IX. *A Monograph of the British* Neuroptera-Planipennia.

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[Read 3rd February, 1868.]

As a further contribution to a knowledge of British Neuropterous insects, I have the honour to present to the Society a Monograph of the native species of *Planipennia*, or true *Neuroptera*, comprising the *Sialidæ*, *Panorpina*, *Rhaphidiodea*, and *Megaloptera* of Burmeister. I enumerate forty-nine species as belonging to our Islands, thus :—

Sialidæ	2
Raphidiidæ	4
Hemerobiidæ . . .	23
Coniopterygidæ . . .	3
Chrysopidæ	13
Panorpidæ	3
Boreidæ	1
	49

The number described for Europe is at present about 150, and in the more obscure groups, especially in the *Hemerobiidæ*, Britain is well represented; but, on the other hand, there is a total absence of many conspicuous species, genera, and even families. Thus we have no native member of the handsome *Myrmeleonidæ*, *Ascalaphidæ*, or *Nemopteridæ*; we want the curious *Dilaridæ* and *Mantispidæ*, and the singular Tipuliform genus *Bittacus*. It has been suggested that some of these do occur here, and are overlooked, but it is scarcely possible that such conspicuous objects should have hitherto escaped observation. Some species, generally abundant on the Continent, are either rare here, or very local, such as *Drepanepteryx phalænoides*, *Micromus aphidivorus*, *Megalomus hirtus*, *Hemerobius concinnus*, &c. The extraordinary *Psectra diptera*, a species universally rare, has been found in Somersetshire. Of those peculiarly British, *Sisyra terminalis* and *S. Dalii* are probably the only examples, and it is very unlikely that we can long retain undisputed claim to these.

Of the three great divisions of the Linnean *Neuroptera* that I have up to the present time investigated for the purpose of monographing, I have found the *Planipennia* the most difficult;—not on account of having been less attended to by authors, but that these have almost invariably neglected the most important characters; and had I taken the advice of a valued continental correspondent, I should have made *tabulam rasam* of all names given before the last thirty years, and commenced anew. Stephens' collection has enabled me to determine most of his species with tolerable certainty; but it is not to him alone that the chaotic condition into which the synonymy has fallen is due.

Here, as in all other *Neuroptera*, the chief characters are to be found in the structure of the abdominal segments, and the parts appended thereto; and it is always desirable that living insects should be examined when that is possible. I have endeavoured to elucidate this part of the subject as much as possible, and the numerous illustrative figures have been lithographed from my own drawings. The same remark will apply to the outlines of neuration, a character also of great importance, especially for the discrimination of genera.

Having spoken of neuration, it behoves me to enjoin caution in deductions from this character. In many *Planipennia* the veining is unstable both in species and individuals; and the Neuropterist must obtain that experience necessary to discriminate specific from accidental or individual variation.

The genus *Hemerobius*, as restricted, has been a cause of great perplexity, and I can scarcely hope to have escaped serious errors. I believe, however, that the characters given will prove of service to those who may hereafter have the fortune to be able to improve upon them.

The materials from which I have worked include most of the British collections of these insects, the possessors of which have my thanks for their courtesy, and especially am I beholden to the veteran Entomologist, J. C. Dale, Esq., for his great kindness in committing to my care unique and valuable specimens. My Continental collection is very rich in *Hemerobiidæ;* it contains many type-specimens named by Schneider, and others that I owe to the co-operation of Herr Brauer. Thus it is hoped that, though imperfect in many respects, this monograph may prove useful as a starting-point for future investigators.

A few words of advice on the method of preparing these insects for collections may not be out of place. I strongly urge that all should be pinned, and placed so high on the pin that no part of the specimen touches the surface of the receptacle in which it is contained; the plan of mounting them on card, now often adopted, is not advisable, especially as by so doing it is almost impossible to examine the abdominal parts, which become filled in with the gum used in mounting, and the neuration can always be better investigated when the wings can be held free against the light.

In conclusion, it is necessary to explain the present position of my contemplated project of monographing all the groups of British Neuropterous insects. With this work the *Trichoptera* and true *Neuroptera* are finished, excepting in so far as supplementary information may be supplied. Among the *Pseudo-Neuroptera*, the *Psocidæ* have already received attention. The *Odonata* will scarcely require more than cataloguing, as a monograph of these could not be other than an extracted copy from De Selys Longchamps' and Hagen's exhaustive works on the subject. The *Perlidæ* I hope to place on the same footing as the groups now finished. The *Ephemeridæ* will probably be worked out by a gentleman (Mr. A. E. Eaton) who has bestowed upon them far more care than I have yet been able to do, and I leave that most difficult family in his hands.

Explanation of the Abbreviations in the Bibliographical References.

Those works which are marked with an asterisk, I have not been able to consult, and the references to them are given on the authority of Dr. Hagen's "Synopsis Synonymica."

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I divide the *Planipennia* into three divisions, *Sialina*, *Hemerobiina*, and *Panorpina*.

I. SIALINA.

Wings in repose more or less vertically deflexed; the posterior pair with a slightly developed anal portion. Front not prolonged into a rostrum. Larva aquatic, or sub-cortical.

II. HEMEROBIINA.

Wings in repose very strongly vertically deflexed; mostly similar in form; no anal space in the posterior, which are thus scarcely folded. Front not prolonged into a rostrum. Larva arboreal, or aquatic.

III. PANORPINA.

Wings in repose carried horizontally in a longitudinal direction, linear, equal.* Front prolonged into a rostrum. Larva living in the earth.

Division I. SIALINA.

Antennæ filiform. *Head* transverse (*Sialidæ*) or elongate (*Raphidiidæ*); front not prolonged; *mandibles* toothed internally; *maxillary palpi* filiform, 5-jointed; labial 3-jointed. *Prothorax* moderate and thick (*Sialidæ*), or very long and slender (*Raphidiidæ*). *Abdomen* robust. *Tarsi* 5-jointed, the third (*Raphidiidæ*) or fourth (*Sialidæ*) joint cordate; *ungues* not serrated. †

Wings ovate, sub-equal, the anal area in the posterior pair slightly developed. *Sub-costa* joining the costa before the apex (*Raphidiidæ*), or becoming confluent with the radius (*Sialidæ*); *radius* parallel with the sub-costa, emitting two or more *sectors;* the longitudinal veins and their branches are mostly furcate on the margins, are connected by few transverse nervules, thus forming large areoles; pterostigma circumscribed (*Raphidiidæ*) or not (*Sialidæ*).

Larva aquatic, or sub-cortical.

The two families, *Sialidæ* and *Raphidiidæ*, contain each only one British genus, and the particular characters of each family are indicated in those above given for the division.

* In *Boreus* the wings are rudimentary.

† In the large exotic *Sialidæ* belonging to the genera *Corydalis* and *Chauliodes*, the antennæ are often pectinated in the male, and the joints of the tarsi are all filiform.

Family I. SIALIDÆ.

The characters of the family, so far as native insects are concerned, are those of the genus.

Genus I. Sialis, Latreille.

Head transverse; *antennæ* simple, short; *ocelli* absent; *labrum* sub-trigonate and deeply notched in the middle in the ♂, (Pl. VIII. fig. 1*g*), rounded in front and with a very slight notch in the ♀* (Pl. VIII. fig. 1*h*); *maxillary lobe* small, simple; *labium* small.

Prothoraæ large, quadrate.

Abdomen short and robust; in the male provided at the apex above with a fleshy lobe, whence are protruded two downwards-directed sub-transparent appendices; beneath is a valve capable of being moved downwards in a vertical direction.

Fourth joint of *tarsi* cordate (Pl. VIII. fig. 1*i*).

Wings more or less smoky, the veins very strong; anal portion of the posterior pair moderately developed; *sub-costa* and *radius* becoming confluent before the apex; *costal area* with numerous transverse nervules, which are straight or slightly curved, excepting in the ill-defined pterostigmatical region, where they are strongly oblique; *sub-costal area* with one transverse veinlet, placed near the middle; transverse discal nervules few, placed in three ill-defined rows.

Larva aquatic; very elongate, furnished at the sides with seven pairs of articulated filaments, by means of which it swims, and which also serve for the purpose of respiration; the abdomen ends in a long setose tail (see Westw. Introd. ii. 50, fig. 64, 18). When about to change, it forms a cell in the bank; the pupa is lively, and changes to an imago within the cell. Eggs deposited in large broad masses on the leaves of plants and other objects in the neighbourhood of the water; but often at a distance therefrom that must cause the young larvæ, when hatched, to make a considerable terrestrial journey.

We have two species which differ especially in the form of the ventral valve in the male.

* This diversity in the form of the *labrum* in the two sexes, does not appear to have been hitherto noticed.

1. Sialis lutaria, Linné.

Hemerobius lutarius, Linn. Faun. Suec. 384 (1761), according to Linné's collection; *Semblis lutarius*, Fab. Spec. Ins. i. 387; Ramb. Névrop. 447; *Sialis lutarius*, Steph. Ill. vi. 133; Pict. Ann. Sci. Nat. v. pl. iii. figs. 1, 4; *S. lutaria*, Burm. Handb. ii. 947; Brauer, Verh. z.-b. Verein. 1856, p. 397, Neurop. Aust. 52. *Sialis niger*, Lat. Hist. Nat. xiii. 44 (1805). *Phryganea flavilatera*, Linn. Faun. Suec. 379, ?.

Dark blackish; *head* with some yellowish impressed spaces in the middle posteriorly, and at the sides. *Tarsi* paler.

Wings pale smoky, scarcely darker at the base; the *veins* black, paler at the base of the costal margin; the *transverse nervule* in the *sub-costal area* of the anterior wings placed towards the base of the first cellule between the radius and sector (Pl. VIII. fig. 1, indicated at *a*).

Apex of the *abdomen* of the ♂ above forming a fleshy lobe, in which is a concave space with a prolongation in the middle; from this lobe proceed two curved, cylindrical, semi-transparent *appendices*, which are seldom seen unless pressure be applied to the abdomen of the living insect; *ventral valve* very large and obtuse (Pl. VIII. fig. 1 *c*).

Length of body 4-7 lines; expanse of wings 11-16 lines.

Very abundant everywhere in the neighbourhood of water, in May.

This insect bears the label "*lutarius*," in Linné's own hand-writing in his collection; but, his description is far more like his *Phryganea flavilatera*. The figure in Schäffer's Icon. Ins. Ratisb., referred to by Linné as representing his *lutarius*, is undoubtedly one of the smaller *Perlidæ*; but the *Sialis* is well figured by Schäffer, tab. xxxvii. fig. 9-10, and Linné does not quote this figure in his notice of *P. flavilatera*.

2. Sialis fuliginosa, Pictet.

Sialis fuliginosa, Pict. Ann. Sci. Nat. v. pl. iii. fig. 6 (1836); Burm. Handb. ii. 947; Brauer, Verh. z.-b. Verein. 1856, p. 397, Neurop. Aust. 52.

Similar to the last, but more intensely black, the wings dark smoky, decidedly darker at the base; the tarsi not paler.

The *transverse nervule* in the *sub-costal area* of the anterior wings placed in the middle of the first cellule between the radius and sector, or more towards the broad apical end of that cellule (Pl. VIII. fig. 2, indicated at *a*).

Apex of the *abdomen* of the ♂ above with a smaller fleshy lobe, with an oval concave space in the centre; the *appendices* proceeding from this lobe thicker at the apex; *ventral valve* very much smaller, triangular, the apex somewhat acute (Pl. VIII. fig. 2 *c*). A reference to the figures will render these differences in the apex of the ♂ abdomen more intelligible.

The slight differences in the neuration, above noted, appear to be constant; but I can see no other certain neural characters; indeed, the arrangement of the veins differs greatly in individuals, and in the opposite wings of the same specimen; hence the figures on Plate VIII. must only be regarded as representing the one character of the nervule in the sub-costal area.

This species is overlooked; it probably appears when *S. lutaria* is nearly over. I have taken it at Rannoch (Perthshire); on the banks of the Mole, near Box Hill; and in the neighbourhood of Haslemere. Mr. Dale has found it in Dorsetshire.

Family II. RAPHIDIIDÆ.

The characters of the family are those of the genus as given below.

Genus I. Raphidia, Linné.

Head elongate, contracted behind; *vertex* nearly plane; *ocelli* present;* *antennæ* slender, short; *clypeus* very narrowly transverse; *labrum* small, nearly quadrate; *maxillæ* with two short and thick end-lobes (Pl. VIII. fig. 3 *e*); *maxillary palpi* with the joints short, the terminal one obtuse; *mandibles* strongly toothed within; *labium* longer than broad; *labial palpi* with three short joints, the terminal one the smallest.

Prothoraæ long and slender, sub-cylindrical, dilated posteriorly; the sides closing over the *prosternum*, and leaving the latter free in a limited space at the posterior end, where are attached the anterior legs. *Meso-* and *meta-thoraæ* nearly equal, transverse, much broader than the prothorax.

* In *Inocellia*, a very closely allied genus, the ocelli are absent.

Abdomen slender in the male, robust in the female; in the male the terminal ventral segments are longitudinally cleft to admit of the insertion of the penis, which is generally broad and flattened; the lateral margins of these segments are generally thickened, and furnished with crotchets; the female is furnished with a very long and flexile ovipositor, composed of two transversely striated divisions, and ending in two small papillæ.

Legs moderately short, the *tarsi* with the first joint long, the third cordate and nearly concealing the fourth.

Wings nearly equal, hyaline; the neuration very similar in both pairs, open; *costal area* dilated in the middle; *costal veinlets* simple; *subcosta* joining the costa far before the apex; *radius* running parallel with the sub-costa, but carried to the apex, and there ending usually in one or more furcations; *sub-costal area* with one transverse veinlet placed before the middle; *pterostigma* more or less coloured, circumscribed by a veinlet on each side, and traversed by one or more oblique veinlets within;* *sectors*, generally two, which soon divide, and the branches are twice, thrice, or four times forked on the margins, the principal branches are connected by two rows of transverse veinlets, and thus form more or less elongate cellules beneath the pterostigma; the *cubitus anticus* starts from towards the base of the radius, and furcates almost immediately, the two branches being connected by two transverse veinlets, and thus forming three large cellules, both branches emitting forks to the dorsal margin, which are there again forked, like the branches of the sectors. The anal space of the wings is very small, and scarcely evident.

In repose the insect elevates its prothorax and deflexes its head.

Larva with an elongated subquadrate head, and with the prothorax nearly similar in form; the meso- and meta-thorax small, and much narrower; the abdomen long and dilated, gradually attenuated at each end; furnished with short 3-jointed antennæ, and strong toothed mandibles; the legs are short, with simple tarsi. *Pupa* in form more resembling the imago, and with the indications of sex strongly apparent. The larva lives beneath the bark of trees, and subsists upon larvæ and other creatures frequenting such situations. The pupa

* In *Inocellia* the pterostigma is without an internal veinlet.

is not contained in a cocoon, but lives in a cell formed by the larva; before the final metamorphosis, it emerges from this cell, and travels until it finds a favourable place, when the skin splits along the back, and the imago appears.

The species can only be separated with certainty by an examination of the anal parts of both sexes, in combination with neuration, &c. It should always be borne in mind that the neuration is liable to vary, and hasty conclusions should not be formed from single specimens presenting unusual characters in this respect. The synonymy is in a terribly confused state, and it has been the custom with many to refer every specimen to *R. ophiopsis* of Linné; but in England we do not possess that species, or, at any rate, that which is so referred (and, I think, rightly,) by Continental authors. I define four British species from an examination of about one hundred native examples, including those in the British Museum, in my own collection, and others kindly lent me by Messrs. Dale, Desvignes, Wormald, Parfitt, Waterhouse, etc., and I have also been aided by my Continental collection, which contains about forty specimens, and nine species, including types communicated to me by Herr Brauer.

1. Raphidia notata, Fabricius.

Raphidia notata, Fab. Spec. Ins. i. 402 (1781); Schum. Versuch, p. 13, fig. 3; Ramb. Névrop. 436. *R. ophiopsis*, Curt. Brit. Ent. pl. xxxvii (1824), not of Linné; Zett. Ins. Lapp. 1054 (according to Hagen). *R. megacephala* (Leach), Steph. Ill. vi. 130 (1836); Hag. Ent. Ann. 1858, p. 31. *R. media*, Burm. Handb. ii. 964 (1839); Schn. Mon. Raph. 76, pl. iv. fig. a-f; Brauer, Neurop. Aust. 53; Hag. Tr. Ent. Soc. ser. 3, v. 495.

The description is made from fresh examples.

Head very broad, the sides rounded, behind rather suddenly contracted into a short thick neck; black, very finely and closely punctured above and beneath; above there is a longitudinal, somewhat reddish, smooth median space, extending from the ocelli to the hinder margin, and divided by an impressed line; beneath the hinder edge of the neck is produced in the middle into a sort of tooth; *front* black; *clypeus* yellowish suffused with

black; *labrum* black; *palpi* black, yellow at the sutures; *ocelli* prominent, equidistant; *antennæ* blackish, yellowish at the base.

Prothoraæ swollen behind, black, transversely rugose and pubescent, the hinder edge narrowly yellowish; free anterior and posterior portion of the prosternum yellow. *Meso-* and *meta-thoraæ* black, the sutures beneath narrowly yellow.

Abdomen black; sides with yellow interrupted double lines, forming elongated spots on each segment, each spot towards the dorsal surface is expanded widely on the posterior margin of each segment; between these spots is usually a smaller indistinct one; beneath, each segment is broadly margined posteriorly with bright yellow. *Penultimate segment* in the ♂ narrow, above excised in the middle posteriorly, the sides very oblique, beneath ending in two large bulbous bases; in the open space formed by the distant ventral margins of this segment is inserted on each side a thick yellow piece, dilating greatly before the apex, which is produced into an incurved crotchet; *penis* broad, pointed at the apex, with an impressed line in the middle; above the two crotchets before-mentioned, are two much longer ones also directed inwards (and usually concealed in dry specimens, owing to the collapsing of the adjacent parts); above, the abdomen terminates in a hood-shaped hairy piece, concave beneath, strongly directed upwards, triangular when seen from the sides, and with the margins turned inwards. In the ♀ the last ventral segment is broadly rounded, the sides very oblique (Pl. VIII, figs. 3 *a-d*).

Legs yellowish; *femora* all blackish except at the extreme apex; *tarsi* somewhat fuscescent.

Wings (Pl. VIII. fig. 3) broad, obtusely rounded, with a slight smoky tinge, and yellowish at the extreme base; *pterostigma* dark brown (sometimes with a small hyaline mark at each end), large, the inner edge concave, the outer edge very oblique, with two transverse veinlets, one of which is usually forked; these veinlets vary greatly (exceptionally there is only one which very rarely is simple), the stigma commences at about the middle of the areole below it, and ends nearly at the same point with it; twelve to fifteen *costal veinlets*, whereof one is often forked; *subcosta*, as a rule, ending so close to the pterostigma as to be almost confluent with its inner

edge; four (very rarely three) *discoidal areoles*, varying much in form, the second being frequently triangular, and shorter than the others; neuration strong and black, the base of some of the longitudinal veins, the costa for about half its length, and the two first costal veinlets, generally yellow; marginal veins bifurcate or quadri-bifurcate at the apical, simply furcate on the dorsal margins.

Expanse of wings 11-14 lines.

The largest and perhaps the most common species. The above description is made from specimens beaten from fir-trees near Croydon. Some examples from other localities have a slightly different appearance, and the sub-costa does not so closely reach the pterostigma, but I can detect no other important difference.

This must certainly be the true *notata* of Fabricius, who described the species from an English specimen, and no other allied insect is found here. Moreover, a fragment of Fabricius' type still exists in Banks' collection, and is sufficient to decide the matter, although nearly destroyed. I am not clear as to the *notata* of Schneider and others, which ordinarily should have only three discoidal areoles, indistinct ocelli, etc., etc.

2. Raphidia xanthostigma, Schummel.

Raphidia xanthostigma, Schum. Versuch, p. 12, fig. 3 (1832); Burm. Handb. ii. 963; Schn. Mon. Raph. 71, pl. iii. fig. a-e; Brauer, Neurop. Aust. 53; Hag. Ent. Ann. 1858, p. 31, Tr. Ent. Soc. ser. 3, v. 495. R. *Londinensis* (Leach), Steph. Ill. vi. 130 (1836), but not of Hag. Ent. Ann. 1858, p. 31.

The following description is drawn up from a freshly-killed male example.

Head widened in front, gradually narrowed behind; brassy-black; slightly but distinctly punctured above and beneath; upper surface nearly flat, with a deep longitudinal median line which is reddish; *front* grayish-white, with a black spot below the base of each antenna; *clypeus* grayish-white, with two reddish spots in the middle; *labrum* brownish, its anterior edge pale; *palpi* black, the sutures of the joints yellowish; *ocelli* indistinct; *antennæ* fuscous, the basal third yellow.

Prothorax covered with small wart-like tubercles; black above; the anterior margin narrowly yellowish, the posterior margin broadly reddish; an indistinct reddish lanceolate mark in the middle posteriorly, and another on each side; margins of the deflexed pronotum reddish-gray; the triangular portion of the pro-sternum seen posteriorly black. *Mesonotum* black, with a triangular yellowish space in front. *Metanotum* wholly black. *Meso-* and *Meta-sterna* black, with a yellow oblique line on each side.

Abdomen pitchy-black above; the sides with a yellow line, which dilates on the anterior portion of each segment, a lateral yellow line extending from the base to the antepenultimate segment; beneath, the two basal segments are spotted with yellow, afterwards the posterior margin of each segment is broadly yellow. *Penultimate dorsal segment* much swollen, nearly quadrate, the sides rounded; *terminal segment* forming a transverse yellow plate, the anterior margin of which is excised (Pl. VIII. fig. 4 *a*). After death the sides of this segment collapse, and then the plate assumes the form represented by fig. 4 *c*. *Beneath* the deflexed lateral margins of the penultimate segment are blackish with a gray spot, provided with a long, thin, curved, pointed, reddish-testaceous crotchet, extending nearly to the apex of the terminal segment; and at the base of this crotchet is a shorter one, the curved apex of which is directed outwardly; *penis* with a greatly dilated yellow apex, with a black corneous line in the middle, which is dilated near the base (Pl. VIII. fig. 4 *b*). In the female the last *ventral segment* appears nearly quadrate, slightly transverse, the apex truncated.

Legs yellowish; the femora (especially the posterior) and terminal tarsal joint fuscous.

Wings (Pl. VIII. fig. 4) narrow; the costal margin nearly regularly rounded; *pterostigma* long, very pale yellow, with one transverse veinlet commencing and ending almost at the same points as the cellule below it; *subcosta* joining the costa slightly before the pterostigma; six to seven *costal veinlets*; three *discoidal areoles*; *first apical* vein forked, not starting from the edge of the pterostigma; terminal veins mostly once forked at the apical, and simple on the dorsal margin; neuration black, the base of the longitudinal veins yellowish.

Expanse of wings, ♂ 8 lines, ♀ 9-10 lines.

Occasionally found in woods. The male may be immediately separated from all others by the form of the terminal dorsal segment. It is the species to which Mr. Waterhouse's account of metamorphosis will apply, according to his type (See Trans. Ent. Soc. i. 23).

3. Raphidia cognata, Rambur.

Raphidia cognata, Ramb. Névrop. 438 (1842); Ed. Pict. Névrop. d'Esp. 53, pl. v. figs. 7—9; Hag. Tr. Ent. Soc. ser. 3, v. 497.

The description is made from an old ♂ example.

Head long and narrow, the sides rounded, rather suddenly constricted behind into a short neck; closely and evenly punctured both above and below; shining black, with a smooth median longitudinal reddish line extending from the hinder edge to about the middle of the occiput; *clypeus* and *labrum* reddish testaceous, fuscescent in the middle; *mandibles* reddish testaceous, blackish at the tips; *antennæ* testaceous in the basal third, afterwards blackish; *ocelli* moderately distinct, equidistant.

Prothorax slightly dilated posteriorly, rugose above, blackish, with three indistinct reddish lines behind; anterior margin narrowly, and the deflexed lateral margins broadly yellowish; free posterior portion of the pro-sternum yellowish. *Meso-* and *meta-nota* black; the former with a large yellow spot in the front of the middle.

Abdomen blackish above, somewhat lurid beneath, the margins of the segments on both surfaces, and a lateral line, bright yellow. In the ♂, the penultimate segment is broad, the sides with a deep triangular excision, the lower portion of which is short and somewhat swollen, ending in a short crotchet turned inwards; from beneath the base of this portion proceeds a longer crotchet, not extending to the apex, and strongly curved inwards at the tip; the penis is short and broad, deeply canaliculated beneath; the terminal segment is somewhat conical when viewed from above, truncated at the apex, scabrous and hairy; longly triangular when viewed from the side.

Legs yellowish; the anterior and intermediate femora with a fuscous line externally; the posterior femora wholly fuscous, except at the apex.

Wings (Pl. IX. fig. 1) nearly similar in form to those of *R. xanthostigma:* the costal margin narrower at the base,

and afterwards abruptly elevated; the sub-costa nearly joins the pterostigma; eight costal veinlets; *pterostigma* elongate, pale brownish yellow, with one transverse veinlet, commencing at about the same point as the areole beneath it, and externally extending scarcely beyond it; *first apical vein* forked, not starting immediately from the pterostigma; second twice forked; third simple; fourth, fifth, and sixth once forked; veins on the dorsal margin simple; three *discoidal areoles*; neuration fuscous, the outer edge of the costa, and the radius and other veins at the base, yellow.

Expanse of wings, ♂, 8 lines.

I have seen but one British specimen, which is in Mr. Waterhouse's Collection.

This species has much analogy with *xanthostigma*, from which it especially differs in the appendices of the ♂, in the more coarsely punctured head, &c., &c.

4. Raphidia maculicollis, Stephens.

Raphidia maculicollis (Leach), Steph. Ill. vi. 131 (1846). *R. affinis* (Leach), Steph. *l. c.* *R. hispanica*, Ramb. Névrop. 438 (1842); Schn. Stett. Zeit. 1845, p. 255; Hag. Tr. Ent. Soc, ser. 3, v. 496; Ed. Pict. Névrop. d'Esp. 52, pl. v. fig. 1—6.

The description is made from a fresh male example.

Head gradually narrowing behind, the sides rounded, the neck evident, but short; black, moderately punctured; a broad depressed median red line extends from the hinder edge to about the middle of the occiput, and there are large red irregular spots, forming an ill-defined band on each side; beneath, the whole posterior portion is red, with an impressed median black line; the rest black; *front* and *clypeus* reddish-yellow; *labrum* piceous; *ocelli* distinct, large, nearly equally distant; *antennæ* black; the basal fourth reddish-yellow.

Prothoraæ narrow in front, and gradually dilated posteriorly, rugose; black above, the anterior edge reddish, the deflexed sides of the pronotum broadly reddish; free posterior portion of the pro-sternum reddish. *Meso-notum* black, with a reddish spot in front, and a reddish tubercle behind. *Meta-notum* black.

Abdomen black; above, each segment is narrowly margined with yellow posteriorly, and at the sides; first

segment reddish-brown, with a yellowish line in the middle; beneath, the yellow margins are broader, and there is also a sub-lateral yellow line. In the ♂ the penultimate segment is truncated, the sides very oblique and excavated; beneath, on each side of the ventral fissure is inserted a long and narrow piece, greenish-yellow, ending in an intensely black anvil-shaped crotchet, the arms being produced and curved, but in opposite directions; the penis is very long, obtuse, oval, deeply canaliculated beneath, yellow, the side-margins thickened, and intensely black; at its extreme base, internally, are two short testaceous crotchets, turned outwards, and curved; terminal segment above small, the margins rounded and finely fringed, yellow. In the ♀ the last ventral segment is broad, strongly rounded, yellow.

Legs yellow; intermediate and posterior femora with an indistinct broad fuscous ring before the apex.

Wings long and narrow, the costal margin slightly rounded to the junction of the sub-costa; *pterostigma* narrow, pale yellowish brown, with one transverse veinlet, the inner edge placed near the middle of the pentagonal areole below it, the outer edge extending far beyond that areole; the *first apical vein* is simple, curved, and starts out of the base of the outer margin of the pterostigma (Pl. IX. fig. 2, indicated at *a*); *sub-costa* ending before the pterostigma; 7-8 costal veinlets; three *discoidal areoles*; second apical vein (counting the simple vein proceeding from the pterostigma as the first) tri- or quadri-furcate, third simple, fourth, fifth, and sixth once forked; neuration blackish, the costa at the base, the first one or two costal veinlets, and the radius for the greater part of its length, yellowish.

Expanse of wings, ♂, 8-9 lines; ♀, 9-11 lines.

I have seen but one living specimen of this insect, sent to me by Mr. Barrett of Haslemere. It occurs chiefly in the south of England, but Mr. Hislop has sent me an example taken in Morayshire in the north-east of Scotland, which scarcely differs from southern individuals. It may be recognized by the extent of the red markings on the head, by the position of the pterostigma with respect to the cellule below it, and especially by the first apical vein being simple, and starting directly from the pterostigma. The only other species which constantly possesses this character is *R. bætica*, Rambur, which is to be separated by the shorter and broader head, &c.; but this must not

be confounded with *bætica* of Brauer, which=*affinis* of Schneider.

I adopt the name *maculicollis* to avoid the clashing of *affinis* with Schneider's like-named species. Stephens' description applies so far as it goes, and the examples of *maculicollis* and *affinis* labelled by Leach, who first proposed the name, belong here, but in each case Stephens had afterwards added two examples of *xanthostigma* in his Collection.

Hagen (in Ent. Ann. 1858, p. 10) incorrectly referred the two Leachian names to *ophiopsis*, as synonyms, and his description applies to the latter species.

Division II. HEMEROBIINA.

Antennæ moniliform.* *Head* transverse; front not prolonged into a rostrum; *ocelli* mostly absent (present in *Osmylus*); *maxillary palpi* 5-jointed, *labial* 3-jointed; *mandibles* with a single tooth internally. *Prothorax* moderately developed. *Abdomen* mostly slender; in the male often provided with a pair of strong appendices; in the female, for the most part, obtuse, or with a short borer. *Legs* slender; *tarsi* 5-jointed, filiform; *ungues* seldom serrated.

Wings ovate, sub-equal (the posterior pair rudimentary in one sex of *Psectra*), no perceptible anal space to the posterior, hence these are not folded. *Sub-costa* running parallel with the *costa*, and into the apex; *radius* parallel with the sub-costa, and sometimes uniting therewith near the apex, emitting one or more *sectors*, whereof the first is sometimes parallel with the radius, the rest branching off from it; *pterostigma* not distinctly circumscribed; *transverse veinlets* usually disposed, for the most part, in two or more rows like steps, and hence termed "gradate veinlets." The margins ciliated (except in *Coniopteryx*), all the veins and veinlets more or less strongly ciliated. The neuration is most strongly developed in *Osmylus*; least so in *Coniopteryx*.

Larva mostly arboreal (aquatic in *Osmylus* and *Sisyra*), elongate, and attenuated at each end,† subsisting on

* In the *Myrmeleonidæ* and *Ascalaphidæ* the antennæ are clavate or capitate: and in the *Dilaridæ* (a family of doubtful location) they are pectinate in the male.

† In the extra-Britannic families, *Myrmeleonidæ* and *Ascalaphidæ*, the larva is short and thick, and lives concealed in the earth; in the *Mantispidæ* it is parasitic in the nests of *Arachnida* and *Hymenoptera*.

Aphides, and other small insects, of which it extracts the juices. The mouth furnished with a pair of very long mandibles with which the prey is seized, at the base of which, internally, the maxillæ lie in a groove.

Pupa contained in an oval or circular silken cocoon, which is very small for the size of the imago; but shortly before the change, it cuts its way out by means of a pair of short strong mandibles, and then extends itself, having previously been coiled round, with the segments retracted.

Eggs ovate, more or less pedicillate, and attached.

Most of these insects fall down on their side, and feign death, when disturbed; the legs being then doubled up, the head drawn under the thorax, and the antennæ concealed.

The British *Hemerobiinæ* may be divided into three families, thus:—

I. Hemerobiidæ.

Antennæ moniliform. Wings mostly with numerous transverse veinlets; margins ciliated.

II. Coniopterygidæ.

Antennæ moniliform. Wings with scarcely any transverse veinlets; margins not visibly ciliated. Insects of minute size, covered wholly with a whitish powder.

III. Chrysopidæ.

Antennæ setiform. Wings with a moderate number of transverse veinlets; margins ciliated. Colour usually greenish.

The larvæ of most of these delicate insects play a great part in the economy of nature, and must be considered as benefactors of the human race in no small degree. With those of *Coccinella* and *Syrphus* they help to counteract the extraordinary fecundity of the *Aphides*; and though their numbers are seldom so great as are those of *Coccinella*, yet from their activity, and from the short time they take to extract the juices of their prey, they must destroy innumerable multitudes of these pests of the horticulturist.

Family I. HEMEROBIIDÆ.

Antennæ short; composed of a number of little rounded joints. Terminal joint of the *palpi* cylindrical, generally subulate. *Ocelli* usually absent (present in *Osmylus*). *Wings* sub-equal (except in one sex of *Psectra*); *costal veinlets* mostly furcate; *sub-costa* and *radius* separated to the apex, or (*Osmylus* and *Sisyra*) becoming there confluent; *sub-costal area* with one, or several, transverse veinlets; *radius* starting from the sub-costa, close to the base, and running parallel with it; emitting either one (whence then arise the others) or all the *sectors; gradate veinlets* generally in two series, the portion of the wing between the inner of these and the base occupied with few transverse veins, or (*Osmylus*) many; the margins, and veins, and veinlets, ciliated.

Body short; the extremity of the abdomen in the male generally provided with appendices.

Legs short, slender; the ungues generally simple.

Larva mostly arboreal (aquatic in *Osmylus* and *Sisyra*).

The following are the British genera:—

A. Ocelli present. Transverse nervules numerous. Osmylus.*

B. Ocelli absent. Transverse nervules few.

a. Radius becoming confluent with the sub-costa. (Pl. IX. fig. 3.) . . . . Sisyra.

b. Radius and sub-costa separate to the apex.

a. First sector emitting the rest. Posterior wings minute in one sex. (Pl. IX. fig. 5). Psectra.

b. All the sectors emitted from the radius. Wings ample in both sexes.

a. A recurrent veinlet at the base of the costal area in the anterior wings, forming a small free cellule. (Pl. IX. fig. 6; Pl. X. figs. 1, 5, 10, 11, indicated at *a*.)

* Apical margin excised. . Drepanepteryx.

** Apical margin entire, rounded.

† Normally not more than four sectors. Hemerobius.

†† More than four sectors. . Megalomus.

b. No recurrent veinlet at the base of the costal area. (Pl. IX. fig. 4.) Micromus.

* In a general monograph of Planipennia, *Osmylus* would form the type of a distinct family—*Osmylidæ*.

Genus I. Osmylus, Latreille.

Head with the vertex inflated; *ocelli* three, placed closely together; *antennæ* about one third the length of the wings, the joints ovate; last joint of the maxillary *palpi* acuminate, pointed.

Prothorax much narrower than the head, longer than broad.

Abdomen moderately robust; in the male, provided with two large ventral valves at the apex.

Legs slender, cylindrical; *ungues* simple; *pulvilli* large.

Wings large; *costal veinlets* both simple and forked; *costal area* narrow at the base; *sub-costa* and *radius* becoming confluent at the apex; *sub-costal area* with one transverse veinlet placed at the base; first *sector* starting from near the base of the radius, and emitting several others which mostly become furcate at the margins; the two *cubiti* parallel, running close together; the *gradate veinlets* run in two sub-parallel series, the space between the inner one and the base densely reticulated with numerous transverse veinlets, forming almost quadrate cellules. In the posterior wings the net-work is more open.

Larva aquatic.

1. Osmylus fulvicephalus, Scopoli.

Hemerobius fulvicephalus, Scop. Ent. Carn. 270 (1763). *H. maculatus*, Fab. Mant. Ins. i. 247 (1787). *Osmylus maculatus*, Lat., and other authors. *Hemerobius chrysops*, Linn. Coll. (but not *H. chrysops*, Linn. Faun. Suec. 382, according to the description). *Osmylus chrysops*, of authors. *Hemerobius laurifoliæformis*, Raz. Hist. Jor. 289 (1789).

Head shining, reddish orange; *eyes*, *ocelli*, and *antennæ*, black, the last with few and short grayish hairs.

Pro- *meso-* and *meta-thorax* blackish fuscous, with yellowish markings in the middle.

Abdomen blackish fuscous, sparingly clothed with grayish hairs.

Legs pale testaceous, terminal joint of tarsi somewhat fuscous.

Wings hyaline, with blackish fuscous spots, which, in the fore-wings, are large and somewhat quadrate, on the dorsal margin towards the base, and on the costal margin near the apex; *pterostigma* marked with pale yellowish between the dark spots; *veins* mostly blackish, a few

yellowish; the radius and sub-costa alternately blackish and yellowish. The *posterior wings* marked with blackish at the pterostigma.

Length of body 7 lines; expanse of wings 20-23 lines.

This large and beautiful insect is not uncommon in summer about streams. It varys little in size, but to some extent in the number and intensity of the spots.

A detailed history of the development, and habits of the larva, is given by Hagen, in the "Linnæa Entomologica," vol. vii. pp. 368—418, pl. iii, iv. The larval existence would appear to last about seven months. The larva does not swim, but rests on or crawls about plant stems, gravel, &c. It can scarcely be said to be truly aquatic, but is rather amphibious; that is to say, it is able to live both in the water, and among the damp moss, débris, &c., in the vicinity of it. The pupa is contained in an irregular rounded cocoon. The first certain accounts of the habits of this larva, were given by Herr Brauer, to whom Entomology is so greatly indebted for his discoveries in Neuropterous larvæ.

It will be remarked that I have rejected the Linnean name *chrysops*, and I here give my reasons for so doing. It is true that in the Linnean Collection this insect is labelled "*chrysops*" in Linné's own handwriting, but a glance at his description of the insect he intended to bear that name, proves that it could not be *Osmylus*. His words run thus:—"Viridi nigroque varius, alis hyalinis, maculatis reticulatis," and "Musca fœtida, auro oculata." A *Chrysopa* is intended by these, and this is also proved by his reference to Frisch (Insekten Teutschlands, vierdter Theil, p. 40, tab. xxiii) who describes the insect under the name of "Der gold-äugigen Stinck-Fliege."

Genus II. Sisyra, Burmeister.

Ocelli absent; *antennæ* about half the length of the wings, the joints rounded, strongly setose; last joint of the *maxillary palpi* acuminate, pointed, about four times the length of the penultimate.

Prothorax narrowly transverse, not so broad as the head.

Abdomen short, moderately robust; in the male provided with two simple corneous appendices at the apex;

in the female there is a short ovipositor, which (after death) is directed upwards and applied against the truncated terminal segment.

Legs short, slender; the tibiæ cylindrical; *ungues* simple, curved; *pulvilli* small.

Wings (Pl. IX. fig. 3) ovate, obtuse; *costal area* narrow; *costal veinlets* simple, those in the *pterostigmatical region* more numerous and strongly oblique; *sub-costa* and *radius* becoming confluent at the apex; *sub-costal area* rather broad, without a transverse nervule; only one *sector*, which starts from the base of the radius, and runs nearly parallel therewith, emitting about three branches to the apex, which are there twice forked; transverse veinlets of the disk very few in number. In the *posterior wings* the sector is more distant from the radius.

Larva aquatic, living in the interior of the fresh-water sponge, and, doubtless, in other analogous positions.

Our three species are thus tabulated:—

A. Wings unicolorous, with no trace of spots.
   a. Antennæ wholly dark. . . . *S. fuscata.*
   b. Antennæ with pale tips. . *S. terminalis.*
B. Anterior wings with an appearance of darker spots. . . . . *S. Dalii.*

1. Sisyra fuscata, Fabricius.

Hemerobius fuscatus, Fab. Ent. Syst. ii. 84 (1793); Steph. Ill. vi. 114, pl. xxx. fig. 10; *Sisyra fuscata*, Burm. Handb. ii. 976; Ramb. Névrop. 416; Wesm. Bull. Acad. Brux. 1840, p. 213; Hag. Stett. Zeit. 1858, p. 131; 1859, p. 412; Ent. Ann. 1858, p. 25; Brauer, Neurop. Aust. 55. *Hemerobius confinis*, Steph. Ill. vi. 144 (1836). *H. nitidulus*, Steph. *l. c.* (not of Fab.). *Sisyra nigripennis*, Wesm. Bull. Acad. Brux. 1840, p. 412. *Hemerobius fumatus*, Mots. Etud. i. 20 (1853).

Larva:—*Branchiotoma spongillæ*, Westw. Tr. Ent. Soc. iii. 105, *id.* Introd. ii. 586; Hogg, Tr. Linn. Soc. xviii. 363; Hal. Proc. Ent. Soc. 1848, p. xxxi.

Blackish fuscous, somewhat shining, sparingly clothed with yellowish hairs; *antennæ* wholly black.

Legs pale testaceous; *tarsi* darker, pale at the tips of the joints.

Wings uniformly shining fuscous; neuration blackish, ciliated with golden; two or three transverse veinlets about the middle of the anterior wings, placed irregularly, and three or four at the base; pterostigmatical region scarcely darker.

Abdomen of the male, above, provided at the apex with two incurved and sharply-pointed appendices; ventral plate large, rounded, obtuse.

Length of body 2-2½ lines; expanse of wings 6-6½ lines.

Common throughout the summer, especially about streams, but also occasionally frequenting standing waters; generally distributed.

The larva, described as *Branchiotoma spongillæ* by Westwood, was discovered by Mr. Hogg, in the substance of *Spongilla fluviatilis*. It is remarkable from the form of the respiratory filaments, which are placed on the under surface of the abdomen, and, in being articulated, somewhat resemble legs.

Certain examples of this species are darker than the ordinary specimens, and form Wesmael's *nigripennis*; perhaps Burmeister's *morio* should also be referred here.

Rambur would appear to have mistaken the sexes; his words "Extrémité abdominale du male ayant un appendice courbé en haut en forme de crochet," must refer to the ovipositor of the female.

2. Sisyra Dalii, MacLachlan.

Sisyra Dalii, M'Lach. Ent. Mo. Mag. ii. 268 (1866). *Hemerobius nitidulus* (Dale), Walk. Brit. Mus. Cat. 296 (not of Fab.).

Castaneous or pale testaceous, clothed with golden hairs; *antennæ* dark fuscous, with a pale basal joint.

Legs pale yellowish, the terminal joint of the tarsi tipped with blackish; clothed with pale hairs.

Wings pale testaceous, sub-hyaline, shining; neuration testaceous; in the *anterior wings* the transverse veinlets, the axilla of one or two furcations, and a spot on the dorsal margin towards the base, fuscous; hence these wings have a slightly dotted appearance; four transverse veinlets in the middle of the wing, two of which are placed in a line, and four others towards the base: *posterior wings* paler, the radius and two transverse veinlets blackish.

Abdomen fuscescent; in the male there are two short and obtuse blackish appendices; the ventral plate short and broad, pale.

Length of body 2 lines, expanse of wings 5½-6 lines.

Taken by Mr. Dale at Ambleside, and also in Dorsetshire. I once found it sparingly, in June, on the banks of the Mole, near Reigate, Surrey.

3. Sisyra terminalis, Curtis.

Sisyra terminalis, Curt. Tr. Ent. Soc. N. S. iii. 56 (1854); Hag. Ent. Ann. 1858, p. 25.

Testaceous or fuscescent, with golden pubescence; *antennæ* black, the apical fourth pale yellowish.

Legs pale grayish yellow, with yellow pubescence.

Wings pale cinereous, shining; the *posterior wings* paler and iridescent; neuration pale grayish-fuscous, with pale ciliation; in the *anterior wings* only one transverse veinlet in the middle, one near the apex, and four or five at the base (Pl. IX. fig. 3).

Abdomen fuscescent; in the male the appendices are small and scarcely evident; the ventral plate is short, broad, and obtuse.

Length of body 2 lines, expanse of wings 5½-6½ lines.

Appears in summer. Originally discovered at Killarney, Ireland, by Mr. Haliday; occurs along the Thames, near Richmond, and I once found it abundantly on the banks of the Mole, near Reigate.

Genus III. Psectra, Hagen.

(Stett. Zeit. 1866, p. 376).

Head with the *vertex* strongly inflated and rounded; *ocelli* absent; *antennæ* rather longer than the wings, the joints rounded; *maxillary palpi* long and slender, the two basal joints short, the third and fourth longer, the fifth still longer, cylindrical, and slightly acuminate.

Prothorax transverse, quadrilobate above. *Meso-* and *meta-thorax* with their lateral lobes strongly developed.

Abdomen short and robust.

Legs moderately long; *tibiæ* gradually dilated in the middle, sub-compressed; *tarsal joints* short; *ungues* small, broad.

Wings very unequal in the male; the posterior pair rudimentary, in the form of small, scarcely evident, lobes, with one strong vein in the middle. *Anterior wings* somewhat narrow and elongate, obtusely rounded at the apex, convex above; *costal veinlets* for the most part simple, a few forked; *costal area* rounded; *sub-costa* and *radius* separated to the apex, distant; *sub-costal area* broad, one transverse veinlet near the base, two in the middle, and two near the apex; one forked *sector*, the upper branch of which runs parallel with the radius; veins all simply furcate on the margins; *gradate veinlets* in oblique series, the outer of which is complete, the inner rudimentary; all the veins and veinlets very strong, and, with the margins, strongly ciliated; a rudimentary vein in the form of a tubercle in each marginal interstice.

The female is said to have developed posterior wings. Burmeister speaks of three sectors, but I think his two first are more properly referred to the two cubiti. I am indebted to my friend Mr. Rye for the figure at Pl. IX. fig. 5; the abdomen is probably represented as too elongate and pointed, but the unique example from which the figure was drawn is not in a sufficiently good condition to ensure absolute correctness in this respect.

1. Psectra diptera, Burmeister.

Hemerobius dipterus, Burm. Handb. ii. 973 (1839); Curt. Tr. Ent. Soc. N. S. iii. 56; M'Lach. Ent. Mo. Mag. ii. 269.

Shining blackish-fuscous, with golden pubescence.

Antennæ with about forty-five joints, the basal one long and much dilated.

Thoracic lobes paler than the rest of the body, dark castaceous.

Legs pale yellowish, the tip of the femora, base of the tibiæ, and terminal joint of the tarsi, fuscous.

Wings sub-hyaline, shining, slightly testaceous; with fuscous spots, and the gradate veinlets broadly margined with fuscous; veins for the most part pale, with distant black tubercles, from each of which springs a blackish hair; all the marginal forks and gradate veinlets deep fuscous; six veinlets in the outer gradate series, and two in the inner, but between the latter and the base are

four others placed in two pairs, one within the other; the margins longly ciliated with fuscous. The rudimentary *posterior wings* are hyaline, with a strong testaceous vein in the middle (Pl. IX. fig. 5).

Length of body 1⅓ line; expanse of wings 3½ lines.

One example of this extraordinary creature was taken off a hazel-bush at Breach Wood, near Langport, Somersetshire, on the 26th June, 1843, by J. C. Dale, Esq., through whose kindness in entrusting it to my care, I am enabled to draw up the above description.

This insect, though very widely distributed in Europe, is excessively rare, and I believe that not more than four or five examples are known. The female, with developed posterior wings, is said to be in the Berlin Museum.

Genus IV. Micromus, Rambur.

Ocelli absent; *antennæ* shorter than the wings, the joints oval or conical, strongly setose; last joint of the *maxillary palpi* scarcely longer than the penultimate, acuminate, the end considerably elongated.

Prothoraæ narrow, transverse.

Abdomen short, slender in the male, more robust in the female; the apex in the male provided with a concave ventral plate, in which lie two corneous, curved, needle-shaped appendices (Pl. IX. fig. 4 *a-b*).

Legs slender; *tibiæ* sub-cylindrical; *ungues* simple; *pulvilli* scarcely evident.

Wings ovate, obtuse. *Anterior wings* with the *costal area* narrow at the base, with no recurrent veinlet, afterwards somewhat dilated; *costal nervules* mostly forked; *sub-costa* and *radius* separated to the apex; *sub-costal area* narrow, with one transverse veinlet at the base, and sometimes one near the apex; three or four *sectors* all starting from the radius, and all twice or thrice forked on the margin; *gradate veinlets* mostly in two very oblique series, which are somewhat distant, the inner one traversing the middle of the wing. *Posterior wings* narrower than the anterior; the costal area very narrow, with simple veinlets.

Larva probably similar to that of *Hemerobius*.

These insects, which otherwise much resemble *Hemerobius*, may be recognized by the narrow base of the costal area of the fore-wings, and by the absence of a recurrent nervule therein (Pl. IX. fig. 4).

We have three species, so different that a tabular arrangement is unnecessary.

1. Micromus variegatus, Fabricius.

Hemerobius variegatus, Fab. Ent. Syst. ii. 85 (1793); Steph. Ill. vi. 113; Zett. Ins. Lapp. 1049; Burm. Handb. ii. 974; Wesm. Bull. Acad. Brux. 1840, p. 214; *Micromus variegatus*, Ramb. Névrop. 417; Costa, Faun. Nap. 4, pl. x. fig. 2; Brauer, Neurop. Aust. 58; Hag. Ent. Ann. 1858, p. 26.

Fuscous, with whitish pubescence; *head* testaceous posteriorly; *palpi* whitish; *antennæ* whitish, with fuscous annulations, the basal joint wholly fuscous; posterior lobe of the *meso-notum*, and scutellum of the *meta-notum*, whitish.

Legs whitish; the *tibiæ* with a faint fuscous ring towards the middle, and fuscous at the apex; *tarsi* blackish at the extreme tips.

Wings narrow, whitish, sub-hyaline; *anterior wings* with two irregular black fasciæ following the gradate veinlets, the inner one continued as a blotch towards the base, the outer one formed of two irregular blotches; margins and veins spotted, and interrupted with black; *neuration* forming large cellules; about five veinlets in each of the *gradate series*, and one or two others towards the base; neuration and margins longly ciliated with whitish. In the *posterior wings* the apex is spotted with black, in the form of three irregular blotches; neuration mostly white (Pl. IX. fig. 4).

Anal appendices of the male, needle-shaped, the ventral lobe large; the abdomen above, with two oval valves at the apex.

Length of body 2-2½ lines; expanse of wings 6 lines.

Frequent in summer, and generally distributed.

2. Micromus aphidivorus, Schrank.

Hemerobius aphidivorus, Schrk. Ins. Aust. 313 (1781). *H. angulatus*, Steph. Ill. vi. 106 (1836). *H. villosus*, Zett. Ins. Lapp. 1050 (1840); *Micromus villosus*, Brauer, Neurop. Aust. 58. *M. intricatus*, Wesm. Bull. Acad. Brux. 1840, p. 214; Hag. Ent. Ann. 1858, p. 26. *M. tendinosus*, Ramb. Névrop. 417 (1842). *H. lineatus*, Gözsy, Sitz. Akad. Wiss. 1852, p. 346.

Brownish-ochreous, with yellow pubescence; *front* paler; *palpi* testaceous; *antennæ* testaceous.

Legs testaceous, with concolorous pubescence.

Wings short and broad, very obtuse. *Anterior wings* testaceous; with two narrow transverse brown fasciæ following the gradate veinlets, intersected by three similar longitudinal fasciæ, running into the apical margin; the membrane with numerous short transverse brown streaks; *neuration* dark fuscous, with paler interruptions; four or five *sectors;* about eight veinlets in the outer *gradate series,* six in the inner, and about three towards the base; margins and neuration slightly ciliated with golden-testaceous. *Posterior wings* paler, more hyaline; *pterostigmatical region* and neuration brown.

Abdomen of the male with pale anal valves, the ventral one very large and concave, the superior lateral ones large and rounded, with a callosity towards the base externally.

Length of body 2½-3 lines; expanse of wings 6-7 lines.

Very rare; appears in summer, and has only been met with singly, so far as I am aware, though widely distributed.

3. Micromus paganus, Linné.

Hemerobius paganus, Linn. Syst. Nat. i. 912 (1767); Vill. Linn. Ent. iii. 49; *Micromus paganus,* Brauer, Neurop. Aust. 58; Hag. Ent. Ann. 1858, p. 26. *H. nemoralis,* Steph. Ill. vi. 110 (1836). *M. lineosus,* Ramb. Névrop. 416 (1842). *H. elegans,* Gözsy, Sitz. Akad. Wiss. 1852, p. 346.

Grayish-white varied with fuscous; front shining, dark fuscous; *palpi* pale testaceous: antennæ whitish-yellow, the basal joint fuscescent.

Legs whitish.

Wings broad, very obtuse. *Anterior wings* yellowish, sub-hyaline, with two oblique, transverse, brownish fasciæ following the gradate veinlets, intersected by three longitudinal ones running into the apical and dorsal margins, the latter margin brown at the base; *neuration* whitish, sparingly interrupted with brown; five *sectors;* nine veinlets in the outer *gradate series,* six in the inner, and one or two towards the base; neuration and margins with short pale ciliation. *Posterior wings* sub-hyaline, iridescent; the outer series of gradate veinlets brown; neuration otherwise pale.

Abdomen pale at the apex, strongly ciliated; the ventral lobe of the male large, very concave, the appendices lying therein are long, extending much beyond the lobe, and curved strongly downwards. (Pl. IX. fig. 4 *a*, 4 *b*).

Length of body 3-4 lines, expanse of wings 8-9 lines.

A common species throughout the summer. (*Hemerobius decussatus* of Leach and Samouelle should be referred here.)

Genus V. Hemerobius, Linné.

Ocelli absent; *antennæ* shorter than the wings, the joints mostly rounded, strongly setose; last joint of the *maxillary palpi* not greatly longer than the penultimate, rather suddenly drawn into a long slender point at the apex.

Prothorax short, transverse.

Abdomen short; the male usually provided with a pair of appendices, which are frequently furcate; the apex usually obtuse in the female, but sometimes with a visible borer.

Legs slender; *tibiæ* usually somewhat dilated and compressed, attenuated at each end, occasionally cylindrical; *ungues* simple; *pulvilli* usually moderately large.

Wings ovate, strongly obtuse, the posterior pair narrower; the margins and veins strongly ciliated. *Anterior wings* with the *costal area* broad, strongly dilated at the base, the veinlets furcate, the first veinlet from the base does not reach the margin, but is directed back to the extreme base, forming a free cellule (Pl. IX. fig. 6; Pl. X. figs. 1, 5, 10, indicated at *a*), and emitting several short branches to the margin; *sub-costa* and *radius* separated to the apex; *sub-costal area* narrow, with one transverse veinlet near the base, and usually another near the apex; one to four (exceptionally five) *sectors* all starting from the radius, and running parallel into the margins, where they are twice or thrice forked: usually in each marginal space, between the veins, there is a small rudimentary, and scarcely evident, veinlet; *gradate veinlets* in two somewhat parallel series, whereof the inner is nearer to the apex than to the base; *pterostigmatical region* indistinct, filled in with very numerous oblique veinlets; in the *posterior wings* the gradate veinlets are less numerous.

Larva covers itself with the skins of the *Aphides* of which it has extracted the juices.

(NOTE: *Hemerobius*, as now restricted, = *Mucropalpus* of Rambur.)

In working out the species of this genus, I have experienced in full force the hopelessness of arriving at a satisfactory result with respect to the synonymy. Hitherto all authors have neglected descriptions of the appendices, which, in most cases, will, at any rate, separate the males; yet even with the help of this all-important character, it is by no means always an easy task to ensure absolute certainty, and these parts must be considered in connection with general form and marking. The greater part of the descriptions of old authors must for ever remain of doubtful application; and, in many instances, the species referred to Linnean names are different in the works of different writers. Hagen's "Hemerobidarum Synopsis synonymica" has been of great service, but I have found it impossible to view several of the older descriptions in the same light as he. I can only hope that the attempt, made in the following descriptions, to place particular stress upon structural characters may afford a more certain basis upon which to work in future. Characters drawn from the neuration of the wings are here tolerably sure, so far as sectional arrangement deduced from the number of sectors is concerned, but further than that they are of little use, especially the furcations of the sectors after they leave the radius.

The Leachian and Stephensian species are far from easy to determine; more especially as Stephens has mixed them up in some instances, and divided them in others. My earlier opinion as to the actual position of some of them has undergone considerable modification on closer examination, and yet it is probable, I may say sure, that my present ideas are not always correct. Hence, in more than one instance, I have not accorded to the names given by the two Entomologists above-mentioned, that precedence to which, by right of priority, they are entitled, and which I have otherwise endeavoured to maintain. It may be, that some future worker of the genus will be more fortunate than I have hitherto been in unravelling this tangled skein. These remarks apply especially to *H. humuli*, *limbatus*, and *pini*.

I have found it impossible to tabulate this genus.

Section I. *Two sectors in the anterior wings* (Pl. IX. fig. 6).

1. Hemerobius elegans, Stephens.

Hemerobius elegans, Steph. Ill. vi. 113 (1836). *H. Marshami*, Steph. Ill. vi. 114 (1836). *H. paucinervis*, Zett. Ins. Lapp. 1050 (1840). *Mucropalpus pygmæus*, Ramb. Névrop. 442 (1842); *H. pygmæus*, Brauer, Neurop. Aust. 56; Hag. Ent. Ann. 1858, p. 56; Ed. Pict. Névrop. d'Esp. 56.

Dark shining piceous, with a few pale golden hairs; *antennæ* black, with a testaceous basal joint; *front* sometimes yellowish testaceous; the whole underside of the head and thorax yellowish.

Abdomen dull pitchy-brown, with golden hairs. In the ♂ I can see no superior or lateral appendices, but the last ventral segment is produced in the middle into a short curled-up hairy lobe.

Legs very pale whitish-yellow; *femora* marked with pale fuscous externally.

Wings short and broad, pale grayish: *anterior pair* closely spotted with darker gray, and varying according to the extent to which the spots coalesce; apical and dorsal margins pale and dark gray in alternate spaces; only two *sectors*; *longitudinal veins* with short pale golden hairs, pale fuscous, those of the disk with whitish dotted interruptions; *gradate veinlets* dark fuscous, four in the outer series placed in two pairs, five in the inner, one of which is placed between the sector and radius, and the four others together in a line, missing two interstices from the first, and a series of three or four others near the base: *posterior wings* pale grayish, with fuscous veins and smoky pterostigma.

Length of body 2-2½ lines, expanse of wings 4-6 lines.

The smallest species; not generally common, and appears to prefer the neighbourhood of streams and rivers; in summer and autumn.

This is the only British species with two sectors, and perhaps also the only European, for the Sardinian *parvulus* may be only a form of *elegans*.

Section 2. *Three sectors in the anterior wings.* (Pl. X. figs. 1, 5).

2. Hemerobius pellucidus, Walker.

Hemerobius pellucidus, (Dale), Walk. Brit. Mus. Cat. 284 (1853); M'Lach. Ent. Mo. Mag. ii. 269. *H. fuscescens*, Walleng. Ofv. 1864, p. 22.

Shining, blackish fuscous, with very few pale hairs; *thoraæ* and *abdomen* paler, the latter somewhat ochreous beneath.

Legs pale dull yellowish.

Wings rather elongate, obtuse, very pale grayish, iridescent; *anterior wings* with the gradate veinlets clouded with darker gray; *pterostigma* brownish; neuration (in all the wings) wholly pale fuscous; three *sectors*; four *gradate veinlets* in the outer series; five in the inner, with two interstices between the first and second, the three others in a line, and placed between the two upper ones and the outer series; three towards the base (Pl. X. fig. 1): *posterior wings* with one or two discal transverse veinlets.

Length of body 2-3 lines; expanse of wings 4-6¼ lines.

I have not seen this insect alive, nor can I find a male with the appendices in a condition for describing.

Taken by Mr. Dale, sparingly, at Glanvilles Wootton, Dorset.

In size and general appearance it resembles pale examples of *H. elegans*, but differs in having three sectors, and in the unspotted veins.

Wallengren's description appears to apply to the species, but I have not seen his type.

3. Hemerobius inconspicuus, n. s.

Head wholly black; *antennæ* blackish-fuscous.

Thoraæ shining pitchy brown, paler in the middle.

Abdomen dull brownish. In the ♂ the last segment above ends in two short blackish points; the last ventral segment is produced into a long lobe, gradually narrowed, the apex obtuse, and strongly curved upwards and inwards, concave at the base internally (Pl. X. fig. 2). In the ♀ the apex of the abdomen is obtuse.

Legs pale.

Wings long, rounded at the apex, uniformly pale smoky fuscous; *pterostigma* with a brownish tinge; *neuration* fuscous, without dots, strongly hairy; in the anterior wings are three *sectors;* four veinlets in the outer gradate series, five in the inner, three towards the base.

Length of body 2-3 lines; expanse of wings 5-6¼ lines.

Found by Mr. Dale, in summer, in old furze-bushes, at Bournemouth, Hants.

This has considerable resemblance to small examples of *H. nitidulus,* but differs in its narrower wings, and undotted veins, and especially in the extraordinary form of the male appendices. It also greatly resembles *Sisyra fuscata* in outward appearance.

In my Continental Collection I have a ♀ from Silesia taken by Zeller, and ♂ and ♀ from France.

The ventral lobe in the ♂ has the appearance of an ovipositor, and had I seen that sex only, I should probably have mistaken it for the ♀, but the matter is set at rest by the examples in Mr. Dale's Collection. An approach towards this formation is seen in *H. elegans.*

The large Continental and American species which I consider to be *H. longifrons* of Walker (See Journ. Linn. Soc. ix. 273; 1867) has an analogous lobe, and I referred all the examples to the female sex, but an examination of the male of *H. inconspicuus* has created some doubt in my mind as to the correctness of my determination, especially as Herr Brauer sent me an insect of similar appearance, which is decidedly female, but has no evident borer.

4. Hemerobius nitidulus, Fabricius.

Hemerobius nitidulus, Fab. Gen. Ins. 244 (1777); Hag. Stett. Zeit. 1858, p. 131. *H. ochraceus,* Wesm. Bull. Acad. Brux. 1840, p. 217; Brauer, Neurop. Aust. 57; Hag. Stett. Zeit. 1859, p. 42. *Mucropalpus obscurus,* Ramb. Névrop. 423 (1842).

Reddish-ochreous; *face* shining piceous; *labrum* reddish; *antennæ* brown, with narrow pale rings.

Abdomen brown, with golden-yellow hairs. In the ♂ the *appendices* are deeply furcate at the apex, the prongs widely diverging, yellow; a callosity externally near the base (Pl. X. fig. 3).

Legs yellowish, the tarsi somewhat brownish.

Wings broad, and broadly elliptical at the apex; shining, unicolorous, pale fuscous, with a reddish tinge; the posterior slightly paler; in the *anterior pair* the neuration is pale, with the costal veinlets, and all the longitudinal veins, closely and regularly dotted with small dark fuscous points; *pterostigma* slightly reddish; three *sectors*; 6-7 veinlets in both *gradate series*; two or three towards the base: in the *posterior pair* the costal veinlets alone are dotted, the rest of the neuration unicolorous.

Length of body 2¼-3 lines; expanse of wings 6½-7½ lines.

Not uncommon among *Pinus sylvestris*, in spring and early summer, in all woods in the neighbourhood of London.

5. Hemerobius micans, Olivier.

Hemerobius micans, Oliv. Enc. Méth. viii. 63 (1811); Wesm. Bull. Acad. Brux. 1840, p. 216; Brauer, Neurop. Aust. 56; Hag. Ent. Ann. 1858, p. 27, Stett. Zeit. 1859, p. 412. *H. punctatus*, Steph. Ill. vi. 111 (1836). *H. pallidus*, Steph. Ill. vi. 112 (1836). *H. lutescens*, Burm. Handb. ii. 974 (1839), Fab. ?. *Mucropalpus fuscinervis*, Schn. Stett. Zeit. 1845, p. 344, var. *Mucropalpus irroratus*, Costa, Faun. Nap. 11, pl. x. fig. 7 (1855).

Yellow; *antennæ* yellow; *face* concolorous, the genæ slightly castaneous; *palpi* yellow, the terminal joint slightly fuscescent; *prothoraæ* reddish brown on each side, clothed with rather long pale hairs; *meso-* and *metathoraæ* with slight fuscescent markings.

Abdomen yellow, slightly pubescent. In the ♂, the *appendices* are long, yellow, pubescent, forked at the tips, the prongs short; a callosity at the base externally (Pl. X. fig. 4).

Legs very pale yellowish.

Wings ovate, elliptical at the apex, pale yellowish, hyaline, very iridescent; *pterostigma* more decidedly yellow; *anterior pair* with the longitudinal veins and costal veinlets pale yellow, with numerous short regular fuscous streaks, longly ciliated; three *sectors; gradate veinlets* fuscous, eight in the outer series, six in the inner, two or three towards the base: in the *posterior pair* the neuration is wholly pale.

Length of body 2-3 lines; expanse of wings 6½-8 lines.

Common throughout the summer.

Var. a.=*Mucropalpus fuscinervis*, of Schneider.

Differs from the ordinary form, in the body being not yellowish; the wings with the membrane nearly colourless, though still highly iridescent; the pterostigma darker, brown; the longitudinal veins less clear, the costal veinlets and sub-costa wholly fuscous; the gradate veinlets in all the wings nearly black, seven in the outer series in the fore-wings.

Expanse of wings 6¾ lines; very uniform in size.

Less frequent than the type-form.

Through the kindness of Herr Brauer, I have seen a type of *fuscinervis*, labelled by Schneider himself. This variety seems to be very constant in its characters, but, save in the colouration of the veins, I can find nothing whereby to separate it specifically; structurally it seems identical.

6. Hemerobius humuli, Linné.

Hemerobius humuli, Linn. Faun. Suec. 383 (1761), Syst. Nat. i. 912; and other authors. *H. lutescens*, Steph. Ill. vi. 109 (not of Fab.). *H. affinis*, Steph. *l. c.* (1836). *H. paganus*, Steph. Ill. vi. 110 (not of Linné). *H. apicalis*, Steph. *l. c.* *H. maculatus*, Wesm. Bull. Acad. Brux. 1840, p. 215.

Pale yellow, the sides of the *prothorax* fuscous; *face* yellow; last joint of *palpi* fuscescent.

Abdomen pale yellow, with pale hairs. In the ♂, the appendices are broad, furcate at the apex; the prongs nearly equal and divergent, hairy, yellow; a callosity at the base (Pl. X. fig. 5*a*).

Legs pale yellow.

Wings elongate, hyaline, beautifully iridescent, scarcely tinged; *anterior pair* more or less clouded with gray, the apical and dorsal margins blotched with gray; usually with a small distinct black spot between the cubiti near the base; neuration (Pl. X. fig. 5) pale, with few black dots, which are most evident at the axillæ of the furcations; *gradate veinlets* brown, about seven in the outer series, and six in the inner, one or two near the base; three *sectors*: *posterior pair* hyaline, unspotted.

Length of body 2¼-3½ lines; expanse of wings 6½-9 lines.

Very abundant everywhere, throughout the year, except in the depth of winter.

Extraordinarily variable in size, and in the extent or absence of markings on the anterior wings. It may usually be separated by the isolated black spot near the base, but this is occasionally absent. Some examples are very dark, and bear considerable resemblance to *H. nervosus*.

Independent of coloration, it seems probable that two species may be here intermingled. In many dry examples, I find the appendices of the males longer, dilated at the apex, but scarcely furcate. A careful comparison of living examples is necessary in order to settle the question.

North American specimens do not differ from the described European form.

7. Hemerobius marginatus, Stephens.

Hemerobius marginatus, Steph. Ill. vi. 109 (1836).
H. flexuosus, Hag. Stett. Zeit. 1858, p. 131 (not described).

Pale primrose-yellow, *face* and *antennæ* concolorous; *palpi* with the terminal joint blackish; sides of the *prothorax* fuscescent.

Abdomen pale yellow, with pale hairs. In the ♂, the *appendices* form two broad, hairy, concave, obtuse, semitransparent yellow lobes, the upper margins of which are slightly turned inwards (Pl. X. figs. 6-6*a*). In the ♀, the abdomen is obtuse.

Legs very pale yellow; tarsi brownish at the tips.

Wings broad, the apical margin very oblique; pale whitish-hyaline, with a yellowish tinge: *anterior pair* usually with large fuscous blotches along the apical and dorsal margins, and often with indistinct transverse grayish fasciæ along the gradate veinlets; or these wings are almost entirely without markings (these specimens are usually males); neuration almost colourless, the costal veinlets and longitudinal veins sparingly streaked with dark fuscous, all the gradate veinlets dark fuscous; three *sectors;* about eight veinlets in the inner and outer *gradate series;* two near the base: *posterior pair* colourless, the pterostigmatical region slightly yellowish.

Length of body 3½-4 lines; expanse of wings 8½-9 lines.

Not common, but occasionally met with in summer.

This insect has much the appearance of *H. humuli*, but is very distinct, as is proved by the form of the male appendices, and also by the shape of the wings, &c.

The species has never hitherto been properly described, though it has been duly separated by Neuropterists; thus in Zeller's collection, I find it with the MS. name "*diversus*" of Schneider, and I have received it from Brauer as "*superbus*," n. s.

8. Hemerobius limbatus, Wesmael.

Hemerobius limbatus, Wesm. Bull. Acad. Brux. 1840, p. 215; Brauer, Neurop. Aust. 57. *H. subfasciatus*, Steph. Ill. vi. 111 (1836). *H. irroratus* (Leach), Steph. *l. c.* and *H. stigma*, Steph. Ill. vi. 112, according to Stephens' collection. *H. limbatellus*, Zett. Ins. Lapp. 1050 (1840), ?.

Unicolorous, brownish or blackish-brown; *antennæ* brown, with scarcely evident narrow pale annulations.

Abdomen brown, with paler pubescence. In the ♂ the *appendices* are blackish or fuscescent, broad, deeply furcate, the prongs diverging, and each slightly curved at the tips in opposite directions; the upper prong slightly the longer, and crossing the corresponding prong of the other appendix (Pl. X. fig. 7).

Legs grayish-yellow, fuscescent at the knees and at the tips of the tarsi.

Wings longly and narrowly ovate, longly elliptical at the apex: *anterior pair* grayish or brownish, with short gray streaks crossing the veins, the gradate veinlets margined with fuscous, more or less distinctly; the apical and dorsal margins generally broadly pale brownish, but varying greatly in this respect; longitudinal veins and costal veinlets pale, very closely pointed with fuscous; *pterostigma* brownish or reddish; three *sectors*; *gradate veinlets* dark fuscous, seven in the outer series, six in the inner, two near the base: *posterior pair* grayish-hyaline; pterostigma brownish; neuration unspotted, for the most part fuscescent, the sub-costa and radius more testaceous; the apical and dorsal margins frequently show a trace of the broad darker margination, as in the fore-wings.

Length of body 2½-3 lines; expanse of wings 7-8 lines.

Common throughout the summer, especially in firs and yews.

Excessively variable, and presenting numerous conditions which I have found it impossible to separate, either as distinct varieties or specific forms; the long and narrow wings seem to present the best character, together with the absence of distinct black or blackish spots.

All the types in Stephens' collection of *irroratus*, *stigma*, and *subfasciatus*, and many of those placed under *pini*, appear to belong to this species. In the "Entomologist's Annual" for 1858, Dr. Hagen has grouped many of these names as synonyms of what he describes as *phaleratus*, Hoffmansegg. This last is only a Museum name; the original description is by Schneider, in the "Arbeit. Schlesich. Gesells." 1846. I am quite unable to apply his description with certainty, though there can be little doubt that the species intended must be either *limbatus*, or one of the closely allied species. In the "Synopsis synonymica" Hagen gives *fasciatus* of Gözsy as a synonym of *phaleratus*, but types of the latter sent by Brauer do not accord with the descriptions of the former.

9. Hemerobius pini, Stephens.

Hemerobius pini (Leach), Steph. Ill. vi. 111 (1836). *H. punctatus*, Gözsy, Sitz. Akad. Wiss. 1852, p. 346, ?.

Yellowish testaceous, shining; the *face*, sides of the *pro-* and *meso- thoraæ*, and the greater part of the *meta-thoraæ* brown, with pale hairs; the prothorax longer than in the allied species, the posterior angles produced strongly downwards, obtuse and dilated, with a tuft of long hairs at the tips; *antennæ* yellow, with close blackish annulations.

Abdomen (♀) fuscescent, with a yellow lateral line.

Legs yellowish; the terminal joint of the tarsi fuscescent.

Wings somewhat elongate, oval, longly elliptical at the apex: *anterior pair* testaceous, the apical and dorsal margins darker; two broad blackish fuscous transverse fasciæ along the gradate veinlets, scarcely reaching the dorsal margin, the inner one is more or less connected at its lower end with a basal blotch, forming an abbreviated fascia; the outer fascia is generally formed

of two disconnected spots; the costal veinlets and the sub-costa and radius blackish fuscous, with short pale interruptions; the rest of the longitudinal veins pale, with closely placed blackish points; fuscous blotches, more or less distinct, along the radius; three *sectors; gradate veinlets* blackish, six to seven in the outer series, six in the inner, and others at the base; *pterostigma* reddish-brown: *posterior pair* paler, whitish, very iridescent; *pterostigma* long, dark reddisk-brown; costal veinlets and radius, and sub-costa wholly blackish; the other longitudinal veins blackish in part, otherwise pale; gradate veinlets mostly blackish.

Length of body $2\frac{1}{4}$-$2\frac{3}{4}$ lines; expanse of wings 7-8 lines.

I have not seen males that I can confidently refer to this species.

There are three or four specimens in the British Museum, all similar, and one of them bears the label "*pini;*" these are probably those from Scotland referred to by Stephens; all the other examples I refer to *limbatus*, and these are probably from Hertford. Stephens' description agrees with Leach's examples, but not with his own. It is also in Mr. Dale's collection, and may be not uncommon.

It is possibly identical with *punctatus* of Gözsy, of which I have certified Austrian types; these latter, though variable, do not show the transverse fasciæ with such distinctness, and are, perhaps, slightly larger; but local influences may account for these slight differences.

10. Hemerobius atrifrons, n. s.

Bright yellow, the sides of the head and the three divisions of the thorax broadly shining fuscous, leaving the yellow ground colour as a pale median line; *face* shining black; *antennæ* yellow, with narrow dark annulations.

Abdomen dark fuscous, with the margins of the segments, and a line on each side, yellow; pubescence brown, or golden-brown. In the ♀ the *appendices* are similar to those of *H. limbatus*, but dark fuscous, with a yellow callosity at the base; the upper prong of the fork is probably slightly shorter, and thus equal with the lower.

Wings shorter and broader than in *H. limbatus*, the apex broadly elliptical: *anterior pair* whitish-hyaline; a few gray markings across the veins; the gradate veinlets broadly margined with fuscous, giving the appearance of two fuscous fasciæ, and many blackish spots at the base, at the axillæ of the furcations and on the longitudinal veins, these veins being otherwise whitish; costal veinlets more finely spotted; *gradate veinlets* black, seven to eight in the outer series, six in the inner, two near the base; three *sectors*; *pterostigma* scarcely indicated; the apical and dorsal portion of the wing without any evident margining: in the *posterior pair* the gradate veinlets, the greater part of the second sector and of the sub-costa and radius are blackish, and the rest of the longitudinal veins have black streaks in the apical half; neuration otherwise pale.

Length of body 2½ lines; expanse of wings 6-6½ lines.

Not unfrequent throughout the summer.

This is evidenty allied to the true *H. fasciatus* of Gözsy, and may be a form thereof; but the latter would appear to be larger and to have the wings longer (intermediate between the present insect and *limbatus* in this respect), with an absence of the sharply defined black spots, the markings taking the form of three or four more or less distinct transverse fuscous fasciæ. I have not met with British examples that I can confidently refer to *fasciatus*, which would seem to be a common species on the mountains of central Europe, judging from numerous specimens received from Zeller.

H. crispus (Leach), Stephens, may belong here as a pale form, but I cannot satisfactorily determine it from the single type.

There are four or five European species pertaining to the *limbatus* group; and one or more of these certainly occurs also in North America. I have specimens of *atrifrons* also from Prussia, Austria, etc.

11. Hemerobius subnebulosus, Stephens.

Hemerobius subnebulosus, Steph. Ill. vi. 107 (1836). *H. fuscus* (Leach), Steph. *l. c.* *H. nebulosus*, Steph. *l. c.* (part). *H. obscurus* (Leach), Steph. Ill. vi. 108. *H. nervosus*, Steph. *l. c.* (not of Fab.). *H. perelegans*, Steph. Ill. vi. 109, var.

Head and *thorax* rusty ochreous, broadly shining blackish on the sides, and with a narrow blackish median longitudinal line; *face* shining black; *antennæ* ochreous, closely annulated with blackish.

Abdomen dull brown, with golden hairs. In the ♂ the *appendices* are broad and band-like, dilated and truncated, the apex produced downwards into a narrow slightly-curved spine-like appendage, the tip of which is furnished with a tooth like the barb of a fish-hook, only that it is placed externally (Pl. X. fig. 8). In the ♀ the apex of the abdomen is obtuse.

Legs yellowish, the anterior and intermediate femora, tibiæ, and tarsi broadly annulated with blackish fuscous.

Wings rather elongated, the apex elliptical: *anterior pair* pale grayish fuscous, with numerous narrow angulated transverse whitish lines, the gradate veinlets margined with dark fuscous, simulating fasciæ, and some strong fuscous spots along the lower cubitus; the dorsal margin pale, slightly ochreous at the base; costal margin with pale spots; longitudinal veins and costal veinlets blackish, with numerous whitish interruptions; hairs pale; three *sectors; gradate veinlets* strong and black, six to seven in the outer series, six in the inner, two or three at the base; *post-costal cellules* both closed; *pterostigma* indistinct: *posterior pair* iridescent, pale grayish; the veins darker.

Length of body 3-3½ lines; expanse of wings 7½-9 lines.

Excessively abundant throughout the summer, especially about London, hiding in the chinks of the bark of fruit-trees, etc.

Varies considerably in intensity; sometimes the wings are uniformly almost blackish-fuscous, at others they are pale, with an appearance of many dark irrorations, and in this state more resemble *H. nervosus*. It may be always distinguished by the peculiar form of the male appendices.

I have never seen a continental example, nor is it known as such by Hagen or Brauer; yet the description of *H. strigosus*, Zett. (Ins. Lapp. 1048) suits the insect tolerably well. I can scarcely believe that a species so common in England should be peculiar to our islands.

The variety *perelegans* is a most beautiful form, in which the wings are strongly suffused with fuscous, with pale spots on the margins. I had previously wrongly

referred this variety to *limbatus*. In the collection of the British Museum a second insect has been placed with Stephens' unique type under the same label. This second example is really a very dark *limbatus*, but not so the first. I have a specimen that I took at Rannoch, in 1865, which agrees almost entirely with the type. Both examples are females, but I believe I am correct in referring them to *subnebulosus*.

12. Hemerobius nervosus, Fabricius.

Hemerobius nervosus, Fab. Ent. Syst. ii. 85 (1793), and other authors. *H. nebulosus*, Steph. Ill. vi. 107 (1836), part. *H. conspersus*, Burm. Handb. ii. 974 (1839). *Mucropalpus distinctus*, Ramb. Névrop. 421 (1842); Costa, Faun. Nap. 9, pl. x. fig. 6.

Ochreous, the sides of thorax broadly shining blackish; a narrow median blackish horizontal line; *face* shining blackish; *antennæ* yellow, with narrow fuscous rings.

Abdomen dark fuscous, with pale golden hairs, and a reddish lateral line in the ♀. In the ♂ the *appendices* are yellow, blackish at the tips, long, regularly curved, band-like or sub-cylindrical, slightly acuminate and obtuse (Pl. X. fig. 9). In the ♀ the apex of the abdomen is obtuse, or sub-truncate.

Legs pale yellowish; tarsi fuscous at the tips; anterior and intermediate tibiæ semi-fasciated, owing to fuscous marks which appear externally only, and are not continued beneath.

Wings elongate, elliptical at the apex: *anterior pair* whitish, clouded with grayish-cinereous, and strongly spotted with dark fuscous, especially about the gradate veinlets and towards the dorsal margin; margins fuscous and whitish in alternate spaces; longitudinal veins and costal veinlets black, strongly interrupted with white, hairs whitish; three *sectors*; *gradate veinlets* black, seven in the outer series, six in the inner, and three or four towards the base; second *post-costal cellule* open: *posterior pair* with blue iridescence, hyaline, the margins often grayish; veins for the most part black, but some of them with long white spaces.

Length of body 3-3¼ lines; expanse of wings 8-9 lines.

In Britain not nearly so common as *H. subnebulosus*, and decidedly unfrequent about London. A very abundant continental species.

Varies greatly in the number and size of the black irrorations.

Section 3. *Four (exceptionally five) sectors in the anterior wings* (Pl. X. fig. 10).

13. Hemerobius concinnus, Stephens.

Hemerobius concinnus, Steph. Ill. vi. 106, pl. xxx. fig. 3 (1836); Hag. Ent. Ann. 1858, p. 28. *H. hirtus*, Burm. Handb. ii. 975 (not of Linné). *H. cylindripes*, Wesm. Bull. Acad. Brux. 1840, p. 218; Brauer, Neurop. Aust. 56. *H. atomarius*, Gözsy, Sitz. Akad. Wiss. 1852, p. 346.

Unicolorous yellow; *face* sometimes inclining to piceous.

Abdomen ochreous-yellow, slightly brownish, with golden hairs. In the ♂ the *appendices* are broad, yellow, pointed, with a tooth on the middle of their lower edge (Pl. X. figs. 10 *a*, 10 *b*). In the ♀ the apex of the abdomen is armed with a long, flattened, slightly acuminate, obtuse borer, the apex of which is often curved upwards in dry examples (Pl. X. fig. 10 *c*).

Legs yellow, the tarsi brownish; tibiæ cylindrical, not spindle-shaped as in the rest of the species.

Wings very broad, and broadly rounded: *anterior pair* with the costal area very broad, dull yellowish, the apical margin spotted with fuscous, and with an appearance of two fuscous transverse fasciæ following the gradate veinlets; the membrane slightly clouded with pale grayish; neuration pale, the costal veinlets and all the longitudinal veins, except the sub-costa, regularly dotted with blackish points, with long pale hairs; *gradate veinlets* dark fuscous, eight or nine in the outer series, six to eight in the inner, continued further towards the base of the dorsal margin by two or three others, two rows of three or four at the base; four (exceptionally five) *sectors*: *posterior pair* paler, without markings, costal margin darker, only the costal veinlets dotted, outer gradate series with seven veinlets, inner with two, whereof that nearest the dorsal margin is conspicuously blackish.

Length of body 3½-4 lines; expanse of wings 9-11 lines.

Usually very rare, but found abundantly in the summer of 1867, by Mr. Barrett, in fir-trees, in Woolmer Forest, Hampshire. It is the largest European species.

Hagen (in "Hemerobidarum Synopsis Synonymica") refers this to *lutescens* of Fabricius, but it now appears to me impossible that the latter insect can be equivalent to our *concinnus*; "magnitudo et statura præcedentium (our *Sisyra fuscata*), alæ omnes albæ punctis strigisque fere indistinctis, fuscis." That Fabricius could have compared the largest European species with *Sisyra fuscata* in point of size is impossible, and I consider his *lutescens* as far more likely to be identical with our *micans*. Burmeister's *lutescens* is, no doubt, *micans*; that of Rambur is probably *humuli*, as is also that of Zetterstedt.

Genus VI. Megalomus, Rambur.

General characters similar to those of *Hemerobius*; the *anterior wings* broader and more strongly rounded at the apex; the *costal area* broader at the base; the sectors more numerous; and the margins and veins strongly ciliated. In the *posterior wings* the costal margin at the extreme base is elevated into a sort of broad tooth which carries a tuft of long hairs (Pl. X. fig. 11).

Rambur includes *Drepanepteryx phalœnoides* in *Megalomus*, but that insect has sufficiently trenchant characters to form a separate genus.

1. Megalomus hirtus, Linné.

Hemerobius hirtus, Linn. Faun. Suec. 382 (1761), Syst. Nat. i. 912; and other authors. *H. fimbriatus*, Curt. Brit. Ent. pl. ccii (1828); Steph. Ill. vi. 113. *Megalomus tortricoides*, Ramb. Névrop. 419 (1842).

Fuscous, strongly pilose.

Antennæ fuscous, the two basal joints ochreous.

Prothoraæ with an ochreous spot on each side. *Mesothoraæ* veined with ochreous in such a manner as to form two rings, filled in with a pupillate spot of the dark ground colour.

Abdomen dark blackish fuscous, marked with ochreous at the base.

Legs pale ochreous; *femora* fuscescent; anterior and intermediate tibiæ fuscescent at the apex, and slightly so at the base; posterior tibiæ fuscescent in the basal third, otherwise ochreous; the terminal joint of all the *tarsi* fuscescent.

Wings slightly ochreous, sub-hyaline; *anterior wings* transversely clouded with grayish fuscous, especially on the apical margin; *neuration* with whitish and blackish spaces in regular alternation; seven *sectors;* twelve veinlets in the outer *gradate series*, six in the inner, and about five towards the base: *posterior wings* whitish, iridescent, broadly margined with grayish fuscous; *neuration* mostly pale on the disk, and fuscous on the margin.

Length of body 3 lines; expanse of wings 7 lines.

Very rare. The above description is made from the example figured by Curtis, which was taken on the 1st July, 1825, at Duddingston, near Edinburgh, by Mr. J. C. Dale. Another example is in the British Museum, and probably one or two other native specimens are in existence.

The appendices of the male are not prominent, but there would appear to be a broad rounded dorsal and ventral plate at the apex of the abdomen. Mr. Dale's example would seem to be a female, in which the abdomen is simply obtuse at the apex, and I have only seen Continental males. Possibly several species of the genus exist in Europe; but, excepting the one with which ours seems to be identical, they are little known. Linné's type still exists in his collection, and bears the label "*hirtus*" in his own handwriting; it agrees in every particular with the English examples.

Genus VII. Drepanepteryx, Leach.

In general character similar to *Hemerobius*, but more robust in form; the last joint of the *maxillary palpi* stronger, only slightly acuminated.

Wings falcate, the apical margin strongly excised, especially in the anterior pair. The *costal area* of the *anterior wings* is very broad at the base, the *costal veinlets* very numerous, and united by two longitudinal rows of connecting veinlets; *sectors* extremely numerous; three complete series of *gradate veinlets;* neuration and margins very shortly ciliated. The costal margin of the *posterior wings* has a similar elevation to that in *Megalomus*.

1. Drepanepteryx phalænoides, Linné.

Hemerobius phalœnoides, Linn. Faun. Suec. 383 (1761); Syst. Nat. i. 912; and other authors. *Drepanepteryx pha-*

lœnoides, Steph. Ill. vi. 100, pl. xxiii. fig. 1. *Drepanopteryx phalœnoides*, Burm. Handb. ii. 975; Brauer, Neurop. Aust. 55. *Megalomus phalœnoides*, Ramb. Névrop. 418.

Dull ochreous, scarcely pubescent, the head bright ochreous; the whole of the under-surface of the body paler.

Antennæ fuscescent, ochreous at the base; *palpi* ochreous.

Legs ochreous.

Anterior wings opaque, testaceous, a whitish wedge-shaped spot on the middle of the dorsal margin strongly margined with fuscous; transverse costal fuscous streaks, the disk slightly reticulated with fuscous, two narrow transverse fuscous fasciæ including the gradate veinlets, and a longitudinal fuscous streak running from the inner series into the apex, a fuscous spot on the disc, rather towards the base; apical sinuations with a narrow whitish margin; dorsal margin fuscous, especially at the base: *posterior wings* sub-hyaline, slightly testaceous, especially at the apex.

Length of body 4 lines; expanse of wings 13-16 lines.

Very rare. A few specimens have been taken in the North of England and South of Scotland. I possess one example recently taken at Windermere by Mr. Strouvelle.

Family II. CONIOPTERYGIDÆ.

Antennæ short, hairy. *Maxillary palpi* with the four first joints short and nearly equal, the terminal joint long and slender. *Labial palpi* with two small basal joints, and a large broad and compressed terminal. *Ocelli* absent. *Wings* equal or unequal; in the *anterior wings* not more than two *costal veinlets*, one at the base, the other at the apex; *costal area* very narrow; *sub-costa* parallel with the costa; the *radius* runs parallel with the sub-costa, and emits two *sectors*, which fork before joining the margin; transverse discal veinlets very few, margins not visibly ciliated.*

Legs moderately long; first joint of the *tarsi* long, the three next short and somewhat cordate, the fifth short and slender; *ungues* simple.

* Under a high power, the margins and veins shew a few moderately strong hairs, and similar but shorter hairs are sparingly distributed over the membrane.

The whole insect is covered with a whitish powder, which, under a very high magnifying power, has the appearance of minute irregularly rounded granules, very slightly attached.

Larva with a small head and thoracic segments, and large dilated abdomen, attenuated posteriorly; lives apparently upon *Cocci*, and allied insects; spins an orbicular cocoon of fine white silk. This larva was discovered by Mr. Haliday (see Curtis' "British Entomology," pl. 528, and Westwood's "Modern Classification," vol. ii. p. 49), and has also been noticed by Dujardin.

These curious little insects were once placed by authors in the *Homoptera*, and also in the family *Psocidæ* among *Neuroptera:* but, as Westwood has shewn, their true position is undoubtedly that here allotted to them.

Genus I. Coniopteryx, Haliday.

(=*Coniortes*, Westwood; *Malacomyza*, Wesmael; *Sciodus*, Zetterstedt; and probably also *Aleuronia*, Fitch.).

The characters of the genus are those of the family.

1. Coniopteryx psociformis, Curtis.

Coniopteryx psociformis, Curt. Brit. Ent. pl. dxxviii. fig. 1-8, and text (1834); Steph. Ill. vi. 117; Burm. Handb. ii. 772; Hag. Ent. Ann. 1858, p. 30. *C. aphidiformis*, Ramb. Névrop. 316 (1842) ?.

Antennæ with about forty joints, much longer than the body. *Wings* very unequal, the posterior pair being very small (Pl. XI. fig. 1).

Expanse of wings $3\frac{2}{3}$-$4\frac{1}{2}$ lines.

Common throughout the summer.

2. Coniopteryx tineiformis, Curtis.

Coniopteryx tineiformis, Curt. Brit. Ent. pl. dxxviii. fig. 9, and text (1834); Westw. Introd. fig. 65, 1-8; Steph. Ill. vi. 116; Ramb. Névrop. 316; Brauer, Neurop. Aust. 55; Hag. Ent. Ann. 1858, p. 29. *Malacomyza lactea*, Wesm. Bull. Acad. Brux. 1840, pp. 166, 244, pl. vi. fig. 3, pl. vii. fig. 2. *Sciodus lacteus*, Zett. Ins. Lapp. 1051 (1840).

Antennæ about the length of the body, with about twenty-five joints. *Wings* sub-equal, slightly smoky gray. *Abdomen* rather short, ochreous (Pl. XI. fig. 2).

Expanse of wings $2\frac{1}{2}$-$2\frac{3}{4}$ lines.

Not uncommon in summer, especially in fir trees.

This species is decidedly more gray than the others; the shortness of the antennæ and the ochreous abdomen also distinguish it from *aleyrodiformis*, which is larger.

3. Coniopteryx aleyrodiformis, Stephens.

Coniopteryx aleyrodiformis, Steph. Ill. vi. 116 (1836); Hag. Ent. Ann. 1858, p. 29.

Antennæ with more than thirty joints, longer than the body. *Wings* sub-equal, broad, the neuration tolerably distinct. *Abdomen* thin.

Expanse of wings $3\frac{1}{2}$-$3\frac{2}{3}$ lines.

Probably equally common with the last; but I cannot say that I have personally noticed it.

These insects are as yet ill-understood, and I regret that the subject can receive no elucidation from me. Hagen, on the authority of an observation made by Zeller (Stett. Zeit. 1859, p. 38), thinks it possible that *psociformis* and *tineiformis* may be the sexes of one species. I cannot confirm or disprove this, never having seen the insects *in copulâ*, but I have certainly found *psociformis* abundantly when *tineiformis* was not to be seen. Rather am I inclined to think, from the formation of the abdomen, that *tineiformis* and *aleyrodiformis* may be only sexual forms of one species. It may be remarked, however, that, according to information furnished by Brauer, three distinct larvæ, pertaining to this genus, are found in Austria. *

One or more species were certainly known to the old authors, but it is impossible to apply their descriptions with certainty; though probably *tineiformis* was the insect they had in view. None of them mention the disparity

* I have recently received from Mr. Haliday a very minute and interesting species, taken in Italy. A short diagnosis is appended.

Coniopteryx hæmatica (Hal. MS.).

Obscure testacea, abdomine aurantiaco. Antennæ albido-flavæ, corpore paulo longiores. Thorax maculis utrinque nigro-fuscis. Pedes pallide testacei. Alæ sub-æquales, fuscescentes, sub-hyalinæ, vix pulverulentæ, venis fuscis.

Long. corp. $\frac{2}{3}$ lin., exp. alar. $1\frac{1}{2}$-$1\frac{3}{4}$ lin.—Hab. Italia.

in the wings, so noticeable in *psociformis*. The following descriptions apply to species of *Coniopteryæ*—*Hemerobius parvulus*, Müller, Faun. Fridrichsd. 66 (1767); *Semblis farinosa*, Rossi, Mant. Faun. Et. ii. 105 (1794); *Phryganea alba*, Fabricius, Ent. Syst. Suppl. 201 (1798); and Müller correctly estimated the position of his insect, in which some of the more modern authors shewed less keen perception.

Family III. CHRYSOPIDÆ.

Antennæ setiform, long. Terminal joint of the *palpi* cylindrical, not subulate. *Ocelli* absent. *Eyes* brilliant. *Wings* sub-equal; *costal veinlets* simple; *sub-costa* and *radius* separated to the apex; *sub-costal area* with one transverse veinlet near the base,* and several near the apex under the pterostigma; *radius* starting from the sub-costa at about a quarter of its length from the base, formed, as it were, of many little veins directed upwards and downwards alternately; a row of cellules between it and the sub-costa; it emits numerous *sectors*, some of which join the cubitus anticus, but most run into the apical portion of the wing, where they end simply or in a furcation; beyond the middle the sectors are united by two rows of *gradate veinlets*; the *cubitus anticus* starts from the sub-costa still nearer the base, and runs straight to the anal portion of the apical margin; the *cubitus posticus* starts from the extreme base of the sub-costa, and runs parallel with the cubitus anticus, but is alternately broken like the radius; it sends off numerous branches to the dorsal margin; between the two cubiti is a row of transverse *cubital cellules*, whereof the *third* is divided into two by a longitudinal veinlet;† the *post-costa* starts from the base of the wing, and joins the dorsal margin soon afterwards.

Body slender; more robust in the female; appendices not evident.

Legs slender; the *ungues* generally strongly curved and dilated internally at the base (Pl. XI. fig. 4 *b*), but sometimes simple (Pl. XI. fig. 4 *a*).

Larva, as a rule, not covering its body with the débris of its prey.‡

* In the exotic genus *Apochrysa* this veinlet is absent.

† In *Apochrysa* this veinlet is absent.

‡ Schneider (Mon. Chrys. p. 56) says, he has never observed these larvæ use the skins of their prey as a covering; but this does take place in some species.

Eggs placed on a long pedicle.

These beautiful insects, familiarly known as "Golden Eyes," have long been notorious for the aptitude which some of them possess for emitting, when handled, a most disagreeable smell of ordure (hence they are sometimes called "Stink Flies") which is retained by the fingers long afterwards. But I am of opinion that this propensity has been very greatly exaggerated, and that it is shown only by certain species, and by them only at certain times. I have had many hundreds of living examples through my hands, and can safely assert that it was only exceptionally that they left any odour behind; though, when this did take place, it was extremely nauseous. *C. septempunctata* is the greatest delinquent in this respect, for I rarely handle a specimen of this species without its leaving a reminder which any amount of washing will not immediately remove.

I divide the British species, formerly placed in *Chrysopa*, into two genera; not because this is rendered necessary for the determination of our insects, but because the large and rapid accumulation of forms from all parts of the globe (nearly 150 species are already described) makes it imperative that some division should be made. The two genera will now stand as follows:—

1. Chrysopa, Leach.

Labrum more or less rounded in front.

Third cubital cellule in the anterior wings divided unequally (Pl. XI. figs. 3 and 4, indicated at *c c*), the upper portion being small, and more or less ovate. Colour more or less green.

2. Nothochrysa, n. g.

Labrum more or less excised in front.*

Third cubital cellule in the anterior wings divided nearly equally (Pl. XI. fig. 5, indicated at *c c*), the two portions being nearly elongate-quadrate, the two rows of gradate veinlets less parallel. Colour more or less reddish or yellowish. Form more robust.

* Curtis, in his "British Entomology," plate 520, gives the excised labrum as a character for the whole of the genus *Chrysopa* as it then stood, and thus figures it (fig. 2) in his dissections; but if these dissections are intended to apply to his *C. abbreviata*, he is certainly in error; Stephens (Ill. vi. 101) makes the same mistake.

It is unnecessary to give detailed characters for each genus, as they would be little more than a repetition of those noticed in the description of the family.

Genus I. Chrysopa, Leach.

The eleven native species of *Chrysopa*, as here restricted, may be tabulated thus :—

A. Second joint of the antennæ concolorous with the basal.
  a. Costal margin of anterior wings sensibly excised. *C. flava*.
  a. *a*. Costal margin not sensibly excised.
    b. The partition-veinlet of the third cubital cellule ends before the insertion of the transverse veinlet above it (Pl. XI. fig. 3, indicated at *c*. *c*.) . . . . *C. vulgaris*.
    b. *b*. The partition-veinlet ends after the insertion of the above-mentioned veinlet (Pl. XI. fig. 4, indicated at *c c*).
      c. A black spot between the basal joints of the antennæ.
        d. A black dot at the extreme base of the costa in anterior wings.
          e. Abdomen wholly green. *C. aspersa*.
          e. *e*. Abdomen black beneath. *C. ventralis*.
        d. *d*. No black dot at base of costa. *C. septempunctata*.
      c. *c*. No black spot between the basal joints of the antennæ.
        f. Palpi annulated with blackish. *C. flavifrons*.
        f. *f*. Palpi unannulated.
          g. Expanse of wings about 21 lines. *C. vittata*.
          g. *g*. Expanse of wings about 14 lines. *C. alba*.

A. A. Second joint of the antennæ marked with black or fuscous.
  a. Colour full green.

b. Ungues dilated at the base (Pl. XI. fig. 4 *b*). . . *C. abbreviata.*
b. b. Ungues simple (Pl. XI. fig. 4 *a*). *C. phyllochroma.*
a. a. Colour blue-green. . . . . *C. perla.*

Too much reliance must not be placed upon this tabular arrangement, as it will not determine species that may occur with us, though not yet discovered; attention must be paid to the detailed descriptions. Most of the species lose their colour very rapidly after death.

1. Chrysopa flava, Scopoli.

Hemerobius flavus, Scop. Ent. Carn. 270 (1763); *Chrysopa flava*, Hag. Ent. Ann. 1858, p. 20. *C. subfalcata*, Steph. Ill. vi. 105 (1836). *C. vittata*, Schn. Mon. Chrys. 65, pl. vi. fig. 1, larva, pl. vii. imago, (not of Wesm.); Brauer, Neurop. Aust. 60.

Pale green; dorsal surface of thorax and abdomen with a yellowish longitudinal line in the middle.

Antennæ shorter than the wings, becoming obscure towards the apex; the basal joint shorter than the head. *Vertex* raised, the elevated portion somewhat triangular, the apex being extended between the basal joints of the antennæ. The head is quite immaculate.

Prothorax rounded at the sides, rather narrowed anteriorly; immaculate.

Abdomen slightly pubescent.

Legs nearly colourless; *ungues* brown, dilated at the base internally.

Wings elongate, apex acute. *Anterior wings* with the costal margin strongly excised after about one-fourth of its length from the base. *Neuration* almost wholly pale; the costal veinlets in the basal portion blackish at their points of junction with the sub-costa; some of the other basal veinlets also blackish; *pterostigma*, in all the wings, scarcely darker, elongate. In the *posterior wings* the costal veinlets are mostly half blackish; other veins and veinlets pale.

After death, the colour becomes uniformly pale yellow.

Length of body 6-7 lines; expanse of wings 17-22 lines.

A common insect in summer, especially in trees bordering streams.

The excised costal margin of the anterior wings will readily separate this species.

2. Chrysopa vittata, Wesmael.

Chrysopa vittata, Wesm. Bull. Acad. Brux. 1840, p. 211; Hag. Ent. Ann. 1858, p. 21, Stett. Zeit. 1858, p. 131, 1859, p. 412. *Hemerobius albus*, Fab. Syst. Ent. 309 (not of Linné); *Chrysopa alba*, Burm. Handb. ii. 918; Brauer, Haid. Abh. 1850, p. 6. *C. perla*, (Leach), Steph. Ill. vi. 105 (not of Linné); Evans, Tr. Ent. Soc. v. 78, pl. ix. fig. 4. *H. proximus*, Ramb. Névrop. 425 (1842). *C. integra*, Hag. Stett. Zeit. 1852, p. 40.

Very similar to *C. flava*, but instantly separated by the somewhat rounded costal margin of the anterior wings; the basal joint of the *antennæ* is longer; the *maxillary palpi* marked with fuscous, especially the terminal joint; the prothorax has a small blackish mark at the margin of the anterior angles; the *wings* are broader, the *neuration* of all the wings wholly pale, excepting about four or five cubital veinlets near the base, which are black.

After death, the abdomen has a strong tendency to turn blackish.

Length of body 6-7 lines; expanse of wings 19-22 lines.

Appears in summer; according to my experience not so common as *C. flava*.

This and the preceding species are almost constantly mixed in collections.

3. Chrysopa alba, Linné.

Hemerobius albus, Linn. Faun. Suec. 382 (1761), Syst. Nat. i. 911; *Chrysopa alba*, Steph. Ill. vi. 104; Evans, Tr. Ent. Soc. v. 78, pl. ix. fig. 1; Schn. Mon. Chrys. 77, pl. xiii; Brauer, Neurop. Aust. 60; Hag. Stett. Zeit. 1852, p. 40, Ent. Ann. 1858, p. 22. *C. ciliata*, Wesm. Bull. Acad. Brux. 1840, p. 212.

Very pale whitish green.

Head small, immaculate. *Vertex* raised, with a depression in the middle in front. *Antennæ* and *palpi* concolorous with the head, not marked.

Prothoraæ immaculate; the anterior angles rounded; a transverse raised line rather behind the middle, and the posterior margin also raised.

Abdomen slightly pubescent.

Legs very pale; *ungues* brown, very strongly curved, the basal portion much dilated internally.

Wings short and broad, apex scarcely acute. *Anterior wings* (Pl. XI. fig. 4) with almost all the *neuration*, excepting the longitudinal veins and sectors, blackish: in the *posterior wings*, only the costal veinlets, those between the sub-costa and radius, and some of the gradate veinlets, blackish; the rest pale, almost colourless.

After death, the colour changes to very pale whitish-yellow.

Length of body 3½-4½ lines; expanse of fore-wings 11-15 lines.

A common species in summer, in woods. Remarkable for its very pale and fugitive colour.

4. Chrysopa flavifrons, Brauer.

Chrysopa flavifrons, Brauer, Haid. Abh. 1850, p. 6, pl. i. fig. 2; Neurop. Aust. 60; Hag. Ent. Ann. 1858, p. 22.

Pale green, front yellowish.

Head with the *vertex* unspotted, inflated, but the raised portion is flattened, or even slightly concave; *front* with a reddish or reddish-fuscous line on each side; *palpi* broadly annulated with blackish, the terminal joint wholly blackish; *antennæ* shorter than the wings, the basal joint short, strongly inflated.

Prothoraæ with an irregular reddish or reddish-fuscous mark on each side of the middle above, and with slight markings at the sides of the anterior and posterior angles; broad, the sides strongly rounded, a transverse raised space rather behind the middle, the posterior margin divided in the middle by an impressed line; with a few blackish hairs, especially on the sides.

Abdomen with pale pubescence.

Legs pale, the tarsi somewhat yellowish; *ungues* brown, long, the basal portion dilated internally, the curved portion distant from it.

Wings broad, the apex scarcely acute. *Neuration* of the *anterior wings* with each costal veinlet black at each end, green in the middle; sub-costal basal veinlet, gradate veinlets wholly, and cubital veinlets at each end, black; *pterostigma* dark green. *Posterior wings* with the costal veinlets wholly black, the others as in the anterior.

After death, changes to yellow, the veins greenish.

Length of body 4-5 lines; expanse of wings 14-15 lines.

Not a common species. I have taken odd specimens at various times, chiefly about Mickleham, in autumn.

5. Chrysopa vulgaris, Schneider.

Chrysopa vulgaris, Schn. Mon. Chrys. 68, pl. vi. fig. 2, larva, pl. viii, imago (1851); Hag. Stett. Zeit. 1852, p. 40, Ent. Ann. 1858, p. 21; Brauer, Neurop. Aust. 59; Ed. Pict. Névrop. d'Esp. 59. *Hemerobius perla*, Fab. Syst. Ent. 82 (not of Linné); Scop. Ent. Carn. 271; Schrk. Ins. Aust. 311; Ratz. Forst. iii. 247, pl. xvi. fig. 6; Ramb. Névrop. 424; Costa, Faun. Nap. pl. xi. fig. 1; *Chrysopa perla*, Burm. Handb. ii. 980; Wesm. Bull. Acad. Brux. 1840, p. 207; Brauer, Haid. Abh. 1850, p. 5, pl. i. fig. 1, imago, pl. ii. fig. 8, larva. *C. affinis*, Evans, Tr. Ent. Soc. v. 78, pl. ix. fig. 2 (1848).

Green, a broad yellow stripe along the dorsal surface of the thorax and abdomen.

The raised portion of the *vertex* flattened, extended between the basal joints of the antennæ, immaculate; *front* more or less suffused with deep flesh colour at the sides; *palpi* not marked with dark; *antennæ* not quite so long as the wings, the apical portion darker, the basal joint small, and often marked with reddish internally.

Prothorax longer than broad, angles rounded, divided into two divisions by a raised transverse space in the middle, the anterior portion flattened, the posterior with two raised oblique lines; clothed with sparse blackish hairs; nearly immaculate.

Abdomen clothed with sparse blackish hairs; the pale yellow dorsal line very conspicuous during life.

Legs green, with short blackish pubescence; *ungues* brown, long, the curved portion extending much beyond the dilated basal portion.

Wings narrow, elongate, scarcely acute; the partition-veinlet of the third *cubital cellule* does not reach the transverse veinlet above it; *neuration* wholly pale in all the wings, ciliated with black; *pterostigma* conspicuous, dark (Pl. XI. fig. 3).

After death, dull yellowish.

Hibernal condition: *C. carnea*, Steph. Ill. vi. 103 (1836); Evans, Tr. Ent. Soc. v. 78, pl. ix. fig. 6. *C. perla*, vars. *primaveria*, *incarnata*, and *rubropunctata*, Brauer, Haid. Abh. iv. 5.

The green colour becomes more or less reddish, still retaining the pale dorsal line, though often less conspi-

cuously. The whole head often suffused with dark flesh colour, and the abdomen frequently with dorsal and lateral rows of crimson or reddish spots.

Length of body 3-4 lines; expanse of wings 11-14 lines.

A very abundant species. It often causes a deposit of verdigris on the pin, which, in a few years, nearly destroys the specimen.

The pale dorsal line is a good character whereby to separate the species at sight. Certain individuals hibernate in thatch, rubbish, houses, &c., and all those taken in winter, or early spring, more or less assume a reddish tint. According to Brauer (*in litt.*) this form should be called a "condition" rather than a "variety," inasmuch as the specimens are ordinarily coloured on their first appearance, but change colour with the approach of colder weather.

6. Chrysopa septempunctata, Wesmael.

Chrysopa 7-punctata, Wesm. Bull. Acad. Brux. 1840, p. 210; Schn. Stett. Zeit. 1845, p. 345, Mon. Chrys. 101, pl. xxx; Hag. Stett. Zeit. 1852, p. 42, Ent. Ann. 1858, p. 23; Brauer, Neurop. Aust. 61; Ed. Pict. Névrop. d'Esp. 64. *C. angustipennis*, Steph. Ill. vi. 104 (1836), according to his collection. *Hemerobius mauricianus*, Ramb. Névrop. 425 (1842). *H. pallens*, Ramb. Névrop. 425 (according to Hag. Stett. Zeit. 1866, p. 298); *C. pallens*, Schn. Mon. Chrys. 104, pl. xxxii; Ed. Pict. Névrop. d'Esp. 64. *C. nobilis*, Brauer, Haid. Abh. 1850, p. 7, pl. i. fig. 4, imago, pl. ii. fig. 13, larva (not of Heyden).

Rather full green; front with black spots.

Head with the *vertex* immaculate, dilated, but depressed in the centre; a black spot between the basal joints of the antennæ (rarely absent); *front* with six black spots—two semilunate ones below the antennæ (these two are often absent); two, rounded, in the genæ below the eyes; two, elongate, placed one on each side of the clypeus; *palpi* somewhat testaceous; *antennæ* little shorter than the wings, pale brownish, excepting towards the base, basal joint short and inflated.

Prothorax short and broad, an impressed longitudinal line in the middle of the posterior portion; anterior angles marked with black.

Legs full green; *tarsi* brownish; *ungues* brown, strongly curved, the basal portion dilated and rounded.

Wings elongate, subacute; *neuration* full green; the costal and post-costal veinlets, the gradate veinlets (usually), those between the radius and the sector at the upper end only, and several cubital veinlets, black; *pterostigma* elongate, dark: in the *posterior wings* the post-costal veinlets are green.

After death changes to greenish-yellow.

Length of body 5-6 lines; expanse of wings 15-18 lines.

Moderately common in summer, and especially entitled to the appellation of "Stink Fly."

I have not accorded to Stephens' name *angustipennis* the right of priority, although his types are certainly the species here described. My reason for not so doing is that the word "immaculate" in his description is so contradictory, that no one could possibly have recognized the species from that description; and I am unwilling to drop Wesmael's name—by which the insect is so well known.

Hagen (Ent. Ann. 1858, p. 22), gives *C. Heydenii* of Schneider, (*nigricostata*, Brauer), as a doubtful synonym for *angustipennis*, but that species is very different.

7. Chrysopa aspersa, Wesmael.

Chrysopa aspersa, Wesm. Bull. Acad. Brux. 1840, p. 210; Schn. Mon. Chrys. 112, pl. xxxvii; Hag. Stett. Zeit. 1852, p. 42, 1859, p. 412, Ent. Ann, 1858, p. 23; Ed. Pict. Névrop. d'Esp. 66. *Hemerobius prasinus*, Ramb. Névrop. 424 (1842). *H. Ramburii*, Costa, Faun. Nap. 14 (1855).

Full green, front spotted with black.

Head with the *vertex* inflated, nearly semicircular, flattened, immaculate; a large triangular black spot between the basal joints of the antennæ; *front* with a black spot on the genæ below each eye, and an elongate black spot on each side of the clypeus; *palpi* sharply annulated with black and white; *antennæ* shorter than the wings, pale grayish-brown, the two basal joints green, the first sometimes with a faint dark mark above.

Prothoraæ with a transverse raised line behind the middle; blackish-brown spots on each side of the middle,

forming somewhat interrupted longitudinal lines, and with three similarly coloured spots on each lateral margin; a few scattered black hairs. *Mesothoraæ* with two blackish-brown dots in the middle above.

Abdomen often with two indistinct lateral rows of blackish spots; clothed sparingly with black hairs.

Legs green, with blackish pubescence; *tarsi* brownish; *ungues* dilated at the base internally, the apical portion long and strongly curved.

Wings rather short, sub-acute; a black dot at the extreme base of the costa. In the *anterior wings* the longitudinal veins are green; the gradate veinlets black; all the other transverse veinlets black at each end and green in the middle; *pterostigma* elongate, green. In the *posterior wings* the costal veinlets are wholly black; neuration otherwise coloured as in the anterior.

After death changes to yellow.

Length of body 4 lines; expanse of wings 13-16 lines.

Tolerably common in summer in woods.

8. Chrysopa ventralis, Curtis.

Chrysopa ventralis, Curt. Brit. Ent. pl. dxx (1834); Steph. Ill. vi. 104; Evans, Tr. Ent. Soc. v. 78, pl. x. fig. 6; Brauer, Neurop. Aust. 61; Hag. Stett. Zeit. 1858, p. 131, Ent. Ann. 1858, p. 23. *C. aspersa*, var. 7, Schn. Mon. Chrys. 112 (1851); Ed. Pict. Névrop. d'Esp. 67.

Almost entirely similar to the last; but the ventral surface of the abdomen, excepting the last segment, is black with pale transverse sutures; the costal veinlets of the anterior wings appear to be pale only at their junction with the costa.

Occurs rather frequently in woods in summer, often in company with *C. aspersa*, and may be instantly recognized by the black underside of the abdomen. Though inclined to consider it distinct from *aspersa*, I think it very desirable that its specific right should be proved by breeding from the larva.

9. Chrysopa abbreviata, Curtis.

Chrysopa abbreviata, Curt. Brit. Ent. pl. dxx (1834); Steph. Ill. vi. 133 (part); Wesm. Bull. Acad. Brux. 1840, p. 209; Evans, Tr. Ent. Soc. v. 78, pl. ix.

fig. 7; Schn. Mon. Chrys. 119, pl. xli (part); Hag. Stett. Zeit. 1852, p. 35, 1858, p. 131, 1859, p. 411, Ent. Ann. 1858, p. 24; Brauer, Neurop. Aust. 62. *C. immaculata*, Steph. Ill. vi. 103 (1836); Evans, Tr. Ent. Soc. v. 78, pl. x. fig. 5. *Hemerobius chlorophanus*, Ratz. Forst. iii. 248 (1837).

Full dark green; vertex and face spotted with black.

Head with the *vertex* dilated, not flattened, somewhat triangular, the angles rounded; two black spots before the antennæ in the middle forming an interrupted semicircle, a black transverse line in the posterior portion sometimes interrupted, and often with a black spot at the posterior angles beneath the eyes; a very large black spot between the basal joints of the antennæ; *front* with a crescentic black spot round the lower edge of the basal joints, one or two spots on each side on the genæ, and a spot on each side of the clypeus; *palpi* annulated with black, the terminal joint almost wholly black; *antennæ* little shorter than the wings, brownish, the basal joint green with a blackish mark internally, second joint deep black.

Prothorax with a longitudinal impressed median line, the angles rounded; generally with an interrupted, narrow, impressed, transverse, median line, below each end of which is a black spot; sides with a narrow black line, and the base of the posterior coxæ circled with black; clothed with short black hairs, especially on the sides. *Meso-* and *meta-thorax* marked with blackish at the sides, and the sutures on the sternum narrowly black.

Abdomen rather thickly clothed with short black hairs, and sometimes with a black line on the sides.

Legs green, with short black hairs; *tarsi* slightly brownish; *ungues* deep brown, dilated at the base internally (Pl. XI. fig. 4 *b*).

Wings short and broad, rounded at the apex; *neuration* for the most part green, with long black hairs; in the *anterior wings* the costal veinlets at their lower end, those between the radius and sector at each end, the gradate veinlets mostly altogether, and several cubital nervules, are black; *pterostigma* dark green: in the *posterior wings* the costal veinlets almost totally, and those between the radius and sector at their upper ends only, are black.

After death changes to pale green.

Length of body 3-4 lines; expanse of wings 11-12 lines.

Occurs in woods in summer; apparently less frequent than the next, with which it is generally confounded in collections.

10. Chrysopa phyllochroma, Wesmael.

Chrysopa phyllochroma, Wesm. Bull. Acad. Brux. 1840, p. 207; Hag. Stett. Zeit. 1852, p. 43, 1858, p. 412, Ent. Ann. 1858, p. 24; Brauer, Neurop. Aust. 62. *C. abbreviata*, Steph. Ill. vi. 103 (part, according to his collection); Schn. Mon. Chrys. 119 (part). *C. pusilla*, Brauer, Haid. Abh. 1850, p. 7, pl. ii. fig. 4. *C. tenella*, Brauer, *l. c.* fig. 5.

In form and colouration, almost entirely similar to the last; in size slightly larger. May be at once separated by the *ungues*, which are simple and but slightly curved (Pl. XI. fig. 4 *a*). On the *vertex* the black transverse posterior line is usually absent.

Length of body 4-4½ lines; expanse of wings 12-13 lines.

Occurs in woods in summer, and is moderately common. I find the transverse veinlets partially black in both species (See Hagen, Ent. Ann. 1858, p. 24).

11. Chrysopa perla, Linné.

Hemerobius perla, Linn. Faun. Suec. 382 (1761), Syst. Nat. i. 911; *Chrysopa perla*, Schn. Mon. Chrys. 136, pl. vi. fig. 4, larva, pl. xlix. imago; Brauer, Neurop. Aust. 61; Hag. Stett. Zeit. 1858, p. 131, Ent. Ann. 1858, p. 24. *H. chrysops*, Fab. Syst. Ent. 309 (not of Linné); Zett. Ins. Lapp. 1048; Ramb. Névrop. 427. *H. cancellatus*, Schrk. Faun. Boic. ii. 189 (1802); *C. cancellata*, Wesm. Bull. Acad. Brux. 1840, p. 208. *C. maculata*, Steph. Ill. vi. 102 (1836); Evans, Tr. Ent. Soc. v. 78, pl. x. fig. 4. *C. reticulata* (Leach), Steph. Ill. vi. 102 (1836); Burm. Handb. ii. 980; Evans, Tr. Ent. Soc. v. 78, pl. x. fig. 3; Brauer, Haid. Abh. 1850, p. 7, pl. ii. fig. 6, imago, fig. 11, larva. *H. reticulata*, Ratz. Forst. iii. 247.

Blue-green, varied with black.

Head yellowish; *vertex* with a depression in the centre, the raised portion with a broad black margin, which is prolonged between the antennæ, and connected with a transverse line margining the posterior edge; front with a ∧-shaped black mark, the apex of which joins the vertical mark between the antennæ, a black spot on the genæ below the eyes, and a black line on each side of the clypeus; *palpi* black, pale at the articulations; *antennæ* shorter than the wings, brown, the basal joint yellowish, the second joint black.

Prothoraæ above, with two somewhat quadrate black spots on each side; insertion of the coxæ ringed with black; *meso-* and *meta-thoraæ* strongly marked with black on the sides, and lined with black beneath.

Abdomen black, more or less varied with blue-green, and with pale pubescence. The extent of black and green varies in the sexes, and also in individuals independently of sex.

Legs green, with short black hairs; *tarsi* brownish; *ungues* dilated at the base internally.

Wings short and broad, obtuse; *longitudinal veins* green, *transverse veinlets* all black and strong, ciliated with black; *pterostigma* darker.

Nearly loses its bluish tint after death.

Length of body 4-6 lines; expanse of wings 12-14 lines.

Very common, especially in woods, throughout the summer.

It is to me a matter of doubt whether Linné's description of *Hemerobius chrysops* does not refer to this insect rather than his description of *perla*, but Schäffer's figure (Icon. Insect. Ratisb. pl. v. fig. 7-8), quoted by him, well represents our *perla*.

Hagen, in the "Entomologist's Annual" for 1858, p. 22, introduces, doubtfully, *C. tenella*, of Schneider (Mon. Chrys. 94, pl. xxv.), on the authority of a specimen in the British Museum. Among some old doubtful specimens there, I cannot find one that agrees with Schneider's description of *tenella*, or with a continental example so named for me by Herr Brauer. It may, however, be assumed as certain that we possess more species than are here described.

Genus II. Nothochrysa, n. g.

(See p. 195).

1. Nothochrysa fulviceps, Stephens.

Chrysopa fulviceps, Steph. Ill. vi. 101, pl. xxx. fig. 2 (1836); Evans, Tr. Ent. Soc. v. 78, pl. x. fig. 1; Schn. Mon. Chrys. 146, pl. liii; Hag. Ent. Ann. 1858, p. 24. *Hemerobius erythrocephalus*, Ramb. Névrop. 428, pl. ix. fig. 5 (1842).

Dark fuscous, head reddish-orange.

Head and basal joint of antennæ orange, the latter with a small fuscous mark internally; the rest of the *antennæ* blackish-fuscous; *palpi* dark fuscous.

Pro- and *meso-thoraæ* yellowish, dark fuscous at the sides; *meta-thoraæ* slightly yellowish in front.

Abdomen with a yellowish lateral line, the apex also yellowish, especially beneath.

Legs yellowish; *tarsi* fuscous; *ungues* dilated at the base internally.

Wings elongate, the anterior obtuse at the apex, the posterior acute; *neuration* all black, excepting the *marginal vein*, *sub-costa*, *radius*, and *cubitus posticus*, which are pale greenish-white; *pterostigma* long, obscured.

Length of body 6 lines; expanse of wings 19-23 lines.

South of England, in summer; always very rare.

2. Nothochrysa capitata, Fabricius.

Hemerobius capitatus, Fab. Ent. Syst. ii. 82 (1793); Guér. Iconog. 387, pl. lxii. fig. 4; *Chrysopa capitata*, Steph. Ill. vi. 102; Wesm. Bull. Acad. Brux. 1840, p. 212; Evans, Tr. Ent. Soc. v. 78, pl. x. fig. 2; Schn. Mon. Chrys. 144, pl. lii; Brauer, Neurop. Aust. 59; Hag. Ent. Ann. 1858, p. 25.

Piceous; head reddish orange.

Head and two basal joints of antennæ reddish orange, rest of the *antennæ* black; *palpi* blackish fuscous.

Prothoraæ obscure reddish orange.

Abdomen reddish at the apex.

Legs testaceous, the knees piceous; *ungues* slightly curved, simple.

Wings short, beautifully iridescent; *neuration* reddish fuscous; *pterostigma* reddish (Pl. XI. fig. 5).

Length of body 4-5 lines; expanse of wings 13-15 lines.

Appears in summer; scarce, but more frequently met with than the preceding species.

According to Schneider, both species are of rare occurence on the continent, though widely distributed. I have never seen either of them alive. In *fulviceps* the lower half of the third cubital cellule is frequently divided by a transverse veinlet.

The following South-European and exotic species, should be placed in *Nothochrysa*.—*Chrysopa italica*, Rossi (S. Europe); *C. stigmatica*, Rambur (S. Europe); *C. corsica*, Hagen (Corsica); *C. æqualis*, Walker (uncertain locality); *C. variegata*, Burmeister (Comoro Islands); *C. rufostigma*, M'Lachlan (S. Africa); *C. gigantea*, M'Lachlan (S. Africa); *C. neurodes*, Rambur (S. Africa; the third cubital cellule is not correctly delineated by Schneider); *C. tripunctata*,* M'Lachlan (Australia); *C. insignis*, Walker (Australia); *C. infecta*, Newman (Malabar); and perhaps others with which I am unacquainted.

A group of species, chiefly from tropical America, of which *C. varia* of Schneider may be taken as the type, distinguished by an excised labrum, very long antennæ, broad wings, graceful form, and generally pale colour, (often with rich markings), will form another genus, to which the name *Leucochrysa* may be applied.

Division III. PANORPINA.

Antennæ sub-setiform or filiform. *Head* small; *front* produced into a rostrum, which is deflexed vertically; *ocelli* present (*Panorpa*) or absent (*Boreus*); *mandibles* usually toothed internally. *Prothorax* narrow and transverse. *Meso-* and *meta-thorax* large. *Abdomen* subcylindrical, the male with the three terminal segments usually modified.

Legs long and slender; *tibiæ* cylindrical; *tarsi* with the first joint very long; *ungues* usually serrated internally †

* In describing *C. tripunctata* (Journ. Linn. Soc. ix. 250), I placed it in the section "labrum antice rotundatum." The true definition of this part in the type was difficult, owing to the position the palpi had assumed. Further examination induces me to believe that the labrum is in reality slightly emarginate, as from analogy it should be.

† The genus *Bittacus* (which does not occur in the British Isles) has only one claw.

Wings linear, obtuse, nearly equal (*Boreus* is subapterous), no anal space; hyaline; the *costa* and *subcosta* are sub-parallel, and both join the costa before the apex; *pterostigma* indistinct. In repose the wings are carried longitudinally, and nearly horizontally.

Larva subterraneous.

The two British genera form two families, and the generic characters apply to the families in so far as our insects are concerned.

Family I. PANORPIDÆ.

Genus I. Panorpa, Linné.

Rostrum long; *ocelli* present; *clypeus* elongated, acuminate at the apex, projecting to the extremity of the labrum; *mandibles* narrow, unidentate; *maxillæ* with two ciliated lobes; *maxillary palpi* with the joints nearly equal, the terminal one more slender; labium elongate; *labial palpi* 4-jointed (according to Westwood), the three first joints broad, the terminal one more slender.

Abdomen sub-cylindrical, long; the second segment is sometimes produced above posteriorly; the fifth segment is elongated, and somewhat acuminate. In the male the three terminal segments are corneous and modified; the two first being more or less conical; the terminal (or eighth) is dilated, and carries a pair of forceps. The composition of this segment is very complicated; the basal portion, which is probably the true segment, is small, and carries two large dilated pieces, at the extremity of which is placed the forceps, the branches of which are irregularly toothed within; the upperside (or the surface which is opposite the dorsum of the abdomen when the terminal segment is recurved) is occupied by an elongate oval plate placed between the two lateral pieces; the lower side (that which is seen uppermost) carries two long appendices arising from the base of the segment, and within these are spine-like processes which are probably the penis-sheaths, the penis being small and concealed. In the female the three last segments are slender and not recurved, the terminal one carrying two diverging articulated appendices.*

* Although I have here followed other authors in giving *eight* abdominal segments, it appears probable that there are in reality *nine*; the first being confused with the hinder part of the meta-thorax. If this supposition be correct, the three modified male terminal segments should be called the seventh, eighth, and ninth, instead of the sixth, seventh, and

Legs long and slightly spinose; *ungues* broad and strongly serrated within; *pulvilli* large and spongy.

Wings long and narrow, the posterior slightly shorter and broader than the anterior; *transverse veinlets* rather numerous towards the apex, forming elongate cellules; the sub-costa joins the costa beyond the middle* in the anterior wings, and far before the middle in the posterior; the radius soon furcates, and forms an elongated discoidal cell; the basal portion of the wing has but few transverse veinlets (Pl. XI. fig. 7).

Though so common, the earlier stages of these insects were long a mystery. Stein first threw light on the subject by the discovery of the pupa, which he described and figured in Wiegmann's Archives for 1838, and their life-history has since been published by that pains-taking Neuropterist, Herr Brauer, who has given the result of his observations in the Sitz. Akad. Wissensch. of Vienna for 1851, and in the Verh. zool.-bot. Gesell. of Vienna for 1863. With the idea that a detailed account of Herr Brauer's discovery may be interesting to British Entomologists, I here give a translation of his latter paper, so far as the larva is concerned.

"The imagines may be kept alive with meat for about a month; those that die are at once devoured by the survivors. Several days after pairing, the female lays her eggs (never many, twelve at the utmost) in crevices of damp earth, and surrounds them with a viscid fluid. They are at first white, afterwards yellowish-gray, and their chorion is marked with net-like ridges."

"The larvæ emerge from the egg in eight days. They are then $\frac{2}{3}'''$ long, and $\frac{1}{8}'''$ broad. Immediately after emerging, they are white with black eyes, but soon become gray. On the whole they are then similar to full-grown larvæ, but are distinguished by the much thicker antennæ, and by the first to seventh abdominal segments having two warts above, each bearing one jointed bristle, which are also seen on the eighth to the tenth segments, but are there larger, and there are two on the eighth and ninth segments; these latter remain in all stages of growth, whereas the former are thrown off at the first moult."

eighth. The detached abdomen of a fresh example of *P. germanica* appeared to show clearly a rudimentary basal segment; see Plate XI. fig. 7 *a*, indicated at *a*.

* This refers only to British species; in the Continental *P. variabilis*, and in many exotic species, the sub-costa scarcely extends beyond the middle of the costa.

"Among generic characters the dentation of the mandibles stands pre-eminent. It remains constant throughout every moult. I therefore describe it together with the full-grown larva. The head is dark brown; the soft fore-part of the upper lip and the front border of the accessory part are white. The upper mandibles are strong, horny, triangular, their tips somewhat curved inwards; on the inner edge is a short blunt tooth, followed by a still shorter one, beyond which the mandibles increase considerably in breadth; the inner edge below these teeth is slightly concave. The lower mandibles have a broad basis, connected by a membrane with the under lip; the stalk and the hooks may be described as composing an angle; the hook is somewhat horny, and bears a round membranous masticatory piece, which in front and on the inner edge has very short points and is rough; on the outer side of these parts are the maxillary palpi, which are four-jointed, the first three joints almost equal, cylindrical, gradually diminishing in thickness, the last joint conical; the labial palpi are placed close together, short and thick, with two cylindrical basal joints, and one conical end-joint, which is as long as the other two united. The antennæ distinctly protrude; the first two joints are short, thick, and cylindrical; the third is thin, and twice as long, cylindrical at the base, thickened towards the end, and therefore somewhat clavate; the fourth is narrow, slightly spindle-shaped or cylindrical, provided at the end with three short points in very young larvæ."

"The large eyes lie behind and a little beneath the antennæ, exactly on the sides of the head; they are slightly contracted, and thus give the larvæ a strange appearance. On the clypeus and frontal and posterior plates of the head stand solitary bristle-like hairs. The head is not closely connected with the first thoracic segment, as the intervening membrane is considerably wide; beneath the latter there runs a fine, slightly curved, horny ridge. The pronotum is horny, broader than long, quadrangular; on its hinder edge, on each side, is the first spiracle. The other thoracic segments are membranous above, and bear only isolated small horny plates, a larger one in the middle, and two smaller ones on each side, on which stand solitary short bristle-like hairs; these plates vary somewhat in different species."

"The legs are short; the coxæ thick and cone-shaped; the femora cylindrical, with a narrow but distinct horny ring at the base; the tarsi are cylindrical, and between them and the tibiæ is, posteriorly, a small peg-like appendage surrounding the hinder part of the tarsus at its base; one might look upon this as a trochanter, but then it would be necessary to consider the coxæ as continuations of the thorax (as, indeed, such are found in the larvæ of *Phryganidæ*), and then the coxæ would be what have been termed thighs, but in that case we miss the separation of the tarsus and foot; the foot is very short, conical, ending in a small simple hook, only well seen on the hinder pair. The thoracic segments, however, leaving the legs out of the question, are of equal thickness with the seven following abdominal segments, and the meso- and meta-thorax agree in structure with them, only they do not bear any spiracles. The first to the seventh abdominal segments bear, each in the middle above, a broad triangular spot rolled up behind, within which the skin looks harder and horny; the rolled up portion bears on each side two bristles; on each side of this spot is a smaller horny plate, the hinder end of which becomes gradually more warty, and bears one bristle; posteriorly the middle plates gradually disappear; in place of the harder plate-like skin, there stand small wart-like protuberances, and on those, as previously mentioned, are placed the four bristles; the skin is of a darker colour round the spots. On closer examination, one observes that each end of the middle plate, standing above in the middle, consists of four smaller parts, divided by a cruciate membranous furrow. On the sides of the second and third thoracic segments are two dark horny wart-spots, one beneath the other, and on the sides of the first to the eighth abdominal segments are three such small plates in a triangle, the foremost of which bears the spiracle. On the underside of the said segments are nipple-like abdominal feet, increasing in size posteriorly. As peculiar distinctions, the eighth and ninth segments bear on the upper side two large cylindrical warts with a long-jointed bristle, and the tenth a median upper one. Out of the tenth segment a four-jointed holding-fork can be protruded, the spikes of which are blunt and cylindrical, two standing out sideways, and two straight behind. Internally numerous muscles approach this fork, the border of which is trans-

parent; it causes an exudation of an adhesive moisture, by means of which the larva is enabled to adhere for a time to highly polished surfaces."

"The larvæ never attack directly the raw meat with which they are fed, but generally burrow at some distance from it, and then tunnel a horse-shoe-shaped passage, one end of which comes up directly beneath the meat. If the food is rapidly turned over, they retire backwards into their tunnel, and escape unseen through the other free end, where they can easily attain the surface, which in the untunnelled earth they would not succeed in doing so readily, as they can dig but slowly. They behave like the false caterpillars of some saw-flies; they often run backwards rapidly, or stand freely up by means of their anal fork, and clean their legs with the mandibles by lowering the head and passing the legs through them. If touched, they roll themselves up, and feign death."

"They are full-grown in thirty days, and then burrow deeper into the ground, excavate an oval cell in a small lump of earth, and remain as larvæ for several months before assuming the pupa state. In this condition they shrivel to one-half of their previous length, the underside increases in thickness, and the end of the body is somewhat curved against the back. If taken out they move slowly, and have no power to walk. The bristles on the three last segments are then partly broken off."

The fact that Brauer reared his larvæ upon meat proves that ordinarily they are carnivorous, subsisting probably upon worms and underground larvæ.

Of these insects, so well known as "Scorpion Flies," we appear to have three species in Britain. The true specific differentiation can only be arrived at from an examination of the terminal segments of the male. The amount of black markings on the wings is only of slight importance, inasmuch as the variations in this respect are endless, and, as this character was the one mainly attended to by many authors, it happens, that by one, many so-called species were divided, and by another, all these were equally erroneously reduced to varieties of one. The number of teeth in the claws, a character to which Rambur would seem to have attached considerable importance, is unstable, and one or more teeth are frequently concealed by the large pulvilli.

The perfect insects are active and predaceous, living on other insects, which they pierce with their long rostrum; with this instrument they will also inflict a sharp and momentarily painful wound on the fingers, when incautiously handled.

Our three species can be tabulated thus:—

A. Terminal margin of the fifth segment in the male straightly truncated; sixth (antepenultimate) segment conical (Pl. XI. figs. 6, 7*a*).
a. Appendices of the male linear (Pl. XI. fig. 6*a*). . . . . *P. communis*.
a. a. Appendices flattened, dilated and truncated at the apex (Pl. XI. fig. 7*b*). *P. germanica*.
A A. Terminal margin of the fifth segment excavated, sixth segment sub-cylindrical, not conical; appendices linear (Pl. XI. fig. 8, 8*a*). *P. cognata*.

I have restricted the references and synonymy to those authors whose descriptions or types permit of a tolerably certain opinion being formed as to the species intended. Both Westwood and Klug, who have monographed the genus, wrongly unite all the European forms under one head; hence, I have omitted all reference to their works. Stephens' collection of these insects has been re-arranged since it became national property, and his *borealis* is no longer recognizable with surety, as no specimen is so labelled by him.

1. Panorpa communis, Linné.

Panorpa communis, Linn. Faun. Suec. 384 (1761), Syst. Nat. i. 915; Leach, Zool. Miscell. ii. 98, pl. xciv. fig. 2; Steph. Ill. vi. 52; Curt. Brit. Ent. pl. dcxcvi. text 1; Ramb. Névrop. 328; Brauer, Neurop. Aust. 36, fig. 17; Hag. Ent. Ann. 1858, p. 32; Eaton, Ann. & Mag. Nat. Hist. 1867, p. 396.

Head: vertex black, marked with dark castaneous beneath the eyes; back of head yellowish; *front* and *rostrum* castaneous, with two longitudinal blackish stripes; *antennæ* black, the basal joint reddish castaneous.

Prothorax black, margined with yellow. *Meso-* and *meta-thorax* black, yellowish in the middle. The whole of the breast yellowish.

Abdomen with the first five segments black, the lateral basal sutures yellowish. In the ♂, the second segment is scarcely produced in front above; the fifth is long, cylindrical, narrowed at the apex, truncate; the sixth cone-shaped, shorter than the fifth, very slender at the base, reddish castaneous, with a large black blotch above; the seventh similar in colour to the sixth, and very similarly formed, only that the apex above is somewhat obliquely truncated; the eighth (terminal) reddish testaceous, broad, the two branches of the forceps crossing each other in a very oblique direction; appendices very long, hairy, cylindrical throughout, approximating at the base and apex, but somewhat distant in the middle, the tips black (Pl. XI. figs. 6, 6*a*); in the ♀, the three terminal segments are reddish castaneous, short, the penultimate the shortest; appendices black.

Legs grayish yellow; *tibiæ* with a few black spines; *spurs* testaceous; *tarsi* blackish or fuscous; *ungues* with long and strong teeth internally.

Wings hyaline, with colourless membrane, and blackish fuscous markings; ordinarily with two spots near the base, forming an incomplete fascia, a complete irregular fascia beyond the middle, the apex broadly margined; detached dots between the fasciæ; these markings all vary much, and some of them are often absent; *pterostigma* indistinctly yellowish; *neuration* black, some of the transverse veinlets paler.

The largest British species. Length of body, ♂, 7 lines, ♀, 6 lines; expanse of wings 12-15 lines.

Abundant everywhere.

2. Panorpa germanica, Linné.

Panorpa germanica, Linn. Syst. Nat. i. 915 (1767); Curt. Brit. Ent. pl. dcxcvi; Ramb. Névrop. 329; Hag. Ent. Ann. 1858, p. 32; Eaton, Ann. & Mag. Nat. Hist. 1867, p. 397. *P. affinis*, Leach, Zool. Miscell. ii. 98, pl. xciv. fig. 2 (1815); Steph. Ill. vi. 52; Curt. Brit. Ent. pl. dcxcvi, text 2. *P. apicalis*, Steph. Ill. vi. 52 (1836); Hag. Ent. Ann. 1858, p. 33. *P. borealis*, Steph. Ill. vi. 53 (1836) ?. *P. montana*, Brauer, Neurop. Aust. 36 (1857).

Head: vertex castaneous, blackish in the middle; the back of the head yellow; *front* and *rostrum* testaceous, black below the basal joints of the antennæ, with two

indistinct fuscous longitudinal stripes; *antennæ* dark blackish fuscous, the basal joints conspicuously yellow.

Prothoraæ blackish, yellow behind and at the sides. *Meso-* and *meta-thoraæ* black at the sides, yellow in the middle. The breast yellowish.

Abdomen blackish, excepting the terminal segments; lateral sutures and the hinder margin of each segment yellow; in the ♂, the second segment is strongly produced in the middle above, overlapping the third; the fifth is scarcely longer than the sixth, ob-conic, truncated and margined with testaceous posteriorly; the sixth testaceous, marked with blackish above, cone-shaped, very slender at the base; the seventh slightly smaller than the sixth, more obliquely truncated in front above; the eighth (terminal) short, strongly dilated, the branches of the forceps shorter than in the last species; *appendices* short, flattened, dilated and truncated at the apex, usually blackish (Pl. XI. figs. 7*a*, 7*b*); in the ♀, the three terminal joints are strongly hairy, the two first broad and nearly equal, the last longer and narrower, with black appendices.

Legs grayish yellow; *tibiæ* with few blackish spines; *spurs* yellowish; *tarsi* fuscescent; *ungues* with fewer and shorter teeth than in the last species.

Wings sub-hyaline, with blackish markings, the membrane with a decided dark tinge; the spots scarcely forming fasciæ, the apex narrowly margined; *pterostigma* scarcely indicated; *neuration* black, with some paler transverse veinlets (Pl. XI. fig. 7).

Length of body, ♂, 4½-5 lines; ♀, 5 lines; expanse of wings 10-12 lines.

Very abundant everywhere. Varies greatly in the number of the spots; sometimes all are absent, excepting the apical margination; on these variations Stephens' species are founded.

Linné's type (♂) still exists in his collection, and bears a label "*germ.*" in his own handwriting.

It may be at once distinguished by the flattened and truncated appendices of the male.

3. Panorpa cognata, Rambur.

Panorpa cognata, Ramb. Névrop. 330 (1842); Eaton, Ann. & Mag. Nat. Hist. 1867, p. 397. *P. germanica*, Steph. Ill. vi. 53 (not of Linné); Brauer, Neurop. Aust. 36, fig. 18. *P. alpina*, Ramb. Névrop. 330 (1842)?; Hag. Ent. Ann. 1858, p. 32.

Head: vertex castaneous, blackish in front; back of the head yellow; *front* and *rostrum* reddish, with scarcely darker lines; *antennæ* blackish, the basal joint reddish.

Prothoraæ blackish, yellowish at the sides. *Meso-* and *meta-thoraæ* blackish at the sides, yellow in the middle. Breast grayish yellow.

Abdomen blackish, the lateral sutures and the hinder margins of the segments yellow; in the ♀ the fifth segment (as well as the three terminal ones) is reddish; in the ♂ the second segment is not visibly produced in the middle above; the fifth a little longer than the fourth, scarcely narrowed posteriorly, the sides of the posterior margins deeply excavated; the sixth cylindrical, not narrowed at the base, above somewhat fuscescent in the middle, and with the upper posterior margin elevated; the seventh cone-shaped, scarcely shorter than the sixth; the eighth (terminal) strongly dilated, the branches of the forceps short; *appendices* long and slender, not dilated, reaching to the base of the forceps, straight, diverging (Pl. XI. figs. 8, 8*a*); in the ♀, the terminal segments are gradually narrower.

Legs grayish yellow, or reddish; *tibiæ* with few blackish spines; *spurs* testaceous; *tarsi* fuscescent; *ungues* with few teeth.

Wings with few grayish or blackish markings, and with the membrane slightly tinted; the markings are, as a rule, reduced to a broad apical margination and one or two spots beyond the middle, whereof that at the pterostigma is conspicuous; *neuration* fuscescent, with a few pale transverse veinlets.

Size of *P. germanica*, and much resembling pale forms of that species. May always be separated by the form of the terminal abdominal segments and appendices of the male.

Local; appears to be most frequent in the New Forest.

Hagen (Ent. Ann. 1858) gives *P. apicalis* of Stephens as distinct; the types are not separable from his *P. germanica*.

It is scarcely probable that we have more species of *Panorpa* in Britain; though *P. variabilis* may occur on some of the higher mountains, and *P. meridionalis* should be looked for in the south-west of Ireland.

Family II. BOREIDÆ.

Genus I. Boreus, Latreille.

Rostrum long; *eyes* large, oval; *ocelli* absent; *mandibles* with several teeth at the apex internally; *maxillæ* connate with the mentum at the base; *maxillary palpi* with the joints slender, nearly equal; *labial palpi* very short, 2-jointed, the second minute.

Abdomen short and stout. In the ♂ the apex is curved upwards; the terminal dorsal segment is modified into two large cylindrical tubes, from each of which springs a slender appendix, which is directed backwards upon the dorsum; the last ventral segment takes the form of a large, elongate, oval or triangular plate; the penultimate segment is very narrow, especially on the dorsum. In the ♀ the apex is furnished with two elongated slender ventral valvules, in which, and extending beyond which, is a long tri-articulate borer.

Legs slender, cylindrical; first joint of the tarsi very long; *ungues* two, slender, simple; *pulvilli* small.

Wings rudimentary. In the ♂ four, slender, bristle-like, curved, serrated internally. In the ♀ in the form of a small scale-like lobe on each side of the meso-thorax.

Larva living in the earth or amongst moss.

The following account of the habits of the larva, etc., is abstracted from Brauer's paper, Verh. d. zool.-bot. Ver. in Wien, 1855, pp. 711-712. When paired the female is seated on the back of the male. The females died at the end of March and beginning of April, and on the 11th May he found larvæ in the breeding-glass, half a line in length, which he had little doubt were those of *Boreus*. In a later paper in the same journal, 1862, pp. 320-323, is a more detailed account from certain observation. The larva is short, thick, and curved; the head horny, pale-brown, broadest behind; the antennæ short; the mandibles toothed internally; the thoracic segments form the thickest part of the body; the divisions little evident. The legs, six in number, short, three-jointed, the first joint thick and conical, the second cylindrical and more slender, the third (or foot) rod-shaped, somewhat curved. The abdomen cylindrical, much thinner than the thorax, and with warts on the sides and above; the last segment rounded, without hooks. It fed upon moss, and its food imparted a

greenish colour to the white body, in consequence of the latter's transparency. The metamorphosis into the pupa state began in September, but many larvæ were already full-grown in February. The pupa is placed in a small cylindrical tunnel in the earth, which is lined with fine web. It is similar to the imago, but shorter and thicker; the colour at first yellow, afterwards pale greenish-yellow; the vertex, eyes, and pro-notum black; the antennæ and legs lie at the sides of the body, and the rudimentary wings are already seen, as are also the sexual characters. It comes to the surface to change to the imago state.

1. Boreus hyemalis, Linné.

Panorpa hyemalis, Linn. Syst. Nat. i. 914 (1767); Fab. Syst. Ent. 314. *Boreus hiemalis*, Latreille, and other authors. *Gryllus proboscideus*, Panz. Faun. Germ. part xxvii. p. 18 (1796).

Varying from greenish-yellow in very immature examples to bronzy-green or bronzy-brown in very mature ones; the basal half of the antennæ, the rostrum (except at its apex), the whole of the pectus, the legs (save at the articulations), the wings of the ♂, and the oviduct of the ♀ (excepting the tip), more or less yellowish or yellowish-brown. In the ♂ the posterior edge of the first (second?) dorsal abdominal segment bears an erect truncated lobe, the lateral edges of which are directed obliquely inwards, so that the truncated apex is the broadest part; the succeeding segment bears a sort of tubercle on its hinder edge, smaller and less conspicuous than the above-mentioned lobe; the ventral valve is triangular, the apex produced, and scarcely acute, entire.

Length of body, ♂ 1¾-2 lines; ♀ (with oviduct) 2½ lines.

This truly winter insect is found in moss from October till March, and has been observed on the surface of the snow. It is apparently most frequent in the North of England, though occasionally found near London, Mr. Walker having taken it at Southgate, and Messrs. Douglas and Scott near Croydon. These latter gentlemen noticed its peculiar saltatorial habits, which are also indicated by Zetterstedt, and appear to obtain in

both sexes; though it is difficult to imagine by what structural characters the insect is enabled to effect the jumps. The male seems to be much more rare than the female.

Hagen (Ent. Mo. Mag. iii. 132) indicates the British insect as distinct from that of Linné, under the name of *B. Westwoodii*, giving as differentiating characters the pale colour of the legs, rostrum, etc., and the slightly grooved apex of the ventral valve in the ♂. I have been unable to identify *B. Westwoodii*, never having seen a ♂, either British or continental, presenting the above-noted structural character in the ventral valve; and so, for the present, I feel compelled to consider our species as that of Linné, not having been able to examine more than three or four males. At the same time, I remark that Dr. Hagen's well-known powers of discrimination render it very probable that two European species really exist.

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Synonymic Catalogue of British Planipennia.

Div. I. SIALINA.

Fam. I. SIALIDÆ.

Gen. i. Sialis, Lat.

Sp. 1. *S. lutaria*, Linn.
flavilatera, Linn.?.
niger, Lat.

Sp. 2. *S. fuliginosa*, Pict.

Fam. II. RAPHIDIIDÆ.

Gen. i. Raphidia, Linn.

Sp. 1. *R. notata*, Fab.
ophiopsis, Curt.
megacephala, Steph.
media, Burm.
angustata, Ratz.

Sp. 2. *R. xanthostigma*, Schum.
Londinensis, Steph.

Sp. 3. *R. cognata*, Ramb.

Sp. 4. *R. maculicollis*, Steph.
affinis, Steph.
hispanica, Ramb.

Div. II. HEMEROBIINA.

Fam. I. HEMEROBIIDÆ.

Gen. i. Osmylus, Lat.

Sp. 1. *O. fulvicephalus*, Scop.
maculatus, Fab.
chrysops, Auct. (*nec* Linn.)
laurifoliæformis, Raz.

Gen. ii. Sisyra, Burm.

Sp. 1. *S. fuscata*, Fab.
confinis, Steph.
nitidulus, Steph.
nigripennis, Wesm.
fumatus, Mots.

Sp. 2. *S. Dalii*, M'Lach.
nitidulus, Walk.

Sp. 3. *S. terminalis*, Curt.

Gen. iii. Psectra, Hag.

Sp. 1. *P. diptera*, Burm.

Gen. iv. Micromus, Ramb.

Sp. 1. *M. variegatus*, Fab.

Synonymic Catalogue of British Planipennia—*continued.*

Sp. 2. *M. aphidivorus*, Schrk.
angulatus, Steph.
villosus, Zett.
intricatus, Wesm.
tendinosus, Ramb.
lineatus, Gözsy.

Sp. 3. *M. paganus*, Linn.
nemoralis, Steph.
lineosus, Ramb.
elegans, Gözsy.

Gen. v. HEMEROBIUS, Linn.
Mucropalpus, Ramb.

Sp. 1. *H. elegans*, Steph.
Marshami, Steph.
paucinervis, Zett.
pygmæus, Ramb.

Sp. 2. *H. pellucidus*, Walk.
fuscescens, Walleng.

Sp. 3. *H. inconspicuus*, M'Lach.

Sp. 4. *H. nitidulus*, Fab.
ochraceus, Wesm.
obscurus, Ramb.

Sp. 5. *H. micans*, Oliv.
punctatus, Steph.
pallidus, Steph.
lutescens, Burm.
irroratus, Costa.
fuscinervis, Schn., var.

Sp. 6. *H. humuli*, Linn.
lutescens, Steph.
affinis, Steph.
paganus, Steph.
apicalis, Steph.
maculatus, Wesm.

Sp. 7. *H. marginatus*, Steph.
flexuosus, Hag.

Sp. 8. *H. limbatus*, Wesm.
subfasciatus, Steph.
irroratus, Steph.
stigma, Steph.
limbatellus, Zett. ?.

Sp. 9. *H. pini*, Steph.
punctatus, Gözsy ?.

Sp. 10. *H. atrifrons*, M'Lach.

Sp. 11. *H. subnebulosus*, Steph.
fuscus, Steph.
nebulosus, Ste. (part).
obscurus, Steph.
nervosus, Steph.
perelegans, Steph.

Sp. 12. *H. nervosus*, Fab.
nebulosus, Ste. (part).
conspersus, Burm.
distinctus, Ramb.

Sp. 13. *H. concinnus*, Steph.
hirtus, Burm.
cylindripes, Wesm.
atomarius, Gözsy.

Gen. vi. MEGALOMUS, Ramb.

Sp. 1. *M. hirtus*, Linn.
fimbriatus, Curt.
tortricoides, Ramb.

Gen. vii. DREPANEPTERYX, Leach.

Sp. 1. *D. phalænoides*, Linn.

Fam. II. CONIOPTERYGIDÆ.

Gen. i. CONIOPTERYX, Hal.
Coniortes, Westw.
Malacomyza, Wesm.
Sciodus, Zett.
Aleuronia, Fitch ?.

Sp. 1. *C. psociformis*, Curt.
aphidiformis, Ramb. ?

Sp. 2. *C. tineiformis*, Curt.
lactea, Wesm.

Sp. 3. *C. aleyrodiformis*, Steph.

Fam. III. CHRYSOPIDÆ.

Gen. i. CHRYSOPA, Leach.

Sp. 1. *C. flava*, Scop.
subfalcata, Steph.
vittata, Schn.

Sp. 2. *C. vittata*, Wesm.
albus, Fab.
perla, Steph.
proximus, Ramb.
integra, Hag.

Sp. 3. *C. alba*, Linn.
ciliata, Wesm.

Sp. 4. *C. flavifrons*, Brauer.

Sp. 5. *C. vulgaris*, Schn.
perla, Fab.
affinis, Evans.
carnea, Ste. (for. bru.)
primaveria, Brauer.
incarnata, Brauer.
rubropunctata, Brau.

Synonymic Catalogue of British Planipennia—*continued.*

Sp. 6. *C. 7-punctata*, Wesm.
angustipennis, Steph.
mauricianus, Ramb.
pallens, Ramb.
nobilis, Brauer.

Sp. 7. *C. aspersa*, Wesm.
prasina, Ramb.
Ramburii, Costa.

Sp. 8. *C. ventralis*, Curt.

Sp. 9. *C. abbreviata*, Curt.
immaculata, Steph.
chlorophanus, Ratz.

Sp. 10. *C. phyllochroma*, Wesm.
abbreviata, Steph.
pusilla, Brauer.
tenella, Brauer.

Sp. 11. *C. perla*, Linn.
chrysops, Fab.
cancellata, Schrk.
maculata, Steph.
reticulata, Steph.

Gen. ii. NOTHOCHRYSA, M'Lach.

Sp. 1. *N. fulviceps*, Steph.
erythrocephalus, Ram.

Sp. 2. *N. capitata*, Fab.

Div. III. PANORPINA.

Fam. I. PANORPIDÆ.

Gen. i. PANORPA, Linn.

Sp. 1. *P. communis*, Linn.

Sp. 2. *P. germanica*, Linn.
affinis, Leach.
apicalis, Steph.
borealis, Steph. ?.
montana, Brauer.

Sp. 3. *P. cognata*, Ramb.
germanica, Steph.
alpina, Ramb. ?.

Fam. II. BOREIDÆ.

Gen. i. BOREUS, Lat.

Sp. 1. *B. hyemalis*, Linn.
proboscideus, Panz.

Explanation of the Plates.

PLATE VIII.

Fig. 1.—*Sialis lutaria*, neuration of anterior wing; 1 *a*, extremity of abdomen of ♂, from above; 1 *b*, ditto, from side; 1 *c*, ventral valve; 1 *d*, maxilla and palpus; 1 *e*, labium and palpus; 1 *f*, mandible; 1 *g*, labrum of ♂; 1 *h*, ditto of ♀; 1 *i*, tarsus.

2.—*Sialis fuliginosa*, neuration of anterior wing; 2 *a*, extremity of abdomen of ♂, from above; 2 *b*, ditto, from side; 2 *c*, ventral valve.

3.—*Raphidia notata*, neuration of anterior wing; 3 *a*, extremity of abdomen of ♂, from side; 3 *b*, ditto, from beneath; 3 *c*, ditto of ♀, from above; 3 *d*, ditto, from side; 3 *e*, maxilla and palpus.

4.—*Raphidia xanthostigma*, neuration of anterior wing; 4 *a*, extremity of abdomen, from above; 4 *b*, ditto, from beneath; 4 *c*, ditto, from side, after death.

PLATE IX.

Fig. 1.—*Raphidia cognata*, neuration of anterior wing.

2.—*R. maculicollis*, ,, ,,

3.—*Sisyra terminalis*, neuration of anterior and posterior wings.

4.—*Micromus variegatus*, ,, ,, ,,
4 *a*, extremity of abdomen of *M. paganus*, from side; 4 *b*, ditto, from beneath.

5.—*Psectra diptera*.

PLATE X.

Fig. 1.—*Hemerobius pellucidus*, neuration of anterior wing.

2.—*H. inconspicuus*, appendices of ♂, from side.

3.—*H. nitidulus*, ,, ,,

4.—*H. micans*, ,, ,,

5.—*H. humuli*, neuration of wings; 5 *a*, appendices of ♂, from side.

PLATE X—*continued.*

Fig. 6.—*Hemerobius marginatus*; appendices of ♂, from above; 6 *a*, ditto, from side.

7.—*H. limbatus*, appendices of ♂, from side.

8.—*H. subnebulosus*, „ „

9.—*H. nervosus*, „ „

10.—*H. concinnus*, neuration of portion of anterior wing; 10 *a*, appendices of ♂, from side; 10 *b*, ditto, from beneath; 10 *c*, extremity of abdomen of ♀, from side.

11.—*Megalomus hirtus*, neuration of wings.

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PLATE XI.

Fig. 1.—*Coniopteryx psociformis*, neuration of wings.

2.—*C. tineiformis*, „ „

3.—*Chrysopa vulgaris*, neuration of anterior wing.

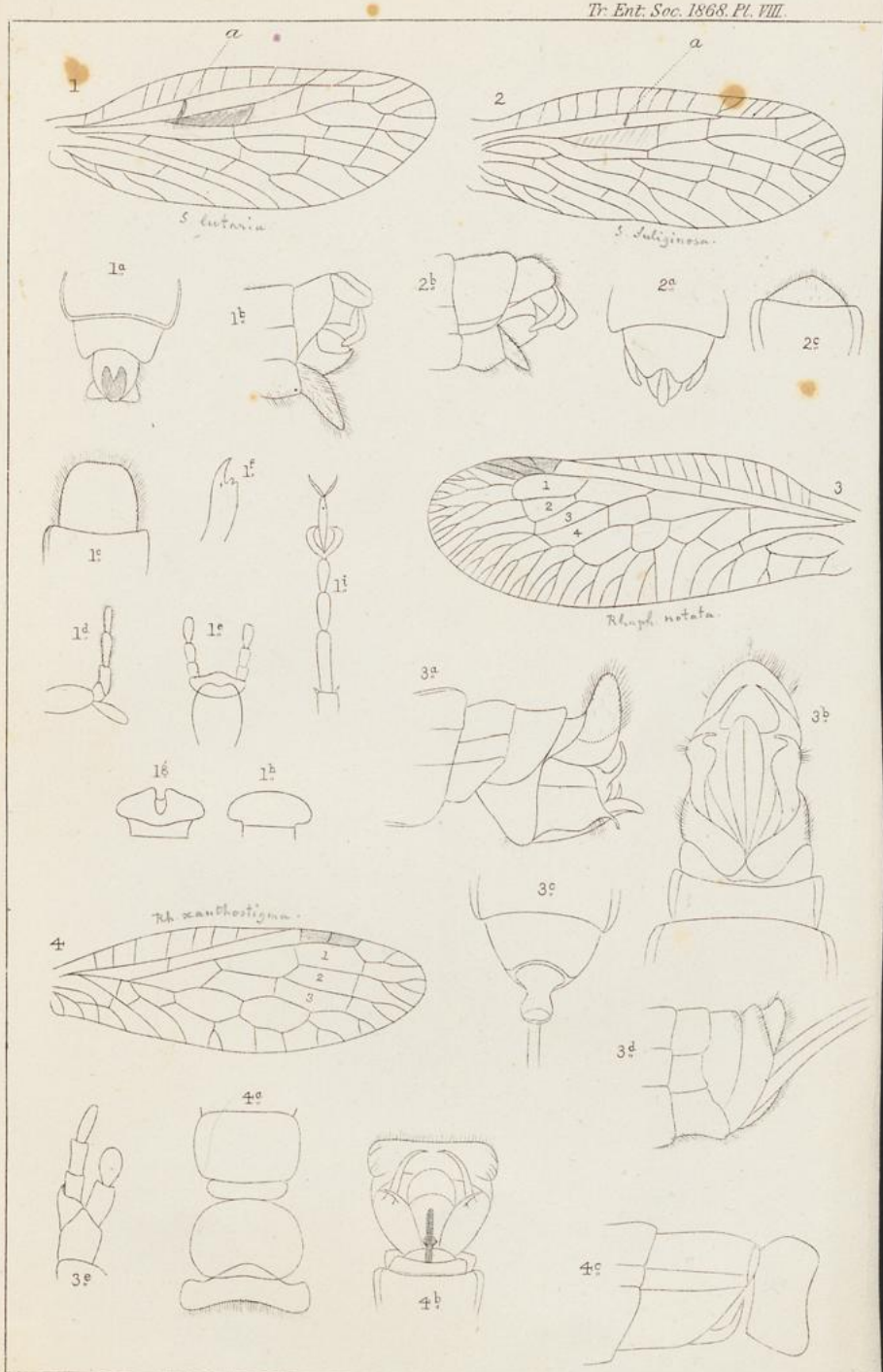
4.—*C. alba*, „ „ (portion); 4 *a*, simple claw of *Chrysopa* (*C. phyllochroma*); 4 *b*, dilated claw (*C. abbreviata*).

5.—*Nothochrysa capitata*, neuration of anterior wing.

6.—*Panorpa communis*, extremity of abdomen of ♂, from side; 6 *a*, appendices of ditto.

7.—*P. germanica*, neuration of wings; 7 *a*, outline of abdomen of ♂, from side; 7 *b*, cheliform terminal segment, and appendices.

8.—*P. cognata*, extremity of abdomen of ♂, from side; 8 *a*, appendices of ditto.



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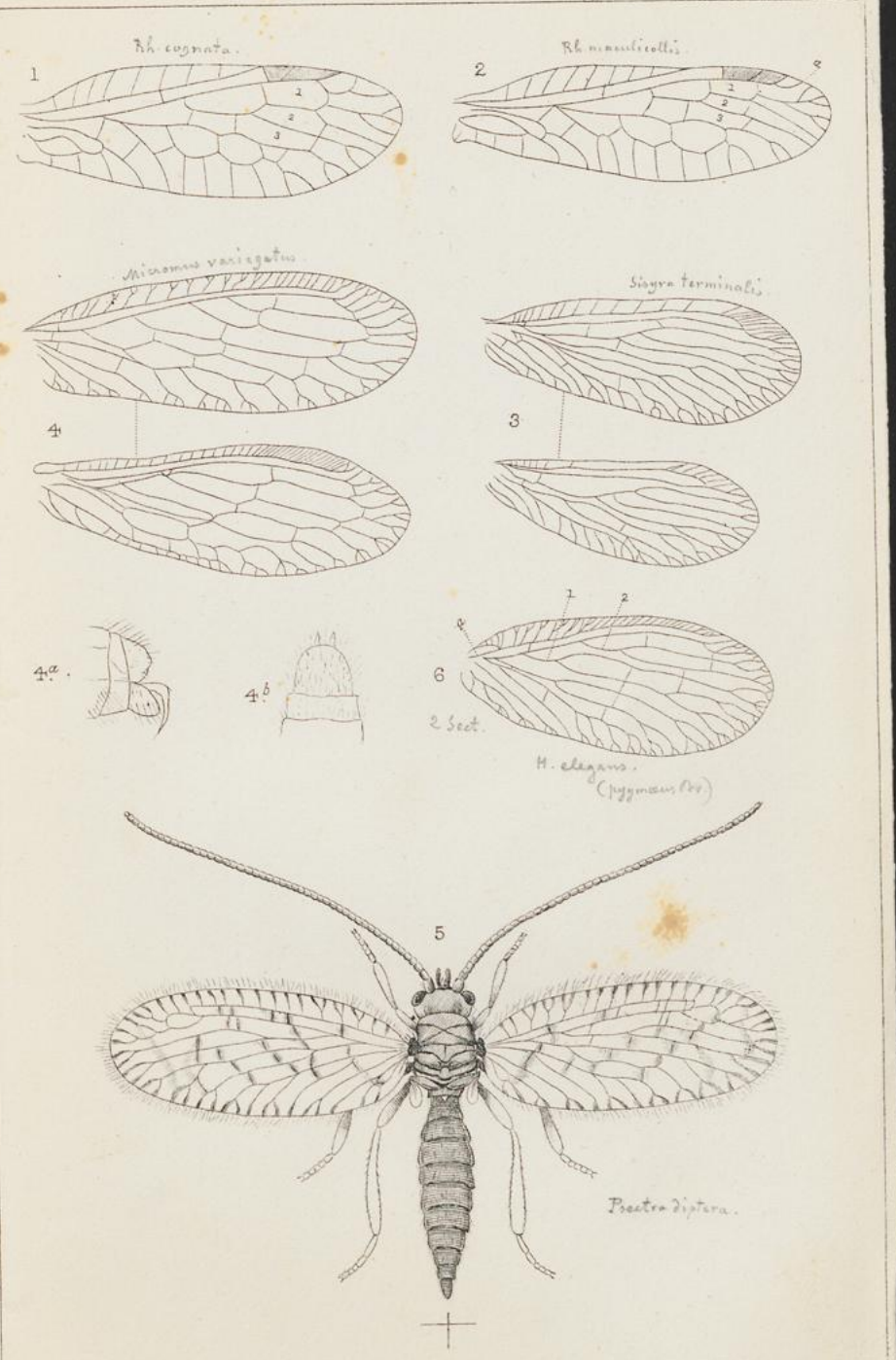

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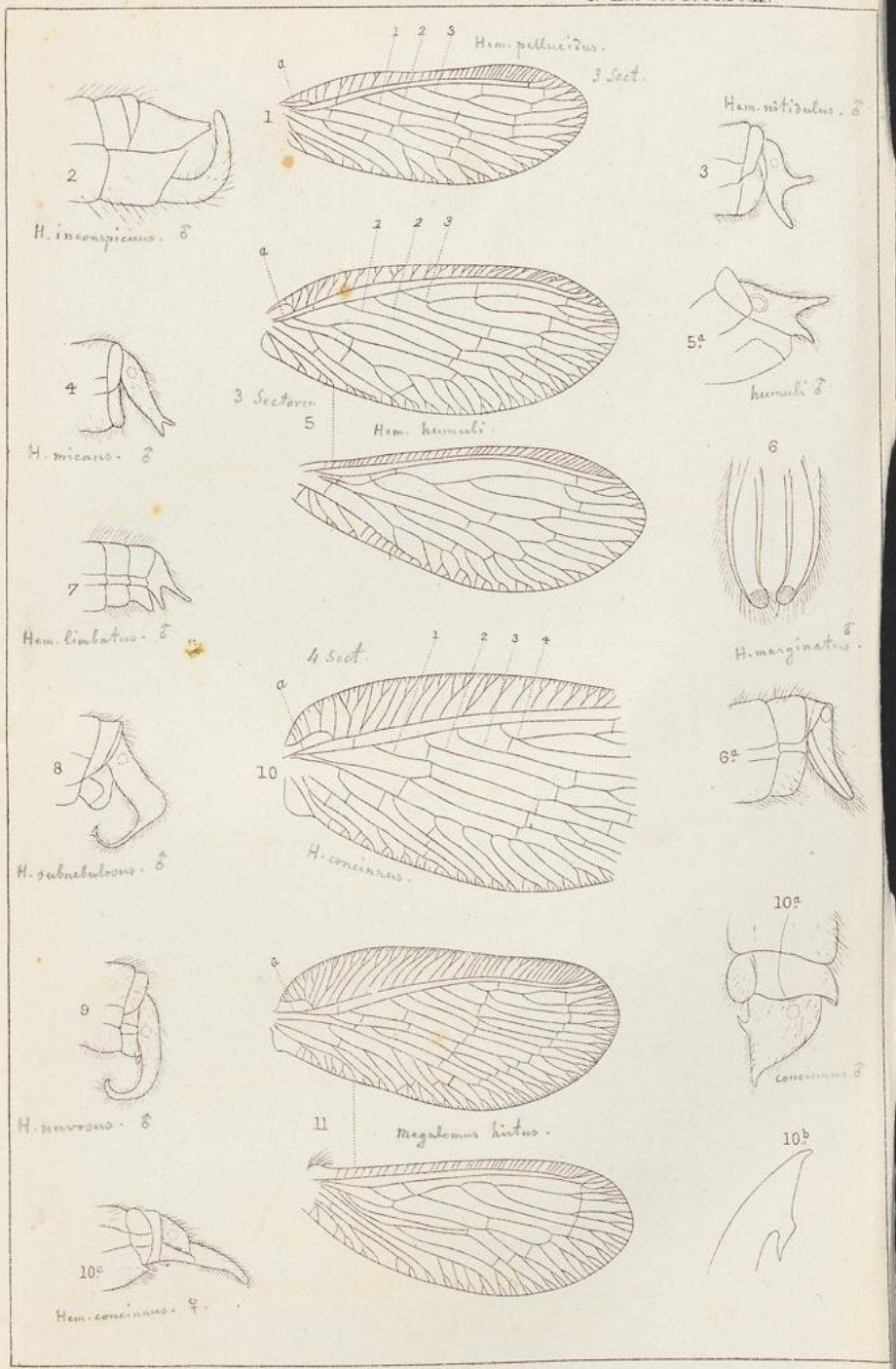
Micromus variegatus F. (1–3 Radialsectoren)
" aphidivorus Schk. (villosus Brau.) intricat. Wesm.
4 Radialsectoren
" paganus L. 5–6. "

2 Sectoren. Hemerob. elegans (pygmaeus Brau.)
3 " " pellucidus Walk.
" " inconspicuus n. sp.
" " nitidulus F. (ochraceus Wesm. Br.)
" " micans Ol. Brau.
" " humuli L.
" " marginatus Steph. (sehr nahe dem humuli.)
" " limbatus Wesm. Brau.
" " pini Steph. = 2. punctatus Gozzy.
" " atrifrons n. sp.
" " subnebulosus Steph.
" " nervosus F. (conspersus Burm.)
4. (saltem) 5 " " concinnus Steph. (hirtus Burm.) cylindripes Wesm
Brauer
2ad. Sect. ? " Megalomus hirtus L.

Tr. Ent. Soc. 1868. Pl. X.



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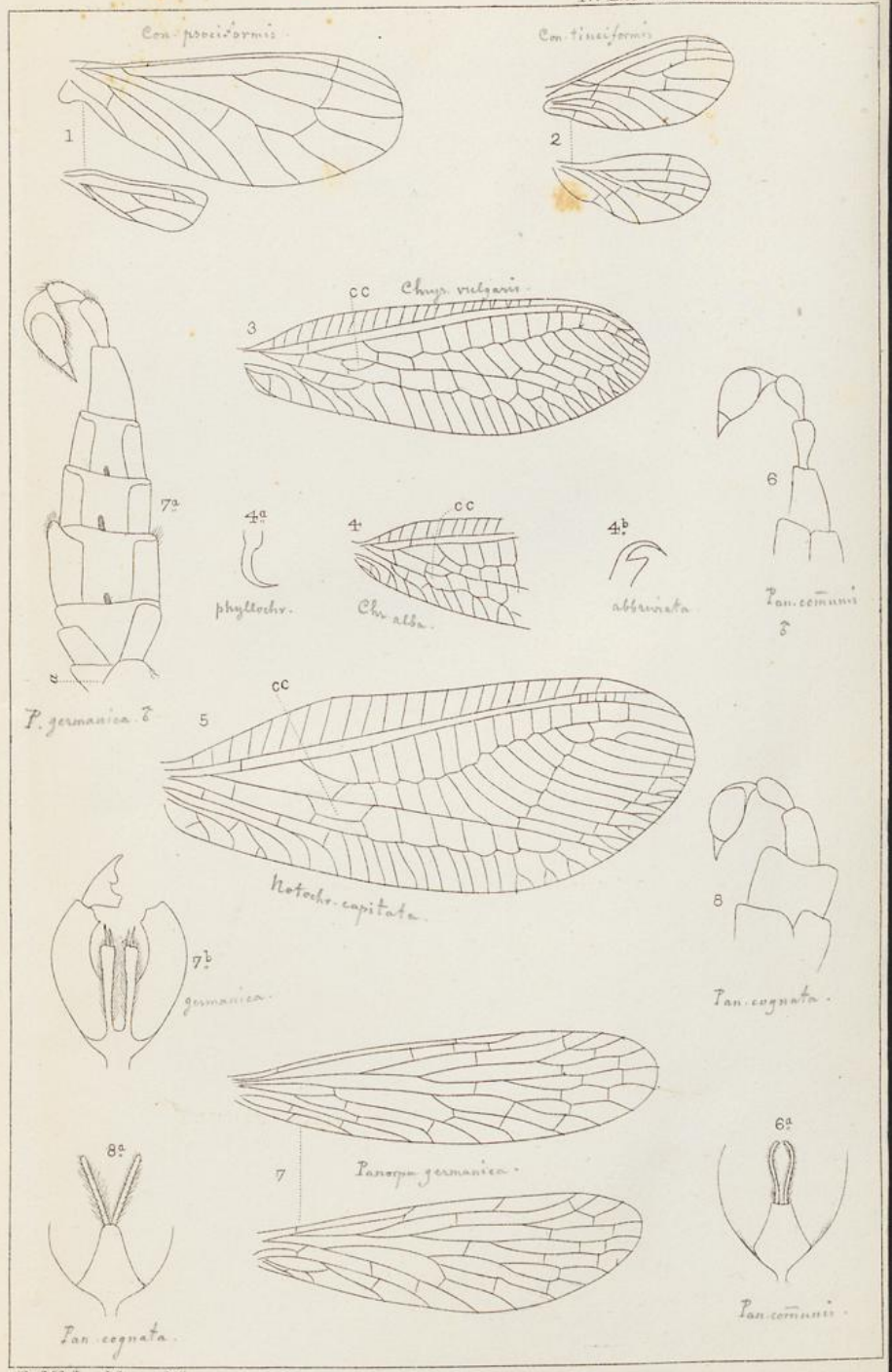

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