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REPORT ON A COLLECTION OF JAPANESE CRANEF-LIES (TIPULIDÆ), WITH A KEY TO THE SPECIES OF PTYCHOPTERA.

BY CHARLES P. ALEXANDER, ITHACA, N. Y.*

(Continued from page 295).

Tribe *Limnophilini*.

Genus *Limnophila* Macquart.

KEY TO THE JAPANESE LIMNOPHILÆ.

1. Wings unspotted (subgen. *Limnophila*) *inconcussa*, sp. n.
Wings marked with brown (subgen. *Pæcilostola*) 2.
2. Large species (male, length 22-25 mm.; wing over 15 mm.);
wings with a few large seams or blotches *satsuma* Westw.
Small species (male, length 10-13 mm.; wing under 12 mm.)
wings with abundant dots in the cells 3.
3. Legs and abdomen yellow throughout; petiole of cell M_1 as
long as cell 1st M_2 *varicornis* Coq.
Legs with segments tipped with brown; abdomen yellow and
brown; petiole of cell M_1 longer than cell
1st M_2 *japonica*, sp. n.

Limnophila inconcussa, sp. n.

Wings unspotted; cross-vein r far from tip of R_1 .

Rostrum brownish yellow beneath, brown above, palpi brown; antennæ dark brown, the third segment more yellowish at its base; antennæ short, reaching about to the wing basis; front, vertex and occiput dark brown, dusted with grey.

Mesonotum greyish with a median brown stripe; pseudo-sutural fovea and tuberculate pits very distinct, black; scutum, scutellum and postnotum brown, pleuræ dark brown (probable that the body, in dried specimens, is grey). Halteres pale. Legs: coxæ and trochanters dull yellow; femora yellow, a little darkened

*Contribution from the Entomological Laboratory of Cornell University.

before the tip; tibiae yellow, brown at tip; first tarsal segment yellow, brown at tip, remainder of tarsi brown. Wings with a brownish yellow tinge; stigma indistinct, brown; veins Sc and R yellow, remainder brown. Venation (see fig. 2, pl. II): R_{2+3} arcuated, long, cross-vein r almost at its fork; Rs long; cross-vein r-m more distad than fork of cell; basal deflection of Cu_1 at or slightly beyond the fork of M.

Abdomen: tergites light brown; sternites much paler, yellowish. Hypopygium (see fig. 12, pl. X): pleurites elongate, slender, cylindrical, clothed with long hairs; two apical appendages, elongated, the outermost longest, more slender, chitinized, directed cephalad, its tip produced into a slender spine and its inner or cephalic edge near the tip armed with blunt denticulae; inner appendage shorter, a little stouter and more fleshy, clothed with long hairs, especially on the inner face; the anal tube prominent, oval.

Vial No. 2.—Tokyo, Japan; 1 ♂, 1 ♀.

Vial No. 9.—Tokyo, Japan; April 25, 1912; 2 ♂, 2 ♀.

Vial No. 17.—Tokyo, Japan; April 25, 1912; 3 ♂, 7 ♀.

Vial No. 27.—Tokyo, Japan; April 25, 1912; 4 ♀.

Holotype.—♂, Vial 2.

Allotype.—♀, Vial 2.

Paratypes.—5 ♂, 13 ♀, in Vials 9, 17 and 27.

Types in author's collection; paratypes in U. S. National Museum and Cornell University collections.

Of the American species, *inconcussa* is most like *toxoneura* O. S. (East. U. S.), but the cross-vein r is removed from the tip of R_1 , fusion of R_{2+3} is longer, etc.; the coloration of the two species is quite different. In Verrall's key to the British species (Ent. Mo. Mag., April, 1887, p. 264, 265), it runs down to *lucorum* Meig., which has a dark brown abdomen, brown legs, etc.

Limnophila (Pæcilstola) satsuma Westwood.

1876.—*Limnobia satsuma* Westwood, Trans. Ent. Soc. Lond., p. 504, pl. 3, fig. 5a, 5b.

1881.—*Limnobia satsuma* Westwood, Trans. Ent. Soc. Lond., p. 383.

1888.—? *Epiphragma satsuma* Bergroth, Ent. Tidskrift, p. 138.

1902.—*Limnobia satsuma* Kertesz, Cat. Dipt., Vol. 2, p. 177.

Male—Length 22.6 mm.; wing 16.8 mm.; hind leg, femur 14.1 mm.; tibia 12.2 mm.

Male—Rostrum and palpi brown, the apical segment of the latter darker; antennæ, segments one and two dark brown, flagellum yellow except the two last segments which are brown; front dark brown, vertex and occiput reddish brown, a narrow median streak continued back from the front.

Pronotum with the scutum dark brown, scutellum yellowish. Mesonotal præscutum rich reddish brown, the lateral margins of the sclerite more greyish, a darker brown median triangle, broadest in front, narrowed to a point at the suture, lateral stripes similar in colour to the median stripe; scutum, lobes dark brown, median line yellowish, dark brown on caudal portion; scutellum and postnotum dark brown. Pleuræ light brownish yellow; propleuræ and dorsal portions of the mesopleuræ up to the wing; root dark brown; mesostigma very large, conspicuous, situated just behind and under the pronotal scutellum. Halteres short, stem yellow, knob brown. Legs: coxæ light yellow; trochanters reddish yellow; femora yellow, tip brown, with a still darker subapical ring; tibiæ slightly darkened at the extreme base, a whitish sub-basal annulus, tip narrowly dark brown; tarsi brownish yellow, tips of the segments darker; legs conspicuously hairy. Wings (see fig. 4, pl. III.): cephalic third deep yellow, caudal portions yellowish grey; surface with conspicuous brown marks: a large blotch at base of M; at origin of Rs; at the cord; a narrow seam to cross-vein r; paler crown margins to Cu and the veins in the vicinity of cell 1st M₂ (discal). Venation (See fig. 4).

Abdomen: tergites rich yellow, extreme apical margin of the sclerites darker; a brown lateral line; sternites lighter yellow, apices, especially of the terminal segments, darker. Hypopygium (See fig. 11, plate X.): viewed from beneath, 9th sternite with caudal margin straight, the sides oblique; pleuræ very short, stout; dorsal apical appendage directed inward, cylindrical, chitinized, its tip with a sharp recurved hook; ventral apical appendages, two, the outermost chitinized, broad at base, rapidly tapering to a sharp point, directed inward, the lower appendage

is fleshy at the base, more chitinized at the tip, its caudal or outer margin grooved to receive the outer appendage. Viewed from above, 9th tergite concave, with a projecting median lobe; anal tube conspicuous, more pointed at upper end than in *japonica*.

One male (Vial No. C; Tokyo, Japan; August, 1912); I give the above description to supplement Westwood's brief characterization. The species agree with *barbipes* Meigen (Europe) in its conspicuously hairy legs.

Limnophila (Pæcilstola) japonica, sp. n.

Wings spotted; tibiae and femora tipped with brown.

Male.—Length 10-13 mm.; wing 9.8 mm. *Female*, length 15 mm.; wing, 11-12.3 mm.

Male.—Rostrum and palpi dark brown; antennae dark brownish black, except segment three, which is pale yellow basally, the tip brown; antennae short, if extended backward it would barely reach the wing basis; segment one elongate, as long as the succeeding three combined; segments 2-5 broad, oval-pyriform, gradually becoming more cylindrical; segments 6-16 cylindrical more elongate toward the end; front, vertex and occiput dark brown.

Pronotum and mesonotum dark brown. Pleurae dark brown. Halteres long, stem yellow, knob brown. Legs: coxae and trochanters dull brownish yellow; femora light yellowish brown, the tip broadly brownish black; tibiae with base narrowly dark brown, remainder yellow, except the broad dark brown tip; tarsi dark brownish black. Wings tinged with brownish, cells C and Sc rather brighter; veins yellowish brown; wing spotted with brown, varying greatly in the size of the markings; in one (♀, Vial A), there are large brown spots at origin of Rs, tip of Sc and fork of R₂₊₃, and abundant pale brown dots over the wing surface; in a second specimen (♂) the wing disk is heavily marked with brown, a series of brown marks in the costal cell, a large square blotch at origin of Rs, another at tip of Sc₁ extending partly down across the cord; others at tips of R₁, R₂ and R₃; large, paler brown dots in all the cells of the wing. Venation (see fig. 2, pl. III).

Abdomen: tergites brownish; sternites dull yellow, apical third of each sclerite brown. Hypopygium (see fig. 10, pl. X): viewed

from above, 9th tergite, caudal margin almost straight with a little rounded knob or hook on either side of the median line; pleurites very short and stout, with three apical appendages, the more dorsal being the longest, slender at base, swollen subapically, the extreme tip slightly hooked and strongly chitinized, this appendage directed caudad and entad; two ventral appendages, the more dorsal being short, blunt, very strongly chitinized at its tip and with numerous, triangular denticulae, closely and regularly set; ventral appendage slender, curved at a right angle, its tip directed cephalad. Anal tube very conspicuous, pale whitish, slightly notched at its tip. Second gonapophyses rather slender, tips expanded, the organs directed caudad. Viewed from beneath, the 9th sternite has a rectangular median protuberance.

Female.—Similar, larger; the dark apices of the abdominal sternites not well marked.

Vial No. A.—Tokyo, Japan; April 25, 1912; 1 ♀.

Vial No. 7.—Tokyo, Japan; April 25, 1912; 2 ♂, 1 ♀.

Vial No. 18.—Tokyo, Japan; June 26, 1912; 4 ♀.

Vial No. 23.—Tokyo, Japan; June 25, 1912; 3 ♂.

Vial No. 48.—Tokyo, Japan; August, 1912; 1 ♂.

Holotype.—♀. Vial 48.

Allotype.—♀. Vial A.

Paratypes.—5 ♂, 5 ♀. Vials 7, 18, 23.

Types in author's collection; paratypes in U. S. National Museum and Cornell University Collections.

This species differs from *L. varicornis* Cog. (Japan)* in its shorter antennae; legs not all yellow, but the segments conspicuously tipped with darker; abdomen not yellow; wings with petiole of cell M_1 much longer than cell 1st M_2 , etc. *L. varicornis* also, is probably a *Pæcilostola*.

Tribe *Pedicini*.

Genus *Tricyphona* Zetterstedt.

KEY TO THE JAPANESE TRICYPHONÆ.

1. Wings hyaline or nearly so, not spotted or striped; cross-veins r-m connected with vein R_{4+5} beyond the fork of R_s *insulana*, sp. n.

*Proc. U.S. Nat. Mus. vol. 21, p. 304 (1893).

- Wings spotted or striped with brown or yellow; cross-vein r-m connected with the radial sector at or before its fork. . . . 2.
2. Wings with a broad, yellow subcostal streak, extending from the base of the wing to the apex; median cross-vein absent. *kuwanai*, sp. n.
- Wings with a narrow brown seam along the cord, and rounded brown spots on most of the cross-veins and at the ends of most of the longitudinal veins; median cross-vein present. *vetusta*, sp. n.

Tricyphona kuwanai, sp. n.

Color yellow; mesonotum with black markings; wings with a conspicuous yellow longitudinal streak.

Female.—Length 15.8 mm.; wing 12.2 mm.; abdomen 12.4 mm.

Female.—Rostrum and palpi brown; antennæ, segment 1 brown, segments 2 to 16 light yellow, the terminal flagellar segments more brown; front and vertex brown, the hind part of the vertex, the occiput and the genæ clearer reddish brown.

Pronotum light yellow, brown medially. Mesonotal præscutum light brownish yellow, darkest medially, the sclerite with four rounded, velvety-dark brownish black spots as follows: a small rounded spot on either side of the median line, about mid-length of the sclerite; an oval spot on the sides of the sclerite, about midway between the pseudosuture and the transverse suture; a small triangular black spot on the middle of the transverse suture; scutum light yellow, with velvety-black marks as follows: a double, semilunar transverse mark on the cephalic portions of the sclerite, caudad of these marks are four small dots, the outermost larger, rounded, occupying the middle of the scutal lobes, the inner small and oval, on either side of the median line; a small elongate black mark on the suture, between the scutum and scutellum; scutellum and postnotum brown. Pleuræ light brownish yellow. Halteres light yellow. Legs: coxæ and trochanters light yellow; femora and tibiæ yellow, tip of the latter narrowly dark brown; first three tarsal segments light yellow, narrowly tipped with dark brown; segments 4 and 5 dark brown. Wings hyaline or nearly so, a broad yellow streak running from the base of the wing

around to beyond the apex, embracing the caudal portion of cell C, cell Sc, cephalic portion of cell R and 1st R_1 , caudal portion of cell 2nd R_1 and outer half of cell R_2 ; cell C is hyaline with small, rather evenly spaced dark brown cross stripes; the margin of the wing from the end of cell C around to end of cell R_5 is light brown; the caudal margin of the longitudinal yellow streak above described is narrowly brown at the deflection of R_2 , a slender brown streak runs caudad and outward along R_{4+5} , ending opposite the fork of R_{1+2} ; Cu and 2nd anal margined with bright yellow. Venation (see fig. 6, plate III), R_5 beyond the cross-vein r-m short, a little shorter than r-m; R_2 , R_3 and R_{4+5} all originate at a common point; R_2 at origin is perpendicular; cross-vein m lacking; basal deflection of Cu at fork of M.

Abdomen: tergites light brownish yellow, with numerous slender black hairs; segment 2 with a short black sub-basal streak on the margin; segments 3 to 6 with longer marginal streaks, which cover almost the basal half of the sclerite; sternites light yellow, with black marks on the sides remote from the margin of sclerite, that on the second oblique, meeting its mate on the venter, the others longitudinal.

Vial No. 31.—Tokyo, Japan; May 7, 1912; 1 ♀.

Holotype.—♀, in Vial 31.

Type in author's collection.

Tricyphona insulana, sp. n.

Brown; wings hyaline without a stigma; no median cross-vein; legs largely yellow.

Female, length 9.6 mm.; wing 9.4 mm.

Female.—Rostrum and palpi dark brown apices of the palpal segments a little paler; antennæ, basal segments pale brown, flagellum dark brown; front, vertex and occiput dark brown, probably with a grey bloom in dry specimens.

Pronotum dark brown. Mesonotum dark brown with indications of stripes near the median line; it is probable that the thorax is covered with a grey bloom; scutum dark brown; scutellum brownish yellow; postnotum brown. Pleuræ brown. Halteres light yellow. Legs: coxæ yellow, more brown basally;

trochanters yellow; femora yellow, darkening to light brown at the tip; tibia light yellow, brown at tip; tarsi brown. Wings hyaline; veins light brown. Venation (see fig. 3, plate IV) cross-vein r-m connects R_{4+5} ; no cross-vein m.

Abdomen: tergum reddish brown, segments with a dark brown apical ring; pleural line yellow; sternites brown, ovipositor with yellow valve.

Vial No. 27.—Tokyo, Japan; April 25, 1912; 1 ♀.

Holotype, ♀, Vial No. 27.

Type in author's collection.

Related to *T. vitripennis* Doane (West. U.S.) but lacks a brown stigma, has no median cross-vein, etc. From *T. immaculata* Meigen (Europe) it differs in having cross-vein r farther removed from the tip of R_1 , cross-vein r-m far beyond the fork of R_s , not at it; the legs much more yellow, not mostly brown; ovipositor of the female yellow, not patch brown, etc.

Tricyphona vetusta, sp. n.

Wings spotted with brown; cross-vein m-cu of the wings present; cross-vein m present.

Female.—Length 16 mm.; wing 14.8 mm.; hind legs femora 3.4 mm.; tibia 10.3 mm.; tarsus 8.9 mm.

Female.—Rostrum light brownish yellow; palpi with segments dark brown, the apical ones with bases yellow; antennæ, base light brown, flagellum dark brown; front, vertex and occiput dark brown.

Pronotum dark brown. Mesonotum, præscutum, greyish with four brown stripes, the median one double, narrowed behind; scutum dark brown, the lobes paler brown; scutellum dark brown, much lighter on the sides; postnotum dark brown with a large oval spot behind on either side of the median line. Pleuræ dark brown, indistinctly variegated with darker. Halteres light yellow, the knob light brown. Legs: Coxæ, especially the fore and middle, brownish at the base, remainder light yellow; trochanters yellowish; femora yellow, darkening into brown at the tip; tibia yellowish brown, rather darker apically; tarsi dark brown. Wings, tinged with light yellow, cells C and Sc a little brighter, with

brown marks as follows: a rounded spot at Sc_2 , a larger one at origin of Rs , a crossband on the cord running from the tip of Sc_1 , down to fork of Cu and thence to the wing-margin along Cu_2 ; a round spot at cross-vein r , apical margin of the wing brown, a brown seam on cross-vein m , brown dots at ends of all the longitudinal veins; veins yellowish brown. Venation (see fig. 5, plate III); Rs in a line with R_{4+5} ; R_{2+3} short, gently arcuated; crossvein r very far distad so that R_1 beyond it is about equal to it in length; cross-vein m present, connecting M_2 with M_3 ; cross-vein $m-cu$ present.

Abdomen: Tergites, segment one brown, segments two and six dull yellow, an indistinct median brown stripe becoming more plainly defined behind until on the 8th and 9th tergites it abruptly suffuses the entire sclerites; pleural stripe broad, dark brown, extending the length of the abdomen as a conspicuous lateral line; sternites light yellow, a rounded ill-defined brown mark on the 8th sternite.

Vial No. 26.—Tokyo, Japan; April 25, 1912; 1 ♀.

Holotype, ♀, in Vial 26.

Type in author's collection.

Related to *T. constans* Deane (West. U.S.) but is much smaller with a very different wing pattern. In venation, suggesting *T. vernalis* Osten-Sacken of the Eastern United States.

Tribe *Cylindrotomini*.

Genus *Liogma* Osten-Sacken.

Liogma kuwanai, sp. n.

Resembles *L. nodicornis* O. S., of the United States, but the tripartite penis-guard is very much longer and directed dorsad.

Male.—Length 15.9 mm.; wing 11.4 mm.; antennæ 3.8-3.9 mm.

Male.—Rostrum and palpi light brown, remaining segments dark brown; flagellar segments slender at base, the inner face produced into a subtriangular tooth, making the flagellum strongly serrate; front, vertex and occiput dull dark brown, very rugulose, the vertex broad.

Mesonotum dark brown, a lighter brown line extending from the median line of the scutum, branching Y-shaped and extending

to the pseudosuture, this pale line being somewhat impressed; scutum, scutellum and postnotum brown, the latter rather darker. Pleuræ, propleuræ and cephalic and dorsal portions of the mesopleuræ, up to the wing-root, yellowish; remainder of the pleuræ brownish. Halteres pale, yellow. Legs: coxæ suffused with brown; trochanters light yellow; femora yellow basally, becoming brown at the tip. Wings tinged with grey, stigma elongate-oval, brown, distinct. Venation (see fig. 4, plate IV).

Abdomen light brownish yellow, the caudal half of the 7th, 8th and 9th tergites brown. Hypopygium (see figs. 13-15, plate X): 9th tergite, viewed from above, with the lateral ears or lobes prominent, the interval between them almost straight, not deeply notched as in *nodicornis*; 9th sternite and its pleurite fused, massive, as in the genus, the apical appendate stout, directed cephalad, flattened at its apex. Viewed from the side, the penis-guard is conspicuous, tripartite as in the tribe, it is very long, arising from the ventral wall, directed caudad and thence dorsad, almost attaining the level of the dorsal edge of the 9th sternite, toward their end, directed cephalad, the tip flattened; anal tube conspicuous. Viewed from beneath, the massive sterno-pleurites meet in a straight median suture, which is membranaceous; the tripartite penis-guard is deeply concave below the forking.

Vial No. E.—Tokyo, Japan; Aug., 1912; 1 ♂.

Holotype.—♂, Vial E.

Type in author's collection.

The difference between the American and Japanese species are shown by the following key:

1. Abdomen brown; ♂ hypopygium, 9th tergite with a deep median notch; guard of the penis short, directed caudad. (East. U. S.).....*nodicornis* O. S.
- Abdomen reddish brown; ♂ hypopygium, 9th tergite without a deep median notch between the prominent lateral ears; guard of the penis elongate, conspicuous, directed caudad and dorsad, almost attaining the dorsal level of the abdomen. (Japan).....*kuwanai*, sp. n.

The succeeding parts dealing the Tipulinæ will conclude the Tipulidæ.

THE CADDIS-FLIES (*TRICHOPTERA*) OF JAPAN. I.—
FAMILY PHRYGANEIDÆ.

BY WARO NAKAHARA, HONGOKU, TOKIO, JAPAN.

Through the kindness of Mr. Miyake, who has generously permitted the free use of the valuable literature and collections in his possession, and has given me much valuable advice, I have recently had the opportunity of studying Japanese caddis-flies or Trichoptera. The purpose of the present study is to record the species known from Japan, offering such notes as may suggest themselves, and to describe any forms that appear to be unknown.

The present paper deals with the family Phryganeidæ, which includes some of the most beautiful caddis-flies in the world.

FAM. PHRYGANEIDÆ.

Genus *Neuronia* Leach.1. *Neuronia regina* MacLachlan.

Holostomis regina MacLachlan—Journ. Linn. Soc. London, Zool., XI, p. 104 (1871); Matsumura, Thous. Ins. Jap., i, p. 165, Pl. XII, fig. 11, ♀ (1904).

Neuronia regina Ulmer—Cat. Coll. Selys, Fasc. VI (1), p. 6, figs. 1, 2 and 3, Pl. i, fig. 1 (1907); Ulmer, Gen. Insect., Pl. XXIX, fig. 3 (1907).

This magnificent species, which is common in China, as well as in India, is not rare in Japan.

The manner of flight of this species resembles that of a certain moth. Occasionally they are found on the bark of trees closely resembling the colour of the forewings, which always cover the abdomen and beautiful hind wings, when they are at rest.

Already reported from Hokkaido and Honto.

2. *Neuronia reginella* sp. nov.

Head blackish, clothed with brownish hairs, especially on the face; vertex wholly fuscous; ocelli brown; labial palpus consisting of four joints, brown; maxillar palpus four-jointed, the last joint more slender than others and fuscous; all the others mostly brown and each thickened at extremity. Antennæ lost, except two basal joints. Prothorax light brown with a median longitudinal impression, clothed with long, fuscous hairs. Meso- and metathorax

fuscous, the former with stout fuscous hairs, the latter with long and weak gray hairs. Underside of thorax mostly brownish. Legs brownish, tibiae and all the tarsal joints fuscous; spurs on tibiae 2, 4, 4; hind femora somewhat dark, with a brown ring near the extremity. Fore wing light fuscous yellow, with fuscous markings, as shown in figure, with some stout blackish hairs at the base;

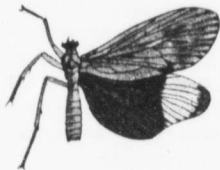


Fig. 13.—*Neuronía reginella* n.sp.
(Male).



Fig. 14.—*Neuronía reginella* (Male),
genitalia, dorsal view.

veins yellowish. Inner half of hind wing violet black, forming a broad, beautiful orange band between this and the fuscous black apical spot. Abdominal segments blackish, fuscous on both dorsal and ventral sides, each segment with hind margin narrowly brown. Suranal plate in the genitalia of male individuals rather broad and little produced in its hind margin; superior appendage, with two small projections and many hairs on the end; intermediate one separated at the end of a small lobe curving little upward; inferior claspers stout and long, suddenly becoming much more slender near its end.

Length of body 20 mm.; length of fore wing 33 mm.; length of hind wing 28 mm.

The type is a single male specimen in the collection of the Imperial Agricultural Experiment Station at Nishigahara. The specimen was captured by Mr. Murata at Nikko, on July 28th.

This species is closely allied to *Neuronía regina*, which is a little larger, but the differences in the genitalia, mouth parts and wing markings seem to me to warrant the specific separation of the two forms.

3. *Neuronía clathrata* Kolenati.

Anobolia (Oligostomis) clathrata Kolenati, Gen. et spec. Trichoptera, i. p. 82 (1848).

Neuronia clathrata Walker—Cat. Neuropt, Brit. Mus., Pt. I, p. 7 (1852); Matsumura, Journ. Coll. Agr. Tohoku Imp. Univ., IV, p. 16 (1911).

4. *Neuronia phalænoides* Linné.

Phryganea phalænoides Linné—Faun. Suec., p. 378 (1761).

Holostomis phalænoides Walker—Cat. Neuropt. Brit. Mus., Pt. I, p. 6 (1852).

Neuronia phalænoides Matsumura—Journ. Coll. Agr. Tohoku Imp. Univ., IV, p. 15 (1911).

The above two species occur in Europe and Siberia, and have been described by Matsumura (l. c.) from Saghalien. It is said that a few specimens have been obtained at Solowiyofka, Chipsani and Galkinowraskee, on that island. No specimen before me.

5. *Neuronia apicalis* Matsumura.

Neuronia apicalis Matsumura—Thous. Ins. Jap., I, p. 172, Pl. XII, fig. 11 (1904); Matsumura—Journ. Coll. Agr. Tohoku, Imp. Univ., IV, p. 15-16 (1911).

6. *Neuronia fluvipes* Matsumura.

Neuronia fluvipes Matsumura—Thous. Ins. Jap., I, p. 172, Pl. XII, fig. 12 (1904).

Unfortunately, neither *N. apicalis* nor *N. fluvipes*, both of which were described by Matsumura about ten years ago from Hokkaido and Honto, are represented in the material before me. The same professor recorded the former from Saghalien, also.

7. *Neuronia melaleuca* MacLachlan.

Phryganea melaleuca MacLachlan—Journ. Linn. Soc. Lond., Zool., XI, p. 106 (1871).

Holostomis melaleuca Matsumura—Thous. Ins. Jap., I, p. 166, Pl. XII, fig. 2, ♀ (1904).

Neuronia melaleuca Ulmer—Doutch. Ent. Zeit., p. 339 (1908).

The specimens in hand, which I believe to be true *N. melaleuca*, differ to a certain extent from that species as described and figured by Matsumura in his "Nippon-Senchu-Zukai" (Thousand Insects of Japan), though the too meagre description does not enable me to satisfactorily determine it. It may be doubted whether Matsumura's identification of his specimen with *N. melaleuca* be justified.

In any case it may safely be said that there is another form in Japan besides *N. melaleuca*, closely allied to this species. It is said that the habits of this species resemble those of *N. regina*.

Habitat—Hokkaido, Honto.

Genus *Phryganea* Linne.

8. *Phryganea japonica* MacLachlan.

Phryganea japonica MacLachlan—Trans. Ent. Soc. Lond., (3) V, p. 248 (1866); Matsumura—Thous. Ins. Jap., I, p. 167, Pl. XII, fig. 3, ♂ (1904); Ulmer—Cat. Coll. Selys, Fasc. VI (1), p. 10, figs. 11, 12 and 13, Pl. I, fig. 2 (1907); Ulmer—Gen. Insect., Pl. XXX, fig. 1 (1907).

The markings of the fore wing of this species are subject to variation, and the material before me can be separated into two types:

(i) Those that have conspicuous fuscous lines along the cubital and the fourth apical veins.

(ii) Those that have faint and obscure fuscous lines along the cubital and the fourth apical veins.

Though there are some other minute differences in the markings of the fore wing between types i and ii, I think they are not worthy of specific rank, since I could not recognize any difference in the genitalia, nor in any other respects, that appear to be specific. Until a more comprehensive study of these two forms is published I shall have to include them in one species, *Phryganea japonica*. It would be very interesting if their life-histories were known.

It seems to me that Ulmer's figure in the Selys Catalogue represents type i and his figure in Genera Insectorum type ii Matsumura's figure seems to represent type i.

This is one of the most common caddisflies of the family in the Main Island of Japan, occurring also in Hokkaido.

9. *Phryganea sordida* MacLachlan.

Phryganea sordida MacLachlan—Journ. Linn. Soc. Lond., Zool., XI, p. 106 (1871); Ulmer—Cat. Coll. Selys, Fasc. VI (1), p. 8, figs. 6-10 (1907).

A single female specimen in the collection of the Imperial Agricultural Experiments Station, from Gifu, labeled "Hayafumi-yama."

10. *Phryganea latipennis* Banks.

Phryganea latipennis Banks—Proc. Ent. Soc., Wash., VII, p. 107 (1906); Ulmer—Cat. Coll. Selys, Fasc. VI (1), p. 10, figs. 14-20, Pl. I, fig. 3 (1907).

A single male specimen in the collection of the Agricultural Experiments Station from Gifu, where the type specimen of this species was obtained.

The above two species seem to be uncommon.

Genus *Limnoceutropus* Ulmer.

11. *Limnoceutropus insolitus* Ulmer.

Limnoceutropus insolitus Ulmer—Cat. Coll. Selys, Fasc. VI (1), p. 14, figs. 21-23 (1907).

This is the single species of the genus *Limnoceutropus*, and is known only from the female. I have not seen specimens of it. Taken at "Nikko, 600-2000 m."

Komagome-Higashikatamachi, Tokyo, Japan.

THE OCCURRENCE OF THE MYMARID GENUS
COSMOCOMOIDEA HOWARD IN AUSTRALIA
(HYMENOPTERA).

BY A. A. GIRAULT, NELSON, N. Q., AUSTRALIA.

The following remarkable mymarid represents the fifteenth genus of the group known to occur in Australia. The original description of the genus is not accessible to me just at present, but I should call attention to the fact that the tarsi are *five-jointed*, not as in *Polynema*, as the name would lead one to infer. I have a specimen of the type of the genus, one of the series on which the species was founded, but not a type.

Genus *Cosmocomoidea* Howard.

1. *Cosmocomoidea renani* new species.

Normal position.

Female.—Length 2.00 mm. Large for the family. Shining black, the bullæ of the scape, cephalic legs, trochanters, knees, proximal four tarsal joints and tips of tibia, rich brown. Wings conspicuously infuscated at tip (about distal fourth), the proximal

margin of the fuscation convex; slightly distad of the middle, where a rather broad band crosses, not quite its own length from the end of the stigmal vein, and obscurely under the marginal vein. Scape more or less brownish along proximal half. Coxæ black. Venation brown. Posterior wings clear. Head and thorax with a scaly, polygonal reticulation, the propodeum less scaly, smooth and shiny between the median carinæ.

Differs from the type of the genus (*morrilli* Howard) in being black, in having the flagellum uniformly black, the wings more conspicuously and differently fumated, the greater size, and in having joints 4 and 5 of the funicle longest of that region; also, the abdomen is not distinctly petiolate, but only tapers at base—slender there. The following important structural characters are noted: The thorax is rather peculiar, for there is a mesopræscutum present at the meson cephalad of the scutum, and which is moderately large and subquadrate; the pronotum is short at the meson, but dorso-laterally long, extending broadly halfway down the scutum (but not by far to the tegulæ), then curving off; the axillæ are small, but distinct, not advanced into the parapsides and widely separated. Scutellum subquadrate, as long as the scutum, the latter with a median grooved line. Parapsidal furrows complete, short, curved, the parapsides short and wedge-shaped, with the base of the wedge mesad. Propodeum with a carina on each side of the meson, the two rather widely separated; the spiracle minute and round, near postscutellar margin. Tarsi 5-jointed. Ovipositor not exerted.

(From one specimen, $2\frac{2}{3}$ -inch objective, 1-inch optic, Bausch and Lomb.)

Male.—Not known.

Described from a single female specimen captured by sweeping grass and foliage in a forest at Nelson, N. Q., December 13, 1912 (A. P. Dodd). Other specimens were captured a few weeks later in the same place.

Habitat.—Australia, Nelson (Cairns), Queensland.

Type.—In the Queensland Museum, Brisbane, the above female in xylol-balsam.

[Dedicated to Ernest Renan.]

NEW SPECIES AND NEW LIFE HISTORIES OF
EPHEMERIDÆ OR MAYFLIES.

BY WILBERT A CLEMENS, TORONTO, ONT.

(Continued from page 262.)

Subfamily—*Heptagenina*.*Ecdyurus maculipennis* Walsh. (Pl. VI, fig. 4, Nymph.)

Only a few imagos of this species were taken, although the nymphs were abundant along open stony shores and in rapids. My collections of nymphs date from July 2nd to August 23rd, and rearings from July 6th to August 30th.

Ecdyurus lucidipennis sp. nov.

This was not a very abundant species, but nymphs were collected July 1st and 14th, and imagos reared July 4th and 17th, respectively.

Male imago:

Measurements—Body 6 mm.; wing 7mm.; fore leg 6.5 mm. Face very slightly obfuscated; dorsal surface of head dark brown or reddish. Notum dark brown; sides of thorax and ventral surface light yellow. Dorsum of abdomen a blackish brown; venter considerably lighter. Penis lobes and bases of forceps yellow; forceps tinged with black. Setæ with basal halves slightly tinged with black and minutely hairy. Fore femora dark, middle and hind yellowish. Wings hyaline; longitudinal veins slightly dusky, especially costa and subcosta; cross-veins entirely colourless.

Female imago:

Measurements—Body 6 mm.; wing 7.5 mm.; fore leg 4 mm. Thorax and abdomen lighter in colour than male.

Nymph: (Pl. VI, fig 5.)

Measurements—Body 7-8 mm.; setæ 3-4 mm. Head brown, with numerous light spots, chief of which are 6 along anterior margin, 2 lateral to each antenna, 4 small, elongated ones between antennæ, and 2 small round spots anterior to these latter. Thorax above lighter brown, with numerous light areas. Anterior part of each abdominal segment brown; four light spots along anterior margin, one large one at each lateral margin, and 3 along posterior margin. Setæ of about equal length and fringed with hairs; middle one slightly smaller in size than lateral ones. Femora flattened,

fringed with spines along anterior margin and with hairs along posterior; rather light in colour, with 2 zigzag brown marks about middle and brown areas at distal and proximal ends. Tibiæ banded about the middle with brown. Tarsi with distal and proximal ends dark.

Ecdyurus pullus, sp. nov.*

This is a large form, compared with the two previous species. The nymphs were found along the very stony, exposed shores of small islands three and four miles out in the open bay. The collections are dated June 23rd and July 6th, and the rearings July 2nd. A few imagos were captured June 27th.

Male imago:

Measurements—Body 10-11 mm.; wing 11 mm.; setæ 22 mm.; fore leg 11-12 mm. Face pale, slightly tinged with brown along the carina. Dark brown on dorsal surface of head between eyes. Pronotum dark brown; mesonotum lighter; a dark brown line on each side of prothorax extending forward from base of fore wing; other dark brown marks at bases of wings and legs. Dorsal surface of abdomen dark brown, somewhat lighter laterally toward anterior margin; ventral surface light in colour. Genitalia of the usual *Ecdyurus* type. Legs light in colour, dark at joints. Tarsi of fore legs in order of increasing lengths, 1, 5, 4 (3 and 2) equal. Wings with longitudinal and cross veins brown and very slightly darkened in apical costal region.

Nymph: (Pl. V, fig. 10.)

Measurements—Body 12 mm.; setæ 15 mm. Head brown, with a colourless area on each side from eye to lateral margin of head, and three light dots between eyes; slightly fringed with hairs along anterior and lateral margins, and a light area about the middle of each half of pronotum. Mesonotum darker, with numerous light spots. Each segment of abdomen brown; 1-8 have six light spots, and 4-8 have the two spots near the median line fused, forming a large rectangular area; segment 9 with only four light spots; segment 10 entirely brown. Gills comparatively small, lamellæ oval. Setæ of about equal size, with each two alternate segments brown; sparsely fringed at joints, and outer

*This species was listed on p. 247 as *Ecdyurus grandis*, sp. nov.

margins of lateral ones not fringed. Femora stout and flattened, brown in colour, lighter at distal and proximal ends, and two or three irregular light areas toward middle; covered with minute spines and fringed along posterior margin with hairs. Tibiæ alternately light and dark banded; fringed along both anterior and posterior margins. Tarsi brown, with proximal tips colourless. Ungues double on each leg, the large one well covered, the other small and lateral to the large one.

Subfamily—*Ephemerinæ*.

Hexagenia bilineata Say.

This was a very common species at Go-Home Bay. The nymphs were first taken on June 6th, by dredging in water 15 to 45 feet deep. The bottom was very muddy. When the nymphs were placed in jars containing about 4 inches of mud, they immediately began to burrow, and were able to bury themselves in a very short time. At first the gills were left partly exposed, and the position of the nymphs could be detected by the waving motion in the thin mud. Later on they completely buried themselves, and only the round openings of the burrows could be seen. The first of these nymphs to emerge was on July 3rd, and others followed in July and August, while one was still alive in the breeding jar on September 9th, when the Station was closed. On June 13th the first subimago was captured at large, but not till June 28th did imagos appear in large numbers. They would commence their flight shortly after sunset, flying in large swarms about the tree tops. The hum of their wings could be heard up to a distance of 125 feet or more. The females deposited their eggs by flying up and down the shore, brushing off the eggs as they appeared in two small, rather compact columns from the openings of the oviducts, by dipping to the surface of the water. On July 12th a female was caught just after copulation, and she deposited a large number of eggs by being held by the wings and touching her abdomen frequently to some water in a jar. These eggs hatched in thirty-six days.

Nymph: (Pl. VI, fig. 1.)

Measurements—Body 30-35 mm.; setæ 13-15 mm.; antennæ 5-6 mm. Head rather yellowish, with dorsal surface between

ocelli and between eyes entirely brown or in some cases lighter along median line and posterior margin. Antennæ very hairy at joints of basal halves, while apical halves are entirely bare and become very slender. Margin and base of frontal piece hairy. Clumps of hairs between eyes and at bases of antennæ, in front of lateral ocelli and posterior to eyes. Mandibular tusks $\frac{3}{4}$ length of antennæ, upcurved, brown at tips, and with three longitudinal rows of hairs. Prothorax has a broad longitudinal band of brown on each side of middle line on dorsal surface, and is very hairy along lateral margins. Mesothorax brown for the most part, dorsally. Each abdominal segment has a large, almost triangular brown area with two light areas within it; these light areas often reduced to mere stripes. Ventrally on segments 6 to 8 there is a faint median longitudinal dark streak, while on ninth segment are two lateral streaks. Setæ of about equal length, and very hairy at joinings for entire length. Gills and legs of usual *Hexagenia* type.

Ephemera simulans Walker.

The imagos of this species appeared from June 5th to July 27th, but were most abundant during the first two weeks in July. The nymphs were not taken at Go-Home Bay, although diligent search was made. The male imagos would appear shortly before 8 o'clock in the evening, and were often noticed in the morning, also, as late as 10 o'clock. They would dance in swarms of a couple of hundred individuals, usually at a height of from 10 to 35 feet. When a female appeared, several males would take after her. The successful male, flying up beneath the female, would seize her around the prothorax with his long fore legs, and bending up his abdomen would grasp her abdomen with his forceps, and his penis could then be inserted in the oviducts. His setæ usually aided him in securing and maintaining his hold by being bent up over the female's body. The couple would then go off on a gradual downward slant toward the water, before reaching which the male would disengage himself and fly back to the swarm, while the female would fly out over the water and soon begin depositing her eggs by skimming the surface of the water with her abdomen. A peculiar thing was noticed, namely, that the male *Ephemera*

frequently attempted copulation with the male *Hexagenia*, apparently being deceived by the colour.

Subfamily—*Baetinae*.

Baetisca obesa Walsh.

The very interesting nymphs of this species were quite abundant along the north-east shore of Giant's Tomb Island, on May 26th. The shore is rather sandy, with numerous small stones, and deepens very gradually. The nymphs were clinging to the stones in water 3 to 15 inches deep. Imagos did not emerge from this collection until July 13th.

Leptophlebia sp. ?

A single almost mature nymph was taken on July 21st in quiet water at the side of an old lumber chute, but it died before time of emergence.

Blasturus cupidus Say.

This is an early species, mature nymphs being found May 25th, and subimagos appearing May 31st. A small nymph, collected May 31st, was observed to be filled with small, oval, brownish bodies. Upon dissection by Mr. A. R. Cooper, these were found to be the eggs of a trematode, and in the midst of them was the trematode itself, which belonged to the genus *Halicometra*. Another nymph, taken some time afterwards, was also discovered to be parasitized.

Blasturus nebulosus Walker.

The nymphs and imagos of this species were first taken June 9th, on a small, bare, granite island a short distance out in the open bay. On top of this island were numerous pot-holes of all sizes, and in these, under loose pieces of rock and some rubbish the nymphs were very abundant, having tadpoles, chironomid larvae and water beetles for associates. Many nymphs were covered with *Vorticella*. Several nymphs were observed to crawl out of the water and transform on the rock just above the surface of the water. Subimagos were clinging to the sides of the rock in sheltered places, and a few imagos were flying above the pools. This species was again observed on June 27th, on an island five miles from the

mainland. The island had an area of about three acres, and was almost smooth, bare granite. On top was a pretty lagoon, margined with water plants, shrubs and a few small trees. Imagos of *Blasturus nebulosus* were dancing over this pond in the sunlight, about 3 p.m., matings frequently occurring.

Nymph:

Measurements—Body 9.5-10 mm.; setae 7-10 mm. General colour blackish brown. Head brown, with a dark area behind middle ocellus and between the lateral ones; black, scroll-like markings between the eyes. Pronotum has a small light spot on each side, close to median line and near anterior margin; posterior to this and farther from median line is another larger oval light spot, and lateral to this again is an elongated light area; the rounded lateral margin is colourless. Abdomen is blackish brown, with light brown markings; segments 5 or 6 to 10 have a light median longitudinal stripe; on each segment is a slightly elongated, incurved small light spot on each side of median line toward the anterior margin of the segment; posterior and more lateral is a larger round light area, which usually disappears on segments 8, 9 and 10. Ventral surface is light brown, with three faint dark longitudinal lines, one median and two lateral; on each side of the median line in each segment is a very small white oblique line near anterior margin, and posterior to this is a small light dot. Median seta shorter, slenderer and lighter in colour than lateral ones. All fringed with hairs at joints. Legs light brown; posterior margins of tibiae and tarsi fringed with hairs, and anterior margins covered with serrated teeth; inner margins of claws with rows of teeth for their entire lengths.

Up to the present time I have not been able to find any apparent differences between the nymphs of these two species of *Blasturus*.

Choroterpes (?) *basalis* Banks.

Large numbers of the nymphs of this species were found in a small stream July 30th, clinging to the lower sides of stones in the quiet water. The next day several subimagos emerged from this

collection. As late as September 5th mature nymphs could be found here.

Ephemerella lutulenta sp. nov.

Male imago:

Measurements—Body 8-9 mm.; wing 10 mm.; setæ 12-14 mm.; fore leg 8 mm. Face dark brown; a spotted reddish-gray streak down carina, and two similar lateral streaks from it to the bases of antennæ. Thorax dark reddish brown. Abdomen blackish brown; segments 9 and 10 slightly lighter in colour; venter pale; posterior lateral margins of 9th segment produced into spines. Forceps pale, with tips brown. Setæ reddish brown toward bases, but becoming pale toward tips; articulations brown. Legs greenish yellow, claws brown. Segments of fore tarsi in order of increasing lengths, 1, 5, 4, 3, 2; 1 very small; fore femur about five-sixths length of fore tibia. Wings entirely clear.

Female imago:

Measurements—Body 9-10 mm.; wing 10 mm.; setæ 10-12 mm.; fore leg 5 mm. Quite similar to male. Posterior lateral projection of 9th abdominal segment not as long as in male.

Nymph:

Measurements—Body 10-11 mm.; setæ 6-7 mm. A large species, with colour varying from a dirty brown to a deep blackish brown, often of a granular appearance. Body and legs hairy. Head with a pair of occipital tubercles of varying size; in the male these are often obscured by the developing eyes of the imago. Pronotum rectangular. Abdominal segments 2-9 produced laterally into flat spines; none on segment 1, minute on 2, increasing in size to the 9th, none on the 10th. A double row of spines on dorsal surface, very minute on segments 8-10, large on 1-7. On venter, six small black dots on each segment, sometimes very faint. Rudimentary gills on segment 1; gills on segments 4-7, covered by a large jointed clytroid gill cover 1.5 mm. in length. Femora stout, brown in colour, with numerous round white dots and several irregular light areas. Tibiæ with median brown band, distal ends light, proximal ends dark. Tarsi about same length as tibiæ, and with proximal half dark and distal half light. Claw with numerous

pectinations. Setæ well fringed with hairs along middle, almost bare at base and tip; each two alternate segments brown.

The nymphs were taken almost everywhere about Go-Home Bay from May 29th to June 19th, in quiet water. Mr. R. P. Wodehouse gave me specimens from various places around Georgian Bay, including Shawanaga Bay, Pentecost Island, French River and Sturgeon Bay.

Ephemerella lineata sp. nov.

Female imago:

Measurements—Body 9 mm.; setæ 14 mm.; wing 10.5 mm. Very similar to female of *E. lutulenta*, but has a rusty brown median longitudinal stripe on dorsal surface of abdomen. In a fresh specimen the stripe would probably extend over the thorax, and thus correspond to the stripe of the nymph. No male specimens were reared.

Nymph (Pl. V, fig. II):

Measurements—Body 10 mm.; setæ 6 mm. Slightly smaller than *E. lutulenta*, but very similar in colour, except that there is a dorsal median longitudinal white stripe from the anterior margin of the pronotum to the posterior margin of the 10th abdominal segment. This stripe lies between the double row of spines on the abdomen. Occipital tubercles slightly longer than those of preceding species.

The nymphs were not very abundant, but were found in about the same localities as *E. lutulenta*, from June 3rd to July 9th. My bred specimens are dated June 14th and June 15th.

Ephemerella bicolor sp. nov.

Male imago:

Measurements—Body 5-6 mm.; wing 6 mm.; setæ 8-9 mm.; fore leg 6 mm. A small brown species, very similar to *E. lutulenta* in form and structure, but very much smaller. The size, apparently, is the only character by which to distinguish it.

Female imago:

Slightly larger than male.

Nymph: (Pl. VI, fig. 3.)

Measurements—Body 6-6.5 mm.; setæ 3 mm. These nymphs show a great variation in colour pattern. The light-coloured

specimens are of a dirty white colour, with brown markings. Head for the most part brown, slightly paler towards posterior margin. Pronotum brown laterally; anterior margin of mesonotum brown, and a brown area at posterior margin between the wing pads. Anterior halves of abdominal segments 2 and 3 brown, and slight marks on the 4th segment; brown areas on 6 and 7 about the median line, and on segment 9 there are two small brown dots at anterior margin, and a rather semicircular brown band posteriorly. Some specimens are almost entirely brown, and between these two extremes the amount of brown and white varies. Many specimens, especially females, show slight indications of tubercles on the head, but they are never large, as in the preceding species. A double row of spines on abdominal segments 1-7; postero-lateral margins of segments 3-9 produced into broad, flat spines. Gills on segments 4-7 covered by a large jointed elytra. Setæ light brown basally, becoming paler distally; well fringed with hairs; joints brown. Legs rather small; femora stout; colour for the most part brown, divided into two areas, the proximal one large and contains a rectangular white spot, the distal one smaller and contains a perfectly round white dot. Tibiæ brown at proximal end and a brown band near distal end. Tarsi with a brown band toward proximal end. Claws dark and pectinated.

The nymphs were everywhere abundant, in exposed as well as sheltered places. Imago were captured and reared from July 1st to July 12th.

Genus *Drunella* Needham.

Several nymphs of this genus were taken, but no imago were reared.

Cænis diminuta Walker.

This little nocturnal species came to the lamp in the reading-room for the first time on July 2nd, and was taken as late as August 12th. The nymphs were common in ponds and lagoons from June 5th to July 30th.

Tricorythus allectus Needham.

Imago were captured on July 3rd and 9th, but none were reared. Nymphs which apparently belong to this species were

dredged up from a slightly sandy bottom in water 5 to 15 feet deep, on September 3rd.

Chiroteoteles albomanicatus Needham.

On July 16th I found a nymph slough at Sandy Gray Falls, on the Go-Home River, but was unable to find either nymphs or imagos. I did not get up to the falls again until August 23rd, and then found the numerous small nymphs of the next generation.

Siphylurus flexus sp. nov.

Two beautiful *Siphylurus* nymphs were taken early in the season, but both died before time of emergence. The first was found May 25th in the bottom of a canoe, when some water was being emptied from it; the other was found June 3rd beneath a stone in about 1½ feet of water along the open, exposed shore of Station Island. Quite a number of imagos, apparently *Siphylurus*, were captured about this time, and it seemed quite probable that they were the same species as the nymphs. I think I have proved this quite conclusively by the wing venation. The wing of the imago has a very characteristic bend in cubitus 2 at the base, and the wing pad of the nymph shows this bend very distinctly. Again, the imago has claws like *Ameletus*, the two on each leg being unlike. These two unlike claws can be made out in one of the nymphs, due to the nymph dying just when about to transform. Imagos were captured on May 23rd, May 26th, and June 12th. On the latter date a swarm of 12 or 15 were observed flying off the west point of Station Island, about 5.30 p.m., at a distance of from 12 to 20 feet from the surface of the water. They faced the west, and had the characteristic fluttering rise and leisurely fall.

Male imago: (Pl. VI, figs. 10, 11.)

Measurements—Body 13-14 mm.; wing 12-13 mm.; setæ 23-24; fore leg 12-13. Head blackish brown, except lower part of face, which is tinged with brown; eyes large, meeting dorsally. Notum blackish brown. Sides of thorax marked irregularly with white. Abdominal segments 1, 8, 9 and 10 dark, segments 2-6 lighter in colour; these latter are light toward anterior margin and brown toward posterior; in the median line the brown is dark and forms a triangular area, the apex extending almost to the anterior margin; from the anterior margin in the median line two bands arise, com-

posed of black dots, passing backwards, curving outward, end near the base of the triangular brown area; between this line and the triangular area is a light brown oval area; segments 7-10 almost entirely blackish brown dorsally, but 7 and 8 have triangular white areas on sides, and 9 a slight indication only; segment 10 has the sides of dorsum white. Ventrally segment 1 is dark brown, and remainder white with brown markings; segment 2 has two brown spots; 3 with two smaller brown spots and a slightly reddish area at anterior margin in median line; on 4 and 5 the brown spots become smaller and the reddish areas larger; on segment 6 the reddish area is elongated to the posterior margin; on 7 and 8 there is a median longitudinal brown line, thickened about the middle, and two dots of unequal sizes on each side of it; segment 10 brown, except for a lateral white streak on each side. Forceps white and 4-jointed. Setæ white, with brown joints, and minutely pubescent. Fore legs brown; femur with a light area near distal end, next to which is a dark brown band; tarsal joints 1, 2 and 3 about equal in length, 4 slightly shorter, and 5 about half the length of 4th. Hind legs lighter in colour than fore; a brown band on femur in distal half; tibia with a brown band about middle; tarsus light in colour, but brown at joints; joint between tibia and tarsus 1 not distinct. Claws unlike. Wings with brown neuration; costal cross veins and others toward base of wing margined more or less with brown; a slight brown cloud in apical costal area; a heavy brown cloud at bulla; often a small cloud at bifurcation of median vein; cubitus 2 strongly bent at base; hind wing with a large brown cloud at base.

Female imago:

Quite similar to male.

Nymph: (Pl. VI. figs. 8, 9.)

Measurements—Body 15 mm.; setæ 5 mm. The two nymphs collected proved to be a male and female, both mature, but, unfortunately, both died when just about to transform. On this account it is difficult to describe the colour pattern, as the body of the subimago shows through the nymph skin.

Head vertical; body curved. Posterior lateral margins of abdominal segments 1-9 produced into spines. Dorsal colour pattern

distinct on segments 9 and 10 only; 9th pale with a short median longitudinal brown stripe commencing at anterior margin; on each side of this is a short stripe of about same length, but placed more posteriorly; lateral to this, again, is a large brown area, roughly triangular, apex at posterior margin, base at anterior; at lateral margin, slightly below middle line, is a small brown spot; on the 10th segment is a median brown longitudinal stripe, with two dots on each side of it. Ventral surface of abdomen white, with three longitudinal brown stripes, one median and two lateral. Gills on segments 1-7, double on 1, 2 and 3. Three setæ of equal length; lateral ones fringed with hairs on inner margins only, except tips; all banded toward distal end with brown. Legs pale; femur with proximal end brown and a brown band beyond middle; tibia with a brown band about the middle; tarsus with brown band toward proximal end; fore tarsus much longer than fore tibia; hind tarsi only slightly longer than hind tibiæ; fore claw rather short, broad and bifid at tip; hind claws about twice length of fore, and very pointed.

Baetis propinquus Walsh.

The imago is described in Eaton's Monograph, but my specimens do not show the subopaque area between the two nervures of the hind wing. Nymphs were taken at Go-Home Bay from June 14th to July 22nd; on August 19th large numbers of them were discovered in a little bay of a small, bare island about three miles out in the open. This rock was the home of numerous gulls, and hence is commonly called "Rookery" Island. The nymphs were mature, and imagos emerged on August 21st and 22nd.

Nymph: (Pl. VI, fig. 6.)

Measurement—Body 6 mm.; setæ 2 mm. Face vertical, mostly brown in colour; on dorsal surface of head on each side of median line is a row of irregularly-shaped light spots. Notum brown with various light areas. Dorsum of abdomen for the most part brown; segments 2-4 brown, with a light area in each half of each segment, and margins colourless; on segment 4 there is also a light area in median line; segment 5 quite light in colour; segment 6 brown, with a light area along anterior margin and two faint ones posterior to it; segments 7 and 8 each with two rather large pale areas in posterior half; segment 9 almost entirely pale; segment 10

slightly brown, especially along posterior margin; on each of the brown segments there are two small faint pale oblique, slightly-curved streaks, and a pale dot posterior to each. Ventrally, the joining of segments brown. Setæ slightly tinged with brown, with tips darker brown and a brown band beyond the middle; lateral setæ fringed on inner sides only. Legs pale; femora banded with brown about middle; tibiæ and tarsi darker toward distal ends; each claw with a lateral row of setinations.

Cloeon dubium Walsh.

The imagos I have agree with the description in Eaton, except that the intercalary veins are single, not in pairs. Adults were numerous at Station Island about July 10th, flying in small swarms along the shore at a height of from 10 to 15 feet. They appeared about 7.45 in the evening. Not many nymphs were taken, collections dating July 30th to August 12th. Imagos were reared July 30th and August 2nd.

Nymph: (Pl. VI, fig. 7).

Measurements—Body 4-4.5 mm.; setæ 1.5 mm. Face vertical, with two large pale areas above antennæ; between eyes a large pale area, partly divided into two parts, and containing two brown stripes. Notum brown, with irregular light areas. Dorsum of abdomen brown, except lateral margins, which are colourless; on each segment there are two small, oblique, pale streaks and two round dots posterior to the streaks. Setæ pale, with brown band toward distal end; lateral setæ fringed on inner sides only. Gills double apparently on segments 1 and 2 only; broader than gills of *Betis*; a main trachea in each slightly to outer side, and branchlets on inner side only. Legs pale; femora banded with brown in distal half; tibiæ and tarsi brown toward proximal ends; claws comparatively long, sharp-pointed, not pectinated.

Callibetis ferruginea Walsh.

Imagos, subimagos and nymph skins of this species were collected in Toronto by Dr. E. M. Walker, who kindly handed them over to me. The date would be about August 20th. None were taken at Go-Home Bay.

I am very grateful to Dr. Anna H. Morgan, Mount Holyoke College, So. Hadley, Mass., for the identification of a number of species for me.

VANESSA CALIFORNICA AGAIN.

BY F. M. WEBSTER, WASHINGTON, D. C.

I note with interest the criticism of Dr. J. McDunnough of Decatur, Illinois, in the July Number of the Canadian Entomologist, on my note in the preceding April number relating to the above-named species.

The trouble seems to be that Dr. McDunnough is looking at the matter solely from the viewpoint of what the writers of the letters, quoted by me, claimed to have seen, while I used these letters in their entirety, together with the identifications as they came to me, for the purpose of complete record, not only with the object of showing what these people stated that they saw, but also what they actually "produced in court," thus the better enabling everyone to draw his own conclusions from all of the evidence presented.

The problem of the exact larval food habits of the species is not susceptible of solution, either in Washington, D. C., or in Decatur, Illinois.

A PARASITE OF THE CHINCH BUG EGG.*

BY JAMES W. MCCOLLOCH,

Assistant Entomologist, Kansas State Agricultural College and Experiment Station.

In the experiments conducted this year to determine the time of the first appearance of young chinch bugs and the mortality of the eggs, a large number of eggs were collected in the field for examination. The eggs, which were collected at different intervals and in different localities, were examined daily. While thus examining the eggs it was noticed that some of them became dark in colour instead of assuming the usual red colouring. These eggs were isolated, and on May 19 there emerged from them three parasites. With these three parasites as a basis, the life-history was carried through four generations, running up to July 5. Since this was the first time between the two broods of the chinch bug,

*Mr. A. B. Gahan, Entomological Assistant of the Bureau of Entomology, U. S. Dept. of Agric., to whom specimens of the parasite were sent for determination, says: "I have made a partial examination of these parasites, and find them to belong to the family *Proctotrypidæ*, and they probably fell close to the genus *Telenomus*. It will require further study for me to determine definitely regarding them. It seems probable that they represent not only a new species, but possibly a new genus."

it became impossible to obtain additional chinch bug eggs with which to continue the work. From July 5 to July 23 only an occasional parasitized egg was found in the field, but beginning with the latter date, parasitized eggs were found in large numbers in the cornfields, and the second generation was obtained by August 10. Up to the present date this year over 275 individual parasites have been bred out. The length of the life cycle has been found to vary from ten to eighteen days, depending on the climatic conditions.

The parasite has been found in every wheat- and cornfield examined around Manhattan. Of 3,101 eggs collected between April 28 and June 10, the average per cent. of parasitism was 20.8, and of 116 eggs collected at Crawford (Central Kansas), 19 eggs, or 16.3, were parasitized.

The work is still under way, and a full description of the parasite, together with notes on its life-history and efficiency, will be published later.

A NEW SPECIES OF PHENGOIDES FROM CALIFORNIA (COLEOPTERA).

BY HERBERT S. BARBER, BUREAU OF ENTOMOLOGY, WASHINGTON, D.C.

With regret the writer feels forced to offer the description of the following species in advance of its publication in a monographic revision of the Phengodids now in manuscript, the appearance of which has been delayed far beyond contemplation.

Phengodes bellus, n. sp.

Large, strongly bicoloured. Antennæ (except two basal joints), palpi, elytra and dorsum of last two abdominal segments (except lateral margin) black; wings creamy white; all other parts luteous.

Length 20 mm.; width across humeri 3.8 mm. Habitat, California.

Occiput coarsely strigose; eyes separated above by slightly more than twice the width of one eye as seen from above, below by about one and one-fourth times the width of one eye as seen

from below. Antennæ extending to about third abdominal segment, black, except two basal joints, which are luteous; rami about ten times as long as supporting joint, black with pale hairs. Maxillary palpi black, last three joints subequal (the penultimate slightly shorter), apex of terminal joint very obliquely truncate. Mandibles strong, upper side nearly flat. Under side of head sparsely pubescent, the hairs arising from moderately fine, strigose punctures; gular suture very strong anteriorly, fossa elongate, very narrow, nearly closed. Pronotum half as long as wide, as wide as body at humeri; disc smooth, shining, very minutely punctulate, with small impression before scutellum; sides broadly explanate, the dilated margins each about one-eighth of the entire width, base almost straight, feebly trisinate; hind angles rounded; side margins straight, very slightly convergent anteriorly; front angles obtuse, broadly rounded; front margin strongly arcuate at middle, nearly straight on each side. Elytra black, one-third longer than width across humeri, feebly bicostate, surface shining, scabrose, punctulate, with fine dark brown pubescence, apices attenuate strongly divergent. Wings creamy white, costa and media brown, other veins pale, a cross-vein between the forks of the cubitus. Abdomen pale, except large black spot on dorsum of last three segments. Legs pale, except tarsi, which are black with dark pubescence, fourth tarsal joint with an elongate, whitish membranous lobe projecting under base of fifth joint; claws with very obtuse tooth at base on inner edge.

Type in the Carnegie Museum. Paratype, No. 16332, U. S. National Museum.

Two specimens collected in June or early July, 1904, by the late Dr. W. Miller, in San Bernardino Co., Cal. (exact locality unknown), and kindly loaned to the writer by Mr. H. G. Klages, who has generously placed the paratype in the U. S. National Collection. This is certainly the handsomest species of the genus known in our fauna. It is distinguished from any other species in the United States by the black elytra and whitish wings. A variety (?) of *P. bipennifera* Corh. is figured in the *Biologia Centrali-Americana* as having black, elytra but specimens have not been seen by the writer.

A WORM THAT CARES.

BY XIMENA MCGLASHAN, TRUCKEE, CALIFORNIA.

Does the worm have care or thought for the adult it is to produce? Many writers assert that there are no signs of sentiment in any of the stages of moth or butterfly existence. They say the mother fly lays her eggs because of natural law, the eggs hatch because they must, the larvæ simply live to eat, and the chrysalis, however wonderful, is only a part of the process. That is all very interesting, but the mother never sees nor cares for her progeny, nor does the offspring care for anything but itself. If one were to cross pens in a friendly tilt with these writers, the best illustrations of loving care would doubtless be sought in the pains and trouble which the mother fly manifests in depositing her eggs, or in the solicitude of the larva for the protection of its pupa.

In my home at Truckee, California, there is a species of *Cossus*, which Barnes and McDunnough say is "probably *Cossus angrezi* Bailey," which lays its eggs under the bark and in the wood of the cotton-wood tree in August. The female will oviposit if confined in a paper bag, and lays more than a hundred eggs; but, if allowed to have her own way, she hides each egg in the wood or bark of the tree. The larvæ burrow into the interior of the trunk, and up to the time when they wish to pupate they are entirely hidden from view. They pupate in the bottom of their burrow, and if they only plan for themselves there would seem to be no reason why they should delay the transformation when the time arrives. As a matter of fact, however, they seem to know that the adult must have access to the open air which they themselves have never breathed. Just before pupation they carry their burrow to the surface and smooth the jagged ends of the bark and wood of the opening so that nothing will retard the egress of the moth. They do one thing more which shows a high order of instinct, if it be not reason. The diameter of the opening, just at the surface, is made a trifle less than that of the burrow itself. A little thin ledge projects inward all around the edges of the hole. When the adult is ready to emerge, with the large pupa-case around its body, it arrives at the projecting ledge on the inner side of the opening, and the case itself is a trifle too large to slip through. It is held fast by the ledge while

the adult pulls itself out. When the moth has escaped, bits of the end of the pupa case project outside the burrow, and the empty case may be forcibly extracted before it dries. If this *Cossus* larva pupated in the earth at the foot of the tree there would be a good reason why it should have carried the burrow to the surface. As it does not pupate outside the tree, and as it remains in the open air only long enough to shape and smooth the opening, may we not conclude that here is a worm which cares for its adult?

A REMARKABLE NEW PLATYGASTERID GENUS FROM AUSTRALIA.

BY ALAN P. DODD, NELSON, N. Q. AUSTRALIA

Platygastoides nov. gen.

Female (?).—Head transverse, as wide as the thorax; ocelli far apart, the lateral ones touching the eye margins. Antennæ 10-jointed; scape extraordinarily dilated, scarcely longer than wide, half as wide as the head; when in the normal position the rest of the antennæ lies back along the scape; pedicel slender, twice as long as wide; 1st funicle joint as long as the pedicel and narrower; 2nd as long as wide; 3rd and 4th wider than long; club 4-jointed; 1st joint very short, transverse; club joints 2-4 large, wide.

Thorax short, scarcely longer than wide; pronotum scarcely visible from above; mesonotum wide, with the parapsidal furrows present, wide apart; outside the parapsidal furrows are two parallel groove lines; scutellum semicircular, with a median groove line; metanotum with two deep sulci, separated by a median carina; lateral edges of the sulci carinate.

Fore wings rather short, broad, without veins. Abdomen sessile, as wide as the thorax, and longer than the head and thorax united; 2nd segment equal to one-half the abdominal length.

Legs rather short; tarsi 5-jointed.

Type.—The following species:

Platygastoides mirabilis sp. nov.

Female (?).—Length, 1.50 mm. Black; legs, except coxæ, reddish yellow; antennæ reddish yellow, the scape and club suf-

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fused with black. Head and thorax finely sculptured; abdomen very finely reticulately rugulose. Fore wings infuscated, opaque; marginal cilia very short; discal cilia very fine and dense.

(From 4 specimens, 2-3 inch objective, 1 inch optic, Bausch and Lomb.)

Male.—Unknown.

Described from two ♀ specimens caught while sweeping the forest slopes of Mount Pyramid, 1,500-2,500 feet, near Cairns; one ♀ caught while sweeping in a jungle, Goondi (Innisfail), N. Q.; and one ♀ received from the South Australian Museum, and labelled, "Cairns district, N. Q., A. M. Lea."

Habitat.—North Queensland (Mount Pyramid, near Cairns, Innisfail).

Type.—South Australian Museum, Adelaide, a ♀ tagmounted plus a slide bearing head, antennæ and forewings.

STRANGE ACTION OF *BOMBUS OCCIDENTALIS*.

BY J. WM. COCKLE, KASLO, B. C.

Whilst walking across my garden to-day I observed a number of bees disporting themselves on the flowers of some Chinese Cabbage that were running to seed.

On closer inspection I found that they were all *Bombus occidentalis* workers, with the exception of a very few *A. mellifica*. The *Bombus* were there in thousands, and their actions caused me to stop and watch them. Instead of settling and inserting their tongues amongst the pistils of the flower, they tumbled in every direction over the flower, and seemed to be looking for hidden treasure at the base of the corolla. Being unable to see what they were so assiduously hunting for, I sat down in the middle of the patch in order to get a closer observation.

They inserted their tongues in small holes at the base of the corolla and between the folds at the base of the petals. In many cases they seemed to have considerable difficulty in forcing an entrance, raising their bodies and thrusting the tongue down with force.

An examination of the flowers showed that all the open flowers were punctured at the top of the bulb which forms the base of the corolla. I made a minute examination of the flowers to find out if the punctures were the work of other insects, but could find no other insect on or in any of the flowers, and also that none of the unopened flower buds showed any sign of puncture. Eventually, by the aid of a glass I found that the puncture was made from the outside and was ragged and torn, and ultimately I was fortunate in seeing one bee actually pierce the base of the corolla whilst I was observing it. As stated before, there were no other bees there except *Apis mellifica*; these were acting in a normal manner, seeking the honey through the centre of the flower, and in no case did I see one attempting to follow the example of the *occidentalis*.

The reason for this (to me, at least) strange action of *B. occidentalis* may possibly be explained by the fact that the tongue of *occidentalis* when fully extended is not nearly long enough to reach the honey sac, but the fact of the folds at the base of the petals being easily pried apart gave them ready access, and it is also probable that when they found a freshly-opened bud on which the folds of the petals had not yet commenced to separate that they found easy access by puncturing the corolla; they most assiduously hunted for a puncture and invariably thrust their tongue into it. Some of the flowers I examined had been punctured in several places. It would be interesting to know if this action of puncture is shared by any of the other bees, or if it is an invariable practice of *occidentalis* when attacking a flower having a deep-seated honey sac.

[NOTE.—*B. occidentalis* belongs to the same group of *Bombus* as the European species *terrestris*, which, it is well known, punctures with its mandibles the base of such flowers as Snapdragon and Broad-bean to obtain the nectar, thereby sometimes damaging the seed vessels. I have seen the workers of *B. terricola*, the representative of this group in Eastern Canada, puncturing the spur of *Impatiens biflora* and sucking the nectar through the wound thus made, though *B. vagans* and *fervidus* were observed obtaining the nectar by entering the flower in the legitimate way.—F. W. L. Sladen, Central Experimental Farm, Ottawa.]