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DESCRIPTIONS OF EASTERN NORTH AMERICAN SPECIES OF
BAETINE MAYFLIES WITH PARTICULAR REFERENCE TO THE
NYMPHAL STAGES.

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HETEROCLOEON

Heterocloeon curiosum McD. (1923)

The reduced median caudal filament of the nymph and the presence of a metathoracic wing in the adult would place this species in the *Acentrella* subdivision of the genus *Baetis*. This nymph is one of the commonest in the streams investigated but is confined to the lower, warmer reaches.

Nymph Pl. 12., figs. 23, 23a, 23b.

Length:—5.3-6.0 mm.

Head:—pale with brown stripes between eyes, clypeus and area below eyes pale; antenna pale, rather long, extending back beyond posterior extremity of thorax.

Thorax:—contrasting light and brown areas; a brown triangular median area seated on anterior border of mesonotum, two brown submedian strokes on scutellum, a brown area near each antero-lateral corner; wing-pads pale; in female individuals, particularly, the thorax may be more uniformly brown; legs pale with dark longitudinal stroke in basal half of femur extended laterally at distal end; tip of femur, tibia and tarsus brownish; tarsal claws brown and pectinate.

Abdomen:—segments 4, 5, 9, and 10 largely pale, others darker though in many specimens the dorsum is more obscurely pigmented lacking such contrast on the segments; on the anterior three segments there is a median dark spot about the middle of each; on the following segments is a pair of dark dots, one on each side of the middle line and in the darker segments the area immediately behind each dark dot is somewhat paler; a pale irregular area along the lateral border becoming more extensive on the anterior segments; lateral caudal filaments long and unbanded, median filament very short projecting less than the width of the base of a lateral filament; gills sometimes with prominent branching tracheae and usually with an extensive grey granular area in the middle.

Female nymphs with dorsum of abdomen obscurely marked brown and usually with two faint submedian darker lines and a median brown patch in segments 2 and 3.

Credit river, Erindale, Ont., 15-VI-1934—15-X-1934. F. P. I.

Ottawa river, Ottawa, Ont., 1-VII-1935—15-IX-1935. F. P. I.

PSEUDOCLOEON

McDunnough (1932 a) has given a key which covers the species described and figured below.

Pseudocloeon parvulum McD. (1932 a)

The nymph described here agrees with McDunnough's description of the nymph of this species.

Nymph Pl. II., figs. 19, 19a, 19b.

Length:—3.2 mm.

Head:—an interrupted brown submedian line over vertex and frons, remainder mostly pale; antennae relatively long extending back to tip of wing pads.

Thorax:—dorsum mostly brownish with restricted pale areas; wing-pads with longitudinal veins traced in brown; legs pale, banded with dark, a band basally on femur, another, sometimes broken, about the middle and an incomplete band distally; tibia with dark band distally and tarsus with dark band proximally; tarsal claws pectinate.

Abdomen:—very strikingly marked dorsum as shown in fig. 19. In a typical segment there is a row of pale areas across the anterior border of the segment, one median and a pair of submedian on each side; the lateral region of the segment is pale; a row of submedian dark dots down the middle of the dorsum in front of which in segments 8 and 9 are dark strokes converging anteriorly; venter with paramedial row of indistinct dark dots about the middle of each segment and in front of each dot a dark stroke converging towards the anterior border; tracheae distinct laterally; the caudal filaments are rather unique as far as I know in this genus in being alternately light and dark banded; the median filament is short being considerably less in length than the width of one of the lateral filaments at the base; the gills also are distinctive having distally an irregular pigmented area. Nymphs readily distinguished from females of *P. dubium* and *P. virile* by the maculate gills, and the alternately light and dark banded caudal filaments.

Peché river, Wakefield, P. Q., 5-VI-1935. F. P. I.

Pseudocloeon cingulatum McDunnough (1931)

Nymph Pl. II., fig. 18, 18a, 18b.

Length:—4.6 mm.

Head:—pale with pair of faint paramedial brown lines; antennae short reaching back little beyond bases of wing pads and somewhat darkened apically.

Thorax:—brown marks on pale background; pronotum with two submedian brown areas near anterior border and a brown area in each antero-lateral and postero-lateral angle; mesonotum with pair of brownish submedian triangular areas in anterior part, these triangles seated on anterior border with acute apex posterior; more extensive brown areas laterally; wing pads pale; legs pale with prominent brown band on coxa and a longitudinal brown stroke in basal half of femur; tarsal claws pectinate.

Abdomen:—rather obscurely marked dorsum somewhat darker on segments 5-7; a submedian row of dark dots forming a double line along the dorsum and the pigmentation less dense immediately around the dark spots; pale areas antero-laterally in the segments and frequently a much more extensive pale lateral area in segment 4; segments 8-10 largely pale; venter with faint ganglionic dots and dashes in double row; lateral caudal filaments pale with indistinct dark band about halfway out; the medially directed setae in this vicinity on the filament are black and give the appearance of an obscure dark band, much less conspicuous however

than the dark band in other species, e.g. *P. dubium*; the gills are present on segments 1-7 and have prominent tracheae.

Peché river, Wakefield, P. Q., 10-VII-1935—15-IX-1935. F. P. I.

Pseudocloeon punctiventris McD. (1923)

These nymphs were reared through to the adult stage. They were found on aquatic vegetation in moderate current.

Nymph Pl. II., figs. 16, 16a, 16b.

Length:—5.7-4.6 mm. A pale nymph which in life is bright chlorophyll green.

Head:—head and mouth parts pale and of typical *Pseudocloeon* form; antennae pale, reaching back to about middle of mesothorax.

Thorax:—in general pale with some light greenish dorsal maculation; legs pale and immaculate; tarsal claws pectinate at base.

Abdomen:—dorsal maculation of pale marks on a light greenish background; an indistinct pale median band and pale lateral flanges; a pair of slightly darkened dots in the middle of each segment forming submedian rows and in front of these darkened indistinct dashes converging on the anterior border; ventrally a median row of small jet black dots the latter situated about the middle of the segment in the anterior of segments (sometimes these present in only two or three anterior segments and entirely absent in occasional individuals); these dots persist in the adult; lateral caudal filaments with a dark bar about halfway out; median filament relatively long for a *Pseudocloeon* measuring in length about twice the width of a lateral filament at the base and composed of several segments; gills relatively clear without conspicuous tracheae; these may be somewhat more prominent in fresh material.

Mad river, Singhampton, Ont., 6-IX-1930. F. P. I.

Pseudocloeon dubium Walsh

This species shows considerable sexual dimorphism in the nymphal stage, the males having contrasting pale and dark maculation and the females being more obscurely marked. The female described below was from the Ottawa river; the male from the Credit river. No very significant difference could be found between the two species in these localities either in males or females. The adults taken at the Credit river were, however, slightly smaller than those of the Ottawa river and the males were somewhat smoky white on the anterior abdominal segments rather than having the clear white of the Ottawa river specimens.

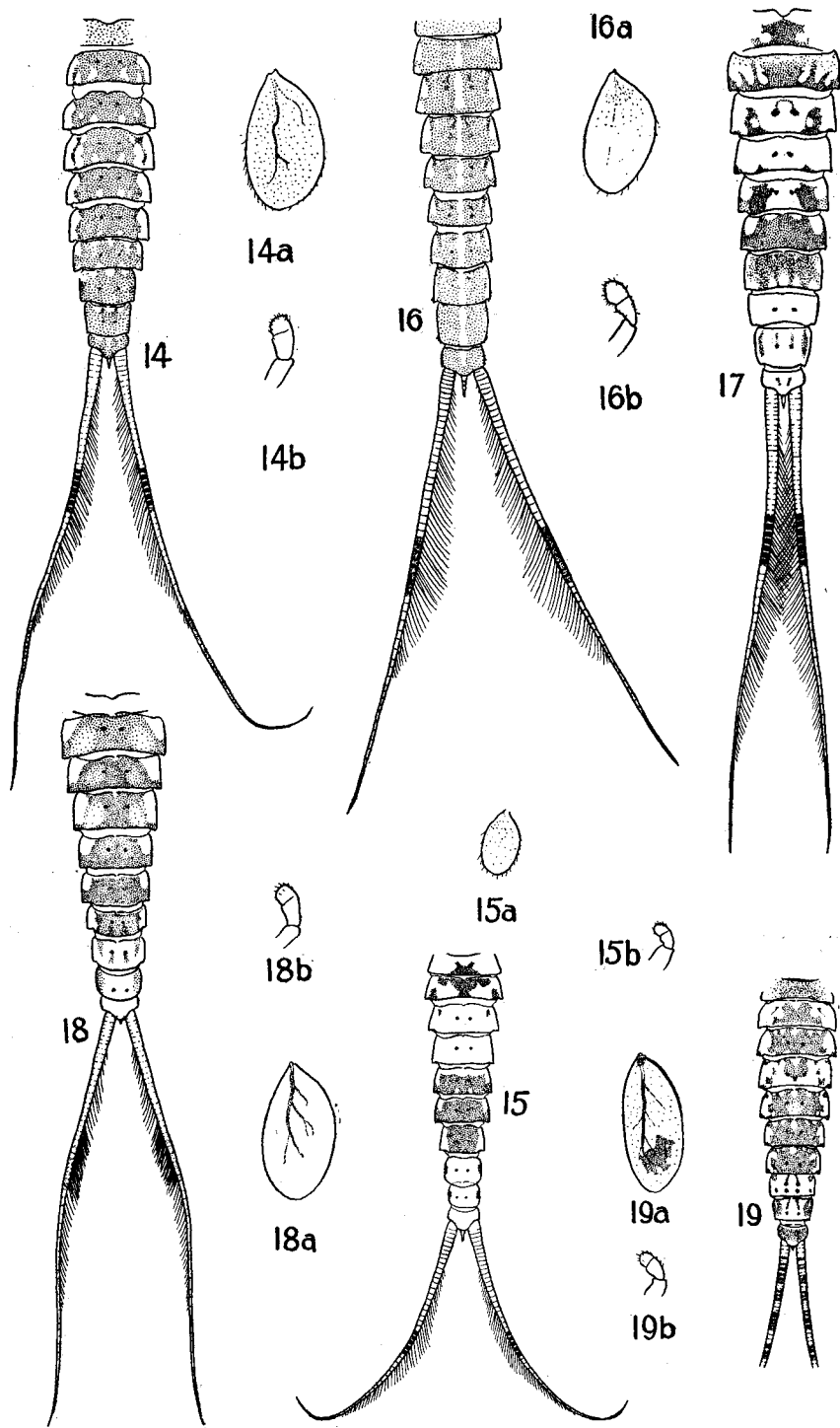
Nymph, male Pl. II., figs. 15, 15a, 15b.

Length:—3.2 mm.

Head and mouth parts:—pale.

Thorax:—pronotum pale in medial area, laterally scattered brown markings on pale background; mesonotum mostly brown with small irregular paler areas; wing pads pale; legs pale, slight darkening at end of tibia and tarsus; claws pectinate.

Abdomen:—very strikingly marked, segments 3 and 4 and 8-10 being pale with the exception of submedial dark dots in the middle of the segments, segments 1 and 2 with more extensive dark areas and segments 5-7 dark with pale antero-lateral corners and flanges; venter of segments 5-7 with median and lateral dark patches; caudal filaments pale with a conspicuous dark band half way out, the



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median filament relatively long, being about as long as the width of a lateral filament at the base; gills on segments 1-7 without distinct tracheae. The Ottawa river males differed somewhat in minor points. They were slightly larger (4.1 mm.); thorax more uniformly brown and on abdominal segments 8 and 9 four instead of two submedian dots; gills with faint tracheae.

Nymph, female Pl. II., figs. 14, 14a, 14b.

Length:—4.2 mm.

Head:—vertex with submedial series of brown marks forming an irregularly convoluted line.

Thorax:—brownish with scattered obscure paler areas.

Abdomen:—not as strikingly marked as in the male; mostly dark with small pale areas along the anterior borders of the segments forming a median row and similar pale areas at the posterior borders of the segments forming a submedian row; lateral pale areas on the flanges and a submedian row of dark dots on the dorsum; venter uniformly pale except for dark tracheae laterally; caudal filaments as in the male; gills with fairly distinct tracheae.

Ottawa river, Ottawa, Ont., 15-VI to 30-VII-1935.

Credit river, Erindale, Ont., 3-VI to 15-X-1934.

It is quite possible that two species are involved in this description, the larger species of the Ottawa river with more prominent tracheae in the gills being the true *dubium* and the smaller species of the Credit river being a new species of the *dubium* group. If this later proves to be the case the female figured with the description is the female of *dubium* and the male nymph would refer to the new species.

Pseudocloeon virile McD. (1923)

This species, larger than *P. dubium*, emerges earlier in the season. There is considerable similarity in the nymphs of both and *virile* also exhibits sexual dimorphism.

Nymph, male Pl. II., fig. 17.

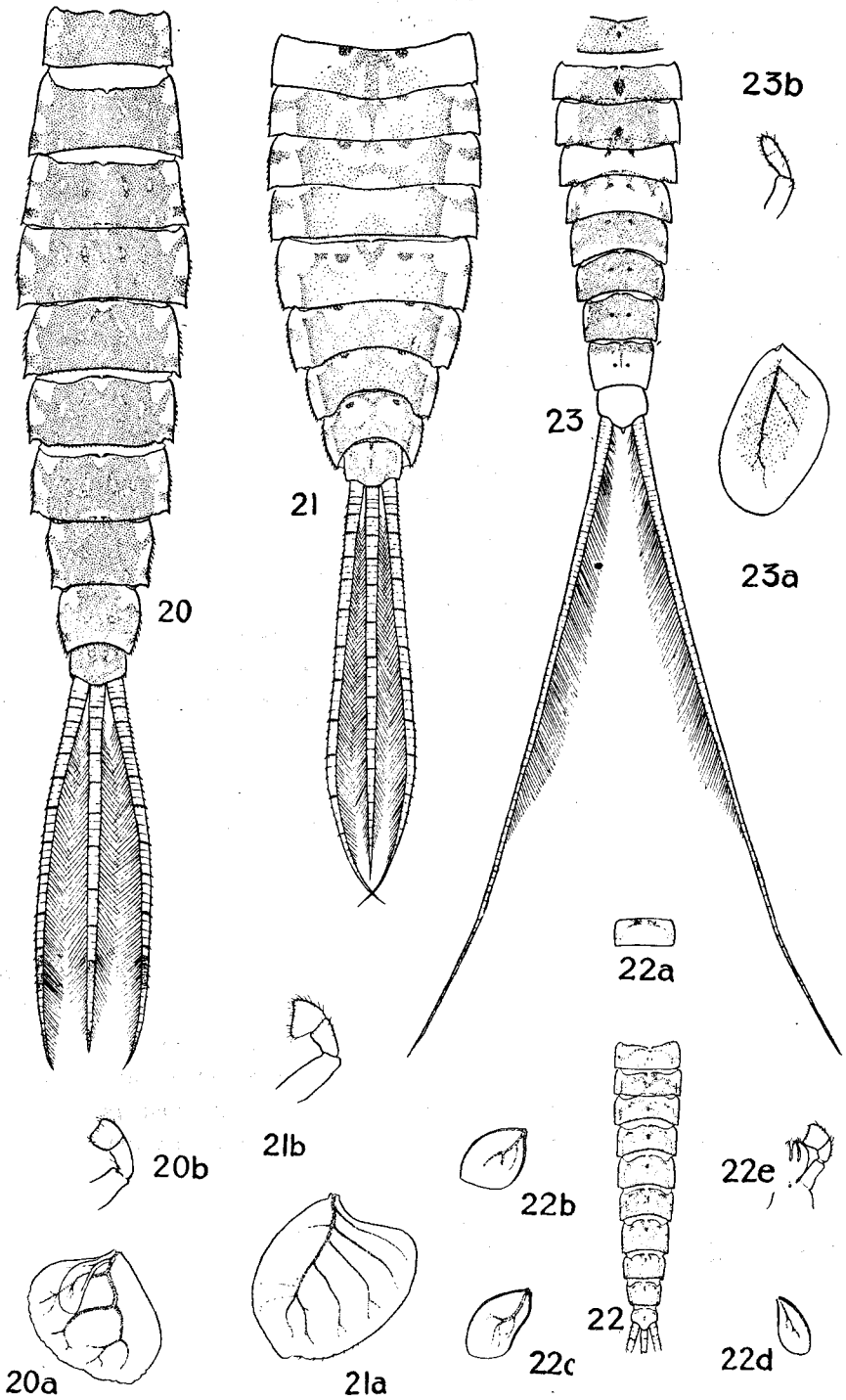
Length:—4.6 mm.

Head:—pale with two pairs of paramedial irregular brown stripes over vertex and frons.

Thorax:—notum mostly pale with small dark brown spots, dots and dashes; veins on wing pads traced with brown; femora with two incomplete dark bars, one towards the base and one nearer the apex; tarsal claws with long pectinations.

Abdomen:—segments 1, 2, 6, and 7 mostly dark above, others mostly pale; row of submedian dark spots about the middle of each dorsum; venter of each segment with four indistinct small submedian dots, (anterior pair sometimes obsolescent) and venters of 5-7 suffused with grey; lateral caudal filaments pale with a dark band less than halfway out and a dark tip, median filament about as long as the width of a lateral filament at the base; gills on segments 1-7, without conspicuous tracheae.

Nymph, female:—much like the female nymph of *P. dubium* though larger; the dorsum of the abdomen with a row of median pale areas at the anterior border of the segments and a submedian row of pale areas at the posterior border of the



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segments, and further laterally another row of pale areas; these pale areas more extensive than in *P. dubium*.

Ottawa river, Ottawa, Ont., I-VI-1935. F. P. I.

Pseudocloeon carolina Banks

The author described the nymph of this species (1930). Since that time more material from other localities has been examined and it has been found that there is great variation in general colouration. Individuals in some localities are extremely dark but resemble in other features the one described at that time.

CLOEON

The nymphs of several species of this genus have been described including *C. ingens* McD. by McDunnough (1930, 1932), and *C. mendax* by Ide (1930). Clemens (1915), it would seem, has described the nymph of *C. rubropicta* under the name *C. dubium* (McDunnough 1930).

Cloeon triangulifera McD. (1931)

This species was found in weedy stretches of streams both in western Ontario and in the province of Quebec in the vicinity of Ottawa. Females only were taken and these appeared on the wing early in the season. The western Ontario individuals were somewhat darker and larger than typical *triangulifera* of the Ottawa region and showed a definite brown band on the fore-femur which is present in *triangulifera* though somewhat indistinct. Dr. McDunnough, to whom I submitted my specimens, considers them to be *C. triangulifera*. Traver (1932) has described a new species of this group and has erected a new genus *Neocloeon* to include it. The nymph of *Neocloeon alamance* Trav. is very similar to the nymph of *C. triangulifera* described below and it would seem that the species, although perhaps not identical, are very close to one another. At present I prefer to leave *triangulifera* in the genus *Cloeon*.

Nymph Pl. 12., figs. 21, 21a, 21b.

Length:—6.2 mm.

Thorax:—legs pale, a dark longitudinal stroke about the middle of the fore-femur and an indistinct dark band subapically in other femora.

Abdomen:—an indistinct and discontinuous median dorsal dark line; situated submedially on the anterior border of each segment or very near it a distinct rounded dark spot surrounded by a pale area; lateral borders of segments pale with a dark quadrate mark before the middle; an indefinite dark area between the pale lateral border and the mid-line; venter pale with a lateral dark area in each segment and a pair of submedian dark spots on anterior border of segments 7, 8 and 9; caudal filaments stout; the laterals spinulose on lateral border; gills simple lamellae on all segments with conspicuous tracheae, the branches on most gills all directed medially from the main tracheal trunk, in the fourth gills weak lateral branches also as shown in figure.

Mad river, Singhampton, Ont., 31-IV-1930. F. P. I.

Cloeon simplex McD. (1925 a)

This beautiful greenish nymph occurs in weedy portions of streams and also in lakes. It is frequently found associated with *C. rubropicta* and *C. triangulifera* in streams.

Nymph Pl. 12., figs. 20, 20a, 20b.

Length:—5.7-7.1 mm. A pale greenish nymph with no very dark markings.

Head:—pale with slight vermiculate tracings around developing adult eyes; antennae long, extending back to end of wing-pads.

Thorax:—on pronotum two narrow brown lines near the mid-line, the pigment more intense in 4 spots; lateral to these a pale band and lateral to these again a broad dark band with irregular light areas anteriorly; mesonotum pale with faint darker marking in form of submedial stripes convergent posteriorly; longitudinal veins of wing pads traced in brown; legs for most part pale, a subterminal darker band on femur; tarsal claws acutely pointed and pectinate.

Abdomen:—dorsum uniformly olive green in life with numerous rather restricted pale areas or dots; the general arrangement of the latter is a pale area on the anterior borders of the segments forming a median row, about the middle of each segment a pair of submedial pale dots, anterior to each a pale stroke converging on the anterior border which may in some segments be restricted to a round dot; lateral to these dots and strokes a paramedial pale elongate stroke, almost directly behind the latter but slightly laterad and on the posterior border of the segment a similar paramedial stroke; a pale irregular area in the antero-lateral angle of each segment; caudal filaments stout and spinulose on the lateral border and a prominent dark band in the distal third; gills with prominent veins; gills double on segments 1-6, simple on 7 (the secondary lobe on gill 6 very minute and occasionally absent).

Mad river, Singhampton, Ont., 6-VIII-1930. F. P. I.

Cloeon minor McD. (1926)

This smallest of all *Cloeon* species was collected by Miss R. Martin in the Madawaska river in Algonquin Park, Ontario, the locality in which the adult types were secured.

Nymph Pl. 12., figs. 22, 22a, 22b, 22c, 22d, 22e.

Length:—3.2 mm.

Head:—brownish with elongate median paler area; antennae pale and moderately long.

Thorax:—pronotum pale brown with two submedial dark dots near posterior border; laterally and near the anterior border another pair of small dark patches and still further to the sides and posteriorly situated a third pair; mesonotum pale brown with submedial pair of dark dots near centre; a more extensive pair of dark spots on the anterior border laterally.

Abdomen:—rather obscurely marked; a median row of spots consisting of a dark spot situated anteriorly in each segment; submedially a row of dark spots on each side nearer anterior border than those of median row; in general a pale area immediately in front and another pale area lateral to each median dark spot; antero-lateral angles of segments pale and segments 9 and 10 largely pale; the ventral maculation is rather distinctive consisting of two quadrate dark patches at either side of the median line, the postero-lateral angle of each produced, and a lateral dark patch; gills are simple lamellae with prominent tracheae, the lateral and medial borders supported by a strong chitinous rib, the posterior border obtusely angulate.

Madawaska river, Algonquin Park Station, Ont., 31-VII-1936. R. D. C. Martin.

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EXPLANATION OF PLATES

PLATE 8

- Fig. 1. *Baetis vagans*; a, gill 4 left side; b, labial palp. Fig. 2. *Baetis rusticans*; a, gill 4 left side; b, labial palp. Fig. 3. *Baetis pluto*; a, gill 4 left side; b, labial palp. Fig. 4. *Baetis brunneicolor*; a, gill 4 left side; b, labial palp.

PLATE 9

- Fig. 5. *Baetis phoebus*; a, gill 4 left side; b, labial palp. Fig. 6. *Baetis cingulatus*; a, gill 4 left side; b, labial palp. Fig. 7. *Baetis flavistriga*; a, gill 4 left side. Fig. 8. *Baetis levitans*; a, gill 4 left side; b, labial palp. Fig. 9. *Baetis intercalaris*; a, gill 4 left side; b, labial palp.

PLATE 10

- Fig. 10. *Baetis frondalis*; a, gill 4 left side; b, labial palp; c, variation in maculation of abdomen. Fig. 11. *Baetis hudsonicus*; a, gill 3 left side; b, labial palp. Fig. 12. *Baetis pygmaeus*; a, gill 4 left side; b, gill 7 left side; c, labial palp. Fig. 13. *Baetis macdunnoughi*; a, gill 4 left side; b, gill 7 left side; c, labial palp.

PLATE 11

- Fig. 14. *Pseudocloeon dubium*, female; a, gill 4 left side; b, labial palp. Fig. 15. *Pseudocloeon dubium*, male; a, gill 4 left side; b, labial palp. Fig. 16. *Pseudocloeon punctiventris*; a, gill 4 left side; b, labial palp. Fig. 17. *Pseudocloeon virile*, male. Fig. 18. *Pseudocloeon cingulatum*; a, gill 4 left side; b, labial palp. Fig. 19. *Pseudocloeon parvulum*; a, gill 4 left side; b, labial palp.

PLATE 12

- Fig. 20. *Cloeon simplex*; a, gill 4 right side; b, labial palp. Fig. 21. *Cloeon triangulifera*; a, gill 4 left side; b, labial palp. Fig. 22. *Cloeon minor*; a, marking on venter; b, c and d, gills 4 and 7 of left side and gill 1 of right side; e, labial palp. Fig. 23. *Heterocloeon curiosum*; a, gill 4 left side; b, labial palp.