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DIVISION OF THE
NATURAL HISTORY SURVEY
THEODORE H. FRISON, *Chief*

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Descriptions of Nearctic Caddis Flies

(Trichoptera)

With Special Reference to the Illinois Species

HERBERT H. ROSS

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FOREWORD

This paper, describing new species of caddis flies from Illinois and other localities in North America, is the initial report on a project of the Illinois Natural History Survey pertaining to these aquatic insects. A complete report treating of the Illinois fauna is planned for later publication. This latter, more comprehensive faunistic study will be fashioned after some recent Survey reports on insect groups and will include keys to the adults and larvae, illustrations of the diagnostic characters, and data on the biology and distribution of these insects occuring in Illinois. The role of these insects in the economy of our lakes and streams makes their study of special interest.

This investigation was started as a major enterprise of the Insect Survey Section during the summer of 1931. Dr. Cornelius Betten of Cornell University was employed by the Illinois Natural History Survey during the summer of that year to initiate the extensive field work and acquaint the systematic entomological staff of the survey with the characters used in the classification of caddis flies and, in so far as possible, with the identity of the various species inhabiting the waters of our state. Since 1931, Dr. H. H. Ross, Systematic Entomologist of the Illinois Natural History Survey, has been responsible for the continuation of this project. In addition to the great assistance received from Dr. Betten, our studies have profited greatly by Dr. Ross' study of the Hagen and Banks types in the Museum of Comparative Zoology, Cambridge, Massachusetts, kindly made available for detailed study and designation of lectotypic specimens by Dr. Nathan Banks.

As these studies progressed, it became apparent that a study of the entire North American fauna would be necessary to identify properly the Illinois species. Therefore, specimens were assembled from localities representing as many parts of the continent as possible. Some of this material was obtained by Illinois Natural History Survey field trips, whereas other material was submitted for study by outside individuals and institutions. When all of this material was finally determined, it was found that a large proportion of it represented new species. It now seems advisable to describe these forms new to science so that the names may be known to others and made available for use in future publications of the Survey.

T. H. FRISON

Kankakee River near Momence, Illinois

Many of Illinois' rarest and most interesting species of caddis flies have been found in this clear, fast-flowing stream.

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VOL. 21, ART. 4 MARCH 1938

Descriptions of Nearctic Caddis Flies

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With Special Reference to the Illinois Species

HERBERT H. ROSS

DESCRIPTIONS of the new species of caddis flies (Trichoptera) treated in this paper are based for the most part upon specimens collected by various members of the ILLINOIS NATURAL HISTORY SURVEY. They are based in part, also, upon other collections sent to the SURVEY by the following members of other institutions: G. F. Knowlton, Utah State Agricultural College, Logan, Utah; J. W. Leonard, Institute of Fisheries Research, Ann Arbor, Michigan; D. C. Mote and R. E. Dimick, Oregon State Agricultural College, Corvallis, Oregon; R. W. Kaiser, Oklahoma Agricultural College, Stillwater, Oklahoma; and various staff members of the University of Wisconsin, Madison, Wisconsin. I wish to thank these individuals and others who have been of assistance to me at various times for their welcome cooperation.

In several cases, notably in *Hydropsyche*, the differences used to separate the adults into species will appear slight. Collections of thousands of specimens and the association of larvae with adults, however, have shown that these small differences are (1) constant and visible through the large series I have studied, (2) correlated with marked differences in the larvae, (3) correlated with distinct ecological habits and distribution patterns and (4) frequently associated with distinct differences in the color pattern of the males.

Many of the species herein described have been reared. The descriptions of the larvae and pupae will not be presented now but will be treated in the forthcoming report on the caddis flies of Illinois. These descriptions will be much more valuable when taken up in conjunction with a synopsis of the entire Illinois group.

Most of the drawings have been made by Dr. C. O. Mohr, of the ILLINOIS NATURAL HISTORY SURVEY, to whom I wish to express my deep gratitude.

The drawings of genitalia in all cases have been made from genital capsules cleared in caustic potash (KOH) solution, washed in distilled water and mounted in glycerin. Many structures necessary for accurate identification cannot be seen clearly unless the specimen is treated in this manner.

Except for the few paratypes otherwise noted, the types of the species described in this paper are deposited in the collection of the ILLINOIS NATURAL HISTORY SURVEY.

The structures hitherto called preanal appendages, socii, anal appendages, etc., appear to be indubitably associated with the lateral margins of the tenth tergite. For this reason they are considered the true cerci. In many of the more primitive genera there is no doubt that these cerci are homologous to the same structure in Hymenoptera, Mecoptera and other orders.

The general order of families and genera is, with few exceptions, that used in Dr. Cornelius Betten's *Caddis Flies of New York State*. Wherever reference

is made in the text to "Betten (1934)" this book is the one indicated.[1]

Family **RHYACOPHILIDAE**

Rhyacophila fenestra new species

This handsome species, fig. 1, is related to members of the *carolina* group but differs from previously described forms in the digitate spurs on the lateral arms of the oedagus as well as in other points of the genitalia.

Male.—Length 11 mm. Head straw color with a quadrangular dark brown spot between the ocelli; antennae and palpi dark brown; eyes black. Thorax brown with the venter, prothorax and lateral sutures yellowish. Abdomen straw color, the dorsum with a purplish cast. Legs straw color with the tarsi suffused with brown. Front wings gray with white markings in the membrane, each marking supplemented with a patch of silvery pubescence on the dorsal side; these light markings are all situated between the darker veins and are so arranged that they form more or less diagonal bands of spots across the wing. Hind wings uniform bluish-gray. The various warts, raised areas and the veins on the wings are provided with rows or clusters of long setae which are either brown, golden or a mixture of these two colors. The blue-gray patches of the front wings are clothed with minute, dark setae matching the color of the wing membrane. The pubescence of the legs is straw color.

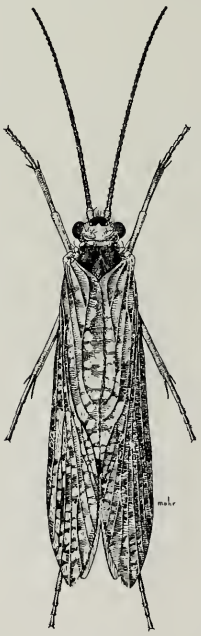

Fig. 1.—*Rhyacophila fenestra*, adult ♀

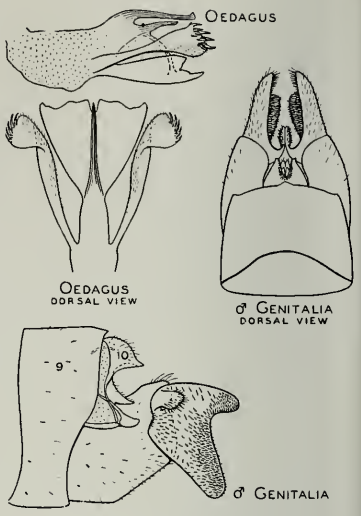

Fig. 2.—*Rhyacophila fenestra*

General structure typical for genus. Tibiae with small, straw colored spines in addition to the usual number of very long ones. Front wing with fork of R_{2+3} distinctly beyond fork of R_{4+5}; M_{1+2} branching very close to margin; M_{3+4} branching midway between *m-cu* and margin of wing. Seventh sternite with a small, pointed mesal projection.

Genitalia as in fig. 2. Claspers relatively short and broad, the dorsal margin of the apical segment subequal to the dorsal margin of the basal seg-

[1]New York State Museum, Bulletin 292. December, 1934.

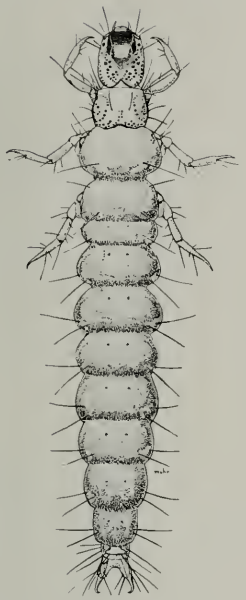

Fig. 3.—*Rhyacophila fenestra*, larva

ment; the apical segment incised for one-third its lateral and one-fourth its mesal length; both lobes straight and rounded, the dorsal one small and the ventral one large. At the base of the segment there is a mesal incurving lobe; most of the apical segment and this lobe are covered with short, dark setae. Tenth tergite narrow, the dorsal lobe cleft down the meson for more than one-half its length; the lateral lobes so produced have convex dorsal margins with a rather short, sharp apical point; below these the segment is produced into two closely appressed concave plates which articulate with the dorsal band of the oedagus. Oedagus consisting of a basal bandlike structure that articulates with the tenth segment and an apical cluster of structures at the end of a membranous tube. This cluster is composed of (1) a semimembranous pair of arms arising at its base, these arms enlarged at the apex and bearing usually five large, incurved spines, each surrounded by small spines; (2) a dorsal, sclerotized median process which is thin and bladelike from the dorsal view and from lateral view is divided into two sinuate rods; and (3) a mesal structure that has a vertical membranous connection with a pair of fanlike ventral lobes which are thin, colorless, only semisclerotized and together are slightly concave on the meson.

Female.—Length 12 mm. Color and general structure exactly the same as for male. Sixth sternite with a narrow process on the meson. Eighth segment tubular, the dorsum carinate, the apical opening circular except for the emargination caused by the dorsal carina.

Holotype, male.—Herod, Illinois: May 12, 1936, reared from Gibbons Creek, Ross & Mohr.

Allotype, female.—Same data as for holotype.

Paratypes.—Illinois.—Herod: May 29, 1935, Ross & Mohr, 1♂; pupae collected May 5, Ross & Mohr, adults emerged at Urbana, May 7-12, 1936, 4♂, 1♀; pupae collected May 12, Mohr & Burks, adults emerged at Urbana, May 14–June 6, 1936, 18♂, 17♀; pupae collected May 13, Frison & Ross, adults emerged at Urbana, May 17–24, 1937, 10♂, 11♀.

The larvae, fig. 3, are common in the rocky streams of the Ozark region in southern Illinois.

Rhyacophila iranda new species

This species most closely approaches *vofixa* Milne but differs radically in the elongate apical portion of the oedagus, fig. 4.

Male.—Length 9 mm. Head and thorax black; the setiferous warts and antennae dark brown. Abdomen with

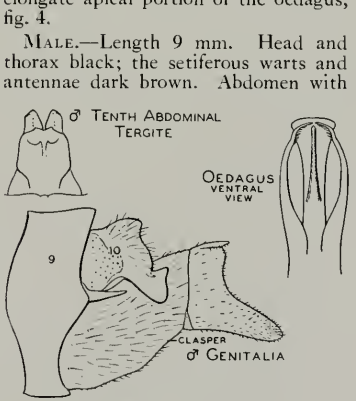

Fig. 4.—*Rhyacophila iranda*

venter straw color and dorsum purplish. Legs with coxae and femora dark brown; remaining parts yellowish-brown. Wings dark brown with light patches in the membrane at the end of each apical cell and in the subcostal, cubital and anal cells; the pubescence dark brown except over the light areas, where it is almost white.

General structure typical for genus. Genitalia as in fig. 4. Ninth segment with ventral portion narrower than dorsal. Clasper with basal segment about as long as depth of ninth segment, its dorsal and ventral margins slightly convex; the apical segment is slightly more than twice as long ventrally as dorsally, the apical margin scooped out and evenly concave, the dorsal angle slightly but sharply produced. Tenth tergite short, the dorsal angle produced into a pair of short points, the ventral angle produced into a pair of truncate lateral areas; most of the surface covered with sparse setae. Apical portion of oedagus with a pair of narrow lateral processes which taper to a thin curved apex, this extreme apical portion with a row of fine setae on the mesal margin; the mesal portion sclerotized, divided into a thin ventral process and a wide, somewhat spatulate, dorsal process.

Holotype, male.—Mount Baker, Washington: July 21, 1936, along Razorhone Creek, H. H. Ross.

Rhyacophila manistee new species

Belonging to the same small group as *minora* Banks, this species differs from it in the narrower tenth tergite and in the arrangement of the dorsal setae at the apex of the oedagus in two regular, parenthesislike bands, fig. 5.

Male.—Length 9 mm. Color dark brown, the legs below coxae yellowish brown, the wings with membrane lighter than the venation, with slightly lighter spots at the ends of the apical cells; most of setae dark brown, intermixed with patches of golden setae.

General structure typical for genus. Genitalia as in fig. 5. Tenth tergite, seen from above, almost twice as long as wide, the apex divided into two short, somewhat pointed lobes; laterally tergite is produced into a postero-ventral lobe with the apex pointed. Claspers with apical segment slightly shorter than basal one; basal segment almost twice as long as wide, the ventral margin straight; apical segment of ventral margin straight at base and upturned at apex; dorsal margin sinuate, so that the clasper is rounded off to a short apical lobe. Oedagus composed of two distinct parts: (1) a short compact basal portion which is sclerotized and has one ventral and three short, apical dorsal projections and (2) a membranous extensile tube at the apex of which is situated a semisclerotized ovate structure which is hollowed out dorsally and has a conspicuous band of small, black setae bordering margin of depression.

Female.—Length 10 mm. Color and general structure same as for male. Genitalia very simple; eighth segment

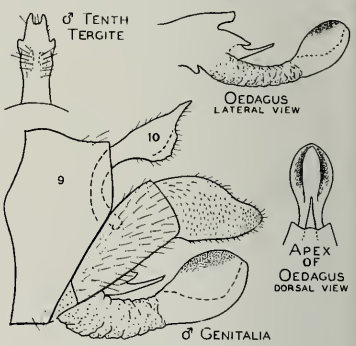

Fig. 5.—*Rhyacophila manistee*

tubular, tapering evenly from base to apex; the remaining segments of the abdomen extensile, tubular and submembranous.

Holotype, male.—Grayling, Michigan: May 21, 1936, along Manistee River near town, Frison & Ross.

Allotype, female.—Same data as for holotype.

Paratypes.—Michigan.—Grayling: Same data as for holotype and allotype, 74♂, 56♀. Lovells: May 22, 1936, along Au Sable River, Frison & Ross, 3♂.

Rhyacophila melita new species

This is distinct from all other North American species not only in the poorly set off and ovate terminal segment of

the clasper but also in the oedagus with its short, heavy, five-tined process, shown in fig. 6.

Male.—Length 11.5 mm. Head dark brown with setiferous warts and antennae light brown. Remainder of body

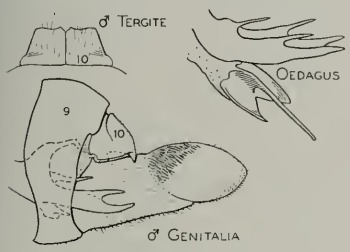

Fig. 6.—*Rhyacophila melita*

dark brown, with the legs and venter of the abdomen straw color. Wings uniformly brown, the veins and stigmal region darker.

General structure same as for genus, the diagnostic differences being almost entirely in the genitalia. Genitalia as in fig. 6. Seventh sternite with the small, triangular mesal projection just above apex. Ninth segment cylindrical, only slightly longer dorsally than ventrally. Claspers only one-tenth longer than depth of ninth segment; the basal segment has the ventral margin slightly more than twice as long as the dorsal margin, the two being parallel; the apical segment, viewed laterally, appears egg shaped, the dorsal side longer than the ventral side, the basal suture indistinct dorsally, the inner margin with the dorso-basal region thickly set with long, stout setae. Tenth tergite, viewed laterally, appears short and beaklike; the dorsal aspect is divided into two halves, each one tapering toward apex and produced near meson into a short, pointed projection; the entire surface is sparsely set with setae. Oedagus as illustrated, the ventral process consisting of a narrow mesal style with a pair of semimembranous flaps at base; the dorsal portion is a heavily sclerotized structure with a single mesal spine at base and with the apex divided into a pair of bifid processes.

Holotype, male.—Crawford County, Michigan: June 16, 1935, north branch of Au Sable River, J. W. Leonard.

Rhyacophila perda new species

This species closely resembles *montana* Carpenter and *lobifera* Betten, but differs from both in the dorsal prolongation of the ninth segment which consequently overhangs the basal segment of the clasper.

Male.—Length 13 mm. Head with lower portion yellowish brown, dorsal portion black with setiferous warts brown, antennae brown with a tawny ring at the base of each segment. Thorax light brown with the scutal lobes darker in the middle. Abdomen yellowish brown, the dorsum with a purplish tinge. Legs entirely yellowish brown. Wings completely infuscate with purplish brown, the veins darker; the membrane around the edge of the wing and in the radial area has small pale areas which do not contrast much with the darker part of the wing.

General characteristics same as for genus. Front wing with fork of R_{2+3} slightly before fork of R_{4+5}. Genitalia as in fig. 7. Ninth segment with the dorsal portion twice as long as the ventral half and forming a quadrate angle into which fits the basal segment of the clasper. Clasper (lateral view) with basal half slightly longer than its width at apex; both upper and lower margins concave. Apical segment with its greatest diagonal length almost equal to basal segment and with a dorso-apical incision which forms a long, narrow dorsal lobe and a wide, truncate ventral lobe jutting out considerably

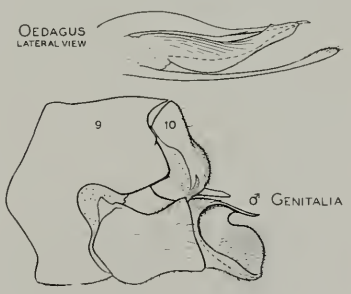

Fig. 7. *Rhyacophila perda*

beyond the dorsal lobe; the entire lateral face sunken except for the dorsal, basal and ventral margins. Tenth tergite fitting beneath meso-dorsal projection of ninth; it is a relatively small, padlike area, appearing somewhat heart-shaped when viewed from above and as a plate when seen from the side. Oedagus has apical portion composed of two main parts: (1) a pair of slender lateral appendages set with small setae at apex and (2) a mesal sclerotized process which bears approximately the same parts as illustrated for *fenestra* but which have become so completely fused that they appear as a single structure.

Holotype, male.—Mount Baker, Washington: July 21, 1936, along Razorhone Creek, H. H. Ross.

Agapetus artesus new species

Practically identical with *minutus* and *illini* in size and general characteristics, this species differs in the short tenth tergite, particularly the vasiform side

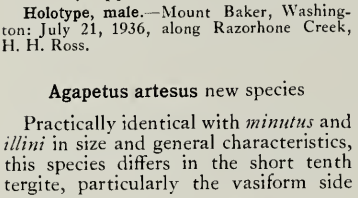

Fig. 8.—*Agapetus artesus*

pieces or lateral pieces which have no spines on their distal margin.

Male.—Length 5 mm. Color identical with *illini* (see below), the body brown and the legs a lighter shade. General characteristics, such as spurs, antennae, ocelli and wings, typical of genus. The abdomen has the usual ovate organ on the fifth sternite and the long tapering process on the sixth.

Genitalia as in fig. 8. Claspers short and deep; seen from the ventral aspect they appear to have a wide base and abruptly narrowed apex, the apical half having a pair of dark, sclerotized points, the larger on the ventral margin, the smaller near the dorsal margin, the two connected by a sclerotized ridge. Tenth tergite composed of two vasiform lateral plates markedly narrowed and pointed at apex, connected by membranous folds. Cerci narrow at base, broader and almost truncate at apex; slightly more than one-third the length of the claspers, pointed latero-caudad and with a cluster of long setae on their lateral face. Oedagus simple with the apex slightly enlarged.

Female.—Slightly larger than male, similar to it in color and general structure. To date no distinguishing characters have been found between this female and that of *illini*.

Holotype, male.—Greer Spring, Missouri: June 7, 1937, H. H. Ross.

Allotype, female.—Same data as for holotype.

Paratypes.—Missouri.—Greer Spring: Mar. 28, 1937, T. H. Frison, 1 ♂; same data as for holotype, 1 ♂, 3 ♀

Agapetus illini new species

This species is indistinguishable from *minutus* except on the basis of genitalia. It is characterized by the longer tenth tergite with a smaller cluster of spines at its apex and a short apical spur on the clasper, fig. 9.

Male.—Length 5 mm. Body dark brown, clothed with brown setae. Legs with basal half dark brown, apical half lighter, clothed with straw colored setae. Wings dark brown with slightly lighter setae. Spurs, antennae, ocelli and wings typical of genus. Fifth sternite with a bulbous organ and sixth with a stout mesal projection which is slightly longer than the segment itself.

Genitalia as in fig. 9. Claspers narrowed toward apex, the upper margin convex; the mesal margin armed with two heavily sclerotized points, one on the dorsal and one on the ventral margin, connected by a sclerotized ridge. Cerci curved outward and bearing on their lateral surface long setae. Tenth tergite composed of a dorsal membranous region and a pair of ventro-lateral sclerotized plates; these are truncate at the apex, which is armed with many spiny projections; the tenth tergite has at its base a pair of dorso-lateral sclerotized projections which can be readily seen only from the dorsal aspect.

Female.—Slightly larger than male,

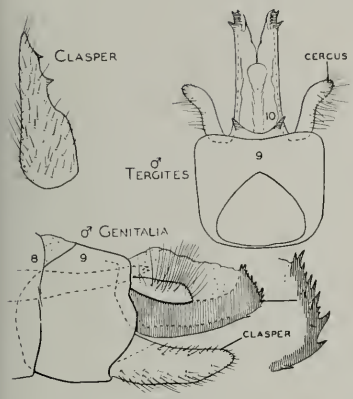

Fig. 9.—*Agapetus illini*

similar to it in color and general structure; middle tibia and basi-tarsus compressed. Fifth, sixth and seventh sternites with a crescentic ridge running from the baso-lateral corner through the meso-apical region. Sixth sternite with a definite mesal projection at apex. Genitalia consists of a simple type of sclerotized tube with the apical segments invaginated.

Holytype, male.—Herod, Illinois: May 1, 1936, Ross & Mohr.

Allotype, female.—Same data as for holotype.

Paratypes.—Illinois.—Eichorn: May 11, 1935, C. O. Mohr, 4♂; Herod: Same data as for holotype, 24♂; May 29, 1928, along Gibbons Creek, T. H. Frison, 11♂; May 10, 1935, C. O. Mohr, 11♂, 1♀; May 29, 1935, Ross & Mohr, 11♂, 7♀; July 11, 1935, Ross & DeLong, 1♂; May 12, 1936, Mohr & Burks, 7♂, 3♀; May 13, 1937, Frison & Ross, 70♂, 7♀.

Agapetus medicus new species

Another species indistinguishable from the *minutus* group on the basis of general characteristics but radically different on the basis of genitalia, having the claspers long and truncate and the tenth tergite also long and truncate but lacking the apical dentation of *minutus* and *illini*.

Male.—Length 5 mm. Color and general structure as given for *illini*.

Abdomen and genitalia as in fig. 10. Tenth tergite bilobed from base, each lateral lobe long and deep but narrow; truncate at the apex and bladelike, the ventral and apical margins without serrations or teeth, the upper margins concave and joined by membranous folds. Cerci slender and slightly sinuate; the apex narrowly rounded and the dorsal half bearing a cluster of long, slender setae; the appendage attaining half the length of the lobes of the tenth tergite. Claspers, seen from the side, rectangular, four times as long as high, the apex truncate except for a slight production near ventral margin and having a sclerotized ridge running across the mesal face at apex. Seen from above, the clasper is fairly uniform in thickness for about three-fifths its length, beyond which it tapers to a rounded tip reinforced mesally by the apical sclerotized ridge. The oedagus is a simple tube, as in the other species of the group.

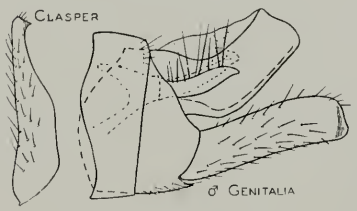

Fig. 10.—*Agapetus medicus*

Holotype, male.—McFadden Springs, Arkansas: June 5, 1937, H. H. Ross.

Paratypes.—Arkansas.—Same data as for holotype, 3♂.

Agapetus pinatus new species

Although this species is indistinguishable from some previously described forms in color and general structure, the genitalia are markedly different.

Male.—Length 5 mm. Body light brown, the antennae and legs even paler. Color and general characteristics same as for other members of the genus.

Genitalia as in fig. 11. Claspers long and narrow. Seen from ventral view, they appear to have a rather long, rectangular basal portion tapering to a fairly sharp point; the sclerotized points on either side of the mesal ridge appear almost in line from this aspect. Tenth tergite with a dorsal semisclerotized portion composed of two flat plates obliquely truncate at apex and almost

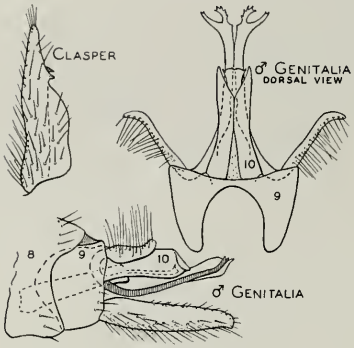

Fig. 11.—*Agapetus pinatus*

touching on the meson; and with a ventral portion consisting of two long, sclerotized rods fused at the base with this dorsal portion and extending considerably beyond it, their apices abruptly turned dorso-laterad and divided into two lobes visible from the dorsal aspect. The lateral one of these apical lobes is divided into two small points, the mesal one clavate with several small, spiny processes. Cerci long, curved outward near apex and having a cluster of long setae along their dorso-lateral margin. The cerci and the ventral rods of the tenth tergite seem to be fused with each other and with the remainder of the tenth tergite at their base. Oedagus simple, composed of a basal tube in which articulates a slender sclerotized rod.

Holotype, male.—Elkmont, Tennessee: June 12, 1935, H. H. Ross.

Agapetus debilis new species

This species is readily distinguished from other members of the group by the long and bidigitate claspers combined with the short tenth tergite.

Male.—Length 6 mm. Body dark brown; the raised areas of the head and thorax, most of the anterior aspect of the head and legs below coxae straw color (except spurs, which are dark brown). Wings uniformly dark brown, the veins darker than the membrane.

General characteristics as for genus except as follows: Front wings with radial crossvein oblique but with vein R_{2+3} hardly at all angled at that point; base without a large specialized area such as in *Glossosoma*. Legs with tibial spurs very long, all of them simple, their count being 2–4–4. Fifth sternite of abdomen without the usual complicated platelike appendage but with a raised area on each side connected by a raised line which runs transversely across the segment about one-third the distance from the apex. Sternites 6 and 7 with only small raised processes ending in a small point at apex.

Genitalia as in fig. 12. Ninth segment cylindrical. Tenth tergite divided on meson for almost its entire length. Seen from lateral view, it appears wide at base, gradually tapering to a narrow, depressed, blunt apex; seen from above, the apices seem to diverge slightly from the main axis of the segment. Claspers very long, projecting three-fourths of

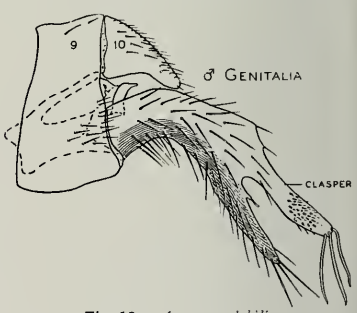

Fig. 12.—*Agapetus debilis*

their length beyond the remainder of the genitalia; the basal portion, or "handle" (comprising .6 of the entire length), is bowed, increasing in depth beyond the middle of the arc. Beyond this "handle" the clasper is divided into two long, fingerlike processes, both of them almost straight, the upper one slightly fusiform, the lower one tapering slightly from base to apex, each one surmounted by a group of setae, the setae on the dorsal process modified into flat spindles. The entire clasper is covered with scattered setae, those on the "handle" longest; it is concave mesally and turned in so that the ventral margin is considerably mesad of the

dorsal margin. Oedagus and its assemblage very small, composed of short, needlelike processes articulating as a group with the tenth tergite and claspers.

Holotype, male.—Logan Canyon, Utah: June 27, 1937, W. P. Nye.

This species brings up some interesting questions in relation to the genera of the Glossosomatinae. It is placed here in *Agapetus* but lacks the lateral plate on the fifth segment, which condition should exclude it from *Agapetus*. On the other hand, the straight tibial spur excludes it from *Mystrophora* and the lack of a callosity on the front wing wing excludes it from *Glossosoma*. The venation, especially the oblique radial crossvein, is somewhat suggestive of *Mystrophora*. Here, then, we have a species set off from almost every known genus in the subfamily by the lack of a specialized development of the male. It may well be that a new genus should be erected for this. At present I am placing it in *Agapetus* on the basis of general resemblance of genitalia. I believe, however, that this species should be set off as a distinct subgenus. Perhaps, when the females are associated with more species in this group, we shall find it necessary to express many of the groups as subgenera and not genera.

Anagapetus new subgenus

Differs from *Agapetus s. st.* in the following characters in the male: Lateral platelike structures on the fifth abdominal sternite represented only by small callous elevations which do not have an internal lamellate structure. No sternites with long, fingerlike mesal projections. Front wing with the radial crossvein diagonal, joining R_{2+3} just basad of the fork of this vein. Other characters typical of the genotype.

Genotype. — *Agapetus debilis* new species (by original designation).

Glossosoma excita new species

This species is distinguished from all others in the genus by the claspers, which are very wide at the base and taper to an apex that appears narrow and upturned when viewed from the lateral aspect and truncate when seen from the ventral.

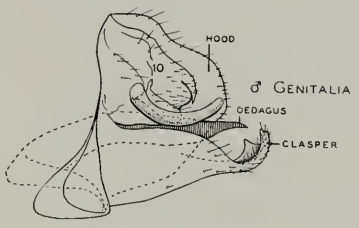

Fig. 13.—*Glossosoma excita*

Male.—Length 7 mm. Color and general structure almost exactly as described for *velona* (below), the diagnostic characters occurring chiefly in the genitalia.

Genitalia as in fig. 13. Genital parts in repose shielded by lateral extensions of the ninth segment. Clasper very broad at base, ventral margin slightly sinuate, the dorsal margin arcuate, the clasper narrowing abruptly about two-thirds the distance from the base and turned up at its extreme apex; the ventral margin angled meso-dorsad so that the clasper has a wide mesal shelf with its meso-apical corner sharply angled; only the apex of the clasper has setae, these relatively short. Tenth tergite stocky, the dorsal margin declivous, the dorsal part of the apex forming a sharp, curved process, the portion beneath this rounded; from the extreme lateral portion of this region there arises a pair of cylindrical, tusk-shaped processes which bear no setae; mesad of these are a pair of fingerlike processes only half as long as the lateral ones and sparsely covered with setae. Oedagus long and simple, its apex narrowed and pointed, articulating by two ribbonlike structures which extend from the extreme base of the oedagus to near the lateral corner of the claspers.

Holotype, male.—Pringle Falls, Oregon: May 26, 1935, N. F. Canova.

Glossosoma velona new species

Although this species is closely related to the *parvulum* group, it is readily distinguished by the shorter cerci and claspers.

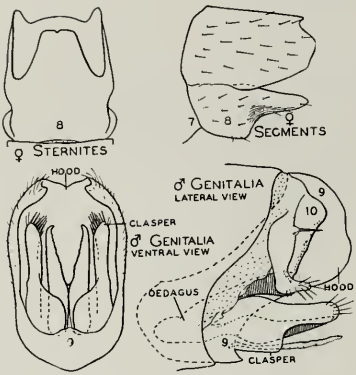

Fig. 14.—*Glossosoma velona*

Male.—Length 6.5 mm. Head, including palpi and scape, dark brown, remainder of antennae straw color. Thorax and abdomen a slightly lighter shade of brown than the head. Legs straw color, the coxae and femora frequently suffused with brown. Wings brown, the portion below the stigma slightly darker than the rest, the veins in this region also darker than the others.

General structure typical for genus as follows: Antennae slightly shorter than wing, broadest at base and tapering greatly to apex. Ocelli well separated from eye, postocellar region with two pairs of setiferous warts. Legs with a spur count of 2–4–4. The spurs on the front tibiae very short, on the middle and hind tibiae very long. Venation typical for genus. Sixth sternite with a broad, flat ligula arising on meson; seventh sternite with a small, stubby process on the meson.

Genitalia as in fig. 14. The entire assemblage in repose enclosed by a hoodlike extension of the ninth segment. Claspers with basal half broad, apical half suddenly narrowed, the apex slightly clavate and provided with a mesal brush of stout setae. Tenth tergite held at right angles to longitudinal body axis, divided into two lobes; each of these has the apical portion sharply pointed and bears a lateral enlargement which is probably the cercus; this appendage has a large tooth at its base and is abruptly angled at its apex, the apex arising free from the segment. Oedagus with a large mesal rod articulating with the tenth tergite at one end and with the remainder of the oedagus at the other; from near the base of this structure arise two stout, sclerotized processes which appear almost fused at their base but are distinct and taper toward the slender and sharp apex.

Female.—Length 7 mm. Similar in color and general characteristics to the male, differing chiefly in that the midtibiae and tarsi are enlarged and flattened. Genitalia as in fig. 14. Sixth sternite with a raised meso-apical process.

Eighth sternite produced at the base into a humplike keel, the apex flattened. Eighth tergite hoodlike, only slightly incised dorsally; remainder of genitalia a simple extrusible tube with thin, sclerotized supporting rods attached to base of clasper.

Holotype, male.—Centralia, Washington: July 26, 1936, H. H. Ross.

Allotype, female.—Same data as for holotype.

Paratypes.—Montana.—Ennis: July 8, 1936, along Madison River, H. H. Ross, 7♂, 3♀.

Oregon.—Arlington: July 29, 1936, along Columbia River, H. H. Ross, 1♀.

Washington.—Same data as for holotype, 1♀.

Glossosoma verdona new species

The absence of hoodlike projections of the ninth segment groups this species with *penitum* Banks. It differs from *penitum*, however, in the ventral portion of the claspers and the subquadrate tenth tergite.

Male.—Length 7.5 mm. Color and general characteristics exactly as described for *velona*. The distinguishing

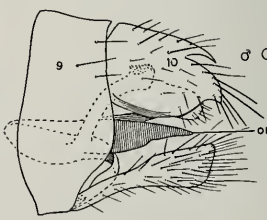

Fig. 15.—*Glossosoma verdona*

characteristics occur only in the genital apparatus.

Genitalia as in fig. 15. Claspers fairly long, basal half narrow, apical half considerably widened, the apical margin practically truncate, seen from either the lateral or ventral aspects; the apical half clothed with long setae and having a mesal lobe abundantly provided with setae. Tenth tergite almost as deep as long; the meso-apical corner is produced into a sharp, curved point; the ventral portion ends in a very broad, curved point and within this is a flaplike lobe; the entire structure is sparsely covered with setae, those on the apical margin being very long. Oedagus anchored at the base by two ribbonlike, sclerotized bands which are fashioned laterally near the base of the claspers; the apical portion of the oedagus is composed of two tapering, sclerotized rods; from the central portion of the oedagus arises an erect process with its apex enlarged into a knoblike structure which is densely covered with short, straight setae.

Holotype, male.—Pinedale, Wyoming: July 6, 1936, along Green River north of town, H. H. Ross.

Paratypes.—Utah.—Big Cottonwood Canyon: April 24, 1937, G. K. Knowlton & F. C. Harmston, 5♂.

Wyoming.—Same data as for holotype, 2♂.

The five paratypes from Utah differ from the others in being uniformly darker in color, and in having the dorso-mesal point of the tenth tergite of the male reduced or absent. The extreme similarity of all other points of the genitalia leaves no doubt, however, that the two series are the same species.

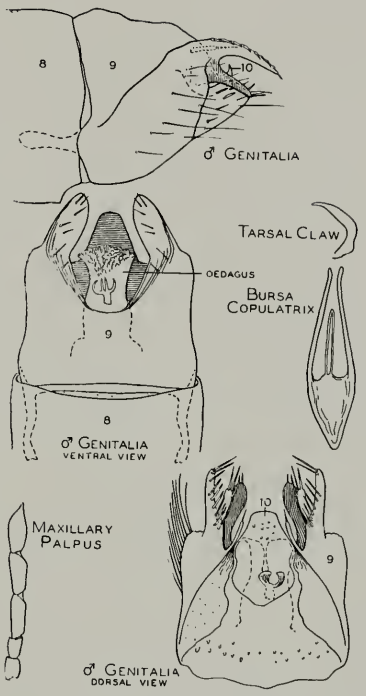

Fig. 16.—*Paragapetus celsus*

Paragapetus celsus new species

This species is most closely related to *nearcticus* Banks, but differs in lacking a long, palmate dorsal process on the tenth tergite.

Male.—Length 4 mm. Color, including wings, legs and other appendages, uniformly blackish brown.

General structure: Antennae about 24-segmented, two-thirds length of forewing. Maxillary palpi stocky, 5-segmented, first two segments short, third subequal in length to first two together, fourth slightly shorter than third, fifth slightly shorter than fourth, pointed at apex, fig. 16. Ocelli present, the median one situated between antennal sockets, the lateral pair midway between antennal sockets and posterior margin of head. Tibial spurs 2–4–4, none modified. Tarsal claws curved, fig. 16, all of them similar in shape. Wings with typical, simple, Rhyacophilid venation; front wing with R_5 and M having two symmetrical dichotomies; Sc_1 and basal abscissa of Sc_2 variable. Abdomen has a sclerotized thickening just before apex on sternites 5–7; that on the seventh has a small, pointed thickening on meson.

Genitalia as in fig. 16. Most of the parts seem fused at the base with the genital capsule. The lateral margin is prolonged dorso-apically into a forked

process; the upper prong of the fork bears a row of stout, fairly long setae on its dorsal margin, and a long, fingerlike process branches from its base, which may be seen dorsally; the lower branch is shorter, with only a few setae, and is situated almost directly beneath the upper. The ventral margin is produced apically into a pair of lateral lobes bearing scattered setae on their inner margin toward apex. Tenth tergite rounded and slightly upturned at apex. Oedagus submembranous, short and thick, with a sclerotized area on its ventral surface; the apex membranous.

Female.—Length 4.5 mm. Similar in color and general structure to male. Abdomen simple in structure. Segments 1–7 normal, remainder retracted into abdomen to form an extensile tube. Bursa copulatrix as in fig. 16.

Holotype, male.—Newfound Gap, North Carolina: June 13, 1935, along Little Pigeon River, H. H. Ross.

Allotype, female.—Same data as for holotype.

Paratypes.—North Carolina.—Same data as for holotype, 54♂, 10♀.

Protoptila Banks

On the basis of their small size and long fringe of hair on the anal margin of the wings, the small insects belonging to this genus would key out to the Hydroptilidae. Certain other characters, however, such as the immature stages, lack of setation on the abdomen and the structure of the male and female genitalia, present conclusive evidence that the genus belongs in the Glossosomatinae of the family Rhyacophilidae. The adults of *Protoptila* may be keyed out from the Hydroptilidae on the basis of always having ocelli which are distant from the eye.

Protoptila jeanae new species

This and the following three species differ from previously described members of the genus in lacking a produced, furcate apical sternite.

Male.—Length 3.5 mm. Head and dorsum of body brown; antennae white with apical eight segments blackish brown; palpi, legs and venter whitish; tibial spurs brown; wings brown with a narrow, white transverse band two-thirds distance from base.

General structure: Head robust and ovoid, with a pair of caudal warts, three prominent ocelli and a pair of larger warts between the lateral ocelli. Maxillary palpi five segmented; the first and second segments subequal and together subequal to the third; the third, fourth and fifth subequal; the entire palpus short and stocky. Antennae filiform, the two basal segments thicker than the rest. Tibial spurs 0–3–3. Abdomen membranous with only few setae except on genitalia.

Genitalia as in fig. 17. Ninth tergite incised on margin, the lateral lobes pointed, fig. 17. Superior appendages with heavy setae along margins, apex surmounted by a rounded, sclerotized process. Claspers sinuate in lateral view, with no setae, the apex roughened and dark. Between these two pairs of appendages are exserted two narrow and pointed processes, and within the body can be seen an erect, somewhat hook-shaped appendage associated with the oedagus.

Female—Size and general structure as in male. Apex of abdomen as in fig. 17, the ultimate segment rounded, the apex bearing a pair of fingerlike processes, the surface covered with fine setae pointing basad. Penultimate segment broad and short, with two lateral slits, under which may be seen the broad, roughened bursa copulatrix.

Holotype, male.—Sevierville, Tennessee: June 11, 1935, J. A. & H. H. Ross.

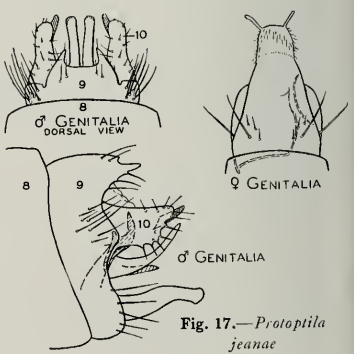

Fig. 17.—*Protoptila jeanae*

Allotype, female.—Same data as for holotype.

Paratypes.—KENTUCKY.—Livingston: June 16, 1935, along Rockcastle River, J. A. & H. H. Ross. 1♀.

NORTH CAROLINA.—Cherokee: June 14, 1935, J. A. & H. H. Ross, 21♂, 3♀.

TENNESSEE.—Same data as for holotype, 9♂, 3♀.

Protoptila erotica new species

In characters of tibial spurs and venation, this species belongs to the *maculata* group but differs in lacking a

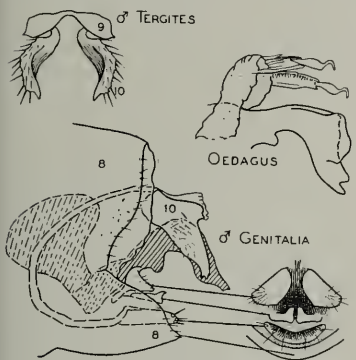

Fig. 18.—*Protoptila erotica*

conspicuous and large ventral plate in the male.

MALE.—Length 3.0 mm. Color and general structure typical for genus. Middle and hind tibiae have four spurs of about equal length. Hind wings excavated along the anterior margin beyond the middle of the wing.

Genitalia as in fig. 18. Tenth tergite divided into two lateral arms which together appear in somewhat the shape of a horseshoe. Ventral plate small, short and narrow, with a few apical setae. What appear to be the claspers are short, stubby processes angled at the apex and closely attached at the base to a plate bearing a paired mesal process which protrudes slightly beyond the claspers. Oedagus large, consisting of a large knoblike portion within the body cavity and an exterior portion. This consists of a central piece, which is angled and widened near its middle and tapers to its apex; arising from its base are two membranous arms, each bearing an elongate hook sheathed with membrane around the base.

FEMALE.—Similar in size, color and general structure to male.

Holotype, male.—Parco, Wyoming: July 5, 1936, along North Platte River, H. H. & J. A. Ross.

Allotype, female.—Same data as for holotype.

Paratypes.—ILLINOIS.—Momence: May 26, 1936, along Kankakee River, H. H. Ross, 124♂; Aug. 21, 1936, Ross & Burks, 6♂.

WISCONSIN.—Chetek: June 5, 1936, Frison & Ross, 1♂, 3♀. Merrill: July 1 ,1933, along Wisconsin River, Frison & Mohr, 1♂. Spooner: June 5, 1936, along Namekagon River, Frison & Ross, 1♂.

WYOMING.—Madison Junction, Yellowstone National Park: July 8, 1936, H. H. Ross, along Gibbon River, 5♂. Parco: Same data as for holotype, 8♂.

Protoptila cantha new species

Differs from other members of the genus in combining the characters of a single preapical spur on the hind tibiae with an incised hind wing, and in details of the genitalia.

MALE.—Length 3.0 mm. Color and general structure typical for genus. Head with only one pair of warts, situated close to the posterior margin. Hind wing with anterior margin incised beyond middle, the wing therefore saberlike. Middle and hind tibiae with three short spurs, the single preapical

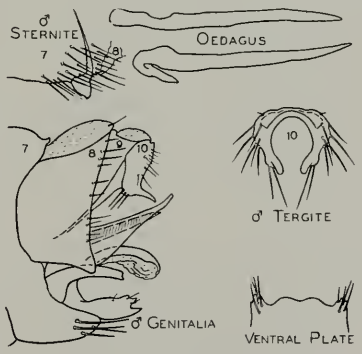

Fig. 19.—*Protoptila cantha*

spur being the same size as the two apical ones.

Genitalia as in fig. 19. Tenth tergite horseshoelike, the apices appearing sharp and stout when seen from the side. Ventral plate bilobed in the center, the lateral angles having three small points. Claspers short, the apex of each blunt. Oedagus contained in a hoodlike structure which is somewhat triangular and extends the full width of the genital capsule. Oedagus a simple, heavy, sclerotized rod sharply bent at the base. Below the oedagus is a curved mesal process with a sclerotized dorsal portion and a membranous ventral border.

Holotype, male.—Parco, Wyoming: Aug. 1, 1936, along North Platt River, H. H. Ross.

Paratypes.—IDAHO.—Caldwell: July 30, 1936, H. H. Ross, along Boise River, 1 ♂.

MARYLAND.—Plummer's Island: June 24, 1902, H. S. Barber, 8 ♂.

WYOMING.—Same data as for holotype, 1 ♂.

Protoptila thoracica new species

Distinguished from other members of the genus by the enlarged scutal lobes and details of the genitalia.

MALE.—Length 3.0 mm. Color and

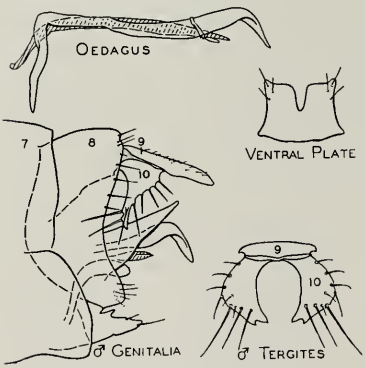

Fig. 20.—*Protoptila thoracica*

general characteristics same as for genus. Lateral portions of mesoscutum greatly swollen, each lobe as large as head. Spur count 0–4–4. Hind wing with anterior margin only slightly incised beyond middle.

Genitalia as in fig. 20. Apical tergite long, rectangular and overhanging genitalia. Tenth tergite long, forming a broad horseshoe bearing several large setae. Ventral plate short, deeply cleft on meson. Oedagus consists of two rods, a short, sinuate one and a longer one with the base bent at a right angle and the apex flattened and curved; the two rods are apparently bound together near the apex with two fine, sclerotized bands. A broad, triangular sheath surrounds these externally. The claspers and other ventral sclerites are reduced and consolidated almost beyond differentiation. From them a pair of curved organs arise, much as in *cantha*.

Holotype, male.—Boulder, Wyoming: July 6, 1936, along tributary of Big Piney River, H. H. Ross.

Family **HYDROPTILIDAE**

Agraylea saltesea new species

Externally this species differs from *multipunctata* Curtis in having the light spots on the wings smaller and in greater contrast with the dark background. Structurally the two species differ in the conical process on the seventh sternite and in the shape of the claspers, which in this new species have a smaller mesal point and a much larger lateral expanse, fig. 21.

MALE.—Length 5.5 mm. Color of head, body and appendages dark brown, the basal segments of the antennae and most of the legs below the coxae yellowish brown, the pubescence on these parts tawny yellow. Wings uniformly dark brown with several cream colored spots as follows: a large one below stigma, a large one on the middle of the caudal margin, a small one at apex of discal cell and about eight small ones each situated at the apex of one of the apical cells.

General structure, including venation, ocelli and tibial spurs, as for genus. Seventh sternite with a short, smooth conical process on meson of apical margin. Genitalia as in fig. 21. Claspers somewhat auriculate, the caudo-mesal angle produced into a short, sharp process, the lateral portion wide, the entire surface clothed with relatively abundant setae. Above and closely associated with the claspers is a pair of

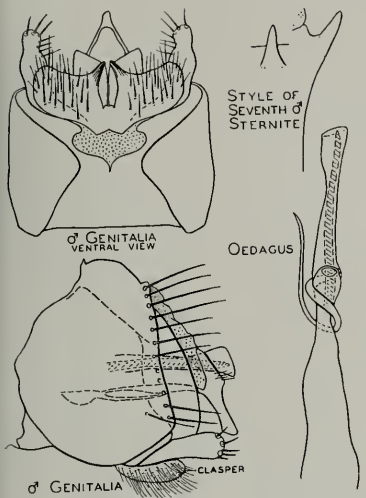

Fig. 21.—*Agraylea saltesea*

sinuate appendages (probably cerci) bearing a number of well separated setae at their apex; these extend considerably beyond the claspers. Above these and below the oedagus is a sclerotized rod which (seen from lateral view) appears bent downward at almost a right angle; this has practically no setae on it and forms a sheath for the oedagus. Oedagus with the basal portion shorter than the apical portion; its margins irregular and sinuate and gradually tapering to the neck; apical portion somewhat bulbous at base, then gradually tapering to a constriction and beyond this expanding again into a cuplike structure; within this is a sclerotized rod running through a circular opening which is above the neck; opposite this opening there originates a spiral appendage which circles the oedagus completely and then runs toward its apex.

Holotype, male.—Saltese, Montana: July 7, 1936, H. H. Ross.

Stactobia brustia new species

This species differs from the genotype in lacking well-defined cerci and in the crook-shaped apex of the oedagus.

Male.—Similar in size, color and general characteristics, such as spur count, position of ocelli, etc., to genotype. Genitalia as in fig. 22. Tenth tergite consists of a large membranous hood, indistinctly divided transversely and bearing a few small setae scattered along this division and two large ones near the ventro-basal corner. Ventral plate heavy, bearing three whiskerlike brushes of setae, although their bases are not segregated into patches; the apex of the plate is turned up. Oedagus long and slender, its apex hooked. The internal support of the genitalia is long, consisting of two long, ventro-lateral rods with a wide, sclerotized arch forming a dorsal bridge between them. The ends of this support join the sides of the ventral plate. This plate is provided with sclerotized supports.

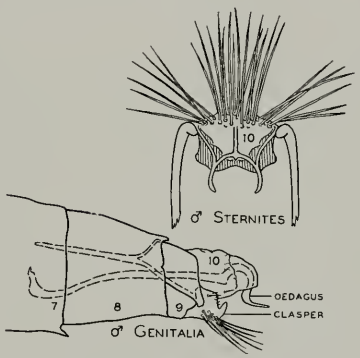

Fig. 22.—*Stactobia brustia*

Holotype, male.—Parco, Wyoming: July 5, 1936, along North Platte River, H. H. Ross.

Stactobia delira new species

This species may be separated from its congeners by the long claspers and the unique, spicate mesal process above them, fig. 23.

Male.—Length 3 mm. Color of head and thorax golden brown. Abdomen pallid with the characteristic dark dorsal pattern. Antennae and legs pallid, almost colorless. Wings gray, the close hairs forming a dark gray background crossed transversely by two light bands situated respectively

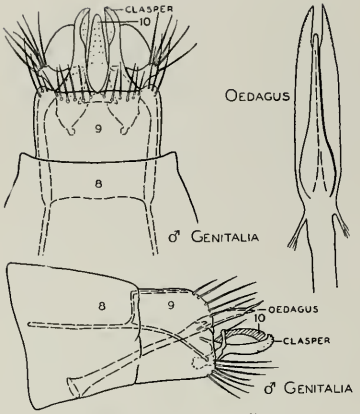

Fig. 23.—*Stactobia delira*

one-third and two-thirds the distance from the base to the apex of the wing.

General structure same as for genus. Genitalia as in fig. 23. Claspers long and slender, hooked dorsad at extreme tip, with only a few minute setae on apical portion. Above these is a pair of short, hooklike appendages (probably cerci) produced laterally into a thumblike process bearing a dense cluster of long setae. Above and between the base of the claspers is a stout, curved tenth tergite which is spicate, from ventral view. The internal skelton of the genitalia is similar in most respects to that of *brustia*, consisting of two long ventral arms with a curved, platelike roof over the apical portion. Oedagus is fairly long and straight, the basal end flute-shaped, the apex divided into a pair of submembranous lateral lobes and a sclerotized mesal process through which the true penis runs; below this apical structure is a pair of threadlike muscle attachments.

Holotype, male.—Spooner, Wisconsin: June 5, 1936, along Namakagon River, Frison & Ross.

Paratypes.—Wisconsin.—Same data as for holotype, 7 ♂.

Stactobia palmata new species

The male is set off from other members of the genus by the digitate processes above the claspers.

Male.—Length and general characteristics as in the two preceding species. Color similar to species of *Hydroptila*, the species in life appearing a salt-and-pepper combination of light and dark grays because of the irregular pattern of these colors on the head, thorax and wings.

Abdomen and genitalia as in fig. 24. Sternites without mesal processes. Claspers curved, short, directed ventrally and with abundant setae on apical portion. Above them arise a pair of trifurcate processes whose bases curve so that the handlike apices almost meet on the meson below the oedagus. Just below the oedagus is a short transverse plate. Oedagus long and slender, without armature, but slightly narrowed at apex. Above it there seem to be only copious folds of membrane. The tenth tergite is entirely membranous. The internal, sclerotized portion of the genitalia is long and bridgelike,

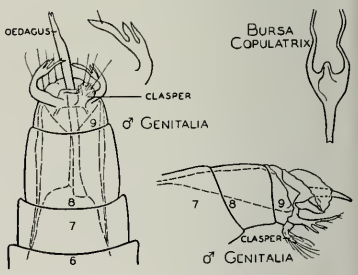

Fig. 24.—*Stactobia palmata*

forming a broad, shallow structure under the dorsal surface of the abdomen.

Female.—Size, color and general structure same as in male. Abdomen typical of the family, with the terminal segments forming a long extensible tube braced along the lateral margins by internal, sclerotized rods. Bursa copulatrix similar in general structure to that of *Hydroptila*, but differing in outline, fig. 24.

Holotype, male.—Merrill, Wisconsin: June 18, 1934, along Wisconsin River, Frison & Mohr.

Allotype, female.—Same data as for holotype.

Paratypes.—Illinois.—Kankakee: June

6, 1935, along Kankakee River, Ross & Mohr, 2♂.

Kentucky.—Livingston: June 16, 1935, along Rockcastle River, H. H. Ross, 2♂, 1♀.

Tennessee.—Gatlinburg: June 12, 1935, along Little Pigeon River, H. H. Ross, 14♂, 7♀.

Wisconsin.—Same data as for holotype, 8♂, 30♀.

Oxyethira aeola new species

The arcuate dorsal plate of the male and the approximate internal arms of the female genitalia distinguish this species from all others described in the genus.

Male.—Size, color and general characteristics as described for members of the genus.

Genitalia as in fig. 25. Seventh sternite with a large, pointed process on the meson. Eighth segment produced into wide lateral lobes which are deeply incised dorsally. Tenth tergite arcuate, angling ventrad and extending just beyond the other parts. Ventral plate truncate. Claspers broad but short, their extreme apex conical. Above them arise a pair of smooth, sinuate appendages composed of one segment and tipped with a long, slender seta. Oedagus composed of an outer sheath, tubular at base, the sclerotized portion narrowing at apex to a thin mesal strip bearing dorsally an extensive membranous area which overlaps the sclerotized strip laterally; within this outer structure is a long, sinuate, slender, sclerotized rod, probably representing the true functional penis.

Female.—Similar in size, color and general characteristics to the male. Genitalia resembling other species of the genus in general pattern, fig. 25. Eighth sternite emarginate on meson. The ninth sternite is represented by an ovoid, sclerotized area, bearing a pair of internal dorsal arms which project into the eighth segment. The bursa copulatrix is small and vasiform, connected with the ninth sternite by a membranous fold.

Holotype, male.—Vancouver, British Columbia: July 20, 1936, along Seymour Creek, H. H. Ross.

Allotype, female.—Same data as for holotype.

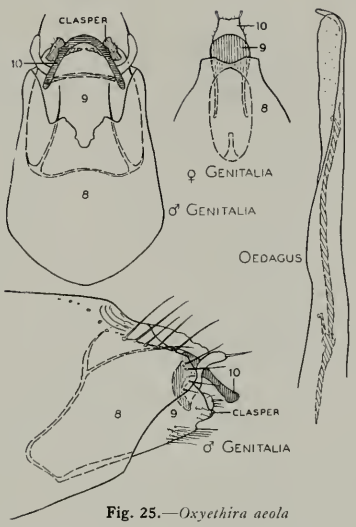

Fig. 25.—*Oxyethira aeola*

Paratype.—British Columbia.—Same data as for holotype, 1♂.

Oxyethira serrata new species

Differs from described members of the genus in the serrate dorso-lateral processes and other characters of the genitalia.

Male.—Length 2.8 mm. Color and general characteristics apparently identical with other members of the genus.

Genitalia as in fig. 26. Seventh sternite has a simple median process on apical margin. Apical margin of eighth sternite deeply and angularly incised. Dorso-lateral processes have lower margin curved, upper margin serrate, tapering to a smooth, upturned tip. Ventro-lateral processes, probably the true claspers, with dorsal margin straight, ventral margin concave and setate, the apex deeply excavated to form an apical, upturned hook. Situated alongside the meson and above the claspers is a stout process, the tenth tergite, forming a blunt hook. Below this are two small, semimembranous lobes, each bearing a stylelike process on its caudo-lateral angle. Oedagus has basal tube

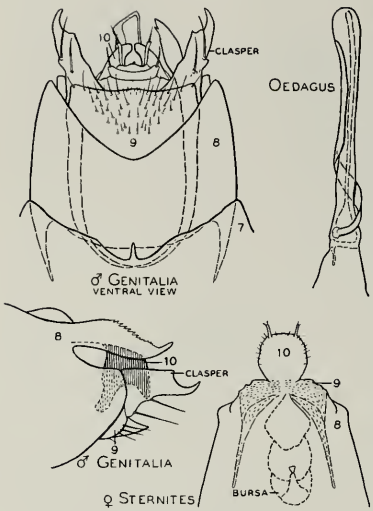

Fig. 26.—*Oxyethira serrata*

short, apical portion long, with tip mostly membranous and blunt; spiral process ribbonlike, encircling tube once.

FEMALE.—Size, color and general characteristics same as in male. Genital characters as in fig. 26.

Holotype, male.—Fox Lake, Illinois: July 15, 1935, at light in town, DeLong & Ross.

Allotype, female.—Same data as for holotype.

Paratypes.—ILLINOIS.—Antioch: July 7, 1932, Frison & Metcalf, 4♂, 32♀; May 27, 1936, along Channel Lake, H. H. Ross, 15♂, 5♀. Fox Lake: Same data as for holotype, 175♂, 250♀; May 28, 1936, H. H. Ross, 64♂, 1♀; June 10, 1936, Ross & Burks, 1♂. Johnsburg: May 28, 1936, along Fox River, H. H. Ross, 85♂, 15♀.

MICHIGAN.—Houghton Lake: June 15–18, 1935, T. H. Frison, 47♂, 200♀.

WISCONSIN.—Spooner: June 5-6, 1936, along Namakagon River, Frison & Ross, 2♂.

Oxythira verna new species

This species is readily distinguished from all other North American species of the genus by the peculiar shape of the oedagus, fig. 27, which has a slender curved tip and a digitate tooth at the point of constriction of the oedagus.

MALE.—Length 2.7 mm. Color of head dark brown, of body light brown. Wings mottled with a salt-and-pepper mixture of cream and brown spots, without conspicuous striping or spot arrangement.

General characteristics as for genus, including spur count, position of ocelli and the narrowed apex of the forewing. Abdomen without conspicuous processes on the sixth to eighth sternites. Eighth sternite deeply incised on the dorsum and incised for one-third its length on the venter, so that this segment is represented chiefly by two lateral areas which flank the genital capsule. These lateral plates have the dorsal margin slightly sinuate, the apical corner with a circular emargination forming a sharp corner on both the dorsal and caudal margins; the caudal margin is slightly emarginate and shelves off into a diagonal caudo-ventral portion which joins the ventral margin.

Genitalia as in fig. 27. The endoskele-

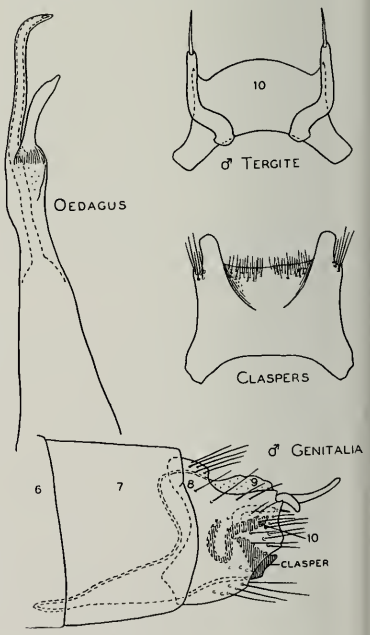

Fig. 27.—*Oxyethira verna*

ton of the genital capsule forms a short, round dorsal lobe and a very long, slender and pointed ventral lobe which extends normally to the sixth segment. Claspers short and stocky, fused on the meson, the lateral portions produced into a pair of prominent lobes separated by a concave mesal portion. Tenth tergite with base sinuate and apex forming a flat plate; the apical margin arcuate except for the sharp corners of the lateral angle; from the base of this arise a pair of semimembranous smooth appendages which have a sinuate base and are tipped with a long seta. Oedagus with the basal portion wide and gradually tapering to the neck; the apical portion is broad at the base but tapers suddenly to form a filamentous rod which is curved at the extreme apex; at the point of constriction there is a large sclerotized digitate process which is half the length of the filamentous portion of the oedagus.

Holotype, male.—Spring Grove, Illinois: June 12, 1936, Ross & Burks.

Neotrichia falca new species

Closely related to *collata* Morton, but differentiated on the basis of a shorter basal tube on the oedagus and other details of hooks and processes on the apical portion of the oedagus.

Male.—Size 2.5 mm. Color a salt-and-pepper mixture of cream and brown spotting over the entire body and wings. General characteristics typical for genus; diagnostic characters apparently restricted to genitalia.

Genitalia as in fig. 28. Tenth tergite membranous, having lateral faces which make a distinct angle with the dorsal face, and a deep cleft on the meson. Below this is a pair of membranous lobes lying beside the oedagus, each lobe surmounted by a bristle. Claspers bladelike, short and stocky, set with fairly numerous setae. Ventral plate divided into two halves, each short and heavily sclerotized; each having apex sinuate and a heavy ventral projection near the middle of the mesal side. Oedagus with basal portion of tube widely flared, about a third as long as narrow portion; apical portion consists of (1) a narrow stem with (2) a pair of stout, dark hooks set in a dorsal excavation and (3) a stout process arising dorsally from below this and extending almost to apex of hooks. These dark hooks seem to be set in place quite rigidly with no articulation other than connective membrane.

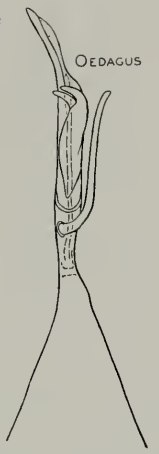

Fig. 28.—*Neotrichia falca*

Holotype, male.—Muncie, Illinois: Sept. 20, 1935, along Stony Creek, Frison & Mohr.

Neotrichia vibrans new species

The curiously shaped oedagus, fig. 29, differentiates the male of this species from all others in the genus. Reliable characters for separating the females have not yet been discovered.

Male.—Size 2 mm. Head and its appendages, thorax and legs pale yellow; the front tibiae covered with black setae; antennae covered with black hair, except apical four segments, which are white. Abdomen gray. Wings covered with patches of black, brown and white, typical for genus.

General characteristics same as for genus. Eighth sternite with a rounded mesal projection on apical margin. Genitalia as in fig. 29, bearing three sets of paired appendages: a dorsal pair, *d*, diverging and angling ventrad, thin, pointed at apex and without setae; a middle pair, *m*, short, stocky at base with the apex curved meso-ventrad and armed with one or two small setae; and a ventral pair, the claspers, somewhat irregular in shape, pointing caudad, slightly concave on their inner margin, and beset with sparse, fine setae. Between the bases of the claspers is a pair of ringlike areas, whose mesal margin

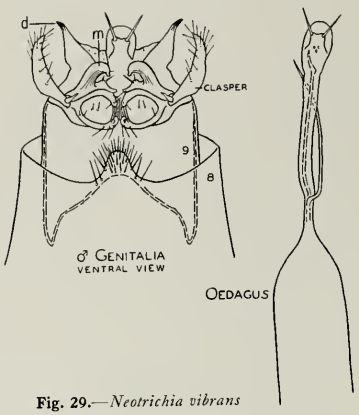

Fig. 29.—*Neotrichia vibrans*

bears small raised portions. Oedagus with a very wide basal cylinder which tapers to a narrow neck; the apical portion is not much thicker than the neck and is slightly enlarged at apex into an ovoid structure bearing two long setae; the neck gives rise to a long, thin filament which curves around the apical portion.

Holotype, male.—Oakwood, Illinois: Sept. 7, 1936, along Middle Fork River, DeLong & Ross.

Polytrichia shawnee new species

Resembles very closely *tarsalis* (Hagen), but differs in the shape of the genitalia, fig. 30.

Male.—Length 3 mm. In general, color brown. Head and antennae almost entirely dark brown; thorax and abdomen mottled brown and whitish. Legs luteous with spurs. Mid and hind tarsi and most of hind tibiae blackish. Wings blackish brown, with a narrow, whitish band just before middle; a white spot on the costal and anal margins two-thirds distance from base, and a white spot at extreme apex.

General structure same as for genus. Ocelli large; antennae filiform, long and slender, reaching apex of abdomen. Apical tibial spurs short and stout. Preapical spur on mid tibiae short and stout; shorter one on hind tibiae the same length; longer one twice that length.

Genitalia as in fig. 30. Claspers almost identical with those of *tarsalis*; the two slightly different, armed within with stout, short, dentiform setae. Oedagus long, slender and enlarged at apex, without armature. Dorsal aspect bears pair of complex appendages; the right one has a long, thin process before middle, is curled in clockspring fashion near apex and ends in a stout tooth set off by a basal suture; the left one bears near base a very long process, beyond this a mesal lobe terminating in a densely sclerotized point, and narrows at its apex to an upturned point.

Female.—Similar in size, color and general structure to male. External genital structure similar to that of most members of the family; bursa copulatrix long and slender.

Holotype, male.—Herod, Illinois: May 29, 1935, Ross & Mohr.

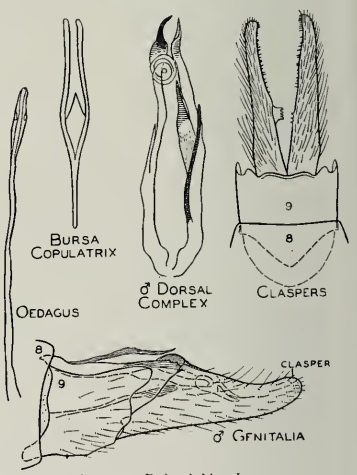

Fig. 30.—*Polytrichia shawnee*

Allotype, female.—Same data as for holotype.

Paratypes.—Illinois.—Same data as for holotype, 11 ♂, 69.

Polytrichia stylata new species

Indistinguishable from *shawnee* except for the dorsal aggregate of stylets on the genitalia, fig. 31. The diagnostic

Fig. 31.—*Polytrichia stylata*

characters are as follows: Left process with a small tooth near base, its apex produced into a sinuate, narrow stylet; right process stouter, partially hidden under the "plate" of the left process, the apex pigmented and crossing beneath apex of left process; the right process has a strong tooth arising under the "plate"; at the base of the two processes is a large, dark tooth slightly sinuate at its apex. Reliable characters for separating the females have not yet been unearthed.

Holotype, male.—Farson, Wyoming: July 6, 1936, along Little Sandy Creek, H. H. Ross.

Allotype, female.—Same data as for holotype.

Paratypes.—Montana.—Ennis: July 8, 1936, along Madison River, H. H. Ross, 1 ♂.

Oklahoma.—Turner Falls State Park: June 2, 1937, along Honey Creek, H. H. Ross, 14 ♂.

Wyoming.—Same data as for holotype, 1 ♂, 1 ♀.

Polytrichia oregona new species

Belonging to the section of the genus containing *confusa* Morton, this species differs from Morton's illustrations in the long mesal process of the left clasper and other details in the shape of the clasper.

Male.—Length 3.25 mm. Color and general structure typical for genus, as described for *shawnee*. Genitalia as in fig. 32. Eighth segment sclerotized much more than sixth or seventh, the dorsal margin almost completely divided by a V-shaped fissure. Dorsal assemblage of parts composed of a stout left and a lighter right sclerotized rod; these are separated at the base and converge to the apex where they are joined by a membranous fold; at the base arise three sclerotized points which curve dorsad, the one toward the apex being the longest. Claspers asymmetrical; left one, seen from lateral view, appears sinuate, near the middle with a long ventral projection which curves slightly mesad, and at the apex with a short, sclerotized point which also curves mesad; right clasper sinuate, shaped like the left but with no trace of the ventral process. Seen from the ventral aspect, each clasper has a cluster of black spines near the middle, those on the left clasper situated on the mesal side, those on the right clasper situated on the ventro-mesal corner. Oedagus simple, as illustrated for *shawnee*.

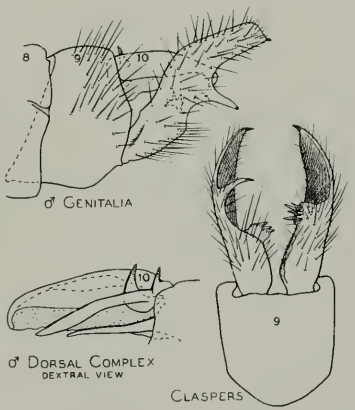

Fig. 32.—*Polytrichia oregona*

Holotype, male.—La Grande, Oregon: July 30, 1936, along Grande Ronde River, H. H. Ross.

Polytrichia spinosa new species

Close to *confusa* and *oregona*, this species differs from the latter in having a black spine pointing mesad in place of the long process on the left clasper and from the former in having the dorsal assemblage of the genitalia short, not reaching beyond the cluster of spines on the right clasper.

Male.—Length 2.25 mm. Color and general structure as described for *shawnee*. Genitalia as in fig. 33, and similar in general to the description given for

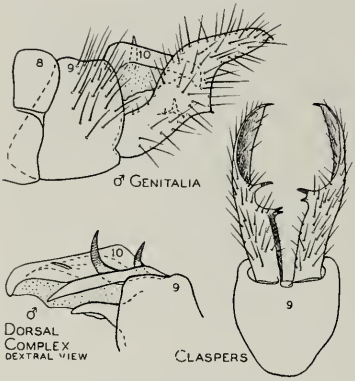

Fig. 33.—*Polytrichia spinosa*

oregona, with the following differences: Eighth segment with the dorsal fissure much wider so that the two parts of the dorsum are well separated. Dorsal assemblage of genitalia shorter, the individual sclerotized rods proportionately shorter and stouter; best seen from a lateral view. Left clasper sinuate, the apex with a sclerotized spine pointing mesad, with a fairly long spine on the ventral corner and with a cluster of two black spines just basad of this on the mesal face; right clasper sinuate, with a small cluster of three spines on the mesal face near the ventral corner. Oedagus same as for *shawnee*.

Holotype, male.—Turner Falls State Park, Oklahoma: June 2, 1937, along Honey Creek, H. H. Ross.

Paratype.—OKLAHOMA.—Same data as for holotype, 1 ♂.

Polytrichia xena new species

This species is distinguishable from others in the genus on the basis of the short mesal process of the genitalia, which has no complicated armature.

MALE.—Length 2.5 mm. Color whitish; areas on periphery of head, all mesonotum, metanotum except scutellum, upper portion of pleurae and dorsum of abdomen brown. Wings dark gray with a light transverse band just before middle; legs whitish, the front tibiae and tarsi clothed with dark setae. General structure same as in *shawnee*. Genitalia as in fig. 34. Genital capsule wide and long but shallow. Ninth segment twice as long ventrally as dorsally, the dorsal margin cut in on meson so that the segment forms merely a narrow bridge mesally. Tenth tergite triangular, apparently fused with the other appendages of the genitalia aside from the claspers and oedagus. This entire process is short; the base is semisclerotized; the right side of the apex is mostly membranous and the left side covered with a sclerotized shield; a small dorsal tooth lies just below extreme apex; the basal third is striate, with irregular creases radiating from the meson. Claspers as long as genital capsule, slightly upturned with the base oblique and the apex bluntly pointed; the inner margin is convex and bears two brushes of stout, dark setae, one at the apex and the other just basad of it; the rest of the clasper is covered with long, scattered setae. Oedagus very simple, as illustrated for *shawnee*, consisting of a narrow filament with the extreme apex more heavily sclerotized than the rest.

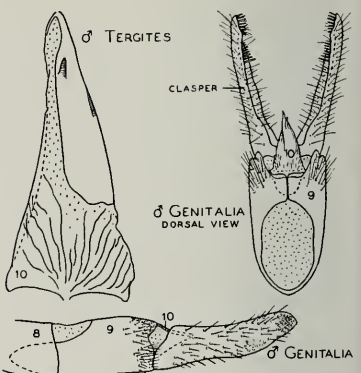

Fig. 34.—*Polytrichia xena*

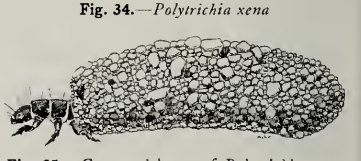

Fig. 35.—Case and larva of *Polytrichia xena*

Holotype, male.—Herod, Illinois: May 13, 1937, along Gibbons Creek, Frison & Ross.

Paratypes.—Illinois.—Same data as for holotype, 3♂.

The larva in its purselike case, fig. 35, is one of the commonest "micros" found in the rocky streams of the Ozarkian uplift in southern Illinois.

Hydroptila vala new species

This species differs from already described members of the genus in the oedagus, fig. 36, with its coiled middle process and upturned end.

Male.—Length 3.3 mm. Body brown, with palpi, legs and venter whitish; patches of white setae on front of head and some small areas on wings.

General structure typical for genus. Antennae long, slender and filiform. Tibial spurs thick and long. Seventh sternite with a long, slender process of almost uniform thickness, thickly clothed with setae and as long as the longer apical spur on the hind tibia.

Genitalia as in fig. 36. Tenth tergite apparently forming two lateral plates separated by a mesal membranous area. Lateral plate small and with apex angulate. From the mesal side at the base of the lateral plates arise a pair of semimembranous appendages, *a*, which are straight to the apex of the claspers and then abruptly hook upward and backward over the dorsal plate. Claspers flattened transversely, curving downward, their lateral margin having some large and some small setae. Oedagus long, the tubular portion subequal in length to the portion beyond the spiral spur; spiral spur encircling tube two and one-half times; free tip not very long; apical portion slender and of uniform thickness; apex upturned but without armature.

Female.—Similar in size, color and general structure to male. Has the elongate and tubular ovipositor typical of the genus. Eighth sternite terminated by an arcuate lobe bearing six long setae; the middle of the segment, bearing an urnshaped mesal area, shown in fig. 36. Bursa copulatrix with closed end elongate.

Holotype, male.—Herod, Illinois: May 29, 1935, Ross & Mohr.

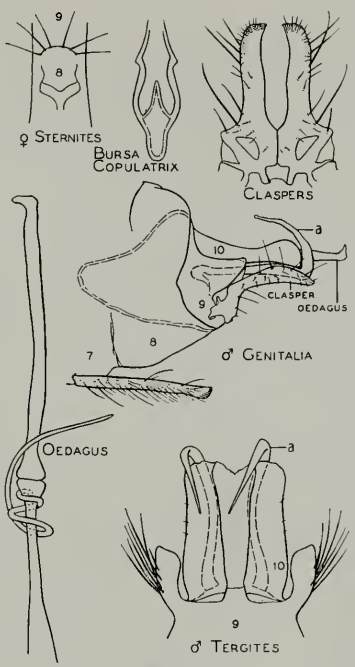

Fig. 36. *Hydroptila vala*

Allotype, female.—Same data as for holotype.

Paratypes.—Illinois.—Same data as for holotype, 15♂, 18♀.

Hydroptila armata new species

Closely allied to *vala*, but differs in details of the genitalia as given below.

Male.—Similar in size, color and general structure to *vala*. Eighth segment with a long, sinuate process at apex.

Genitalia as in fig. 37. Tenth tergite membranous, narrowed toward apex, with a slight incision on meson, and the two caudolateral angles produced into slender, sclerotized processes. Lateral plate long, narrow and upturned at end. From within this at base arises a pair of long, upturned and semimembranous hooks, *a*. The left one is longer than

the right. Claspers long, narrow at base and thickened toward apex; extreme tip upturned and heavily sclerotized. Entire clasper studded with small setae; a few large ones on dorsal margin. Oedagus fairly simple; basal portion long; apical portion of almost uniform thickness; apex with a stout transverse tooth; spiral process encircling tube twice.

Female.—Similar in color and general characteristics to male. Eighth sternite with a crescentic apical lobe bearing six long and diverging setae; eighth tergite with a sclerotized apical portion forming a pair of lateral lobes bearing several setae, the lobes connected with a sclerotized bridge and not conspicuously extended.

Holotype, male.—Winamac, Indiana: May 24, 1937, drainage ditch west of town, H. H. Ross.

Allotype, female.—Same data as for holotype.

Paratypes.—Illinois.—Fox Lake: July 15, 1935, DeLong & Ross, 2♂. Momence: Aug. 21, 1936, Ross & Burks, 1♂; May 24, 1937, H. H. Ross, 7♂. Oakwood: Sept. 20, 1935, along Salt Fork River, DeLong & Ross, 1♂. Spring Grove: June 12, 1936, Ross & Burks, 1♂. Wilmington: July 1, 1935, De Long & Ross, 2♂.

Indiana.—Kankakee State Game Preserve: May 24, 1937, along Kankakee River, H. H. Ross, 1♂. Winamac; May 24, 1937, drainage ditch west of town, H. H. Ross, 5♂, 9♀.

Michigan.—Batavia: May 19, 1936, along Swan Creek, Frison & Ross, 1♂. Clinton: May 19, 1936, along Raisin River, Frison & Ross, 1♂. Goodrich: May 30, 1936, along Thread River, Frison & Ross, 1♂.

Wisconsin.—Spooner: June 5, 1936, along Namakagon River, Frison & Ross, 1♂.

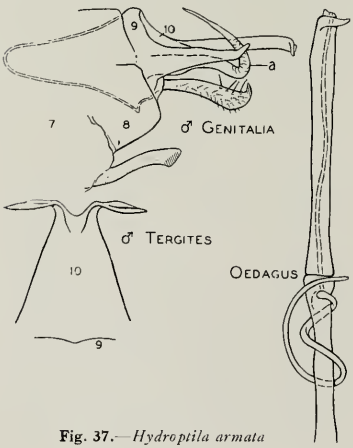

Fig. 37.—*Hydroptila armata*

Hydroptila amoena new species

Similar in many respects to *hamata* Morton, but has a more slender process on the seventh segment, longer and more

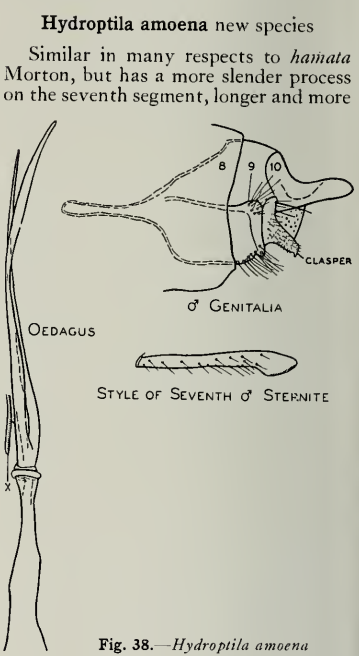

Fig. 38.—*Hydroptila amoena*

deeply cleft tenth tergite, oedagus not curved sharply at tip, as well as other differences.

Male.—Length 3 mm. Color and general structure same as for *vala*. Seventh sternite has a long, slender process with its extreme apex curved out, enlarged and roughened.

Genitalia as in fig. 38. Tenth tergite long, mesal portion depressed and incised at apex, lateral portions at first glance appearing separate and clasper-like. Remainder of external parts difficult to determine from the standpoint of homology, but as illustrated in fig. 38. Claspers short, stout and pyramidal, the extreme apex forming a short, blunt tooth; both claspers ap-

pressed on meson. Oedagus with basal tube less than two-thirds length of apical portion; spiral process short, circling only halfway around the tube; the tube divided immediately beyond this point, the two tubes thus formed progressing side by side to their apex where they may separate; one of them becomes smaller toward the apex and finally terminates as a narrow filament; the other narrows, then widens again and finally narrows to a small tip. Beside the oedagus a small rodlike structure, *x*, has been observed, which is apparently associated with the oedagus but which has not been oriented with certainty.

Holotype, male.—Herod, Illinois: May 29, 1935, Ross & Mohr.

Paratypes.—Illinois.—Herod: April 19, 1937, along Gibbons Creek, Ross & Mohr, 1♂.

Oklahoma.—Turner Falls State Park: June 2, 1937, along Honey Creek, H. H. Ross, 20♂.

Hydroptila tortosa new species

This species is a member of the *hamata* complex but differs from the other species of that group in the peculiar oedagus, fig. 39.

Male.—Length 2.5 mm. Color and general structure same as for *amoena* except for the legs, which have the femora and tibiae dark brown. Seventh sternite has a long, slender process clothed at base with long setae, the apex enlarged but laterally compressed and having the ventral margin serrate.

Genitalia as in fig. 39. Basal arm of ninth segment short, no longer than segment itself. Tenth tergite pointed, as seen from lateral view; divided into two ovate lobes, as seen from the dorsal view, without setae. Claspers saberlike, curved meso-ventrad and almost touching on the meson; thickness uniform for most of length, apex pointed, ventral half with minute setae. Oedagus very long, the basal portion about equal in length to the apical portion which has a heavy, sinuate central stem, the apex of which is twisted and flattened. Two slender filamentous processes arise near base but do not extend so far as the central stem; at the base of the apical portion is the detached, sclerotized rod found also in *amoena*.

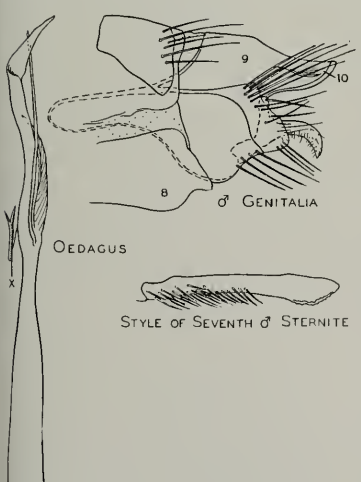

Fig. 39.—*Hydroptila tortosa*

Holotype, male.—Luray, Virginia: Sept. 28, 1936, T. H. Frison.

Hydroptila virgata new species

Resembles *hamata* Morton very closely but differs from it in the tapered projection of the seventh sternite, fig. 40, the absence of a long style beside the oedagus and other characters of the genitalia.

Male.—Size 3.25 mm. Color and general structure as in *vala*. Seventh sternite with a process three-quarters the length of the longer apical spur of the hind tibiae; this process tapered at base and flattened and turned out at apex, normally so densely clothed with wide setae that the shape is obscured. Eighth sternite with an apical mesal protuberance which appears angulate as seen ventrally.

Genitalia as in fig. 40. Lateral lobe of ninth segment small, outcurved and pointed at apex. At the base of the lateral lobe arises a short, tubular process, *p*, bearing a very long seta at apex. Tenth tergite with apex membranous, the tip upturned and set off with a transverse crease; basal portion large and rounded, the ventro-apical region

having a patch of short setae. Claspers sinuate, short and small, with apex rounded on end and coming to a blunt point dorsally. Oedagus with basal tube subequal in length to apical portion beyond spiral; apical portion cylindrical, tapering gradually to region near apex, where it forms a complete S-shaped curve, at the base of which is a stubby and membranous protuberance; spiral process slender, curved around base of tube almost twice and finally continuing beside it for half its length.

Female.—Size, color and general structure same as in male. Bursa copulatrix with the apex shorter and stockier than in *vala*. Penultimate segment without ventral ornamentation.

Holotype, male.—Herod, Illinois: May 29, 1935, Ross & Mohr.

Allotype, female.—Same data as for holotype.

Paratypes.—Illinois.—Eichorn: May 29, 1935, along Hicks Branch, Ross & Mohr, 1♂.

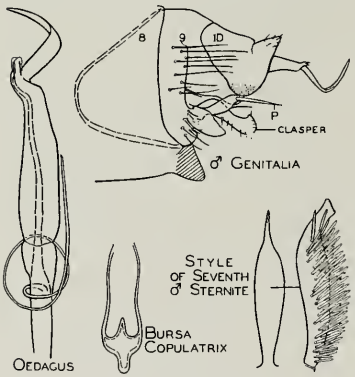

Fig. 40.—*Hydroptila virgata*

Herod: Same data as for holotype, 44♂, 160♀; May 10, 1935, C. O. Mohr, 1♂; May 13, 1937, Frison & Ross, 13♂.

Hydroptila dentata new species

This species is most closely related to the *delineata* group but differs from all hitherto described species in the lateral, spurlike setae of the eighth segment.

Male.—Length 2.3 mm. Color and general structure identical with preceding species. Eighth segment produced into a pair of lateral processes, each armed at apex with four or five stout, fingerlike setae; the ventral portion of the segment is emarginate on the meson and produced into a lateral hump on each side.

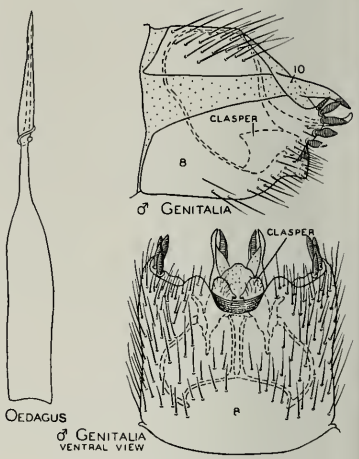

Fig. 41.—*Hydroptila dentata*

Genitalia as in fig. 41. Claspers small, apex rounded and produced into a sharp process on the meson, not extending beyond the lateral lobes of the eighth sternite. Tenth tergite semimembranous and cleft down the meson, the lateral lobes each tapering to a threadlike apex which is recurved to form a bladelike process on each side. Oedagus short, the basal portion very wide compared to the threadlike apical portion. The base of the apical portion is marked by a slender filament which encircles the oedagus at this point.

Holotype, male.—Luray, Virginia: Sept. 28, 1936, T. H. Frison.

Paratypes.—Virginia.—Same data as for holotype, 2♂.

Hydroptila grandiosa new species

This species approaches *delineata* Morton very closely in most respects but differs markedly from it in the peglike setae at the apex of the lateral margin of the eighth segment and in the heavily sclerotized, curved appendages of the

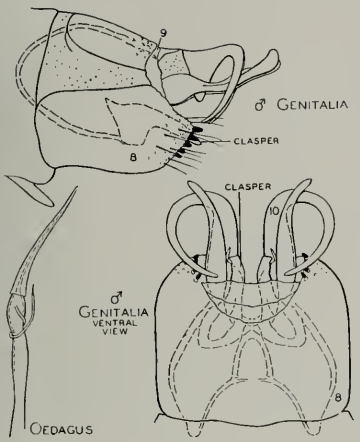

Fig. 42.—*Hydroptila grandiosa*

genitalia, fig. 42. The latter separate it from *dentata* also.

MALE.—Length 3 mm. Color and general appearance as for other members of the genus. Seventh sternite with a bluntly pointed mesal spur, short and more or less inconspicuous. Eighth sternite incised at apex, each lateral portion produced into a stout lobe bearing four or five peglike setae at the apex. Eighth tergite small and more or less quadrate; does not extend as far caudad as the sternite.

Genitalia as in fig. 42. Claspers small, narrow at apex and broadening out at base; extreme tip obliquely truncate, with a slight notch and tooth on lateral corner. Above the claspers are two long, sinuate processes which are divergent toward apex. The tenth tergite is reduced to a small triangular sclerite which is pointed at apex. Articulating with it are a pair of large, heavily sclerotized hooks with a very wide base and long curved tips. The dorsal corner of the base of each hook is closely connected with the apex of the dorsal plate, and the ventral corner is closely associated with the sinuate processes below it. Oedagus small compared to the remainder of the genital capsule, the portion beyond the constriction slender and gradually tapering to apex; tube slightly bulbous below constriction, the spiral rod making a complete revolution around it and lying along and over the apical portion to form a somewhat 8-shaped pattern.

Holotype, male.—Oakwood, Illinois: Sept. 20, 1935, along Salt Fork River, DeLong & Ross.

Paratypes.—ILLINOIS.—Momence: May 24, 1937, along Kankakee River, H. H. Ross, 2♂. Oakwood: July 18, 1933, along Salt Fork River, Ross & Mohr, 2♂.

INDIANA.—DeLong: May 24, 1937, along Tippecanoe River, H. H. Ross, 13♂. Knox: May 24, 1937, along Yellow River, H. H. Ross, 2♂.

Hydroptila ajax new species

A close ally of *albicornis* Hagen, differing in details of genitalia, notably the different claspers and long, stout spiral process of the oedagus.

MALE.—Length 2.5 mm. Color and general structure typical for genus.

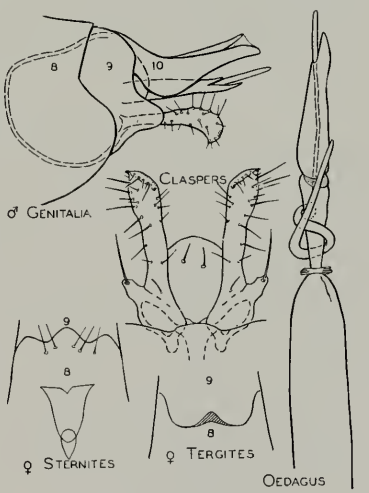

Fig. 43.—*Hydroptila ajax*

Seventh sternite with only a short, pointed mesal process.

Genitalia as in fig. 43. Lateral lobe of ninth segment short and rounded. Tenth tergite entire, but with a pair of membranous areas dividing it distinctly

into one mesal and two lateral lobes. Claspers turned down at end, with a pair of dark areas at tip; lateral margin armed with about six long setae grouped near apex and having smaller setae scattered over entire area; footlike base only slightly produced laterad and not conspicuously large. Oedagus almost straight; basal portion regularly tubular and fully twice length of apical portion; apical portion round, gently tapering and with the penis projecting as a thin rod; articulation with constricted portion apparent but not so well developed as in *albicornis;* spiral process stout, encircling tube one and one-half times.

FEMALE.—Similar in color and general structure to male. Diagnostic characteristics, fig. 43, as follows: eighth sternite with a mesal, triangular sclerite which is much longer than wide; dorsal margin of eighth segment with incision humped in middle and ventral margin sinuate with two or three pairs of setae below the emargination.

Holotype, male.—Oakwood, Illinois: July 18, 1933, along Salt Fork River, Ross & Mohr.

Allotype, female.—Same data as for holotype.

Paratypes.—ILLINOIS.—Muncie: June 27, 1932, H. H. Ross, at light, 10♂, 12♀; July 18, 1933, Ross & Mohr, 1♂; Sept. 18, 1935, De Long & Ross, 1♂. Oakwood: July 18, 1933, Ross & Mohr, 184♂, 24♀; July 18, 1933, along Middle Fork Vermilion River, Ross & Mohr, 7♂; Sept. 20, 1935, DeLong & Ross, 4♂.

IDAHO.—Bear River Narrows: Aug. 8, 1937, G. F. Knowlton, 12♂, 16♀.

OREGON.—LaGrande: July 30, 1936, along Grande Ronde River, H. H. Ross, 1♂, 1♀.

WASHINGTON.—Centralia: July 26, 1936, H. H. Ross, 5♂, 1♀.

WYOMING.—Farson: July 6, 1936, along Little Sandy Creek, H. H. Ross, 7♂, 4♀.

Hydroptila scolops new species

In many respects this species is intermediate between *albicornis* and *ajax*, but differs from both in the shape of the claspers and oedagus.

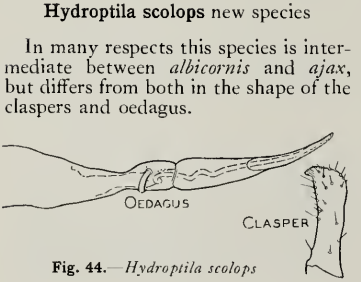

Fig. 44.—*Hydroptila scolops*

MALE.—Indistinguishable in size, color and general structure from *ajax*. Genitalia, fig. 44, also very similar to these, the only tangible differences being in the claspers and oedagus. Claspers slightly curved ventro-laterad, the apico-lateral corner produced into a rounded, corneous projection; apical and lateral margins set with several small setae; a smaller number of setae on the ventral face; the baso-lateral seta not on a lateral projection. Oedagus with basal portion short and flaring, constricted before robust portion bearing spiral; apical portion tapering to a thin, curved apex, one side cut away for nearly half its length to form a trough in which lies the apex of the rodlike penis; spiral process short, not encircling tube, its apex very slender and lying close to tube.

Holotype, male.—Shawneetown, Illinois: May 11, 1935, at light, C. O. Mohr.

Hydroptila melia new species

This species is closest to members of the *albicornis* group but differs from them in the lengthened claspers and ninth and tenth tergites.

MALE.—Length 3 mm. Color and general structure same as for genus. Seventh sternite with a small, pointed mesal process. Eighth segment only moderately incised ventrally.

Genital capsule as in fig. 45, its invaginated portion rounded and arcuate in such a fashion that there is little asymmetry in the dorsal and ventral halves. Ninth tergite slightly produced into a pair of small lobes on the meson, excavated on either side of these. Tenth tergite produced into two long, slerotized and sharp lateral processes. These two lobes have their lateral margins slightly diverging from the base; their mesal margins almost meet at the base and between them is a pair of membranous folds which partially cover the mesal angle; from the side these lateral pieces appear relatively shallow, deepest near base and tapering to a sharp apical point; both are attached at base by membrane to an orbicular, sclerotized mesal plate connected with the ninth tergite. Claspers long, slightly widened toward apex, the apical two-thirds covered with small scattered setae, the

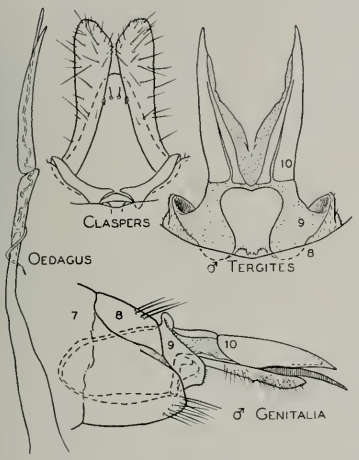

Fig. 45.—*Hydroptila melia*

mesal margin with a slightly produced, darkly sclerotized point in the middle; the transverse footlike portion of the base of the clasper is concealed within the last segment. Oedagus very long; portion below neck no longer than portion beyond neck, widening gradually to a moderately bulbous base; neck very narrow, not at all bulbous, with only a faint and thin spiral rod which encircles the basal portion of the neck; apical portion of oedagus saber-shaped and thin, the terminal opening long because of the extreme obliqueness of the apex.

Holotype, male.—Turner Falls State Park, Oklahoma: June 2, 1937, along Honey Creek, H. H. Ross.

Paratypes.—Oklahoma.—Same data as for holotype, 36♂.

Hydroptila arctia new species

Although similar in a large number of respects to *consimilis* Morton, the attenuated claspers identify this new species at once.

Male.—Length 2.5 mm. Color and general structure same as for other members of the genus. Seventh sternite with only a short, pointed mesal process.

Genitalia as in fig. 46. Genital capsule extending only a short distance into the abdomen, the basal lobe produced strongly ventrad. Lateral portion of ninth segment produced into a fairly long upturned process which is wide at the base and narrow at the apex, and has a dorsal cushion of stout setae at its base; below this the segment is slightly bilobed to form a pair of convex areas bearing numbers of setae. Tenth tergite markedly flares toward apex, the lateral areas having sclerotized plates which are wide on their basal half and taper on the flared portion to a point; their mesal portion consists of wide membranous lobes which are separated by a narrow cleft down the meson. Claspers broad at base, the apical portion rapidly tapering to an elongate, narrow structure having a few scattered setae on the mesal and lateral surfaces and a few minute ones over the entire surface at extreme apex; the apical lateral angle turns out slightly and forms a small sclerotized point; the mesal margins of the two claspers diverge slightly and have no sclerotized armature. From the lateral aspect the claspers appear quite

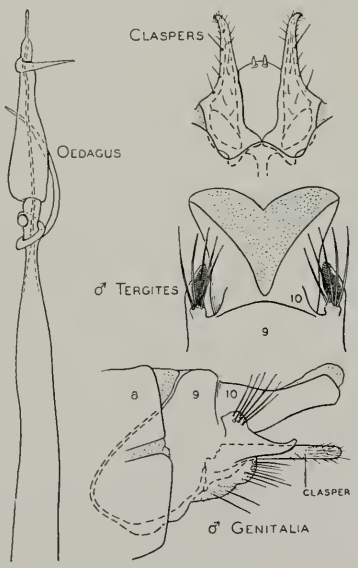

Fig. 46.—*Hydroptila arctia*

regularly filiform with sides parallel and apex rounded.

Oedagus with a long, slightly sinuate, otherwise regular, basal tube which is twice as long as the portion beyond the constriction. Middle "neck" slender, slightly enlarged into a small, bulbous process, at which point the apical portion of the oedagus articulates; apical portion with its greatest diameter near base, from there narrowing evenly to transverse spine, beyond which it continues for a short distance as a narrow membranous tube. The transverse spine is sharp and as long as the "neck." The spinal process encircles the "neck" one and one-half times, its apex angling forward and passing across the vasiform apex.

Holotype, male.—Bear River Narrows, Idaho: Aug. 8, 1937, G. F. Knowlton.

Hydroptila angusta new species

Very similar to *consimilis* Morton but differs from it in having the head of the oedagus long and slender with a small tooth at the apex. In *consimilis* this apical process is much longer in proportion to the length of the head of the oedagus.

Male.—Length 2.75 mm. Color and general characteristics same as for other members of the genus. Seventh sternite with only a short, pointed mesal process.

Genitalia, as in fig. 47, similar in almost all respects to those of *consimilis* figured by Betten (1934). Tenth tergite wide, deeply and angularly cleft for half its length, with only the extreme lateral margins sclerotized. Claspers sinuate, thin, curved at apex and with a sclerotized point at the base of the curve. Ventral plate membranous, rounded at apex and reaching almost as far caudad as the claspers; it bears a pair of short, erect spines just below the middle. Oedagus slender; basal tube long, narrowed to a creased area just below spiral process; portion beyond constriction with bulbous base, soon tapering into a long, slender apical portion surmounted near apex by a short oblique process; spiral process of neck stout, encircling tube one and a half times, its apex angling away from the tube. Penis a slender tube, typical of genus, the basal portion semimembranous, the apical portion sclerotized.

Female.—Size, color and general structure same as for male. Genital characters of importance, fig. 47, as follows: Eighth sternite near apex with a trapezoidal structure; apex of eighth segment of tube with a square cleft on

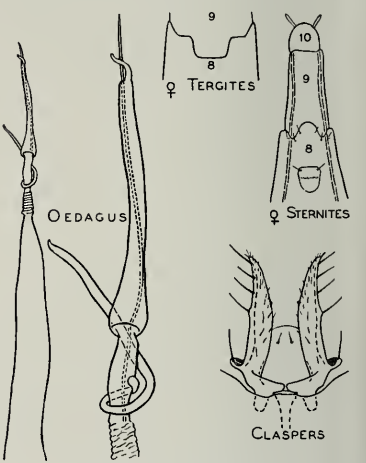

Fig. 47.—*Hydroptila angusta*

the dorsum and with a rounded lobe bearing six paired setae on the venter.

Holotype, male.—Muncie, Illinois: Sept. 18, 1935, along Stony Creek, DeLong & Ross.

Allotype, female.—Same data as for holotype.

Paratypes.—Illinois.—Charleston: Aug. 15, 1933, Embarrass River, Ross & Mohr, 6♂. Danville: Sept. 20, 1935, Frison & Mohr, 1♂. Homer Park: Aug. 5, 1931, H. H. Ross, 1♂; Oct. 16, 1932, Ross & Mohr, 9♂. Kankakee: Aug. 1, 1933, along Kankakee River, Ross & Mohr, 146♂; June 6, 1935, Ross & Mohr, 1♂; July 21, 1935, Ross and Mohr, 1♂; July 22, 1935, DeLong and Ross, 3♂. Momence: May 24, 1937, H. H. Ross, 1♂. Muncie: June 27, 1932, H. H. Ross, 5♂, 8♀; June 27, 1932, at light, H. H. Ross, 4♂, 8♀; Sept. 18, 1935, DeLong & Ross, 21♂; Sept. 20, 1935, Frison & Mohr, 13♂. Oakwood: July 18, 1933, along Middle Fork Vermilion River, Ross & Mohr, 65♂; July 18, 1933, Ross & Mohr, 140♂, 90♀; Sept. 20, 1935, DeLong & Ross, 80♂. Putnam: July 11, 1933, Lake Senachwine, C. O. Mohr, 4♂. Rock Island: June 24, 1931, C. O. Mohr, 3♂. Wilmington:

May 12, 1935, Frison & Ross, 1♂; June 6, 1935, Ross & Mohr, 1♂; July 1, 1935, DeLong & Ross, 36♂.

Hydroptila protera new species

This species is distinguished from all others in the genus by the combination of the twisted, bladelike apex of the oedagus and the narrow and converging claspers, fig. 48.

Male.—Length 3 mm. Color and general structure typical for genus. Seventh sternite with only a small, pointed mesal process.

Genitalia as in fig. 48. Genital capsule with the basal portion rounded at base and not produced far into the abdomen.

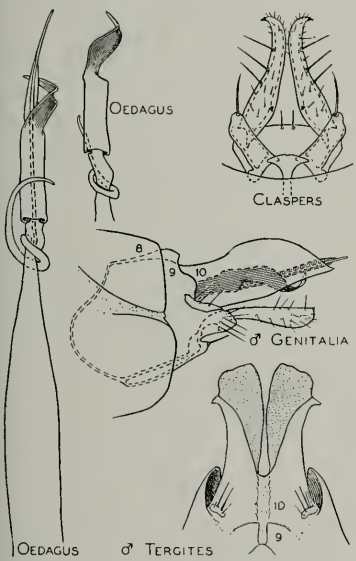

Fig. 48. *Hydroptila protera*

The apico-lateral margins of the ninth segment bear a small setiferous sclerite at the base of the tenth tergite, and just ventrad of this sclerite are produced into a short lobe bearing a few long setae. Tenth tergite long and deep, deeply incised down meson into two halves; these angle considerably laterad; the basal portion of each half is almost entirely sclerotized, the sclerotized portion narrowing off abruptly beyond middle into a narrow arm which ends in a small point directed laterad; the mesal portion of the apex of each half consists of a large membranous lobe, the lobes of the two sides almost touching near the middle. Claspers with a distinct and almost quadrate base, the apical portion arising from the lateral half of the base, slightly swollen just beyond base, thence narrowing and ending in outcurved points; from the lateral aspect the claspers appear to have a straight dorsal margin and an evenly sinuate ventral one; the lateral margin has a few long setae supplemented by scattered shorter ones. The ventral plate is very short and armed with a pair of fairly long setae near apex. Oedagus with basal tube slightly more than twice as long as portion beyond constriction; neck small, slightly twisted and slightly bulbous, narrowed where it articulates with the apical portion; apical portion with basal two-thirds almost cylindrical, apex forming a stout, twisted blade. The spinal process, which encircles the neck one and one-half times, is quite stout.

Holotype, male.—Turner Falls State Park, Oklahoma: June 2, 1937, along Honey Creek, H. H. Ross.

Paratypes.—Oklahoma.—Same data as for holotype, 8♂.

Hydroptila argosa new species

This species differs from all hitherto described members of the genus in the curved condition of the entire apex of the oedagus, fig. 49.

Male.—Length 2.5 mm. Color and general structure typical of genus. Seventh sternite with only a short, pointed mesal process.

Genitalia, fig. 49, relatively simple, without long or recurved lateral processes. Tenth tergite entire, evenly rounded at apex, entirely membranous and with a small, triangular digitate process on meson near apex. Claspers fairly long, narrow, triangular and markedly diverging, beset with short, fine setae. Above them is a submembranous flap bearing two setae near its apex. Oedagus with a long basal portion surmounted by a narrow neck and

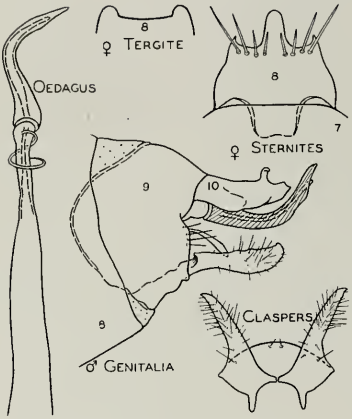

Fig. 49.—*Hydroptila argosa*

small bulbous portion; the apical portion fits on this bulb and is curved almost into a quadrant in one plane; the neck is provided with a thin spiral process encircling the neck one and one-half times.

FEMALE.—Slightly larger than the male; similar to it in color and general structure. Diagnostic characters occur on the eighth segment, fig. 49. Apex of eighth tergite almost transverse, slightly produced at sides. Apex of eighth sternite with a long, round, smooth mesal projection, with a semicircle of eight large setae just basad of the apical margin. Seventh sternite with a wide internal process which is slightly emarginate at apex. Bursa copulatrix similar to some other members of the genus.

Holotype, male.—Parco, Wyoming: Aug. 1, 1936, along North Platte River, H. H. Ross.

Allotype, female.—Same data as for holotype.

Paratypes.—WYOMING.—Same data as for holotype, 167♂, 131♀.

IDAHO.—Bear River Narrows: Aug. 8, 1937, G. F. Knowlton, 5♂, 14♀.

Hydroptila xera new species

Distinguished from previously described members of the genus by the long, slender oedagus and the long, outcurved claspers, fig. 50.

MALE.—Size 2.5 mm. Color and general structure typical for genus. Seventh sternite with a meso-apical process about half the length of the segment and pointed at apex; without flattened setae.

Genitalia as in fig. 50. Tenth tergite semimembranous, deeply incised on meson, the lateral portions of the apex diverging. Claspers sinuate and slender, with a small quadrate base; medium-sized setae along stem and a cluster of minute setae at apex. Above the claspers is a pair of smooth sclerotized appendages which are wide apart at base and meet at apex. Oedagus very long and slender, the bulbous portion set off from the base by a constriction; the extreme apex curved, the apex of the protrusible penis straight. No spiral process has been detected, perhaps because of extreme translucency.

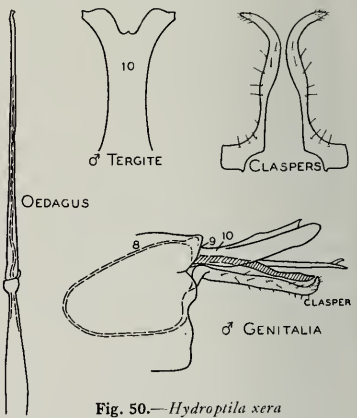

Fig. 50.—*Hydroptila xera*

Holotype, male.—Caldwell, Idaho: July 30, 1936, along Boise River, H. H. Ross.

Paratypes.—IDAHO.—Bear River Narrows: Aug. 8, 1937, G. F. Knowlton, 2♂.

Family **PHILOPOTAMIDAE**

Philopotamus dorcus new species

This species differs from the other nearctic members of the genus in the spatulate terminal segment of the claspers and the appendagelike lateral branches of the apical tergite.

Male.—Length 8.5 mm. Body black, covered with gray hairs. Legs and antennae yellowish brown, covered with dark brown hairs. Front wing membrane gray, irrorate over the entire surface with whitish areas, the gray portion covered mostly with blackish hairs, the white areas with whitish or cream-colored hairs; these white areas form a row of conspicuous spots around the edge of the apical half of the wing. Hind wing uniformly gray, covered with black hairs.

General characteristics of antennae, ocelli, venation and spur count same as for genus. Genitalia as in fig. 51. Seventh, eighth and ninth sternites without mesal processes. Ninth tergite pointed on meson. Tenth tergite set off from ninth by a deep excavation, the tergite cleft practically to the base, forming a pair of foliaceous appendages well separated on the meson. Claspers with the two segments subequal in length, the apical segment slightly constricted near base and expanded at apex. Cerci more than two-thirds length of apical segment of claspers. Oedagus assemblage composed of a pair of slender rods housed in a more or less triangular sheath which is wide at base and short.

Female.—Length 11 mm. Color and general structure as in male with the following differences: membrane of front wings darker, the pattern therefore having greater contrast; terminal abdominal segments tubular.

Holotype, male.—Burke, Idaho: July 19, 1935, K. F. Richardson.

Allotype, female.—Same data as for holotype.

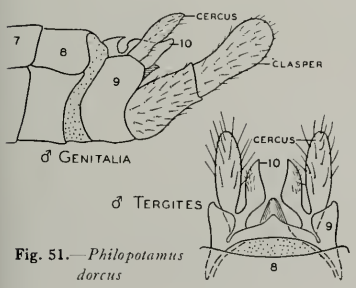

Fig. 51.—*Philopotamus dorcus*

Paratype.—British Columbia.—Vancouver: July 15, 1936, along Capilano River, H H. Ross, 1 ♂.

Dolophilus shawnee new species

Closely resembling *major* Banks and *gabriella* Banks, this species differs from the former in having only a short dorsomesal process on the tenth tergite, and from the latter in having only a short mesal process on the eighth abdominal sternite.

Fig. 52.—*Dolophilus shawnee*

Male.—Length 7 mm. Color of head, body and legs varying shades of brown; antennae annulate with tawny and dark brown; wings uniformly gray. In unrubbed specimens, fig. 52, the head and prothorax are covered with tufts of thick, tawny hair, and the wings with fine, short, black setae which give them a purplish shade.

General structure same as for genus,

with the following differences: Seventh sternite with a broad, triangular process one-half length of sternite, eighth sternite only slightly produced. Genitalia as in fig. 53. Claspers long, basal segment large, scarcely longer than wide, apical segment almost twice as long as basal segment, four times as long as wide and with a brush of short, stout setae within apex. Tenth tergite produced into a sharp, triangular process with a pair of narrow cerci almost as long as the process.

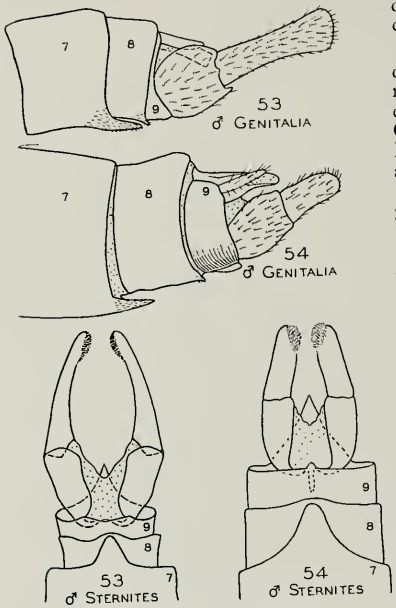

Fig. 53.—*Dolophilus shawnee*
Fig. 54.—*Dolophilus occideus*

FEMALE.—Similar in size, color and general structure to male. Abdomen terminated by a tubiform ovipositor typical for genus, without conspicuous sclerotized appendages.

Holotype, male.—Herod, Illinois: May 26, 1936, reared from Gibbons Creek, Mohr & Burks.

Allotype, female.—Herod, Illinois: May 29, 1936, along Gibbons Greek, Ross & Mohr.

Paratypes.—ILLINOIS.—Same data as for allotype, 5♂, 7♀.

Dolophilus occideus new species

This species differs from most members of the genus in the short ventral processes of the seventh and especially the eighth sternites. From *shawnee*, to which it is most closely related, it differs in the short apical segment of the claspers.

MALE.—Length 7.5 mm. Color as described for *shawnee*. The specimen is rubbed to such an extent that the condition of pubescence cannot be given. General structure same as for genus. Diagnostic characters found only in the apex of the abdomen and genitalia.

Abdomen and genitalia as in fig. 54. Seventh sternite produced into a very broad mesal lobe which is rounded at apex. Eighth sternite sinuate, slightly produced on meson. Ninth tergite with a mesal T-like protuberance running almost the entire length of the segment and projecting slightly beyond the apical margin. Tenth tergite produced into a long, triangular process. Cerci lanceolate, shorter than the mesal projection; claspers with basal segment only slightly longer than apical one, robust and covered with scattered setae; apical segment short, slightly wider at base than apex, with scattered setae on the outer side and with a band of short, dense setae just within the apex.

Holotype, male.—Lincoln County, Oregon: May 3, 1936, along Yew Creek in Alsea Mountains, R. E. Rieder.

Chimarrha utahensis new species

This is the first species of this genus to be recorded from the Rocky Mountain region of North America. It differs radically from the other known North American species in the shape of the clasper and in the shape of the tenth tergite.

MALE.—Length 6.5 mm. Color entirely black, the pubescence a mixture of black and gray hairs. General structure: Head robust, the postero-dorsal portion expanded, the eyes small and set close to the base of the mandibles. Ocelli very small and inconspicuous.

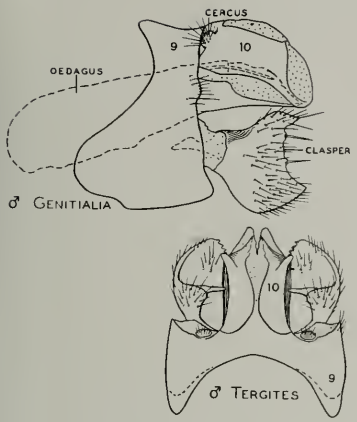

Fig. 55.—*Chimarrha utahensis*

Antennae filiform. Maxillary palpi long and relatively thick. Venation and spurs on tibiae typical for genus.

Genitalia as in fig. 55. Claspers with base narrow, apex expanded, the dorsal and ventral corners appearing sharply differentiated when seen from a lateral view, the apical margin (seen from above or below) serrate; the apico-dorsal margin with a fingerlike mesal process. Convex outer surface with moderately thick setae, the apical margin with one or two heavier ones; the hollowed-out inner face has only a few setae. Tenth tergite relatively simple, composed of a pair of sclerotized plates which are somewhat quadrangular, with the postero-ventral corner attenuated; the apico-dorsal portion has a thumblike projection which is not conspicuous from the lateral view. At the base of the tenth tergite is a round, biscuit-shaped cercus set with long, thin setae.

Holotype, male.—Gandy, Utah: Sept. 26, 1936, C. J. Sorenson.

Family **POLYCENTROPIDAE**

Holocentropus glacialis new species

A close relative of *grellus* Milne, differing in the rhomboidal clasper in having a shorter but wider meso-dorsal flap. In *grellus*, fig. 56, the caudo-ventral portion of the clasper is produced into a thin point but in *glacialis* no such segregation is evident.

Male.—Length 8 mm. Body and appendages light brown, with abundant tawny hair covering the entire head and body. Front wings with a checkered pattern of light brown and cream which is most noticeably contrasting along the apical margin of the wing; hind wings uniformly light brown. General structure typical for genus, including wing venation, tibial spurs, etc.

Genitalia as in fig. 57. Ninth tergite short and semimembranous. Below its base arise two pairs of processes, a sclerotized, thin, curved dorsal pair (probably the tenth tergite, which follows the line of the oedagus), and a shorter, stout, submembranous ventral pair (the cerci), which lies beside the oedagus and is clothed with long, scattered setae. These two pairs are connected at the base. Claspers with a fairly narrow base, in general somewhat rhomboidal in shape; the lateral face is evenly convex with a deep crease not far above the ventral margin; the dorsal margin is produced into a large flap which is long and wide; its mesal margin is more or less straight, its anterior and posterior margins oblique; the inner

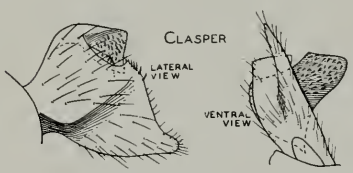

Fig. 56.—*Holocentropus grellus*

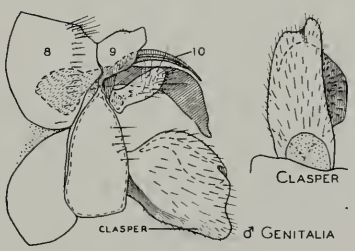

Fig. 57.—*Holocentropus glacialis*

face is studded with triangular spines; the apical margin of the clasper is sinuate, forming a low dorsal lobe and a broad, rounded ventral projection. Oedagus somewhat arcuate, the extreme base bulbous, the apical portion fusiform and tapering to a pointed apex; from the ventral aspect this apical projection appears short and thumblike.

Holotype, male.—Antioch, Illinois: June 11, 1936, beside Channel Lake, Ross & Burks.

Paratypes.—ILLINOIS.—Antioch: Same data as for holotype, 2♂; July 1, 1931, Frison, Betten & Ross, 16♂; July 7, 1932, at light, Frison & Metcalf, 1♂. Fox Lake: July 1, 1931, Frison, Betten & Ross, 15♂; June 30, 1935, DeLong & Ross, 3♂; May 28, 1936, in weeds, H. H. Ross, 16♂.

WISCONSIN.—Lake Delavan: Sept. 5, 1892, C. A. Hart, no. 18799, 1♂; Sept. 7, 1892, C. A. Hart, no. 18810, 1♂.

Holocentropus melanae new species

Closely related to *flavus*, this genus differs in the lateral projection of the clasper in addition to other details of the genitalia.

MALE.—Length 7.5 mm. Dorsum brown; antennae, venter and legs straw

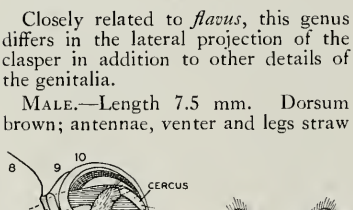

Fig. 58.—*Holocentropus melanae*

color. Forewings almost uniformly brown with a few light patches around stigma and crossveins; hind wings lighter, unicolorous. General structure typical for genus, including setation and wing venation. Diagnostic characteristics apparently restricted to genitalia.

Genitalia as in fig. 58. Ninth tergite weakly developed and submembranous. From the base of it arise two pairs of processes: (1) a pair of long, slender, setaceous filaments, probably representing the tenth tergite, which follow a semicircular course that straightens out at their extremity; (2) a pair of shorter, two-segmented cerci which have the basal segment stocky, angulate laterally, densely clothed with setae, the apical segment shorter than the basal, submembranous and with only a few scattered setae. Ventro-mesad of the base of these processes are two short projections sticking straight out, with their apices bearing numerous setae. Claspers broad at base, with a mesal fold at the base which from lateral view appears only as a hump; they have a large lateral projection near the base which appears like a pointed flange when seen from ventral view. Between these two projections the remainder of the clasper narrows off rapidly; its apical portion is slender, appearing somewhat angled when seen from the lateral view but fingerlike and seemingly rounded when seen from ventral view. Oedagus somewhat semicircular, the basal portion round, slightly sinuate, the middle slightly enlarged and the apex decidedly pointed.

Holotype, male.—Montmorency County, Michigan: July 3, 1935, along east branch of Black River, J. W. Leonard.

Cernotina new genus

This genus is a very interesting connecting link between the two groups Polycentropidae and Psychomiidae. It combines the venation and spur count of the groups considered typical of the latter family with the habitus, structure of mouthparts and general organization of genitalia of the Polycentropidae. There seems little doubt but that these two groups should be placed together in a single family.

CHARACTERISTICS.—Head without any ocelli, antennae not longer than length of body. Maxillary palpi, fig. 61, with first segment short and angular; second short with a distinct meso-ventral lobe which is as long as the width of the segment; third segment longer than first two together and slightly longer than fourth; third and fourth widest just above apex; fifth segment subequal to third and fourth together, indistinctly multisegmented. Forewing, fig. 61, between four and five times as long as wide, R_{2+3} not divided, M_{1+2} not divided; hind wing, fig. 61, narrow, the apex rounded. The branches of R_5 and

M much reduced. Tibial spur count 2–4–4, the front tibia without a preapical spur.

Genotype.—*Cernotina calcea* new species (original designation).

This genus differs from previously described genera of the Polycentropinae in lacking the preapical spur of the front tibia and in having a narrow condition of the hind wing; from hitherto described genera of the Psychomiinae it differs in the lobate second segment of the maxillary palpus.

Cernotina calcea new species

Male.—Length 5 mm. Head, body and appendages straw color; the wings, tibiae and tarsi darkened with brown hairs; the abdomen purplish above. General characteristics as described above for genus.

Genitalia as in fig. 59. Tenth tergite bifid at apex, the two processes long, narrow and pointed, covered with thin setae. Cerci consist of a wide, somewhat bulbous base, a long, slender apical process and three large, heavy, pointed spines set one above the other on the mesal side. Claspers extend as far as the cerci, the apex circularly incised, the mesal side produced into a thin, vertical plate, the pair almost touching on the meson. Oedagus tubular, apparently opening between the mesal angles of the dorsal appendages.

Female.—Length 6 mm. Color and general structure similar to those of male. Genitalic segments forming a conical structure with no apparent development of diagnostic parts.

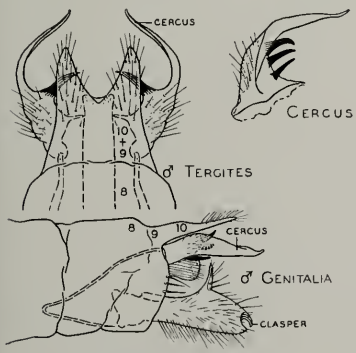

Fig. 59.—*Cernotina calcea*

Holotype, male.—Kankakee, Illinois: July 21, 1935, along Kankakee River, Ross & Mohr.

Allotype, female.—Kankakee, Illinois: Aug. 1, 1933, along Kankakee River, Ross & Mohr.

Paratypes.—Illinois.—Oakwood: July 18, 1933, along Salt Fork River, Ross & Mohr, 1♂.

Oklahoma.—Turner Falls State Park: June 2, 1937, along Honey Creek, H. H. Ross, 36♂.

Cernotina oklahoma new species

This species differs from *calcea* in the short cerci without mesal armature, fig. 60.

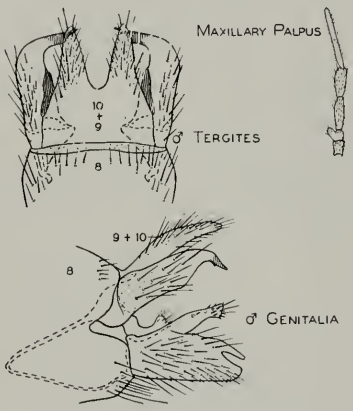

Fig. 60.—*Cernotina oklahoma*

Male.—Size, color and general characteristics same as for the genotype. Diagnostic characters present only in the genitalia.

Genitalia as in fig. 60. Tenth tergite incised as with *calcea;* the lateral lobes separated slightly more at their apex and more nearly triangular in shape. Cerci not projecting beyond lobes of tenth tergite; they are broad at the base and angle sharply mesad at the apex, the apical portion much more slender than the basal, and its distal corner produced into a short, narrow, fingerlike process. At the base of the each cercus is an angulate ventro-mesal lobe bearing at its apex a group of setae.

Claspers have a short, oblique dorsal lobe bearing on its mesal surface at the apex conspicuous, well-separated setae; the main body of the clasper is bifid at the apex, the dorsal process narrow and fingerlike, the ventral portion wide and obtusely angled at the apex. The tenth tergite, basal portion of cerci and main body of clasper are clothed with long, scattered setae.

Holotype, male.—Turner Falls State Park, Oklahoma: June 2, 1937, along Honey Creek, H. H. Ross.

Paratypes.—Oklahoma.—Same data as for holotype, 57♂.

In the collection from Turner Falls State Park containing males of the three species here described in this genus, 50 females were represented. No characters have yet been found to segregate these into groups corresponding with the three species indicated by the male genitalia.

Cernotina spicata new species

Differs from *calcea* in lacking the mesal teeth of the cerci and the larger dorsal lobe of the claspers.

Male.—Size, color and general structure same as for the genotype. Diagnostic differences occur only in the genitalia.

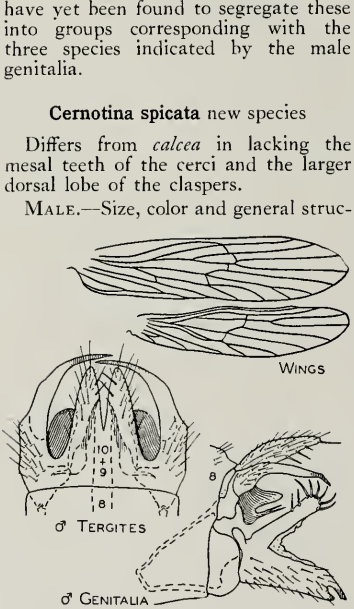

Fig. 61.—*Cernotina spicata*

Genitalia as in fig. 61. Tenth tergite divided into two narrow, acute lobes. Cerci with a long, slender dorsal process curving mesad, the two overlapping slightly, and a sclerotized ventral lobe. From the mesal portion of the base of each cercus a stout, spurlike process arises, extending caudad beyond the ventral lobe. Claspers have a large dorsal lobe surmounted by a cluster of large, curved setae; the main ventral portion slightly concave beneath; the apex deeply incised to form a narrow, oblique and almost truncate upper process and a lower, shorter and more pointed one.

Holotype, male.—Turner Falls State Park, Oklahoma: June 2, 1937, along Honey Creek, H. H. Ross.

Paratypes.—Michigan.—Montmorency County: July 3, 1935, along east branch of Black River, J. W. Leonard, 2♂.

Oklahoma.—Same data as for holotype, 8♂.

Psychomyiella nomada new species

In many respects this species is intermediate between *Psychomyia* and *Psychomyiella*. It has the hind wing with R_{2+3} distinct and M_1 separating from M_2 as in the former. In common with the latter, it possesses a hind wing having the apex tapered and male genitalia having the dorsal plate fused with the dorsal appendages. This species differs from all the other species of these two genera in lacking a flaplike, sclerotized plate at the base of the female genitalia. The mixture of characters suggests the possibility that *Psychomyia* and *Psychomyiella* might better be regarded as subgenera rather than genera.

The long cerci separate this species from related nearctic members of the group.

Male.—Length 5.7 mm. Color various shades of light brown, in life the entire insect appearing pale, yellowish brown.

General characteristics same as for genus, with the following exceptions: hind wing with R_{2+3} distinct from R_1 and separated from it by a crossvein; M with both M_1 and M_2 present.

Genitalia as in fig. 62. Tenth tergite cleft, its lateral processes each fused with a cercus to form a pair of long, stout, upturned processes; the portion made up of cercus bears long setae, the portion composed of tenth tergite is

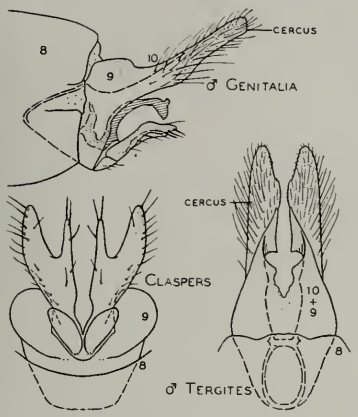

Fig. 62.—*Psychomyiella nomada*

covered with microtrichiae. Claspers, about half length of dorsal processes, divided at apex into a shining, slender inner lobe and a wider outer lobe set with microtrichiae. Over the base of the claspers lies a pair of ovoid plates. These are situated in the mesal emargination of the ventral plate. Oedagus fairly stout, round and forming a semicircular arc terminated by a small knob which is surmounted by a small, truncate process.

FEMALE.—Size 6 mm. Color and general structure same as for male. Differs from female of *flavida* in lacking the sclerotized flap at the base of the genitalia.

Holotype, male.—Cherokee, North Carolina: June 14, 1935, along branch of Little Tennessee River, H. H. Ross.

Allotype, female.—Same data as for holotype.

Paratypes.—NORTH CAROLINA.—Same data as for holotype, 102♂, 69.

Psychomyiella lumina new species

This species is very close to *nomada* but differs in the elongate claspers and other details of the genitalia.

MALE.—Length 6.5 mm. Body and legs brown. Head and thorax darker than the abdomen. Wings light brown with veins darker. General characteristics same as in *nomada*.

Genitalia as in fig. 63. Tenth tergite cleft, the lateral extensions long and pointed, fused only at base with the preanal cerci. These are long and angled, with long setae on the sides and over the entire apical half; their mesal margin bears an area of stout, dense setae. The apices of the tenth tergite and cerci are not fused. Claspers long, narrow and slightly flattened dorso-ventrally. Seen from the ventral side, they appear slightly pointed at apex toward the meson and have a pair of padlike areas covering their base. Oedagus slender and hook-

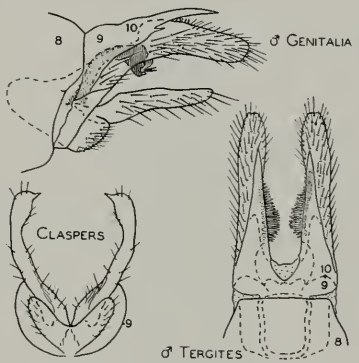

Fig. 63.—*Psychomyiella lumina*

shaped, the extreme apex bulbous and provided with small spiny processes.

Holotype, male.—Pringle Falls, Oregon: May 26, 1935, N. F. Canova.

Paratypes.—OREGON.—Same data as for holotype, 2♂.

Family **HYDROPSYCHIDAE**

Hydropsyche simulans new species

Very similar to *bidens*, but differs in the convex dorsal hump at the base of the head of the oedagus.

MALE.—Length 13 mm. Head and body various shades of brown, clothed with variously colored patches of hairs. Front wings mottled with cream, gray and brown, in addition to patches of light and dark colored setae; the effect is the somewhat patterned mottling shown in fig. 64. Hind wings uniformly gray.

Fig. 64.—*Hydropsyche simulans*

General structure typical for genus. The eyes are slightly larger than those of *cornuta* but smaller than those of *frisoni*. Genitalia as in fig. 65. Very similar to *cornuta*, differing only in the following points: Tenth tergite not declivous, but flat and almost truncate at apex, the lateral lobes separated by only a small notch; claspers inclined to be fusiform, with the base and apex narrowed; apex of oedagus flared only slightly, with the mesal plates narrow at the base, long and curved ventrad, their ventral margins not approximate; where the base of the oedagus joins the apical portion it forms a convex hump.

Female.—Length 14 mm. Color and general structure same as for male, except for the smaller eyes. Genitalia apparently identical with those of *cornuta* (see p. 141).

Holotype, male.—Mount Carmel, Illinois: Sept. 11, 1937, along Wabash River, H. H. Ross.

Allotype, female.—Same data as for holotype.

Paratypes.—Illinois.—Alton: September 6, 1932, along Mississippi River, Frison & Mohr, 1♂; June 26, 1934, DeLong & Ross, 35♂. Freeport: June 28, 1935, DeLong & Ross, 1♂. Havana: May 14, 1934, H. H. Ross, 1♂; April 15, 1935, along Quiver Creek, Ross & Mohr, 1♂; April 25, 1935, along Quiver Creek, Ross & Mohr, 4♂; April 29, 1937, Ross & Mohr, 5♂, 4♀. Homer Park: July 6, 1927, at light, Frison & Glasgow, 1♂. Kankakee: June 12, 1931, Frison & Mohr, 1♂; June 6, 1935, Ross & Mohr, 7♂, 2♀. Lawrenceville: Sept. 7, 1933, Ross & Mohr, 1♂. Mount Carmel: June 25, 1936, DeLong & Ross, 46♂; Sept. 11, 1937, Ross, 10♂, 4♀. Oakwood: July 18, 1933, at Salt Fork River, Ross & Mohr, 1♂; Sept. 20, 1935, DeLong & Ross, 1♂. Olney: Aug. 20, 1902, E. G. Titus, no. 33630, 1♂. Rockford: June 12, 1931, Frison & Mohr, 8♂; May 30, 1936, H. H. Ross, 2♂. Rock Island: June 21, 1928, 1♂; May 3, 1931, H. H. Ross, 1♂; May 6, 1931, Ross & Mohr, 1♂; May 16, 1931, Ross & Mohr, 1♂; June 5, 1935, Ross & Mohr, 1♂. Rockton: July 2, 1931, Frison, Betten & Ross, 1♂. Savanna: July 30, 1892, Hart, Forbes, Shiga & McElfresh, no. 18547, 1♂; June 29, 1935, DeLong & Ross, 1♂, 1♀. Shawneetown: May 27, 1928, at light, Frison, 2♂; May 28, 1935, Ross & Mohr, 2♂, 6♀. Sterling: May 21, 1925, at light, D. H. Thompson, 1♂. Wilmington: May 12, 1935, Frison & Ross, 1♂; May 17, 1935, along Kankakee River, H. H. Ross, 1♂.

Indiana.—Petersburg: June 4, 1936, along

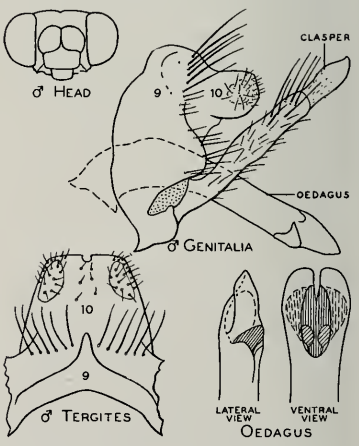

Fig. 65.—*Hydropsyche simulans*

White River, Mohr & Burks, 2♂, 1♀. Portersville: June 3, 1936, along East Fork River, Mohr & Burks, 6♂. Shoals: Sept. 10, 1936, along White River, Ross & Burks, 1♂.

Iowa.—Ottumwa: August 2, 1936, H. H. Ross, 8♂.

Wisconsin.—The Dells: June 5, 1936, along Wisconsin River, Frison & Ross, 15♂.

Hydropsyche cornuta new species

Closely allied to *scalaris* and *simulans*, differing in the wide mesal plates of the oedagus and other small details of the genitalia.

Male.—Length 12 mm. Color as described for *simulans*, but with slightly less contrast in the pattern. General structure same as for this species also, with the exception of the eyes, which are smaller, being only half as wide as the distance between them.

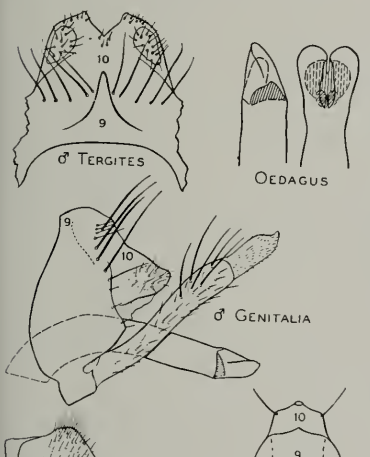

Fig. 66.—*Hydropsyche cornuta*

Genitalia as in fig. 66. Suture separating ninth and tenth terga present at the sides only. Median ridge of ninth tergum short and narrow, with a row of long setae just below it on each side. Tenth tergum wide, with a wide V-shaped incision on the meson, the lateral lobes more or less pointed and each having small setae on the mesal and apical regions; lateral portions with a pair of setiferous warts on each side bearing scattered, long setae. Seen from the side, the tenth segment appears declivous and pointed at apex. Clasper sinuate; apical segment hooked upward at apex. Oedagus curved at base, middle portion cylindrical, apex slightly upturned and pointed; mesal plates wide and low, close together on the ventral side; ventral cavity orbicular, the lateral processes of the apex widest near apex and almost touching along the meson.

Female.—Length 13 mm. Similar to male in color and general structure, differing in antigenetic characters of genitalia. Eighth tergite without a brush of strong setae. Eighth sternite divided into two lateral lobes, the mesal incision only half the length of the segment. Mesal angle of lobes of eighth sternite slightly produced, the hump so formed having longer and denser setae than nearby margins of lobe. Characters have not yet been found to differentiate the females of this species from those of *simulans*, *bidens*, etc.

Holotype, male.—Hamilton, Illinois: Aug. 30, 1931, Ross & Mohr.

Allotype, female.—Same data as for holotype and collected *in coitu* with it.

Paratypes.—Illinois.—Alton: June 26, 1934, DeLong & Ross, 22♂. Dixon: June 27, 1935, DeLong & Ross, 42♂, 5♀. East Dubuque: July 22, 1927, Frison & Glasgow, 3♂. Elizabethtown: June 22, 1927, at light, Frison & Glasgow, 1♂; June 27, 1931, Frison, Betten & Ross, 1♂; June 25, 1932, Ross, Dozier & Park, 5♂, 2♀. Florence: June 7, 1928, Frison, 1♂. Golconda: Sept. 4, 1924, T. H. Frison, 1♂. Hamilton: June 22, 1928, at light, Frison, Hottes & Ross, 44♂, 1♀; June 3, 1930, Frison & Ross, 1♂, 1♀; Aug. 30, 1931, Ross & Mohr, 122♂, 274♀, 8 mating pairs. Harrisburg: June 15, 1934, at light, DeLong & Ross, 10♂, 4♀. Havana: May 9, 1931, Ross & Mohr, 1♂; Aug. 30, 1931, H. H. Ross, 2♂; May 14, 1934, H. H. Ross, 17♂, 26♀. Herod: June 9, 1936, T. H. Frison, 1♂, 1♀. Homer Park: May 11, 1927, along Salt Fork River, 1♂; July 6, 1927, at light, Frison & Glasgow, 1♂. Kankakee: June 6, 1935, Ross & Mohr, 1♂. Keithsburg: 1932, 2♂. Mount Carmel: June 25, 1936, DeLong & Ross, 3♂. Oakwood: April 24, 1925, T. H. Frison, 1♂. Oregon: June 30, 1935, at Castle Rock, DeLong & Ross 3♂; May 29, 1936, H. H. Ross, 6♂. Putnam: July 11, 1933, at light, Lake Senachwine, Mohr, 1♂. Rockford: May 30, 1935, H. H. Ross, 24♂; May 30, 1936, H. H. Ross,

15♂; June 4, 1936, at light, Frison & Ross, 1♂. Rock Island: May 12, 1928, at Electric Station, 5♂; July 23, 1928, at light, Frison & Hottes, 3♂; May 6, 1931, Ross & Mohr, 4♂; May 10, 1931, Ross & Mohr, 8♂; June 24, 1931, C. O. Mohr, 8♂; May 11, 1934, Ross & Mohr, 35♂; June 5, 1935, Ross & Mohr, 54♂, 26♀. Rosiclare: July 5, 1935, Frison & Mohr, 1♂. Savanna: July 20, 1892, along railroad, Forbes & McElfresh, no. 18504, 1♂; July 23, 1892, along Mississippi River, Hart & Forbes, no. 18518, 1♂; July 26, 1892, Mississippi River, Hart, Shiga, Forbes & McElfresh, no. 18532, 1♂; July 30, 1892, Hart & Forbes, no. 18547 and no. 18549, 2♂; June 29, 1935, DeLong & Ross, 23♂. Shawneetown: May 27, 1928, at light, Frison, 1♂. St. Joseph: July 29, 1919, 1♂. Sterling: May 21–22, 1925, at light, D. H. Thompson, 6♂, 10♀. Urbana, 1♂.

MICHIGAN.—Berrien Springs: Sept. 17, 1936, Ross & Burks, 29♂, 45♀. Grand Rapids: May 23, 1936, Frison & Ross, 1♂.

WISCONSIN.—The Dells: June 5, 1936, along Wisconsin River, Frison & Ross, 1♂.

Hydropsyche bidens new species

A close relative of *cornuta*, differing in the conformation of the apex of the oedagus.

MALE.—Length 10 mm. Similar in color, general structure and genitalia to *cornuta* with the following differences:

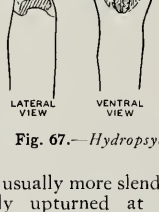

Fig. 67.—*Hydropsyche bidens*

Form usually more slender; tenth tergite slightly upturned at apex; apex of oedagus, fig. 67, with lateral arms pointed, narrowly V-shaped and aligned with the horizontal axis of the oedagus; the dorsal portion between them depressed at apex.

FEMALE.—Length 11 mm. Color, general structure and genitalia apparrently identical with *cornuta*.

Holotype, male.—Apple River Canyon State Park, Illinois: Aug. 22, 1935, DeLong & Ross.

Allotype, female.—Same data as for holotype.

Paratypes.—ILLINOIS.—Alton: June 26, 1934, DeLong & Ross, 121♂. Apple River Canyon State Park: Aug. 22, 1935, DeLong & Ross, 2♂. Carmi: April 24, 1935, on bridge across Wabash River, T. H. Frison, 2♂; May 28, 1935, Ross & Mohr, 7♂, 23♀. Charleston: June 11, 1931, at light, H. H. Ross, 10♂; Aug. 15, 1933, Embarrass River, Ross & Mohr, 1♂. Danville: Sept. 20, 1935, Frison & Mohr, 1♂. Dixon: June 27, 1935, DeLong & Ross, 2♂. East Dubuque: June 15, 1932, Frison & Mohr, 1♂. Elizabethtown: June 27, 1931, Betten, Frison & Ross, 1♂. Freeport: June 28, 1935, DeLong & Ross, 1♂. Fulton: June 20, 1927, Frison & Glasgow, 1♂. Havana: July 20, 1927, at light, Frison & Glasgow, 1♂, 1♀; Aug. 30, 1931, Ross & Mohr, 3♂; May 9, 1934, Ross & Mohr, 1♂; May 14, 1934, H. H. Ross, 1♂. Hardin: June 25, 1931, Frison, Betten & Ross, 8♂. Homer Park: Aug. 10, 1925, T. H. Frison, 1♂; June 30, 1927, at light, Frison & Glasgow, 2♂, 1♀; July 6, 1927, at light, Frison & Glasgow, 4♂; July 11, 1927, at light, Frison & Glasgow, 2♂. Kampsville: June 25, 1931, Frison, Betten & Ross, 6♂. Kankakee: June 12, 1931, Frison & Mohr, 6♂; June 6, 1935, Ross & Mohr, 3♂. Keithsburg: 1932, 4♂. Momence: June 4, 1932, Frison & Mohr, 1♂; May 26, 1936, along Kankakee River, H. H. Ross, 6♂. Mount Carmel: June 25, 1936, DeLong & Ross, 4♂. Oakwood: July 6, 1927, at light, Glasgow & Frison, 4♂; Sept. 20, 1935, DeLong & Ross, 3♂. Pike: May 26, 1906, 1♂. Quincy: June 9, 1932, Ross & Mohr, 2♂. Rockford: June 12, 1931, Frison & Mohr, 2♂; May 30, 1936, H. H. Ross, 4♂; June 4, 1936, at light; Frison & Ross, 1♂. Rock Island: June 23, 1928, Frison & Hottes, 1♂; May 3, 1931, H. H. Ross, 1♂; May 16, 1931, 2♂; June 24, 1931, C. O. Mohr, 3♂; May 11, 1934, Ross & Mohr, 3♂; May 11, 1935, Ross & Mohr, 1♂; June 5, 1935, Ross & Mohr, 27♂. Savanna: July 20, 1892, Forbes & McElfresh, no. 18504, 1♂; July 20, 1927, at light, Frison & Glasgow, 1♂, 1♀; June 29, 1935, DeLong & Ross, 12♂. Urbana: June 17, 1887, Hart, no. 12096, 1♂.

INDIANA.—Petersburg: June 3, 1936, White River, Mohr & Burks, 1♂, 2♀. Rogers: Sept. 8, 1936, Ross & Burks, 1♂. Shoals: Sept. 10, 1936, along White River, Ross & Burks, 1♂.

IOWA.—Ottumwa: Aug. 2, 1936, H. H. Ross, 6♂.

MICHIGAN.—Grand Rapids: May 23, 1936, Frison & Ross, 1♂.

WISCONSIN.—The Dells: June 5, 1936, along Wisconsin River, Frison & Ross, 3♂.

Hydropsyche frisoni new species

Similar in size and color to *scalaris*, but differs in having larger eyes and in the more upturned apex of the oedagus, fig. 68, in which the lateral plates are below the level of the mesal portion.

MALE.—Length 12 mm. Body dark brown, covered with tawny hair; wings with an irregular mottling of tawny and

brown, the latter color darkest along the cubital veins; the entire surface of the wing beset with patches of whitish hairs, the assemblage of colors giving the wing a salt-and-pepper effect.

General structure similar to *simulans*. Eyes large, each about one-third the size of the entire head.

Genitalia, as in fig. 68. Suture separating ninth and tenth terga apparently

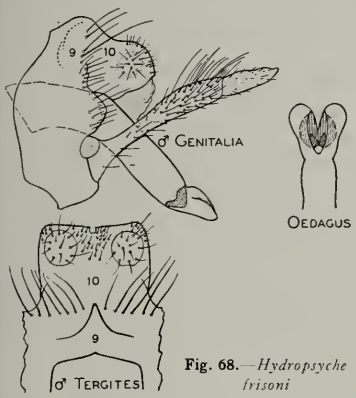

Fig. 68.—*Hydropsyche frisoni*

obsolete. Median ridge short and pointed, a row of long setae below it on each side. Apex of tenth tergite wide and truncate with a narrow mesal notch; mesal and lateral areas of apex with clusters of small setae; each of lateral portions with a large raised wart bearing about a dozen scattered, long setae. Seen from lateral view the tenth tergite appears short and declivous at the apex. Claspers narrow at base, widening toward apex; the apical segment is slightly sinuate, with the tip upturned. Oedagus angled at base, the middle portion cylindrical and the apical portion upturned at a slight angle to it. Apex with lateral processes flared, dividing the ventral cavity with a wide incision; the plates appear narrow and triangular, seen from the ventral view.

Female.—Similar in size, color and general structure to male. The eyes are small, and the genitalia appear to be identical with those of *cornuta*.

Holotype, male.—Oakwood, Illinois; April 24, 1925, along Salt Fork River, T. H. Frison.

Allotype, female.—Same data as for holotype.

Paratypes.—Illinois.—Danville, July 18, 1933, along Middle Fork Vermilion River, Ross & Mohr, 1♂. Homer Park: July 11, 1927, at light, T. H. F. & R. D. G., 1♂. Muncie: July 27, 1927, T. H. Frison, 2♂. Oakwood: Same data as for holotype, 5♂; July 6, 1927, at light, T. H. F. & R. D. G., 5♂; July 18, 1933, Ross & Mohr, 2♂; Aug. 25, 1936, H. H. Ross, 1♂.

Michigan.—Crawford County: May 2, 1936, along north branch of AuSable River, J. W. Leonard, 2♂.

Hydropsyche arinale new species

This species resembles several others in the *scalaris* group in general structure of genitalia but differs from them in the moniliform apex of the oedagus.

Male.—Length 9 mm. Color and general characteristics same as in preceding species.

Genitalia as in fig. 69. Suture dividing ninth and tenth terga apparently obsolete. Median ridge of ninth tergite short and pointed. Tenth tergite with a wide incision on meson; apical margins and mesal area with a few short setae; on each side of the meson at apex is an elliptical membranous area bearing medium-long setae. Claspers with first segment thicker beyond middle; apical segment with tip slightly

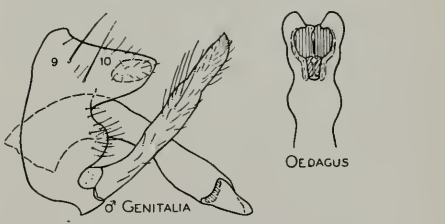

Fig. 69.—*Hydropsyche arinale*

upturned. Oedagus curved at base, narrowed at middle and swollen at apex; when oedagus is seen from above or below, an extra constriction is visible below the apex. Apical portion with lateral arms remote at apex; ventral cavity not covered below, but entirely covered above by mesal extensions of the lateral arms which overlap slightly at apex and are incised to form a small

opening just below it; mesal plates appearing slightly hooked dorsally.

Holotype, male.—Oregon, Illinois: July 18, 1927, at light, T. H. Frison & R. D. Glasgow.

Paratypes.—Illinois.—Algonquin: Sept. 5, 1904, 1♂. Oregon: Same data as for holotype, 1♂. Richmond: May 28, 1936, H. H. Ross, 1♂.

Hydropsyche valanis new species

Similar in size of body and eyes to *aerata* but differs in its deeper brown color, its rounded ninth and tenth

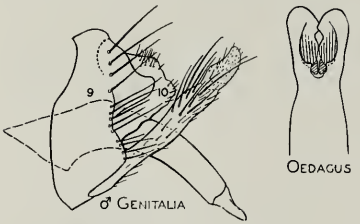

Fig. 70.—*Hydropsyche valanis*

segments, more nearly flat apex of oedagus and other genital characters.

Male.—Size and general structure similar to *cornuta*. Color tawny or cream, with irregular flecking of light brown over the entire surface of the wings. Antennae with diagonal black lines on the basal seven segments of the flagellum. Legs light tawny. Eyes large, as wide as the distance between them.

Genitalia as in fig. 70. Ninth and tenth abdominal terga separated by a well-marked suture. Ninth tergite with median hump rounded at apex and with a line of four or five long setae below it on each side; apical margin of segment emerginate on meson, forming a pair of lateral, angulate projections. Tenth tergite semimembranous, divided by a mesal incision into two wide lobes, each with scattered, short setae along its margin. Claspers sinuate, the apical segment slightly hooked at tip; the basal segment with scattered, short setae over its entire surface and in addition an area near apex bearing many extremely long setae; apical segment covered with fine setae. Oedagus angled at base; middle portion cylindrical, narrowing slightly at apex; apical portion flattened dorso-ventrally, the lateral processes meeting on the meson at tip and leaving only a small hole between them.

Holotype, male.—Rockton, Illinois: July 2, 1931, along Rock River, Frison, Betten & Ross.

Paratypes.—Illinois.—Kankakee: July 21, 1935, Ross & Mohr, 1♂. Rock Island: June 23, 1928, Frison & Hottes, 1♂. Rockton: Same data as for holotype, 7♂.

Indiana.—Peru: May 18, 1936, at light, Frison & Ross, 1♂.

Iowa.—Ottumwa: Aug. 2, 1936, H. H Ross, 1♂.

Wisconsin.—Merrill: July 1, 1933, along Wisconsin River, Frison & Mohr, 1♂.

Hydropsyche aerata new species

Closely allied to *valanis* but differs in the white and brown pattern of the wings and body, the narrower apex of the oedagus and the upturned tenth tergite.

Fig. 71.—*Hydropsyche aerata*

Male.—Length 9 mm. Color markings as in fig. 71. Head and thorax dark brown; abdomen light brown, covered with white hair; antennae and legs white; wings white with definite brown markings which form a broad, saddle-shaped mark on the meson just beyond the middle and a rectangular spot on the anterior margin near apex; in addition to these, there are a few indistinct, lighter markings in the anal and cubital region near the base of the wing and sparse mottling over the apical fourth of the wing.

Form slender. Eyes very large, fig. 71, together forming two-thirds of the head. Malar space narrow, no longer than the width of the flagellum.

Genitalia as in fig. 72. Ninth tergite humped, forming a high, pointed mesal ridge, just below which is a row of long setae. Tenth tergite long and narrow, the apex divided by a short incision into a pair of semispatulate lobes; on each lateral margin is a slightly elevated, oval region bearing distinct, scattered setae. Lateral lobe considerably produced, with eight to twelve long setae on its caudal margin. Claspers with apical segment rounded at tip, slightly elliptic and covered with short setae; basal segment with basal half narrow, apical half abruptly wider, the latter with an area bearing several long setae, the entire segment bearing sparse, shorter setae. Oedagus with base angled, middle portion narrowed and apical portion wider; extreme apex considerably flattened and widened, incised on meson to form a circular area almost surrounded by a pair of rounded processes.

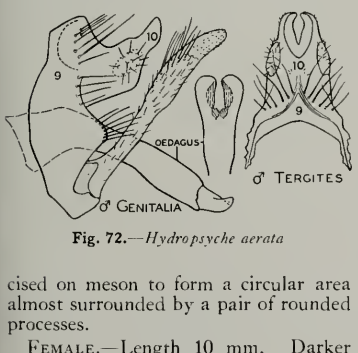

Fig. 72.—*Hydropsyche aerata*

Female.—Length 10 mm. Darker than male; similar to light females of *phalerata* and *hageni*, with which *aerata* usually occurs. Structure identical with that of *cornuta*.

Holotype, male.—Aurora, Illinois: July 17, 1927, at light, T. H. F. & R. D. G.

Allotype, female.—Kankakee, Illinois: Aug. 8, 1935, Ross & DeLong.

Paratypes.—Illinois.—Kankakee: Aug. 1, 1933, along Kankakee River, Ross & Mohr, 1♂; May 26, 1935, Ross & Mohr, cage no. 3, 1♂; June 6, 1935, Ross & Mohr, 78♂, 42♀; July 21, 1935, Ross & Mohr, 23♂; Aug. 8, 1935, Ross & DeLong, 1♂. Momence: May 26, 1936, along Kankakee River, Ross, 1♂; Aug. 4, 1936, Frison & Burks, 4♂; Aug. 21, 1936, Ross & Burks, 1♂. Mount Carmel: July 3, 1906, 1♂. Wilmington: May 12, 1935, Frison & Ross, 10♂, 7♀; May 17, 1935, along Kankakee River, H. H. Ross, 37♂, 10♀; June 6, 1935, Ross & Mohr, 7♂; July 1, 1935, De Long & Ross, 1♂; Aug. 20, 1935, DeLong & Ross, 2♂.

Indiana.—Shoals: Sept. 10, 1936, White River, Ross & Burks, 61♂, 25♀.

Hydropsyche leonardi new species

This species is very closely related to *hageni* Banks but differs in the shorter and thicker apical projection of the oedagus beyond the ventro-mesal cavity.

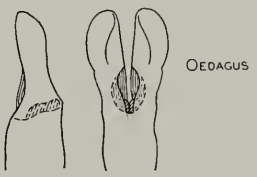

Fig. 73. *Hydropsyche leonardi*

Male.—Length 12 mm. Color identical with that of *cornuta*. General structure as described for *cornuta* except for the eyes, which are as large as those in *simulans*.

Genitalia as in fig. 73. Ninth and tenth tergites almost identical with those illustrated for *cornuta*, the apex of the tenth tergite not upturned and only slightly emarginate on the meson. Claspers with basal segment slightly sinuate and slightly enlarged at apex; apical segment twice as wide as greatest length, the dorso-apical angle concave, the extreme ventro-apical corner pointed and slightly hooked. Oedagus

with base angled as in *simulans*. Apex of oedagus shaped much like a duck's bill, long, wide, narrowed at base and expanded at apex; the lateral processes extending beyond the mesal cavity, slightly more than the full length of the cavity; seen from the side, with the apex appearing only obtusely angled, the portion adjacent to the mesal cavity narrowed, giving it a spatulate appearance; mesal cavity with a wide opening ventrally, and the dorsal side with a fairly narrow, parallel-sided opening; mesal plates small, seemingly very low seen from side view, closely appressed on the meson.

Holotype, male. — Lovells, Crawford County, Michigan: May 2, 1936, along north branch Au Sable River, two miles above town, J. W. Leonard.

Paratype.—MICHIGAN.—Same data as for holotype, 1 ♂.

Hydropsyche dicantha new species

The swollen oedagus and large spines on the tenth tergite distinguish this species from all other members of the genus.

MALE.—Length 8.5 mm. Color various shades of brown. Head and dorsal portion of thorax almost black, covered with a mixture of white and tawny, bushy pubescence; antennae yellowish brown, the eight basal segments of the flagellum with a dorsal, dark brown V; legs and ventral portion of abdomen yellowish brown, the tarsi with sparse, short, black setae. Wings for the most part brown with small light areas over the entire surface and with a larger light area just before the apex of the anal cells; pubescence of wings generally tawny, cream colored over the light areas of the membrane.

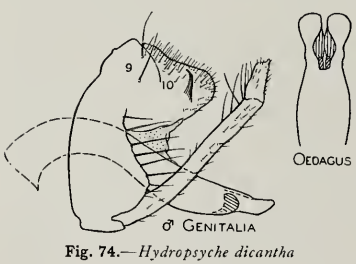

Fig. 74.—*Hydropsyche dicantha*

General structure same as for genus. Seen from front, eyes appear twice as high as wide; longer than the distance between them at base as 4:3; markedly converging at base.

Genitalia as in fig. 74. Tenth tergite deeply and narrowly incised on the meson, the two lobes thus formed rounded at the apex and having a dorsally directed spine arising near the latero-ventral margin; claspers long and extremely slender, the basal segment very little expanded at apex and five times the length of the apical segment. Oedagus sigmoidal, markedly swollen before apex, the apical portion having slender lateral arms which are slightly depressed dorsally; meso-ventral cavity almost completely open ventrally, the dorsal margins meeting on the meson; mesal plates somewhat orbicular, not very prominent seen from the ventral aspect.

Holotype, male.—Swansea, Ontario: Aug. 15, 1934, H. S. Parish.

This species was identified as *venularis* Banks by Betten. *Venularis*, however, although a member of the *scalaris* group, is very different from this species.

Hydropsyche betteni new species

This species is close to *depravata* Hagen, differing from it in the truncate apex and abruptly curved base of the oedagus, fig. 75.

MALE.—Length 12 mm. Color: Head yellowish brown with dark brown mottling on the dorsum; antennae dark brown with a black V mark on the seven basal segments of the flagellum; thorax dark brown, the mesonotum almost black; the legs concolorous with thorax at base, gradually merging into a yellowish brown toward apex; wings dark gray with whitish areas scattered over the entire surface, the gray portion of the wing covered with blackish pubescence, the lighter spots covered with whitish pubescence.

General structure typical of genus. Genitalia as in fig. 75. Claspers with basal segment narrow at base and widened at apex; the apical segment, half the length of basal segment, gradually tapering from base to apex, curved

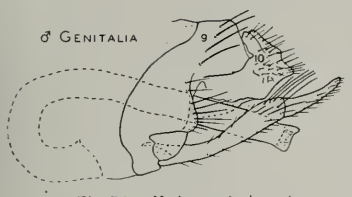

Fig. 75.—*Hydropsyche betteni*

mesad, the extreme apex blunt. Tenth tergite cleft on meson to its base, the two lobes with the dorsal margin incised just above apex, the apical dorsal corner angular, the apical margin truncate and slightly declivous. Oedagus long, the basal portion turned abruptly and forming a complete half circle, the remainder almost straight and cylindrical; the extreme apex almost truncate except for two small, ovate dorsal lobes.

Female.—Length 13 mm. Similar in color and general structure to the male. Genitalia as in fig. 75. Eighth tergite with apical ventral corner produced ventrad, with a brush of ventrally directed setae. Eighth sternite cleft for only two-thirds its length, the lateral lobes highest near lateral margin and with scattered setae at apex. Ninth and tenth tergites form a round structure divided down the meson by a furrow.

Holotype, male.—Richmond, Illinois: May 28, 1936, H. H. Ross.

Allotype, female.—Same data as for holotype.

Paratypes.—Illinois.—Clinton: May 21, 1935, at Weldon Springs, Frison & Ross, 2♂, 3♀. Havana: April 25, 1935, along Quiver Creek, Ross & Mohr, 3♂. McHenry: May 28, 1936, two miles north of town, H. H. Ross, 1♂. Richmond: Same data as for holotype, 3♀. St. Anne: July 20, 1934, Frison, DeLong & Ross, 1♂. White Pines State Park: May 30, 1936, H. H. Ross, 5♂.

Indiana.—Rome City: May 19, 1936, Frison & Ross, 9♂, 6♀.

This species was identified as *incommoda* Hagen by Betten (1934). Hagen's species, however, is a close relative of *scalaris* and *simulans*.

Hydropsyche cuanis new species

Similar in general structure to *depravata* Hagen but differing markedly in the incised apex of the oedagus.

Male.—Length 10 mm. Body black, covered with light brown pubescence; eyes reddish; antennae annulate with light and darker brown; legs beyond coxae yellowish; wings fairly dark, mottled with shades of brown and without a definite pattern.

Antennae slender. Eyes large, two-thirds as wide as the distance separating them, the inner margins diverging ventrad. Malar space subequal in length to width of flagellum.

Genitalia as in fig. 76. Tenth tergum with a narrow mesal impression, dividing the apical portion of the sclerite into

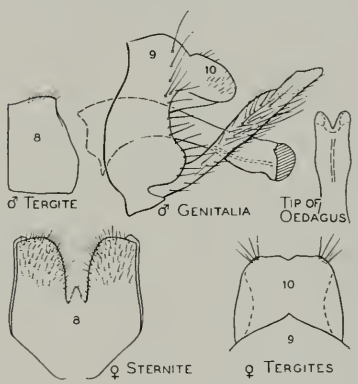

Fig. 76.—*Hydropsyche cuanis*

two wide and almost truncate parts. Ninth tergite humped, separated from the tenth tergite by a definite crease. Claspers narrowing just beyond base, then gradually enlarging to region near joint; apical portion of uniform thickness except at apex, which is obtusely pointed because of the obliqueness of the dorsal portion; basal segment of clasper with long setae, apical segment with close, fine setae and with a few additional longer ones on the ventral side. Oedagus broad and curved at base, narrowed in middle and swollen at apex; extreme apex with a pair of liplike lobes pointing dorsoventrad, separated by a fairly sharp cleft.

Female.—Length 11 mm. Color and general structure as for male. Eighth tergite with an inconspicuous row of

small setae along lateral half of apical margin, fig. 76. Eighth sternite with two lateral lobes, the mesal incision reaching only halfway to base of segment; meso-apical portion of these lobes almost evenly rounded, with an even fringe of slender setae over a wide margin.

Holotype, male. — Wilmington, Illinois: May 17, 1937, on Kankakee River, Ross & Burks.

Allotype, female.—Collected *in coitu* with holotype.

Paratypes.—Illinois.—Momence: June 4, 1932, Frison & Mohr, 4♂; Aug. 1, 1935, Ross & Burks, 1♂; May 26, 1936, Ross, 1♂; July 14, 1936, B. D. Burks, 1♂; Aug. 3, 1936, C. O. Mohr, 1♂; Aug. 4, 1936, Frison & Burks, 53♂. Spring Grove: May 14, 1936, Ross & Mohr, 3♂, 1♀; June 12, 1936, Ross & Burks, 5♂, 1♀. Wilmington: May 12, 1935, Frison & Ross, 130♂, 142♀; May 17, 1935, H. H. Ross, 136♂, 22♀; May 27, 1935, Ross & Mohr, 24♂, 50♀; June 6, 1935, Ross & Mohr, 31♂, 7♀; May 17, 1937, Ross & Burks, 142♂, 65♀.

Michigan.—Bronson: May 19, 1936, along Prairie River, Frison & Ross, 3♂, 3♀. Goodrich: May 20, 1936, along Thread River, Frison & Ross, 6♂.

Hydropsyche piatrix new species

Although closely related to *vexa*, this species differs in the short processes of the tenth tergite and the lack of spines at the apex of the lateral appendages of the oedagus.

Male.—Length 8 mm. Head, thorax and abdomen various shades of brown; legs straw color; antennae alternate bands of straw color and brown; wings with membrane almost clear and with a mottled, irrorate pattern of setae resulting in a salt-and-pepper brown mixture typical of the *alternans* group.

General structure typical for genus. Genitalia as in fig. 77. Tenth tergite with a round, raised portion before apex and with a pair of short, stubby lateral processes. Oedagus with base sharply angled and slightly constricted at the angulation, then gradually increasing in size to apex. The dorsal sclerotized plates are large and fit into the abrupt angle at the apex of the oedagus. Behind this is a pair of short membranous lobes, each bearing at its end a short, buttonlike sclerotized spine. The terminal projection of the oedagus is angled down more than usual and bears a single invaginated cluster of spines and a pair of thin, membranous lateral appendages which reach one-third of the way to the base of the oedagus; these appendages have no spines at their apex but instead a circular opening around which are several small setae.

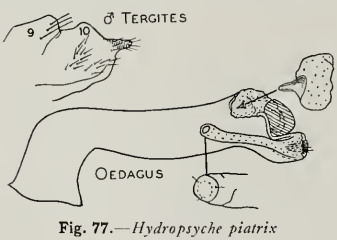

Fig. 77.—*Hydropsyche piatrix*

Holotype, male.—Greer, Missouri: March 28, 1937, at spring near town, T. H. Frison.

Paratypes.—Arkansas.—Mammoth Springs: June 6, 1937, H. H. Ross, 2♂.

Hydropsyche vexa new species

This species differs from *piatrix* in having spines in the apex of the disto-lateral arms of the oedagus and from others in having only short and very slender spines on the dorso-lateral arms of the oedagus.

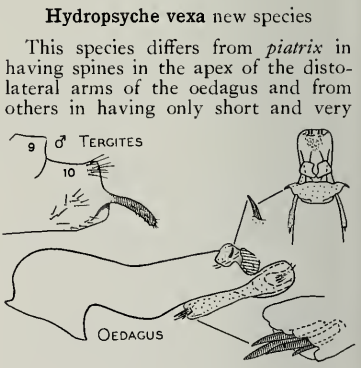

Fig. 78.—*Hydropsyche vexa*

Male.—Length 9 mm. Color and general structure and characteristics exactly as in *piatrix*. Genitalia as in fig. 78. Tenth tergite fairly long with a relatively sharp angle at its apex, and with a pair of long, slender lateral processes. Oedagus with the basal portion wide and low and a distinct thickening near middle; dorso-lateral appendages membranous, each tipped with a short, slender spine; apex of oedagus with a

single invaginated group of spines and with a pair of stout, membranous appendages which have a group of spines at their apex.

Holotype, male.—Bloomer, Wisconsin: June 5, 1936, Frison & Ross.

Paratypes.—Wisconsin.—Same data as for holotype, 2♂.

Hydropsyche bronta new species

Although close to *morosa* Hagen, this species differs markedly in the very long spur at the end of the lateral appendage, fig. 79.

Male.—Length 11 mm. Color same as described for *piatrix*. General structure typical of genus. Diagnostic characters, apparently, present only in the genitalia.

Genitalia as in fig. 79. Ninth and tenth tergites with prominent hump;

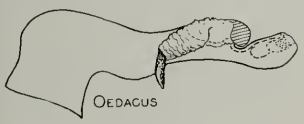

Fig. 79.—*Hydropsyche bronta*

tenth tergite with a pair of short, finger-like apical processes. Apical segment of claspers conical, the base about one-third as wide as the length of the segment, the apex very narrow and pointed. Oedagus with base broad and at right angles to remainder. Horizontal portion swollen beyond basal angle, the apical half little more than half as thick. Mesal plates ovate. Behind these arise a pair of long, membranous processes, at the end of which is situated a long spur which projects beneath the ventral margin of the oedagus. This spur is held at right angles to the oedagus; its surface is armed with spinelike teeth, and its apex is curved slightly caudad. Apical portion of oedagus knoblike, with one mesal and two lateral membranous pockets; the lateral pockets provided with two to four very small sclerotized spicules; mesal pocket having at the most a few weak, unsclerotized spicules; the spicules of the lateral pockets are completely sessile.

Female.—Length 12 mm. Color and general structure same as for male; genitalia apparently indistinguishable from other species of *alternans* group (see *sparna*, p. 150).

Holotype, male.—Bronson, Michigan: May 19, 1936, along Prairie River, Frison & Ross.

Allotype, female.—Same date as for holotype.

Paratypes.—Illinois.—Apple River Canyon, Aug. 22, 1935, DeLong & Ross, 3♂. Havana: April 25, 1925, along Quiver Creek, Ross & Mohr, 1♂. Oregon: Aug. 23, 1935, DeLong & Ross, 2♂. White Pine State Park: May 30, 1936, H. H. Ross, 7♂, 3♀.

Michigan.—Big Rapids: May 22, 1936, along Muskegon River, Frison & Ross, 1♂. Bronson: Same data as for holotype, 12♂.

New York.—Ithaca: Aug. 1, 1934, C. Betten, 1♂.

Wisconsin.—Bloomer: June 5, 1936, Frison & Ross, 5♂. Trout Lake: Aug. 13, 1936, D. M. DeLong, 1♂.

Hydropsyche cheilonis new species

This is a close relative of the species described above. The points of difference in the genitalia are described below.

Male.—Similar in size, color and general characteristics to *bronta*. Genitalia as in fig. 80. Horizontal part of oedagus not markedly constricted just below mesal plates; the apical bulb

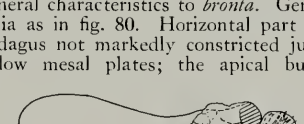

Fig. 80.—*Hydropsyche cheilonis*

short and stout, with four pockets (two meso-dorsal and two lateral) each bearing a group of at least six relatively long and heavily sclerotized spicules; the lateral pockets are exserted so that these lateral groups of spicules are slightly stalked. The membranous appendages behind the mesal plates are short, and the spur at the end of these is narrower and more nearly round in cross section than is that of *bronta*; this spur has a distinct constriction just beyond its base, and the apex is pointed.

Female.—This is indistinguishable from that of *bronta* and other females of this group.

Holotype, male.—Oakwood, Illinois: July

18, 1933, along Salt Fork River, Ross & Mohr.

Allotype, female.—Same data as for holotype.

Paratypes.—Illinois.—Muncie: May 4, 1936, Ross & Burks, 1♂. Oakwood: Same data as for holotype, 2♂, 6♀; Sept. 20, 1935, DeLong & Ross, 7♂, 9♀; July 18, 1933, along middle fork Vermilion River, Ross & Mohr, 1♂.

Indiana.—Knox: May 24, 1937, along Yellow River, H. H. Ross, 1♂.

Hydropsyche sparna new species

Belonging to the *chlorotica* group, this species differs from hitherto described members in the long, membranous appendages of the oedagus which bear a sclerotized lateral process shaped like a collar button, fig. 81.

Male.—Length 11 mm. Color and general structure same as in *piatrix*, the

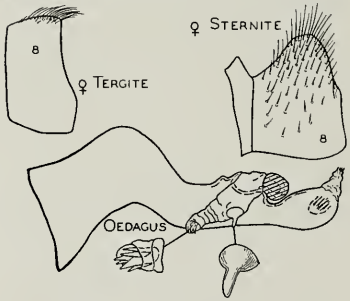

Fig. 81.—*Hydropsyche sparna*

differences occurring in the male genitalia.

Genitalia as in fig. 81. Ninth and tenth tergites humplike but not excessively so. Apical process of tenth tergite short, slightly thickened in middle and tapering off to a rounded apex; bilaterally compressed, arcuate and converging at tip when seen from above. Oedagus with basal portion sharply S-shaped, the extreme base wide. Dorsal plates ovoid. Basad of these extend a pair of membranous appendages with the apex terminating in a group of colorless, flattened spines and with a collar buttonlike spine on the ventro-lateral margin near middle. Extreme apex of oedagus bulbous with three eversible pockets of spines, one mesal and two lateral.

Female.—Length 12 mm. Color and general structure same as for male. Lateral corner of eighth tergite similar to *cuanis* but with a longer fringe of setae. Eighth sternite incised on the meson for only one-half its length, as is typical of the genus, but with the apical lobes much more prominent than in either *cornuta* or *cuanis*.

Holotype, male.—Lovells, Michigan: May 22, 1936, along Au Sable River, Frison & Ross.

Allotype, female.—Same data as for holotype.

Paratypes.—Michigan.—Lovells: Same data as for holotype, 9♂, 9♀.

New York.—Ithaca: Sept. 1, 2♂; May 20, 1♂; May 26, 4♀; Aug. 1, 1924, 39♂; June 23, 1937, D. T. Ries, 1♂.

Tennessee.—Gatlinburg: May 28, 1934, along fork of Little Pigeon River, T. H. Frison, 1♂.

This species was recorded as *H. phalerata* Hagen by Betten, 1934. An examination of Hagen's type shows that true *phalerata* is not the one described here.

Hydropsyche centra new species

This species is close to *cockerelli* but differs in having longer lateral appendages of the tenth tergum and a longer postero-lateral spur on the oedagus, fig. 82.

Male.—Length 9 mm. Color and general structure same as for *piatrix* and other members of *alternans* group. Genitalia as in fig. 82. Tenth tergite with an angulate crest, its lateral appendages long, thickened in middle

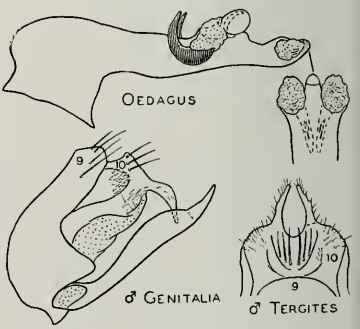

Fig. 82.—*Hydropsyche centra*

and tapered at apex, close together at base and converging toward apex. Claspers with apical segment long and tapering. Oedagus with a very large lateral spur which is upcurved and sharp. Apex of oedagus rounded, with a mesal and two lateral patches of very short, almost indiscernible rods.

FEMALE.—Size, color and general structure as in male. At present indistinguishable from females of other closely related species.

Holotype, male.—Centralia, Washington: July 26, 1936, at light, H. H. Ross.

Allotype, female.—Same data as for holotype.

Hydropsyche tana new species

Closely related to *oslari* Banks, but is distinguished by the high crest of the tenth tergite and the short apical segment of the clasper.

MALE.—Size 8.5 mm. Color and general structure same as for *centra* and other members of *alternans* group. Genitalia as in fig. 83. Tenth tergite with a high, spurlike crest, its lateral appendages short, stout and curved ventrad, narrow and close together as seen from the dorsal aspect. Claspers with relatively short apical segment. Oedagus with a short, pointed lateral spur; the dorsal plates longer than deep,

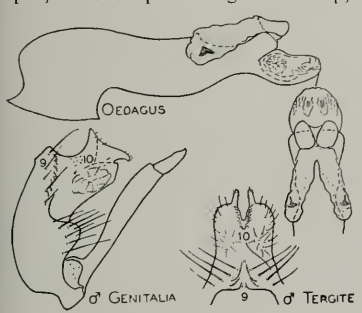

Fig. 83.—*Hydropsyche tana*

overhanging apex of oedagus; the latter is rounded at tip, with two pockets of fairly long rods.

FEMALE.—Size, color and general structure same as in male. No distinguishing characters found to separate it from females of other species in the group.

Holotype, male.—Harrison, Montana: July 8, 1936, along creek, H. H. Ross.

Allotype, female.—Same date as for holotype.

Paratypes.—MONTANA.—Same data as for holotype, 9♂, 2♀.

Cheumatopsyche aphanta new species

This species is closely related to *gracilis* Banks but is readily distinguished from it by the shorter and

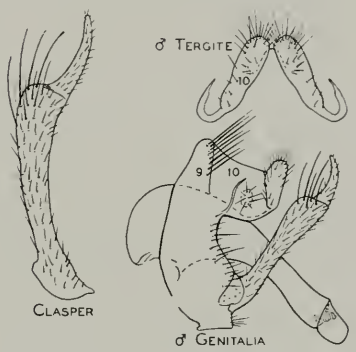

Fig. 84.—*Cheumatopsyche aphanta*

stockier basal segment of the claspers, the shorter and deeper tenth tergite and the ovate, oblique lobes at the apex of the tenth tergite.

MALE.—Length 7 mm. Color dark brown with the following exceptions: antennae yellowish brown, the six basal segments of the flagellum with a dark dorsal V mark, the apical portion slightly darker; prosternum, most of the legs and the venter of the abdomen straw color; each wing with indistinct grayish spots scattered over most of its area, in addition to a large gray spot on the anal margin near apex and a smaller but conspicuous spot near apex of stigmal region. General structure, including warts on the head, venation and spur count of legs, typical for genus. Diagnostic characters apparently restricted to genitalia.

Genitalia as in fig. 84. Tenth tergite almost as deep as long, and having a

lateral lobe covered with about ten long, scattered setae; apex developed into two lateral processes which are situated obliquely in reference to the anal aspect and are somewhat ovate, wider near the lobe; clothed with fine setae which are most abundant at the apex. Claspers with basal segment not quite three times length of apical segment, enlarged at apex and with a cluster of long setae on the lateral angle near apex; apical segment long and slender, tapering gradually from base to apex, clothed with short, fine setae. Oedagus with base considerably enlarged, and with the apico-lateral plates short.

FEMALE.—Similar in length, color and general structure to male. To date no definite characters have been found to separate the females of this genus except average size and color, so that their determination is largely a matter of association.

Holotype, male.—Oakwood, Illinois: June 14, 1935, C. O. Mohr.

Allotype, female.—Oregon, Illinois: Aug. 23, 1935, Ross & DeLong.

Paratypes.—ILLINOIS.—Apple River Canyon: Aug. 22, 1935, Ross & DeLong, 7♂; June 29, 1935, DeLong & Ross, 7♂. Chemung: May 28, 1936, Piscasaw Creek, H. H. Ross, 2♂. Muncie: Sept. 7, 1931, at light, H. H. Ross, 5♂, 1♀. Oakwood: June 14, 1935, C. O. Mohr, 52♂; Sept. 20, 1935, DeLong & Ross, 13♂. Oregon: Same data as for allotype, 41♂.

Cheumatopsyche campyla new species

This species forms an intermediate step between the *gracilis* group and *lasia*, which in turn is intermediate between *campyla* and *speciosa*. *Campyla* differs from the *gracilis* group in having the apical processes of the tenth tergite tapering from base to apex and forming a narrow tip, fig. 85. From *lasia* it differs in that these processes are straight and not deeply emarginate near base, fig. 85.

MALE.—Length 10 mm. Color of head and thorax blackish, remainder of body and appendages light brown, the legs and antennae shading to straw color toward apex. Flagellum with five or six basal segments having a distinct, dorsal V mark. Each front wing finely irrorate with light brown and cream color, and with a large light spot on anal margin near apex. Hind wings uniformly light brown. General structure same as for genus.

Genitalia as in fig. 85. Tenth tergite slightly longer than deep with a lateral submembranous knob bearing long, scattered setae and with the apex produced into a pair of lateral processes which extend considerably above the level of the segment. These processes, seen from caudal view, are wide at base, gradually narrowed to the apex and curved, sometimes the lateral margin having a small but noticeable emargination; processes are clothed with setae which fringe the lateral margin and form a rather thick crown at the apex. Claspers with basal segment three times length of second; slender and somewhat knobbed just above apex and with the usual type of pubescence; apical segment broad at base, tapering to a slender and slightly sinuate apex. Oedagus with basal portion not greatly enlarged compared to other members of the genus; the lateral lobes short and ovate.

FEMALE.—Similar in length, color and general characteristics to male.

Holotype, male.—Momence, Illinois: May 26, 1936, along Kankakee River, H. H. Ross.

Allotype, female.—Same data as for holotype. Collected *in coitu* with it.

Paratypes.—ILLINOIS.—Algonquin: W. A. Nason, 1♂, 1♀. Carmi: April 24, 1935, on bridge across Little Wabash River, T. H.

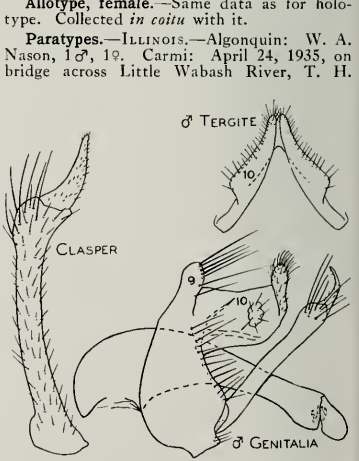

Fig. 85.—*Cheumatopsyche campyla*

Frison, 9♂, 7♀; May 28, 1935, Ross & Mohr, 6♂. Dixon: June 27, 1935, DeLong & Ross, 21♂. East Dubuque: July 22, 1927, Frison & Glasgow, sweepings, 3♂, 1♀. Florence: Oct. 11, 1931, Mohr, 1♂. Harrisburg: June 15, 1934, at light, DeLong & Ross, 1♂. Havana: June 20, 1936, at light, C. O. Mohr, 4♂, 4♀. Kankakee: Aug. 1, 1933, along Kankakee River, Ross & Mohr, 1♂; July 21, 1935, Ross & Mohr, 19♂. Momence: May 26, 1936, Ross, 2 mating pairs; Aug. 3, 1936, along Kankakee River, C. O. Mohr, 1♂, 1♀. Mount Carmel: June 23, 1927, Frison & Glasgow, 1♂. Oakwood: June 14, 1935, C. O. Mohr, 1♂; Sept. 20, 1935, DeLong & Ross, 15♂. Oregon: June 27, 1928, Frison, Hottes & Ross, mating pair; Aug. 23, 1935, DeLong & Ross, 2♂; May 29, 1936, H. H. Ross, 2♂, 2♀. Rockford: May 30, 1936, H. H. Ross, 12♂, 15♀; June 4, 1936, at light, Frison & Ross, 1♂. Rock Island: May 6, 1931, Ross & Mohr, 1♂. Savanna: June 29, 1935, DeLong & Ross, 4♂. Springfield: July 9, 1931, Frison, 1♂. Spring Grove: May 10, 1935, Frison & Ross, 2♂, 3♀. Wilmington: May 12, 1935, Frison & Ross, 1♂; May 17, 1935, along Kankakee River, H. H. Ross, 45♂; July 1, 1935, DeLong & Ross, 10♂; May 17, 1937, along Kankakee River, Ross & Burks, 9♂.

Indiana.—Peru: May 18, 1936, at light, Frison & Ross, 3♂, 15♀. Shoals: June 26, 1936, along White River, Ross & DeLong, 4♂, 2♀; Sept. 10, 1936, along White River, Ross & Burks, 19♂, 16♀.

Iowa.—Lewiston: July 10, 1936, altitude 550 feet, 2♂.

Michigan.—Berrien Springs: Sept. 17, 1936, Ross & Burks, 1♂, 5♀. Grand Rapids: May 13, 1936, Frison & Ross, 5♂, 1♀. Jonesville: May 19, 1936, Frison & Ross, 2♂. Omer: May 21, 1936, along Rifle River, Frison & Ross, 4♂, 6♀.

Montana.—Flathead Lake: Aug. 26, 1891, S. A. Forbes, no. 27108, 1♂.

Ohio.—Gibralter Island, Put in Bay: May 25, 1937, DeLong & Smith, 4♂, 4♀.

Ontario.—Niagara Falls: June 10, 1937, Ries & Davis, 9♂.

Oregon.—Arlington: July 29, 1936, along Columbia River, H. H. Ross, 43♂, 51♀. La Grande: July 30, 1936, along Grande Ronde River, H. H. Ross, 11♂.

Wisconsin.—The Dells: June 5, 1936, along Wisconsin River, Frison & Ross, 9♂, 2♀. Edgerton: June 5, 1936, Frison & Ross, 2♂, 2♀.

Wyoming.—Boulder: July 6, 1936, tributary Pine Branch River, H. H. Ross, 1♂. Pinedale: July 6, 1936, along Green River north of town, H. H. Ross, 1♂, 14♀.

Cheumatopsyche enonis new species

Probably one of the most generalized in the genus, this species differs from the *sordida* complex in having the apical segment of the claspers pointed and triangular; it differs from other nearctic

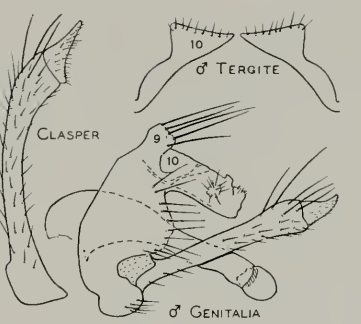

Fig. 86.— *Cheumatopsyche enonis*

members of the genus in having a short apical segment of the claspers and in lacking conspicuous lateral processes at the apex of the tenth tergite, fig. 86.

Male.—Length 6 mm. Body light brown, with the venter and legs grading into straw color and the wings having a definite mottling of lighter brown than the body. General structure same as for genus.

Genitalia as in fig. 86. Tenth tergite long and shallow, almost three times as long as deep, the usual lateral tuberculate processes bearing long, slender setae. The apex of the segment is divided into two lateral processes which are erect along the transverse line; they do not extend above the level of the segment and, because of their small size, they are inconspicuous. Claspers with basal segment four times length of apical, enlarged at apex with setation as in preceding species; apical segment somewhat triangular with both the lateral and mesal margins convex, the baso-mesal corner produced into an angle, the entire segment covered with minute setae which are longer on the mesal margin. Oedagus with basal portion enlarged very little, the lateral lobes at the apex appear more or less globular seen from lateral view.

Holotype, male.—Parco, Wyoming: July 5, 1936, along North Platte River near town, H. H. Ross.

Allotype, female.—Same data as for holotype.

Paratypes.—Wyoming.—Parco: July 5, 1936, along North Platte River near town, H. H. Ross, 28♂, 27♀; Aug. 1, 1936, along North

Platte River, H. H. Ross, 6♂, 4♀. Rock Springs: July 5, 1936, at light, H. H. Ross, 44♂, 18♀.

Cheumatopsyche gyra new species

This species is closely related to *gracilis*, from which it differs in the more bulbous oedagus and the caudal appendages of the tenth tergite, which

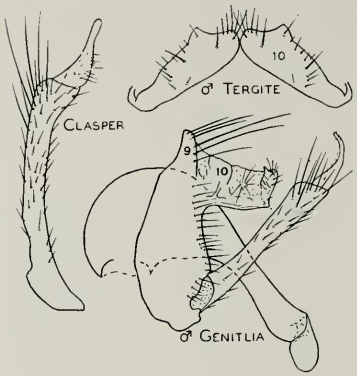

Fig. 87.—*Cheumatopsyche gyra*

have a sharp tooth on the dorso-lateral corner and which meet to form a much wider angle.

MALE.—Length 7 mm. Color dark brown with the following exceptions: Apical half of legs shading to a light brown, the body and wings with a few very distinct, light spots, the spot on the anal margin near apex being very much reduced in size and no larger than any of the other spots. Antennae, unlike *aphanta*, uniformly brown with only a slight indication of the dorsal V mark on the basal segments of the flagellum. General structure as for genus.

Genitalia as in fig. 87. Tenth tergite almost twice as long as deep, with a lateral tuberculate hump bearing several long, slender setae; apex divided into a pair of lateral plates almost touching dorsally and forming a wide angle. Viewed from the caudal aspect, these plates have both inner and outer margins slightly sinuate, the lateral margin produced dorsally into a sharp, angular projection so that the dorsal margin of the process is concave. These plates bear scattered setae; a slight concentration of setae is found on the dorso-mesal portion. Claspers with basal segment slightly more than three times length of apical segment; apex slightly enlarged, clothed with scattered setae and having the usual cluster of long setae on the lateral side at apex; apical segment with the lateral margin evenly concave, the mesal margin sinuate, which results in the base being wide and tapering to a narrow constriction, above which the remainder of the segment widens very slightly. The entire segment is sparsely studded with minute setae, a few longer ones occurring along the mesal margin. Oedagus with basal portion more bulbous than in *aphanta* and with a narrower constriction upon the lobe. The lateral lobes at the apex are longer than in *aphanta*.

Holotype, male.—Cherokee, North Carolina: June 14, 1935, H. H. Ross.

Cheumatopsyche lasia new species

In general appearance this species is similar to *campyla* but differs from it in the bent condition of the lateral processes at the apex of the tenth tergite, fig. 88.

MALE.—Length 7 mm. Color similar to *campyla* except that the irrorate

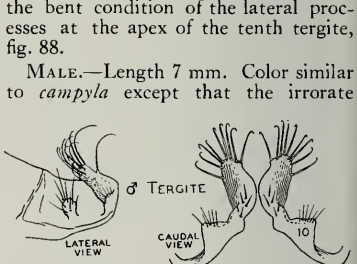

Fig. 88.—*Cheumatopsyche lasia*

pattern of the front wings is finer and slightly more markedly contrasting. General structure typical for genus.

Genitalia very similar in most particulars to *campyla*, the oedagus, claspers and general proportions being almost identical with those in fig. 85. Tenth tergite, fig. 88, slightly longer than deep, the apex produced into two lateral lobes. The base of each lobe is at right angles to the axis of the segment, but the apical half is bent back at a 45-degree angle and hides part of the apex

of the tergite. Seen from caudal view, these processes have an angular lateral projection near base, which bears a few short setae. This projection merges with the apical portion, which is somewhat ovate and which has a crown of about ten long setae that curve dorsad and then caudad. These setae are more conspicuous from a lateral view.

FEMALE.—Size, color and general structure same as for male, with the usual antigeny.

Holotype, male.—Davis, Oklahoma: June 2, 1937, along Washita River, H. H. Ross.

Allotype, female.—Same data as for holotype.

Paratypes.—ILLINOIS.—Dixon: June 27, 1935, DeLong & Ross, 2♂. White Pine State Park: May 30, 1936, H. H. Ross, 1♂.

IOWA.—Ottumwa: Aug. 2, 1936, H. H. Ross, 11♂, 32♀.

OKLAHOMA.—Same data as for holotype, 242♂, 96♀.

Cheumatopsyche oxa new species

This species is closely related to *pettiti* but differs from it on the basis of the much longer apical segment of the claspers, the more bulbous oedagus and the shape of the processes at the end of the tenth tergite.

MALE.—Length 8 mm. Color indistinguishable from that of *gyra*, the wings having only inconspicuous light areas so that they appear almost uniformly brown. General structure typical for genus.

Genitalia as in fig. 89. Tenth tergite scarcely longer than deep, the apex produced into two lateral processes appearing slightly constricted in middle, seen from caudal view. These processes are clothed with scattered setae that are more abundant at the apex. The lateral aspect of the tenth tergite has the usual knoblike projection, which bears long, scattered setae. Claspers long, the apical segment slender, two-thirds as long as the basal segment; the basal segment bears the usual setation but is scarcely thickened at the apex; the apical segment is clothed with minute setae scattered sparsely over its entire surface and also a few longer setae along the mesal margin. Oedagus bulbous, very similar in proportions to that of *aphanta*, fig. 84.

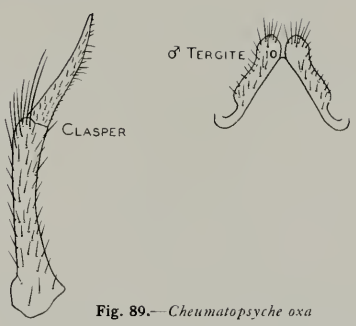

Fig. 89.—*Cheumatopsyche oxa*

FEMALE.—Similar in length, color and general characteristics to male. Differing in the usual antigenetic characters of genitalia.

Holotype, male.—Columbia City, Indiana: May 19, 1936, along Eel River near town, Frison & Ross.

Allotype, female.—Same data as for holotype.

Paratypes.—INDIANA.—Same data as for holotype, 4♂.

MICHIGAN.—Bronson: May 19, 1936, along Prairie River, Frison & Ross, 3♂, 5♀.

Family **LEPTOCERIDAE**

Athripsodes alagmus new species

Closely resembling *tarsipunctatus* Vorhies, this species differs from it in having the cerci and tenth tergite shorter, the ventral spines of the tenth tergite almost as long as the tergite itself and the oedagus more robust.

MALE.—Length 12 mm. Color reddish brown except as follows: antennae straw color, each segment having a narrow, dark apical band; in addition, apical half of antennae covered with dark brown scales and basal half covered with almost white scales; wings with membrane rather dark brown, bearing very small, round areas of lighter brown scattered over the entire surface; membranous area whitish; legs beyond coxae straw color. General structure typical for genus; size of eyes same as given for *ophioderus* (see p. 157).

Genitalia as in fig. 90. Tenth tergite seen from above appears vasiform; seen from the side shallow at base and enlarged at extreme apex; a pair of heavily

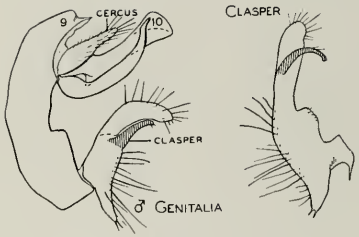

Fig. 90.—*Athripsodes alagmus*

sclerotized lateral arms arise at the extreme base, progressing for a distance parallel with the rest of the tergite; moderately upturned near apex and with the end truncate. Cerci short, as wide as long and deeply incised laterally near apex to form a narrow apical projection on the mesal side. Claspers with the basal portion projecting into a long, pointed process, the apical lobe submembranous, fusiform and markedly curved caudad; the sclerotized process curved, either slightly truncate or rounded at apex. The basal portion of each clasper has a baso-mesal projection which is truncate, with a basal thread and a semitruncate or semiangulate smaller projection just above this on the meson. Oedagus short and deep with a small lateral flange and with the apex pointed. Of the internal structures, the most conspicuous is a pair of heavily sclerotized spines which are more than half the length of the oedagus, bulbous at base and pointed at apex.

Holotype, male.—Fox Lake, Illinois; July 1, 1931, Frison, Betten & Ross.

Paratypes.—Illinois.—Antioch: July 7, 1932, Frison & Metcalf, 2♂. Fox Lake: Same data as for holotype, 7♂. Fulton: July 20, 1927, Frison & Glasgow, 5♂. Homer Park: July 6, 1927, at light, Frison & Glasgow, 1♂. McHenry: June 30, 1931, Frison, Betten & Ross, 1♂.

Wisconsin.—Little St. Germaine Lake: Aug. 12, 1936, D. M. DeLong, 2♂.

Athripsodes cophus new species

This species is similar in general habitus to *submaculus* Walker and *erraticus* Milne but differs from both in the flange-like structures at the base of the tenth tergite, in addition to other characters of the genitalia.

Male.—Length 14 mm. Color of head, thorax, dorsum and venter of abdomen, and most of legs blackish brown to black, antennae slightly darker brown than head; apices of tibiae and all but apical segment of tarsi light brown; wing membrane pale yellowish brown, most of veins darker shades of brown. Pubescence of head a mixture of white and black hairs, that of thorax black and that of the remainder including the wings brown. General characteristics same as for genus. Eyes small; seen from dorsal view, separated by slightly more than twice longest dorsal length. Venation and spur count same as for genus.

Genitalia as in fig. 91. Tenth tergite with a large base from which protrude (1) a narrow, mesal prolongation flared

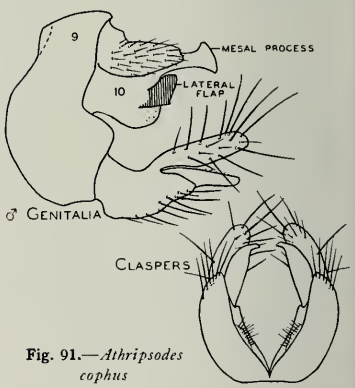

Fig. 91.—*Athripsodes cophus*

at the apex and with the apical margin arcuate; (2) a pair of short, flaplike plates below the base of the mesal projection. Cerci short, bluntly angled at apex. Clasper with base bulbous, without rows of heavy setae or mesal flaps; only the mesal margin armed with a patch of short setae; apical lobe finger-like, semimembranous, with about fifteen long, slender setae scattered over its surface; at the base of this lobe is the sclerotized lateral appendage which is almost as long and wide as the apical lobe and has the apex pointed and slightly hooked. Oedagus anchored firmly within the genital capsule, com-

posed of a tonguelike ventral flap which is thin and spatulate in outline, a middle submembranous and extrusible lobe and a dorsal pair of pointed, sclerotized rods which also are extrusible.

Holotype, male.—Pinedale, Wyoming: July 6, 1936, Green River north of the town, H. H. Ross.

Paratypes.—Wyoming.—Same data as for holotype, 2♂.

I have compared this species with *Athripsodes nigronervosus* Retzius, of Europe, with which it is very similar in size and general appearance, but the genitalia of the two species are very different.

Athripsodes ophioderus new species

Close to the *punctatus* group, this species differs from the members of that group in the necklike tenth tergite with its ovate apical enlargement.

Male.—Length 10 mm. Color of head, body and appendages reddish brown, with the following exceptions: antennae almost straw color, each segment with a very narrow, dark brown ring at apex; wings with three whitish spots, one just in front of and the other just beyond the stigmal area of the costal margin, the third on the anal margin near apex. Setation of body and appendages a mixture of brown and blackish hairs.

General structure, including wing venation and setation, typical for genus. Eyes small, seen from lateral view appearing slightly longer than high; seen from above, the two seem separated by three times the distance of their greatest dorsal length.

Genitalia as in fig. 92. Ninth tergite produced dorsally into a narrow point. Tenth tergite somewhat S-shaped, divided into three distinct regions: (1) a robust basal part bearing at its apex a pair of short dorsal spurs and a pair of disto-ventral humps with a cluster of short, stout setae; (2) a slightly curved necklike portion which is slightly excavated beneath, the dorsum convex transversely and twice as wide as deep; and (3) a bulbous apical portion which is rounded apically, no wider than the "neck" but enlarged ventrally. Cerci short and wide, the apico-lateral margin incised. Claspers with the basal portion

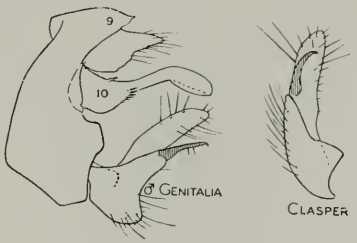

Fig. 92.—*Athripsodes ophioderus*

somewhat triangular, the ventro-mesal corner produced into a right angle plate; mesal margin immediately behind this plate with a small flange bearing a few small setae; apical lobe fingerlike and semimembranous, with about fifteen long setae scattered over its surface; at the base of this lobe is the sclerotized lateral appendage which is only one-half the greatest length of the apical lobe, moderately stout at base, curved and tapering evenly to a slender point. Oedagus with a spatulate ventral plate and a pair of stout, upcurved dorsal spines; between these and the ventral plate a semisclerotized process somewhat fingerlike but indefinite in outline for most of its length. Oedagus withdrawn into a small socket joined internally with the tenth segment.

Holotype, male.—Elizabethtown, Illinois: June 22, 1927, at light, Frison & Glasgow.

Paratype.—Illinois.—Same data as for holotype, 1♂.

Triaenodes taenia new species

This species resembles *dentata* Banks in the general pattern of the genitalia but differs in the longer lateral process and the small, short mesal process of the claspers and the shorter and wider sclerotized bands which arise from the base of the claspers, fig. 93.

Male.—Length 10 mm. Head, body, mouthparts and legs almost straw color and covered with long, yellowish pubescence. Wings tawny, covered with long and fairly dense pubescence which forms a tawny background with poorly defined darker areas covering the basal third of the costal region and the apical fourth of the front wing. Antennae cream color with a narrow brown ring

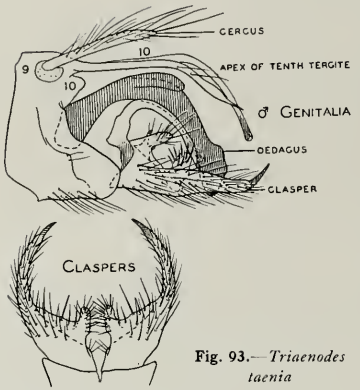

Fig. 93.—*Triaenodes taenia*

at the apex of each segment; these rings diminish in darkness from base to apex until at the tip of the antennae they are scarcely perceptible.

General structure typical for subgenus *Triaenodes*. The basal segment of the antennae is furnished with an ellipsoid, scalelike plate which runs the entire length of the dorso-mesal margin. Wing venation, mouthparts and legs same as for subgenus.

Genitalia as in fig. 93. Tenth tergite cleft, divided into two long, ribbonlike processes which curve ventrad near the middle and follow the outline of the oedagus; the right process is longer than the left and curves to the left at its extreme apex; the left is shorter but curves as much to the right as the right does to the left. Cerci long and fingerlike, clothed with long setae. Claspers with (1) a long arcuate lateral arm whose tip is smooth and sclerotized, the remainder of the arm set with abundant setae; (2) a small mesal projection which is subdivided into two almost equal lobes separated at the base by a distance equal to their length, one basal, the other apical, only the latter visible from a ventral view, both clothed with setae, those on the apical lobe shorter and much stouter; and (3) a curved, almost saberlike process originating from the base of the clasper and following the contours of the oedagus, curving downward and reaching only half the distance to apex of clasper. Oedagus arcuate, semimembranous, with a conspicuous dorsal lobe near middle and with the apex somewhat enlarged.

Holotype, male.—Gatlinburg, Tennessee: June 12, 1935, along Little Pigeon River, H. H. Ross.

Triaenodes tridonta new species

Related to the more primitive members of the genus, this species differs from them in the tridentate tenth tergite, fig. 94.

Male.—Length 10 mm. Head and body chestnut brown, the antennae annulate with narrow bands of brown and wider bands of cream color. Mouth parts and legs shading to straw color; wings uniformly brown, covered with brown pubescence.

Belongs to the subgenus *Triaenodes*, having a scale on the dorso-mesal surface of the basal antennal segment; the scale having a round base, more or less parallel sides and a tapering, rounded apex. Maxillary palpi long and very bushy. Venation and spurs typical for genus.

Genitalia as in fig. 94. Ninth segment very short dorsally and long ventrally. Tenth tergite longer than the claspers or the preanal appendages. The base is somewhat cylindrical, gradually widening to a tridentate apex, the two lateral arms long and sharp, the mesal one short and sharp; the entire structure twisted so that the tridentate condition is not conspicuous from a dorsal view.

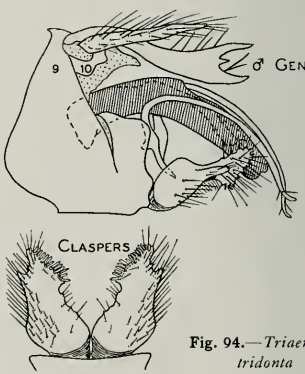

Fig. 94.—*Triaenodes tridonta*

Cerci shorter than tenth tergite, narrow, pointed and clothed with long setae. Claspers short, the base enlarged and bulbous, especially when seen from the side, the apical portion divided into a short, sharp lateral angle and a wider mesal lobe. The lateral half of the clasper is provided with abundant long setae, and the oblique apical margin of the mesal lobe bears a dense row of short, peglike setae. From the base of the clasper arises a long, sclerotized, filamentous process which curves near the base and thence follows the direction of the oedagus; the apical portion of this process is slightly fusiform with the apex narrowed and slightly upturned. The processes of each side are similar in general outline. Oedagus arcuate, the basal portion tubular and the apical portion composed in part of semimembranous folds which are difficult to distinguish.

Holotype, male.—Pushmataha County, Oklahoma: May 28, 1934, C. A. Soeler.

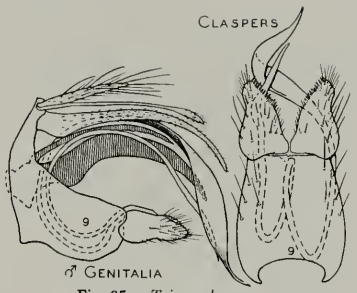

Fig. 95.—*Triaenodes perna*

Triaenodes perna new species

A close relative of *helo* Milne, this species differs in the constricted claspers and the much stronger asymmetry of the ribbonlike processes which arise at their base.

MALE.—Length 9 mm. Color of head, body, antennae, mouthparts and legs same as for *tridonta*. Wings with a fairly well defined pattern as follows: Front wing basad of cord with a nearly parallel-sided, dark brown stripe occupying about one-half of the width of the wing, set off from the anal margin by a narrow, tawny border and from the costal region by a tawny border which is narrow at the base and gradually increases in width to the cord; the area beyond the cord is dark brown, unicolorous with the dark streak on the basal part of the wing, except for the small continuation of the tawny costal part, which tapers off beyond the stigma, and indications of tawny shading along the extreme distal edge of the wing. General structure typical of the subgenus *Triaenodes* with respect to the antennal scale, wing venation, etc.

Genitalia as in fig. 95. Ninth segment very short dorsally, ventral half together with the tenth sternite forming a long, deep projection which is longer than and twice as deep as the claspers. Tenth tergite very slender, slightly clavate at extreme apex. From immediately below the tergite protrudes a semimembranous "tongue" which is broad at base and soon tapers to a whiplike apex. Both the tenth tergite and the "tongue" project almost as far posteriorly as the apex of the claspers. Cerci half length of tenth tergite, narrow, fingerlike and clothed with long setae. Claspers somewhat triangular, the lateral margin indented so that the basolateral corner is somewhat bulbous; the meso-apical margin oblique and with a dense row of short, peglike setae; the ventro-mesal lobe is not developed but is represented only by a low ridge directly dorsad of the area bearing the peglike setae. From the base of the claspers arise the usual ribbonlike bands. They are very long and form an almost complete circle, ending below and beyond the apex of the claspers; the right band has the apical half greatly widened and turned, and has a sharply pointed tip; the left band is slender throughout, slightly thickened a short distance before the apex, scarcely twisted and has a sharp point. Oedagus branched near base, the dorsal branch forming a narrow, tonguelike structure underneath the larger similar structure that arises from under the tenth tergite; the ventral branch bulbous at extreme base, thence arcuate and tapering to a narrow apex.

FEMALE.—Similar in size, color and general characteristics to male, differing chiefly as follows: venter of abdomen

with third and fourth sternites dark brown; fifth, sixth and seventh gradually becoming lighter toward apex; scale at base of first antennal segment absent; external genitalia typical for the genus, provided with a hollowed-out, clasperlike pair of appendages which hide the ovipositor tube.

Holotype, male.—Eichorn, Illinois: June 13, 1934, along Hick's Branch, DeLong & Ross.

Allotype, female.—Same data as for holotype.

Paratype.—Illinois.—Same data as for holotype, 1♀.

Oecetis eddlestoni new species

This species is intermediate between *avara* Banks and *scala* Milne, differing from the former in the long processes of the tenth tergite and from the latter in the reniform claspers, fig. 96.

Male.—Length 10 mm. Color various shades of brown; the flagellum straw color with a dark apical ring on each segment; the palpi dark brown; the wings fairly dark brown with fine, light dots scattered over the membrane, the cord and cubital veins darker than the rest; the abdomen pale with a dark dorsomesal line down each segment.

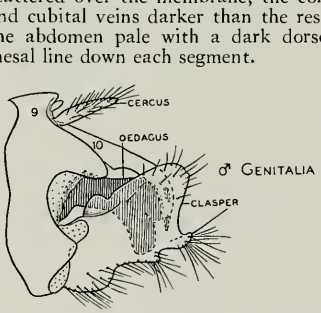

Fig. 96.—*Oecetis eddlestoni*

General characteristics same as for genus. Antennae thrice length of body. Protibiae with only one apical spur. The three "crossveins" forming the cord staggered ladderlike, none interstitial with each other, the posterior one interstitial with $Cu_{1a}+M_{3+4}$.

Genitalia as in fig. 96. Ninth segment with a long, thumblike caudal projection closer to dorsal margin than to ventral. Tenth tergite with a small, submembranous mesal projection at extreme base and with the apex produced into a pair of long, flat, sclerotized arms curving ventrad at base and armed with two spines, one at apex and one just beyond arch of curved portion. Cerci lanceolate, short and covered with sparse but long setae. Claspers rectangular-reniform in general outline, the apical margin with one emargination and the ventral one with two, each emargination bordered by blunt lobes; the apicoventral lobe curved mesad, slightly longer than the others, although this is not apparent from the lateral aspect; each lobe is surmounted by a tuft of setae, those on the dorsal lobe more scattered, shorter and slightly stouter than the others. Oedagus suddenly constricted just above base, the apical portion swollen and bilobed, the ventral lobe hanging much lower than the dorsal one.

Holotype, male.—Sayre, Pennsylvania: July 29, 1937, along Susquehanna River, J. H. Eddleston.

The similarity of this species to both the subgenus *Oecetodes* Ulmer and *Quaria* Milne in regard to wing venation and general characteristics, as well as its intermediate position between the two in regard to genitalia, necessitates the sinking of the subgenus *Quaria* under *Oecetodes*.

Leptocerus oligius new species

This species is very close to *guttata* (Banks) from which it differs in the shape of the tenth tergite, which in *oligius* is broad at base and suddenly narrowed to form a pair of filaments. In *guttata* these processes are long and gradually tapering for their entire length. This is the species illustrated by Betten (1934, plate 36, fig. 10, and plate 37, fig. 1) as *Setodes* sp. 1 from Ogdensburg and Buffalo, New York.

Male.—Length 8 mm. Body creamy; some sutures and veins light brown; eyes black.

General structure same as for genotype; eyes large, occupying most of the lateral view of head capsule, the dorsal length two-thirds the shortest distance between them. Basal segment of each antenna swollen; one and one-half times

as long as wide and no longer than the third antennal segment. Spur formula 0–2–2. Front wings slender, pointed at apex, radial sector three-branched,

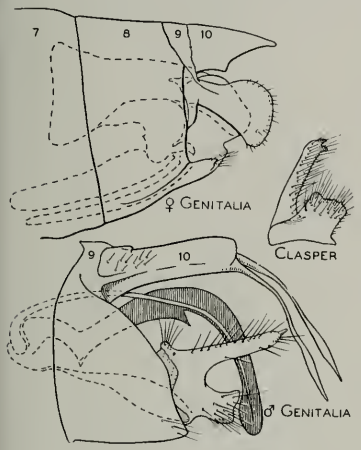

Fig. 97.—*Leptocerus oligius*

media two-branched; hind wings also narrow and pointed, with Cu_1 branched.

Genitalia as in fig. 97. Tenth tergite divided into two processes whose basal two-fifths are broad and contiguous on meson; the apical three-fifths narrow, slender filaments slightly thickened and sinuate before apex, the constriction occurring abruptly. Claspers divided into a ventro-mesal, quadrate lobe slightly emarginate at the apex, and a long, fingerlike, dorso-lateral lobe with a pair of toothlike processes at apex. From the baso-mesal angle of each clasper arises a sclerotized plate joining the base of the oedagus. The entire clasper is clothed with long, fine setae. Oedagus arcuate with basal portion sclerotized and with a sharp ventral process near the height of its arc, the apical portion semimembranous; from each side at base arises a sclerotized filament which curves back to the base of the ninth segment, then curves up and follows oedagus to its apex, the two processes being similar.

FEMALE.—Similar in size, color and general structure to male, differing in characters of the genitalia, fig. 97. Ninth tergite cylindrical and heavily sclerotized. Tenth tergite carinate on meson, broad at base, the apical half tapering to a triangular and pointed apex. Below this on each side is a spatulate, clasperlike process constricted at the base; between these is a moundlike structure formed of two lateral plates open above and fused ventrally. The sternal plate is somewhat produced, its apical margin forming one mesal and two lateral pointed projections. A pair of invaginated, spindlelike structures lie just above the venter and extend halfway into the eighth segment.

Holotype, male.—Wilmington, Illinois: Aug. 20, 1934, along Kankakee River, DeLong & Ross.

Allotype, female.—Same data as for holotype.

Paratypes.—ILLINOIS.—Same data as for holotype, 2♀.

Family PHRYGANEIDAE

Agrypnia dextra new species

Similar to *glacialis*, differing in the apex of the tenth tergite, which has only a single pair of lateral styles, the two being distinctly asymmetrical, the right one the longer and the left one the shorter, fig. 98.

MALE.—Length 19 mm. Light brown to straw color, the pubescence straw color; the eyes are slightly darker.

General structure identical with other members of the genus *Agrypnia s. st.*

Genitalia as in fig. 98. Ninth segment with the ventral half cylindrical, the dorsal half narrowed and forming a short collar across meson; this collar bears tufts of long setae at the apex. Tenth tergite twice as long as wide, the ventral

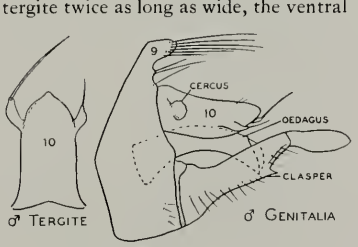

Fig. 98. *Agrypnia dextra*

margin evenly arcuate, the dorsal margin slightly concave and the apex narrowed to a blunt point; just before the apex there arises a pair of submembranous styles which are both slightly fusiform, the right one longer than the left and bearing at its apex a very long, stout seta; the left style is shorter, bears a short seta only one-third the length of seta of the right style, and is not narrowed at apex; near the base of the tergite is a small, submembranous and flaplike preanal appendage. Claspers arcuate and converging apically; from a lateral view the basal segment appears over twice as long as the apical segment and bears an angular projection two-thirds the distance from base (this projection is on the mesal margin and is better seen from the ventral aspect). The apical segment is almost lanceolate and bears tufts of spines pointing basad. Oedagus tubular and evenly but not greatly arcuate; the apical margin oblique, forming a pointed ventro-mesal end.

Holotype, male.—Riverdale, Idaho: May 10, 1935, C. F. Smith & G. F. Knowlton.

Paratype.—Idaho.—Same data as for holotype, 1♂.

Family **LIMNEPHILIDAE**

Apatelia aenicta new species

This species is a very close relative of *A. wallengreni* but differs in the longer mesal process of the ninth tergite and the apical widening of the cerci.

Male.—Length 10 mm. Color of body and appendages black with the following exceptions: apical segments of antennae brownish, sutures of venter, apical and upper portion of femora, most of tibiae and basal portion of tarsi reddish brown; wing membrane dark gray, venation dark brown. The body and wings are clothed with tawny hair.

General characteristics same as for genus in regard to setation and shape of head and thorax. Spur count of tibiae 1–2–4, the spurs relatively short, very sharp and yellow. Front wing with stigmal area half as deep as long, tapered in relation to the remaining surface of the wing and set off sharply at the base by an oblique, weakly sclerotized but convex crossvein. Remainder of venation typical for genus.

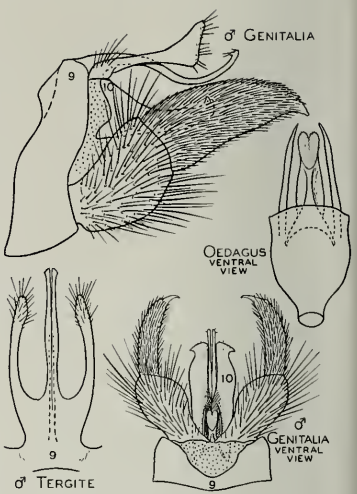

Fig. 99.—*Apatelia aenicta*

Genitalia as in fig. 99. Ninth segment cylindrical, narrow and slightly sinuate from lateral view. Set in the mesal notch is a three pronged appendage composed of a slender, sinuate mesal rod and a pair of lateral rods greatly expanded at the apex in the vertical plane; these lateral appendages are considerably shorter than the mesal rod; each has at its base and apex a tuft of scattered setae. Tenth tergite long and wide, deep at its base but excavated dorsally to form a shallow apical portion which is upturned at the tip; seen from a ventral view the lateral margins of the tenth tergite appear slightly sinuate, then incised near tip to form a relatively sharp lateral point. Claspers very large, the basal segment covered with thick, long setae, the apical segment covered with shorter and denser setae; basal segment shorter than apical segment, only slightly longer than wide; apical segment narrower than basal segment, tapering gradually to a sclerotized and curved point free from setae. Oedagus consists of a large, vasiform base from which extrude a pair of long, sclerotized rods lying one on each side of the apical portion of the oedagus, which is surmounted by a bilobed, cushionlike pad.

Female.—Similar to male in size, color and general structure, differing from male in genitalia. Diagnostic characters have not yet been worked out for females of this genus, but the tapered and wide stigmal area will separate this female from most of its congeners.

Holotype, male.—Churchill, Manitoba: July 2, 1936, H. E. McClure.

Allotype, female.—Same data as for holotype.

Paratypes.—Manitoba.—Same data as for holotype, 1♂; same place as for holotype, July 5, 1936, 1♂, 2♀.

Carborius lyratus new species

This species, fig. 100, differs from *punctatissimus* (Walker), fig. 101, in the short genal spine and different shape of the oedagus and claspers, fig. 100.

Male.—Length 16 mm. Head and thorax light brown; the abdomen, antennae, mouthparts and legs straw color (except the spines on the legs, which are black); the wings light brown, minutely flecked with pale areas over the entire membrane.

General structure, including legs and wing venation, same as for genus. Head with a small genal projection, which is only a third as long as that in the genotype. A large macrochaeta present behind each lateral ocellus. Basitarsi without black spines on ventral side.

Genitalia as in fig. 100. Eighth tergite with apical margin only finely setate, and produced into a mesal process which is slightly wider than long, is shallowly emarginate at apex and has sharp corners and well delineated margins. Ninth and tenth tergites much reduced, represented by a pair of mesal, thumblike processes pointing dorsad, these flanked by a pair of cerci laid back flat against the tergite; caudad of these is a triangular, sclerotized plate, the narrowed apex rounded, the widening base invaginated into the body cavity and articulating with the base of the oedagus. Claspers with a wide, quadrate base, beyond which the clasper narrows and then widens just before apex. Oedagus extrusible; apical portion consisting of a pair of heavy, sclerotized, sinuate rods each bearing four or five stout appressed spines near apex and a central oedagus tube which is slightly dumb-bell-shaped and is surmounted by a lyre-shaped division of the apex.

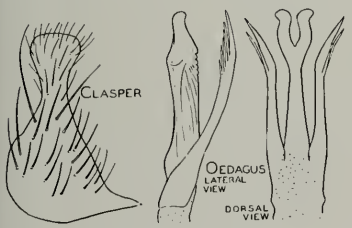

Fig. 100.—*Carborius lyratus*

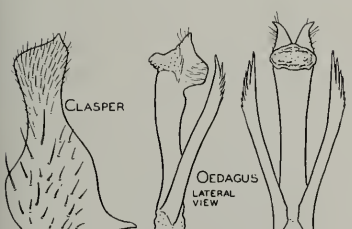

Fig. 101.—*Carborius punctatissimus*

Holotype, male.—Oakwood, Illinois: Sept. 20, 1935, DeLong & Ross.

Paratype.—Pennsylvania.—Columbia Crossroads: July 7, 1931, R. M. Leonard, 1♂.

Glyphopsyche ormiae new species

Close to *ullus* Milne, this species differs in the smaller pads on the eighth tergite and the smaller, thinner and less bulbous apices of the tenth tergite.

Male.—Length 19 mm. Color tawny to yellowish brown except for the following: some black spines and setae (especially those on the legs); a pale, silvery stripe on the front wing down the radial cell and continuing in a straight line through cell R_5 almost to margin of wing; and an almost entirely colorless hind wing.

General structure typical for genus, the form very slender. Shape and setation of head and thorax, and venation of wings, typical for genus. Tibiae with the spur count 1–2–1, the lone spur on the hind tibiae long, sharp and sinuate.

Genitalia as in fig. 102. Eighth tergite with a pair of convex apical pads densely clothed with short, fine, brown setae. Ninth and tenth tergites narrowed on

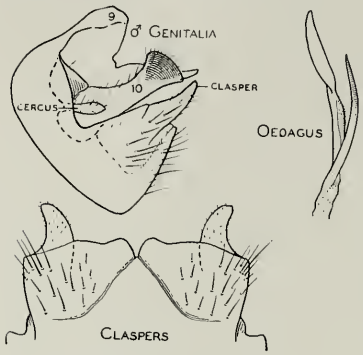

Fig. 102.—*Glyphopsyche ormiae*

meson, mostly submembranous except for the lateral processes of the tenth tergite; these are heavily sclerotized, enlarged and deeply concave at apex to form a pair of spurlike lobes. Cerci very small, situated at base of tenth tergite. Claspers not readily differentiated from apical sternite; they have a broad base with the lateral angle produced into a pointed, fingerlike process curved laterad; the extreme base of the clasper is armed with scattered, long setae; it is set off from the apical sternite by a V-shaped mesal suture which becomes obsolete toward the lateral margin. Oedagus with a pair of sclerotized lateral arms lying beside the central portion; the central portion is divided into two long, submembranous lobes at extreme apex and is provided with a long, narrow cushion of minute spines from the base of these lobes to the base of the sclerite.

Holotype, male.—Smithfield, Utah: Oct. 20, 1936, H. F. Thornley.

Paratypes.—UTAH.—Smithfield: Same data as for holotype, 1 ♂. Logan: Nov. 3, 1934, C. F. Smith, 1 ♂.

Limnephilus acnestus new species

In color and general appearance this species resembles many species hitherto placed in *Colpotaulius*. It differs from them in the combination of small tenth tergite, large cerci and spiny lateral arms of the oedagus.

MALE.—Length 9 mm. Head and body various shades of brown. Wings with a pale, tawny brown color irregularly peppered with darker brown spots, brown sections of veins and dark brown setae. Legs uniformly tawny to light brown, the spurs and setae concolorous, the spines conspicuously black.

General characteristics same as for genus. Dorsum of head with scattered, appressed setae and long, black bristles; the wart in front of the lateral ocellus bears three, and there is one bristle which arises mesad and slightly caudad of the ocellus. Pronotum collarlike, with a fossa between the two halves. Mesonotum slightly flattened, the scutal warts long and bearing a linear row of very long, black bristles arched caudad. Front wings bearing long and erect setae along the veins; the wing is somewhat abbreviated so that the apical cells are short, giving the wing a chopped-off appearance. Front tibia with apical spur,

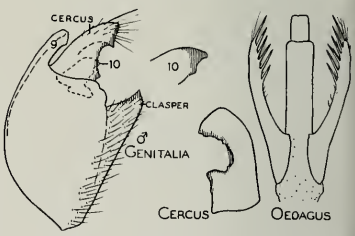

Fig. 103.—*Limnephilus acnestus*

which is very wide at base, triangular and flattened. Front basitarsus subequal in length to next segment of tarsus. Eighth tergite with a long mesal projection overhanging the genitalia; this projection bears a cushion of short, black bristles.

Genitalia as in fig. 103. Ninth segment wide in the middle, suddenly constricted to a very narrow dorsal bridge. Lateral lobes of tenth tergite small and low, the apex of each lobe curved and emarginate to form a pair of low humps. Cerci large, the base broad, the central mesal portion incised so that the apex is

somewhat hoodlike. Claspers broad, their apex forming a sharp, sclerotized point which does not extend above base of cerci; they are covered with moderately long setae and set off from the ninth segment by an obsolescent suture. Apical portion of oedagus tubular, the extreme apex forming a short, narrowed cylinder; lateral arms stout, tapering to a somewhat pointed apex which bears on its dorso-mesal corner a row of six or seven stout spines interspersed with thinner setae.

Holotype, male.—Inyo County, California: May, 1922, O. C. Poling.

Limnephilus keratus new species

In general appearance this species comes closest to members of the *Anabolina* group but differs from all species previously described in having the two horns arise from the base of the tenth tergite.

Male.—Length 17 mm. Color of head, body and appendages various shades of reddish brown. The spines on the tibiae and tarsi are black. Wings a fairly uniform salt-and-pepper mixture of dark brown and straw-colored dots; the brown markings are thickest just below radius 1, cubitus 1 and the anal veins.

General structure same as for subgenus *Anabolina*. Head with one or two bristles mesad and slightly caudad of lateral ocellus, the base of the bristles arising from a wide calyx. The wart in front of the ocellus bears two or three large and a few small bristles. Pronotum with the two warts forming a collar bisected by a fossa on the meson. Mesonotum with scutal warts only moderately long and bearing two large, black bristles and about eight small, pale ones, all arching caudad. Tibiae with spur formula 1–3–4, all the spurs long, pale and pointed. Front basitarsus elongate, one and one-half times the length of the next segment. Front wings wide with the apex evenly rounded. Eighth segment cylindrical with no patches of bristles or produced lobes.

Genitalia as in fig. 104. Ninth segment cylindrical, widened dorsally to form a projection over part of the genital appendages. Just below the apex of the ninth and above the base of the tenth tergite is a very heavily sclerotized structure divided almost to base to form a pair of slightly diverging horns which curve ventrad slightly. Lobes of the tenth tergite composed of deep, thin

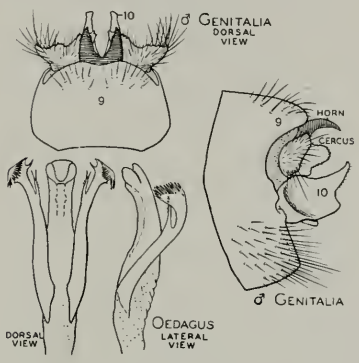

Fig. 104.—*Limnephilus keratus*

plates sunken in the middle to form a wide basal portion situated in the transverse plane and a produced and uppointed apical portion in the longitudinal plane; the apex is indented to form an upturned and a shorter, blunter ventral angle, the dorsal point being armed with a few minute setae. Cerci situated between the base of the lobes of the tenth tergite and the pronged structure; their base is small but their entire dorsal, lateral and mesal margins are expanded into an earlike structure whose edges are heavily sclerotized, irregularly serrate and armed with long setae. Claspers greatly reduced and scarcely differentiated from ninth segment, with no dorsal projection of any description. Apical portion of oedagus wide at base, tapering to a slightly narrower apex, which is semimembranous with a sclerotized fork embedded in the dorsal margin; lateral arms stout, the apex divided into a narrow, pointed dorso-mesal spike beset with a few small spines and an apical, foliaceous and in-curved "palm." This "palm" bears a small projection on each lateral margin just before apex and a picketlike row of setae along the apical margin.

Holotype, male.—Thunder Bay, Ontario: July 1, 1937, H. S. Parish.

Limnephilus merinthus new species

This species is most closely related to the *kincaidi* group but differs in the short and uniformly sclerotized lateral arms of the oedagus.

Male.—Length 8.5 mm. Head and body dark brown to black, the warts reddish brown. Antennae and legs reddish brown suffused slightly with dark brown; the spines of the tibiae and tarsi black. Wings light brown to tawny with irregular, darker brown markings between radial sector and cubitus 1.

General structure typical of the subgenus *Anabolina*. Head long, with a large bristle mesad and slightly caudad of each lateral ocellus, the wart in front of lateral ocellus with one or two large and several small bristles. Pronotum collarlike, the two dorsal warts separated by a fossa. Mesonotum flat, the scutal warts long and wide, containing an abundance of long and short bristles arched caudad. Venation same as for subgenus, the wings somewhat abbreviated so that the apical cells are short. Front basitarsus short and stocky, slightly shorter than succeeding segment. Tibial spur formula 1–3–4, the spur on the front leg black, smooth and angled sharply at extreme apex, the other tibial spurs long, sharp and yellow. Eighth tergite produced on the meson to form an apical lobe extending over genitalia in repose.

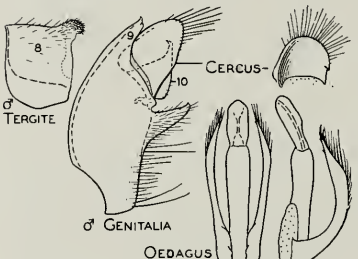

Fig. 105.—*Limnephilus merinthus*

Genitalia as in fig. 105. Ninth segment narrowed to a collar dorsally. Lobes of tenth tergite thin, platelike and with a rounded ventral angle but with the dorsal segment produced into an erect projection recurved at extreme apex. Cerci appear semiovate as seen from lateral view, the apex rounded; seen from the caudal view they appear somewhat auriculate and close together on the meson; the mesal margin is armed with a single stout spur; the apical surface of the cercus is fringed with scattered, long setae. Clasper projecting caudad considerably, its apex turned up slightly, the surface covered with a scattering of medium length setae. Oedagus with apical portion short, the mesal tube cylindrical with a more slender terminal portion; lateral arms entirely sclerotized. Dorsal margin practically smooth; extreme apex divided into two or three heavy spines, the ventral margin having a fringe of setae longest at the apex and gradually diminishing in length toward the base.

Female.—Similar in size, color and general structure to male, differing in the longer front basitarsus, genitalia and other antigenetic characters.

Holotype, male.—Churchill, Manitoba: July 17, 1936, H. E. McClure.

Allotype, female.—Same data as for holotype.

Paratypes.—Manitoba.—Same data as for holotype, 3♂; same place as for holotype, July 10 and July 20, 1936, 2♂.

Limnephilus taloga new species

This species belongs to the section *Colpotaulius* and bears a marked resemblance in the genitalia to *spinatus* Banks. It differs from this species markedly in the shape of the cerci and in the setation of lateral arms of oedagus.

Fig. 106.—*Limnephilus taloga*

Male.—Length 12 mm. Body various shades of brown; the dorsum mottled with dark and light shades; the venter, including the legs, straw color; wings with the membrane straw color, no pattern, the venation a mixture of straw color and brown. Most of the long setae on the head and thorax black, the remainder tawny; the spines on the legs black, the spurs brown; the setae on the veins of the wings black, the remainder of the wing vestiture dark brown to black.

General characteristics typical of the genus *Limnephilus*. The lateral ocellus has a wart just in front of it bearing two very long, black macrochaetae and has one small and one large macrochaeta just meso-caudad of ocellus. Scutal wart of the mesonotum very long, the anterior setae the shorter, the posterior ones the longer, all curved caudad. Front femur with a band of black spinulae beneath; the tibia with a companion band of black spinulae; the basitarsus short, flared at apex and only one-third the length of the succeeding segment. Wing venation typical for genus, the veins supplied with regularly placed and abundant long setae, more erect and markedly longer than the hairs of the membrane.

Genitalia as in fig. 106. Eighth without cushions of setae and with only two or three sparse rows of setae across the segment. Tenth tergite with the median area low and inconspicuous; the lateral processes broad at base, narrowed and up-turned at the apex to form almost needlelike structures which appear divergent when seen from a caudal view. Cerci almost twice as high as width at base, both margins evenly curved, the mesal aspect with a single long, sharp spinous process near the dorso-caudal angle; seen from above, the cerci are separated at their base for a distance almost equal to their length. Claspers long and pointed, set off at the base by a faint suture. Apical extensile portion of oedagus with the central portion typical of genus, the lateral arms diagnostic, having the base broad and armed with three strong dorsal spines, the apical portion narrowed gradually to a sharp point which may have a slight division near its apex. All parts of the genital capsule are yellowish with the exception of the following: the setae, the lateral processes of the tenth tergite and the mesal spines of the cerci, which are black; the lateral arms of the oedagus, which are a darker brown than the remainder of the structure.

Female.—Length 13.5 mm. Similar in color and general structure to male, except for the usual antigeny. No characters have been discovered which will separate the females of the closely related form of this genus.

Holotype, male.—Taloga, Oklahoma: June 6, 1937, Standish & Kaiser.

Allotype, female.—Same data as for holotype.

Paratypes.—Oklahoma.—Taloga: Same data as for holotype, 1♀.

Utah.—Indian Writings (near Logan): Sept. 11, 1937, San Rafael Road, at light, W. P. Nye, 1♂, 1♀.

Limnephilus thorus new species

Closely related to *externus* Hagen, this species differs in the larger clasper, the sharper dorsal angle of the cerci and the less ornamented lateral arms of the oedagus.

Male.—Length 18 mm. Body brown with the eyes black and the wings shading to yellowish; there is no pattern on the wings except a slight shading from light to dark at various places.

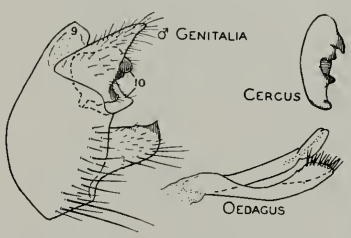

Fig. 107. *Limnephilus thorus*

General structure: Macrochaetae of head inconspicuous because they are fairly short and the same color as the head. Front tarsus with basal segments one-quarter longer than second, neither the tarsus nor tibia with areas of black spines underneath. Wings extending beyond apex of abdomen, three and

three-fourths times as long as wide; venation typical for genus. Eighth tergite with patch of black setae at apex.

Genitalia as in fig. 107, with appendages short. Ninth segment reduced to a narrow collar on the dorsum. Tenth tergite short and stocky, its apical margin produced into a dorsal knob and a ventral point which juts out beyond the base of the cerci. Cerci triangular, the apex angular; the caudal margin with two projections on ventral portion visible from the side and with four toothlike processes visible from caudal view. Clasper short and stocky, its extreme apex turned up into a small, sharp dorsal point. The setae on the entire genital capsule are scattered. The apico-dorsal knob of the tenth tergite and the apical, mesal, toothlike processes of the cerci are heavily sclerotized. Oedagus with central portion tubular, the extreme apex constricted at its base; lateral arms as long as the mesal portion, wider at base than in middle and slightly enlarged in apex; the mesal margin of the apex is armed with a row of short setae.

Holotype, male.—Blue Creek, Utah: Aug. 28, 1934, C. F. Smith.

Neophylax oligius new species

This species resembles *autumnus* Vorhies in size and general appearance, but differs from it in the genitalia of the male, in particular the claspers with their short, sharp mesal point and unrecurved lateral corner, fig. 108.

Male.—Length 11 mm. Body, antennae and legs light brown, the pubescence light brown and the spines on the legs dark brown to black; front wings with the ground color brown, darker than the body, and with lighter brown areas forming an irrorate pattern on the distal two-thirds of the wing and a narrow band covering most of the area caudad of vein Cu_2; hind wings uniform color, lighter than front wings.

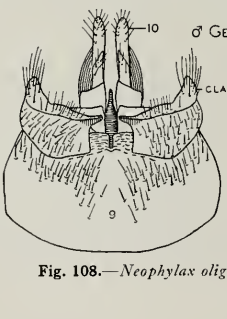

Fig. 108.—*Neophylax oligius*

General characteristics typical for genus, with diagnostic characters apparently restricted to the genitalia of the male. Wing venation, ocelli and legs normal; the head with the small wart just behind lateral ocelli.

Genitalia as in fig. 108. Tenth tergite long, divided into a dorsal, robust branch rounded at apex and a ventral branch which is slender and slightly truncate at apex. Apparent ninth sternite with an apico-dorsal lobe which appears triangular viewed laterally, straplike viewed caudally, and which joins the oedagus assemblage on the meson; the remainder of the sternite is hemicylindrical. Clasper short, produced into a short, sclerotized mesal point and an erect lateral point which is apparent chiefly from the side; the entire clasper, except the mesal point, is covered with scattered setae. Between the claspers is a pair of small, sclerotized, quadrate plates which are striate. The internal portion of the oedagus is tubular; from this juts a smaller, tapering tube.

Female.—Length 12 mm. Color and general structure same as in male. The female genitalia are very simple and to date no good morphological differences have been discovered which will separate the females of this genus.

Holotype, male.—Merriweather, Michigan: Aug. 23, 1937, H. H. Ross.

Allotype, female.—Same data as for holotype.

Paratypes. — Michigan. — Merriweather: Same data as for holotype, 3♂, 3♀. Honor: Aug. 24, 1936, in Platte River, C. O. Mohr, 1♂, 1♀, taken from cocoon.

Wisconsin.—Sayner: Aug. 25, 1937, in Plum Creek, H. H. Ross, 3♂, 1♀, taken from cocoon.

Neophylax ayanus new species

This species is distinguished from previously described members of the genus by its somber coloring and the elongate claspers.

Male.—Length 11 mm. Head, body and wings dark brown, the wings in-

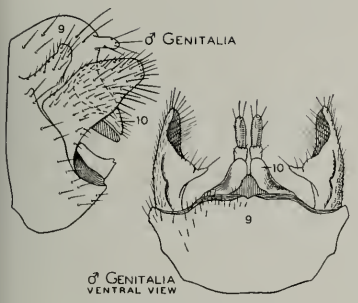

Fig. 109.—*Neophylax ayanus*

conspicuously flecked with luterous markings in the membrane which are somewhat obscured by the tawny hair that covers the entire wing. Antennae and legs pale yellow, the spines of the tibiae and tarsi black.

General structure as described for preceding species.

Genitalia as in fig. 109. Tenth tergite with the basal portion rounded and humplike, the apex attenuated into a beaklike structure following the line of the oedagus; the apparent cerci form a pair of clavate knobs above the base of the beak. Claspers twice as long as wide, the lateral margin convex, the inner margin concave and with a cup-like mesal process arising near middle; the margins and lateral surface are covered with a scattering of long and medium length setae. Apical portion of oedagus beaklike, extending under the beak of the tenth tergite. Ninth sternite with the apical margin produced to form a pair of wide mesal lobes, surmounted by a pointed projection on the meson; this mesal projection is the hump in the center of a caudo-mesal sclerite set at right angles to the ninth sternite.

FEMALE.—Similar in size, color and general structure to male. The characters of the female genitalia have not yet been worked out in this genus, so that for the present the female can be distinguished only by the color.

Holotype, male. — Louisville, Kentucky: Oct. 8, 1937, Bear Grass Creek, Ross & Burks.

Allotype, female.—Same data as for holotype.

Paratypes.—KENTUCKY.—Same data as for holotype, 6♂, 3♀.

INDIANA.—Cataract: Sept. 24, 1937, Mill Creek near Cataract Falls, Frison & Ross, 1♂, 1♀.

Neophylax stolus new species

A close relative of *ayanus*, this species differs from it in the narrow projection of the ninth sternite and in the twisted condition of the clasper.

MALE.—Similar in size, color and general structure to *ayanus*. Genitalia, fig. 110, similar in general to *ayanus* but with the following differences: Beak of tenth tergite and that of oedagus more slender and slightly longer, seen from lateral view. Claspers slightly shorter, with the dorsal margin evenly convex and with the apical portion twisted so that only a triangle at the base is in full lateral view; the oblique apical portion forms a hoodlike apex; from ventral view the clasper appears concave; it has a shelflike plate across it two-thirds the distance from the base; the apical margins of the clasper bear several long setae, the basal portion shorter setae.

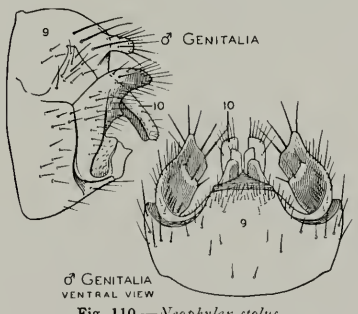

Fig. 110.—*Neophylax stolus*

Ninth sternite excavated on the sides to form a prolonged mesal lobe, at the apex of which is a heavily sclerotized, declivous plate ending in a sharp mesal point.

Holotype, male.—Monterey, Virginia: Sept. 28, 1936, T. H. Frison.

Platycentropus plectrus new species

This species is easily distinguished from *indistinctus* Walker by the lateral, hornlike angles of the ninth tergite.

MALE.—Length 16.5 mm. Dorsum of head and body dark brown to blackish

with the warts brownish yellow; entire venter, antennae, legs and mouthparts yellow; the spines on the tibiae and tarsi black. Wings almost entirely brownish yellow with the following darker marks: a light brown streak running from base

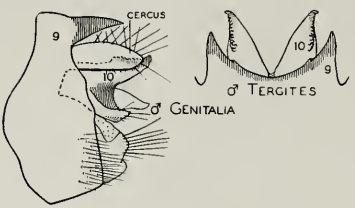

Fig. 111.—*Platycentropus plectrus*

of media along stem of media, M_{3+4} and cubitus 1, a lighter brown band in the postanal field and a dark brown band filling all but the central portion of cell R_5.

Structure typical for genus. Head with a long bristle mesad and slightly caudad of lateral ocellus. Mesonotum with scutal wart triangular, the anterior portion forming a sharp angle and the wart bearing only medium sized, luteous bristles. Front basitarsus long and slender, almost twice length of next segment. Tibial spur formula 1–3–3. Eighth tergite simple, without prolongations or patches of small bristles.

Male genitalia as in fig. 111. Ninth tergite mostly cylindrical but with the dorsum flattened slightly, produced laterally and incised dorsally to form a pair of dark, heavily sclerotized, sharp projections which overhang the genitalia. Lobes of tenth tergite with a broad base and a platelike mesal extension; this latter has the apico-ventral margin rounded, the apex up-turned and the apico-dorsal margin slightly raised, moderately serrate and very heavily sclerotized; the basal portion of the lobe is furnished with a few short bristles. Cerci obovate, the dorsal margin evenly convex and bearing numerous long setae. Claspers small, distinctly set off from the ninth segment and with a cushion of long setae on the small knob which forms the apex. Oedagus with the apical portion consisting of a very large central tube and a pair of much shorter lateral arms which are flat, thin and with the apex divided into a number of small, uneven points.

Holotype, male.—Honor, Michigan: Sept. 16, 1936, along Platte River, Ross & Burks.

Paratype.—Wisconsin.—Prairie du Lac, 1♂ (Museum of Comparative Zoology collection).

Family **SERICOSTOMATIDAE**

Notidobia pele new species

Running closest to *assimilis* Banks, this species differs from it in having no hook at the apex of the clasper; instead it has a plate situated on the mesal margin.

Male.—Length 12 mm. Color light brown mixed with irregular areas of a lighter shade; the costal and apical cells

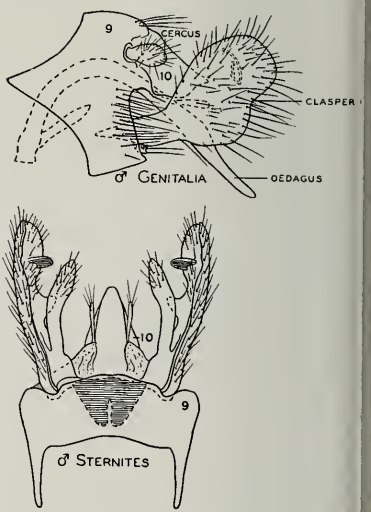

Fig. 112.—*Notidobia pele*

of the wings even paler except for a narrow area adjacent to the veins.

Structure typical for genus. Eyes set with dark setae. First antennal segment very short, as wide at base as length. Eyes large, separated anteriorly for a distance equal to the greatest dorsal length of the eyes. Maxillary palpi very short and closely appressed to face, the

apical segment short and submembranous, the first and second very closely united, twice as long as the third and with a membranous mesal filament extending almost the entire length of the combined two segments. Spur formula 2–2–4.

Genitalia as in fig. 112. Sternites without processes. Ninth segment with lateral pointed extensions reaching into the eighth segment. Tenth tergite appearing somewhat triangular viewed from above, narrowed to a subacute tip which is slightly depressed as seen from side; from the baso-lateral corners extend a pair of slender semisclerotized styles which reach almost to the apex of the tergite. Cerci short, obovate and flaplike, covered with sparse setae. Claspers with base quite narrow, apical portion enlarged and reniform, the disto-ventral margin emarginate, the mesal margin with a long, clavate process extending up from base and a small, platelike projection at right angles to the clasper, one-fourth the distance from the apex; in addition, the dorsal margin near middle has a short, blunt mesal projection. The lateral aspect of the clasper, except at base, is covered with a scattering of long and very coarse setae. Oedagus bowed, the extreme base slightly enlarged and with a fingerlike process, the apical portion slightly enlarged and then excavated dorsally to form a narrowed and very slightly upturned apex.

Holotype, male.—Smokemont, North Carolina: June 14, 1935, H. H. Ross.

Paratype.—North Carolina.—Same data as for holotype, 1 ♂.

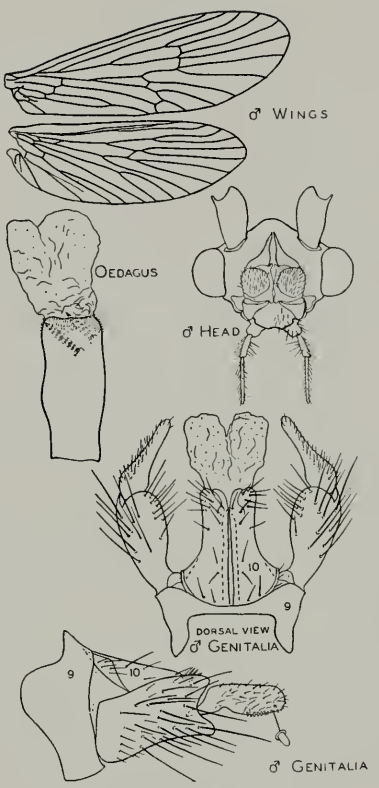

Fig. 113.—*Goerita semata*

Goerita new genus

This genus differs from the Brachycentrinae in having four spurs on the hind tibiae; from the Lepidostomatinae in having the spurs short and grouped close together toward the apex of the tibia; from the Helicopsychinae in having the hind wings broad at base; from the Sericostomatinae in having the eyes smooth and not hairy. From the Goerinae, to which it is most closely related, this genus can be distinguished by the maxillary palpus of the male, which has a quadrate second segment, and by the high crown of the head in the female, fig. 113.

Characteristics: Maxillary palpi of male three-segmented, the first segment widening to apex, the second quadrate, the third membranous and tapering to a thin filament; the two palpi held up together in front of the face to form a short mask. First antennal segment only as long as greatest length of eye; cylindrical. Eyes small, separated by almost twice their length in both sexes. Wing formation typical for generalized members of the subfamily. Both eyes ovate, relatively broad at base and blunt at apex, with most of the hypothetical veins and crossveins present. Male claspers distinctly two-segmented.

Genotype.—*Goerita semata* new species (original designation).

Goerita semata new species

Male.—Length 6 mm. Body light brown; the membranous areas white; the dorsum of the abdomen purple; the first antennal segment and legs below coxae straw color; the wings uniformly light brown with light brown pubescence. General structure as given for genus.

Genitalia as in fig. 113. Abdomen without ventral ornamentation. Ninth segment very narrow dorsally, forming across the meson a thin, sclerotized bridge. Tenth tergite formed of a pair of fairly wide lateral plates, practically touching on meson, wide and arcuate at base, the apical half with sides subparallel, the apex divided into two rounded lobes, the lateral lobe slightly overlapping the mesal lobe; the entire structure with only scattered long setae clustered chiefly at apex and along meson. Claspers, viewed from above, with basal segment swollen at apex and apical segment swollen at base. Seen from the lateral view, the basal segment appears almost rectangular; it appears slightly concave when viewed ventrally. It is incised at the apex to form a hollow bearing the apical segment, which is constricted just beyond base to form an apical, sausagelike portion having on its ventral surface a row of rounded, fat, peglike setae. Oedagus tubular, with an apical fringe of very fine setae; in prepared specimens there protrudes from the apex a large, membranous fold and within the oedagus can be seen two stout spines.

Female.—Similar in size, color and general structure to male, except for antigeny. Maxillary palpi longer than width of front between eyes. Eighth sternite crescentic; ninth forming a concave sinuate pad fitting within the crescent. For purposes of diagnosis the shape of the head is most important.

Holotype, male.—Newfound Gap, North Carolina: June 13, 1935, H. H. Ross.

Allotype, female.—Same data as for holotype.

Paratypes.—North Carolina.—Same data as for holotype, 14♂, 49.

Goera stylata new species

This species is readily distinguished from others in the genus by the distomesal processes of the claspers and the extremely long styles of the tenth tergite.

Male.—Length 9 mm. Color a medium dark shade of brown, with the following exceptions: membranous areas white; warts, labial palpi and legs beyond femora straw color; maxillary

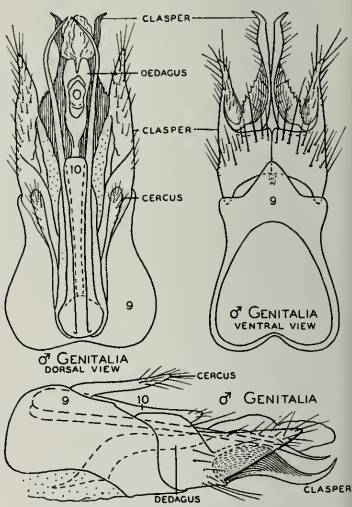

Fig. 114.—*Goera stylata*

palpi white with a black line along the ventro-mesal edge; pubescence brown throughout. General structure typical for genus.

Genitalia as in fig. 114. Sternites 6 and 7 with a row of six or seven erect yellow spines, those on the sixth sternite slightly longer. Ninth segment seen from lateral view appears twisted into an oblique position, the ventral margin pushed twice its own length caudad of the dorsal margin. Tenth tergite, arising far back in a fold of the ninth, consists of a narrow central style reaching midway to apex of genitalia and a

pair of long, sclerotized styles which arise under and laterad of the central style and proceed as far caudad as the rest of the genital capsule; these sclerotized styles diverge slightly from near the base to almost the apex but at this latter point curve mesad and almost touch at extreme apex. Cerci long and slender, clavate, bearing at their apex a cluster of scattered setae and reaching not quite so far caudad as the middle lobe of the tenth tergite. Claspers complicated, the basal portion embracing a large proportion of the segment, the two claspers truncate and approximate on the venter; the apex is divided into two lobes, a triangular, lateral lobe set with long, scattered setae and a very heavy, dark, sclerotized mesal lobe which is sigmoidal from lateral view, broad at base and tapering to apex, and which from a ventral view curves into meson, where it touches the mesal processes of the other clasper. The two processes proceed distad with only slight divergences until close to the apex, where they are angled laterad to form a short point. The dorsal margin of the mesal process is produced into a thin, serrate ledge. Oedagus with the basal portion tubular and sinuate, constricted just beyond middle and expanded into an apical bulb which is three times as long as wide, is constricted in the middle and bears at the apex an ovate mass of membranous folds.

Holotype, male.—Lovells, Michigan: May 24, 1936, north branch Au Sable River near town, J. W. Leonard.

Theliopsyche epilone new species

Closely related to *parva* Banks, this species differs from it in the longer process of the clasper, fig. 115.

Male.—Length 6 mm. Body dark brown with the membranous areas and legs below coxae lighter brown to straw color. Pubescence dark brown.

General structure: Maxillary palpi cylindrical, the apical segment slightly longer than the preapical and clothed with abundant, very long setae, the ventral setae forming a fairly thick brush. First antennal segment long and cylindrical, slightly longer than half width of head. Wing venation and spur count typical for genus.

Genitalia as in fig. 115. Seventh sternite with a broad, ligulate mesal tongue, typical of genus. Ninth segment oblique, the apico-ventral margin truncate with a slight incision on the meson

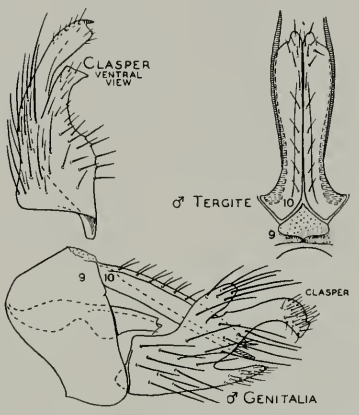

Fig. 115.—*Theliopsyche epilone*

and situated very much caudad of the dorsal portion of the segment. Tenth tergite long, set into a mesal angulation of the ninth, consisting of (1) a pair of long, sclerotized, sinuate rods which arise at the baso-lateral corner of the tergite and follow the outline of the mesal sclerite and (2) a mesal pair of wider, thinner plates which are appressed on the meson to form a rooflike structure, which end on a rounded lateral corner and a short, round mesal projection and which bear scattered setae along meson. Claspers with a wide base, produced into three apical processes: (1) a short, truncate ventral one which curves mesad and which has the mesal corner pointed (2) a short, thumblike dorsal one which is about the same length as the ventral one and (3) a lateral one, representing the body of the clasper, which curves mesad and ends in a very short, sharp spur; the base of the clasper is covered with a scattering of long setae, as is the dorsal lobe also, but the lateral and ventral lobes bear only a few short setae on the apical half. Oedagus submembranous; situated beneath rooflike tenth tergite.

Holotype, male.—Newfound Gap, North Carolina: June 13, 1935, along Little Pigeon River, H. H. Ross.

Paratypes.—NORTH CAROLINA.—Same data as for holotype, 3♂.

Aopsyche new subgenus

This subgenus is very closely related to *Theliopsyche* as evidenced by the similar type of distinctive genitalia and the tonguelike process on the seventh sternite. It differs from that genus, however, in the different shape of the maxillary palpi, fig. 116, and the peculiar venation featuring a very wide subcostal cell and crowded branches of radial sector.

Characteristics: Structure typical of Lepidostomatinae. First antennal segment almost as long as width of head. Maxillary palpi long, the second segment slender at base, widened toward apex, and the inner apical side bearing a brush of dense, dark setae; apical segment slender, tapering to apex, bearing only a few long setae on inner side. Front wing without scales; venation as in fig. 116. Costa thick to juncture with subcosta, which is close to costa and faint; subcostal cell wide; branches of radial sector crowded together and close to R_1; media with three branches. Hind wing with costa and subcosta indistinguishable, radius with four branches, media with two and cubitus 1 with two; all are weak except the strong veins R_1 and Cu_1. Spurs 2–4–4. Seventh sternite of abdomen with a tonguelike projection extending from the incised apical margin. Eighth sternite reduced to a narrow, sclerotized band.

Genotype.—*Theliopsyche corona* new species (original designation).

Theliopsyche corona new species

MALE.—Length 6 mm. Color blackish brown with the wings and legs lighter than the other parts. General structure given under description of the genus.

Genitalia as in fig. 116. Tenth tergite consists of a pair of raised plates, each of which gives rise to a lateral, elongate, spinous process extending almost to the apex of the claspers. Claspers consisting of several parts: a broad base, a large dorsal knob which is more or less thumb-

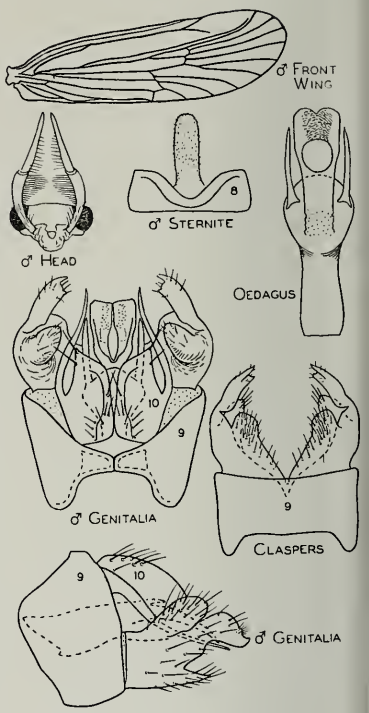

Fig. 116.—*Theliopsyche corona*

shaped, a ventral projection which is slightly truncate at apex and a lateral, fingerlike appendage which bears a small outer tooth at extreme apex, flanked by several small setae. Oedagus large, composed of a tubular base which merges into an oval area bearing a pair of lateral, spinous processes and a submembranous, mesal appendage; this latter has a circular opening on the ventral side, above which the oedagus is divided along the meson.

Holotype, male.—Gatlinburg, Tennessee: May 27, 1934, along branch of Little Pigeon River, T. H. Frison.

Lepidostoma Rambur

A study of the females of the Lepidostomatinae shows that many of the genera, such as *Lepidostoma*, *Nosopus*

and *Olemira*, are set apart as genera only on secondary sexual characters. A detailed study of the genitalia shows that, in many cases, past divisions have cut across phylogenetic lines. It seems advisable at the present time to group the species of this complex under the one genus *Lepidostoma*. There is no doubt but that a great deal of investigation will be needed to establish even a semipermanent generic organization of the subfamily, and it seems to me that until this takes recognition of the females it will not be at all satisfactory.

Lepidostoma knowltoni new species

This species is closest to the *togatum* group but differs in the combination of unreflexed costa in the front wing with a very twisted and abnormal first antennal segment, fig. 117.

Male.—Length 10 mm. Body light brown with the eyes, first antennal segment and dorsum of thorax darker brown.

General structure: Basal antennal segments contorted, excavated and twisted as in fig. 117, bearing at the base a short dorsal process pointed dorsomesad, beyond this another similar one on the mesal margin pointing mesad and between these on the ventral margin another process which is pointed and continues as a thick brush of stout setae, the entire structure curving mesodorsad and ending on a level with the dorsal margin of the segment. Beyond this the segment is dorso-ventrally compressed, then widened again at apex. Maxillary palpi with a stout brush of scales issuing from the apex; in both specimens examined this brush is opened up to form an almost globular mass which hides the structure of the palpus. Legs and wings normal for genus. Both wings with a sparse scattering of scales over most of the wing but without the costal margin reflexed.

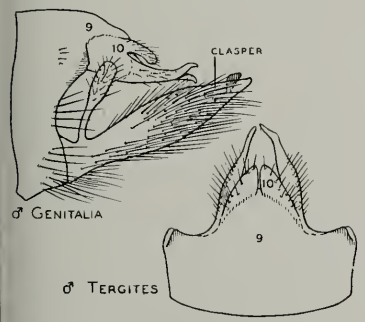

Fig. 117.—*Lepidostoma knowltoni*

Genitalia as in fig. 117. Ninth tergite produced caudad on meson, merging imperceptibly with the tenth tergite. Tenth tergite represented by two rather distinct parts: (1) a pair of dorsal, mesally appressed lobes with a scattering of fine setae and (2) a pair of lateral appendages joined at their base to the dorsal pair, converging toward the tip and angled dorsad at the tip; the basal portion is fairly stocky, clothed with numerous long setae; the apical portion is smooth and more heavily sclerotized; this pair of processes is almost twice the length of the dorsal pair. Claspers fairly long and narrow, the base with a long, thin and clavate dorsal appendage and a short, wide, hooklike process on the ventro-mesal edge (seen from ventral view). The apex is abruptly tapered to a triangular point, beneath which is a short, smooth projection. The entire ventral aspect of the clasper bears a dense mat of long setae. Oedagus is tubular and forms a semicircular arc.

Holotype, male.—Clinton, Utah: June 21, 1936, G. F. Knowlton.

Paratype.—Utah.—Same data as for holotype, 1 ♂.

Lepidostoma pleca new species

Closely related to *bryanti*, this species differs in the depressed and pointed apex of the tenth tergite and the bristle-filled cavities on the first antennal segment.

Male.—Length 9 mm. Color dark brown with the following exceptions: pubescence on maxillary palpi mostly white; bristles on the first antennal segment a mixture of black, brown and white; legs below coxae light brown; wing membrane almost colorless with a sparse covering of light brown hair and irregular patches of black scales on front wing and a fairly thick, uniform scattering of black scales on the hind wing.

General structure as follows: Maxillary palpi with apical segment long and cleft, clothed ventrally with long, whitish hair and dorsally with a long brush of long, slender scales. First antennal segment twisted and compressed, the lateral margin deeply excavated for almost its entire length, the cavity so formed filled with a dense brush of

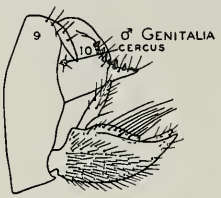

Fig. 118.—*Lepidostoma pleca*

bristles; ventro-mesal margin produced into an arcuate, flat appendage, usually hidden by a lateral brush of bristles. Tibial spurs numbering 2–4–4. Wing venation typical of group, the costal margin reflexed at base for one-tenth the distance to stigmal region, the pocket thus formed filled with scales.

Genitalia as in fig. 118. Ninth segment annular, its meso-dorsal margin indented to receive the tenth tergite. Tenth tergite divided down the meson for its entire length but with an open V fissure for only half its length; the resultant lobes broad at base with the ventral margin almost straight and the dorsal margin S-shaped, resulting in a quadrantlike base and a narrow fingerlike apex; the apical half of this S-shaped upper margin set with a row of irregular, toothlike spines. Clasper extends one-third its length beyond apex of tenth tergite. From the meso-dorsal angle of the base arises a fingerlike process which proceeds at a wide angle to the clasper. Near the base is a second small, fingerlike process appressed to the dorsal margin, and near the apex is a third flat process which (from lateral view) seems to lie behind and to extend slightly dorsad of the pointed apex of the clasper. From a ventral view the clasper appears arcuate, with both mesal and lateral margins evenly curved. Oedagus tubular and arcuate with a pair of dorsal, fingerlike processes arising near base and following contour of oedagus almost to apex.

Holotype, male.—Ingles Creek (near Bluett Pass), Washington: July 10, 1936, H. H. Ross.

Lepidostoma quercina new species

This species is close to *podager* McL. but differs in having the front legs normal. In *podager*, the first segment of the tarsus is abnormally developed and dilated, twice the length of the tibia.

Male.—Length 10 mm. Body brown with the eyes almost black, the membranous areas white, the venter of the abdomen and legs below coxae lighter brown than the sclerotized portions of the head and thorax; wings light brown, the veins slightly darker than the membrane, surface covered with brown setae but without patches of white scales.

General structure: Basal segment of antenna subequal in length to greatest length of eye, only slightly swollen.

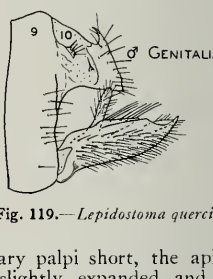

Fig. 119.—*Lepidostoma quercina*

Maxillary palpi short, the apical segment slightly expanded and covered with a dense brush of white setae. Front basitarsus one-fourth shorter than front tibia and not quite twice length of second tarsal segment. Spur formula of tibiae 2–4–4, the spurs long, straight and pointed. Front wing obovate, the front margin not reflexed and the venation typical of the genus. Cells C, Sc and R_1 subequal in width. Hind wing typical for genus.

Genitalia as in fig. 119. Ninth tergite annular. Tenth tergite with base submembranous and apex divided into two sclerotized lateral plates. Seen from the lateral view, each of these appears to have a fairly straight ventral margin, a slightly irregular, oblique caudal margin; the dorsal angle produced into a long, sharp, recurved point and the lateral

margin near base having a pointed hump that bears a seta, this hump being more conspicuous from the dorsal aspect. Basad of this is a small, shelflike projection (probably the cercus) bearing several conspicuous setae. Claspers extending considerably beyond apex of tenth tergite. From the main body of each clasper arise three, straight, fingerlike processes: a short one arising just within apex and extending not quite to apex; a meso-dorsal one arising about one-third distance from base and running in the same longitudinal plane as the clasper and from a lateral view having the dorsal margin just visible above the dorsal margin of the clasper; and a third arising on the mesal margin near base and diverging dorsally at close to a right angle to the body of the clasper. The body of the clasper itself has a convex ventral margin; the dorsal margin is excavated near apex to form an apical point; from ventral view the clasper appears arcuate, the two claspers converging toward apex. Oedagus tubular and bearing two dorsal plates which lie above it; these plates are very thin, wide at base, tapering gradually to a sharp point, and follow the outline of the oedagus.

Holotype, male.—Corvallis, Oregon: April 2, 1935, Oak Creek.

The male genitalia of this species are practically exact for *Nosopus podager* McL. but the legs and mouthparts are quite normal. Considering the close relationship of these two, expressed by similarity in male genitalia, it is obvious that the genus *Nosopus* is not really a distinct unit from many species which I am placing in *Lepidostoma*.

Lepidostoma strophis new species

This species is closest in most respects to *modesta*, differing in the short tenth tergite and other details of the genitalia, fig. 120.

Male.—Length 8 mm. Color similar to *quercina*. General structure also similar to *quercina* with the following differences: maxillary palpi held close together for their entire length, forming a spatulate mask which when held up to face reaches to the apex of the first antennal segment.

Genitalia as in fig. 120. Ninth segment annular. Tenth tergite divided as far as its length by a wide V-shaped cleft, the apical process thus formed appearing triangular from dorsal aspect and arcuate dorsally from a lateral aspect; the extreme apex is slightly produced into a short stub which diverges slightly laterad and bears a cluster of small setae. The area basad of this stubby apex bears only a few scattered

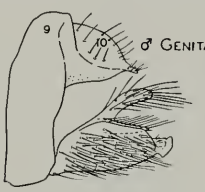

Fig. 120.—*Lepidostoma strophis*

setae. Claspers extend somewhat beyond apex of tenth tergite; they are broadest near middle and the apex is surmounted by a thin, spatulate plate which bears no conspicuous setae; near the base of the clasper there arise two dorsal processes, one is fusiform and thumblike and curves dorso-caudad, the other is pointed and runs along partly hidden for its entire length by the latero-dorsal edge of the clasper. Each clasper has its ventral margin so densely clothed with setae that they form a brush.

Holotype, male.—Beulah, Michigan: Sept. 16, 1936, Ross & Burks.

Paratypes.—British Columbia.—Cultus Lake: June 5, 1927, H. H. Ross, 2♂.

Michigan.—Same data as for holotype, 1♂.

Amiocentrus new subgenus

Characteristics: Venation as in *Brachycentrus*, with the apex of vein radius bowed in the front wing. Maxillary palpi, fig. 121, very short, failing to reach the ventral margin of the antenna, the first and second segments sufficiently coalesced to obscure completely the dividing suture; the apical segment very short and pointed at the apex, the outer face of the entire palpus clothed with long, shaggy hair. Tibial spur count 2–2–2; structure otherwise typical of *Brachycentrus*.

Genotype.—*Brachycentrus aspilus* new species (by original designation).

Brachycentrus aspilus new species

Male.—Length 9 mm. Color mostly dark brown with the sutures and membranous areas whitish, the legs upon the femora light brown to straw color, the wing membrane light brown, the venation darker. General structure as described for subgenus.

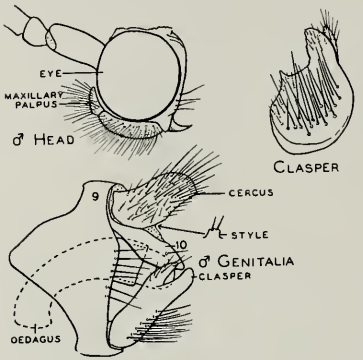

Fig. 121.—*Brachycentrus aspilus*

Genitalia as in fig. 121. Ninth segment very narrow dorsally and ventrally, but with large lateral expansions which underlie the eighth segment. Tenth tergite membranous with the lateral margins and apex sclerotized, divided down the meson from apex to base of sclerosis; just basad of this point are a pair of small, flabby tubercles bearing two to three setae. Cerci short, with all corners rounded, the short mesal margin closely appressed, the dorsal surface clothed with a mixture of long and short setae. Claspers with a broad basal portion and a pair of lateral lobes; seen from ventral view the base appears ovate with a meso-apical, sharp point, the disc bearing a pad of long, dense setae, the ventral lobe sclerotized with only a few minute setae and the dorsal lobe membranous with a scattering of medium setae. Oedagus arcuate, tubular. The apical fifth rounded and semimembranous.

Female.—Size, color and general structure similar to those of male except for antigeny. Genitalia apparently identical with other members of the genus.

Holotype, male.—Pinedale, Wyoming: July 6, 1936, along Green River north of town, H. H. Ross.

Allotype, female.—Logan, Utah: July 31, 1937, at light, K. Nye.

Paratypes.—Montana.—Ennis: July 8, 1936, along Madison River, H. H. Ross, 1 ♂.

Utah.—Same data as for allotype, 1 ♂, 1 ♀.

This species resembles many forms of *Brachycentrus s. st.* in the approximate cerci, shape of the oedagus and the short maxillary palpi. On the basis of key characters, notably tibial spurs, the species would key out to *Micrasema* but this similarity is only superficial.

Micrasema wataga new species

Closely related to both *rusticum* (Hagen) and *charonis* Banks, this species differs from both in the long pair of setiferous tubercles on the tenth tergite (these are very short and stubby in both previously described species) and in the arrangement of setae along the edge of the apical lobes of the tenth tergite (these setae form a small, round cluster in both previously described species).

Male.—Length 6 mm. Color dark brown, the eyes black, the membranous areas white and the entire body covered with brown hair. General structure, including venation and spur count, typical for genus. Maxillary palpi three-segmented, long and hairy, and extended in front and considerably above dorsal

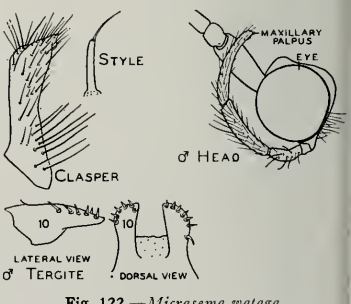

Fig. 122.—*Micrasema wataga*

margin of head, the second and third segments subequal in length. Tibial spurs short and not much longer than some of spurlike setae elsewhere on the tibiae. Venter of abdomen with abundant long setae but without mesal processes.

Genitalia as in fig. 122. Tenth tergite represented most conspicuously by two lateral, sclerotized plates connected at base by membranous folds; these plates appear pointed as seen from lateral view and bear a row of stout setae along the edge; from dorsal view they appear as in fig. 122, their mesal margins subparallel, their lateral margins rounded. At the base of these lateral processes and just caudad of the cerci are two long, narrow, submembranous filaments, bearing at their apex a single long setae. Cerci short and somewhat auriculate, held in a somewhat vertical position and covered with long, scattered setae. Claspers narrowed in middle, the apex creased to form two small, irregular lobes; the entire clasper covered with long, scattered setae, those near the base longest. Oedagus elongate, appearing egg-shaped seen from above and arcuate seen from the side; identical with that of *charonis*.

Female.—Length 7.5 mm. Color and general structure same as for male except for antigeny. Abdomen with only sternites 2–7 rectangular, these covered with scattered setae clustered more abundantly near apex. Beyond this the abdomen presents the usual structure for the subfamily.

Holotype, male.—Elkmont, Tennessee: June 12, 1935, H. H. Ross.

Allotype, female.—Same data as for holotype.

Paratypes.—New York.—Enfield Glen: Aug. 13, 1928, A. R. Park, 1 ♂.

North Carolina.—Smokemont: May 28, 1934, along Oconoluttee River, T. H. Frison, 2 ♂.

Tennessee.—Same data as for holotype, 5 ♂.

Helicopsyche limnella new species

This species differs from previously described members of the genus from North America in the longer scape and the pointed corner of the male claspers.

Male.—Length 5.5. mm. Body almost uniformly brown; wings and abdomen the same color; the flagellum and apical segments of the legs straw color; the membranous portions white. The pubescence is almost entirely dark brown.

General characters as for genus, with the maxillary palpi three-segmented, the second and third subequal and long; spur formula 2–2–4 and venation as illustrated for the genus. Scape one and one-half times depth of head; robust; the inner margin concave and bearing a dense cluster of long, thin setae. Fore tibiae and tarsi covered

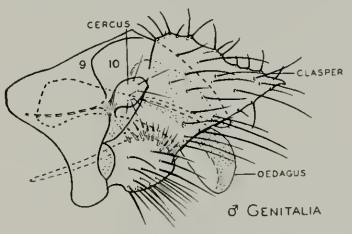

Fig. 123.— *Helicopsyche limnella*

with scales, mid and hind tibiae and tarsi with rows of small, black spinulae.

Genitalia as in fig. 123. Sixth sternite with a mesal, spatulate projection which is as long as the segment. Tenth tergite reduced to a narrow, submembranous flap extending between the claspers and above the oedagus. Cerci small, reduced to small knobs bearing scattered setae at apex. Each clasper, seen from the side, appears small at base and flared at apex, the caudoventral corner produced into a slender point curving mesad; from a ventral view each clasper appears to have a small basal lobe situated mesad and crowned with a tuft of short setae; from this base the clasper curves gracefully to the apex. Oedagus bulbous at base and apex, these two portions connected by a narrow tube.

Female.—Length 6 mm. Color and general structure same as for male with the following exceptions: Maxillary palpi five-segmented and the scape of the antennae small. Genitalia indistinguishable from those of other members of the genus, displaying the usual brush of unkempt, black setae on the fourth, fifth and sixth sternites.

Holotype, male.—McFadden Springs, Arkansas: June 5, 1937, H. H. Ross.

Allotype, female.—Mountain Pine, Arkansas: June 5, 1937, H. H. Ross.

Paratypes.— ARKANSAS. — McFadden Springs: Same data as for holotype, 2♂. Mountain Pine: Same data as for allotype, 6♂, 2♀.

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