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POPULAR AND ECONOMIC ENTOMOLOGY.

POISONED BAIT FOR CUTWORMS.

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Experiments conducted at the Dominion Entomological Laboratory at Lethbridge, Alberta, during the past two years upon the control of *Porosagrotis orthogonia* and *Euxoa ochrogaster*, and again this Spring upon a species of *Chorizagrotis* have proved to us that shorts are far more valuable than bran as a bait for the purpose of poisoning.

In 1913, when experiments were first started, bran only was tried, and results were extremely disappointing, for it was seen that this material lost most of its attractiveness when dry. Under our semi-arid conditions it seems impossible to obtain a bran mixture that will remain sufficiently attractive after it has lost its moisture, some fifteen minutes after its application to the heated soil. In this connection it should be noted that we have no dew at night.

Numerous mixtures were given thorough, and repeated, trials under varying conditions, in which different quantities of salt, sugar, and various syrups were used as attractive agents. In all cases 1-10 acre plots were treated at, or after, sundown, and they were examined once or twice during the three or four days following the date of application. The bran was applied at the rate of 100 lbs. per acre, but even with this amount never more than 26% of the worms were killed.

The following are a few typical results from about 40 observations:—

On Fall Wheat

100 lbs. Bran, 2 lbs. Sugar, 2 lbs. Paris Green, 2½ gallons Water.—20% dead.

100 lbs. Bran, 6 lbs. Sugar, 2 lbs. Paris Green, 2½ gallons Water.—10% dead.

100 lbs. Bran, 6 lbs. Salt, 2 lbs. Paris Green, 2½ gallons Water. —10% dead.

On Spring Wheat

100 lbs. Bran, 1 gallon Molasses, 2 lbs. Paris Green, 2½ gallons Water.—26% dead.

100 lbs. Bran, 1 lb. Sugar, 2 lbs. Paris Green, 2½ gallons Water. —0% dead.

Similar results were obtained when the baits were employed on oats and alfalfa.

Obviously, we could not recommend any of these to the farmers, for even had they been fairly successful an application of 100 lbs. per acre is too heavy to be practical on our large prairie fields.

From notes made in 1913 we drew the following conclusions:—

1. Cutworms in dry localities feed largely in order to obtain moisture, and dry bran is not sufficiently attractive to be fed upon extensively when their normal moist food is available.

2. One species (*P. orthogonia*) for which we were poisoning feeds almost exclusively below ground, and a surface application of poisoned bait is therefore mainly wasted.

3. Molasses gave more hopeful results than any other attractive agent used.

In 1914 we tried replacing the bran with shorts, and harrowing the bait in when *P. orthogonia* was the species present, and specialized upon the molasses mixtures. Results were most gratifying, and we found that in each case the improvement was marked.

In all cases comparative tests were made simultaneously, and the following are some of the results on Spring Wheat:—

A. Surface application.

100 lbs. Bran, 1 gallon Molasses, 2 lbs. Paris Green, 4 gallons Water.—26% dead.

50 lbs. Bran and 50 lbs. Shorts, 1 gallon Molasses, 2 lbs. Paris Green, 4 gallons Water.—43% dead.

100 lbs. Shorts, 1 gallon Molasses, 2 lbs. Paris Green, 4 gallons Water.—53% dead.

25 lbs. Bran and 25 lbs. Shorts, ½ gallon Molasses, 1 lb. Paris Green, 2 gallons Water.—36% dead.

50 lbs. Shorts, ½ gallon Molasses, 1 lb. Paris Green, 2 gallons Water.—64% dead.

B. Harrowed in immediately after application.

25 lbs. Bran and 25 lbs. Shorts, ½ gallon Molasses, 1 lb. Paris Green, 4 gallons Water.—70% dead.

50 lbs. Shorts, ½ gallon Molasses, 1 lb. Paris Green, 4 gallons Water.—80% dead.

Most of the experiments were repeated from three to ten times under varying conditions, and the relative killing values were in every case similar to those given above. A few experiments in which sugar was used showed a marked inferiority.

For *Euxoa ochrogaster* the unharrowed plots gave slightly better results than the harrowed, and it was observed that this species feeds more frequently above the ground than does *P. orthogonia*.

By experimenting with varying amounts of Paris Green, and sweetening substances, we arrived at the following formula as giving the best results: Shorts, 50 pounds; Molasses, ½ gallon; Paris Green, 1 pound, and Water, 2½ gallons.

This mixture costs from $1 to $1.25 per acre for the ingredients alone, but since cutworms begin to damage a field in nearly every case in small well-defined areas, from which they spread subsequently over far larger areas, prompt treatment as soon as damage is seen reduces the cost per acre of the area saved to a small figure.

The superiority of Shorts over Bran has been again established in the control of Army Cutworms (*Chorizagrotis* spp.), which invaded part of the Province early this year. Results from field experiments upon these species are rather uncertain, since the migratory habits are so pronounced. In specially constructed field cages definite results were obtained, and comparisons show that the value of poisoned Shorts is certain, while the application of poisoned Bran is of very doubtful benefit when judged from the aspect of cost and results. The cages were set out in a clean field of spring wheat, so that the 50 worms placed in each, though confined to nine square feet, were in every other respect under identical conditions with those experienced in nature.

Unfortunately the weather turned cold when we started these experiments, and has remained so ever since, so that our percentage kiiiings are not quite so high as they might have been had feeding been more general. Little of the wheat was eaten.

The following are a few of the results selected from 18 experiments and comprise those in which Kansas Grasshopper mixture, and a modification of it in which Shorts were used, were compared:

Poison was applied at the rate of 20 lbs. per acre. Examinations were made 48 hours after application. This was necessary, since dead worms are eaten readily by those still alive.

Applied to moist soil, and moistened by a shower.

20 lbs. Bran, 2 quarts Molasses, 1 lb. Paris Green, 3 Oranges, 3½ gallons Water.—26% dead.

20 lbs. Shorts, 2 quarts Molasses, 1 lb. Paris Green, 3 Oranges, 1 gallon Water.—56% dead.

Applied dry two days after mixing.

20 lbs. Bran, 2 quarts Molasses, 1 lb. Paris Green, 3 Oranges, 3½ gallons Water.—24% dead.

20 lbs. Shorts, 2 quarts Molasses, 1 lb. Paris Green, 3 Oranges, 1 gallon Water.—76% dead.

In the second case the weather was warmer, and more normal.

We found that the fruit in these and other mixtures had a slight beneficial effect, though the killing was as good with the following mixture: Shorts, 50 lbs.; Molasses, 2 gallons; Paris Green, 1 lb., applied at the rate of 20 pounds per acre. In this case no water was used, and we find that the benefit derived from using Paris Green in greater quantities than one pound to fifty pounds of Shorts (or Bran) does not warrant the extra cost.

The only objection to Shorts is the difficulty of mixing, but if lots of not more than 50 pounds are mixed at a time, and the reduced quantity of water is added slowly during the mixing, the difficulty is minimized. Strangely enough, the greater the proportion of molasses to water the more readily the mixture is made.

From the above figures, which represent very few of the results obtained from our numerous experiments, all pointing to the same conclusions, it will be seen that we are having great difficulty in poisoning worms under our dry conditions, but by substituting bran with shorts the problem of control is brought nearer to solution, and since this modification has proved beneficial under a variety of conditions we believe that it will be found to be of value wherever poisoning is practised for the control of cutworms.

CHARACTERS SEPARATING THE SPECIES OF THE BEE GENUS *CŒLIOXYS* OCCURRING IN ONTARIO.

BY F. W. L. SLADEN,

Apiarist, Central Experimental Farm, Ottawa.

(The author has availed himself of a kind offer made by Prof. T. D. A. Cockerell to look over any tables of bees he had prepared. Prof. Cockerell's valuable notes are followed by his initials.)

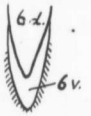

Fig. 24

MALES.

In all the following species the fore coxæ bear teeth:

1. *Second dorsal segment with a pair of transverse foveæ*, posterior to the transverse depression (interrupted or continuous) that crosses the segment. Tooth on either side of segment 5 well developed. . . . . 3.

No foveæ present, tooth on side of segment 5 rudimentary (apex of ventral segment 4 not emarginate) . . . . . 2.

[No foveæ, place where they would be very *densely* covered with minute punctures; tooth on side of segment 5 fairly large. Tegulæ bright apricot colour. (Indiana) . . *immaculata* Ckll.(I suppose this might extend to Canada.—T. D. A. C.)]

2. *Transverse depression on segment 2 uninterrupted in middle;* segment 1 well clothed with long hair, abdomen comparatively finely and closely punctured; postgenæ with large groove at lower end, the groove densely clothed with hair like rest of hind cheek. Apex of 4th ventral segment short, rounded; abdomen short and wide, *no carina on frons*, legs black . . . . . *ribis* Ckll.

(*C. ribis kincaidii* Ckll., from Olympia, Wash., also runs here.—T. D. A. C.)

Transverse depression of segment 2 widely interrupted in middle; segment 1 clothed scantily, the hair very short and adpressed, abdomen coarsely and remotely punctured, *postgenæ without groove*, apex of 4th ventral segment bispinose, abdomen elongate; *frons with Y-shaped carina*, the forks flattened

out, enclosing the middle ocellus.....*alternata* Say (=*texana* Cr.)

3. *Foveæ on segment 2 linear or very small*, legs more or less red; teeth on sides of segment 5 large, rudimentary teeth on sides of segment 4. Apical margin of 4th ventral segment lamellate and minutely emarginate.....4.

Foveæ comparatively large and wide (though often shallow), legs usually black, teeth on sides of segment 5 rather small, no trace of teeth on sides of segment 4.....7.

4. *Foveæ linear, each about ½ mm. long, with a narrow impunctate margin completely surrounding it*; (Good character!—T. D. A. C.); the hair on head and thorax rather longer, insect larger; length 8 to 10 mm.....*rufitarsus* Sm.

Foveæ rudimentary, not more than ¼ mm. long, sometimes minute, resembling a large puncture, hair on head and thorax rather shorter, insect smaller; length 7 to 9 mm. *octodentata* Say.

7. *Foveæ and the region anterior to it very closely punctured, the elevation posterior to it impunctate;* transverse grooves on segments 2 to 4 widely interrupted in middle, apical felt bands on segments 1 to 4 wide at sides, on segment 1 widely interrupted in middle, on segments 2 to 4 very narrow across middle; segments 2 to 4 more coarsely and remotely punctured; punctures on mesonotum far enough apart to give it a slight shine; hair on base of segment 1 adpressed.....*lucrosa* Cr.

The anterior region of each fovea not closely punctured, the elevation posterior to it remotely punctured; transverse grooves on segments 2 to 4 uninterruped in middle; apical felt bands on segments 1 to 4 less wide at sides, less narrow in middle, on segment 1 not interrupted in middle; segments 2 to 4 more finely and more closely punctured; mesonotum so closely punctured as to appear dull; hair on base of segment 1 upstanding.....*moesta* Cr.

FEMALES.

1. *Last ventral segment with a small notch on each side near the tip*. 3.
Last ventral segment not notched.....2.

2. *Last ventral segment with apical portion narrowed to form a process about twice as long as wide and not more than one-third as wide as wider portion of segment;* clypeus without basal depression, transverse depression on segment 2 uninterrupted, segment 1 well clothed with long hair, abdomen short and wide, comparatively finely and closely punctured, no longitudinal carina on frons.....*ribis* Ckll.

[*C. ribis kincaidii* Ckll. (Olympia, Wash.), runs here. It is larger than typical *ribis*, and has tawny hair on head and thorax. It will doubtless be found in B. C.—T. D. A. C.]

Last ventral segment with sides convex, tapering to blunt point with a fringe of fuscous hair, clypeus with a depression on each side of its upper margin, transverse depression on segment 2 widely interrupted in middle; segment 1 scantily clothed, hair very short and adpressed; abdomen elongate; segments 2 to 4 coarsely and remotely punctured; frons with Y-shaped carina with the central ocellus between its forks.....*alternata* Say.

3. *Legs more or less red*.....4.

Legs not red; depressions on segments 2 and 3 always shallow, especially towards middle, where they are widely interrupted on segment 3; segments 1 to 5 more evenly and finely punctured.....6.

4. *Segment 6 1¼ times as long as wide, slightly rounded at apex;* depression on segments 2 and 3 narrow, deep and rugose, punctures on segments 1 to 5 large and close, an impunctate line immediately behind depressions on segments 2 and 3 and behind their vestiges on segments 4 and 5.....5.

Segment 6 1¾ times as long as wide, pointed at apex..Cœl. 11.

(*C. deplanata*, which occurs in Washington State, would come in about here, but it has the 6th dorsal segment obtuse at apex—on looking at other specimens it seems variable and may be fairly pointed. The 6th segment is quite broad in *deplanata* seen from above, its width is about three-quarters its length.—T. D. A. C.)

5. *Sixth dorsal segment strongly angulated at sides so that its apical half is narrowed;* larger insect; length up to 12 mm.....*rufitarsus* Sm.

Sixth dorsal segment not or only slightly angulated at sides, smaller insect; length up to 10 mm. . . . . *octodentata* Say.

6. *Transverse depression on segment 2 widely interrupted in middle;* apical felt bands on segments 2 to 4 wide at sides, very narrow across middle on segment 1, very wide and triangular at sides and widely interrupted in middle; punctures on segments 2 to 4 larger and less close; punctures on mesonotum far enough apart to give it a slight shine; hair on basal part of segment 1 adpressed; last dorsal segment about 1¼ times as long as wide; *tibial spurs more or less ferruginous. . lucrosa* Cr.

Transverse depression on segment 2 not or scarcely interrupted in middle; apical felt bands on segments 2 to 4 less wide at sides, less narrow in middle; on segment 1 much less wide at sides and uninterrupted in unrubbed specimens; punctures on segments 2 to 4 smaller and closer; mesonotum so closely punctured as to appear dull; hairs on basal part of segment 1 upstanding; last dorsal segment about twice as long as wide, *tibial spurs black* . . . . . *moesta* Cr.

A CONTRIBUTION TOWARDS THE TAXONOMY OF THE DELPHACIDÆ.

BY F. MUIR.

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When working out some Malayan Delphacidæ the writer found it expedient to tabulate as many of the genera of the family as possible; unfortunately many of these genera are unknown to him except through the descriptions, which, in many instances, do not give characters necessary to locate them with accuracy. For this reason the present table has many defects, well recognized by the writer, but as it has been of great use to him he believes it will be of use to others, and for this reason alone he publishes it.

The Spur. As this organ is the characteristic feature of the family it is not surprising that its shape should be of taxonomic value; unfortunately many species have been described with only a mere reference to its existence. The writer is not aware of anyone making a primary use of it for dividing the family into divisions or subfamilies before Kirkaldy, who was followed by Crawford.

July, 1915

The spine-like, subulate spur is the most primitive and some of its possessors show the more generalized form of tegmina. The solid cultrate spur with both surfaces convex (Delphacini, Section A) appears to be the next stage, which is followed by the inner surface becoming concave (Section B) and eventually laminate (Section C). Section A is of interest as, with the exception of *Proterosydne** with one Australian and one American species, all the genera at present known are Hawaiian. With the exception of three species off grasses and sedges which are placed in Kelesia, all the native Hawaiian Delphacidæ belong to this section and are not attached to grasses. Swezey† has shown that *Nesodryas freycinetiæ* has but an apical tooth on the spur in first instar, those on the hind edge appearing at later instars. Section B contains six genera; of these, five, of which the habits are known, are attached to grasses. It is highly probable that further study will add several more to this section.

The antennæ. These organs come next to the spur for usefulness in taxonomic work; there appears to be but little specific variation and an absence of the sexual differences found in some of the other families of Fulgoroidea. The terete form is probably the more primitive, and the short basal joint more primitive than the longer basal joint.

The mesonotal carinæ. These are of great utility as they are always mentioned by describers and of their presence or absence there is little dispute.

The pronotal carinæ. Among some of the more difficult genera of section C of the Delphacini it is necessary not only to recognize the presence of these carinæ but also their shape and extension. Unless this is done it will be difficult to keep apart several genera containing different forms, and it will lead to the formation of one or more unwieldy genera of polymorphic character, whose species it will be more difficult to locate than are the present genera. This has been the case with Crawford's work on the north American forms and it will be still worse if the same methods are applied to the genera of the world.

It is generally possible to recognize two forms, those divergingly

*Crawford wrongly states this genus to be Hawaiian.
†Proc. Haw. Ent. Soc., II., 13.

curved posteriorly, or following, to a great extent, the contour of the hind margin of the eye, and which plainly do not reach the hind margin; and those which, although diverging posteriorly, are straight or convergingly curved, and meet the hind margin or approach it exceedingly closely.

Carination of head. In these we have the most unsatisfactory taxonomic characters, for in so many species they are obscured at the junction of vertex and face, and there is considerable variation in such characters as the furcation of the median frontal carinæ. In Homoptera such variation is common in all characters which undergo a great alteration at the last ecdysis*. In all nymphs of Delphacidæ with which the writer is acquainted there are two medio-longitudinal carinæ on the face which, in certain species amalgamate to a greater or lesser extent, the extent of amalgamation being variable. For this reason it has been necessary to place certain genera in two or three locations. With a wider knowledge of the species of certain genera, and their variations, than the writer possesses it is highly probable that more definite characterisation can be constructed.

Tibial spines of the hind legs have been used for taxonomic purposes, but they do not appear to be of great value for there is great specific variation; usually there is one at the base, one about middle and several at apex. It is possible that the proportional length of the first joint of hind tarsus and the absence or presence of one or two spines near the middle can be used more than they have been, also the proportional length of the front tibiæ.

For specific work it is absolutely necessary that the male genitalia be examined, and a use of it for generic distinction is possible in certain groups.

In the orismology the writer has used the term vertex as indicating that portion of the head, excluding the eyes, which can

*An extreme case of this nature is found in the Derbid genus *Zoraida* in which the face is only a narrow carina (composed of two carinæ more or less amalgamated) between the eyes; in the nymph the face is broad with two median carinæ well separated. In the adult the wide face still exists but is invaginated medio-longitudinally, the outer carinæ of the nymph forming the narrow face of the adult. This can be demonstrated by boiling a head of *Z. insulicola* (perhaps any other species) in caustic potash when the face will open. Several genera have been erected upon slightly widened faces (i.e. *Shirakia* and *Zoraidoides*) some of which are likely to be found to be imperfectly developed *Zoraida*.

be seen in a true dorsal view, irrespective of any carinæ which may appear to separate the vertex from frons. The term apex indicates the most anterior portion, considering the labrum as the most anterior of the dorsal portion of the head, irrespective of its deflexion.

With the increase in the number of known species and of our knowledge, it becomes necessary to divide and subdivide the groups of species included in the various sections of the Fulgorids; whether we consider the main divisions as families or subfamilies is a matter of personal opinion. Personally the writer thinks it is more natural and expedient to consider the Delphacids as a family, and the divisions as subfamilies. He holds the same opinion in regards to the Derbids, a group not so well defined as the Delphacids. It is more likely that future workers will follow Kirkaldy in this matter than those who wish to contain the whole of the Fulgorids (sens lat.) in one family.

The classification of this family, whatever arrangement we may use, shows parallel development and convergence. Arranged in the present order we see parallel development in carination of head and thorax, in lengthening and broadening of vertex and in the proportional length of joints of legs in each of the divisions. Another point clearly shown is the improbability of most or all of the characters used for taxonomic purposes being of vital importance to the individual or species. The spur is sometimes stated to be of use in jumping, but other Homoptera jump equally well without a spur; even if this argument be allowed can it be shown that one form of spur is superior to another?

The fact that a genus is included in the table does not imply that the writer considers it a good genus, there are several he considers it advisable to sink, but not without greater knowledge of the variation within the genera than he possesses at present.

The genera not located are:—*Calligypona*, placed by Ashanin after *Chlorionidea*, but not mentioned by Melichar in his Homoptera of middle Europe; *Epeurysa*, placed after *Eurysa* by Matsumura; *Dichoneura*, a South American genus which Crawford places, probably correctly, in the writer's Section B of the Delphacini; *Mestus*, the specimens marked *morio* (type species) that the author possesses do not agree with the original description; *Zuleika* placed by Distant near *Dicronotropis*.

The writer's knowledge of the genera is as follows:—

A. Examination of the type species:—

Aloha, Anectopia, Asiraca, Bambusibatus, Belocera, Chlorionidea, Conomelus, Copicerus, Criomorphus. Delphacinus, Delphax, Dictyophorodelphax, Eocurysa, Eurybregma, Eurysa, Gelastodelphax. Haplodelphax, Kormus, Laccocera, Lanaphora, Liburnia, Magemelus, Melanesia, Metropis, Nesodryas, Nesorestias, Nesosydne, Nesothoe, Pentagramma, Perigrinus, Perimececera, Perkinsiella, Phyllodinus, Proterosydne, Pseudaræopus, Punana, Saccharosydne. Smicrotodelphax, Sogatopsis, Stenocranus, Stobaera (?).

B. Examination of species other than the type:—

Chloriona, Dicranotropis, Eumetopina, Kelisa, Pissonotus, Purohita, Sardia, Tropidocephala, Ugyops.

C. From literature only:—

Achorotile, Amblycotis, Bakerella, Bergias, Bostæra, Calligypona, Canyra, Dichoneura, Embolophora, Eodelphax, Epeurysa, Epibidis, Eucanyra, Euidella, Haplalomelus, Idiosemus, Idiosystatus, Iburnia, Jassidæus, Kalpa, Liburniella, Leimonodite, Livatis, Macrotomella, Malaxa, Meglamelanus, Micromasoria, Nesoplias, Nilaparvata, Ostama, Paranda, Platybrachys, Prokelisia, Pundaluoya, Rhinotettix, Sogata, Sparnia, Toya, Upachara Zuleika.

The writer hopes to improve upon the present table when he is better acquainted with more of the genera, and for this reason he would be pleased to receive for examination or exchange any species in list C and the type species of list B.

The writer takes this opportunity to thank Dr. L. Melichar for the gift of many species representing most of the European genera upon which the classification of the family is chiefly based.

In using the table it will be necessary to run the genus down in each section, as we are ignorant of the characters employed in so many instances.

The writer regrets that he has not been able to procure specimens of any of Mr. Distant's Indian genera as he feels sure some are at present wrongly placed in his table, but the nature of the spur is not stated in any instance.

(To be continued).

THE BEE GENUS *THRINCHOSTOMA* IN INDIA.

BY F. W. L. SLADEN,
Apiarist, Central Experimental Farm, Ottawa.

(This paper was submitted to Prof. Cockerell in March, 1915, who kindly added the valuable notes given in brackets.—F.W.L.S.)

Prof. T. D. A. Cockerell's description, on pages 35 and 36 of Vol. XLV of the Canadian Entomologist, as a new species, of a male and female of this curious genus that I recently sent him in a box of bees, has led me to examine the remainder of my specimens.

I find that the male and female described by Prof. Cockerell belong to two different species, for, besides a male that agrees fairly well with his description of *T. sladeni*, there is a male of a different species that evidently is the true mate of a female I possess that agrees fairly well with Prof. Cockerell's description of the female of *T. sladeni*.

My supposed male of *T. sladeni* agrees with Prof. Cockerell's description of the male in having the head and thorax clothed with white hairs, the margin of the clypeus cream-coloured, the legs red-brown, with the various creamy-white markings described, and in minor details, but it carries at the base of the 5th ventral segment of the abdomen, on either side of the middle, a cluster of three-hooked spines. The spines are arranged in a transverse line, the inner spine is the longest and the outer one the shortest. This remarkable and important structure is not mentioned in Prof. Cockerell's description.

The male of the other species, for which I propose the name *T. assamensis*, has also a transverse row of erect hooked spines at the base ofthe 5th ventral segment, but they number eight instead of six and are nearly equidistant and of equal length. This male, agrees with the female of mine that I refer to this species, and also with the female described by Prof. Cockerell under *T. sladeni*, in every important detail that is not sexual. In addition, it possesses in common with my female another remarkable character not mentioned by Prof. Cockerell. The second transverse cubital nervure does not reach to the radial nervure. [It does in my female, however.—T. D. A. C.]

The figure of *Halictus wroughtoni* Cameron shown on page 432 of Bingham's Hymenoptera of India, Vol. I (Fauna of British

India, 1897), is that of a male *Thrinchostoma*, allowing for engraver's errors. But, unfortunately, Bingham's accompanying description, which is of the female, is meager. In the colouring of the clypeus and legs and the structure of the base of the propodeum it agrees with *T. sladeni*, but in the colouring of the wing nervures with *T. assamensis*.

[*Assamensis* appears to be near to *T. macrognathum* (Friese) from Java, which (♂) has "Clypeus gelbbraun jederseits an Rande mit schwarzer Beule." Head and thorax yellow-haired. "Beine gelblich, gelbbraun behaart." Long 9-10 mm.; ♀ not known.

Friese redescribes your Khasia Hills insect as *sladeni*, using same ♀ and ♂ forms as I had. (Tijdschrift voor Entomologie, LVII (1914), p. 27.) Friese makes a subgenus (of *Halictus*) *Rostratilapis* for *macrognathum* and *sladeni*.—T. D. A. C.]

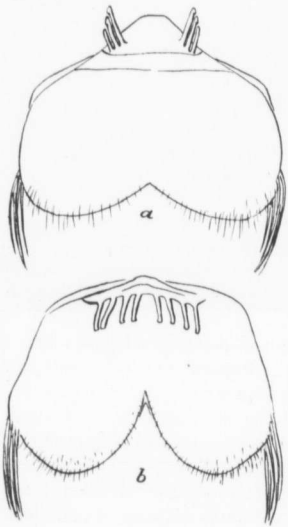


Fig. 25.—(See p. 215.)

Thrinchostoma assamensis, n. sp.

♂.—Length 13 mm. (head extended), expanse 21 mm. Head and thorax black, clothed with short pale fulvous hair; inner margins of the eyes concave; clypeus greatly extended, more so than in *T. sladeni*, clear yellow; supra-clypeal area piceous; malar space piceous, its extremity yellow; mandibles yellow, their tips piceous; labrum yellow; clypeus very shining, coarsely and remotely punctured; supra-clypeal space more closely and finely punctured; antennæ piceous; apex of scape paler; upper part of front finely and shallowly punctured, almost impunctate in the region of the ocelli; propodeum rounded

longitudinally rugose at the base; tegulæ testaceous. Wings hyaline, yellowish; nervures, stigma and hairs on wings pale testaceous; the first recurrent nervure joins the second submarginal cell before the end. Legs entirely testaceous-yellow; hind femora not much thickened, concave beneath; lobe on hind tibiæ wider than in *T. sladeni*. Abdomen has the first segment testaceous blackened in the centre and on either side at the base; second segment testaceous, with a transverse black band not narrowed in the middle; remaining segment black; as in *T. sladeni*, broad apical bands of shining white hair are noticeable in some lights on segments 3 to 5; abdomen shining, the basal segment impunctate; the dull, closely-punctured area on either side of the 2nd segment near the middle, present in *T. sladeni*, is absent; beneath, segments 1 to 4 pale; segments 5 and 6 black; segment 5 bilobate (in *T. sladeni* it is merely emarginate), bearing at its base a transverse row of erect hooked spines, eight in number, equal in length and nearly equidistant

♀.—Described by Cockerell, Can. Ent., Vol. XLV, p. 36, under the name of *T. sladeni*.

Habitat: Khasia Hills, Assam, India.

EXPLANATION OF FIGURES.

a. Thrinchostoma sladeni Ckll., ♂, 5th ventral segment.

b. Thrinchostoma assamensis, n. sp., ♂, 5th ventral segment.

THE TYPE OF *DELPHAX* FABR. AND *LIBURNIA* STAL.

BY E. BERGROTH, TURTOLA, FINLAND.

In his recently published "Contribution Toward a Monograph of the Delphacidæ of North and South America," Mr. D. L. Crawford discusses the use of the name *Delphax* by different authors, and correctly states that *Delphax crassicornis* Fabr. is the type of both *Delphax* Fabr. and *Arœopus* Spin., and that *Arœopus* consequently is a synonym of *Delphax*. He then proceeds to say: "In 1866 Stal (Hemipt. Africana, Vol. IV, p. 178) further complicated matters by restricting the name *Delphax* to *D. clavicornis*, which he erroneously supposed to be the type." In the cited place Stal does not at all speak of *Delphax*, but in the cited work and volume, p. 175, he expressly states: "*Delphax* Fabr., Stal =*Arœopus* Spin."

As *crassicornis* is the type of *Arœopus*, it is according to Stal clearly also the type of *Delphax*. *D. clavicornis* Fabr. is the type of *Asiraca* Latr., which Stal always called by its correct name; nowhere has he called this genus *Delphax*. Far from having "complicated matters," Stal was the first author who set down the correct type of *Delphax*. Crawford has apparently not seen Stal's Hem. Afr., and what he says seems to be based on wrong second-hand quotations in some obscure paper. He further states, probably relying on the wrong statements of Kirkaldy and Distant, that Stal used *Embolophora monoceros* Stal as the type of *Liburnia*. Had he known Stal's Hem. Afr., he would have seen that Stal maintained *Embolophora* as subgenerically or sectionally distinct from *Liburnia* proper. This fact is sufficient to preclude *monoceros* from the possibility of being considered the type of *Liburnia*. The type of the latter genus is *pellucida* Fabr., as pointed out by Van Duzee.

Crawford gives good descriptions, and in many cases detail-figures, of the American Delphacids known to him, citing only the the names (with bibliographical references) of the other species, but reproducing the descriptions of the genera which he had not seen. He has, however, overlooked Stal's important work, "Rio Janeiro Hemiptera, II: Homoptera." Of the new genera and species of Delphacidæ described by Stal in this work not even the names are mentioned. *Delphax cylindricornis* Fabr., redescribed from the type by Stal in his "Hemiptera Fabriciana" as *Canyra cylindricornis*, has also been omitted. From the facts that Crawford says this work was published in 1858, and that *Delphax seminigra* Stal (not "seminegra!") is described on p. 275 of it (whereas the work is from 1869, has only 130 pages, and contains nothing about that species) it is clear that the work is unknown to him. *Hygyops pictifrons* Stal from the Philippine Islands is cited as a synonym of *Delphax pictifrons* Stal from Mexico, a synonymy which had been impossible if the author had known the cited papers where these generically distinct species are described. In all Crawford enumerates seven of Stal's publications in his bibliographic list, but it seems dubious whether he has seen any of them.

Stal is the founder of modern hemipterology, and it is not advisable to begin the study of any group of the Homoptera Auchenorhyncha without knowing his works.

A KEY TO THE FAMILIES OF TRICHOPTEROUS LARVÆ.*

BY JOSEPH KRAFKA, JR., LAKE FOREST, ILL.

The larvæ of the caddis-flies are among the most common of aquatic forms; they are most interesting in their habits, and they are of undoubted economic importance; but their study is greatly retarded by the fact that there is available no means of determining them even approximately. The larvæ of the European fauna have been dealt with adequately by Ulmer, Siltala, Klapálek, Struck, Thienemann, and other European entomologists. While no thorough-going attempt has been made to trace the natural relationships in larval characters, the European genera and species can at least be recognized by keys of a more or less artificial character. Even this cannot be done for American genera, since the only species described are some eighteen by Vorhies in his excellent paper.† However, a key to the families is possible and should prove serviceable, as none has so far appeared in English. For the key here offered, that of Ulmer‡ has been used as a basis, but the whole ground has been covered in an independent study of American material.

Reference to the figures should make the distinctions of the key clear, but perhaps the terms "thysanuriform" and "eruciform" as used in the order may be more fully explained. In the Trichoptera, those larvæ are designated as thysanuriform that have the long axis of the head in line with the long axis of the body, the abdomen dorso-ventrally compressed and the depressions between the segments deep. In the eruciform type, the long axis of the head is at a decided angle with the long axis of the body, the abdomen is cylindrical and the strictures between the segments shallow. The sub-eruciform type is intermediate between thysanuriform and eruciform.

*This key is prepared as a contribution to Dr. Betten's forthcoming monograph in which the structure of all the stages of Trichoptera is dealt with, and in which descriptions of all the American genera and of all eastern American species are included.

†Vorhies, Dr. Charles T., Studies on the Trichoptera of Wisconsin. Trans. Wis. Acad. Science Arts and Letters, Vol. XVI, Part 1, No. 6, 1909, pp. 647-738, pls. LII-LXI.

‡Ulmer, Dr. Georg, Trichoptera in Brauer's Die Süsswasserfauna Deutchlands, Heft 5 u. 6, 1909. Key to larvæ, pp. 213-217.

1a. Larvæ thysanuriform. (Fig. 1.) Abdomen of nine segments; prolegs not fused in median line to form an apparent tenth segment.* (Fig. 3.) No tubercles on first abdominal segment. No prosternal horn. No lateral line. Tracheal gills generally absent; rectal gills generally present, but not always everted 2

1b. Larvæ eruciform or sub-eruciform. (Fig. 2.) Basal segments of prolegs fused in median line to form an apparent tenth abdominal segment. (Fig. 4.) Tubercles present on first abdominal segment. Prosternal horn often present. (Fig. 35.) Lateral line present, but sometimes very light. No rectal gills; tracheal gills generally present 10

2a. Abdomen very much wider than the thorax. Small larvæ with portable cases of silk ..... *Hydroptilidæ*.

2b. Abdomen not very much wider than thorax. Cases when present not of silk only ..... 3.

3a. Chitinous shield present on the dorsal surface of the ninth abdominal segment. (Fig. 7 and 8) ..... 4.

3b. No chitinous shield on the dorsal surface of the ninth abdominal segment. (Fig. 3) ..... 5.

4a. Prolegs well developed, free; claws of the prolegs long and slender, without teeth on convex surface, but sometimes with teeth on concave surface. Sometimes accessory claws present at side of main ones. (Fig. 7). Maxillary lobe long and slender. (Fig. 5.)...*Rhyacophilinæ* (Fam. *Rhyacophilidæ*).

4b. Prolegs short; basal segments wholly chitinized and fused to the ninth abdominal segment in a nearly vertical position. Claw very long with small teeth on convex side. (Fig. 8.) Maxillary lobes short, broad, with many sense rods. (Fig. 6) ..... *Glossosomatinæ* (Fam. *Rhyacophilidæ*).

5a. Branched tracheal gills present. (Fig. 12.) All three thoracic segments chitinized dorsally. Numerous bristles on convex side of mandibles. (Fig. 13) ..... 6.

5b. No tracheal gills. Only prothorax chitinized dorsally (except in *Econominæ*, where all three segments are chitinized). Only two bristles on convex side of mandibles ..... 7.

*In the Hydroptilidæ there is an indefinite suture crossing the ninth segment dorsally, giving somewhat the appearance of a tenth, but this family can easily be set off by the general shape of the body (see 2a).

LARVÆ OF TRICHOPTERA.

(See p. 224).

6a. Dorsal surface of head flattened, forming a broad disk, inclosed by a heavy horse-shoe shaped ridge or carina, making a false clypeus. This carina crosses the true clypeus near its apex, setting off a small triangle. (Fig. 10.) Mandibles toothed on whole inner margin; teeth broad and blunt; interspaces broad and deep. (Fig. 13)
.....*Macronematinæ* (Fam. *Hydropsychidæ*)

6b. Dorsal surface of the head flattened, but disk not so sharply defined and practically limited to the true clypeus. (Fig. 11.) No carina. Mandibles with sharp teeth at apical end.
.....*Hydropsychinæ* (Fam. *Hydropsychidæ*).

7a. Labrum not wholly chitinized; its anterior angles and membrane connecting it to the clypeus, forming a flexible lip, bearing numerous bristles. Uusally the anterior margin of the clypeus is asymmetrically curved (Fig. 9) *Philopotamidæ*.

7b. Labrum wholly chitinized; its anterior angles rounded. Anterior margin of the clypeus never asymetrically curved
.....8

8a. All three thoracic segments chitinized dorsally
.....*Econominæ* (Fam. *Polycentropidæ*).

8b. Only prothorax chitinized dorsally .....9.

9a. Claws of legs long, slender, with but one basal spur. (Fig. 15.) Labial lobes short, not so long as the maxillary palps (except in *Phylocentropus*). Penultimate segment of maxillary palpus very long. (Figs. 16, 17)....*Polycentropidæ*.

9b. Claws of legs short; claw on first leg bears a basal spur and a bristle beside it. (Fig. 14.) Two basal spurs on claws of second and third legs. Labial lobe long, slender, pointed, generally longer than the maxillary palps. Maxillary palps short; segments of equal length. (Fig. 18)
..... *Psychomyidæ*.

10a. Labrum with a very distinct row of twenty or more heavy bristles traversing its dorsal surface at about one-third the distance from its front margin. (Fig. 19)
..... *Calamoceratidæ*.

10b. Labrum without armature as above in 10a. Generally only three pairs of black bristles on its dorsal surfaces and three pairs of yellow spines on its front margin. (Fig. 20).....11.

11a. Labrum much longer than broad. (Fig. 21.) Pronotum and mesonotum chitinized. Metanotum with four plates; two broad medium ones, lying one behind the other (the posterior one being hard to distinguish) and two lateral ones, small and triangular. (Fig. 22).....*Odontoceridæ*.

11b. Labrum much broader than long. (Fig. 20.) Thoracic armature various, but not as above .....12.

12a. *Gula subquadrate, widely separating the pleuræ. (Figs. 23, 24.) Prothorax and mesothorax chitinized dorsally. Metathorax membranous. No prosternal horn.....13.

12b. *Gula triangular or elongated. Pleuræ contiguous or nearly so at the apex of the gula. (Figs. 25, 26.) Thoracic armature not as in 12a. Prosternal horn generally present. (Fig. 35).....15.

13a. Long spur-bearing processes on distal ends of first and second tibiæ. (Fig. 27.) Hind tibiæ divided. (Fig. 28.) Hind claw either long and bristle-like or very short and bearing many bristles. (Fig. 29.) Labial lobe with numerous bristles near the middle of the ventral side ..... *Molanninæ* (Fam. *Molannidæ*.)

13b. No spur-bearing processes on first and second tibiæ, but sometimes a swelling on the first tibiæ. (Fig. 32.) Hind tibiæ not divided except in *Mystacides*. Claws normal. Few bristles on labial lobe.....14.

14a. Femora not divided into a short apical and a long distal piece. Mandibles with inner bristles, and a clump of accessory bristles near distal end of convex side. (Fig. 30). Chitin points over lateral line on abdominal segments III to VIII. ..... *Beræinæ* (Fam. *Molannidæ*).

14b. Femora of middle and hind legs divided into a small basal and a long apical piece. (Fig. 31.) Right mandible without inner bristles. No accessory bristles on back of mandibles ..... *Leptoceridæ*.

*In two subfamilies the characters will not agree with all those listed in either 12a or 12b. Forms agreeing with 12b in all except the form and position of the gula (*Brachycentrinæ*) or in all except thoracic armature (*Sericostomatinæ*) should remain in 12b.

15a. Postsegmental gills on lateral line always covered with black hairs. (Fig. 33). Prothorax only chitinized. One pair of small bristle-bearing plates on mesothorax and on metathorax ..... *Phryganeidæ*.

15b. Gills never with black hairs. Thoracic armature not as in 15a..... 16.

16a. Prothorax and mesothorax chitinized dorsally. Metathorax membranous, bearing three pairs of small shields; median anterior pair very small; second pair small, slightly laterad and posterior to first; third pair largest, generally crescent-shaped, lying laterad to second; all well supplied with bristles. (Fig. 34) ..... *Limnophilidæ*.

16b. Thoracic armature not as in 16a ..... 17.

17a. Pronotum chitinized. Mesothorax bearing two or three pairs of heavily chitinized plates, metathorax with two or four pairs of smaller plates ..... 18.

17b. Pronotum chitinized. Mesonotum and metanotum membranous, or at most only weakly chitinized ..... 19.

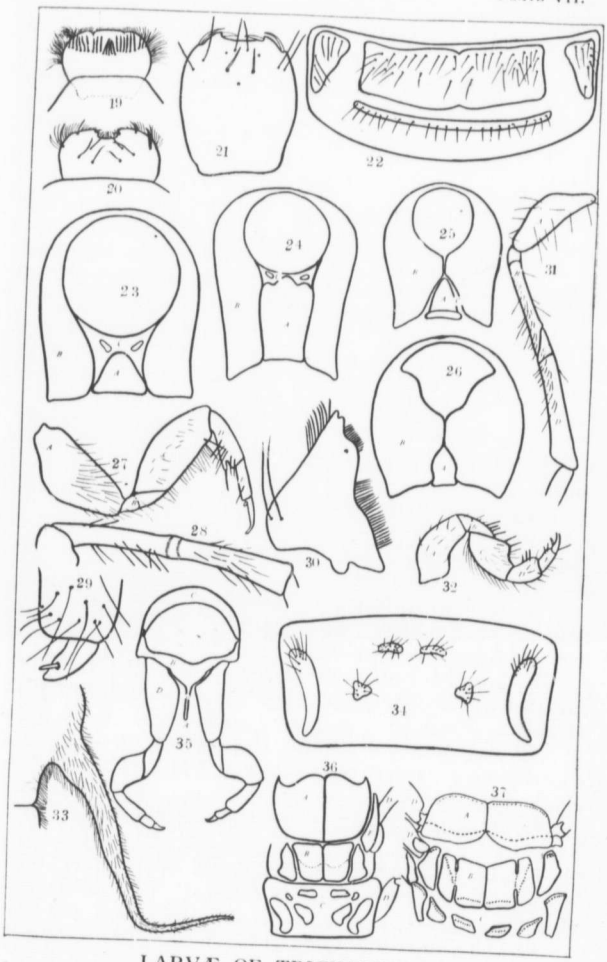
18a. Anterior angles of pronotum produced into pointed processes. Head retractile. Two or three pairs of plates on mesothorax; four pairs on metathorax. (Fig. 36).—Tubercles present on first abdominal segment. Gula triangular; pleuræ nearly contiguous behind its apex. (Fig. 25) ..... *Goerinæ* (Fam. *Sericostomatidæ*).

18b. Anterior angles of pronotum rounded. Head not retractile. Four broad plates on mesothorax, but only two pairs of smaller ones on metathorax. (Fig. 37.) No lateral tubercles on first abdominal segment. Gula subquadrate; pleuræ separated widely by the gula. ..... *Brachycentrinæ* (Fam. *Sericostomatidæ*).

19a. Only lateral tubercles on first abdominal segment well developed. Gills thread-like, single. Middle and hind tibiæ with one distal spur each. Prosternal horn present ..... *Lepidostomatinæ* (Fam. *Sericostomatidæ*)

19b. All three tubercles on first abdominal segment well developed. Gills thread-like, clustered; only on the anterior margins of the segments. Middle and hind tibiæ without distal spur. No prosternal horn ..... *Sericostomatinæ* (Fam. *Sericostomatidæ*)

Lake Forest College.



LARVÆ OF TRICHOPTERA.

(See p. 225).

Explanation of Plates VI and VII.

PLATE VI.

Fig. 1. *Macronema zebratum* Hag.; a, branched tracheal gills; b, prolegs; c, rectal gills.

Fig. 2. *Phryganea* sp.; a, tubercles; b, tracheal gills; c, lateral line; d, prolegs.

Fig. 3. *Macronema zebratum* Hag.; ventral aspect of prolegs; a, 8th abdominal segment; b, 9th abdominal segment; c, basal segment of prolegs; d, claw of proleg.

Fig. 4. *Platycentropus hostis* Hag.; dorsal aspect of prolegs; b, 9th abdominal segment; c, basal segments of prolegs forming a 10th abdominal segment; d, claws of prolegs; e, supporting plate of claw.

Fig. 5. *Rhyacophila fuscula* Walk.; labium and maxilla; a, labial lobe; b, labial palpus; c, maxillary lobe; d. maxillary palpus.

Fig. 6. *Mystrophora americana* Banks; labium and maxilla; a, labial lobe; b, labial palpus; c, maxillary lobe; d, maxillary palpus.

Fig. 7. *Rhyacophila fuscula* Walk.; lateral view of prolegs; a, 8th abdominal segment; b, 9th abdominal segment; c, claw of proleg; d, accessory claw; e, basal segment of proleg; f, dorsal plate on 9th abdominal segment.

Fig. 8. *Mystrophora americana* Banks; a, 8th abdominal segment; b, 9th abdominal segment; c, claw of proleg; d, basal segment of proleg; e, dorsal plate on 9th abdominal segment.

Fig. 9. *Chimarrha* sp.; dorsal view of clypeus and labrum; a, clypeus; b, labrum; c, connecting membrane; d, anterior angles of labrum.

Fig. 10. *Macronema zebratum* Hag.; dorsal view of head; a, true clypeus; b, false clypeus; c, carina; d, labrum; e, connecting membrane; f, mandibles.

Fig. 11. *Hydropsyche* sp. dorsal view of head; a, true clypeus; b, labrum.

Fig. 12. *Macronema zebratum* Hag.; branched tracheal gill.

Fig. 13. *Macronema zebratum* Hag.; ventral aspect of left mandible.

Fig. 14. *Psychomyia pusilla* Fabr; claw of 1st leg (after Ulmer).

Fig. 15. *Phylocentropus* sp.; claw of 1st leg.

Fig. 16. *Phylocentropus* sp.; labium and maxillæ; a, labial lobe; b, max. lobe; c, max. palpus.

Fig. 17. *Plectrocnemia conspersa* Curt.; labium and maxilla (after Ulmer); a, labial lobe; b, max. lobe; c, max. palpus.

Fig. 18. *Psychomyia pusilla* Fabr.; labium and maxilla (after Ulmer); a, labial lobe; b, max. lobe; c, max. palpus.

PLATE VII.

Fig. 19. *Ganonema americanum* Walk.; dorsal view of labrum.

Fig. 20. *Chilostigma* sp.; dorsal view of labrum.

Fig. 21. *Psilotreta frontalis* Banks; dorsal view of labrum.

Fig. 22. *Psilotreta frontalis* Banks; dorsal view of metathorax showing chitinous plates.

Fig. 23. *Leptocella uwarowii* Kol.; ventral view of head; a, gula; b, pleura; c, membrane.

Fig. 24. *Mystacides sepulchralis* Walk.; ventral view of head; a, gula; b, pleura; c, membrane.

Fig. 25. *Goera pilosa* Fabr.; ventral view of head; a, gula; b, pleura; c, membrane.

Fig. 26. *Arctoecia medialis* Banks; ventral view of head; a, gula; b, pleura.

Fig. 27. *Molanna cinerea* Hag.; first leg; a, coxa; b. trochanter; c, femur; d. tibia; e, tarsus.

Fig. 28. *Molanna cinerea* Hag.; femur of 3rd leg.

Fig. 29. *Molanna cinerea* Hag.; claw of 3rd leg.

Fig. 30. *Beræodes minuta* L; mandible (after Ulmer).

Fig. 31. *Leptocella uwarowii* Kol.; third leg; a, coxa; b, trochanter; c, apical piece of femur; d, distal piece of femur.

Fig. 32. *Leptocella uwarowii* Kol.; first leg; a, coxa; b, trochanter; c, femur; d, tibia; e, tarsus.

Fig. 33. *Phryganea* sp.; tracheal gill.

Fig. 34. *Platycentropus hostis* Hag.; dorsal view of metathorax.

Fig. 35. *Arctœcia medialis* Banks; anterior view of prothorax; a, prosternal horn; b, prosternum; c, pronotum; d, 1st leg.

Fig. 36. *Gœra pilosa* Fabr.; thoracic armature; a, prothorax; b, mesothorax; c, metathorax; d, base of legs; e, supporting plates.

Fig. 37. *Brachycentrus nigrosoma* Banks; thoracic armature; a prothorax; b, mesothorax; c, metathorax; d, base of legs.

NEW NORTH AMERICAN GALL MIDGES.

BY E. P. FELT, ALBANY, N. Y.

The following descriptions relate to undescribed species which have been received from various localities during several months past.

Lestremia floridana, n. sp.

The midge characterized below was collected by Mr. C. W. Johnson and labelled Jacksonville, Fla. It is easily separable from both *L. elongata* Felt and *L. barberi* Felt by the relatively much longer antennal segments. The somewhat similar *L. sambuci* Felt and *L. kansensis* Felt are easily distinguished from this species by the much greater production and more slender character of the terminal antennal segment.

Female.—Length 1.2 mm. Antennæ extending to the base of the abdomen, sparsely haired, reddish brown; 11 segments, the fifth with a stem about ¼ the length of the cylindric basal enlargement, which latter has a length 2½ times its diameter; terminal segment moderately stout, only slightly produced, the basal portion with a length three times its diameter and apically with a short, stout, fusiform appendage. Palpi: first segment narrowly oval, with a length over twice its diameter, the second ½ longer than the first, more slender, the third ½ longer than the second, more slender, the fourth nearly twice as long as the third, slender, irregular. Mesonotum yellowish brown. Scutellum yellowish, postscutellum reddish yellow. Abdomen reddish brown. Halteres, coxæ and femora basally, fuscous yellowish, distal portion of femora, tibiæ and tarsi reddish brown. Claws moderately stout, simple, the pulvilli about half the length of the claws. Ovipositor triarticulate, the terminal lobe narrowly ovoid and with scattering, large setæ in addition to numerous smaller ones. Type Cecid. 1514.

Microcerata aldrichii, n. sp.

The midges described below were collected by Prof. J. M. Aldrich by sweeping winter wheat at Lafayette, Ind., May 6, 1914. The species approaches closely *M. spinosa* Felt, from which it may be easily separated by the darker colour and the fused eighth and ninth antennal segments of the male, the latter having a length

about twice its diameter, while in *M. spinosa* these two segments are free, the last having a length only about three-fourths greater than its diameter. There are doubtless other differences in the similar appearing midges.

Male.—Length 1.5 mm. Antennæ moderately short, tapering, the basal segment dark brown, the others light brown; 9 sessile segments, the second greatly enlarged, the ninth plainly fused with the eighth, and with a length about twice its diameter. Palpi: first segment subquadrate, with a length over twice its diameter, the second a little longer and more slender than the first, the third one-half longer than the second, more slender, the fourth twice as long as the third, slightly expanded distally. Body a nearly uniform brownish black, the submedian lines of the mesonotum sparsely haired. Wings moderately large, costa, subcosta and the third vein yellowish brown, whitish basally. Halteres yellowish transparent. Coxæ dark brown. Legs mostly fuscous yellowish, the pulvilli as long as the moderately stout, slightly curved, finely pectinate claws.

Genitalia: basal clasp segment moderately stout, long; terminal clasp segment short, swollen basally, somewhat recurved and thickly setose apically; dorsal plate moderately long, triangularly emarginate, the lobes narrowly rounded apically; ventral plate long, apically roundly and obliquely truncate and thickly setose.

Female.—Length 1 mm. Antennæ yellowish brown, the second segment only moderately enlarged, the fourth with a length about three-fourths its diameter and with thick groups of short, stout spines subapically; terminal segment produced, with a length nearly twice its diameter, somewhat swollen basally and broadly rounded apically. Body a nearly uniform brownish black. Ovipositor short, the lobes yellowish, biarticulate, the distal segment roundly oval and thickly setose, minor lobes thickly setose, triangular, narrowly rounded apically. Type Cecid 1585.

Porricondyla wellsi, n. sp.

The midge described below was taken by Mr. D. B. Young on a window at Wells, N. Y., July 5, 1914. It is easily distinguished from allied forms by the greatly produced stems of the flagellate

antennal segments and the short, greatly swollen terminal clasp segment.

Male.—Length 2 mm. Antennæ a little longer than the body, sparsely haired; 16 segments, the fifth with a stem twice the length of the basal enlargement, which latter has a length one-half greater than its diameter; terminal segment reduced, with a length nearly three times its diameter and tapering almost uniformly to an acute apex. Palpi reddish, first segment with a length four times its diameter, second a little shorter, stouter, the third longer than the second, more slender and the fourth one-half longer than the third. Mesonotum shining dark brown. Scutellum and post-scutellum yellowish. Abdomen yellowish white, with narrow, double, transverse, brownish sclerites on each abdominal segment, the distal segments tinged with reddish. Genitalia fuscous yellowish. Halteres and coxæ pale yellowish. Legs mostly a variable straw; claws rather slender, strongly curved, unidentate, the pulvilli as long as the claws. Genitalia; basal clasp segment short, stout; terminal clasp segment short, greatly swollen near the middle and with a length hardly one-half greater than the diameter; dorsal plate rather long, deeply and roundly emarginate, the lobes broadly rounded; ventral plate moderately long, broad, deeply and triangularly emarginate, the lobes tapering to a roundly truncate apex. Harpes short, stout, irregular, heavily chitinized. Type Cecid. 1564.

Asteromyia sylvestris, n. sp.

The yellowish or brownish blister leaf galls of this species were very abundant October 22, 1914, on *Aster cordifolius* at Mount Kisco, N. Y. A number of adults were reared together with several parasites, the latter undetermined.

Gall.—Diameter three to four mm., circular, a variable yellowish or brownish blister leaf gall on *Aster cordifolius*. Some are yellowish with brown centres and others mostly dark brown. There may be three to twenty on a leaf and the larvæ evidently hibernate in the gall, though adults appeared under insectary conditions in mid-winter.

Male.—Length 1.6 mm. Antennæ extending to the base of the abdomen, sparsely haired, reddish brown; 16 segments, the fifth with a length one-fourth greater than its diameter; terminal

segment somewhat produced, with a length nearly one-half greater than its diameter and sometimes partly fused with the preceding. Palpi; first segment narrowly oval, the second one-half longer, tapering to a subacute apex. Mesonotum shining reddish brown, the submedian lines sparsely haired. Scutellum and postscutellum shining yellowish brown. Abdomen mostly dark brown basally, the segments sparsely margined sublaterally and posteriorly with a broken line of white scales, the fifth to the seventh segments sparsely clothed with fuscous scales, the latter hardly obscuring the reddish orange colour of the abdomen; discal spot white, elongate and near the middle of the wing. Halteres fuscous yellowish basally, fuscous apically. Coxæ fuscous yellowish, femora and tibiæ fuscous yellowish basally, fuscous apically; tarsi a nearly uniform dark brown; claws long, rather slender, strongly curved, unidentate, the pulvilli nearly as long as the claws. Genitalia; dorsal plate deeply and triangularly emarginate, the broad lobes broadly and rather irregularly rounded; ventral plate long, broad, broadly rounded.

Female.—Length 2 mm. Antennæ fuscous basally, yellowish or reddish apically, sparsely haired; 16 segments, the fifth with a length about equal to its diameter. Palpi; the first segment with a length nearly twice its diameter, the second a little longer than the first, abruptly tapering distally. Mesonotum dark reddish brown. Scutellum and postscutellum dark brown. Abdomen a nearly uniform brownish black, the ovipositor fuscous yellowish, about one-third the length of the abdomen, the terminal lobes being broadly ovate and thickly setose. Halteres yellowish transparent basally, brownish black apically. Coxæ and legs a nearly uniform brownish black, the posterior tibiæ narrowly and indistinctly annulate distally with white. Type Cecid. a2585.

Kalodiplosis, n. g.

The unidentate, heavily toothed claws, the rudimentary pulvilli, the third vein joining the margin at or slightly before the apex of the wing, the triarticulate palpi, the heavy, rather thick and moderately short circumfili, and the long dorsal and ventral plates, the latter deeply emarginate and with relatively narrow lobes, serves to distinguish this genus from *Dicrodiplosis* Rubs. and the series related thereto. Type *Dicrodiplosis multifila* Felt.

Kalodiplosis multifila Felt

1907 Felt, E. P. New Species of Cecidomyiidæ II, p. 19-20 (Dicrodiplosis).

1908 Felt, E. P. N. Y. St. Mus. Bul. 124, p. 300, 394 (Dicrodiplosis).

The male representing this species is in the U. S. National Museum and was collected by August Busck at Porto Rico.

Male.—Length 1.5 mm. Antennæ as long as the body, thickly haired, dark brown; 14 segments, the fifth having the basal part of the stem with a length about one-half its diameter, the distal part with a length three-fourths its diameter; basal enlargement subglobular, the distal enlargement vasiform and with two circumfili, each with about twelve moderately heavy, stout loops; terminal segment, basal portion of the stem with a length twice its diameter, the distal enlargement subcylindric, with a l ngth nearly twice its diameter, at the distal fourth tapering to an acute apex. Palpi; first segment short, stout, subglobose, the second with a length thrice its diameter, the third longer and more slender than the second. Mesonotum dark brown, the submedian lines indistinct. Scutellum dark reddish brown, postscutellum fuscous. Abdomen dark brown, the segments sparsely margined posteriorly with coarse setæ. Costa light straw, the third vein joining the margin just before the apex, the fifth forked; halteres fuscous yellowish. Coxæ and base of femora pale yellowish, the distal portion of femora, tibiæ and tarsi a variable brown; claws long, stout, strongly curved, unidentate, the pulvilli about half the length of the claws. Genitalia; basal clasp segment long, stout; terminal clasp segment short, swollen basally; dorsal plate long, broad, broadly and roundly emarginate, the lobes irregularly rounded; ventral plate long, broad, dilated apically, broadly and triangularly emarginate, the lobes rather slender and narrowly rounded. Type Cecid. 1024.

Kalodiplosis floridana, n. sp.

The midges described below were received under date of September 21, 1914, from Dr. Frederick Knab and recorded as having been collected August 22, 1914, on sea grape (*Coccoloba*) at Miami, Fla., by W. W. Yothers. This species is easily dis-

tinguished from *K. multifila* Felt, by the longer stems of the flagellate antennal segments as well as by differences in colour.

Male.—Length 1 mm. Antennæ probably one-half longer than the body, thickly haired, yellowish brown; 14 segments, the fifth having the stems nearly equal, each with a length one-half greater than the diameter; terminal segment missing. Palpi; first segment irregularly ovate, the second with a length over twice its width, the third one-half longer than the second, more slender. Mesonotum dark reddish brown. Scutellum and postscutellum yellowish. Abdomen mostly dark brown, yellowish brown apically. Halteres yellowish basally, slightly fuscous apically. Coxæ and femora fuscous straw, the tarsi somewhat darker; claws stout, unidentate, the pulvilli about half the length of the claws. Genitalia; basal clasp segment long, stout; terminal clasp segment short, rather stout, swollen near the basal third; dorsal plate long, broad, deeply and triangularly emarginate, the lobes rather long, broad and narrowly rounded; ventral plate long, deeply and triangularly emarginate, the slender, slightly diverging lobes narrowly rounded and sparsely setose apically; style long, stout, strongly curved.

Female.—Length 1.25 mm. Antennæ probably nearly as long as the body, sparsely haired, yellowish brown; 14 segments, the fifth with a stem one-fourth the length of the cylindric basal enlargement, which latter has a length about twice its diameter; terminal segment slightly prolonged and obtusely rounded apically. Palpi; first segment irregularly ovate, the second rather slender, with a length nearly three times its diameter, the third a little longer and more slender than the second. Mesonotum dark brown. Scutellum and postscutellum yellowish. Abdomen reddish brown, yellowish basally and with an oval subbasal spot dorsally. Halteres mostly a light fuscous yellowish. Coxæ and femora mostly fuscous yellowish, the apical portion of femora, tibiæ and tarsi dark brown. Ovipositor short, the terminal lobes narrowly oval and sparsely setose. Other characters practically as in the male. Type Cecid. 1563.

Hormomyia fenestra, n. sp.

This species is closely related to *H. shawi* Felt, though easily distinguished by marked differences in colour characters and in

the structure of the basal clasp segment. Both sexes were taken by Mr. C. P. Alexander, August 22, 1910, at Woodworth's Lake, Fulton County, N. Y.

Male.—Length 5 mm. Antennæ probably as long as the body, sparsely haired, dark yellowish brown; probably 15 segments, the fifth having the two portions of the stem nearly equal, each with a length one-half greater than the diameter. Palpi; the first segment irregular, with a length about twice its diameter and apically with an irregular, quadrate, pseudo-segment; the second segment extremely slender, with a length fully ten times its diameter and at the basal third a pseudo-articulation. Mesonotum reddish brown, the submedian lines and posterior median area, scutellum and postscutellum mostly brownish yellow. Abdomen dark brown. Genitalia fuscous yellowish, the basal clasp segment subrectangular, with a length about three times its diameter and a conspicuous, broadly rounded internal lobe at the basal third; terminal clasp segment stout, curved, diameter nearly uniform, fuscous apically; dorsal plate broad, broadly and irregularly emarginate, the lobes broad and tapering irregularly to a narrowly rounded, setose apex; ventral plate long, spatulate, sparsely setose, broadly and roundly emarginate distally.

Female.—Length 5 mm. Antennæ missing. Palpi; the first segment subglobose, the second rectangular, with a length one-half greater than its diameter, the third greatly produced, with a length fully ten times its diameter. Mesonotum a variable reddish brown, the submedian lines brownish yellow. Scutellum and postscutellum mostly fuscous yellowish. Abdomen sparsely haired, dark reddish brown. Halteres yellowish transparent. Coxæ yellowish brown, legs a variable straw colour, the articulations slightly darker. Ovipositor short, the terminal lobes broadly oval and thickly clothed with short, stout setæ, minor lobes triangular, with a few coarse setæ on the rounded apex. Type Cecid. 1596.

The female, Cecid. 1595 is referred with little question to the same species, a procedure justified by similar abdominal structures and the capture of the two on the same date and under presumably identical conditions. The specific name is given on account of the peculiar, light coloured, window-like spots in the body walls of the abdomen.

A NEW GENUS AND SPECIES OF TRICHOGRAMMATIDÆ FROM THE PHILIPPINES.

BY A. A. GIRAULT,
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The following genus belongs to the Chætostrichini:

Pseudobrachysticha, new genus.

Female.—In my table of genera runs to *Brachysticha* Mayr, but differs from that genus in that there is only one-ring joint and the fore wings are naked, the marginal ciliation at the apex but moderately long and the club is 2-jointed, the antennæ 6-jointed. Moreover, in the male the club is solid. Because the single funicle joint is connected rather closely with the club, sometimes making the latter appear 3-jointed, this genus may be confused with *Pterygogramma* Perkins, but the male is different from the female, the discal ciliation of the fore wing is absent, excepting a single line of it along the cephalic margin from venation to apex, the funicle is really present and the ovipositor is inserted in the middle of the abdomen. Marginal vein as long as the submarginal, the stigmal with a short neck and a rounded knob. Mandibles tridentate. Male the same, except the shape of the abdomen and the 5-jointed antennæ. A short, distinct postmarginal vein.

1. **Pseudobrachysticha semiaurea,** new species.

Female.—Length, 0.60 mm.

Bright golden yellow, the abdomen black (the incisions of the segments sometimes showing through as yellow cross-stripes), the venation dusky black, the fore wing smoky from base to slightly beyond the apex of the venation, but subhyaline at base to the break of the submarginal vein and along under the marginal vein, the infuscation accented across from base of the marginal vein and less so across from the apex of the stigmal (thus more or less bifasciate). Caudal wings slightly dusky to some little distance beyond the venation. Two to four isolated cilia on the fore wing in a line longitudinally between apex of stigmal vein and apex of the wing. Marginal cilia at apex of the fore wing about between a fourth and a third of the greatest wing width, distinctly shorter the caudal marginal cilia of the caudal wing. The latter rather broad, but distinctly narrower than the length of its marginal

cilia, naked discally, excepting for a pair of isolated cilia in a line longitudinally, central and somewhat proximad of the middle between the apex of the venation and the apex of the blade. Antennal club dusky. Cephalic face of the pronotum black. Hind femora sometimes dusky. Scape and legs nearly white.

The male is similarly coloured.

Described from a large number of specimens of both sexes reared from the eggs of *Hilda breviceps* Stal, Los Banos, Philippine Islands, February, 1915, C. F. Baker.

Types.—Catalogue *No. 19300*, U. S. N. M., four males, four females on a slide. A large number of paratypes on another slide.

A NEW SPECIES OF *PSEUDOMPHALE* FROM CHILE.

BY A. A. GIRAULT,
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The genus *Pseudomphale* Schrottky is the same as *Horismenus* in the North American sense. It may be *Horismenus* in the European sense, yet doubtfully. There are three ring-joints. The single Australian species of *Horismenus* represents a new genus which may be named *Horismenopsis*, new genus. The genotype is *Horismenus antiopa* Girault. The following new species of *Horismenus* was found in the collections of the United States National Museum when reviewing the North American Entedoninæ.

1. **Pseudomphale hypatia,** new species.

Female.—Length, 2.50 mm.

Differs from *lixivorus* Crawford in that the tibiæ are not dark, but merely embrowned centrally or brown except at tips; the stripe of scaliness across near apex of segment 2 of the abdomen is not so wide nor so produced proximad at lateral margin, the petiole is distinctly shorter and vertical, the abdomen subsessile, the median carina of the propodeum longer and broader. From *floridanus* Ashmead in the same particulars except the tibiæ, which are darker than in that species, brown, not white; also in *floridanus*, segment 2 of the abdomen is longer, slightly over half the length of that region (somewhat less than half in this new species); also the thorax is blue, not black. Differs from *microgaster* Ashmead in the shorter segment 2 of the abdomen. Runs close to *brasiliensis* Ashmead, but differs in the shorter abdominal

petiole, shorter segment 2 of the abdomen, which in *brasiliensis* occupies ¾ of the surface and is sculptured broadly distad, the median carina of the propodeum is broader and the pedicel longer, the tibiæ darker being brown. Compared with types of the named species except *microgaster*. Three ring-joints. Pedicel slightly longer than funicle 1.

Differs from the genotype in its dark femora, scape, etc. Described from three females labelled "*Ceroplastus novaesci*, Santiago, Chile, M. J. Rivera, Letter March 15, 1910."

Types.—Catalogue *No. 19320*, U. S. N. M., two females on tags (one a paratype). Parapsidal furrows half complete from caudad. Median groove of scutum delicate, only at proximal third.

ERRATA.—In my article "Geometrid Notes" in the Canadian Entomologist, Vol. XLVII No. 5, pp. 155-158, I wish to make the following corrections:—

P. 157, line 24, for "*paratype*" read "*paratypes*".
P. 157, line 28, for "*saawichata*" read "*saanichata*".
P. 158, line 29, for "*fuscata*" read "*furcata*".
P. 158, line 34, for "*saawichata*" read "*saanichata*".

L. W. SWETT.

BOOK REVIEW.

KEY TO THE FAMILIES OF NORTH AMERICAN INSECTS.—An Introduction to the Classification of Insects. By Charles T. Brues, Assistant Professor of Economic Entomology, Harvard University, and A. L. Melander, Professor of Entomology, State College of Washington, Boston, Mass., and Pullman, Wash. Published by the Authors, 1915. 137 pp., 18 plates.

This little book brings together a complete analytical key to the orders and families of North American insects compiled from the works of the most recent authorities in the various branches of systematic entomology. Such a work has been a great desideratum among teachers of entomology in view of the rapid changes in the classification of insects which have been brought about in recent years as a result of the labours of an ever-increasing army of workers in this field.

The book "has been prepared to meet the requirements not alone of college courses in systematic entomology, but also of

agricultural high schools and of physicians, fruit inspectors, the modern farmer, the nature-lover, or anyone who is concerned with the practical identification of insects." It begins with a conspectus of the higher groups of insects down to the families, following which is a key to the orders, dealing with the earlier as well as the adult stages. The remainder of the text is occupied by short diagnoses of each order, followed in each case by dichotomous keys to the suborders, superfamilies and families. A few typical genera are mentioned in connection with each family, and when these contain well-known species of economic importance, both the scientific and common names of such species are given.

The book is copiously illustrated by 427 simple but excellent figures, showing the general appearance of members of typical genera or characters of taxonomic value.

The classification into orders and the grouping of these into subclasses and classes is essentially that of Handlirsch*, who recognizes five classes and divides one of these, the *Pterygogenea*, into 11 subclasses and 30 orders, there being 37 orders altogether. Only the orders and lower groups, however, are characterized in the keys. This system is undoubtedly based upon a much broader and more thorough consideration of all available data on the subject than any other hitherto proposed, and probably expresses the true relationships of the main groups of insects with correspondingly greater accuracy, and yet we cannot but think that the wisdom of following it in a manual such as this is open to question, at least in so far as its usefulness to the average teacher, or the physician or nature-lover is concerned, for it is far more complex than any of the older systems, and can only be appreciated by the most advanced students. For some reason, not apparent to the reviewer, the most generalized groups, usually known as the *Apterygota* or *Thysanura* and *Collembola*, but divided by Handlirsch into four classes, are placed at the end of the series, although the general sequence of groups is an ascending one.

The book also contains a glossary of special terms, an index to genera and higher groups, and an index to common names. It should certainly prove a most useful addition to any entomological or zoological library.

*Die fossilen Insekten und die Phylogenie der rezenten Formen. Leipzig 1908.

Mailed July 16th, 1915