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POPULAR AND PRACTICAL ENTOMOLOGY.

NOTES ON A CECROPIA CATERPILLAR.

BY MRS. ANNIE G. HEWITT WHITE, TORONTO.

On a lilac bush in my garden I was fortunate enough, in late September, to find a fine specimen of the large green caterpillar of the Cecropia Moth. Cutting the branchlet holding the handsome sojourner, I mounted it on a large potato, to keep the leaves fresh, and placed a battery jar over it.

About 10 o'clock on the night of the 23rd of September, the caterpillar began spinning its cocoon.

Sept. 25th.—Outer wall of cocoon finished and looks like a transparent, silk basket. The caterpillar still moving in that peculiar figure-of-eight, that I have observed seems to be the motion which all spinning caterpillars adopt.

Sept. 26th.—Cocoon almost opaque, shaped like an airship, $3\frac{3}{4}$ inches long, $1\frac{7}{8}$ inches wide. Caterpillar dimly seen within, still moving.

Sept. 28th.—Cocoon complete; all quiet within.

Oct. 8th.—Heard a scratching sound. Thought it was a mouse and instituted a search. Traced the sound, which seemed now more like silk being torn, to the corner where the cocoon was placed. It continued the whole evening.

Oct. 9th.—Scratching still continues, 8 o'clock, p.m. Can no longer resist the temptation to see what is going on, will wait a day.

Oct. 10th, 8 p.m.—Opened the cocoon, and saw one of the most wonderful of Nature's workings that has ever been vouchsafed to me.

Carefully cutting open the side of the cocoon, and turning down the flap made, I had a window-like opening by which to watch the proceedings. The caterpillar, still unchanged, stood on end within the smoothly-lined cocoon, his gaily coloured tubercles as bright as ever against the pale, green body.

Suddenly he rose and fell, as if heaving a deep sigh. Then he began a curious swaying movement, round and round, or from side to side, much like the movement of a bear.

At last, the skin at the back of his neck cracked open, and his motion became more violent. Extending himself to his greatest length he raised his first pair of legs, the others moving also, but not to such extent, as if praying for help. Then he drew down, down, till he seemed to crouch in despair.

Keenly excited now I gently opened the cocoon-window wider, and now the reason for the decorations of gaudy tubercles was explained.

As he moved in the various directions the spines rubbed against the wall of the cocoon, and thus aided him in discarding the larval skin. The crack in the skin had meanwhile greatly lengthened, and the head parts and leg cases slowly slid downward. It was very much like a child taking off a frock after the back is unbuttoned.

Now appeared to my enraptured gaze a totally new creature. A creature of soft, velvety folds of a golden yellow, with gelatine legs and heavy antennæ (it was evidently a male). The wings, as if folded many times, lay in thick clumps on the body, and the lower body wore the stripes of the perfect moth.

The swaying motion still kept on, the skin moving ever downward till neatly packed away, it formed the masque or cushion found in the empty cocoons.

Now from the segments of the body and seemingly from openings about the head, a yellow varnish began to exude, which gradually covered the whole creature; smoothing down the antennæ and legs, and levelling the wings with the body, till all the parts looked as if covered with yellow glass.

The change of form commenced at about nine o'clock in the evening. It was two o'clock in the morning when completed. The pupa still moved faintly, and was quickly turning a dark brown.

I sealed up the cocoon carefully, and put it away in a cold place to await further developments.

In June the moth came out in perfect order, none the worse for the evening's education it had afforded me.

A NEW ISOTOMA OF THE SNOW FAUNA.

BY J. W. FOLSOM, URBANA, ILLINOIS.

This Canadian species of *Isotoma* is here described in order that its name may be used in a forthcoming article on insects of the snow by Mr. Charles Macnamara, after whom the new collembolan is named. He writes: "This species seems to be confined to wooded swamps; I have never seen it elsewhere; and it sometimes comes out on the snow in small numbers. This is the only pugnacious springtail I have ever observed. It almost always attacks an *Achorutes* put in the same vial with it and sometimes kills it."

***Isotoma macnamarai*, new species.**

Olive green. Legs and furcula pale. Body segments bordered narrowly with black. Head conspicuously large in proportion to the body (fig. 1). Eyes (fig. 2) 8+8, on black patches. Post-antennal organs absent. Antennæ four-fifths as long as the head, with segments in relative lengths as 8, 12, 13, 21; fourth segment elliptical. Sense organ of third antennal segment with two geniculate sense clubs (fig. 3). Fourth antennal segment with slender curving sense hairs. Unguis stout (fig. 4), with a proximal outer pair of small teeth and with a conspicuous inner tooth one-third from the base. Unguiculus more than half as long as unguis, broadly lanceolate, unidentate at the middle of the inner margin. Tenent hair single, unknobbed. Third and fourth abdominal segments subequal in length. Fifth and sixth abdominal segments not ankylosed. Furcula apparently appended to the fifth abdominal segment, gradually tapering and short, extending a little beyond the posterior margin of the second abdominal segment. Manubrium and dentes subequal in length. Dentes crenulate dorsally. Mucrones two-fifths as long as hind ungues, quadridentate (fig. 5); apical tooth short, not hooked; second and third teeth large, subequal; fourth small, lateral, at base of third. Rami of tenaculum quadridentate; corpus with ventral setæ. Clothing of abundant strong curving setæ of moderate length (fig. 6), with long, outstanding, simple sensory setæ, of which there are several pairs on the fourth and the fifth abdominal seg-

ments, and one pair on each of the remaining segments except the prothoracic, which has none. Maximum length, 1.8 mm.

This species is nearest *Isotoma grandiceps* Reuter, from Siberia and St. Lawrence Island, Alaska, but differs from the description of *grandiceps*, particularly in the form and markings of the head, the colour of the body, number of eyes, and number of mucronal teeth.

Arnprior, Ontario, Canada, December to April, inclusive; Charles Macnamara. Ten cotypes.

EXPLANATION OF PLATE VII.

Isotoma macnamarai.—Fig. 1. Dorsal aspect, from photograph by Mr. Macnamara, X 35. Fig. 2. Eyes of left side, X 346. Fig. 3. Sense organ of third antennal segment of right side, X 1120. Fig. 4. Right hind foot, X 653. Fig. 5. Right aspect of right mucro, X 653. Fig. 6. Setæ, median dorsal line of third abdominal segment, X 346.

ENTOMOLOGICAL COLLECTIONS OF THE LATE W. H. HARRINGTON.

The Entomological Collections of the late Mr. W. H. Harrington have been acquired by the Entomological Branch of the Department of Agriculture, Ottawa, and will be incorporated in the Canadian National Collection of Insects. The collection is particularly rich in the parasitic families of the Hymenoptera in which Mr. Harrington was specially interested. It contains a number of types of Provancher's species, as indicated in Messrs. Gahan and Rohwer's account of the "Lectotypes of the Species of Hymenoptera (except Apoidea) described by Abbé Provancher," given in several issues of *The Canadian Entomologist* from volume 49, No. 9, p. 298 to volume 50, No. 6, p. 196; accordingly, any types described as being in the Harrington Collection will now be found in the National Collection at Ottawa.



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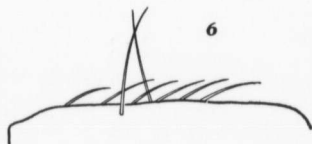


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J. W. FOLBOM



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ISOTOMA MACNAMARAI, n. sp.
See p. 292.

GEOMETRID NOTES—HYDRIOMENA.

BY L. W. SWETT, LEXINGTON, MASS.

The recent issue of Barnes and McDunnough's "Contributions to the Natural History of the Lepidoptera of North America," vol. IV, No. 1, contains an excellent "Revision of the Genus Hydriomena". It is a vast improvement on any former revision, as it is illustrated by excellent plates including figures of the genitalia. The work gives evidence of great pains and careful study and is based on large series of specimens, which unfortunately were lacking to the present writer in his original work on this genus. I would suggest that in order to supplement the revision the future student might work out the egg and pupal structure including the cremaster thorn and the life-histories, which would render it practically complete. In my early paper (Can. Ent., vol. 43, March, 1911) I attempted to straighten out the group on the basis of the palpal structure. I had little material and most of this was loaned, so that I could not study the genitalia, as stated in my article. From the date of my publication until two years ago I had received few additions in this group, and so had no chance to work out the life-histories. Barnes and McDunnough's paper with the figures of the specimens and the genitalia, is quite an advance over my early attempts. During the past year or two I had been in correspondence with Dr. McDunnough on the species of Hydriomena and their genitalia, with the result that except in one or two points we were practically of the same opinions. I have, therefore, very little to add to this valuable work except a few notes on the species. I believe that this classification, based on the genitalia and palpi, is on a sound basis and will be little changed.

Dr. McDunnough's separation of *H. furcata* Thunberg and *quinquefasciata* Packard is a painstaking piece of work. I could not separate these in my early paper as the material was all loaned, and it was only recently after I had made slides of the genitalia that I realized the differences between them.

In regard to *H. albifasciata* Pack. Dr. McDunnough is quite correct. I had only the female to judge by, and it was impossible to place the species correctly without the male. *Resecta* seems also to be a suffused, ruddy form of *albifasciata*, but it may later

prove that we are in error, and in that case the only species it could be referred to is *abacta*. Dr. Taylor and Mr. Grossbeck were the first to suggest the relationship between *albifasciata* Pack. and *reflata* Grote, as pointed out on page 78 of my paper. Dr. McDunnough, on p. 12 of his "Revision," associates *banavahrata* Strecker with *nubilofasciata* Pack., which is better than Dr. Dyar's reference to *californiata* Pack. A year or so ago I ran across a sketch of the type, made by Mr. Grossbeck, and this showed it to be *nubilofasciata* by the outer terminal bands on the primaries. If this sketch was made from the type, and I have every reason to believe it was, then *banavahrata* will fall under *nubilofasciata*. I shall restrict the type of *nubilofasciata* Pack. to the male in the Packard collection, as the female is badly rubbed and is possibly not the same species. The male type of *nubilofasciata* has a reddish shade to the central or mesial space.

In regard to *H. manzanita* Taylor I think this species, or a form of it, occurs in California, as Dr. McDunnough states, though sparingly. I have recently seen three or four rubbed specimens from there.

I have little to add to Dr. McDunnough's remarks (p. 17) on *H. frigidata* Walker and *transfigurata* Swett, except that I believe the labels, in some unaccountable way, were mixed on a specimen from New Brighton, Pa. I do not remember having seen *transfigurata* from Mr. Merrick, but I had several *frigidata* which I sent to Mr. Prout to be compared with Walker's type. Mr. Prout stated that they were the same as *frigidata*. It must have been one of these females, upon which I accidentally put a wrong label, as I knew both species at the time and would not have confused them. *Hydriomena transfigurata* is a rare species and is of a rather uniform, pale green colour. *H. niveifasciata* Swett seems to be correctly placed as a form of *irata*.

Dr. McDunnough's most startling discovery was concerning the types of *H. chiricahuata* Swett (p. 29); viz., that they were not conspecific. I distinctly remember that they were alike in markings, and the fact that he noted the same, goes to prove the value of genital characters in closely allied species. Future work on this group should be based on very large series from all localities, and on field notes.

I think I may have confused Dr. McDunnough on *bistriolata* Zeller, as I was mistaken in supposing the Cambridge specimen to be a paratype. I have made a careful study of Zeller's descriptions and Dr. Hagen's methods, and find that the error may be laid to Packard's door, where he states in the Monograph that he has Zeller's types. Unless Zeller states that the specimens are in the museum at Cambridge they cannot be considered as types, as his descriptions indicate. Hagen appears to have sent specimens to Zeller and placed a yellow label on the specimen agreeing with those he sent; hence they may be considered as having been merely compared with the type. This does not alter our conception of the species as both Dr. McDunnough and I knew it, but changes the fixation of types.

I have positively identified the type of *glaucata* Pack. as the specimen in the Henry Edwards' collection, so labeled. I find in the older plates of the Boston Society of Natural History the wings are reversed, so by a careful comparison of holes and tears in the wing I was able definitely to place it. Mr. Frank Watson has again checked my notes and made comparisons verifying my conclusions. In the original Henry Edwards' catalogue, for No. 1375, he gives "Santa Clara Co., California, taken at rest in forest, on a pine tree, in June." The specimen was originally mounted on a headless brass pin, but was repaired and remounted on May 2, 1917, and stands as No. 13197, Henry Edwards' collection.

Hydriomeva edenata Swett has more elongated primaries than *glaucata* Pack. Apparently Dr. McDunnough has a closely related form, shown on pl. VI, fig. 4, but the basal and mesial lines do not exactly match the type of *glaucata*.

H. regulata looks superficially like a suffused form of some of the *speciosata* group.

H. periclata Swett should be placed as a form of *H. quinquefasciata* Pack., rather than *furcata*, the type having a broken uncus, and a recent second specimen showing the correct location of the form. I am to blame for this, rather than Dr. McDunnough, as in my notes to him on the species I so placed it incorrectly owing to this defect in the type and the lack of other material. The receipt of two males recently from the same locality enabled me to place it correctly.

I have still another new species of *Hydriomena*, which I

received from the Provincial Museum, Victoria, B.C., through Mr. E. H. Blackmore. It may be described as follows:

Hydriomena macdunnoughi, sp. nov.

This species has a very close resemblance to *H. ruberata* in colour and style of markings, and can be best compared with that species.

Palpi moderate, front of head dark ashen, thorax and abdomen fuscous. Fore wings dark ashen gray with a ruddy tinge. The basal band runs straight across the wing, except where it bends outwardly on the median vein and again sharply outwards at vein 1. The mesial band as a whole is smoky fuscous with a ruddy tinge and crossed through the middle by the usual watery band. The intradiscal, black band runs straight to median vein, then makes an incurve to inner margin. Mesial space quite narrow, pale ashen with a ruddy tinge, and containing a prominent, linear, discal dot. Extradiscal line running almost straight across the wing, irregularly scalloped inwardly on the veins. Marginal area ruddy grey with a smoky, curved band running through the centre. There are geminate black dots at the base of the fringe. Hind wings dark, smoky gray with a prominent black, curved band beyond the discal spot.

Fore wings beneath smoky with two outer curved bands beyond the discal spot. Hind wings of same colour with a prominent, black, curved extradiscal line, beyond which is a second faint line.

The fringe on all the wings is short and fuscous.

The palpi in this species are much shorter than in *ruberata*, and the general colour is a darker smoky fuscous with ruddy tinge. The course of the basal and median bands is different from that of *ruberata*. The uncus is broader near the tip, and the valvae do not narrow as in *ruberata*, but are broad and full one-third back from the tip.

Expanse 28 mm.

Holotype.—♂, Atlin, B.C., June 11, 1914, from E. H. Blackmore, in the writer's collection. *Allotype*.—♀, Atlin, B.C., June 11, 1914, in Mr. Blackmore's collection.

Paratypes.—3 ♂'s, Atlin, B.C., June 11, 1914, in coll. Blackmore, and 1 ♂ of above date in collection of the writer.

I have named this species after my friend, Dr. Jas McDunnough, in recognition of his excellent work on the genus *Hydriomena*.

NEW SPECIES OF ODONATA FROM THE SOUTH-
WESTERN UNITED STATES.

PART II.

BY CLARENCE HAMILTON KENNEDY,
Cornell University, Ithaca, N. Y.

The following undescribed species have been in the writer's hands for some time awaiting that time when he had hoped to be able to write a more comprehensive paper covering this region.

I wish to thank Dr. P. P. Calvert for the privilege of describing the *Aeschna* from his collection, and Prof. S. J. Hunter for the privilege of describing the material from the Snow collection.

***Erpetogomphus lampropeltis*, n. sp.**

Holotype.—Male caught by the writer on Sespe Creek, Fillmore, Ventura Co., California, Aug. 7, 1915, and now in the U. S. National Museum.

Paratype.—Female *not in copula* with the holotype but with the same data, now in the U. S. National Museum.

Male.—Length of abdomen 30 mm.; appendages 2 mm. Length of hind wing 25 mm.

Colour.—Face pale gray, with a brown line along the labral suture and one on the fronto-nasal suture. Vertex brown; antennae black ringed with yellow. Rear of head mottled with gray and brown. Eyes bluish gray above shading into gray below.

Thorax with the dark markings dark brown, the pale areas gray as follows: Dorsum brown with the middorsal and mesostigmal keels gray. Antealar ridges brown. A narrow ($\frac{2}{3}$ mm. wide) antehumeral pale stripe sloping outwards from the antealar sinus. A second hair line of gray just anterior to the humeral suture, this line widened above to a triangular spot. Side of thorax gray with an irregular brown line on first lateral suture ($\frac{1}{2}$ mm. wide), and a similar brown line on second lateral suture. These are connected at about one-fourth their length from the alar ridge. Wings hyaline with black pterostigmata. Legs with coxae and femora gray; the latter with a broad, dorsal brown stripe; tibiae and tarsi black.

Abdomen with the pale markings on segs. 1-7 gray (almost white) and on segs. 8-10 an intense and vivid orange brown.

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All dark markings intense black except on segs. 1 and 2, where they are brown. Seg. 1 brown with a large gray spot on its lower posterior angle. Seg. 2 brown with a middorsal pale stripe, the auricle and the lower posterior angle pale. Seg. 3 pale with its side nearly occupied by an anterior and a posterior black spot. Segs. 4-6 black with a pale band on the basal third. Seg. 7 similar but the pale band occupying the basal half. In life this band is very conspicuous because of the great amount of black before and after it. Segs. 8 and 9 with the dorsum black, the apical edge and the lower half of sides orange. Seg. 10 orange, browner at its base. Appendages yellow.

The appendages are like those of *crotalinus* and *designatus*. The tips of the dorsal pair are not as slender as in *designatus*, and the dorsal angle or hump is near the middle of the appendage. The inferior appendage is as in *designatus*.

Female.—Abdomen with appendages 36 mm. long; hind wing 30 mm.

Colour.—As in male but with the brown on segs. 1 and 2 reduced to an apical ring and a broad, lateral stripe. Segs. 3-7 each with a broad, middorsal, lanceolate, pale spot and a pale spot on the lower edge of the side. Segs. 8-10 as in the male.

The vulvar lamina is similar to that of *designatus* but the lateral lobes are broadly triangular, two-fifths as long as seg. 9, and terminate in acute points caudad.

The nearest relative seems to be *designatus*.

This is named after the handsome black-and-white banded king snake of California.

Æschna arida, n. sp.

Holotype.—Male, from Fort Wingate, New Mexico, and now in the collection of Dr. Calvert.

Paratype.—Female, from "Oak Creek Canyon, Arizona, 6,000 ft., Aug., F. H. Snow." This is one of a pair in the Snow collection of Kansas University, at Lawrence, Kansas.

The male of this pair in the Snow collection bears the same pin label as the paratype, and is referred to in the description as the "second male."

Male.—Colour; face greenish, labrum with a black line across its articulation; a narrow fronto-nasal line. T-mark conspicuous.

its stem triangular. Frontal vesicle edged with yellowish above. Occiput small and pale, rear of head black, eyes brown (dried material) with a conspicuous dash.

Thorax brown. Dorsal stripes 1 mm. broad; enlarged at the upper end. Lateral stripes yellowish, (probably greenish in life with yellow ends). Both are broad and straight; the anterior being slightly notched at the middle of its anterior edge and narrower from there to the upper end. Anterior stripe 1.5 mm. wide below, slightly narrower in its upper half; the posterior stripe nearly 2 mm. wide.

Each lateral stripe bordered on both edges of its entire length with a wide band of dark brown. Wings hyaline, stigmata 4 mm. long in type; 3 mm. in second male, dark brown above, yellowish below. Legs black with the bases of the femora dark brown.

Abdomen brown on segs. 1-3, black on 4-10 with blue markings. The figure shows the shape of these.

M D present on segs. 3-7, P D is very large and roughly triangular, fusing broadly below with P L. M L is present on segs. 3-8. A L present on segs. 2-8. A narrow, apical band on seg. 10. Ventral surface probably black.

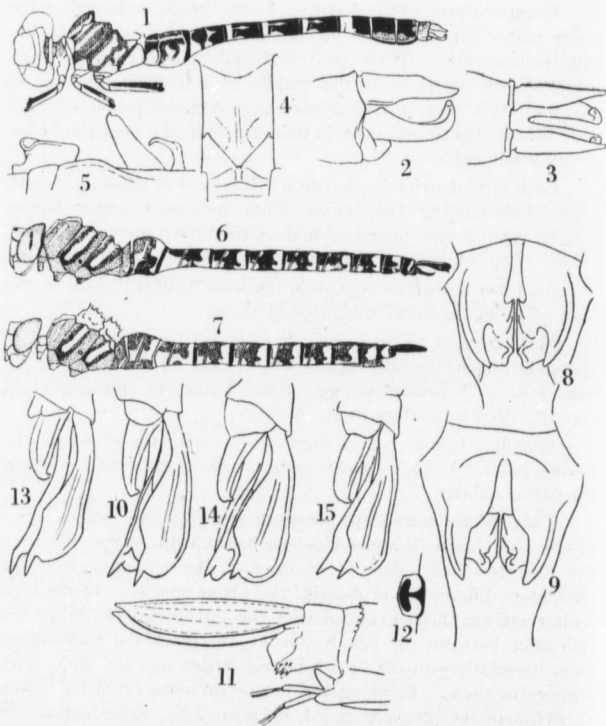
Female.—Colour—as in the male but with the brown of the thorax paler. Veins of wings brown. Abdomen brown, becoming darker caudad.

This species is close to *constricta*, *palmata* and *walkeri*. See figs. 6-15. The male appendages are broad as in *walkeri*, but have the long terminal spines of *constricta*. The hamules show few characters different from those of the above species. In the type male these are thrown caudad with the extruded penis, hence the difference between the figs. 8 and 9. In colour the male differs from its relatives in the broad, lateral stripes and the wide, dark borders to these. From *walkeri* in the presence of M D. From *constricta* in the presence of P L on segs. 5-8. From *palmata* in the greater amount of blue on the abdomen. The female is easily distinguished by the appendages which are narrow, heavy and nearly straight on the dorsal edge.

The name refers to the desert region in which are the more humid mountains from which the types have come.

CAN. ENT. VOL. L.

PLATE VIII



NEW ODONATA FROM THE SOUTHWESTERN UNITED STATES.

See p. 297.

Figs. 1—5. *Erpetogomphus lampropeltis*. 1. Male colour pattern. 2—3. Male appendages 4. Vulva. 5. Male second segment.

Figs. 6—12. *Eschna arida*. 6. Male colour pattern. 7. Female colour pattern. 8. Hamules of "second male". 9. Hamules of Holotype. 10. Appendages of male. 11. Appendages of Paratype. 12. *Eschna constricta*. 14. *Eschna walkeri*. 15. *Eschna palmata*.

POLLINATION OF ALFALFA BY BEES OF THE GENUS
MEGACHILE. TABLE OF CANADIAN SPECIES
OF THE *LATIMANUS* GROUP.

BY F. W. L. SLADEN, APIARIST, DOMINION EXPERIMENTAL FARMS.

A study has been made of the species of bees that trip and therefore, presumably, pollinate the flowers of alfalfa in the parts of Canada where this plant is or can be grown for seed.

In July and August, 1916, the females of a species of leaf-cutter bee, *Megachile diligens*, Sladen* (*latimanus* Cockerell, not of Say) were found to be visiting the fields of alfalfa in bloom and tripping the flowers in considerable numbers at Medicine Hat and Lethbridge, Alta., each flower visited being tripped. The same thing was noticed in 1917, when they were observed to be tripping the flowers at an average rate of 17 per minute. This species was more numerous in the alfalfa fields than five other species of *Megachile* together, (*perihirta* Ckll., *calogaster*, Ckll., *vidu* Sm., *manifesta* Cr. and *brevis* Cr.) all of which performed the same service. Several species of bumble-bees, fairly plentiful, worked more slowly and often failed to trip the flowers. Honey-bees, also plentiful, visited the flowers without tripping them.

Observations made on July 20, 1917, at Summerland, B.C., and on July 21, at Keremeos, B.C., gave the same results, except that *perihirta* was the abundant species, *M. diligens* not having been met with in British Columbia.

M. perihirta was found nesting gregariously in a nearly new and bare gravel railway embankment at Cochrane, Ont., on August 9, 1917. A nest of the same species was found in a nearly new gravel road leading to a dwelling house at Invermere, B.C., in July, 1914. There is, therefore, some hope that *perihirta* might be encouraged to breed in the vicinity of alfalfa fields by spreading gravel and making it firm by rolling. *Diligens* might also be encouraged in this way because it is very closely related to *perihirta* and probably has similar nesting habits.

Closely related to these two species is a third, *latimanus* Say, found in Southeastern Canada. These three species constitute

*The name *diligens* was first used in the Agricultural Gazette of Canada, Feb. 1918, p. 125.
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what may be called the *latimanus* group to which Robertson gave the name *Xanthosarus*.

The males of all three species were taken at the wild liquorice (*Glycyrrhiza lepidota*) at Lethbridge on June 28, 1914. The flowers of this plant wither about the middle of July, and *diligens* was found in abundance on *Psoralea argophylla* within the railway fence between Redcliff and Medicine Hat on July 31, 1917. As both these plants are *papilionaceous*, it is not surprising that alfalfa should prove attractive to these bees. The females of *diligens* show considerable hostility to a person trespassing in the alfalfa fields by zigzagging before him more frequently and more menacingly than bumble-bees do in a field of red clover, but they do not attempt to sting.

The females of the *latimanus* group are very active and energetic, far more so than honey-bees or bumble-bees. Their industry is equalled only by that of *Clisodon terminalis* (*Anthophora furcata* of Europe) which has not been observed at alfalfa except at Ottawa. *Perihirta* shows melanism in the north and on the Pacific Coast. No species answering to the description of the *latimanus* group is recorded in Friese's monograph of the European species of *Megachile* in "Die Bienen Europas," published in 1899.

As the species of the *latimanus* group are very closely related, and not easy to separate, especially in the females, the following table will be useful:

Latimanus Group. (**Xanthosarus** Rob.)

♂.—Fore tarsi dilated, middle femora swelled so that they are stouter than hind femora. *middle basitarsi with a large process or tooth on underside.*

♀.—Large, length 12 to 15 mm. pollen brush pale red, paler at base, white felt hair bands on the apical margins of abdominal segments 3 to 5; 6th dorsal segment well clothed with comparatively long hair which becomes shorter and decumbent towards and at the apex. This hair is white to pale golden but black in northern localities, *and there are always some pale, reddish hairs on the sides of the 6th segment.*

MALES.

1. *Process on middle basitarsi narrow and ridge-like.* Pile pale yellow-brown, becoming paler on exposure. Abdomen densely

clothed, the pale felt bands on the apices of segments 2 to 5 scarcely developed. Length 11 to 13 mm.....*perihirta* Ckll.

Haileybury, Ont.; Cochrane, Ont., (on *Epilobium angustifolium*), August 8, 1917; Lethbridge, Alta.; June 29, 1914; common at Summerland, B.C., Keremeos, B. C., and Victoria, B.C., in July.

1. *Process on middle basitarsus nearly as wide as basitarsus*.....2

2. Pile bright yellow-brown, fading on exposure to pale yellow-brown, abdomen densely clothed, the pale, felt bands on the apices of segments 2 to 5 scarcely developed. Process on middle basitarsus rounded. Anterior tibiae pale below. No spine in front of the middle coxae. Length 12 to

14 mm.....*latimanus* Say.

Digby, N.S.; Ottawa, Ont.; Aweme, Man.; Melfort, Sask.; Lethbridge, Alta.

Pile very pale yellow-brown, fading on exposure to white. Segments 4, 5 and 6 sparsely clothed. Well-marked white felt bands on apical margin of segments 3, 4, 5. Process on middle basitarsus with minute crest at apex. Fore tibiae black on basal half above. A spine in front of the middle coxae.* Length 12 to

14 mm.....*diligens* Sladen (*latimanus* Ckll. not of Say).

Common at Medicine Hat, Alta., and Lethbridge, Alta., throughout July and August.

FEMALES

1. Pile on thorax and base of abdomen greenish white, soon becoming white. Few or no black hairs on upper side of thorax (hairs on disc of thorax short and easily rubbed off). White felt bands on apical margin of segments 3, 4 and 5 wider (about .25 mm. wide in centre of segment 4). Hair on segment 6 entirely pale. Pollen brush pale red only on apical part.....*diligens* Sladen (*latimanus* Ckll. not of Say). Common at Medicine Hat, Alta.; Redcliff, Alta., and Lethbridge, Alta., throughout July and August.
- Pile on thorax and base of abdomen pale brownish yellow, be-

*This remarkable character was pointed out to me by Mr. J. C. Crawford.

coming paler on exposure. A patch of black hair on centre of upper surface of thorax. *White felt bands on apical margin* of segments 3, 4 and 5 *narrower* (about .15 mm. wide or less in centre of segment 4) and narrowed or interrupted in centre, at least on segments 3 and 4. Pollen brush more extensively red.....2.

2. Hair on segment 6 denser, never mixed with black. Apical felt band on segment 5 never interrupted in middle. Black patch on thorax never large. Red of pollen brush somewhat paler.....*latimanus* Say.
 Fredericton, N.B.; Ste. Anne de la Pocatiere, Que.; Ottawa, Ont., common on sunflowers; Toronto, Ont.; Aweme, Man.; Lethbridge, Alta.; July and August.

Hair on segment 6 less dense, usually pale and almost entirely black in specimens from Northern Ontario and Northern Alberta; these specimens and specimens from Victoria, B.C., have the white felt bands, on apices of segment 3 and 4, and also sometimes on segment 5 very weak and widely interrupted in middle. Black patch on thorax larger (in specimens from Northern Ontario and Northern Alberta covering almost the entire upper surface). Red of pollen brush somewhat brighter.....*perihirta* Ckll.

Thornloe, Ont.; Cochrane, Ont.; Athabaska, Alta.; Lethbridge, Alta.; Invermere, B.C.; Penticton, B.C., Keremeos, B.C. and Victoria, B.C. Specimens from the interior valleys of Southern British Columbia are almost indistinguishable from those of *latimanus* Say.

Next in importance to the species of the *latimanus* group in the pollination of alfalfa is *Megachile calogaster* Ckll., a variety of, or closely related to *M. melanophæa* Sm. *M. calogaster* has no white felt bands at the apices of any of the abdominal segments, and segments 3 to 5 are black haired. The female has a bright red pollen brush, and the fore tarsi of the males are dilated and pale as in the *latimanus* group. It is common in Southern Alberta and Southern British Columbia, flying from about the middle of June until about the end of July, that is two or three weeks earlier than those of the *latimanus* group. It is found on many flowers besides alfalfa.

NEW SPECIES OF RHODITES FROM OREGON.

BY WILLIAM BEUTENMULLER, NEW YORK.

Rhodites oregonensis, sp. nov.

Female.—Head black, coarsely rugoso-punctate and finely pubescent. Antennæ 14-jointed, black. Thorax jet black, shining, minutely rugose with larger punctures, pubescent. Parapsidal grooves continuous, very distinct, and moderately widely apart at the scutellum. Median groove distinct, gradually becoming finer forwardly, especially between the anterior parallel lines, and practically lost at the collar. Anterior parallel lines fine and close to the median groove. Lateral groove very fine and scarcely defined. Pleuræ finely rugose with a large, smooth, polished area. Scutellum subopaque, black, finely and evenly rugose, basal fovea wanting. Abdomen rufous, terminal segment blackish, microscopically punctate on the dorsal half of the last four segments, lower half and basal segments smooth. The punctured segments are clothed with yellowish decumbent hairs at their bases laterally, ventral sheath black, plough-shaped and extending beyond the last segment. Dorsum and venter rather sharply keeled with the sides moderately rounded. Legs rufous, tarsi dark brown-black. Wings yellowish, hyaline, veins dark brown and stout, transverse veins, slightly infuscated. Radial area closed, cubitus not continuous. Areolet large. Length 4.50 mm.

Gall.—(Plate, IX, Figs. 1-6). On the tip of the twigs or in the seed-pods of *Rosa nutkana*. Monothalamous. Red, smooth, elongate or subspindle-shaped with the apex rather sharply pointed and broader at the base, sometimes with the apex more or less rounded. It is an elongated malformation of a bud. Larval chamber large and situated at the base of the gall. (Figs. 1-4). When in the seed-pod the gall is somewhat like the kernel of a wheat or oat, and is densely covered with short, hairy filaments. The entire seed-pod, as a general rule, is completely filled with galls, closely packed together, sometimes causing the pod to burst open when the galls therein reach maturity. (Figs. 5-6.)

Habitat.—Corvallis, Oregon, (B. G. Thompson).

It is a very distinct species allied to *Rhodites rosæ*, *nodulosus* and *verna*. There are no differences between the flies I bred from

the twig galls from those in the seed-pods. The galls were sent to me in February, 1917, and the flies began to emerge indoors from February 28th until late in March. I also received galls in July collected by Mr. Thompson, who deserves credit for discovering this interesting new species as well as the three following species.

Rhodites ashmeadi, sp. nov.

Female.—Head black, finely and evenly granulate. Antennae black, 14-jointed. Thorax black, very slightly shining, minutely granulate, with larger punctures. Parapsidal grooves fine and sharply defined, running almost parallel from the collar to the scutellum where they suddenly curved inwardly but are rather widely apart at this point. Median groove fine, and running from the scutellum to about the ends of the anterior parallel lines and are obliterated anteriorly. Anterior parallel lines very fine and scarcely evident, and widely separated. Lateral grooves exceedingly fine. Scutellum opaque, very finely and evenly rugose, granulated not more so than the thorax, basal fovea wanting. Pleurae black, finely granulated with a smooth, polished area. Abdomen rufous, terminal segments and dorsum darker, terminal segments, punctate, and with short, yellowish, decumbent hairs, and more sharply keeled than the basal segments. Ventral spine not extending beyond the last segment. Wings dusky hyaline, radial cell yellowish brown and a small cloud beyond. Radial area closed. Cubitus continuous. Areolet distinct. Length 3-3.50 mm.

Gall.—(Plate IX, Figs. 7-10). On the stems of *Rosa nutkana*. Polythalamous. A hard, fusiform swelling of the twig varying from 12-30 mm. in length, and from 4-7 mm. in width. It is hard and woody like the stem and has numerous cells inside. (Fig. 7.) Externally it is red and smooth like the stem.

Habitat.—Corvallis, Oregon. (B. G. Thompson).

The galls were received from Mr. B. G. Thompson early in February, 1917, and the flies emerged from the latter part of this month until April 7th, 1917. Named in honor of the late Dr. W. H. Ashmead, who helped me so much in my studies of the Cynipidae.

Rhodites ostensackeni, sp. nov.

Female.—Head black, roughly and evenly rugose. Antennæ 14-jointed, 3rd joint very long, following joints considerably shorter and subequal. Thorax black, highly polished, sparsely punctate but densely so between the parapsidal grooves at the scutellum, and with scattered, minute, yellowish hairs. Parapsidal grooves very distinct, deep and finely punctate. Median groove fine and continuous. Anterior parallel lines indistinctly evident. Lateral grooves short and distinct. Pleuræ finely rugoso-punctate without a smooth, shining area. Scutellum opaque, finely rugose, basal fovea wanting. Abdomen black or piceous, subglobose, microscopically punctate from the fourth to last segments, basal segments smooth. Ventral spine stout, extending slightly beyond the last segment. Legs rufous. Wing hyaline, clouded with yellowish brown in the radial cell and a little beyond. Veins dark brown. Radial area open at the costa. Cubitus continuous. Areolet large. Length 3-3.75 mm.

Gall.—(Plate IX, Figs. 11, 12). On the roots of *Rosa nulkana*. Polythalamous. Irregularly rounded and composed of confluent nodules, and is more or less irregularly grooved. At the place of attachment it is on a short stalk, and the gall may be easily removed. Inside are numerous hard larval cells firmly imbedded in the pithy substance. It looks very much like a miniature gall of *Rhodites radicum*. Width 12-17 mm. Height 10-15 mm.

Habitat.—Corvallis, Oregon. (B. G. Thompson).

A distinct species allied to *Rhodites utahensis* and *R. radicum*. The galls were sent to me by Mr. Thompson early in February, and the flies began to emerge about March 30th and early in April. Named in honour of the late R. von Ostensacken, the pioneer on the work of American Cynipidæ.

Rhodites basseti, sp. nov.

Female.—Head black, densely punctate on the face, less so on the vertex and cheeks. Antennæ black, 14-jointed. Thorax black, very densely and finely punctate, subopaque. Parapsidal grooves rather sharply defined, continuous and widely apart at the scutellum. Median groove delicate and scarcely defined

anteriorly. Anterior parallel lines very delicate. Lateral grooves fine. Pleuræ black, subopaque, rugosely punctate with a shining, smooth or almost smooth area. Scutellum black, rugose and without basal fovea. Abdomen black, smooth, shining, with the ventral sheath extending slightly beyond the tip of the abdomen. Legs rufous. Wings dusky hyaline with the cubital and radial cells yellowish brown and a slight cloud of this colour in the large terminal area. Veins brown. Radial area closed on the costa. Cubitus distinctly continuous. Areolet distinct. Length 2.50-3 mm.

Male.—Colour of the female. Antennæ 15-jointed. Wings somewhat less infuscated in the cells. Length 2-2.75 mm.

Gall.—(Plate IX, Figs. 13, 14). On the tips of the twigs of *Rosa nutkana*. Polythalamous. A rounded, hard and woody gall densely covered with long, green filaments forming a moss-like mass as in *Rhodites rosæ*, and strongly concave at the place of attachment. Diameter 17-38 mm.

Habitat.—Corvallis, Oregon. (B. G. Thompson).

A number of galls of this species were sent to me by Mr. B. G. Thompson, collected December 10th, 1916. At first I considered them to be *Rhodites rosæ* Linn. But when the flies began to emerge (indoors) during the latter part of February until about the middle of March, I found that they were different from *R. rosæ* in sculpture and colour. The gall, although similar externally to *R. rosæ*, differs by being more woody inside and strongly concave at the place of attachment, being almost like an inverted cup or bowl in shape, while the gall of *R. rosæ* is composed of an agglomeration of hard cells around a branch. Named after the late Homer F. Bassett.

EXPLANATION OF PLATE IX.

- Figs. 1-4 *Rhodites oregonensis* Beutm., on tips of branches.
 Figs. 5-6 " " " in seed-pods.
 Figs. 7-10 " *ashmeadi* Beutm.
 Figs. 11-12 " *ostensackeni* Beutm.
 Figs. 13-14 " *bassetti* Beutm.



11



13



12



14

GALLS OF NEW SPECIES OF RHODITES.

See p. 308.

A NEW NORTH AMERICAN SPECIES OF ANTHOMYIIDÆ
(DIPTERA).

BY J. R. MALLOCH, URBANA, ILL.

Among some Diptera recently received from Mr. C. W. Johnson I have found several very interesting forms, some of which are evidently undescribed. One of the most striking forms is the one described herewith, which is also represented in material in my hands belonging to the U. S. Bureau of Biological Survey.

***Hylemyia pluvialis*, n. sp.**

Male.—Black, covered with dense gray pruinescence. Antennæ and palpi black; orbits and face with silvery pruinescence. Thorax not vittate. Abdomen with an interrupted dorso-central black stripe, which is slightly dilated at anterior margin of each segment. Legs black, tibiæ entirely or in large part rufous. Wings clear.

Eyes separated by less than distance across posterior ocelli; arista with the longest hairs about twice as long as basal diameter of arista. Prealar bristle usually absent; 3 strong pairs of pre-sutural acrostichals usually present; pleura with normal hairs and bristles. Third dorsal abdominal segments with a truncate extension at posterior lateral angle; fifth sternite with broad processes which extend almost to apex of abdomen and are armed along outer margin with a fringe of long, slender bristles which are directed downward and curve mesad at their apices.

Fore tibia with one posterior bristle above middle; third and fourth fore tarsal joints slightly dilated; mid tibia with 1-2 antero-dorsal and 2-3 postero-dorsal bristles; hind femur with 5-6 widely spaced antero-ventral bristles, and 4-5 weak postero-ventral setulose hairs on basal half; hind tibia with 3-5 antero-dorsal and 3 postero-dorsal bristles, and 5-6 antero-ventral, and 7-9 postero-ventral setulose hairs. Third and fourth wing-veins slightly convergent apically; costal thorn of moderate length.

Length 5 mm.

Type locality, Gold Rock, Ont., Rainy River District, July 21 (H. H. Newcomb).

Paratypes.—Estes Park, Moraine Park, altitude 7,500 feet, Col. (E. C. Jackson.)

September, 1918

Type in collection of Illinois Natural History Survey, paratypes in collection of U. S. Bureau of Biological Survey.

TWO NEW HYDROTÆAS. (DIPTERA, ANTHOMYIDÆ).

BY J. M. ALDRICH,

Bureau of Entomology, U. S. Dept. of Agriculture

The two species herein described possess the common characters of the genus,—sixth vein not reaching the margin of the wing, scutellum bare below, hind calypter projecting beyond the front one, four posterior dorsocentrals, and in the male two teeth on the underside of the front femur near tip. Males of the genus are quite easily separated by the armature of the legs, but these characters are greatly reduced or mostly absent in females, which are in several instances very difficult to distinguish. Mr. Malloch has tabulated the males for the known North American species in Bulletin of the Brooklyn Entomological Society, XI, 108, 1916, and the females in the same journal, XIII, 30, 1918. With the two herein described we have a total of 17 species, of which 9 are European.

The function of the femoral teeth which occur regularly in the males has not been observed to my knowledge. I surmise that the male grasps the front edge of the wing of the female with the femur and tibia during copulation; while this is merely a theory, it is offered as a stimulus to observation.

Hydrotæa orbitalis, n. sp.

Male.—General colour deep black, only the abdomen noticeably pollinose. Eyes bare, separated on the front by about two-thirds of the space between the hind ocelli, the black median stripe distinct to ocelli, orbits very narrow, widening close to the antennæ, shining black to the level of the arista, below this like the flat facialia they are thinly brown pollinose; lunule white pollinose; antennæ black, of ordinary size, arista bare; palpi and proboscis black. Thorax subshining black above, more opaque black anteriorly, with no stripes; pleuræ wholly shining except a space above hind coxæ, which with the postnotum is thinly brown pollinose. Prealar wanting; two or three pairs of anterior acrostichals in rows close together, a few very delicate hairs barely visible

between them; halteres with black knob; calypters yellow. Abdomen ovate, above with somewhat changeable pollen with a rather bluish cast, showing an indistinct median black stripe. Legs black, front femora with the usual two teeth below near tip, the outer bearing four small spines on its outer side, with which several longer bristles near the base form a widely interrupted row; front tibia without bristles except at apex; middle femur with long, soft hairs on front and hind sides, a few more bristle-like in front on basal half, middle tibia with no bristles on outer front side in one specimen, in the other with one very small, and in both with two behind; hind femur on outer side with complete upper and lower rows of bristles, both nearly horizontal, and numerous hairs below on inner side, some of which beyond middle are bristly; hind tibia with one long bristle behind below middle, a complete row of cilia on outer hind side including one bristle below the middle, a row of cilia on apical half of outer front side, and on inner front side for the middle third a loose row of erect, slender hairs of which the uppermost are one-half longer than the thickness of the tibia; at the tip of the hind tibia on the inner side is a row of a dozen close-set little spines forming a small comb, which stands in a diagonal position. Tarsi of ordinary form, the pulvilli not much elongated. Wing brownish, narrow, third and fourth veins a little convergent, last section of fourth more than twice the preceding.

Length 6 mm.

Female unknown.

Two males: the type is from Lafayette, Ind., June 20, 1916; paratype Moscow, Idaho, June 19, 1910, taken on parsnip flowers. Both collected by the writer. The type will be deposited in the National Museum.

In Malloch's table the species runs to couplet 10, and of the remaining species is nearest related to *bispinosa* Zett., which, however, has a strong bristle on outer front side of middle tibia, and lacks the peculiar hairs on the inner front side of the hind tibia.

Hydrotæa comata, n. sp.

Male.—Deep black, subshining, abdomen only faintly pollinose. Eyes bare, separated at middle of front by about the dis-

tance between hind ocelli; frontal stripe extending to ocelli; orbits very narrow, widening below, shining black to below level of arista, then thinly brown pollinose; facialia and lunule more densely brown pollinose; antennæ black, of ordinary size, arista bare, its penultimate joint longer than wide; palpi and proboscis black; postorbital cilia long, slender, curling over the eye. Thorax shining black, unstriped, only the postnotum and a space above the hind coxa with thin, brown pollen; prealar indistinguishable among some long hairs, several pairs of long, erect anterior acrostichals mixed with slender, tall hairs; mesopleura and sternopleura with abundant long hair, the two stpl. bristles of striking length; halteres blackish, calypters deep yellow. Abdomen rather elongate, shining black, only when viewed from behind showing a thin, dark pollen with a median dark stripe. Legs wholly shining black; front femora with the usual two teeth below, and abundant hairs on outer side, among which below about five bristles form a short row; front tibiæ broadly flattened and corrugated on the inner side opposite the femoral teeth, without bristles except at tip; middle femora on front side with short, erect, dense hairs, on hind side with immensely long hairs, some $\frac{2}{5}$ as long as the femur; middle tibia on outer front side with four slender bristles beyond middle, the subapical long and hairlike; on the outer hind side with four bristles, and on inner hind side close to tip with half a dozen smallish, hairlike bristles; middle basitarsus with unusually long hairs below, which are longer apically and continue but slightly reduced to the tip of the following joint; hind femur below at base with a stout, erect double spine with crooked tip; on the outer side the upper series of bristles is complete and the lower begins at the middle; hind tibia with striking rows of long villous hairs or bristles on the outer and inner flexor sides, the outer especially long, some of them $\frac{2}{5}$ as long as the tibia; a distinct bristle just below the middle behind, and on the outer hind side a series of long hairs in which two bristles occur. Pulvilli dark, not elongated.

Wings brownish, third and fourth veins barely convergent; last segment of the fourth less than twice the preceding.

Female.—Shining black, including abdomen. Front one-third the head-width, velvet black except the large, shining ocellar

triangle, which stops just short of the cruciate bristles, and the shining orbits, which become very wide near the antennæ, where together they exceed the stripe; thorax with the hairs not unusually developed; two pairs of large, anterior acrostichals with hairs between and before; prealar distinct, more than one-third as long as following bristle; two sternopleurals behind, the lower smaller, and one in front. Front tibia with one or two very minute bristles in front; middle tibia with three on outer front beyond middle, four on outer hind; hind tibia with one long behind, three on outer hind, three on outer front; middle tarsi normal; middle femur with a row of short bristles on front side, ending abruptly at middle, no unusual hairs behind. Calypters as in male, halteres more brown than black.

Length of male 7.2 mm.; of female 6.4 mm.

One male, one female, collected at Tacoma, Wash., on June 27, 1917, by Professor A. L. Melander, to whom they are returned.

The male runs to *oculta* in Malloch's table, from which it differs in many characters, among them the presence of dense hair below on the first two joints of the middle tarsus. The female hardly runs at all in Malloch's table, as the halteres are intermediate between yellow and black, the first alternative; it separates from all other species in large size, wide shining, black orbits, and the armature of the middle tibia.

OBITUARY.

LIEUT. VERNON KING.

We regret to record the death of Lieut. Vernon King of the Royal Flying Corps, who was killed in France on April 11th, 1918.

Lieut. King was a graduate of the Ontario Agricultural College, Guelph, and before enlisting was a Scientific Assistant in the Branch of Cereal and Forage Insect Investigations of the Bureau of Entomology, U. S. Dept. of Agriculture. He resigned his position in November, 1914, and proceeded to England. After serving at the Dardanelles he joined the Flying Corps and was killed in an air fight while carrying on duties as an observer on the date mentioned. He was an extremely promising young man, and was very well liked by all who knew him.

September, 1918

PARTIAL KEY TO THE GENUS *AGROMYZA* (DIPTERA).
FOURTH PAPER.

BY J. R. MALLOCH, URBANA, ILL.

The key presented in this paper contains species with the following characters:

Frons partly reddish or yellow, either the interfrontalia or orbits or both entirely or in part pale; scutellum not noticeably paler than dorsum of thorax; costa extending to apex of fourth vein; halteres whitish or yellowish.

I believe that the species I described as *coloradensis* in October, 1913, is the same as that described by Melander, a week or two before the appearance of my paper, under the name *genualis*. The descriptions agree so clearly that I have indicated the synonymy in the present paper.

I have included *aceris* Greene in this key although I cannot tell definitely from the description whether the frons is partly red in front or not. The species is closely related to *pruinosa* with which it is compared in the key. There are several species closely related to these two, including *pruni* Grossenbacher, and *waltoni* Malloch, the arbitrary characters used in the keys being responsible for their occurrence in different papers in this series. All of the cambium-mining species I have examined have the orbits poorly or not at all differentiated from the interfrontalia, the thorax with very dense pruinescence, and 4 pairs of dorso-central bristles.

- | | |
|--|-------------------------------|
| 1. Mesonotum opaque gray; centre of disc between the rows of dorsocentrals with a yellowish brown longitudinal vitta which extends on to the disc of scutellum; 4 pairs of dorsocentrals present. Food-plant unknown. N. H.; Mo.; Ill.; N. M.; B. C..... | <i>immaculata</i> Coquillett. |
| Mesonotum shining, or if opaque gray then without a longitudinal vitta..... | 2 |
| 2. Antennæ entirely yellow or reddish, the third joint occasionally slightly darkened at insertion of the arista..... | 3 |
| At least the third antenal joint black..... | 10 |
| 3. Pleuræ most yellow..... | 4 |
| Pleuræ black, at most the sutures yellowish..... | 6 |

4. Lateral margins of mesonotum concolorous with disc; pleurae entirely yellow. Food-plant unknown.
 Ill.....*pleuralis* Malloch.
 Lateral margins of mesonotum yellow; pleurae with dark marks.....5
5. Very small species, 1 mm. in length; frons subquadrate; mesonotum with 3 pairs of dorso-centrals. Food-plant unknown. Wash.....*clara* Melander.
 Larger species, 1.5 mm. in length; frons longer than broad; mesonotum with 4 pairs of dorso-centrals. Food-plant unknown. Cal.; Maine.....*citrefrons* Malloch.
6. Lateral margins of mesonotum pale yellow.....7
 Lateral margins of mesonotum concolorous with disc.....8
7. Last section of fifth vein subequal to preceding section. Food-plant unknown. Alaska.....*pollinosa* Melander.
 Last section of fifth vein twice as long as preceding section. Food-plant unknown. N. M.....*indecisa* Malloch.
8. Legs entirely black; frons reddish in front, blackish behind; thorax densely gray pruinescent, with 4 pairs of dorso-centrals; outer cross-vein at its own length from inner. Larvæ mining in cambium of *Amelanchier canadensis*. W. Va.....*amelanchieris* Greené.
 Legs with the knees at least pale, either reddish or yellow....8a.
- 8a. Large, robust species, at least 4 mm. in length; orbits poorly or not at all differentiated from interfrontalia; thorax with 4 pairs of dorso-central bristles.....8b.
 Smaller, slender species, at most 3 mm. in length; orbits well differentiated from interfrontalia; thorax with 2, rarely 3, pairs of dorso-central bristles.....9
- 8b. Palpi reddish yellow; first costal division not over two-thirds as long as second; last section of fifth vein subequal to penultimate section. Larvæ mining in cambium of *Betula niger*. Col., Va., Ill.....*pruinosa* Coquillett.
 Palpi black; first costal division about three-fourths as long as second; last section of fifth vein distinctly longer than penultimate section. Larvæ mining in cambium of *Acer rubrum*. Va.....*aceris* Greene.
9. Last section of fifth vein 1 1/3 times as long as preceding sec-

- tion first costal division (that beyond humeral vein) over half as long as second; interfrontalia entirely reddish; orbital and dorso-central bristles weak; proboscis and palpi fuscous; food-plant unknown. Ill.....*albidohalterata* Malloch.
- Last section of fifth vein subequal to preceding section; first costal division half as long as second; interfrontalia infuscated on upper half; orbital and dorso-central bristles strong; proboscis and palpi orange-coloured. Food-plant unknown. D. C., Pa., Ill.....*varifrons* Coquillett.
10. Lateral margins of mesonotum broadly pale yellow.....11
Lateral margins of mesonotum narrowly, or not at all, yellow, the pale colour confined almost entirely to the suture or to the extreme upper margin of the pleuræ.....12.
11. Frons with the centre stripe pale yellow; orbits sometimes blackened posteriorly; legs black, knees never yellow. Larvæ mining leaves of *Malva*, *Verbena*, *Solidago*, *Helianthus*, etc. General.....*jucunda* V. d. Wulp.
- Frons with centre stripe more or less blackened; legs with knees pale yellow. Larvæ mining leaves of oats, wheat and other cereals. General.....*coquilletti* Malloch.
12. Palpi yellow. Food-plant unknown.
General.....*longipennis* Loew.
Palpi black.....13.
13. Legs entirely black.....13.
Legs in part yellow.....15.
14. Shining black species, very slightly dusted; interfrontalia yellow; thoracic bristles very long; 4 pairs of strong dorso-centrals; last section of fourth vein three times as long as preceding section. Food-plant unknown.
Mont.....*rutiliceps* Melander.
- Opaque black, pollinose species; thoracic bristles distinct from setulæ; abdomen entirely black; frons reddish anteriorly, black posteriorly. Larvæ mining in cambium of *Amelanchier canadensis*. W. Va.....*amelanchieris* Greene.
- Opaque black, pollinose species; interfrontalia yellow; thoracic setulæ long, dorso-centrals scarcely distinguishable from them except the posterior pair; last section of fourth vein

- 4 times as long as preceding section. Food-plant unknown.
 Id.....*auriceps* Melander.
15. Small species, 1.5-2 mm. in length; general colour shining black, interfrontalia black; orbits lemon yellow on upper half; apical half of femora yellow; tibiae brownish yellow. Food-plant unknown. Mass., D. C., Ind., Ill.....*marginata* Loew.
- Larger species, 2.5-3.5 mm. in length; general colour opaque black, gray pollinose; interfrontalia and orbits largely or entirely yellow; femora narrowly yellow at apices. Food-plant unknown. Mont., Id., Wash., Col.,
 Maine.....(*coloradensis* Malloch) *genualis* Melander.

OUR BIRCH *SYMDOBIUS* DISTINCT FROM THE EUROPEAN. (APHIDIDÆ—HOM.)

BY A. C. BAKER, WASHINGTON, D.C.

In 1909 specimens of the oviparous female of a species of *Symydobius* were collected from birch by the writer at Puslinch Lake near Guelph, Ont. These were determined as *oblongus* Heyden. Dr. Edith M. Patch* found the same species in Maine in 1908 and gave an excellent description and figures of it under the name *oblongus*. Specimens collected in 1903 on *Betula alba* in Minneapolis, Minn., presumably by Mr. Theo. Pergande, are now in the collection of the Bureau of Entomology. A study of the different specimens available has led the writer to conclude that our American form is quite a distinct species.

Specimens of *S. oblongus* taken in Petrograd by Chlodkovsky, in Warsaw by Mordwilko, and in Brussels by Schouteden, all agree in characters, and these are uniformly different from our American species.

In the alate form the most striking difference is met with in the relative lengths of the antennal segments. This will be seen from the following measurements of *oblongus* as compared with the description of the American species given herewith.

S. oblongus III, 1.12 mm.; IV, 0.72 mm.; V, 0.528 mm.; VI, (0.208 mm.+0.112 mm.).

*Me. Agr. Exp. Sta., Bull. 181.
 September, 1918

It will be seen by these measurements that the unguis of segment VI is much shorter than the base and only about one-tenth as long as segment III. In the American species on the other hand the base and the unguis of segment VI are almost equal, and the unguis is about one-fourth as long as segment III. In the American species also the anal plate is somewhat indented, whereas in the European species this is not noticed.

The apterous forms show the same differences between the two species in regard to segment VI of the antennæ. the European species measuring III, 1.168 mm.; IV, 0.72 mm.; V, 0.512 mm.; VI, (0.144 mm.+0.112 mm.). Another difference between the two species in this form is that in the American species segment III is armed with a row of sensoria which cover the entire segment, whereas in *oblongus* only the basal half of the segment is covered. There is this same difference also in the alate forms, but a little more than half of segment III is covered in *oblongus*.

***Symydobius americanus*, n. sp.**

Alate viviparous female.—Antennal segments as follows: III, 0.96 mm.; IV, 0.64 mm.; V, 0.528 mm.; VI, (0.224 mm.+0.24 mm.). Segment III with a row of about 25 rather small protruding sensoria arranged in a more or less even row over the entire segment. Hind tibiæ 1.28 mm., hind tarsus 0.192 mm.; hind wing about 3 mm. long, cauda rounded, anal plate slightly notched.

Colour brown, abdomen with dark transverse bands, cornicles pale, wing veins heavily bordered with dark brown; antennæ with segments I to III and the distal extremities of IV, V and VI dark brown, the remainder yellowish white.

Apterous viviparous female.—Antennæ as follows: III, 1.15 mm.; IV, 0.72 mm.; V, 0.592 mm.; VI, (0.24 mm.+0.24 mm.). Segment III, armed with about 20 circular sensoria in a somewhat even row along the segment. Hind tibiæ somewhat curved, about 2.88 mm. long; hind tarsus 0.224 mm. Cauda and anal plate similar to those of the alate form. Length from vertex to tip of cauda 2.88 mm.

Colour brown. Antennæ and cornicles similar to those of the alate form. Abdomen with transverse brown markings. Eyes red.

Oviparous female.—Antennæ as follows: III, 0.928 mm.; IV, 0.512 mm.; V, 0.416 mm.; VI, (0.208 mm.+0.24 mm.). Segment III armed with sensoria as in the apterous viviparous female. Hind tibiæ 1.44 mm. long; slightly swollen and armed with a very large number of rather small, indistinct sensoria; hind tarsus 0.224 mm.; caudal extremity somewhat drawn out into an ovipositor though not prominently so.

Colour as in the apterous viviparous form.

Described from specimens in balsam mounts.

Type in U. S. Nat. Museum.

The two species may be separated by means of the following characters:

- A. Unguis of segment VI considerably shorter than the base and about one-tenth as long as segment III; sensoria on segment III on basal half only.....*oblongus*.
- B. Unguis of segment III about equal to base and about one-fourth as long as segment III; sensoria on segment III in a row covering entire segment.....*americanus*.

HOW EMPHOR DRINKS.

BY CHARLES ROBERTSON, CARLINVILLE, ILLINOIS.

The fact that *Emphor bombiformis* rests upon the water when drinking, mentioned under the above title by Frederick Knab in Proc. Ent. Soc. Washington, Vol. XIII, p. 170, 1911, was observed in 1890 and was recorded in the Canadian Entomologist, Vol. XXII, p. 217. It is fairly certain that the bees were not drinking in the ordinary sense, but that they consisted exclusively of females which were getting water to soften the earth in which they were making excavations for their nests.