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POPULAR AND PRACTICAL ENTOMOLOGY.

FRESH WOODS AND PASTURES NEW.

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I.

Love of novelty never fades: it is the will-o'-the-wisp that lures us on in the morning of our years, and many a dance it leads us through the day. But long before noon we become aware of a steady glow from the opposite quarter: it is the glamour of the past and is destined to brighten our declining days in the evening of life. This charm of the old familiar things so grows on us that at last nothing grips the heart quite like meeting old friends; and among our friends surely not least are the flowers and their myriad winged visitors, so intimately associated with many a long summer's day ramble. So it comes about that a new locality, neither distant enough to be strange, nor near enough to be stale, beckons with both hands (as it were) by this double lure of new and old.

It was the beginning of May when I first set out to conquer the hinterland of my new home in Peterborough, armed to the teeth (almost) with Gray's botany and a cyanide jar. I had heard so often of the great Cavan swamp that I felt it must be subjugated first and a pretty heavy toll exacted of *flora* and *fauna*. One or two who took the trouble to answer me when I pestered them with questions, had told me that if I went far enough west on Smith Street I would certainly find the swamp. So out I marched, bag and baggage, and, sure enough, less than an hour brought me to a great stretch of wooded swamp on the north of the road: a fringe of willows and cedar, a broad belt of tall poplars, and, beyond that, tamarack, spruce, balsam—yes, and over yonder to the northeast, hemlock and a large hardwood of maple—sights to make the botanist's heart beat. But alas! man, who murders to dissect, has drained the Cavan swamp in a vain effort to reclaim

the land; the natural growth of sphagnum has been killed and the floral wealth of Cavan is no more. All this I had yet to discover.

The day was bright, but a cold wind had encountered me on the road, that fought obstinately against my advance, hanging on my flank and stinging me with its slings and arrows. In the shelter of the swamp these missiles hurtled harmlessly over my head, while I roamed about through the hush of shadowed groves and across sunlit glades to the soft music of drumming partridges: they seemed to be everywhere in the heart of the swamp, and from time to time as I pressed forward I would flush one of the drummers from its retreat a few paces off. After about an hour of progress I found myself in a thick growth of cedars, and, working east a few rods, emerged at a great clearing just south of the G.T.R. between Peterborough and Best's. Between me and the railway was a wide sluggish stream of peaty-looking water—known (I believe) as a municipal ditch. The clearing extended east from where I stood for half a mile, with the drain on the north and a hardwood bush on the south; its greatest width was about 200 yards. It had been covered with small trees, mostly cedar, poplar, alder and elm; these had been nearly all cut down and much of the débris was lying on the ground. However, a fringe of alders still stood along the south bank of the stream, and the west end of the clearing had not been so heavily slashed.

While standing on the edge of this clearing I spied a large *Chrysomela* crawling up a burnt stump among the alders. It had the usual ebony pattern on its elytra; but instead of being creamy white, the ground colour was a rich chestnut. At the point of capture the insect dropped to the ground, but I was not to be denied, and a few minutes' search revealed my prize under a dead leaf. One swallow doesn't make a summer; it would be rash from a single beetle on a burnt stump to argue a new species of *Chrysomela* owing its brilliant complexion to a diet of charcoal. The neighbouring alders had not yet leafed out, but I searched their stems and branches carefully for over an hour and felt fully repaid by the result: four captures and one escape of the same chestnut-crimson *Chrysomela*; besides a dozen specimens of a beetle new to me so far except in cabinets *Lina lapponica (interrupta)*; both insects evidently hibernated freely.

Towards the end of May, when the foliage was all out, I tramped along the railway track to the east end of this place and spent most of the sunny hours of one Saturday roaming about the clearing. As I approached I could hear a man driving hardwood pickets into soggy ground in the heart of the swamp. The sound went on all day (just west of the clearing) at regular intervals. But in the clearing itself such abundance and variety of leaf-eating beetles—especially *Chrysomelas*—I have never met with. If *Chrysomela* means golden sheep, then this certainly was the enchanted land of Colchis, for golden fleeces hung on every tree; and if the word means golden apple, here was every branch laden with gleaming fruit, a veritable garden of the Hesperides.

Was the dragon that guarded the fruit asleep, or was it that indefatigable laborer hammering stakes into the ground behind the alder thicket? What good was a fence, anyway, in the heart of such a swamp? When the sound of that incessant hammer kept up till long after six o'clock, my curiosity got the better of me, and, stealing through the cedars and poplars at the west end of the clearing, I soon found myself on the edge of the municipal ditch and only a few yards from the mysterious workman; he stopped as soon as he saw me, and, without any warning, rose into the air and flapped heavily away over the trees—a common bittern; ten minutes later he was driving piles into the bank of Lily Lake half a mile away.

When I came to check over the day's bag of Chrysomelids—a work whose successful completion was due to Dr. Bethune's kind help—it was something like this. On willow in the clearing I had taken about a dozen of *Chrysomela multipunctata*—var. *bigsbiana*: this form, with a dark thorax margined before and on the sides with pale cream, and having the sutural stripe dark, I have never taken on any other plant than the willow. On dogwood—out of the scores seen—I had taken 8 of *Chrysomela philadelphia*: this form I have always found on dogwood, and I have never taken any other species of *Chrysomela* on that shrub; the whole thorax is dark-bronzed (from green to black) and the elytra are without the sutural stripe, though the scutellum is marked with a dark spot. On spiræa I took two or three of what I thought to be this same form, but they proved on examination to be the variety

spirææ, in which the dark sutural stripe is present. On alder, I had found the handsome chestnut-crimson *Chrysomela* abundant, and had taken some fifty specimens: they are apparently a very robust form of *Chrysomela philadelphica*, as they lack the dark sutural stripe, and their other markings correspond. (*Chrysomela philadelphica* var.—shall we say *alni* or *Hesperidum*?). While hunting for this insect on the fringe of alders beside the municipal ditch, I discovered yet another *Chrysomela* and succeeded in making about fifteen captures; it was almost as large as the last, but the ground colour was white to pale cream, with heavily-marked and united sutural and sub-sutural lines; in short, it was *Chrysomela scalaris*, with a very slight difference—the apical or third pair of spurs were broken away from the sutural line and appeared as two detached spots; and the middle pair of spurs also tended to be irregular and broken. The normal form of *scalaris*, I had found once in great abundance in the larval stage on basswood near the Rideau Ferry and in the six or eight beetles that I reared through the pupal state, I remarked the same variation in the ladder-like series of projections to which the species owes its name. Each of these forms was abundantly distinct from all the others; I never saw any sign of interbreeding; each colony, each species and variety appeared to keep to itself. On the alders in this swamp there were, besides, thousands of *Lina interrupta (lapponica)*; these were in all stages of *larvæ*, *pupæ* and *imagines*. In spite of its multitudes, and the short pupal interval between voracious grub and devouring beetle, the damage done to alder foliage seems trivial, due partly to the insect's small size and partly to the abundance of its food plant. Near the edge of the clearing I took two specimens of *Lina scripta*, feeding on willow; this beetle I have never found on any other plant than willow; those near Peterborough were all of the normal form, but often one or other of two varieties are to be found: in both of these the creamy ground-color of the elytra is replaced by a light-brown, and the elongated elytral spots are larger and only separated by narrow borders of the ground colour; in one variety these elongated spots are black; in the other, dark-brown; the former of these was sent me from Montreal, and I do not know its food plant; the other I found in abundance near Lindsay one season, feeding on willow. There

are four or five varietal forms illustrated by Blatchley (after Riley), but these do not include the forms I have just mentioned. Along the railway track, not far from this swamp, I took both species of *Crioceris* on plants of wild asparagus.

The genus *Chrysomela* has always been of great interest to me, I suppose because of its beauty, and, seeing in one of the books that the sub-species *rhoda* fed exclusively on hazel, I made a systematic search for the insect, but without any success. The only capture I have made on this plant is a species of *Balaninus* or nut-weevil, one of the wariest of insects; I have distinctly seen (and more than once) *Balaninus* swoon from the leaf it was resting on, while I was still several feet away; it invariably feeds in such a position as to drop into the tangled heart of the bush instead of falling exposed at the side. But the frequent occurrence of *Chrysomelæ scalaris* and *philadelphica* in varietal form on alder, coupled with their entire absence from hazel, rouses a suspicion. In size and habit, as well as character of foliage, the alder and the hazel are very similar, especially to a non-botanist: it would be interesting to get a consensus of opinion (or, rather, experience) in the matter from other field-collectors.

Another beetle, said by Blatchley to be beaten from hazel, is *Syneta ferruginea*. I had seldom seen this beetle (and never more than one at a time) till last season, but in testing out the alder as a food plant of *Chrysomelas* I took three or four pairs of *Syneta ferruginea* on leaves of alder near Bethany. The robust red-brown form of *Chr. philadelphica* I have now taken, two seasons running, and on alder, as far west of Peterborough as Mount Pleasant, and also two or three miles east of the city on the outskirts of my second hunting ground—Burnham's wood.

A NEW PHANURUS FROM THE UNITED STATES, WITH NOTES ON ALLIED SPECIES.

BY A. A. GIRAULT, GLENDALE, MD.

1. **Phanurus opacus** Howard.

Both sexes are black; the thorax above is subglabrous.

2. **Phanurus floridanus** Ashmead.

The head and thorax are polished, the tibiae and knees pale

brown; segments 1 and 2 of abdomen have very short striae at base. The club is stouter than with *ovivorus*.

3. *Phanurus ovivorus* Ashmead.

The club is slenderer than in the preceding, the tibiae dark, the thorax above showing faint reticulation cephalad, but mostly glabrous. The first two segments of the abdomen do not have striae at base, or else these are extremely minute and short. In *flavipes* the vertex and scutum is uniformly finely reticulate. The species *ovivorus* is very close to *opacus*, if not identical.

4. *Phanurus emersoni*, new species.

Female—Length 0.90 mm. Black, the wings subhyaline; the venation pale dusky, the tarsi yellow. Differs from *opacus* Howard in that the male is varicoloured here. Differs from female *opacus*, *floridanus* and *ovivorus* in that the vertex and scutum are densely reticulated. Differs from *tabanivorus* in that the abdomen is only somewhat longer than the rest of the body, its third segment is not a fourth the length of the third, the thorax above is reticulated, and the male has the entire thorax honey yellow, also the antennae (besides the legs and head as in *tabanivorus*). Closest (female) to *ovivorus*, which it resembles. Stigmal vein nearly twice longer than the marginal, about half the length of the postmarginal. Funicle 1 a half longer than wide, two-thirds the length of the pedicel, 2 a little shorter than 1, 3 still shorter, 4 globular, smallest; 5 cup-shaped, 6 the same, larger, wider than long; 7 and 8 subquadrate, 9 ovate, longer than wide. Short, distinct striae at base of segment 2 of the abdomen.

In the male, funicles 1-3 are somewhat longer than in the female, while 4-9 are moniliform, wider than long, small; the club joint is ovate and as long as funicle 1 and stouter.

Described from a large number of both sexes reared from tabanid eggs at Dallas, Texas (F. C. Bishop).

Types—Catalogue No. 19664, U.S.N.M., 1 ♂, 8 ♀'s on two tags and a slide bearing 1 ♂, 4 ♀'s.

Types of opacus, ovivorus, floridanus and flavipes examined.

NEW GENERA AND SPECIES OF AUSTRALIAN
MUSCOIDEA.BY CHARLES H. T. TOWNSEND,
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The Muscoidea of all the principal regions of the earth have been catalogued, after a fashion, more or less completely, except those of Australia and Tasmania, which still stand without any published list whatever. The writer has recently prepared a complete synonymical catalogue of the Australian muscoid fauna, including that of Tasmania, in the course of which he has found it advisable to erect genera for certain described forms whose characters are sufficiently clearly recorded to allow of such action, credit being due to Brauer and Austen for elucidating the several types of Macquart and Walker concerned. These genera are presented in the present paper, together with descriptions of a few additional genera for new forms represented in the U. S. National Museum collection.

Paracalliphora, new genus.

Genotype, *Calliphora oceaniae* R. D., 1830, Myod., 438, Port Jackson and Timor (Brazil in error).

Differs from *Musca* (*Calliphora*) as follows: Epistoma more produced, not so constricted by the vibrissal angles. Ocellar bristles wanting in male, weak or vestigial in female. Cheeks and front both averaging narrower. Scutellum with only two strong marginal pairs of macrochætæ besides the apical pair. Abdomen scarcely broader than the thorax, much less thickly hairy. (Nine specimens: 4, Sydney, H. Gurney; 2, Reedy Creek, N.S.W., maggots from sheep; 3, Australia, Koebele, No. 483).

Calliphora tibialis (1st) Mcq., 1846, Dipt. Exot. Suppl. I, 195, Tasmania and Australia, belongs to this genus. Brauer (Sitz. Ak. Wiss. CVIII, 524) says: "Gehört mit *M. stygia* F. zu *Pollenia villosa* R. D." This would seem to be wrong, as specimens mentioned below in U. S. N. M. coll. agree fairly with Macquart's description and are congeneric with *oceaniae*. They bear a strong superficial resemblance to *villosa*, but lack the fulvous hair of abdomen. (Three spms.: Croydon, N. S. W., W. W. Froggatt).

Calliphora rufipes Mcq., 1843, Dipt. Exot. II (3), 286, Suppl. II, 99, Java and Tasmania, also appears to belong here, but I have no specimens and can only judge by comparing the description with material of *oceanica*, to which it seems extremely close. Brauer (Sitz. Ak. Wiss. CVIII, 526) says that it equals *Musca stygia* F. (*villosa* R. D.), but this seems doubtful since Macquart says "caerulea * * * abdomen bleu." It is also rather too small (6 mm.).

Tricyclopsis, new genus.

Genotype, *Rhynchomyia dubia* Mcq., 1855, Dipt. Exot. Suppl. V, 129-30, Adelaide. Brauer, Sitz. Ak. Wiss. CVIII, 514.

Near *Tricyclea* Wulp, but the third vein is bare. Facialia ciliate to above middle of face. Facial carina absent. Arista long-plumose above and below. Parafacials with short bristly hairs. Third antennal joint three or four times as long as second. Palpi clubshaped. Epistomia strongly produced. Antennae two-thirds as long as face.

Gerotachina, new genus.

Genotype, *Tachina obtusa* Walker, 1856, Dipt. Saund., 274-5, New South Wales. Austen, Ann. Mag. N. H. ser. 7, XIX, 330-1 (Syn. *Echinomyia stolidia* Wlk., 1858, Trans. Ent. Soc. London, n. s. IV, 195-6, male).

Differs from *Microtropesa* Mcq. as follows: Third antennal joint of female distinctly shorter than the second; that of male not longer than the second, or but slightly longer; in both sexes the third joint is convex on upper border. Arista short and stout. Row of six to eight small admedian spinelike macrochaetae on hind margin of second abdominal segment. Agrees with *Microtropesa* in all other characters given by Walker and Austen.

Tasmaniomyia, new genus.

Genotype, *Masicera viridiventris* (1st) Mcq., 1847, Dipt. Exot. Suppl. II, 84-5, Tasmania. Brauer, Sitz. Ak. Wiss. CVI, 336-7. (Syn. *Masicera viridiventris* 2d Mcq., 1851, Dipt. Exot. Suppl. IV (2), 163-4, female, locality Egypt in error).

Differs from *Microtropesa* Mcq. as follows: Parafacials bare, only with some hairs above. Facial carina narrow, sunken, not easily visible from in front. No ocellar bristles. Male claws long and slender, female claws short. Vertex in female as wide as one eye, in male narrower. Several rows of bristles on parafrontals in both sexes, but orbitals apparently absent in female as well as male. Abdomen of female flattened and pointed, that of male more oval; male hypopygium small, not directed forward. Front prominent, face receding, epistoma not prominent. Third antennal joint over twice to three times as long as second. Hind cross-vein sinuate, at two-thirds distance between small cross-vein and cubitus.

Acephana, new genus.

Genotype, *Masicera rubrifrons* Mcq., 1847, Dipt. Exot. Suppl. II, 85, Tasmania. Brauer, Sitz. Ak. Wiss. CVI, 339-40.

Differs from *Microtropesa* Mcq. as follows: Eyes hairy. Abdominal macrochaetae weak. Vibrissal angles somewhat convergent. Third antennal joint pointed on upper apical corner, like that of *Acemyia*. No ocellars. Female with two orbitals, and two verticals. Differs from *Goniophana* (equals *Tritaxys* Mcq.) in the hind tibiae not ciliate; and from *Gadiophana* in the short second arisal joint. Epistoma not very prominent. Arista thickened to middle. Hind cross-vein sinuate, at two-thirds distance between the small cross-vein and bend of fourth.

Opsophana, new genus.

Genotype, *Masicera rufifacies* Mcq., 1847, Dipt. Exot. Suppl. II, 87, Tasmania. Brauer, Sitz. Ak. Wiss. CVI, 340.

Differs from *Microtropesa* Mcq. as follows: No ocellar bristles. Eyes thickly hairy. Hind tibiae pectinate, with longer bristles below. Abdomen with only thin bristle-like macrochaetae. Male claws long. Epistoma much produced, the vibrissae situated high above oral margin. Related to *Goniophana* and *Acephana*. Front of male narrow. Frontals not descending below base of antennae. Third antennal joint about four times as long as the second. Apical cell ending near wing apex.

Chlorodexia, new genus.

Genotype, *Chlorodexia froggattii*, new species.

Differs from *Chlorotachina* Townsend (Proc. Biol. Soc. Washn. XXVIII, 21) as follows: Epistoma not nearly so produced, vibrissæ not farther above oral margin than length of second antennal joint. Cheeks wider in proportion to eye-height, ocellar and frontal bristles stronger. Pubescence of eyes longer. Cubitus well removed from hind margin of wing, with long and strong stump; hind cross-vein much nearer to cubitus. Abdominal macrochaetae longer and stronger, hairs of abdomen longer.

Chlorodexia froggattii, new species.

Length of body 11 mm.; of wing 11 mm. One male Merriwa, N. S. W. (W. W. Froggatt).

Metallic green, with a rather thick coat of silvery pollen over all. Facial plate and cheek grooves testaceous, the former with an ochre-gold pollen; frontalia dark brown, first two antennal joints dark rufous, third joint and arista brown, palpi dark brown. Parafrontals dull golden pollinose, extending to cheek grooves. Cheeks, occiput, thorax, scutellum and abdomen deep metallic green, more or less thickly pollinose, four heavy blackish vittæ on mesoscutum, abdomen showing more distinctly bright green, venter and pleuræ with less pollen. Legs dark brown, the femora blackish. Wings nearly clear, tegulae tawny whitish.

Holotype—No. 19971 U. S. N. M.

Named in honour of Mr. W. W. Froggatt.

Protomiltogramma, new genus.

Genotype, *Protomiltogramma cincta*, new species.

Differs from *Miltogramma* as follows: Form more elongate, subcylindrical, the abdomen subconical. Vibrissæ strong, decussate, well differentiated from the peristomal bristles. Third antennal joint elongate, nearly three times as long as second. Cheeks of female about as wide as margin of epistoma, those of male much narrower. Scutellum enlarged, elongate and broad, especially so in female, with about five or six marginal pairs of macrochaetae besides the apical pair.

Protomiltogramma cincta, new species.

Length of body 7 to 10 mm.; of wing 5 to 6.5 mm. One male and one female, latter the larger; male from Hamilton, Upper North Pine, Queensland, Jany., 1890; female from Buderim Mt., Queensland, Dec., 1889 (Dept. of Mines and Agr.).

Face and cheeks luteous, with pale yellowish bloom; rather more silvery in male. Frontalia fulvous to fulvotestaceous, antennæ wholly light ochre-yellow, arista brown. Parafrontals golden. Thorax, pleuræ and scutellum with golden pollen, which is paler in front and on sides; the mesoscutum with three heavy brown vittæ plainly continued on scutellum. Abdomen dark brown or blackish, the second to fourth segments evenly bordered anteriorly with rather broad band of silvery, which may have a faint golden lustre. Legs black, femora pollinose on outside. Wings clear, tegulæ watery-white.

Holotype—No. 19972 U. S. N. M., female.

Froggattimyia, new genus.

Genotype, *Froggattimyia hirta*, new species.

Parafrontals and parafacials evenly covered with short black bristly hairs. Parafacials bulged, their planes not oblique but nearly transverse. Cheek grooves restricted. Cheeks of male swollen, one-half eye-height in width, evenly clothed with fine short black hairs; those of female with yellowish hairs. Female vertex a little less than width of one eye, that of male hardly over one-half eye-width. Female with two proclinate orbitals, male without. Ocellar bristles small. Front of male prominent; in profile, frontals descending only a little below base of antennæ face rather receding; facial plate elongate and narrow, only a little sunken, with rather sharp carina, vibrissæ situated well above oral margin, epistoma not prominent. Third antennal joint about two and one-half times second; palpi club-shaped. Apical pair of separated and strong scutellar bristles, and two lateral pairs. Abdominal macrochaetæ vestigial in both sexes. Hind tibiae very short-ciliate in both sexes. Apical cell ending well before wing tip, open; hind cross-vein sinuate, nearer to bend; latter rounded, without wrinkle or stump. Parafrontals slightly widening below,

where they are nearly as wide as facial depression. Frontalia broad in both sexes, narrowed posteriorly in male.

Named in honour of Mr. W. W. Froggatt.

Froggattimyia hirta, new species.

Length of body 7 to 10 mm.; of wing 6.75 to 8 mm. One male and one female, Mittagong, N. S. W., reared from sawfly larvæ, Feby., 1902 (W. W. Froggatt). The smaller measurements are of the female, whose abdomen is flexed.

Cheeks, face and front pale golden; frontalia fulvous to rufous; antennæ fulvous, third joint brown on upper edge at least distally. Mesoscutum dark; with thin pollinose coat in male leaving five vittæ, the middle one linear; thick coat of ashy pollen in female, leaving four vittæ and a faint suggestion of fifth. Scutellum dull luteous. Abdomen brownish, broadly dull fulvorangeous on sides from first to fourth segments in male, narrowly so on first to third segments in female, ashy pollinose on dark parts and yellowish pollinose on lighter parts. Legs luteous to fulvous, femora of male blackish on base. Wings nearly clear. Tegulæ pale yellowish to whitish.

Holotype—No. 19973 U. S. N. M., male.

Protomeigenia, new genus.

Genotype—*Protomeigenia aurea*, new species.

Differs from *Froggattimyia* as follows: Parafacials bare, with some short bristly hairs above near lowest frontals. Vertex of female fully as wide as one eye, that of male about two-thirds same. Frontalia rather wider, front more prominent, face more receding. Parafacials rather broader, not bulged, their planes oblique; facial plate distinctly more sunken. Scutellum with a weak decussate apical pair of bristles in both sexes, and three lateral pairs of stronger ones. Cheek grooves not so restricted. Cheeks not so swollen.

Protomeigenia aurea, new species.

Length of body 7 to 9 mm.; of wing 6.5 to 7.5 mm. One male and one female, Manilla, N. S. W., reared from sawfly larvae,

Jany. 10 and 13, 1902 (W. W. Froggatt). The female is the smaller and has the abdomen flexed.

Face, cheeks and front golden. Facial plate lighter, frontalia brownish-rufous. Antennæ bright rufous, the third joint blackish on upper edge and distally. Mesoscutum of both sexes with four vittæ, the inner pair linear. Scutellum fulvorufous. Abdomen of male with only the faintest suggestion of fulvous on sides, that of female without. Thorax and abdomen dark, quite thickly coated with silvery. Otherwise the colour description of preceding species applies exactly.

Holotype—No. 19974 U. S. N. M., male.

Austrophorocera, new genus.

Genotype, *Phorocera biserialis* Mcq., 1847, Dipt. Exot. Suppl. II, 89, Tasmania. Brauer, Sitz. Ak. Wiss. CVI, 347.

Allied to *Thrycolyga*. Facialia ciliate in two rows to base of antennæ. Apical scutellar bristles very fine, short, decussate. Male front rather broad, with two rows of bristles on each side. Frontals descending well below base of antennæ. Third antennal joint four times as long as the second, which is not elongate. Arista thickened on only basal half. Parafacials bare. Eyes hairy. No discal macrochætæ on intermediate segments of abdomen. Hind cross-vein sinuate, at two-thirds the distance between the small cross-vein and bend of fourth vein.

Pareupogona, new genus.

Genotype, *Masicera oblonga* Mcq., 1847, Dipt. Exot. Suppl. II, 86, Tasmania. Brauer, Sitz. Ak. Wiss. CVI, 338.

Runs to *Eupogona* in B.B.'s tables of Masiceratidæ, and to *Gædia* in their tables of Phoroceratidæ. Differs from *Eupogona* as follows: Male only. Second and third abdominal segments with discal macrochætæ. Legs elongate. Scutellum with strong separated pair of apical macrochætæ. Differs from *Gædia* in the open apical cell, which is very narrow at the end. Four postsuturals. Ocellars long, fine, proclinate. Facialia double-ciliate half way up. Parafacials with some short bristly hairs. Frontals strong, descending to middle of face. Vertex moderately wide. Eyes bare. Second

aristal joint short. Male claws long. Male with row of delicate bristles outside the frontals, together with short bristly hairs. Apical cross-vein straight, cubitus without stump. Vertical bristles strong. First abdominal segment with marginal macrochaetae. Costal spine small, third vein bristled only at base. Hind tibiae not ciliate. Proboscis short and stout, palpi club-shaped. Third antennal joint of male enlarged, about three times as long as the second.

To this genus apparently belongs *Masicera simplex* Mcq., 1847, Dipt. Exot. Suppl. II, 87, Tasmania; Brauer, Sitz. Ak. Wiss. CVI, 337. The characters agree well, except that the male vertex is considerably narrower.

Eurygastropsis, new genus.

Genotype, *Eurigaster tasmaniae* Walker, 1858, Trans. Ent. Soc. London, n. s. IV, 197, Tasmania, Austen, Ann. Mag. N. H. ser. 7, XIX, 331.

Allied to *Frontina*. Eyes and parafacials hairy. Ocellar bristles wanting. Epistoma very prominent. Macrochaetae of abdomen only marginal. Male claws short. Male frontalia narrowed posteriorly. Frontal bristles descending one-third way down the face. Facialia ciliate practically their whole length. Antennae reaching the epistoma, third joint six times as long as second. Arista thickened its whole length, hardly as long as third antennal joint. Cubitus obtuse, apical cross-vein slightly bent in, apical cell ending well before wing tip, hind cross-vein nearer to cubitus than to small cross-vein.

Mesembriomintho, new genus.

Genotype, *Mesembriomintho compressa*, new species.

Differs from *Mintho* as follows: Apical cell closed in margin, ending just before wing tip; cubitus close to hind margin of wing; costal spine atrophied. Front of male at vertex hardly over one-third width of one eye, that of female about one-half eye-width. Facialia bare. Arista plumose. Frontal bristles not descending below base of antennae. Abdomen strongly compressed laterally

in both sexes. No median macrochaetae on first abdominal segment. Front claws of male longer than others.

Mesembriomintho compressa, new species.

Length of body 6.75 to 8.5 mm.; of wing 5.25 to 6.75 mm. One male and one female, Hamilton, Upper North Pine, Queensland, Jany. 1890 (Dept. of Mines and Agriculture). The female is the smaller.

Black, silvery pollinose. Frontalia and first two antennal joints dark brown; third joint dusky, with a silvery bloom. Palpi fulvous, obscurely infusate basally in female. Thorax silvery; with four linear vittae, the middle ones stopping at suture; the outer ones obliterated anteriorly by a heavy broad vitta on each side, the two being confluent on anterior edge of thorax. Scutellum blackish. First abdominal segment, apical half of second and more than apical half of third shining black, not pollinose; rest of abdomen silvery-white pollinose. Legs blackish; femora brownish, silvery on outside, especially front pair. Wings lightly yellowish-smoky. Tegulae watery-whitish.

Holotype—No. 19975 U. S. N. M., male.

Parabrachelia, new genus.

Genotype, *Masicera rufipes* Mcq., 1847, Dipt. Exot. Suppl. II, 86, Tasmania. Brauer, Sitz. Ak. Wiss. CVI, 339.

Differs from *Brachelia* as follows: Male only. Cheeks broad. Proboscis short, palpi slender. Apical cell closed in margin, cubitus without stump. Hind tibiae not ciliate. Parafacials broad, bare. Ocellars present, proclinate. Male claws elongate. Abdominal macrochaetae discal and marginal. Apical cross-vein straight. Eyes thickly hairy. Epistoma prominently produced. Apical scutellar bristles erect, delicate, not decussate; the laterals very long and strong. Vertical bristles present. Second arisal joint short. First abdominal segment shortened, hypopygium small. Frontal bristles descending one-third way down the face. Third antennal joint three times the second, which is not elongate. Hind cross-vein only a little nearer to cubitus than to small cross-vein.

Austrophryno, new genus.

Genotype, *Tachina densa* Walker, 1856, Dipt. Saund., 288-9, New South Wales. Austen, Ann. Mag. N. H. ser. 7, XIX, 331 (Syn. *Tachina hebes* Wlk., l.c. 289, male, Tasmania).

Allied to *Phryno*. Facialia ciliate on lower one-third. Cheeks one-third eye-height. Antennæ inserted above eye-middle. Face broad. Frontal bristles descending to base of arista, with some small bristles below. Abdominal macrochaetæ only marginal. Epistoma only slightly prominent. Eyes hairy. Frontalia narrow. Antennæ about as long as face; the third joint slender in female and less than three times the second, in male about three times second. Arista much longer than third antennal joint, thickened at base. Cubitus hardly obtuse, apical cross-vein slightly bent in at base, hind cross-vein more or less bent inward.

Tracheomyia, new genus.

Genotype, *Oestrus macropi* Froggatt, 1913, Agric. Gazette N. S. W., July 2, 1913, pp. 567-8, pl. (5 figs.), Moramana Station, Walgett District, Australia. Maggot lives in the *windpipe* of the kangaroo. Fly unknown.

This appears to be an endemic Australian œstrid, and is the first one known. Its existence is thus of the greatest interest from the biogeographical point of view, as well as with relation to the phylogeny of muscoid stocks. The particular combination of larval characters is unique, as may be seen from the description and figures. The larval habitat in the host is likewise unique. The host itself is distinctively Australian. All these facts argue for the marked distinctness of the fly. The small boss of the anal stigmatic plates described by Froggatt would seem to be the false stigmatic opening or so-called button, and can hardly contain the spiracles which should lie outside the button in the field of the plates. It appears that the anal stigmata much resemble those of *Æstrus ovis*, but the armature is very distinct and approaches that of certain tachinids. Evidently this maggot does not belong to any of the described genera of Australian flies. It may be allied to *Pharyngomyia* or *Pharyngobolus*, judging from larval habit, but on larval characters it is nearer to *Æstrus* than to either of the genera named.

THE HEATH COLLECTION OF LEPIDOPTERA.

BY F. H. WOLLEY DOD, MIDNAPORE, ALTA.

The collection of Lepidoptera formed by the late E. Firmstone Heath, of Cartwright, Manitoba, was, shortly after his death, acquired by the Manitoba Government. Mr. J. B. Wallis, of Winnipeg, was asked to overhaul it and put it into condition for museum reference, as it was intended that it should form the nucleus of the entomological section of the Provincial Museum. Shortly before Christmas Mr. Wallis very kindly wrote offering me the opportunity of looking through it, a chance of which I was most ready to avail myself. Accordingly, in the last week of the old year, I visited him at his rooms on Boyd Avenue, where the collection had been temporarily deposited, and together we spent four or five days studying it, sorting out the mixtures, and making a full list of the species as far as we were able to identify them. Such species as we were uncertain about, or had no means of verifying, were subsequently sent east to experts in the various families. The *Hydræciæ* and *Papaipemas* went to Mr. Bird, *Geometrinæ* and *Hepialidæ* went to Mr. A. F. Winn, *Drs. Barnes* and *McDunnough*, the *Catocalas* and *Deltoids* to Mr. Arthur Gibson and *Drs. Barnes* and *McDunnough*, and the *Micros* to Mr. Busck. A number of species in all families were submitted to Messrs. Barnes and McDunnough. The assistance of all these gentlemen is most gratefully acknowledged.

Viewed as a whole, the collection was in poor condition. The percentage of worn or indifferent specimens was high, and, with a very few exceptions, the setting was badly done on short pins. Nearly all of those on long pins were from other collections. A portion, none too large a portion either, of the specimens bore date labels, usually face downwards; though so very low was the setting that the specimens had in any case to be removed whenever it was desired to read them. The authority for an identification was very rarely given, and even when given, was written on a label below a series, and never attached to the actual specimen or specimens named by a recognised authority. Some specimens

bore numbers, probably indicating that they or their duplicates had been submitted to an expert, and it may be possible in some cases to make guesses at associating these specimens with similar numbers amongst the numerous notes and correspondence pertaining to the collection, but which we did not then have time to look through. I cannot recall that we found one single instance in which a Cartwright label was attached to a specimen. But, as I believe Heath to have collected at Cartwright exclusively for about 35 years, we decided that it would be reasonable to assume any specimen to be of Cartwright origin unless any other locality or collector's name was pinned below it, as, for instance, I found was always the case with specimens which I had sent him myself. Heath, though a most energetic collector and ardent lover of nature, had, unfortunately, a poorly developed faculty for recognising a species. I had long previously discovered this from correspondence and exchange of specimens with him, though, as a matter of fact, he cared little for specimens not from Cartwright, and so rarely accepted in exchange. During Smith's lifetime, Heath had relied almost exclusively upon him for names in the Noctuidæ, and very rarely, either openly or privately, disputed a name that was given him. Now, Smith's determinations for corresponding collectors were very frequently, to say the least of it, hasty, and very often, alas, culpably careless. In my own experience, in my earlier collecting days in the west, I not infrequently found that if I sent Smith specimens of a species—it might be of a well known and not very variable species either—twice or three times, he would apply a different and very distinct name to it each time. Heath evidently met with this trouble, and got over the difficulty by dividing a species, not always very variable, into two or three. We frequently found a series of good or tolerably good specimens standing as one species, and a series of bad specimens of the same as distinct. And perhaps a series of smaller specimens of the same thing as something else, such as "probably new J.B.S." Nor was that all. Besides the frequency with which one species stood for two or more, it was deplorable the number of very distinct and often dissimilar species which were arranged in one series under the same name. In short, the errors and mixtures were appalling.

A few instances of the confusions and mixtures may be interesting. Heath had two female co-types of *Hadena miniota* Smith, described from *Miniota* and Cartwright. When I saw Smith's types at Rutgers College, I recognised in them a form I have been taking at Calgary for twenty years simultaneously with, and apparently grading into, typical *versuta*, and thereafter in my notes in the "Canadian Entomologist" referred *miniota* as a colour-form of that species. (I have recently had good reason to doubt the correctness of that reference, but that is beside the point at present.) Heath wrote and remonstrated, saying that the two were entirely different and could not be confused. I assumed that he had misidentified *miniota*, and told him so. He thereupon showed me a co-type, which I returned with the remark that it merely confirmed my conviction. When I viewed the collection with Mr. Wallis, the mystery was solved. A short series of *miniota*, including two co-types, stood under *versuta*, which label had been surcharged upon a *miniota* label presumably, as per my dictum. But the surprise stood next to it. A long series, two columns or more, containing two or three *miniota*, and one or two other species, but principally *devastatrix*, stood also as *versuta*. That such a series should have been pronounced to be "quite distinct from *miniota*" was of course intelligible. But the complication did not end there, for in another box a series of *devastatrix* stood, pure, under its correct name.

Caradrina rufostriga stood in a series under its correct synonym of *punctivena*. Elsewhere in the collection it did duty as *Hadena indirecta*. *Noctua clandestina* stood correctly named, and also as *Amphipyra tragopoginis*. *Peridroma occulta* ditto, and as *Polia pulverulenta*. Four *Agroperina lutosa* and one *Scopelosoma sidus* stood as *lutosa*, and another series of *lutosa* as *Euxoa scandens*. One *scandens* stood as *Porosagrotis vetusta*. *Scandens* and *lutosa* were two species found scattered abroad throughout the collection. Another species badly mixed up with many others, particularly with *Orthosia dusca*, was *Parastichtis discivaria*, and one badly worn specimen of it stood as the sole representative of *Hadena semicana*. *Mamestra neoterica* was arranged in two series, one as *goodellii*, another as *acutetermina*. *Acutetermina* itself did duty for *neoterica*, and two specimens of it stood apart under "*Noctua*,

not identified by Smith'! *Mamestra grandis* did duty both for its own self, and for *legitima*. Four specimens stood under *Mamestra incurva*, two of them being *larissa* and two *vicina*. *Cleoceris curvijascia*, was *Hillia algens*, which also stood correctly. *Orthosia inops* and *Erastria panatela* stood together as *Tapiñostola variana*, and *inops*, another rather widely scattered species, stood correctly named as well. One *Cucullia intermedia* stood as *Rancora albicinerea*, of which species two specimens stood together in the collection under no name.

I have mentioned only a few of the principal mixtures and misidentifications. I shall refer to others amongst the list of species to follow. These I think will serve to show that records published by Heath must be treated as wholly unreliable. They may also in some instances serve as a clue as to what species may have been intended by some of his published names. But, whilst that should be thoroughly borne¹ in mind, the fact must not be lost sight of that the late Mr. Heath did a very great deal for western entomology, and his collection, which he spent so many years in accumulating, and which gave him so much pleasure in life, forms a very valuable basis on which Manitoba students may found a list of species occurring in that province. Would that such workers were more numerous.

The following list comprises only those species which are believed to have been taken by Heath at Cartwright. The order and nomenclature followed is, with certain necessary exceptions, that of Smith's 1903 Check List. In some instances amongst the Noctuidæ, where the generic names adopted by Sir George Hampson are at least fairly well known changes, I use those, adding the older ones in brackets. The time will probably not be long before a new general Check List will be published, in which the order and genera used by Hampson will be largely adopted.

RHOPALOCERA.

NYMPHALIDÆ.

- Danais plexippus* Linn.
- Euptoieta claudia* Cram.
- Argynnis cybele* Fabr.

Argynnis aphrodite Fabr. One female without label. Apparently typical, and agreeing with a female in the collection labeled Jefferson, N. Y.

Argynnis lais Edw. Very pale and near *cypris*.

Argynnis atlantis Edw. One male without label. Typical. I was surprised to see this form from Manitoba. Mr. Wallis has taken it quite commonly at Winnipeg Beach.

Argynnis nevadensis Edw. var. *meadii* Edw. Standing as *edwardsii*, by which form it used to be known in the west.

Argynnis myrina Cram.

Argynnis freija Thunb.

Argynnis bellona Fabr.

Phyciodes nycteis Db.-Hew. And two large females erroneously as *hanhami* Fletcher.

Phyciodes ismeria Bd.-Lec.

Phyciodes tharos Dru.

Grapta interrogationis Fabr. vars. *fabricii* Edw. and *umbrosa* Lint.

Grapta comma Harr. vars. *harrisii* Edw. and *dryas* Edw.

Grapta satyrus Edw.

Grapta faunus Edw.

Grapta progne Cram.

Grapta j-album Bd.-Lec.

Vanessa antiopa Linn.

Vanessa californica Bdv.

Vanessa mülberti Godt.

Pyrameis atalanta Linn.

Pyrameis huntera Fabr.

Pyrameis cardui Linn.

Limenitis arthemis Dru.

Limenitis archippus Cram.

Debis portlandia Fabr.

Neonympha canthus Bd.-Lec.

Neonympha eurytis Fabr.

Cænonympha typhon Rott. var. *laidon* Borkh. Dr. McDunough says that in his opinion this is *inornata* Edws., and that there is no justification in sinking *inornata* as a synonym.

Erebia discoidalis Kirby.

Satyrus alope Fabr. vars. *nephele* Kirby and *olympus* Edw.

Chionobas varuna Edw.

LYCÆNIDÆ.

Thecla acadica Edw.

Thecla calanus Hbn.

Thecla liparops Bd.-Lec.

Thecla augustus Kirby.

Thecla titus Fabr.

Thecla heathii Fletcher. There were no specimens under this name in the collection. The species was described in 1903 from a single female taken by Mr. Heath at Cartwright, about twenty-five years previously. As Dr. Skinner has suggested, it may prove to be an aberration.

Chrysophanus thoe Bdv.

Chrysophanus helloides Bdv.

Lycæna sæpiolus Bdv.

Lycæna afra Edw. The form stood as *couperii* Grt., but Mr. Wallis tells me that it is now called *afra* (teste, Dr. Skinner).

Lycæna rustica Edw. One female standing as *aquilo*. On comparison with Calgary material the specimen appears to be normal female *rustica*.

Lycæna melissa Edw.

Lycæna pseudargiolus Bd.-Lec. and vars. *lucia* Kirby and *neglecta* Edw.

Lycæna amyntula Bdv. Heath appeared to have separated two series as *amyntula* and *comyntas*, but the separation did not seem justified.

PAPILIONIDÆ.

Pieris protodice Bd.-Lec.

Pieris napi Linn. var. *oleracea-æstiva* Harr.

Pieris rapæ Linn.

Nathalis iole Bdv.

Colias cæsonia Stoll.

Colias eurytheme Bdv.

Colias eriphyle Edw.

Colias philodice Godt. According to specimens named for Mr. Wallis by Dr. Skinner, *eriphyle* and *philodice* fly in Manitoba, and are distinguishable, and both are in the Heath collection. He calls those with secondaries yellow beneath *eriphyle*, and those green *philodice*. The green appearance, by the way, is really the effect of an admixture of black scales upon a pale lemon ground. If that diagnosis is right, then I have two species mixed at Calgary, but must admit my inability to draw a line between them. Moreover, all my *philodice* from the eastern states have most distinctly yellow undersides to the secondaries.

Papilio polyxenes Fabr.

Papilio glaucus Linn. var. *turnus* Linn.

HESPERIIDÆ.

Carterocephalus palæmon Pall.

Thymelicus garita Reak.

Pamphila hobomok Harr.

Pamphila comma Linn var. *manitoba* Scudder. Females only stood under the name, but males of this form stood under *mystic*.

Pamphila peckius Kirby.

Pamphila mystic Scudd. Three females, much worn.

Pamphila cernes Bd.-Lec.

Pamphila metacomet Harr.

Amblyscirtes vialis Edw.

Pyrgus tessellata Scudd. Probably the form named *occidentalis* by Skinner in Ent. News, XVII, 96, March, 1906, and figured on plate XIII, October, of the same year.

Nisoniades brizo Bd.-Lec.

Nisoniades icelus Lint.

Nisoniades juvenalis Fabr.

Eudamus pylades Scudd.

Eudamus tityrus Fabr.

(TO BE CONTINUED)

A FEW OBSERVATIONS ON THE APPLE MAGGOT
PARASITE—*BIOSTERES RHAGOLETIS*,
RICHMOND.

BY C. A. GOOD, TRURO, NOVA SCOTIA.

In the September number (1915) of the Canadian Entomologist appeared an article written by Mr. W. C. Woods of Orono, Maine, in which he discussed the presence of the new apple maggot parasite, *Biosteres rhagoletis*. As he had not seen the insect at work, the following short account should be interesting since it throws some light upon the manner in which the maggots are parasitized.

In August of this year, while observing the oviposition habits of the apple maggot near Digby, Nova Scotia, my attention was drawn to several small, brownish insects which were flying about the leaves. Presently one of them alighted upon an apple, and after slowly crawling over it in an erratic fashion for a few minutes, it raised itself high on its legs and began prodding the skin of the apple with its ovipositor. Previously this instrument had been stretched out behind the abdomen in a horizontal position, but it was now bent under it, and down in a vertical manner. First using the two heavier and outer pairs of the ovipositor to pierce the skin, they were eventually raised up slightly while the lighter-coloured, more slender egg-tube was plunged into the apple to a depth of about one-quarter of an inch. After a pause of a few seconds the whole was withdrawn and the insect moved to a new spot, recommencing the operation at once. Five punctures were made in rapid succession before I caught it. This insect was later determined by Mr. E. A. Richmond, of Cornell University, as *Biosteres rhagoletis*.

Thus it appears that this parasite is a larval one, and this, no doubt, accounts for the high percentage of mortality among the larvæ and pupæ of the apple maggot.

May, 1916

APHIDIDÆ FOUND ON THE APPLE IN BRITAIN AND
THE DESCRIPTION OF A NEW SPECIES
FROM AFRICA.

BY FRED V. THEOBALD, M.A.

APHIDIDÆ FOUND ON THE APPLE IN BRITAIN.

No less than eight species of Plant Lice or Aphididæ have been found at different times on the apple in Great Britain. The following are the species I have examined:—

1. *Aphis pomi* De Geer.
2. *Aphis kochii* Schonteden.
3. *Aphis cratægi* Kaltenbach.
4. *Aphis nigra* nov. nom (*oxyacanthæ* Koch).
5. *Aphis rumicis* Fabricius.
6. *Siphocoryne avenæ* Fabricius.
7. *Phorodon humuli* Schrank.
8. *Eriosoma lanigera* Haussman.

Of these, four species are common, namely, *Aphis pomi*, *Aphis kochii*, *Siphocoryne avenæ* and *Eriosoma lanigera*.

Of the others, I have several times received or found Kaltenbach's *Aphis cratægi*, which must not be confounded with the *Aphis* of that name redescribed by Buckton in his Monograph of British Aphides,* which is a totally distinct insect—green, not black! *Aphis rumicis* was sent me once from apples in 1900, and in 1904 I found many on some "Maiden" apples, undoubtedly "casuals" in both cases. Nevertheless this Aphid was reproducing on the fruit trees.

Aphis oxyacanthæ Koch (non Schrank) has been sent me once from Berkshire.†

Phorodon humuli, the Hop-Damson Aphid, was found in 1911 breeding on a few apple trees at Wye in considerable numbers. The chief object of this paper is to show that the most harmful of all apple-leaf and shoot-feeding "Plant Lice" in Great Britain is Koch's *Aphis pyri*, renamed by Schonteden *Aphis kochii* (for reasons afterwards given), and not as has been stated here and in America, Kaltenbach's *Aphis sorbi*, which was described from specimens found on *Sorbus aucuparia*, a totally distinct species.

*Vol. 11, p. 35, pl. XLVII, figs. 1-3, 1877.

†This I have renamed *Aphis nigra*.

May, 1916

It was only through receiving some aptera from that tree sent by Mr. Britten, from Cumberland, that I discovered this general mistake.

That the so-called Brown, Blue and Rosy Aphis or Leaf-curling Aphis of the apple in England was not *Aphis sorbi* was at once seen, for Kaltenbach* clearly stated that the cornicles of the apterous ♀ were "blassgelb, an der Spitze bräunlich," whilst the erroneously called *Aphis sorbi* has them markedly black in all stages.

Probably the presence of the four pre-anal papillæ in both species led Sanderson and others to the conclusion that they were the same. Very similar papillæ, I find, also occur in Kaltenbach's *Aphis crataegi*.

I have not attempted to deal with all the known features of the life histories of these insects, nor the full bibliography, but merely point out their proper names and the salient features of their bionomics as observed in Britain and the literature examined.

The Woolly Aphis (*Eriosoma lanigera*) is not dealt with, however, as I am preparing a special report on this insect in regard to its life in Britain. Several other species have been found on the apple in America; only one of these, so far, is known in Europe, namely, Koch's *Aphis medicaginis*, which I have found in England, but which, up to now, has not been noticed on the apple. These are referred to in a note at the end of this paper. I also add the description of an undescribed Apple Aphis from Africa.

SYNONYMIC LIST OF BRITISH APHIDIDÆ FOUND ON THE APPLE.

1. *Aphis pomi* De Geer.

Aphis mali Fabricius.

Aphis pyri Kittel (non Boyer, Koch).

Aphis padi Sanderson (non Linnæus).

Aphis oxyacanthæ Schrank.

2. *Aphis kochii* Schonteden.

Aphis pyri Koch (non Boyer).

Aphis pyri-mali Fabricius (part).

Aphis mali Buckton (part), Britton.

*Mono. Pflanzenlause, I, p. 70. 1843.

Aphis sorbi Walker (part), Sanderson, Theobald, etc., (non Kaltenbach).

Myzus mali Ferrari (part).

**Aphis malifoliae* Fitch.

3. ***Aphis crataegi*** Kaltenbach (non Buckton).

4. ***Aphis nigra***, nov. nom.

Aphis oxyacanthæ Koch (non Schrank).

5. ***Aphis rumicis*** Linnaeus.

Aphis papaveris Fabricius.

Aphis thlaspeos Schrank.

Aphis fabæ Scopoli.

Aphis atriplicis Fabricius.

Aphis aparines Schrank.

Aphis armata Haussman.

Aphis dahliæ Mosley.

Aphis atriplicis Buckton.

Aphis evonymi Fabricius.

Aphis ulicis Fabricius.

Rumicifex Amyot.

Meconaphis Amyot.

6. ***Siphocoryne avenæ*** Fabricius.

Aphis avenæ Fabricius.

Aphis avenæ sativæ Schrank.

Aphis annuæ Oestlund.

Aphis mali Fitch (non Fabricius).

Aphis fitchii Sanderson.

Aphis crataegifoliae Fitch.†

7. ***Phorodon humuli*** Schrank-Koch.

Aphis humuli Schrank.

Aphis pruni Scopoli.

*Schonteden places this as a synonym of De Geer's *Aphis pomi*. It is certainly not so.

†Schonteden gives Fitch's *Aphis prunifoliae* as a synonym. It is not, for this is clearly only *Aphis pruni*.

8. *Eriosoma lanigera* Haussman.*Aphis lanigera* Haussman.*Eriosoma mali* Somonelle.*Myzoxylus mali* Blot.*Schizoneura lanigera* Kaltenbach.*Pemphigus pyri* Fitch.

TABLE OF SPECIES:

Alate viviparous females

I. Cornicles present.

A. Abdomen green, with black lateral spots, etc.

B. Head and base of antennæ without marked processes. Cornicles long, cylindrical, black. Antennæ with 7-8 sensoria on segment 3 and 2 to 4 on segment 4.....*pomi* 1
Cornicles moderately long, black, slightly swollen at base.Antennæ with 5-6 sensoria on 3 in a line, none on 4.....*pomonella* 2

Cornicles rather short, pale brown to green, constricted at base and apex.

Sensoria on segments 3, 4 and 5.....*avenæ* 3BB. Head and base of antennæ with marked processes.....*humuli* 4AA. Abdomen dark. Black, brownish-black, deep olive-green, with 5 blacker lateral spots and bars, rather shiny.....*rumicis* 5Unknown.....*nigra* 6AAA. Abdomen reddish and black.....*kochii* 7AAAA. Abdomen black white at base.....*cratægi* 8II. No cornicles.....*lanigera* 9*Apterous viviparous females.*

I. Cornicles present.

A. Green, not mealy.

B. Cornicles long, cylindrical, black.....*pomi* 1BB. Cornicles shortish, brown and green, constricted at base and apex.....*avenæ* 2BBB. Cornicles long, thin, green.....*humuli* 3

- AA. Blue-black, slaty or pink, cornicles black, globose and mealy.....*kochii* 4
- AAA. Black.
- B. Somewhat flattened; mealy.....*cratægi* 5
- BB. Globose; somewhat mealy; often with white flecks.....*rumicis* 6
- BBB. Globose; not mealy; all legs black.....*nigra* 7
- II. No cornicles.....*lanigera* 8

Aphis pomi, De Geer.

Aphis mali Fabricius (non Oestlund, etc.).

Aphis oxyacanthæ Schrank (non Koch).

Aphis padi Sanderson (non Linnæus).

Aphis pyri Kittel (non Boyer, Koch, etc.).

De Geer, Mems. III, p. 53, pl. III, figs. 18-21, 1773.

Fabricius, Syst. Ent., p. 737 (pyri-mali), 1794; Ent. Syst., p. 216 (pomi), 1794.

Schrank, Fn. Boica. II, p. 115 (mali), p. 115 (oxyacanthæ), 1801.

Kaltenbach, Mono. Pflanz., p. 72, 1842.

Koch, Die Pflanz., p. 107, pl. XX, figs. 143, 144, 1857.

Passerini, Gli Afidi, p. 34, 1860; Aphid. Ital. a. z. an. fig. II, p. 163, 1862.

Walker, Ann. Mag. Nat. Hist., se. 2, II, p. 269, 1848; Zoologist, VI, p. 2251, 1848; List. Homop. B. Mus., p. 905, 1852.

Ferrari, Aphid. Lig. Ann. d. Mus. Civ. Stor. Nat. Genova II, p. 68, 1872.

Macchiati, Bull. Soc. Ent. Ital., p. 255, N. 82 (mali), 1887.

Buckton, Mono. Brit. Aph. II, p. 44, pl. L (part), 1879.

Taschenberg, Prakt. Ins. kunde, pt. V, p. 53, 1880.

Ormerod, Man. Inj. Ins., p. 284 (mali, Kochinete), 1890.

Cowen, Bull. 31, Colo. Agri. Exp. Sta., p. 120, 1895.

Fletcher, Rept. Ent. and Bot. Canada, 1895, pp. 147-163, 1896.

Ormerod, Handb. Ins. Orchard. and Bush Fruits, p. 6 (mali, etc.), 1898.

Fletcher, Rept. Ent. and Bot. Canada, 1898, p. 206 (mali), 1899.

Smith, Bull. 143, N. Jersey Agri. Exp. Sta., p. 23, 1900.

Forbes, Circ. 36, Ill. Agri. Exp. Sta., p. 32, 1901.

Leonardi, Gli Insetti Nocivi. III, p. 221, 1901.

Sanderson, Trans. Penn. Hort. Soc., pt. II, p. 45, 1901, and 12th Rept. Del. Coll. Agri. Exp. Sta., p. 191, fig. 10 (padi), 1901, and 13th Rept., p. 130, 1902.

Gillette, Bull. 31, U. S. Div. Ent., U. S. A. Dept. Agri., p. 53, 1902.

Tullgren, Upp. Prak. Ent. XIII, p. 79 (mali Koch), 1903.

Schonteden, Ann. Soc. Ent. Belg. XLVII, p. 173, 1903, and Marcellia; Avellino II, p. 93, 1903.

Theobald, 1st Rept. Eco. Zool. (Brit. Mus.), p. 27, 1903.

Tavares, Broteria, Lisboa, II, p. 165, No. 16, 1903.

Saunders, Rept. Ent. and Bot., 1903; Sess. Pap. 16, p. 193, 1904.

Marchal and Chateau, Autun. Mem. Soc. Hist. Nat. XVIII, p. 273, 1905.

Carpenter, Eco. Proc. Roy. Soc. Dublin I, pt. 4, p. 301, 1905.

Dewar, Farmers' Bull. VIII, p. 12, Orange River Colony, 1905.

- Tavares, Broteria, Lisboa, IV, p. 12, 1905.
 Sanderson, Bull. 74, Del. Coll. Agri. Exp. Sta., pp. 130-136, figs. 11-14, 1906.
 Theobald, Rept. Eco. Zool. 1907, p. 38, 1907.
 Quaintance, Circ. 81, Bur. Ent., U. S. Dep. Agri., 1907.
 Grevillius und Niessen, Coeln. Arbeiten der Rheinischen Bauern-vereins, iii, No. 60, 1908.
 Theobald, Ins. and Allied Pests of Fruit, p. 133, 1908.
 Gillette and Taylor, Bull. 133, Colo. Agri. Exp. Sta., p. 23, 1908, and Bull. 134, p. 11, 1908.
 Gillette, Journ. Eco. Ent. I, p. 303, pl. 5, figs. 1-8, 1908.
 Lea, Ins. and Fung. Pests of Orchard and Farm, Tasmania, p. 64, 1908.
 Theobald, Rept. Eco. Zool., 1908, p. 50, 1909.
 Carpenter, Eco. Proc. R. Soc. Dublin, II, pt. 2, p. 12, 1910.
 Theobald, Rept. Eco. Zool. 1910, p. 35, 1911.
 Theobald, Rept. Eco. Zool. 1911, p. 34, 1912.
 Tullgren, Upp. Prak. Ent. XXII, p. 65 (pomi), 1913.
 Carpenter, Eco. Pro. R. Dublin Soc. II, No. 6 (pomi and sorbi), 1913.
 Theobald, Bull. Ent. Res. IV, p. 323, 1914.
 Patch, Bull. 233, Maine Agri. Exp. Sta., p. 267, 1914.

Note.—Oestlund says Dr. Fitch's *Aphis malifoliae* appears to be a variety of *Aphis mali* Fabricius, Schonteden, etc., and thinks it is the same as *Aphis pomi* De Geer; that is *mali* of Fabricius. I think it may be *kochii*; it is certainly not *pomi*.

DESCRIPTION:

Alate viviparous female.

Head and thorax black. Abdomen green; cornicles straight, black, imbricated. Antennæ shorter than body; 3rd segment with 6-10 sensoria; 4th with 2-4 sensoria; 3rd longer than 4th, 4th longer than 5th, 3rd to 6th imbricated. Cauda black, blunt, with 4 to 5 pairs of lateral hairs. On the green abdomen are four pairs of lateral black spots, and from each arises a blunt projecting tubercle, and another is present on the segment carrying the cornicles, smaller than the preceding but marked; the 7th and 8th segments may have blackish median basal patches. Legs green; apices of femora and tibiæ dark; tarsi dark. Wings with yellowish-green insertions. *Length* 2.0 to 2.5 mm.

Apterous viviparous female:

Bright green to rich yellow green; cornicles markedly black, slightly tapering, thick and rather long. Cauda blackish to deep brown. Antennæ not quite as long as the body; 3rd to 6th segments imbricated; 3rd longer than 4th, 4th very slightly longer

than the 5th. Legs green; apices of femora and tibiae and the tarsi black.

Length 1.5 to 2 mm.

Oviparous female:

Apterous. Green to dull yellow, often mottled; head brownish. Cornicles black, straight, imbricated. Cauda black. Antennæ not as long as body, of 6 segments, basal one larger than the 2nd, 3rd, 4th and 5th nearly equal in length; 6th about as long as 4th and 5th; the 5th and 6th dark; also the 1st and 2nd, remainder green; imbricated, especially apically. The junction of the 3rd and 4th often indistinct. Eyes large, dark. Proboscis reaching past the 2nd pair of legs, acuminate. Pronotum with a large green papilla on each side; abdomen with a large papilla on each side before hind legs and 3 smaller ones between them and the cornicles; sometimes yellowish laterally; also with a few hairs. Cornicles thick, black, cylindrical, slightly expanding basally, imbricated, longer than segment 3 of the antennæ. Cauda prominent, dark and very spinose, with 5-6 pairs of lateral hairs curved apically and a median dorsal apical one. Anal plate dark. Legs with dark femora, except just at their base; tibiae pale, dark at the apex; tarsi dark; hind tibiae with a few pores (2-6), or trace of sensoria*; genitalia dark.

Length 1 to 1.5 mm.

Male:

Apterous, dull yellowish-brown, yellowish-green to green. Antennæ of 6 segments, not quite as long to slightly longer than the body; 1st segment wider than the 2nd, but no longer; 3rd as long as the 4th; 4th slightly longer or the same length as the 5th; 6th about as long as the 4th and 5th; in a few I have noticed a single sensorium on the 4th; edges markedly serrated. Eyes large, black. Cornicles black, cylindrical, slightly expanding at the base; not quite as long as segment 3 of the antennæ. Femora and tibiae dull green to deep brown, except the apex of the latter; tarsi dark. Cauda black, spinose, with several long lateral hairs bent at their tips. Genitalia black. Penis yellowish.

Length .8 to 1.0 mm.

*Gillett says 10 oval sensoria on hind tibiae.

Food Plants—Apple, Pear, *Cotoneaster vulgaris*, *Cydonia* spp., *Mespilus germanicus*, *Crataegus oxycanthæ*, *C. monogyna*. It has also been referred to on *Sorbus aucuparia*, *S. domesticus*, and *S. torminalis*. Macchiati gives *Mespilus japonica* and *Ailantus glandulosa* (p. 255).

Distribution.—All over Britain and Europe generally, America, South Africa. The only African records are Dewar's (1905) and are by Lounsbury, who found the ova on imported stock. Tasmania (Lea).

NOTES ON LIFE-HISTORY.

The Green Apple Aphis occurs every year on apples and pears in Britain, often in considerable numbers, but never in such vast swarms as does the following species. Moreover the damage caused by it is not nearly so severe as that done by *Aphis kochii*. It mainly lives on the top shoots and beneath the leaves; sometimes it is densely packed together; at others in scattered groups. The curling of the foliage is not nearly so severe as in attacks of *Aphis kochii*. This green "Dolphin" hatches out from mid-April to early in May; that is somewhat later than in the following species. It increases very slowly at first, but in June it may spread very rapidly, and on into July, when the tops of the trees may become covered with it. The earliest alate females I have found were towards the end of June, and these may continue to appear erratically on into August and fly from the apple and pear to other trees close by. In October the sexual forms occur, namely, apterous, oviparous females and apterous males. These often swarm in October and November under the leaves, where copulation takes place. When fertilized, the females crowd on to the shoots and there deposit their ova, usually great numbers together, so that nothing of the shoots can be seen. At first the ova are yellowish-green to dull yellow; in a few days they become black and shiny. There they remain all the winter. The males are very few in number. The whole life-cycle seems to be passed on the apple and pear, unlike *Aphis kochii* and *A. avenæ*.

Miss Patch also finds in America that it is not migratory, and is thus to be found at all seasons of the year upon apples in some form or other.

This species does comparatively little harm in Britain, although

it often occurs in great abundance. On young nursery stock, however, I have seen it not only stunt the growth to a very great extent, but to actually kill the tender tips of the shoots. In America Miss Patch says that it is by far the most troublesome of the leaf aphides of the apple in Maine; contrary to what we notice in Britain. It can easily be dealt with by spraying, unlike our most troublesome Apple Aphis—*Aphis kochii*.

The hind tibiae of the oviparous female are not swollen, as is usual, and bear but very few sensoria; in fact, in many I have been unable to find any pores at all.

(TO BE CONTINUED).

SOME 1915 NOTES ON A FEW COMMON JASSOIDEA IN
THE CENTRAL MISSISSIPPI VALLEY STATES.

BY EDMUND H. GIBSON, U. S. BUREAU OF ENTOMOLOGY,
WASHINGTON, D. C.

The past year has been especially favourable for jassid collecting in the Central Mississippi Valley, principally because of frequent rains favouring rank growth of native grasses and weeds, and an ever abundant supply of tender plant growth and foliage. The following notes are from observations made in western Illinois, Kentucky, Tennessee, eastern Missouri and Arkansas.

Draculacephala mollipes Say was everywhere abundant from early spring until late fall. During the early summer it was very numerous in northern Arkansas, where it caused considerable injury to young corn. Great quantities were observed around electric lights in the heart of the city of St. Louis early in September. There is no doubt but that *D. mollipes* has a characteristic habit of long flights at night. This is one, if not the most general feeder of all the Jassoidea. However, oviposition seems to be confined principally to grains, grasses, and grass-like plants. This sharp-headed grain leafhopper was seldom taken in sweepings from the foliage of trees.

Diedrocephala versuta Say became abundant during the late summer. It was found to be of economic importance to cow-peas in Missouri, where occasional injury was noted to the tender growth of the vines. Alfalfa is the only other field crop upon which they were found abundant. Adults were collected from many ornamental

plants and shrubs growing in the Missouri Botanical Gardens at St. Louis. This species, the nymphs particularly, seem to be rather sluggish in their movements. They do not jump or run quickly, and it is quite easy to put one's finger on them.

Dicrocephala coccinea Say, one of the most handsome and striking forms, was taken wherever collections were made. While not found in such numbers as *D. mollipes* or *D. versuta*, yet they were observed feeding on a great variety of plants, including over 50 species of weeds, on many ornamental plants and shrubs, and various trees. It was the only species found to feed on the leaves of the American Holly. Many of their nymphal cast skins were observed on the under side of the leaves of Magnolia trees, upon which they undoubtedly feed. Adults are attracted to lights at night and remain almost inactive during the day time.

Phlepsius irroratus Say appeared to be of considerable economic importance to alfalfa and clover throughout the central Mississippi Valley states. It was also collected in abundance from various grains during the spring months. The greatest damage done seems to be caused by the feeding of the nymphs and adults upon the stems, which they prefer to the leaves. This irrorate leafhopper exhibits flight as much in day time as at night. Adults and nymphs were captured at all seasons of the year.

Agallia sanguinolenta Prov., the clover leafhopper, has a general distribution, and occurred in sufficient numbers to cause some alarm to alfalfa growers. This with *Empoasca mali* caused considerable injury to alfalfa and red clover in southeast Missouri during the early summer months. It proved, however, to be easily captured in the hopperdozer. This is one of the hardiest of the Jassoidea. Adults were observed to be active in grain fields during the winter months on comparatively cold days, when other species were in hiding or hibernating. The list of food plants is quite limited, it having been taken from but few other plants than those of the Leguminosæ family.

Empoasca mali Le B. was probably the most injurious jassid of the year, adults and nymphs attacking alfalfa, clover, and several other field crops in great numbers. The species occurs everywhere in the Mississippi Valley, and is most injurious in the central states. It easily adapts itself to change of food plants, as

is evidenced by the innumerable plants, shrubs, and trees upon which it is known to feed. This is one of the earliest species to make its appearance in the spring. During 1915 there were at least six generations for the latitude of southern Illinois. The author has for some time suspected this species of being an important factor in the spread and dissemination of the alfalfa yellow leaf spot, *Pseudopeziza medicaginis*, and the brown spot, *Coletotrichum trifolium*; and in this regard possibly *Agallia sanguinolenta* plays a part. The adults exhibit a strong habit of flight, especially at night.

Among other Jassoidea which were common during the year, the following may be listed:

Pediopsis viridis Fitch.

Agallia constricta Say.

Cicadula 6-notata Fall.

Deltocephalus inimicus Say.

Deltocephalus nigrofrons Forbes.

Athysanus exitiosus Uhl.

Athysanus bicolor Van D.

Platymetopius frontalis Van D.

Eutettix seminuda Say.

Typhlocyba comes Say.

ENTOMOLOGICAL NOTES.

Alfred E. Cameron, D.Sc., M.A. (Aberdeen), M.Sc. (Manchester), has been appointed a Field Officer of the Entomological Branch, Ottawa. He will be specially charged with the investigation of the Pear Thrips and other insects in British Columbia.

Dr. Cameron graduated in 1909 in the University of Aberdeen with the degree of master of arts. After taking the further degree of bachelor of science in Zoology, he took up advanced entomological work under Prof. Maxwell Lefroy, Professor of Entomology in the Imperial College of Science, London, and continued his entomological research work as an Honorary Research Fellow in the University of Manchester in 1912, where he took the degree of master of science (M.Sc.). He was appointed by the English Board of Agriculture and Fisheries to a Government Scholarship, and continued his investigations in England and in the United States. In 1914 he spent a year conducting practical entomological

work and spraying experiments in the Agricultural Experiment Station of New Jersey under Dr. Headlee, State Entomologist, and returned to England to take up university work in Manchester and the University College of South Wales. He has published a number of entomological memoirs in various scientific journals and received his doctorate in 1915. His thorough scientific and practical training will make him a valuable addition to the Entomological Branch of the Dominion Department of Agriculture.

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THOMAS H. CUNNINGHAM.

We regret to announce the death, on February 16th, of Mr. Thomas H. Cunningham, Inspector of Fruit Pests for British Columbia, at the age of 78 years. Mr. Cunningham's health had been poor during the last two years, but he continued his duties in spite of advanced years and diminished vigour with a characteristic tenacity.

For many years he had served the Board of Horticulture of British Columbia as its Inspector of Fruit Pests with a zeal rarely equalled. It was natural that in the prosecution of his work of inspecting orchards and nurseries, imported nursery stock and fruit, he should fail to please everybody; but to the wholehearted enthusiasm with which he carried out his work is due, to no small degree, the comparative freedom of British Columbia orchards from some of our most serious fruit pests. To name two in particular, the Codling Moth and San José Scale, would have been widely distributed by this time but for the energetic methods he employed. The fruit growers of the province owe much to his industry, and his death removes a unique member of the Entomological fraternity of Canada.

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The Ohio State University has recently inaugurated a plan providing for Research Professors which enables the holders to devote their time especially to research work, and Professor Herbert Osborn has been elected Research Professor in the Department of Zoology and Entomology. He will be relieved from routine, class and department duties, devoting his time to researches, especially in the line of Entomology, but will continue to have direction of research work of Graduate students in his particular field.

Mailed May 15th, 1916.