

LEPERISINUS CALIFORNICUS, N. SP.

Adult (enlarged 10 diam.); and tunnels in olive branch (natural size).

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NEW SPECIES OF THE FAMILY IPIDÆ (COLEOPTERA)*

PART III.

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Pityokteines jasperi, n. sp.

A small, very slender species, closely allied to *sparsus* Lec; with the elytra very closely, regularly, deeply punctured behind.

Description of the female—Length, 2.3 mm.; width, .7 mm.; colour, dark piceous, nearly black, with the antennæ and legs paler. The head has the front plano-convex, densely very finely granulate, with a small median tubercle, and thickly clothed with very long curved yellow hairs much as in *sparsus*; the antennal club thickened basally, very obliquely truncate and depressed apically, with the sutures confined to the apical depressed outer surface.

The *pronotum* is distinctly longer than wide, with the sides straight on the basal half, broadly evenly rounded in front; coarsely, rather densely, and irregularly asperate in front; rather coarsely, moderately closely and deeply punctured behind, more finely near the rather wide smooth median line; with sparse long hairs about the sides and in front, and the front margin densely fringed with long curved yellow hairs.

The *elytra* are elongate, with the sides parallel beyond the middle, the striae narrowly faintly impressed, the sutural striae distinctly deeper and wider, the striae punctures of median size, very close on the disc, and deep; the interstriae punctures regularly uniseriate, deep, as large as those of the striae and nearly as close on the caudal half, as close and granulate near the declivity, a little smaller and less numerous towards the base. The declivity is steep, convex, with the suture elevated and granulate and the

*Contributions from the Entomological Branch, Department of Agriculture, Ottawa.

sutural striæ strongly impressed; almost unarmed, with the declivital teeth reduced to three extremely minute acute granules in the usual situations, on the 2nd and 3rd and 6th interspaces, with a very few additional minute granules; the declivity very closely and deeply punctured. The pubescence of the elytra is rather short and abundant on the sides and behind.

The *male* has the front plano-convex, densely, deeply granulate-punctate, with an indistinct median carina, and sparsely hairy; the declivity concave from the deeply widely impressed sutural striæ, sparsely deeply punctured, shining, the 2nd and 3rd teeth large, acute, within the rather distinct granulate lateral margin, the 2nd curved, the first tooth minute. Jasper Park, Alberta, Canada. The type is in the collection of the Entomological Branch, Ottawa.

***Pityokteines elegans*, n. sp.**

This species is closely allied to *sparsus* (*balsameus*) Lec., but is slightly more elongate, with the elytral striæ finely, regularly impressed, and the interstitial punctures very small.

Description of the female—Length, 2.5 mm.; the *head* has the front flattened, densely, finely granulate, very densely clothed with very long incurved orange-coloured hairs; the antennal club wider than long, the first suture nearly straight except at the sides, the distal oblique part strongly depressed.

The *pronotum* is slightly longer than wide, with the sides feebly arcuate on the basal half; the front margin broadly rounded, rather closely asperate in front; rather finely and sparsely punctured behind, with a wide smooth median space; the hairs sparse, long and erect about the sides, thicker on the frontal declivity and gradually longer from the summit to the apical margin, which is densely fringed with very long orange hairs similar to those of the front of the head.

The *elytra* are slightly longer than in *sparus*, with the sides parallel, the apex semicircularly rounded, the striæ finely regularly impressed, the sutural striæ somewhat deeper and wider than the others; the stria punctures small and very closely placed, slightly smaller at the base; the interspaces wide, moderately convex on the disc, smooth except near the declivity; the interstitial punctures

sparse on the disc and distinctly smaller than those of the striae, becoming closer, as large as those of the striae and granulate near the declivity and on the sides; the declivity very steep, almost as in *sparsus*, shining, sparsely but strongly punctured; the suture raised, the declivital face somewhat circularly flattened and rather deeply and broadly sulcate on each side, with three small, acute teeth on each side, situate just within the rather ill-defined, crenulate, lateral margin of the declivity, the ventral acute margin formed by two crenulations on each side and absent near the suture.

The *male* has the front convex, rather coarsely punctured, more sparsely behind, rather densely towards the epistoma, the punctures slightly granulate, sparsely hairy; the pronotum without the fringe of long hairs from the front margin; the elytral declivity deeply concave, with the 2nd and 3rd teeth of each side forming part of the lateral margin and very large, stout, incurved and acute.

Described from four females and two males, sent by Professor H. F. Wilson, Corvallis, Oregon, Labels: Hood River, O.; Childs Coll.; 8-20-14; Also, Grassy Lake, Lassen Co., Cal., *Pinus monticola*, Mr. Ralph Hopping. The type is in the collection of the Entomological Branch, Ottawa.

***Orthotomicus lasiocarpi*, n. sp.**

A very small slender species combining characters of *Orthotomicus* and *Pityokteines*.

Description of the female—The length, 2 mm.; slender. The head has the front convex, deeply rather coarsely punctured, sparsely towards the vertex, densely towards the epistoma; with a wide median carina on the caudal two-thirds; transversely impressed on the epistoma; the pubescence short and inconspicuous, closer on the epistoma; the antennal club slightly longer than wide, obliquely truncate on the distal half, with the distal segments showing from the upper side at the apex, the sutures procurved, the sutures of the under face on the distal half and slightly procurved.

The *pronotum* is slightly longer than wide, feebly arcuate on the sides behind, slightly constricted before the middle and broadly

rounded on the front margin; the asperities of the cephalic half numerous and subconcentric; the caudal half moderately deeply, closely punctured, densely on the sides; the median line smooth, and narrowly carinate from the summit to the base; the lateral oblique depressions connected across the dorsum.

The *elytra* are elongate, with the sutural striae slightly, broadly impressed, a little more widely behind; the other striae not impressed; the strial punctures very small, moderately close and deep; the interstrial punctures nearly as large and nearly as close as those of the striae, finely granulate behind; the suture elevated except at the base and granulate towards the declivity. The *declivity* convex from the side, steep, the sutural striae deeply widely sulcate, wider towards the apex, terminated before the apex of the *elytra* by the obtuse, narrow, apical projection; shining, very minutely rather sparsely punctured; with a few minute denticles on each side in the usual position on the crest of the lateral convexity, the 1st on the end of the 2nd interspace, the 2nd on the 3rd interspace, and two close together on the 5th and 6th interspaces. The second visible abdominal sternite is as long as the two following ones united. The male has the front as in the female; it differs only in having the declivital denticles of the 2nd, 3rd and 6th interspaces developed into small acute teeth, and the declivital impression apparently deeper thereby. The genitalia have the "trough" a very long spiral band and the processes (feet) very long and slender, very much as in *sparsus*.

This species is of the size of *jasperi*, but more slender, and is allied to the species of *Pityokteines* in the small size, the *elytral* punctuation, the poorly developed apical projection of the *elytra*, the long second visible abdominal sternite, and the characters of the male genitalia. The antennal club, however, although flattened considerably, has the apical segments incompletely telescoped, showing distinctly at the apex from the upper side, the apex of the declivity, too, is distinctly though obtusely margined; and the female lacks the strong tuft of hairs on the front; these characters unite the species rather definitely with the genus *Orthotomicus*.

Type series from Rogers' Pass, British Columbia, abundant in *Abies lasiocarpa*; Edmonton, Alta., abundant in *Larix americana*. The type is in the collection of the Entomological Branch, Ottawa.

Orthotomicus ornatus, n. sp.

This is a small elongate species, allied to *sparus* (*balsameus*) Lec., and also to *cætatus* Eichh.

Description of the male—Length, 2.3 mm. The head has the front convex, closely, rather coarsely granulate, with the median carina nearly obsolete, the hairs long but sparse; the antennal club about as wide as long, thickened basally, the apical half strongly obliquely truncate, the first suture recurved, with the apical segments almost completely telescoped, showing only one suture at the apex, on the upper surface.

The pronotum is distinctly longer than wide, with the sides straight to well beyond the middle, then narrowed to the broadly rounded front margin; coarsely very sparsely asperate and finely granulate, moderately punctured behind, closely on the sides, rather sparsely on the disc, with a smooth medium space becoming narrow and slightly carinate towards the summit.

The elytra have the sides straight and parallel for four-fifths the length; then semicircularly rounded behind as viewed from above; the striae narrow, straight, regular, and slightly impressed; the sutural striae slightly wider and more strongly impressed on the disc, still more strongly behind, but not widened before the declivity; the striae punctures rather large except towards the base, regular, quadrate, and *very closely placed*; larger and closer behind; the interspaces nearly flat, those of the disc wider than the striae in front and narrower towards the declivity, uniseriately punctured, the punctures rather numerous, about 12 on the discal interspaces between the base and the top of the declivity, the punctures very small in front becoming as large and close as those of the striae and granulate near the declivity. The declivity is vertical, moderately concave, somewhat less deeply than the male of *sparus*; densely, coarsely punctured and hairy; with three acute teeth on each elytron, the first tooth minute, on the second interspace; the second extremely coarse, stout at the base, acute, incurved, on the third and fourth interspaces, much closer to the first tooth than to the third; the third smaller, slender, straight and acute, on the sixth and seventh interspaces; the second and third on the margin of the declivity, which is completed laterally

by a subacute arcuate ridge connecting the second and third teeth; with a small denticle on the end of the fifth interspace at the base of the second tooth; the apical margin of the declivity narrowly separated from the elytral margin, moderately acute, entire, extending across the suture.

The female has the front closely coarsely granulate-punctate, with a narrow median carina on the caudal half developed into a compressed tubercle at the cephalic end on the centre of the front, and with a deep transverse impression between the tubercle and the margin of the epistoma; the declivity nearly vertical, similar to that of the male, but much less deeply concave; the sutural striae still distinctly but much less deeply and broadly sulcate, and the sides of the declivity less elevated and less distinctly margined; the apical margin feeble, barely distinct at the suture; with smaller teeth, situated much as in the male, on the convexity laterad of the sulcus, but in a straight oblique line, the first minute, the second and third alike, small, conical and acute; the concavity densely, coarsely punctured and hairy as in the male. The second visible segment of the abdomen is as long as the next two united.

This species unites the characters of *Orthotomicus* with those of *Pityokteines*. It is allied to *Orthotomicus* in the frontal secondary sexual characters, and in the fairly distinct apical margin of the declivity; but rather closely to the typical *Pityokteines* in the small size, long second visible abdominal sternite, and frequently by the characters of the somewhat variable antennal club.

It is represented in our collection as follows: A short type series from Williams, Arizona, in the Cornell Uni. Collection, No. 302, sub. 100; a short series from Oregon sent by Professor H. F. Wilson; a short series from Tulare, Co. Cal., taken by Mr. Ralph Hopping in *Pinus ponderosa* and *Pinus jeffreyi*. The type is in the collection of the Entomological Branch, Ottawa.

Ips chagnoni, n. sp. .

Description of the male—Length, 4.7 mm.; width, 1.75 mm.; larger and stouter than its close ally, *grandicollis* Eich., sides of prothorax and elytra nearly parallel, pronotum slightly wider than the elytra; clothed with stiff, erect, reddish hairs, thick

about the sides, front of the pronotum and margin of the declivity, sparse on disc of pronotum and disc of elytra.

The front of the *head* is much as in *grandicollis*, but more coarsely sculptured, with a median coarse granule near the epistomal margin, succeeded by a broad median impression, and this by the wide smooth median line; the antennal club has the sutures rather broadly but strongly angulate.

The *pronotum* is distinctly but only moderately longer than wide, broadly rounded behind, with the hind angles oblique; the sides subparallel to the middle, then obliquely narrowed and broadly rounded in front; the asperities of the cephalic half rather small and concentric near the summit; the caudal part smooth and shining, rather finely and moderately closely punctured on the disc, with the smooth median space obsolete except at the centre of the disc, closely and more coarsely punctured on the sides.

The *elytra* are punctate-striate, with the striae slightly impressed on the disc, excepting the sutural striae, which are very deeply impressed and wider behind, with the punctures larger, closer and transverse; the punctures of the remaining striae of medium size, circular and more closely placed on the disc; the interspaces flattened, excepting the first two, which are distinctly convex; all the interspaces confusedly punctured and granulate at the margin of the declivity; the lateral interspaces closely uniseriately punctured, with punctures as large as those of the striae, the punctures confused at the base, near the declivity, and on the last two interspaces; the discal interspaces more sparsely punctured, the first rather closely uniseriately punctured throughout and granulate near the declivity, the second punctured only near the declivity and the base, widest and the most strongly convex; the third with three widely separated punctures in addition to those at the base and near the declivity; the fourth punctured forward to the middle and again at the base; the fifth sparsely punctured at the base and closely towards the declivity; and the remaining interspaces closely punctured; the elytra rather densely clothed with stiff reddish hairs on the sides and around the margin of the declivity, with a few hairs along the base, and very sparsely hairy on the disc. The *declivity* is deeply excavated, coarsely,

not densely, confusedly punctured, with numerous minute hairs, thicker and longer near the margin and on the strongly raised suture; the declivital armature nearly as in *grandicollis* Eichhoff; the first tooth small, acute, on the end of the second interspace; the second, on the fourth interspace, large, acute, the apex directed dorso-mesad with the caudal margin crenulate and nearly vertical, connected at its base with the third tooth, which is stouter and longer, blunt and somewhat curved meso-caudad; the fourth and fifth teeth smaller and acute, on the declivital margin between the 3rd and the acute apical margin, which is narrow, acute, and raised almost to the level of the tips of the 4th and 5th teeth.

The *female* is somewhat less coarsely sculptured on the front and declivity.

There is considerable variation in the punctuation, and the discal striæ of the elytra are frequently decidedly impressed, with all the discal interspaces convex. The length varies from 4 mm., to 5.2 mm.

This species is distinct from *grandicollis* Eich. in the larger size, stouter form, shorter pronotum, and confusedly punctured interspaces near the declivity; from *vancouveri* and *confusus* by the very sparse punctures on the basal half of the discal interspaces.

The species is abundant in Ontario and Quebec Provinces, chiefly in *Picea canadensis* and *Pinus strobus*; it extends southwards into New York State. The type is from Montreal Island, P. Q., collected by Mr. G. Chagnon, of Montreal, and is deposited in the collection of the Entomological Branch, Ottawa.

Ips vancouveri, n. sp.

Description of the male— Allied to *confusus* Lec., but stouter, densely hairy, and much more coarsely sculptured; length, 5.5 mm.; colour, dark reddish brown.

The *head* has the front evenly convex, coarsely rather sparsely granulate, more finely and densely on the sides; the epistoma transversely impressed, with a narrow median emargination; with a compressed, short, blunt median tubercle at the base of the epistoma, followed by a small median impression, and the smooth median line obsolete; the vertex shining and nearly smooth; the

sutures of the antennal club very strongly angulate at the middle; the pubescence of the front close, long and erect.

The *pronotum* is distinctly longer than wide, widest at the base, with the sides slightly arcuately narrowed for two-thirds the length, then strongly narrowed to the narrow but broadly rounded front margin; subconcentrically, not very densely asperate in front; the pubescence abundant and long about the sides and in front; closely, rather coarsely and deeply punctured behind, more closely on the sides.

The *elytra* are as wide as the pronotum, with the striae strongly impressed on the disc, distinctly impressed on the sides; the sutural striae deep and wide, deepened towards the base, and widened behind; the striae punctures coarse, close, deep and quadrate, smaller near the declivity, the discal interspaces strongly convex and coarsely roughly punctured, not closely near the base, densely and confused on more than the caudal half, and granulate about the declivity; the lateral interspaces with the punctures less coarse but very densely confused throughout; the first interspace closely confusedly punctured and uniseriately granulate; the second interspace the widest, sparsely punctured in front, closely, confusedly granulate-punctate on more than the caudal half and with a row of acute granules terminating in the first declivital tooth, which is much closer to the second tooth than to the suture; the declivital teeth otherwise nearly as in *confusus*, but distinctly coarser, the 2nd tooth conical acute, with its caudal margin sinuate and nearly vertical, close to the 3rd, which is stout, subcapitate and curved downwards, the 4th and 5th conical, on the margin of the declivity between the 3rd and the narrow, strongly produced apical margin; the concavity densely, deeply, rather finely punctured, and densely clothed throughout with long slender pale hairs; the *elytra* densely clothed with long hairs, more sparsely on the disc.

The female has the frontal tubercle of the male represented by a slight median episternal carina, followed by a median shining impressed area, and the declivital teeth less strongly developed.

The species occurs in Sitka spruce and western white pine on Vancouver Island and the coast of British Columbia; it occurs

at Kaslo, B. C., and probably elsewhere in the interior. The type is from *Pinus monticola*, Quathiaski Cove, B. C.

The size varies moderately, from 5 mm. to 5.7 mm. in length; the colour, from dark reddish to black; the punctuation from coarse to moderate in size. The type is in the collection of the Entomological Branch, Ottawa.

***Leperisinus californicus*, n. sp.**

This species is allied to *aculeatus* Say, of the same size and shape, with the yellow-grey markings very distinct.

Description of the female—Length, 2.5 mm.; colour, black, with the apex of the pronotum, the base of the elytra, the scape and funicle of the antennæ and the legs red, and the pronotum and elytra distinctly marked with areas of yellow-grey scales. The head has the front broadly moderately concave in front, convex towards the vertex; very finely reticulate and moderately shining; finely granulate-punctate, sparsely in front, with closer, shorter, erect, dark, plumose hairs behind, the epistoma bearing very long, upcurved, slender, plumose hairs, and from the margin a dense fringe of very long, simple, orange-coloured hairs; a sub-triangular area behind the epistoma more brightly shining and with a faint trace of a median carina; the antennal club pubescent, elongate oval, moderately compressed, with the sutures transverse, the last oblique.

The pronotum is very much wider than long, strongly arcuate on the sides and very strongly narrowed in front to the very broadly rounded but not emarginate front margin; with coarse, shallow punctures, finely scabrous on the median area, with rather numerous coarse, lunar rugosities on the middle of the sides, ending in front in a submarginal row of rugosities connecting the lateral dark areas; the colour-markings somewhat as in *aculeatus*, with a black lens-shaped, longitudinal, median area, clothed with elongate, plumose, dark-coloured, almost invisible scales, intermixed with stout plumose hairs; with a longitudinal, narrow, irregular, medially widened, black area in the middle of each side and the remainder of the disc densely clothed with very wide, flat, yellow-grey, plumose scales, with a few stout plumose hairs intermixed, the

scales gradually becoming stout plumose hairs on the ventral surface and along the front margin.

The elytra are shaped much as in *aculeatus*, strongly elevated, arcuate and serrate on the basal margin, and narrowly rounded behind as viewed from above; the declivity very strongly oblique, from the side, so that the median line of the elytra is almost evenly broadly arcuate in profile from the middle to the apex; clothed with scales and erect hairs; the striae very narrow, slightly impressed; the stria punctures small and indistinct; the interspaces wide and nearly flat, on the disc slightly convex towards the base; the suture elevated on the caudal two-thirds, and the third interspace convex, more strongly on the declivity; the interspaces with uniseriate coarse rugosities, becoming lunar and more numerous at the base and more acute behind; densely clothed with very wide, often subcircular, flattened, plumose scales which become stout plumose hairs at the base, long, conspicuous and usually black on the caudal two-thirds of the sides, very slender near the side margin, becoming very large, erect, widely spatulate scales behind on the disc, longer and densely placed on the first and third interspaces of the declivity, making those interspaces apparently carinate, nearly obsolete on the second declivital interspace; on the disc the vestiture coloured in three yellow-grey bands alternating with three dark subtransverse bands; the first band black, suffused with reddish, basal; the second band pale, wide, from the suture to the side margins, extending irregularly backwards on the side, with the pale section of the first interspace attaining the scutellum, that on the second extended farther behind, that on third nearly obsolete; the second pale band, the fourth from the base, is a subquadrate blotch on the 2nd, 3rd, 4th and 5th interspaces, extended forward on the 5th and connected diagonally by scattered pale scales with the base of the first pale band, evidently the remnant of a strongly oblique pale band, surrounded by the 3rd and 5th bands, which are black, and meet on the middle of the side to be extended irregularly to the side margins; the third pale band, the sixth from the base, is transverse, apical, with a narrow extension forward on the 4th and 5th interspaces nearly to the 2nd pale band, and connected by scattered pale scales with a caudal extension of the 1st pale band on the 8th interspace.

The ventral surface is strongly inflated at the metathorax, the abdomen strongly oblique from the metathorax to the apex; the last segment strongly flattened and the last three sutures very deep; clothed with greyish, stout, plumose, scale-like hairs with slender plumose hairs intermixed towards the middle line, with a *dark area* covering the last two segments and the caudal border of the 3rd densely clothed with erect black hairs.

The male has the front less concave, with a well-developed acute postepistomal median carina, with the hairs on the epistoma short except the marginal fringe, which is moderately long.

Labels with the type: San Diego, Cal., 7-18-15, olive, ♀. Adults and work in olive branches were received from Professor E. O. Essig and Dr. E. C. Van Dyke. The species was taken from living olive trees, at San Diego, Cal., in 1914, and was causing much injury to the host. Two specimens of the same species were received from Mr. Ralph Hopping, taken by him on brush in the chapparal belt, Camp Greely, Fresno Co., Cal., 3,000 ft., in 1909.

The type of this species is in the collection of the Entomological Branch, Ottawa.

THE NYMPHS OF ENALLAGMA CYATHIGERUM AND E. CALVERTI.

BY E. M. WALKER, TORONTO.

The nymph of *Enallagma cyathigerum* Charp. has been described by Lucas ('00)¹ and Ris ('09)², that of *E. calverti* Morse by the present writer ('13)³. No description of the nymph of the former species based on American specimens has, however, yet appeared, and this has been a desideratum for two reasons.

In the first place the American form of *cyathigerum* was originally described as a distinct species (*E. annexum* Hagen), and has been frequently cited under this name, or as *E. cyathigerum* race *annexum*, and although Williamson ('02)⁴ pointed out its identity with *cyathigerum*, and has been generally followed, the question of the validity of *annexum* as a race has always seemed to me not indisputable. I have examined a large number of Canadian specimens from a very wide range of territory and also a number of European examples, and, although I regard them all as one species, I have never had any difficulty in separating the

males of the American form from those of the European form by the shape of the abdominal appendages. The difference is slight, but constant in the material I have examined.

In the second place, having recently reared *cyathigerum* at Toronto, I find that the nymph does not wholly agree with Ris' description and figure (I have not had access to Lucas' description), but that, on the other hand, it is so extremely like that of *calverti* that a comparative study of these forms is necessary in order to make their separation possible.

Early in June, 1914, I found *E. cyathigerum* in considerable numbers at "Fisherman's Island," a long narrow sand bar, south of the city, which separates Ashbridge's Bay from the open lake, and, until recent filling-in operations commenced, was margined on the inner side by a wide extent of marsh. It proved too late to obtain the nymphs that season, but on May 24 of the following year a visit was made to the same spot and about twenty mature nymphs were secured. They were accompanied by large numbers of *E. hageni*. On May 26 a male *cyathigerum* emerged, and as the identity of the nymphs was now assured, the remainder was preserved for study. Imagos had already become quite numerous on the island, and soon became abundant. A large number were examined, but all were alike; no specimens of *calverti* were found among them. Shortly afterwards they disappeared and were followed, as in the previous year, by swarms of *E. hageni*.

During the season of flight of *cyathigerum*, *E. calverti* was common about a pond in the vicinity of my house in Wychwood Park, Toronto, and I reared this species again here, as I had previously done at Lake Simcoe and Go-Home Bay, Ont. I was thus able to obtain sufficient material for a comparison of the nymphs of the two species.

The Nymph of *Enallagma cyathigerum*. (Pl. IX).

Very similar to *E. calverti* Morse in size, form and coloration (v. Can. Ent., XLV, 1913, p. 162, pl. 1, figs. 4, 5). Head as in

1. British Dragonflies, pp. 297-307.
2. Die Süßwasserfauna Deutschlands. Heft 9, Odonata, pp. 50, 54.
3. Can. Ent., XLV, No. 6, p. 162.
4. Proc. Acad. Ind., p. 121.

E. calverti, differing from that of *E. hageni*, *E. ebrium*, *Ischnura verticalis* and *Cænagrion resolutum* in the somewhat more prominent eyes and postero-lateral surfaces of the head, these parts having a somewhat more strongly sinuate outline in dorsal view (cf. Can. Ent., *l.c.*, figs. 4, 6). Labium of the usual form in this genus, the lateral margins in about the proximal two-thirds straight and diverging at an angle of about 30° , in the remainder at about 70° , breadth at the base of lateral lobes four-fifths of the length; mental setæ 4, sometimes 3 on one or both sides, lateral setæ 6; lateral lobes of the usual form, the end-hook preceded by 2 or 3 teeth, which are preceded by a more or less denticulated and incurved margin. Spinules on lateral margins of abdominal segments of moderate size, forming an irregular single or partly double series and not increasing much in size near the postero-lateral angles.

Gills long and relatively narrower than in *E. hageni*, the margins of a little less than the proximal half spinulose, the spinules somewhat coarse, particularly on the dorsal margin of the median gill and the ventral margins of the lateral gills, distal margins with moderately long slender hairs; apices convexo-angulate or rounded. The greatest breadth is just before the distal end of the spinulose margins, measuring between one-fourth and one-fifth (median gill) or one-fifth and one-sixth (lateral gills) of the length. Beyond this point the gills are suddenly, though slightly, narrowed.

The lateral appendages (superior appendages of adult) differ in form in the two sexes. In the male, they are rounded and somewhat depressed, in profile about half longer than deep, and, when viewed obliquely from above, they present a distinct, though shallow, dorso-caudal concavity; viewed directly from above, they appear about as broad as long with convex margins, especially the outer. In the female, these appendages are subpyramidal, tapering to a blunt apex, the outer margin in dorsal view nearly straight, the inner margins somewhat more convex toward the base.

Colour—Olivaceous or brownish-green (brownish-yellow in alcoholic specimens), generally nearly uniform, but frequently more or less speckled with dark irregular spots, the abdomen

usually with diffuse, dorsal longitudinal dark band, divided by a pale median line, and sometimes with a definite row of dark spots on the sides, legs pale, femora with a darker anteapical annulus, which may be faint in pale specimens. Gills generally diffuse greyish-brown, sometimes very pale, sometimes quite dark, typically with three or four narrow, transverse, somewhat angular bars about the middle or slightly beyond, following one another closely and sometimes partly confluent, the first band usually the most distinct and in very pale specimens sometimes the only one present. In well-marked specimens there may be an indication of another band farther distad, and in dark specimens there may also be considerable pigmentation along the tracheal branches and sometimes dark blotches independent of the tracheæ.

Length of body 21-21.5 mm.; hind wing-pad 4-4.8 mm.; hind femora 3.8-4.4 mm.; gills 7.5-8.5 mm.

As in the case of the adults, the nymphs of *E. cyathigerum* and *calverti* differ apparently only in one constant character, the form of the superior (lateral) abdominal appendages of the male. In the nymph of *calverti* these appendages in profile appear fully as deep as long, with a much broader and more bluntly rounded apex, which is somewhat above the mid-longitudinal axis. The sulcation seen in *cyathigerum* in an oblique view from above is not present in *calverti*. The outline of the appendage viewed directly from above is less rounded than in *cyathigerum*, the outer margins being but slightly curved, and passing into the posterior margins by a rounded angle. There is a distinct submedian longitudinal ridge.

Ris' figure of the gill of a European specimen of *E. cyathigerum*, reproduced from a photograph, differs considerably from the gills of my specimens, being more like those of *E. hageni* and *E. ebrium* in form. It is little more than three times as long as broad; the margins are more evenly convex, and the marginal spinules appear decidedly smaller, those of the stronger series not interrupting the curve of the margin as in American specimens and in *E. calverti*. In Ris' figure, the gill is broadest beyond the apex of the spinulose part of the margins, while in American specimens the greatest width is just before this point. The gill is also described as having no transverse bands and none appear on the figure.

EXPLANATION OF PLATE IX.

Figs. 1-5, *Enallagma cyathigerum*, Charp., nymph; 1, median gill; 2, lateral abdominal appendages of female, dorsal view (median gill removed); 3, lateral abdominal appendages of male, dorsal view; 4, right appendage of male, profile view; 5, same, dorso-lateral view. Figs. 6-8, *Enallagma calverti* Morse, nymph; 6, lateral abdominal appendages of male, dorsal view (median gill removed); 7, right appendage of male, profile view; 8, same, dorso-lateral view.

GEOFFREY MEADE-WALDO.

All who attended the Jubilee Meeting of the Entomological Society of Ontario in August, 1913, remember, among other pleasant recollections of that meeting, the pleasure which the presence of Mr. Meade-Waldo occasioned; Mr. Meade-Waldo attended the meeting as a representative of the British Museum of Natural History. To all those and to his other friends in Canada his untimely death in March will come as a shock. He had a peculiarly winning manner and a deep love not only of the science to which he chiefly devoted himself, but to nature generally, as he was a keen ornithologist and an ardent advocate for the preservation of wild life. His enthusiasm was very marked during the excursion we made at the time of the meeting to Grimsby, from which excursion he arrived home not only with his hands full, but, in the absence of a third prehensile organ, carrying in his mouth a twig bearing a Sphinx caterpillar.

Mr. Meade-Waldo was born in January, 1884, and after being educated at Eton and Magdalen College, Oxford, he visited the East, including the Federated Malay States and Borneo. In 1909 he was appointed to the Entomological Department of the British Museum, Natural History, where at the time of his death he had charge of the Hymenoptera. In this group he had already carried out valuable and much-needed work, and his death will be a severe loss not only to British entomology, but to a still wider body of entomologists who were following his promising career with great expectations.

C. GORDON HEWITT.



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NYMPS OF ENALLAGMA CYATHIGERUM AND
E. CALVERTI.

(Page 193.)

POPULAR AND PRACTICAL ENTOMOLOGY.

FRESH WOODS AND PASTURES NEW.

BY FRANCIS J. A. MORRIS, PETERBOROUGH, ONT.

II.

Just east of the city, overlooking the Lift Lock, stands a high hill, bare of trees. Yet even this naked hog's back has points of interest; for example, a month ago I discovered that a strange family had established squatter's rights on the face of it; they had come from the far west, but whether hobo-fashion, bumping it along the railway, or as stowaways in one of the large grain boats so often seen (by politicians and farmers) plying back and forth on the Trent Valley Canal, I do not know. Their godfather was a Russian, Hieronymus Grindel, and Gray describes them as "rarely adventive" eastward; rare or not, they have certainly arrived at Peterborough and come to stay: *Grindelia squarrosa*, the Gum-plant or Tar-weed. But the chief point of interest in this hill just now is the extensive view it affords of Peterborough's environs. It was from its summit as a vantage ground that I first spied a long stretch of thickly wooded country, about a mile south of the Lift Lock and running east as far as the eye could see. The nearest point in this line of forest is Burnham's wood.

My first expedition to this discovered a number of newly-felled pines on a side-road near the Burnham farmhouse and orchard. These were visited two or three times in June, and besides the common Monohammi, Clerids and Buprestids of the white pine, I captured seven specimens of *Acanthocinus obsoletus*, a light grey beetle with extremely long antennæ; it is very fond of resting on the under side of the trunk of pine trees in their first season of decay. I once captured nearly a score of these in the first half of June on a single pine, that in falling had lodged in the crotch of a neighbouring tree. I took also five specimens of a *Neoclytus*, which I think is *longipes*: head, thorax and body black, with three grayish-white lines of pubescence on each elytron; viz., a vertical crescent at the base, an oblique median line, and a transverse wavy line near the apex. I have taken it before on white pine, and have never found it on any other tree; the kindred species, *erythrocephalus*, reddish-brown in colour with yellow marks

on the elytra, prefers hardwoods, especially oak, hawthorn and maple. Towards the end of June I captured on the same pine trunks a specimen of *Leptostylus sex-guttatus (commixtus)*.

Rather nearer the wood was a swamp of willow and alder, and early in June, while testing out the local distribution of *Chrysomela*, I spied the graceful outline of a longicorn's antenna projecting over the edge of an alder leaf just above my head. The sun was near the zenith, and I could see through the leaf the oblong shadow of the insect's body. By mounting on a large overturned pine stump I could just reach up to the leaf and carefully closed my finger and thumb over the quarry. I then broke off the leaf with my free hand and succeeded in transferring my capture to the cyanide bottle. To my surprise this proved to be a pair of longicorns—the male barely a third the size of the female. I had never seen the beetle before. It was *Batyle ignicollis*, but, so far, I have been able to learn nothing of its life-history.

The wood itself was a somewhat low-lying hardwood with hemlock intermingled; a couple of paths ran through it that had been used in the spring at the gathering of maple sap. Near one of these paths were some stumps and also a large fallen tree of basswood. The first find I made was in fresh fungus on one of the stumps. Here I captured fully a score of a certain staphylinid: apparently all in the same colony, yet (according to cabinet methods) there were specimens here of five or six species. I am glad to see that Blatchley is suspicious of this unnatural system of classification. If there is any value in field observation, his suspicions are more than justified. The beetle was *Oxyporus*, and my specimens showed every sort of gradation from black to yellow, answering to three or four of Blatchley's specific descriptions, and probably several others not given in Blatchley. Half of them, no doubt, simply varietal and based on a single capture.

About the sheaf of leaves sprouting round the stump I took one or two specimens of *Saperda vestita*, and, on the trunk of the fallen basswood in the first week of June a treat was in store for me that I had not had for seven years or more, immense numbers of the basswood *Saperda* emerging from the bark or ovipositing on the trunk. There is a certain season, early in June, and no other (in my experience) when this sight is possible. Two or three

days later, and this tree showed hardly one insect for every score at the earlier date.

It was quite early in June, too, that I found, resting on the underside of a limb of the tree, very hard to discern in the shadow, a fairly large grey beetle; about the size of *Urographis fasciatus*, but abundantly distinct (when the two are set side by side); moreover, what to me seemed more important than all, frequenting basswood. Often as I have found *Urographis*—sometimes in considerable numbers—it has always been on oak, maple, or some other tree with exceedingly hard and close-fitting bark. So I set representatives of six or seven related genera, including the true *Urographis*, alongside of my stranger. The elytra of this latter were rounded at the tip, the hind tarsi all small, and the scape of the antennæ short and bulging; it was most like *Acanthoderes*, or *Acanthocinus*. These, unfortunately, were at opposite ends of the Tribe *Acanthoderini*; the subdivision of genera in the tribe is based on the shape of the antennal scapes. In my beetle these were strongly clavate. Apparently, then, it was *Acanthoderes*; but that genus proved to have dorsal tubercles. My beetle had three shining black spaces on the disk of the thorax, corresponding in size and position to such tubercles, but not in the least gibbous. I then went a step further back to the tribal distinction (between *Acanthoderini* and *Pogonocherini*); this depends on the shape of the front coxal cavities. With some misgiving, I immersed one of my three specimens of the beetle in hot water—a baptism which fortunately did no damage. As soon as the joints were relaxed and the surface dry, I went on with my scrutiny. The coxal cavities were distinctly angulated. I turned to the Tribe *Pogonocherini*, and had the joy of identifying beyond a shadow of doubt, even to the species, and that from LeConte and Horn's masterpiece of generic classification; *Hoplosia nubila*: a beetle *sui generis*, so that the description in the key was no less than a detailed etching of the very object before me. The description tallied in every stroke, and to cap it all I found the following notes: In LeConte & Horn—"the genera of this tribe are dispersed by Lacordaire among three groups; the genera have a characteristic habitus, with the exception of *Hoplosia*, which resembles a *Graphisurus*, but with the antennæ of *Acanthoderes*; and in Blatchley—" *Hoplosia nubila* is said to breed in dry twigs of beech and LINDEN."

On a second visit to this tree in the first half of June I had the good luck to capture a second specimen, and this year at the same date on a similar log in a wood farther east I captured a third.

At the end of June, some miles west of Peterborough, on a torn limb of basswood (in which the sap was probably fermenting) I took a specimen of *Leptostylus macula*, and out of curiosity revisited the tree in Burnham's wood. Here on one of the upper branches I found—apparently waiting for me—its duplicate.

In this same month of June, while following a path through the wood, I caught sight of a very beautiful chrysalis fastened to the underside of a leaflet of butternut. It was short and broad, white with black markings; it appeared to be thick through and ornamented with ridges or prominences on the face of it; visions of a brand new chrysomelid floated before me. Unfortunately the leaf of butternut was firmly attached to a stem 12 or 14 feet up the tree. As I circled round the base of it, with my eye glued on the chrysalis, no doubt I made a good picture for an up-to-date version of Æsop's fables—The Fox and the Grapes. Well, there was no help for it! If I wanted that chrysalis, I'd got to climb. The revival of a long disused habit—like that of climbing trees—sometimes recalls interesting memories. It is said that the late Prof. Bain, of Aberdeen, soon after the publication of Darwin's "Descent of Man," was found crawling about his study floor in the hope of recovering some of the long-lost sensations of primitive man before he assumed the erect habit. Who knows but that I might, on the same atavistic principle, retrieve some arboreal memory from quadrumanous ancestors as they swung nimbly down the forest aisles. Here goes, anyway! and I approached the tree. Somehow it didn't look so simple as speeling up the drying-green posts at the age of ten; for one thing, it seemed hard to get close enough to the tree to embrace it; but, as soon as I laid my cheek to the bark and threw my arms about the stem, my shins and feet seemed to correlate instinctively, and up I swarmed. Nor was it so much force of gravity that stopped me half way up, as the ludicrous thought of a new chapter in Dickens, adding yet another to the long list of undignified attitudes involuntarily struck by the immortal Samuel Pickwick. Assuredly if anyone

caught me before I caught that chrysalis, I should be haled off to the nearest lunatic asylum. The thought of the chrysalis spurred me up the few feet remaining, and when I did slide down to the ground, it was not empty-handed. The discovery of three more of these pupæ, not many yards further on and within easy reach, was a trifle disconcerting; but if (I reflected) this did eventually prove a new beetle, four specimens were none too many. Little did I know then that hundreds of this creature—a regular colony—were hiding in the bushes just round the corner, chuckling up their sleeves, probably, at the amazing spectacle of Pickwick heaving his bulk up a butternut tree. Its very name, when I came to discover it, seemed a piece of mocking irony—*Anatis*, the Innocent.

I followed the path along to the north end of the wood, through a belt of cedars, to look at a fine colony of Adders' Tongue Fern, and then turned west. After skirting the edge of the wood for a space, the path presently dipped in again among the trees. Here and there I passed a glade grown up with Early Elder, and suddenly was arrested by a gleam of bright prussian blue and yellow among the leaves. This contrasted colour-scheme characterizes one of the moths as well as a Lampyrid beetle; and more than once I had been disappointed in this way, when I fancied myself stalking and about to bag the famous Elder-borer (*Desmocerus palliatus*). But to-day must have been my lucky day, or some of the Little People had admired my efforts at tree climbing and were determined to reward me as only fairies can. It was no changeling grass-moth or fire-fly this time, but the genuine Knotty Cloak. On the same shrub I found a pair of these borers a moment later, and in the little glade, among the thickets of Elder, I captured seven specimens of this beautiful beetle in about an hour—always on the under side of the foliage or crawling on the stem. I don't think I looked for any thing else all the afternoon than the Early Elder, and I returned home with fifteen of the beetles. Once I knew where and when to look for the Elder-borer, it became a common capture. That season I took over seventy, between June 20 and July 25, nearly always on Early Elder growing in woodland glades, and generally on the foliage. It is not so frequent a borer in the Late Elder, and I have never found it on the flower-clusters of that plant, which blossoms at the end of June.

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

BY FRED. V. THEOBALD, M.A.

(Continued from page 177.)

Aphis kochii Schonteden (nov. nom.).

Aphis pyri Koch (non Boyer de Fonscolombe).

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

Aphis mali Buckton (part) (non Fabricius).

Aphis pyri-mali Fabricius (part).

Aphis malifoliae Fitch* (and Thomas).

Myzus mali Ferrari (part).

Aphis pyri Gillette and Taylor (non Boyer).†

Koch, Die Pflanzen, p. 60, pl. X, figs. 76, 77, 1857.

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Lugger, Bull. 69, Minn. Agri. Exp. Sta., p. 195, pl. XII, figs. 1, 2, 3, 1900.

Sanderson, Trans. Penn. Hort. Soc., II, p. 46, 1901 and 12th Rept. Del.

Agri. Coll. Exp. Sta., p. 189, fig. 10, a and b, 1901.

Leonidi, Gli Insetti Nocivi., IV, p. 226, 1901.

Sanderson, Rept. Del. Agri. Coll. Exp. Sta., pp. 149-156, figs. 22-25, 19.

Tavares, Broteria, IV, p. 48, 1905.

Theobald, Rept. Eco. Zool., 1905, pp. 28-30, figs. 13, 14, 1905.

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Theobald, Ins. and Allied Pests Fruit, p. 136, figs. 105, 109, 110, 1903.

Theobald, Rept. Eco. Zool., 1910, p. 35, 1911.

Gillette and Taylor, Bull. 133, Colo. Agri. Exp. Sta., p. 31, 1908.

Patch, Bull. 233, Maine Agri. Exp. Sta., p. 267, 1914.

NOTE.—Joshua Major, in his "Treatise of the Insects Most Prevalent on Fruit Trees, Etc." (p. 10, 1829) mentions Apple Aphides of various kinds, and evidently refers to this species, and not to *A. avenæ*, as has been suggested.

*Oestlund (Aphid. Minn. p. 64, 1877) thinks this a variety of *mali* but his *mali* is certainly *avenæ*.

†Gillette and Taylor called this *pyri* after Koch's description, but Boyer's *pyri* antedates Koch's.

DESCRIPTION.

Alate viviparous female (spring form).

Head black. Thorax shiny black. Abdomen dull reddish of various shades at the base, sometimes yellowish red, with four black lateral spots and a black area on the posterior region, with 3-4 lateral tubercles before the cornicles. Antennæ black, not quite as long or nearly as long as the body; first segment longer than the 2nd; the 3rd with many sensoria over its whole length (47-60); the 4th scarcely longer than the 5th, with many sensoria over its whole length (27-35); the 5th with 3-0 sensoria on the basal $\frac{3}{4}$ and the usual sub-apical one; the 6th a little longer than the 3rd; the last three segments imbricated. Cornicles black, cylindrical, moderately long, imbricated. Cauda small, dusky. On the 7th and 8th abdominal segments are two pairs of dorsal tubercles. Legs with yellowish-brown trochanters; bases of femora and tibiæ pale, apices of the same dark. Wings with brownish veins and paler insertions; venation often very variable.

Length—2 to 2.5 mm.; wing expanse, 7-8 mm. Sanderson says "abdomen yellowish-red," and figures it with only four pairs of dark lateral spots. All European specimens have a large dark abdominal area, as in the return migrant.

Alate viviparous female (return migrant).

Head and thorax black. Abdomen reddish, with a large dark dorsal area of various extent, often extending from close to the thorax up to the cornicles,* at others time quite small; black transverse bars caudad of the cornicles, and three large black lateral spots before the cornicles and traces, more or less distinct, of one caudad of them. Antennæ black and similar to the spring form. Legs and cornicles the same as the spring form. No trace of the four tubercles on segments 7 and 8 of the abdomen, according to Sanderson; but I have found them in all British specimens I have examined. Rostrum reaches to the second pair of legs. Cauda dark, small.

Apterous viviparous female.

Colour varying from slaty-grey to bluish black, plum colour, brown, brick-dust red, pink, rosy and almost black. The young

*Now and then almost black specimens occur.

may be yellowish pink, some bright pink, to brick-dust red; others almost green, or yellowish green. A few mottled or darkened at the sides. The mature female is usually a slaty-grey or dull bluish black covered with much whitish meal; form globular.

The pronotum has two blackish tubercles. The abdomen with 5-6 (usually 6) pairs of lateral tubercles; segments 7 and 8 each with two sub-median dorsal tubercles or dark plates. Antennæ as long or slightly shorter than the body, especially in the early broods; 1st segment wider and a little longer than the 2nd; the 3rd the longest in the early broods, about as long as the 6th in the later broods; 4th longer than the 5th; 3rd to 6th markedly imbricated. Cornicles black, rather long, somewhat tapering towards the apex; in others almost cylindrical; imbricated; in certain stages they may be somewhat paler at the base. The 7th and 8th segments of the abdomen show, in some specimens, a darker plate which bears the papillæ. Legs pale grey to pale brownish green, apical half of meso- and meta-femora black, also the tibial tips and the tarsi. Antennæ dark brown, almost white at the base. Proboscis reaching to the 2nd pair of legs. Cauda small, dark.

Length—2 to 2.2 mm.

Nymph—Pink, reddish yellow or salmon colour, with fine white mealy covering. Eyes reddish black. Apex of cornicles and wing pads dark. Base of antennæ and legs paler.

Oviparous female.

Apterous, yellow, or lemon-yellow, to greyish or dull greenish yellow; head darkened. Antennæ nearly as long as the body; 1st segment longer and broader than the 2nd; 3rd longer than the 4th, not quite as long as the 6th; 4th a little longer than 5th, about half the 3rd; 6th a little longer than 4th and 5th; its basal area about half as long as the 5th; yellowish to pale greenish; the 5th and 6th segments smoky, markedly imbricated; sensorium on 5 and 6 normal. Eyes large. Cornicles straight, cylindrical, about as long, but thicker than the 4th antennal segment, pale yellowish to dusky yellow, except for the very dusky tip, imbricated and with one or two marked apical striæ. Fore and mid legs yellow or yellowish green, except the tarsi, which are dusky and the tips of femora and tibiae; hind legs with broadened tibiae, dusky, except at the base, with 45-50 sensoria over the whole surface; tarsi dark.

Proboscis yellow, brown at the tip, reaching to about the 3rd coxæ. Cauda small, pale, blunt, with two pairs of lateral hairs. On the body is a small lateral papilla between the mid and hind legs on each side.

Length—.8 to 1 mm.

Male—Alate. Head and thorax dark, somewhat shiny. Abdomen small, dark in centre, with dark lateral spots, and dull reddish in places. Cauda and anal plate dark. Penis pale yellowish. Antennæ a little longer than body, deep blackish brown; 1st segment larger than 2nd; 3rd long, as long or longer than the 6th, with 45-50 sensoria; 4th longer than 5th, with 18-22 sensoria; 5th with 7-10 sensoria; 6th with flagellum about six times as long as the basal area, which is about one-third of the 5th. Eyes very large, dark. Proboscis rather thin and acuminate, reaching to the second legs; last two segments about equal. Cornicles black, cylindrical, rather narrow, imbricated, with some apical striæ. Legs with coxæ, most of femora, apex of tibiæ and the tarsi dark brown to black, rest dull yellowish green. Wings with brown veins.

Length—1.5 mm.

FOOD PLANTS.—All varieties of Apples and Pears, mostly on former in Britain; the Medlar; Walker records it from *Cratægus oxyacantha*, *Sorbus aucuparia* and *Sorbus domesticus*; Passerini on *Sorbus torminalis*. These latter records, I expect, all refer to the true *Aphis sorbi*.

DISTRIBUTION.—All over Britain, but especially in the Midlands, east, south and west; most parts of Europe, North America, Africa, and apparently in Australia.

LIFE-HISTORY IN BRITAIN.

This species hatches out in April, any time between the second week and the end of the month. It at first lives freely on the tops of the bursting buds and then enters them. As the buds open out, it continues to live freely on the young leaves and on the young and tender growth generally. To some extent the young foliage may shelter it. As the insect matures into the "Mother Queen," the leaf may either curl up and partially enclose her, or she may remain exposed beneath the leaf. This "mother-queen" soon produces living young, and often with great rapidity; and these, as

they grow, cause the leaf to curl right up and enclose them—the curled leaf frequently becoming a living mass of apteræ. By their constant sucking the foliage becomes more and more contorted, and eventually, both from the sucking of the insects and their excrement, which seems to have a scorching effect, the leaves turn brown, and may or may not fall off. Not only does this aphid feed on the leaves at the top of the shoots, but also on the shoots, and the result is contorted and stunted growth. The internodes are shortened, and consequently a very “stubby” appearance is produced, especially in young stock.

The first alata I have found occurred on June 13th, 1899, and I have found them onwards until 29th of July, in 1914. Although these Plant Lice become alate in masses, a few always occur some time before the main swarm, and others later. The winged females are very sluggish, and, like those of *Aphis rumicis*, collect together in masses, usually choosing the underside of a fairly large branch of the tree near its junction with the trunk. Many of these groups of alata were noticed in 1915 to die off and remain attached to the branches. This winged summer generation flies off in July, but where to I have been unable to trace. It dies out on the apple and pear from mid-July. In the beginning of September a few return migrants may appear, but the majority in October. These produce the sexual generation of apterous oviparous females and alate males. The sexuparæ may occur on into mid-November, and I have several times found the oviparous females in the first week in December. The females and males occur under the leaves, and, when fertilized, the females crawl to the shoots and lay their eggs either singly or in small groups; never in dense masses as is done by *Aphis pomi*. Many of the oviparous females fall to the ground with the ripe leaves before they have oviposited. These may lay their ova on the leaves as they lie upon the ground. The ova are at first yellowish, but soon become the normal shiny black.

I have vainly tried to trace this species to other plants this last six years. Weeds and their roots have been searched, to no avail. Recently, W. R. Ross writes me that he has found *sorbi* of the apple on the roots of *Plantago* in summer in Canada.

In one or two localities I have noticed that the attack of this

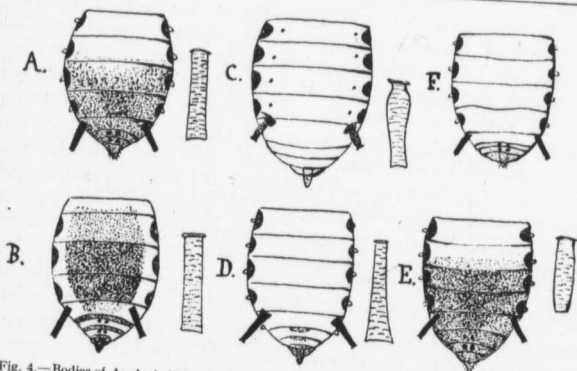


Fig. 4.—Bodies of Apple Aphides. A, *Aphis kochii* Schonteden (spring migrant). B, *A. kochii* Sch. (autumn migrant). C, *Siphocoryne avenae* Fabr. D, *Aphis pomi* De G. E, *A. crataegi* Kaltent. F, *A. kochii* (*sorbii* of Sanderson) spring migrant (after Sanderson).

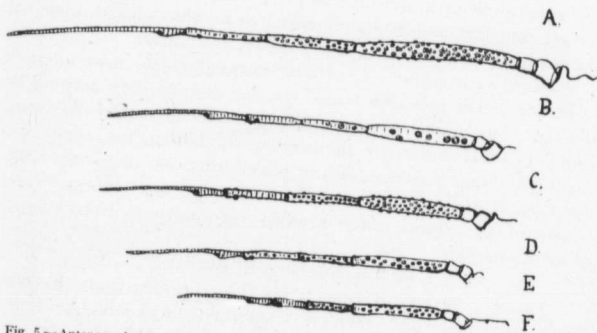


Fig. 5.—Antennae of alate viviparous female Apple Aphides. A, *Aphis kochii* Schonteden, 13, V, '12 (spring migrant). B, *A. kochii* Sch., 5, IX, '12 (return migrant). C, *A. pomi* De G., 17, VIII, '12. D, *A. crataegi* Kaltent. E, *Siphocoryne avenae* Fabr., 14, X, '15 (spring migrant). F, *S. avenae* Fabr., 7, IX, '15 (return migrant).

aphis is very marked, for the leaves become deformed in a blister-like manner, the damaged areas being coloured a rosy or pallid yellow tint. This appearance, to some extent, resembles that caused by *Aphis crataegi* Kalt. I first noticed this in the Marden area in Kent in 1907, and in recent years in my own garden on an old Cyder Apple. Ants were found carrying the aphides down this large tree to some espaliers below, viz., Lord Suffield, Peasgood, Bramley Seedling and Cox's, but the effect caused by the aphides on them was quite normal. This shows that under certain conditions and on certain varieties the effect of this aphis varies. Walker records *A. sorbi* as appearing in thick clusters on *Sorbus domestica* near London in 1847, giving the leaves autumnal red and yellow tints; this record again may refer to true *sorbi*. In some years in Britain *Aphis kochii* does enormous harm—perhaps 1915 has been the worst year of all. Many orchards were quite ruined by it, the foliage scorched, and in very many the fruit badly deformed by the punctures of the aphides, and consequently of no commercial value. In one plantation visited, which had been banded with Tanglefoot, but not sprayed, the insects swarmed all over the trunks and the bands were completely covered with thick layers of them. Some were found crawling up, others down the trees, all being apteræ or nymphæ. On July 4th this wandering ceased, and the majority commenced to become winged, many of the alatae died on the trees, many others flew away.

Variation in colour.—I know of no aphid which varies so much in colour in the apterous stage. In one district they may all be slaty-grey, in another all bluish black, and locally called the "Blue Bug," in others most are plum colour or brown, but all have a small sprinkling of pale reddish or pink forms with them and called the Rosy Aphis; now and again this alone occurs. In some cases I have found colonies a dull brown, very similar to Koch's figure of his *Aphis pyri*.

NATURAL ENEMIES IN BRITAIN.

Towards the end of June a few *Coccinellidæ*, many Syrphid larvæ and now and then a Chrysopid larva may be found feeding on this insect. By the first week in July they become more abundant, and by the second week, as a rule, these "natural checks" seem to have obtained the ascendancy over the "Dolphins."

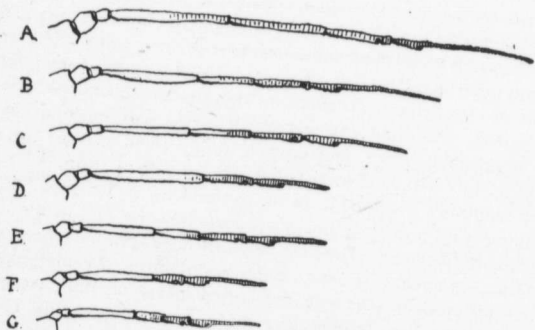


Fig. 6.—Antennae of apterous viviparous female Apple Aphides. A, *Aphis kochii* Schonteden. B, *A. sorbi* Kaltent. C, *A. pomi* De G. D, *A. crataegi* Kalteab. E, *A. oxycantha* (= *nigra* nov. nom.) Koch. F and G, *Siphocoryne avenae* Fabr., 1st and 2nd series.

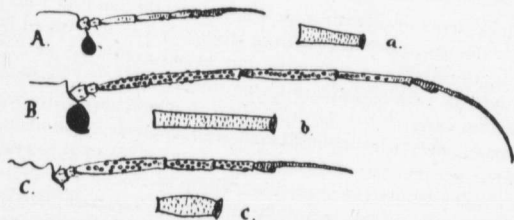


Fig. 7.—Males of Apple Aphides. A, Male *Aphis pomi*; a, cornicle. B, Male *A. kochii*; b, cornicle. C, Male *Siphocoryne avenae*; c, cornicle.

By this time, however, all the damage has been done. Very few seem to be struck by Chalcid parasites, but I have bred one species on two occasions. The chief enemies are the *Adalia bipunctata*, and *Coccinella septem-punctata*. The chief syrphids I have bred have been *Syrphus ribesii* and *Catabomba pyrastris*, but I have found several other larvæ feeding on them, including *Syrphus grossulariæ*. Spraying has little or no effect on this pest when once the leaves are curled. Nicotine-soft soap wash is the only one that shows any appreciable effect, and growers retain their nicotine for this purpose, but it is not nearly effectual enough to clean the trees, as so many lice are not hit owing to the dense leaf curling. Early spraying with nicotine and soap has, however, in many cases checked the damage. The best results I have seen have been with late lime spraying, just before the blossom opens. In small plantations and gardens stripping the curled leaves on bush trees has produced excellent results, and also autumnal spraying to kill the sexuales.

***Aphis cratægi* Kaltenbach (non Buckton).**

Kaltenbach, Mono. Pflanz., p. 66, 1843.

Tullgren, Upp. Prak. Ent. XVII, pp. 59 and 76, 1907.

Theobald, Entomologist XLIV, p. 403, 1911.

Theobald, Rept. Eco. Zool., 1911, p. 31, 1912.

Theobald, Entomologist XLVIII, No. 630, p. 259, 5, 1915.

Alate viviparous female.

Black and shiny, with a mealy snow-white band on the base of the abdomen, which varies from a narrow line to a broad band covering the first four segments, but usually only the first two; this band has a white meal orbit above and beneath. The colour to some extent varies; it may be pale yellowish white, pure white or pale pink, more rarely with an indistinct whitish green hue, and on this pale area are a few paired dusky marks or spots; five pairs of lateral black papillæ before the cornicles. The posterior of the abdomen may be a pale colour, with narrow transverse dark bars, and there are two sub-median papillæ behind; venter pinkish to pinkish white, and also to some extent mealy. Antennæ shorter than the body, black; the 3rd segment with 64-70 sensoria; 4th with 25 to 30 sensoria; 3rd thick and longer than the 4th; 4th about as long as the 5th. Eyes dark brown. Proboscis yellowish, apex black, reach-

ing nearly to or quite to the 3rd coxæ. Cornicles rather short, black to deep brown; imbricated, cylindrical, or slightly expanding at the base, a few constricted at the apex and base. Cauda black or brown, blunt, with two pairs of lateral hairs. Legs black, except the base of the femora, which are yellowish. Base of wings yellowish; stigma and veins greyish brown to brown.

Length—1.8 to 2 mm.

Apterous viviparous female.

Deep greyish green to almost black, with much mealy covering, and, when denuded of this, the insect is somewhat shiny. Antennæ

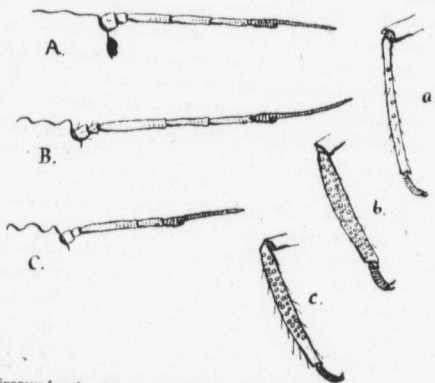


Fig. 8.—Oviparous females of Apple Aphides. A, *Aphis pomi*; a, hind tibia. B, *A. koehlii*; b, hind tibia. C, *Siphocoryne avenae*; c, hind tibia.

shorter than the body, base paler than the rest, composed in all the specimens I have seen of 5 segments only; the 3rd very long; the 4th less than half its length; the 5th with a short flagellum. Eyes deep brown to black. Proboscis greenish, apical half almost black, reaching to the second pair of legs. Venter deep greenish. Cauda black to brown. Cornicles short, black; in some the base is reddish yellow. Legs black.

Length—2 mm.

Nymph.—Two forms occur, one pale to deep green, mealy,

with dark legs and cornicles; the other fawn coloured and mealy, with dark wing-pads and eyes. Legs and cornicles dusky.

DISTRIBUTION.—Windermere, Cumberland, 23, V, 14 (Rymer Roberts). Marden, V, 07, and Wye, Kent, V, 10 (Theobald). Haddenham, Cambs, VI, 05 (Theobald), and Mortimer, Berks, V and VI, 11 (Lake).

FOOD PLANTS—*Pyrus malus*, *Pyrus communis* and *Crataegus oxyacantha*, etc.

OBSERVATIONS.—Described by Kaltenbach from Apple, Pear and Hawthorn. I have found it and received it from apple in England and often on hawthorn in Kent. It produces a very marked appearance, causing the leaves to become blistered. The blisters assume a rosy red to deep red hue; when on apple, yellow and red. The leaves curl downwards, and under those galled areas the insects live and reproduce. Sometimes the mid-rib region is galled; at others almost any part may be deformed; this is especially so on the hawthorn. It does not appear to be a commonly distributed species, anyway in the south and midlands. It was sent me from Mortimer in 1911, where Mr. Lake found it in abundance on Lane's Prince Albert apple. It is a very marked species, easily distinguished when alate by the white basal abdominal band when alive, and by this area being pale when the mealy covering is removed. The apteræ, in certain lights, appear quite black; in others a distinct grey-green, with dark legs, antennæ and a mealy coat. They are also flatter than the other dark species found on the apple (*nigra*, *rumicis*, etc.). Schonteden (Mem. Soc. Ent. Belg., XII, p. 226) places this species as a synonym of Boyer de Fonscolombe's *Aphis pyri*, which I cannot help thinking is incorrect.

Fonscolombe expressly states that the abdomen of the alate female is "Verdâtre, avec une bande brune un peu confuse de cheque côté; quelquefois presque tout brun; les tubercules lateraux sont verdâtres." The sexuparæ are not known.

Alatæ hatched from May 22nd to May 30th; they were very active. It is not known to what tree or plant they migrate. It is usually seen late in May and June, and continues to July. Buckton describes quite a distinct *Aphis* as Kaltenbach's *Aphis crategi*, the apterous female being bright green and slightly mealy,

the alate female with bright green abdomen. I have already re-named Buckton's species *cratægiella* (Entomologist, XLIV, p. 4, 13, 1911). Passerini also describes an *Aphis cratægi* which is distinct, for he says it has "rusty red spots at the base of the cornicles."

Koch places Kaltenbach's *cratægi* as a synonym of Fonscolombe's *Aphis pyri*, but, as shown here, Koch's species is distinct.

(To be continued).

THEODORE PERGANDE.

News of the death of Theodore Pergande, which occurred on March 23, 1916, came as a shock to Canadian entomologists who have had the pleasure of meeting him and discussing questions relating to insect life. For a number of years, as we all know, his life had not been a very active one. During my last short stay in Washington I was unable to see Mr. Pergande, but I well remember my first visit to the Bureau of Entomology in 1901, when I frequently had the pleasure of meeting him and discussing matters of mutual interest. His liking for my late friend and associate, James Fletcher, was indeed genuine, and this undoubtedly opened the way for a more than passing interest in my visit.

From the Monthly Letter of the Bureau of Entomology, U. S. Department of Agriculture, for March, 1916, we learn that Pergande was born in Germany on December 28, 1840. He came to the United States at the time of the Civil War, and before very long entered the Northern army, serving throughout the war. Afterwards he secured a position as assistant to Prof. C. V. Riley, who at that time was State Entomologist to Missouri. When Riley was appointed Entomologist of the U. S. Department of Agriculture, in 1878, he took Pergande with him to Washington; and the latter for many years had direct charge of the rearing work, kept the notes, and made the great majority of the biological investigations upon which the entomological publications of the Department were based. Important results of his studies have been published as bulletins from the Bureau at Washington. His

publications, especially on the Aphididæ, are well known. "The Life-history of Two Species of Plant-lice inhabiting both the Witch-hazel and Birch," issued as Technical Bulletin No. 9, is a remarkable contribution, and one which took nearly twenty-two years of patient labour to complete. Two other important publications are "The Life-history of the Alder Blight Aphis," issued as Technical Bulletin No. 24, and the "North American Phylloxerinae Affecting Hicoria (Carya) and other Trees." This latter, published in Volume IX of the Proceedings of the Davenport Academy of Sciences, comprises pp. 185 to 273, accompanied by 21 plates. It is, indeed, a valuable contribution. The Entomological Society of Ontario occasionally received from Mr. Pergande short articles for publication in this journal.

The death of Mr. Pergande, who was the oldest assistant, in continuous service, in the Bureau of Entomology, Washington, D.C., took place after a brief illness of less than two weeks. The work he accomplished during his long engagement in the service of the United States Government will long be appreciated. We, in Canada, were indeed sorry to learn of his demise.

ARTHUR GIBSON.

NOTES AND QUERIES.

INHABITANTS ON AN APRIL MUD PUDDLE.

On the afternoon of April first I determined to start out on the initial 1916 collecting trip in spite of the ice on the pond nearby and the still lingering snowdrifts in the woods.

Wading along in the open water, at the edge of the pond, I started out a few *Peltodytes* (*Cnemidotus*) and *Hydroporus*, and discovered a couple of *Matus bicarinatus* on the under side of a board. Passing on up the hill, after investigating a shallow pool at the foot without success, through the oak scrub to an abandoned gravel pit, I came upon a small puddle of water about two inches deep and six feet square. After stirring this up and taking a few *Hydrobius fuscipes* and one *Hydroporus tristis*, I proceeded to tread the few inches of soft earth into a mass of mud and water, with the following surprising results, which came floating to the

surface of the mixture: One *Tachys lævus* Say, seven *Tachys granarius* Dej., one *Amara cupreolata* Putz., two *Agonoderus testaceus* Dej., many *Stenolophus conjunctus* Say, several *Helophorus lineatus* Say, one *Ilybius biguttatus* Germ., one *Phelister subrotundus* Say, three *Cytilus (sericeus) alternatus* Say, two *Heterocerus brunneus* Melsh., one *Atenius imbricatus* Melsh. (my first record for this), four *Aphonus castaneus* Melsh., two *Graphops curtipennis* Melsh., one *Graphops marcassita* Cr., twelve *Dyschirius* sp., seven *Aleocharina* sp., one *Aleocharina* sp., two *Stenus* sp., two other *Staphylinida* sp., two species of ants, several spiders, two plush-covered caterpillars, two larvæ, one chrysalis, and one small Dipteron that appeared at home on the surface of the water.

The only vegetation here was some moss or lichens and a few spears of grass. Several much more favourable looking places failed to yield a single specimen other than *Hydrobius fuscipes*.

The catch numbered 60 odd specimens of 21 species representing 19 genera and 9 families of the Coleoptera alone.

C. A. FROST,

Framingham, Mass.

APHIDS ON CALIFORNIA PRIVET IN NEW JERSEY.

As a rule, California privet (*Ligustrum ovalifolium*) enjoys unusual freedom from insect attacks in New Jersey, even though it becomes infested with *Aleyrodes citri* Riley & Howard in the southern states and the San José scale in California. In New Jersey white grubs (*Lachnosterna* sp.) have been found injuring the roots, and occasionally a stray San José scale is discovered, but on July 15, 1915, a privet hedge in Jersey City was found to be infested by plant lice. The upper surfaces of the leaves were characteristically discoloured, some being quite yellow and the foliage of the infested plants had a peculiar limp appearance instead of being twisted and curled. Specimens were sent to Prof. C. P. Gillette and determined by Mr. L. C. Bragg as *Rhopalosiphum ligustri* Kalt. They also stated that they believed this to be the first record of the occurrence of this species in the United States.

HARRY B. WEISS,

New Brunswick, N. J.

ODONATA AND EPHEMERIDÆ.

Contributions to Canadian Biology, being studies from the Biological Stations of Canada, 1911-1914, Fasciculus II—Fresh Water Fish and Lake Biology. Supplement to the 47th Annual Report of the Department of Marine and Fisheries; Fisheries Branch. Ottawa, 1915.

In this "Blue book," issued by the Dominion Government, there is a series of thirteen important papers dealing with the aquatic fauna and flora of the eastern coast of the Georgian Bay in Ontario. They are published in this way in order to extend the knowledge respecting the available food for fishes in these waters, their parasitic enemies and other matters of biologic interest. Three papers deal with aquatic insects. The first is by Dr. E. M. Walker on "The Odonata of the vicinity of Go Home Bay," in which he records his observations on the Dragon and Damsel flies to be found in the neighbourhood of the Biological Station, with descriptive notes on more than sixty species. The article is illustrated with two plates of structural details, five views of the characteristic scenery, and a plan showing the seasonal distribution of the species—the whole forming a most valuable contribution to the knowledge of the life-histories of these attractive insects.

The other papers of an entomological character are by Mr. W. A. Clemens of the University of Toronto, and are entitled, "Rearing Experiments and Ecology of Georgian Bay Ephemeridæ" and "Life-histories of Georgian Bay Ephemeridæ: observations on Heptagenia and breeding experiments." In the former paper twenty species are referred to and many of them described; and in the latter, which deals only with a single but largely represented genus of May-flies, there is given a key to the imagos and descriptions of the nymphs and their life-histories. Six plates of nymphs and details of structure add much to the value of the papers. These insects, which are often to be found in enormous numbers, supply a very important part of the food of many fishes.

C. J. S. B.