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BEETLES FOUND ABOUT FOLIAGE.

BY F. J. A. MORRIS, TRINITY COLLEGE SCHOOL, PORT HOPE, ONT.

During my five years or more of collecting, I have captured, on and about foliage, species belonging to eight or ten of the great families of beetles. Some of these have been merely incidental, and I know of nothing in their habits to connect them with the toce or herbaceous plant on which I found them. For instance, there is a species of Lagriid, a family closely related to the Tenebrionidæ or Darkling beetles, which I have often taken on foliage--*Arthromacra ænea;* usually the beetle is found feeding in blossoms of the dogwood, occasionally on the foliage of that shrub, but quite often I have seen it on the leaves of the May-apple *(Podophyllum peltatum)*, the New Jersey Tea *(Ceanothus americanus)*, and the Sweet Fern *(Comptonia asplenifolia)*; it appears to have a special fondness for this last shrub, and on bright, hot days of July, is often abundant in patches of Sweet Fern.

So far as I know, it does not eat the leaves, but, contrary to the general habit of the Tenebrionids, it certainly courts bright sunshine. There is an allied genus in Great Britain *(Lagria hirta)* said to be found on blossoms and in hedges, which, even in the larval stage, is remarkable for its habit of wandering openly about foliage. Most of the Tenebrionid larvæ feed obscurely on vegetable matter, preferably in a dry condition; probably the best known—in domestic economy—is *Tenebrio molitor*, the famous meal-worm, which I have occasionally had served to me at breakfast in a plate of porridge.

There are three families of beetles in particular, many of whose members are extremely fond of sunshire. The Elaters or Click Beetles, their next of kin, the Buprestids or Metallic Wood-borers, and the Cerambycidæ or Long-horns.

I have often captured some of the smaller species of Elaters, chiefly of the genus Corymbites, resting on the upper side of leaves, apparently indulging in the luxury of a sun-bath. Early in May two seasons ago I

took a magnificent specimen of *Buprestis striata* basking on the tip of a branch of white pine, and in August of the same year I saw darting about in the mid-day heat and settling from time to time on the foliage of a spruce the gorgeous little Buprestid, *Chrysobothris harrisii*. This dazzling vision in peacock-blue was vouchsafed to me for a moment only and then withdrawn, but in my mind's eye I have been "following the gleam" ever since. Altogether that proved a red-letter day in my calendar, for I captured on the trunk of a newly-felled balsam fir at the same spot my sole specimen of *Monohammus marmorator*.

A great many of the Cerambycidæ or Long-horns are fond of this sun-basking; and I have made occasional captures on foliage of species that usually seek the shade; once a specimen of *Callidium antennatum* on a blade of grass by the roadside, and once a fine specimen of *Calloides nobilis* on a stalk of sedge by the railway track. But of those that are active by day, many of them feeding in blossoms, I have found many species on leaves, especially of the two tribes *Clytini* and *Lepturini*; in one or two cases the insect seems to prefer one foliage to all others, and perhaps such captures ought not to be regarded as merely incidental; for instance, I have found *Clytanthus ruricola* show a decided preference for the leaves of the thimbleberry, though it does not often feed in the blossom of this plant.

The capture I look back upon with greatest pride was that of a small specimen of *Eupogonius subarmatus* in my first season of collecting. I was going through a belt of basswood on the lookout for various things, but chiefly "Walking Sticks" and the larvæ of *Chrysomela scalaris*; by "Walking Sticks" I mean the Phasmid, *Diapheromera femorata*, an Orthopterous insect next of kin to the Praying Mantids; it occurred not infrequently that season about the Rideau on basswood; still more abundant on basswood leaves were the larvæ of *Chrysomela scalaris*, and I was rearing some in captivity. While scanning the under side of the foliage just above my head I noticed a leaf through which the sunlight passed imperfectly; there was a small opaque area near the leaf; in short, something rather smaller than a housefly was casting its shadow on the upper surface. I drew the leaf cautiously down and surprised a diminutive longicorn sunning itself in the middle of the leaf; unfortunately, I surprised it in more senses than one, for, in response to a stimulus of self-preservation, it instantly collapsed, and tumbling down the leaf in a series

of somersaults, like the clown in a pantomime, disappeared from the stage. For nearly half an hour I hunted among the *debris* at my feet, and at last discovered the little harlequin playing 'possum under a twig.

At first I took this beetle for *Amphionycha flammata*, to which superficially it bears an extraordinary resemblance; but I found the ungues or claws (which are divaricate) simple instead of cleft; as they are distinctly cleft in *Amphionycha*, the foot appearing to end in four minute claws, it became certain my capture was *Eupogonius subarmatus*.

Another form of incidental capture is where beetles of a carnivorous habit resort to foliage in search of food. I have once taken *Calosoma scrutator*, and several times *Calosoma calidum* on the foliage of the white pine; these enterprising ground beetles poaching on the arboreal preserves for caterpillars; many of the diurnal fireflies, which are carnivorous, may be found resorting to foliage for the same purpose, and the *Coccinellidæ* or Lady-birds are regularly so taken. One July I found two or three species of Lady-bird resorting in large numbers to an asparagus bed, where they were doing yeoman service in devouring larvæ as they fed on the foliage; on the *menu* of their banquet, if not the *piéce de resistance*, was *Crioceris asparagi*, and they were feasting royally.

Passing from incidental captures to those where the insect was found on its food-plant, I shall begin with an insect I saw in July three years ago, which did not devour the leaves, but using its jaws as a pair of scissors, cut them and rolled them up into cylinders. I mean the weevil, *Attelabus analis*, the oak-leaf roller.

I was examining the leaves of various plants, herbaceous and woody, along the railway track, some 12 miles north of Port Hope—especially willow shrubs and oak-seedlings whose foliage was lush and tender, the leaves being, many of them, still pink and soft—when I noticed a curculio with black head and snout, the thorax and elytra of a shining chestnut-red. I recognized it from having seen cabinet specimens as one of the oak-leaf rollers, and on diligent seach I found it fairly abundant and always on young leaves, which no doubt proved more pliable and easily worked by this ingenious little artificer. It was not easy to see much work done, as the beetle is easily alarmed, and drops from the leaf if approached too closely. I was able in one case, however, to watch the actual process of rolling, and in another some of the preliminary work of cutting. Observations published in an American journal of entomology go to prove that,

though the act is instinctive and involves neither practise nor imitation, it is not absolutely perfect; leaves have been found cut in more than one place and then abandoned as unsatisfactory.

There is a very interesting account of a British leaf-roller (*Rhynchites betulæ*) given by Sharpe in the Cambridge Natural History. The female beetle goes to the margin of the leaf, at the base, but some way out from the stalk, and cuts through the leaf from the margin to the mid-rib somewhat in the shape of an upright letter S; it then crosses the mid-rib and cuts through the other half of the leaf to the margin, somewhat in the shape of a prostrate letter S. The beetle then returns to the margin, where it begins cutting, and, much as a grocer makes a paper funnel for sugar, rolls the edge over round an ideal axis till it brings it to the mid-rib; here it holds the funnel in position with the legs of one side, while with the other three it draws the further side of the leaf towards it and wraps it around the part of the funnel already formed. When it finds the material stiff to work with, it bites the surface of the leaf with its mandibles or pushes it into position with its feet, adjusting means to end like a sailor at work in the shrouds furling canvas. It then enters the funnel, bites two or three small pits into the leaf, deposits an egg in each, and, then emerging, completes the funnel by folding over and tucking in the tip of the leaf.

Mr. Sharpe, in comment, points out that the insect has never seen a funnel in its life, and yet manages to make one perfectly the very first time of trying. But the author's perplexity is partly due to his confusing a purely instinctive act with an act of intelligence (vide the Peckham's book on Wasps). How can an insect be a highly-skilled engineer, working with mathematical accuracy and on a scientific plan? It is an insoluble problem if you try to state your answer in terms of intelligence and individual consciousness. But place it among impulsive acts, involuntary and more or less mechanical, common to all members of the species, and you can give a fairly satisfactory explanation in terms of instinct.

Among insects especially are found instincts whose perfection is simply diabolical, often involving a highly-complex series of acts performed but once in the whole lifetime of the individual, and therefore admitting of neither practise nor imitation. To look upon such acts as the result of conscious intelligence is absurd; the intellect has no place here, and would be simply a meddler, likely to bungle and make a botch of the artificer's work. On the other hand, a whole-hearted Darwinian like Weismaur has no difficulty in applying his great principle of selection to such an act, and

seeing in it once more beautiful illustration of how all things living in the world, whether *flora* or *fauna*, are adapted to their environment.

As I have begun with one of the weevils which come at the end of the Coleoptera in classification, I will pass to a family not far removed from the weevils, the Blister Beetles (*Meloidæ*), many of which in the mature state occur abundantly on foliage and are very destructive. Four species of the genus *Epicauta* are known in Ontario; some of them occasionally attack the leaves of the potato, but more usually they feed harmlessly on flowers like golden-rod and helianthus or the low herbage by river banks. I have not seen any of this genus, and think it uncommon east of Toronto, or at least in the neighbourhood of Port Hope. One species of an allied genus (*Macrobasis unicolor*), which also attacks the potato, I have found in great abundance about Port Sydney in low grounds, feeding and breeding on the foliage of meadow-rue. The family consists of two tribes, *Cantharidæ* and *Meloidæ*. The former all have power of flight, and are frequently found about foliage or flowers; in the latter the wings are abortive or entirely absent, and the beetle's most daring excursions into the realm of air consists in crawling up a grass-blade or the stem of some herbaceous plant. One or two species of *Meloe* or Oil Beetle are frequently found early in the spring and late in the summer, but the insect does not appear to eat foliage. Both tribes of this family are famous for their possession of a principle known as cantharidine, whence they are called Blister beetles, some of the species being of great medicinal value.

A more remarkable feature about them, which they share with some of their neighbours, the *Mordellidæ*, is the phenomenon of hyper-metamorphosis. They are all parasitic in the larval stage, their hosts being usually bees, occasionally wasps and (in the case of *Epicauta*) locusts. The normal form of the larva is preceded by a very active louse-like insect known as a triungulin (each leg terminating in a triple set of hooks). The larva that succeeds the triungulin is inactive and almost legless; moreover, in some cases the true pupa is preceded by a sort of preliminary pupal form, from which emerges a larva of habit almost as active as the original triungulin, though it does not feed.

The triungulin is a monomaniac, I mean a creature of but one idea, one single goal of ambition, and its six active legs enable it to get there. The loadstone that draws the triungulin like a steel-filing to a magnet is the egg of its host. In the case of *Epicauta vittata*, this is the egg cluster

of a locust, and the present beetle takes the precaution of laying its egg near where the locust has hidden its egg-batches in the ground. Among the Cantharids, whose host is a genus of bee (*Anthophora*), the beetle oviposits near the bee's nest, but in order that the triungulin may reach the egg of the bee, it has to be carried into the nest by a queen bee; its instinct impels it to seize the first hair within reach. This frequently proves to be the leg of a drone, and in some cases the triungulin manages to transfer itself to the leg of a queen bee during the nuptial flight, and so reaches its goal, the egg cell in the hive. But hundreds of triungulins must perish from seizing a wrong object, and in order to compensate for this, selection has enormously increased the fertility of the female beetle, which lays as many as 2,000 eggs. In the *Meloe* or Oil beetle the instinct is even more imperfect; the beetle does not lay her eggs near the home of the host, and the triungulin mounts to the top of grass-stems or enters a blossom and waits there for a hair (any hair will do); this more often than not proves to be growing on the leg of a fly, or if a bee, the wrong kind, and thousands of the triungulins, instinctively seizing the first hairy object that offers, are carried into space to perish miserably. All that saves the *Meloe* from utter extinction is the stupendous fecundity of the female, the clutch of eggs laid by this Apteryx among insects producing a brood of no fewer than 10,000 triungulin chicks.

Apart from the great Phytophagous group of beetles, easily the best known family of leaf-eaters is the Scarabæids. One section of this family consists of scavengers pure and simple, the larva being nourished in manure or rotting wood and the female laying her eggs in such material. But an important branch of the family is phytophagous, the larvæ feeding on living vegetable matter, usually the roots of grasses and herbaceous plants, and the mature insects often feeding voraciously on leaves of trees or soft vegetable tissue.

In this family of beetles, structurally so different from the Phytophagous Beetles, strictly so called, it is interesting to note how far one group has diverged from another in response to conditions entailed by their chosen food material. Among the *Coprini* you find the larval stage completed in a few weeks, or at most months, while the life of the mature beetle (as in *Scarabæus*) extends over a period of two or three years. Among the *Melolonthini* almost the converse obtains; the larva takes two, three or even five years to mature, and the beetle after emerging from the ground lives for only a week or two.

In Ontario the most familiar of these phytophagous scarabs are the leaf-chafers, popularly known as June bugs. After three years passed in subterranean obscurity the beetles emerge, often in vast quantities; they are inactive during the day, and remain hidden in the grass at the foot of trees or on the foliage itself, but at dusk they rouse up from their lairs and fly about among the trees in irregular flight, noisy and blundering; before midnight their activity on the wing ceases. The life of the individual beetle after emerging from the ground lasts little more than a week or two, and you would naturally expect its chief concern to be the perpetuation of its kind.

But often Melolonthinus, like Launcelot Gobbo, is a huge feeder, sometimes entirely stripping fruit trees and ornamental shade trees of their foliage. There are one or two genera in this group containing species a good deal smaller than *Lachnosterna*, the true June bug, which are also very destructive in some parts and seasons. The Rose-chafer *(Macrodactylus subspinosus)*, not content with eating the buds and petals of rose blossoms, frequently attacks the grapevine and the foliage of various fruit trees; it is also sometimes a pest on young corn; it does not seem so far to have made its way east of Toronto in any serious numbers.

A closely-allied genus is the *Dichelonycha*, one species of which *(D. elongata)* I have often seen eating the foliage of basswood. Three seasons ago it was very abundant in the woods near Port Hope, and responsible for a good deal of damage done in July to the foliage of forest trees; it shows a decided preference for basswood, eating its foliage more readily and more rapidly than other leaves, though I have found it on hawthorn and on maple.

Another genus, that of *Hoplia (trifasciata)*, occurs often on hawthorn leaves, but is almost entirely a pollen-feeder, like *Trichius piger* and *Euphoria inda*. *Hoplia*, which occurs often on choke-cherry, early alder and hawthorn, the males appearing at the beginning of May and the females a fortnight later, disappears at the beginning of June. Another species of *Euphoria*, a beautiful beetle called *E. fulgida*, I suspect of eating forest leaves; I have picked it up several times under trees in open rocky hardwoods on the north shore of the Rideau.

Among Scarabs that frequent foliage are also two species very destructive in the tribe *Rutelini*, large, handsome beetles—*Pelidnota punctata*, found on grapevines, and *Cotalpa lanigera*, chiefly on pear trees, but occasionally on elm, popular and oak. I have never found this

beetle, but the *Pelidnota* has been taken occasionally in the neighbourhood, usually on the cultivated grapevine, but once or twice on wild vines some miles north of the town; it does not appear to be at all frequent east of Toronto.

I mentioned at the outset of my paper the Buprestids as a family peculiarly fond of basking in the sun. There are two genera of Buprestid that eat leaves, *Agrilus* and *Brachys*. The first of these is a long, narrow beetle, taken occasionally on the leaves of basswood, but more common on the foliage of raspberries. The larva bores in the stem of the raspberry. A curious feature about the *Agrilus* is that in appearance and shape, as well as in some of its movements for escape or to elude observation, it closely resembles the longicorn beetle *Oberea;* moreover, the habits and life-history of the two beetles are almost identical; they both lay their eggs in raspberry stems, where the larva bores and feeds, and they both in maturity resort to the leaves of the plant as a resting place and occasionally for food.

The genus *Brachys* is a short form of beetle, almost as broad as it is long, the species I have most commonly found being *Brachys ærosa;* it is not uncommon on basswood and two or three other forest leaves, but I have usually found it feeding on the foliage of a hazel *(Corylus rostrata)*, where it is sometimes abundant. It is stated in Sharpe's article on insects in the Cambridge Natural History, that some of the smaller kinds of Buprestid have been discovered to feed on the parenchyma of leaves. I know nothing about the larval habit of *Brachys*, but arguing on analogy from *Agrilus*, I would hazard the guess that the larva is a leaf-miner on hazel or other forest leaves.

In drawing a parallel between *Agrilus* and *Oberea*, I referred to both form and habit. The form of *Brachys*, short and broad and somewhat flat, suggests the form of *Odontota*, a leaf-miner among the *Chrysomelians;* in habit, since the mature beetle of *Agrilus* responds to the same food stimulus as its larva, the eating of hazel and other leaves by the *Brachys* beetle may mean that the larva mines in such leaves. (Vide CAN. ENT., 1887, XIX, 159.

I have found a great many instances among the Coleoptera where the mature insect seems to be affected in a greater or less degree by the same stimulus as the larva. Perhaps the sight of the larva's food-plant strikes on some happy chord of childish recollection in the mature beetle.

To the student of animal instinct it is no doubt far more wonderful that an insect in its comparatively short life should at different stages respond to two quite distinct food-stimuli. The syrphus fly, *Eristalis tenax*, whose larva feeds in liquid manure, is, at maturity, a honey-sucking haunter of blossoms; in extreme cases, like that of the parasitic oil beetles, as many as three distinct food-stimuli occur in the life of the individual.

But in my ramble through the realm of Coleoptera, it is the opposite phenomenon which has struck me most. I mean the number of beetles that are attracted to the food of their larva. I have noticed this especially among the Cerambycidæ. In many of them the smell of fermenting sap (where a tree is newly felled or has been injured by the lopping of branches or the mutilation of bark) seems to act as a direct and powerful stimulus in liberating the instinct of reproduction. This is specially noticeable in the Monohammi. In others again, where perhaps the smell of sap has first drawn the insects to the tree for breeding purposes, the sight of the foliage seems to impel the beetles to eat the leaves. This is particularly the case in some genera that approach most nearly to the Chrysomelians. We have a familiar illustration of it in *Tetraopes*, the Milkweed beetle, whose larva feeds in the stem of the plant, while the beetle resorts in large numbers to the leaves, on which it feeds freely as well as breeding. Less conspicuous examples of the same phenomenon are the *Oberea*, and still more the *Saperda*. I have several times captured *Saperda vestita* feeding on the sheaf of leafy twigs surrounding the basswood stumps, under whose bark the eggs are laid. I have found *Saperda moesta* eating the leaves of the poplar where its larva develops, and on a single willow I once counted over 200 specimens of *Saperda concolor* breeding on the leaves and eating the foliage with evident relish.

These last few paragraphs have brought me right into the great group of Phytophagous beetles, properly so called, whose larvæ, without exception, find support on living vegetable tissue. They comprise three families, the Bruchids, which devour seeds; the Cerambycids, which attack the woody tissue of trees and shrubs, and the Chrysomelids, which feed at all stages on foliage and the more succulent parts of vegetation.

The Bruchids form only a small group, and the genus *Bruchus* is the only one of much importance; besides the Pea and Bean Weevils (so called), the only species I have found at all abundant is a minute insect, *Bruchus discoideus*, sometimes plentiful in the blossoms of the white *Convolvulus* or Morning Glory.

The Cerambycids appear to have been in their origin scavengers, rarely attacking sound wood; but the larvæ of many of them before reaching full growth eat right into solid timber, while others appear to eke out their existence by draining the afflux of sap to the part they have wounded; yet others again have deserted the forest tree that formed their ancestral home and taken up their abode in the fruit trees of our orchards. The larvæ develop slowly, and must greatly reduce the vitality of the tree they infest. They are exceedingly tenacious of life, and many instances are on record to show that the larval stage is capable of enormous extension.

The imago of *Monohammus* has been known to emerge from chairs and tables years after the manufacture of the furniture. Mr. C. O. Waterhouse, an English Naturalist, heard one of these larvæ at work in a boot-tree (an implement for stretching top boots) which he had in his possession for 14 years; he then presented the implement to the Natural History Museum at Kensington, where for six or seven years longer the larva continued to saw wood. The entire absence of sap had of course arrested the development of the larva, and it was unable to complete its transformation. Sereno Watson, the American botanist, relates another case (Packard, U. S. Ent. Comm., 1890, p. 689), that seems to prove the life of one longicorn to have lasted 45 years. When you add to this tenacity of life the larval obscurity which makes even detection difficult, it will be seen how serious a pest the longicorns may and often do become.

The Chrysomelians, on the other hand, live openly on foliage, which they devour as beetles no less than as larvæ. The larval stage is short and the insect, as a rule, helpless and easily destroyed. They more than compensate, however, for their exposure to attack by their rapid breeding, many genera producing two broods every season. There are 11 tribes of the family in boreal America, all of them represented in Ontario. But the great bulk of our Chrysomelidæ belong to the four consecutive tribes—*Cryptocephalini*, *Eumolpini*, *Chrysomelini* and *Galerucini*—the last of these is far the greatest, and contains more genera and almost as many species as the other three combined. Together these four tribes contain more than two-thirds of the entire genera and species in the family.

As, geologically, the woody fibred vegetation preceded the leafy and succulent plants, it is probable that the Cerambycidæ attained their greatest development far earlier than the Chrysomelidæ. But the two families are undoubtedly closely akin, and the Donacias may be regarded, both in form and in habit, as in many respects intermediate between some of the less highly-specialized genera of Cerambycids and the Chrysomelids.

NOTES ON TENTHREDINOIDEA, WITH DESCRIPTIONS OF NEW SPECIES.*

BY S. A. ROHWER, WASHINGTON, D. C.

PAPER XIII, MISCELLANEOUS NOTES.

The Common Pear Slug.

After repeated requests for information concerning the synonymy or correct name of the common pear slug, it has been deemed advisable to publish certain remarks on this species. According to Rev. Herr F. W. Konow's classification (a) this species belongs to the genus *Eriocampoides* Konow. Dr. A. D. MacGillivray (b) places *Eriocampoides* Konow as a synonym of *Caliroa* Costa, dividing Konow's genus into *Endelomyia* Ashmead and *Caliroa* Costa. In this the use of names is wrong. Konow's genus, as defined by him, may be divided into two subgenera, as follows: (c)

Clypeus truncate; pedicellum shorter than the scape; hind wings of the female usually with only one discal cell..... *Caliroa* Costa, syn. *Endelomyia* Ashmead.

Clypeus emarginate; pedicellum subequal in length with the scape; hind wings of the female usually with only one discal cell..... *Eriocampoides* Konow.

As these characters are hardly of generic importance, the above two groups should be treated as subgenera.

Linnæus (d) describes a sawfly under the name *Tenthredo cerasi* as follows:

"Cerasi. 14. T. antennis septemnodiis, corpore nigro, pedibus luteis.
"*Reaum. ins.* 5, t. 12, f. 1–5.
"*Habitat in* Cerasi *foliis, quæ involvit ut mutetur.*"

*Papers IX, X, XI, XII and the present one may be considered as contributions from the Division of Forest Insects, Bureau of Entomology, U. S. Department of Agriculture. In paper XII, Vol. 42, July, 1910, p. 242, it was stated that a paper on the subgenus *Hoplocampa* would be used as paper XIII. When the paper was completed it was found that it could be published in a series of technical papers of the Bureau of Entomology, and will appear as such.

(a) Genera Insect. fas. 29, 1906, p. 74.

(b) CAN. ENT., Vol. 39, Oct., 1909, p. 346 and 347.

(c) The matter of generic synonymy is treated more fully in a paper to be published shortly by the Bureau of Entomology.

(d) System. Nat. Ed. 10a I, 1758, p. 557, n. 14.

This description is very incomplete, but by referring to the figures and account given by Réaumur, which figures and describes the adult and larvæ, also the skeletonization of a cherry leaf, there can be but little doubt that this refers to a species of *Caliroa;* the description applying very well to the species commonly given as *limacina* Retzius (e), Degeer (f), who purports to be treating the same species as Réaumur, also figures a species of *Caliroa.*

Tenthredo flavipes Schrank (g) may well be considered to be a synonymn of *Tenthredo cerasi* (Linnæus).

Retzius (h) describes his *Tenthredo limacina* as follows :

"313. *T. limacina*, antennis filiformibus, 9-nodiis, nigra, pedibus fuscis, alis nigrescentibus. T. 2, p. 1007, t. 38, f. 16–25. [Referring to Degeer's writings.]

"T. cerasi, L. S. N., p. 923."

From the very description it is evident that Retzius is renaming the *Tenthredo cerasi* of Linnæus.

Tenthredo (Selandria) cerasorum Dahlbom (i) is a new name for the *Hylotoma cerasi* Fallen, and is not a species of *Caliroa.* (j)

Tenthredo (Allantus) adumbrata Klug (k) is a synonym of *cerasi* Linnæus.

Selandria atra Stephens (l) is considered by Konow to be a synonym of *Caliroa (Eriocampoides) annulipes* (Klug), and may be, but it is probable that the *Selandria atra* Westwood (m) is not *annulipes* (Klug), but *cerasi* (Linnæus).

The publication of the description of *Tenthredo (Blennocampa) æthiops* Gimmerthal (n) is not available.

(e) Herr Konow, Gen. Insect. fas. 29, 1906, p. 127, places *cerasi* Linnæus as a variety of *Tenthredopsis litterata* (Fourcory), but this would seem to be in error, as Réaumur's figure can not apply to a species of *Tenthredopsis.*

(f) Mem. hist. Insect. II (I) 1771, p. 1007, n. 23 ; T. 38, F. 16–25.

(g) Enum. Insect. Austr., 1781, p. 340, n. 686.

(h) Gen. and spec. Insect., 1783, p. 73, n. 313.

(i) Conspect. Tenthred. Scandin., 1835, p. 11, n. 142.

(j) Rev. Herr Konow places it, apparently correctly, as a synonym of *(Tenthredo) Aneugmenus stramineipes* (Klug).

(k) Magaz. Ges. Naturf. Fr. Berlin, VIII, 1814, p. 64, n. 36.

(l) Illus. Brit. Mandib., VII, 1835, p. 52, n. 30.

(m) Gard. Ghron., 1848, p. 524 ; Entom. Annual, 1862, p. 132.

(n) Arbeit. naturf. Ver. Riga. I (I), 1847, p. 52, n. 3.

Tenthredo (Selandria) æthiops Eversmann (o) is described as belonging to a group of species having "a. Area lanceolata petiolata, *Alae posticæ cellula discoidali carentes," which does not apply to *Caliroa*.

Monostegia antipopa W. F. Kirby (p) may well be considered as a synonym of *Caliroa (Eriocampoides) cerasi* (Linnæus) Kirby (q), to the contrary notwithstanding. Examination of the type of Kirby's species failed to disclose differences other than the venation of the hind wings, which is not reliable.

Tenthredo cerasi Peck (r) is, as Dr. MacGillivray has pointed out, a synonym of the Linnean species.

The synonymy of this species expressed below will serve to indicate the different names under which the species has been referred to. For a bibliography of the species up to 1894 one may consult Dalla Torre's Catalogus Hymenopterorum, Volume one. Since then a number of authors have referred to this species, and the damage done by it in both the palæarctic region and in Australia. Many of these are merely records of occurrence without much value. Some also reproduce the figures given by Mr. C. L. Marlatt (s). To assure themselves of the identity of their insect, entomologists will do well to consult Dr. MacGillivray's table (t) to the species of this group, and Marlatt's figure one.

CALIROA (Eriocampoides) CERASI (Linnæus). The common pear slug.

Synonyms:

Tenthredo flavipes Schrank.
" *lamacina* Retzius.
" (Allantus) *adumbrata* Klug.
" *cerasi* Peck.
Selandria atra Westwood (apparently).
Monostegia anthipoda W. F. Kirby.

THE NAME OF THE TURNIP SAWFLY.

Rev. Herr F. W. Konow (a) gives as the name of the turnip sawfly *Athalia colibri* Christ, 1791, placing as a synonym *Tenthredo salicis*

(o) Bul. Soc. Mouscou, XX, P. I, 1847, p. 29, n. 1.
(p) Tr. Ent. Soc. Lond., 1881, p. 50, n. 81.
(q) Ent., Vol. 37, 1904, p. 84.
(r) Mass. Agr. Rept., 1799, p. 9.
(s) Circ. 26, second series U. S. D. A. Bur. Ent.
(t) CAN. ENT., Vol. 39, Oct., 1909, p. 347, etc.
(a) Gen. Insect. fas. 29, 1906, p. 93.

Schrank, 1781. In Dalla Torre's Catalogus Hymenopterorum, 1894, p. 152, this species is given as *Athalia spinarum* (Fabr.) Leach. As Konow has indicated (Gen. Insect. and other references) *spinarum* Fabricius is a synonym of *colibri* Christ; but *Tenthredo salicis* Schrank, 1781, is not the proper name as might be surmised from Konow's synonymy, because in mentioning *Tenthredo salicis* Schrank (a) cites as the species he is describing *Tenthredo salicis* Linnæus, 1761, which is now *Pteronus salicis* Schrank, therefore, although he did describe a species of *Athalia*, did not establish a valid name in the genus, having only misidentified the Linnean species, *Tenthredo salicis*. The synonymy of this species would be as follows:

ATHALIA COLIBRI (Christ) Konow.

Tenthredo salicis Schrank, 1781 (not Linnæus, 1761).
" *spinarum* Fabricius, 1793.
" *centifoliæ* Panzer, 1795.

The subspecies and varieties as well as the biography have been omitted.

EUURA Newman versus CRYPTOCAMPUS Hartig.

The genus *Cryptocampus* Hartig (b) was published in March, while the genus *Euura* Newman (c) was published in January. *Cryptocampus* Hartig must, therefore, fall as a synonym of *Euura* Newman.

ARGE Schrank versus HYLOTOMA Latreille.

Rev. Herr F. W. Konow (d) replaces the generic name *Hylotoma* Latreille by *Arge* Schrank with the following words: "Statt des Gattungsnames *Hylotoma* Latr. muss der oblige ältere Name eintreten." The two names in question were proposed in works dated the same year. *Arge* Schrank, in Fauna Boica, Vol. 2, part 2, 1802, p. 209 and pp. 226 to 229; *Hylotoma* Latreille, in Hist. Nat. Ins., Vol. 3, 1802, p. 302. *Arge* was founded on six species arranged in the following order: *Tenthredo ustulata* Linn., *T. enodis* Linn., *T. ciliaris* Linn., *Arge rosincola* Sck., *A. bicolor* Sck., and *A. berberdis* Sck. *Hylotoma* was founded on one species, *T. rosæ* Linn., which is given as an "example."

(a) Enum. Ins. Austr., 1781, p. 338.
(b) Fam. d. Blatt. und Holzwesp, 1837, p. 221.
(c) Ent. Mag., Vol. 4, 1837, p. 259.
(d) Deutsch. ent. zeit., Vol. 30, 1886, p. 73.

There seems to be no positive way of proving which book was published first, but evidence seems to indicate that Schrank's work has priority. The "Vorrde" of Volume 1, part 1, of Schrank's work is dated March 12, 1801, and there seems to be but little doubt that this part appeared in 1801; part two then probably appeared in 1802, as its title page indicates. Volume 2 of Hist. Nat. Crust. and Ins. was noted by Illiger in 1803 (p. 282). This volume was supposed to have been published in 1802. Volume 4 of Latreille's work on page 332 refers to W. Kirby "Apum Angliæ," which is said to have been published in 1802, and the dedication was written May 1, 1802. Considering the slow means of transport, it would seem improbable that Kirby's work could be published in 1802, and be mentioned in a book by Latreille, also published in 1802. Indicating as this does that Latreille's works did not appear in the year their title page is dated, while Schrank's work probably did, we may well assume that Schrank's work has priority.

The International Committee on Zoological Nomenclature has not, as yet, ruled on cases of different books published on the same date containing different names for the same animal, but if the Code of Nomenclature adopted by the American Ornithologists' Union is indicative of the ruling of this committee, *Arge*, which has page precedence over *Hylotoma*, will be used. (b) The first reviser rule as defined by the International Committee does not cover the case either, as it refers only to names published in the same work. If, however, the first reviser rule was to be made to apply to such cases, *Arge* would again have to be used for *Hylotoma*; because, although the SPECIES of *Hylotoma* had been revised by Fabricius; Fallen, Klug, Dahlbom, Hartig, Thomson, Cameron and others before Konow came into the field, Konow is the first reviser of the GENERA, as he is the first to bring the generic name *Arge* in connection with the other genera of the group, and to give characters for their separation.

All this shows the desirability of using *Arge* for *Hylotoma*, as the European master has done. Now the pendulum has swung, it would be folly to try and swing it back. Such oscillation will never bring stability in nomenclature, a thing much needed and desired.

(b) See Canon XVII, p. xlix of the 1908 edition, which says: "Of names published simultaneously in different books, that shall be taken which stands on the anterior page.

FIFTH ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF AMERICA.

The Fifth Annual Meeting of the Entomological Society of America was held at the University of Minnesota, Minneapolis, December 27th and 28th, in the School of Mines Building. The president, Dr. J. B. Smith, presided throughout the session. In the absence of the secretary-treasurer, Professor J. G. Sanders was elected secretary pro tem.

The following papers were read during the session :

E. L. Dickerson.—"Notes on the Tingid *Leptobyrsa explanata* Heid."

J. B. Smith.—"Notes on *Sanninoidea exitiosa*."

J. P. Jensen.—"The Structure of Spermatophores in Crickets."

S. J. Hunter.—"The Biological Survey of the Insect Life of Kansas."

H. C. and H. H. Severin.—"An Experimental Study of the Death-feigning Habits of *Belostoma (Zaitha) flumineum* and *Nepa apiculata* Uhler."

C. H. T. Townsend.—"Announcement of Further Results Secured in the Study of *Tachinidæ* and Allies."

T. D. A. Cockerell.—"Some Suggested Rules to Govern Entomological Publications."

The report of the Committee on Nomenclature was received and ordered printed.

The report of the Executive Committe showed that nineteen new members had been received during the year and four lost through death.

The result of the mail vote ordered by the Society at the Boston meeting was that the annual dues of the Society should be two dollars, this to include a subscription to the Annals of the Entomological Society of America.

The following officers were eleeted :

President—Professor Herbert Osborn.

First Vice-President—Professor Lawrence Bruner.

Second Vice-President—Professor Alex. D. MacGillivray

Secretary-Treasurer—Professor Alex. D. MacGillivray.

Additional members of the Executive Committee :

Professor J. H. Comstock. Dr. W. M. Wheeler.

Professor J. B. Smith. Dr. H. Skinner.

Professor C. J. S. Bethune. Dr. A. D. Hopkins.

The annual public address was given in Handicraft Hall by Prof. F. L. Washburn : "The Typhoid Fly in the Minnesota Iron Range."

ALEX. D. MACGILLIVRAY, Secretary-Treasurer.

THE PREPARATORY STAGES OF *PHRAGMATOBIA ASSIMILANS* WALKER, VARIETY *FRANCONIA* SLOSSON.*

BY ARTHUR GIBSON, OTTAWA, ONT.

On May 4, 1909, Mr. Horace Dawson, of Hymers, Ont., forwarded to me some arctian larvæ which he had found crawling on snow. These larvæ, with the exception of two or three, which were parasitized, and four others which died, spun their cocoons and pupated during the journey to Ottawa. Others which Mr. Dawson kept himself were making their cocoons on the above date. The first moth, a male, from the larvæ sent emerged during the morning of May 21, and I was delighted to see that it was the variety *franconia* of *Phragmatobia assimilans*. Before 3 o'clock of the same day another male had emerged, and also a female. Other specimens emerged as follows: one on May 22, one on June 2, one on June 3 and four on June 21. One of the males which emerged on May 21, and the female, which issued the same day, were put in a small wooden box with sides of gauze; this was placed out of doors beneath a large pine tree, and left there for two days, when it was brought into the office and the female transferred to a small wooden pill-box. By May 26 a small batch of eggs was laid, and on May 28 another cluster was deposited. The eggs were laid side by side, not loosely, as is the habit in *Apantesis*, and were firmly attached to the side of the pill-box. The first batch comprised 26 eggs, the second 23. From these, 40 larvæ were obtained, the first specimens hatching on June 2, and the last ones on June 4. The following notes were taken on the egg, larval stages and pupa:

Egg.—0.8 mm. in diameter, 0.7 mm. in height; conoidal, rounded, flattened at base; creamy-white, shining, reticulated.

Stage I.—Length, 2.5 mm. General appearance dark at first, turning greenish after feeding. Head 0.3 mm. wide, black, shining; mouth-parts brownish. Thoracic shield dark brown, shining. Tubercles on body large and conspicuous, with exception of i, which is very small; all shiny, pale brown in colour, and each bearing a long, slender, slightly barbed hair. No markings on the body. Ventral surface and prolegs whitish, the latter darkened in places. Thoracic feet pale brown.

Some of the larvæ passed the first moult on June 8, the others soon afterwards.

*Contributions from the Division of Entomology, Ottawa.

April, 1911

Stage II—Length just after moulting, 5 mm. General colour dark grayish, turning paler towards end of stage. Head 0.5 mm. wide, black, slightly depressed at vertex. Thoracic shield dark brown. A series of conspicuous reddish blotches now occur on the dorsum, in a line with tubercle i, and also others of the same colour below the lateral tubercles, those near tubercle ii, however, being more intense in colour, almost a blood-red. Tubercles black, shiny, each bearing a bunch of spreading bristles of varying lengths, those from tubercles below the spiracles being pale, almost golden, while those from the dorsal and upper lateral tubercles are black. Spiracles black. Prolegs pale, thoracic feet darkened.

A few larvæ moulted the second time on June 11, others on 12th and 13th.

Stage III.—Length at first, 8 mm. Head 0.9 mm. wide, black, shining. Body darker than in Stage II, caused by the reddish blotches on skin being now of a dull purplish colour, the whole skin being more heavily streaked and blotched than before. Under a lens the greenish ground colour of the skin shows up against the dull purple in the centre of the dorsum as a stripe. The bristles from the tubercles below spiracles are of a pale rusty tinge. Otherwise the larvæ are the same as in last stage.

Larvæ moulted for the third time on June 16, 17 and 18.

Stage IV.—Head 1.2 mm. wide, black, shiny, as in previous stages. The larvæ now differ in the blotches on the skin being darker, some specimens having a pale dorsal stripe, and the bristles from all the tubercles being of a pale rusty colour. Length at end of stage, when at rest, 15 mm.

Larvæ moulted again on June 21, 22 and 23.

Stage V.—Length just after moulting and at rest, 15 mm. Head 2.0 to 2.2 mm. wide, rounded, somewhat quadrate, depressed at vertex; black, shiny, brownish patch on cheek above ocelli. The skin is of a uniform dull purplish colour, paler around the tubercles, which are dull blackish. Tubercles, with exception of ventral series, large; i slightly smaller than ii and iii. Bristles from tubercles stout, conspicuously barbed, of a dull rusty or mouse-colour, those below the spiracles being brighter. The pale dorsal stripe present in some specimens in Stage IV is only visible now just after moulting. Spiracles cream-coloured, ringed with black. Thoracic feet black, shining; prolegs, upper half concolorous with venter, lower half pale.

Soon after the larvæ reached this stage they stopped feeding, and within a week all had died. No disease could be detected among them. They simply refused all food offered them, and acted as if they wanted to hibernate. The heads of the four larvæ mentioned above, which died during their journey to Ottawa, measure 2.2 mm., 2.2 mm., 2.3 mm. and 2.3 mm., respectively, the same width as those of Stage V. Mr. Dawson informs me that these larvæ winter full fed; he has watched them closely, and has never seen them eat anything in spring. He has on several occasions found them crawling on snow in March and April, looking for a place to pupate.

Cocoon.—The cocoons of the larvæ first received were spun among some leaves and moss in the box in which they were sent. The cocoon is thin, but not so slight as in *Apantesis*, the pupa being readily seen within. It is simply a light network of whitish silk, to which has been attached many of the hairs from the larva.

Pupa.—Length, 14–15.5 mm.; width at widest part 5.5 mm.; black, shining; folds of abdomen bright reddish-yellow; abdomen bears, sparsely, short thick hairs. Spiracles black. Cremaster round, reddish, shiny, terminating in a bunch of about eight straight, stout, reddish-brown, capitate bristles of varying lengths.

Food-plant.—Mr. Dawson tells me that he thinks the larvæ feed on a species of Lungwort, *Mertensia*. Those which I obtained from eggs were fed on dandelion and plantain.

Parasites.—Two or three of the mature larvæ received had been attacked by a Tachinid. Within a day or two after their arrival at Ottawa the puparia emerged, and later three flies, one of which has been identified by Mr. W. D. Coquillett as *Exorista chelonie* Rond.

Mr. H. H. Lyman, of Montreal, also received some larvæ from Mr. Dawson, and he has kindly sent me the following notes, which I am glad to include here:

"Larvæ of *Phragmatobia assimilans* Walk., var. *franconia* Slosson, received from Mr. Horace Dawson, Hymers, Ont., Nov. 20, 1909.

"Of the usual 'woolly-bear' type (and in two stages), head somewhat quadrate, rounded at corners, not bilobed, smooth and shining, dark brown or blackish, with a few brown hairs. Body dark sooty-brown, somewhat foxy towards the ventral surface. Feet blackish, prolegs or claspers light brown. No bands discernible on dorsum.

"Two or three were in a later stage, having apparently moulted ahead of the others. These showed a strongly-marked dorsal band of dull orange. The hairs were of varying lengths, not of the close-cropped form of the previous stage, and more radiating from the warts in appearance. The hairs on dorsal surface were blacker than in previous stage, those towards venter more foxy. Feet and claspers light brown."

Towards the end of May, 1910, Mr. Lyman wrote saying that he had succeeded in carrying some of the larvæ over the winter, from which he obtained five of the moths. When the larvæ came out of hibernation, Mr. Lyman offered them everything he could think of in the way of fodder, but this they refused, and spun up very soon.

All of the specimens of this moth which I have seen (about 25, including 10 which I reared) are similar in appearance, excepting that the females are darker and smaller, 30–32 mm. in expanse (the males being 33–38 mm. in expanse). The figure accompanying Mrs. Slosson's original description* is very good, but the band on the secondaries in all of the specimens before me (11 males and 3 females) is marginal, not submarginal as in the description, with the exception of one male, in which the band is nearly wholly marginal. This band, too, is much wider in our specimens than in the figure above referred to.

I have never seen typical *Phragmatobia assimilans* from Canada, all of the specimens examined by me being the form known as the variety *franconia*.

Distribution in Canada.—In addition to the specimens reared from larvæ received from Hymers, Ont., and adults taken there by Mr. Dawson, the writer has records of specimens collected at Sudbury, Ont. (J. D. Evans); Ottawa, June 3 (A. Gibson); Ottawa, May 24 (A. Nicholls); Montmorency Falls, Que., June 14 (A. R. M. Boulton); Lake Beauport, Que., June 23 (A. R. M. Boulton); Meach Lake, Que., May 16, 17 (C. H. Young).

FOUR NEW SPECIES OF ASILIDÆ.

BY NATHAN BANKS, EAST FALLS CHURCH, VIRGINIA.

Ommatius maculatus, n. sp.

Face with white pubescence and long white hair below, dense white hair behind mouth-parts; antennæ all blackish; thorax black, shining, a grayish-white stripe each side, wider at ends, a cross-mark from middle of each stripe to the margin, and the lower lateral margins grayish-white, so

*Entomological News, March, 1891.

that the thorax above shows a long shining black median stripe and two shining black spots on each side; scutellum gray-white; pleura black, gray pollinose; coxæ black, front ones white pollinose, and front and middle coxæ with white hair at tips; legs reddish-yellow, front and middle femora mostly black, but pale at base, hind femora black on apical half, tibiæ black at tips, and the tarsi mostly black above, femora shining, all with white hairs and bristles, but black bristles on tarsi and tips of tibiæ, hind femora with short, white, spine-like bristles beneath, all bristles on hind tibiæ very short, but little longer than the width of the joint. Abdomen dull blackish, with short, sparse white hair, tips of segment gray; hypopygium reddish. The large bristles on sides of thorax are yellowish; the wings hyaline; venation black, the costa and radius near the middle a trifle heavier and deep black, but not swollen.

Length, 10 mm.

From Bill Williams' Fork, Arizona, August (Snow).

Ommatius pretiosus, n. sp.

Face white pollinose, with long white hair below and a few longer black ones, white hair behind mouth-parts; second joint of antennæ reddish, rest blackish; thorax dull blackish, a large whitish pollinose spot each side in front, and one behind over the base of wing, and narrowly connected to the anterior spot; behind whitish pollinose, also over the scutellum and on each side metathorax; pleura grayish pollinose; legs yellowish, with long white hair and some black bristles, a black spot each side at tips of femora, and the tips of tibiæ (especially the hind pair) darker, hind trochanters black, and in male the hind femora have a broad black band nearly covering the entire joint, in female only a long black streak above. Abdomen reddish-yellow, base black, and the apical segments infuscated, in female the base is only black-marked above. Wings grayish fumose, scarcely darker on tip, venation black, margin not swollen. The large bristles each side on thorax are black. The hind femora have no spine-like bristles beneath in the male, but in the female there are stiff black bristles beneath on basal half of hind femora; the hind tibiæ has one very long bristle above near base and several beyond the middle, one of these also very long; there are three pairs of long bristles beneath the metatarsi.

Length, 13 mm.

From Palmerlee, Arizona, July (Biederman).

Mallophora fulva, n. sp.

Closely related to *M. orcina*, but distinguished as follows; No black hair on sides of face, the scutellum and abdomen with fulvous (instead of pale yellowish) hair, and no white hair (all black) on the last joint of the hind tarsi; the bristles in front of the halteres are pale yellowish (black in *M. orcina*), and there are a few yellowish hairs at base of the wings. The facial tubercle (seen from the side) slopes off more gradually above than in *M. orcina*.

From Palmerlee, Arizona, Sept. (Biederman).

Laphria dispar, n. sp.

Face with dull tawny pubescence, long black hair below with a few yellow ones, and black hairs around base of antennæ, behind mouth-parts and cheeks white hair, while that on occiput and vertex is black; thorax black, with black hair, a denser tuft on the humeri, and long black bristles on the sides; long erect hair on the scutellum; some short tawny hairs at tip of the mesothorax; the row in front of halteres mostly white, but the upper ones are black; pleura black. Legs black, anterior coxæ densely long white-haired, also some on the middle coxæ, front and middle femora, and tibiæ with long white hair, the middle tibiæ with two outer rows of long black bristles, tarsi with black bristles, hind femora and tibiæ with pale hair on basal part, rest blackish, about four or five curved bristles on outer side of hind tibiæ, each about twice as long as the width of the joint. Abdomen black, with fulvous hair on apical parts of segments, denser at the outer angles, and more on apical segments than on basal ones, apicals frequently covered with fulvous hair; hypopygium black; wings hyaline, tinged with darker, especially on the apical half; venation blackish.

FIG. 5.—*Laphria dispar*, male genitalia.

A female has the abdomen more densely fulvous-haired, and the dorsum of thorax with fulvous hair.

Length, 13 to 15 mm.

From Ithaca, N. Y., July; cotypes from Hecton Mills, Penna., May and June (coll. Walton).

This species has been mixed with *L. sericea*, but the genitalia of the male are very different; *L. sericea* has more yellowish hair on the face, etc. It differs from *L. æatus* in absence of tawny hair on chest, in black abdomen, absence of white fringe at base of abdomen, etc.

SOME NEW BEES FROM FLOWERS OF CACTACEÆ.

BY T. D. A. COCKERELL, UNIVERSITY OF COLORADO.

Melissodes opuntiella, n. sp.

♂.—Length about 9 mm.; black, with white hair, that on head and thorax all white, without any ochraceous or fuscous; head broad; clypeus pale yellow, with the usual spots, and the lower margin rather broadly piceous or reddish; mandibles with a large yellow spot; labrum entirely black, with white hair; scape short, black; flagellum very broadly bright orange-fulvous beneath, unusually short for a *Melissodes*, reaching only to about middle of scutellum; mesothorax and scutellum shining, with scattered small but distinct punctures; tegulæ testaceous, with white hair; wings clear, nervures dusky ferruginous; legs black, with dull ferruginous tarsi; hair of legs white, ferruginous on inner side of basitarsi; abdomen finely punctured, the hind margins of the segments broadly hyaline, and with dull white hair-bands; last two segments with short but evident lateral teeth. Not unlike the Mexican *M. otomita* Cresson, but with the face broader, the antennæ shorter (especially the apical joints), and the mesothorax and scutellum more finely and sparsely punctured.

♀.—Length about 10 mm.; clypeus black, closely punctured; eyes green; flagellum short, bright ferruginous beneath beyond the second joint; hair of head and thorax white, without dark, as in the male; first abdominal segment with a patch of white hair at each posterior corner, second with a dense basal hair-band and a broader apical one, both straight and uniform; third and fourth also with broad white apical hair-bands, third with grayish-white tomentum basally; fifth and sixth with the hair entirely dark chocolate; scopa of hind legs loose, plumose, adapted for carrying the large pollen of the *Opuntia*; hair on inner side of hind basitarsi ferruginous.

Hab.—Brownsville, Texas, at flowers of *Opuntia lindheimeri*, both sexes, March 23, 1908 *(Jones and Pratt)*; Hondo, Texas, at flowers of *Opuntia*, male, April 30, 1908 *(J. D. Mitchell)*; Cotulla, Texas, at *Opuntia*, female, May 5, 1905 *(J. C. Crawford)*. The type is a male from Brownsville.

In my tables in Trans. Amer. Ent. Soc., 1906, the male runs to *M. snowi*, which has the flagellum more than twice as long. The female runs nearest to *M. tepaneca*, a much larger species, with fulvous hair on thorax. It really much resembles the female of *M. sphæralceæ* Ckll., though the latter has dark hair on the thorax above.

April, 1911

Ashmeadiella echinocerei, n. sp.

♀.—Length about 5½ mm.; black, with white hair, yellowish on inner side of tarsi; legs black; tegulæ shining piceous. Similar to *H. cactorum* Ckll., but distinguished by its narrow face (facial quadrangle much longer than broad), densely punctured mesothorax and strongly punctured abdomen. The eyes are broader in proportion to their length. As it is rather difficult to appreciate these characters without specimens of *cactorum* to compare, I give measurements:

Length to breadth of facial quadrangle as 85 to 72.

Length to breadth of eye as 85 to 42.

Hab.—Flagstaff, Arizona, at flowers of *Echinocereus*, June 12, 1909 *(F. C. Pratt)*.

Diadasia piercei, n. sp.

Like *D. afflicta* (Cresson), but a little larger, the legs dark ferruginous, and the area of metathorax dullish, microscopically sculptured, not smooth and brilliantly shining as in *afflicta*. Female with abdomen very broad (considerably broader than in *afflicta)*, with the sooty-brown scopa of hind legs very long and loose. Tegulæ in both sexes rich ferruginous; male with the hair on disc of second abdominal segment not wholly pale. The end of the male abdomen is formed as in *D. afflicta*, not as in *D. bituberculata*. *D. australis opuntiæ* often has the scopa of hind legs as dark as in *piercei*, but then it has the hair at the apex of the abdomen tawny-fulvous, not chocolate as in *piercei*. The second submarginal cell in *piercei* is narrow and parallel-sided.

Hab—Corpus Christi, Texas, at flowers of *Opuntia*, March 18, 1908, one male = type *(W. D. Pierce)*; Beeville, Texas, at *Opuntia*, April 30, 1896, 4 ♂'s, 1 ♀ *(Marlatt)*.

A species of the Lower Austral Zone.

SMERINTHUS CERISYI KIRBY.

Mr. Wolley Dod's interesting note in the March number has caused me to look up the name of this species. In Kirby's "Fauna Boreali-Americana: Insecta," p. 301, there is a description given of his species which he names "*Smerinthus cerisyi*, Cerisy's Smerinthus." Unfortunately, in Smith's and Dyar's lists the name is incorrectly given as "*cerysii*." The species is evidently named after a Mr. Cerisy, who probably was one of Sir John Robertson's party that collected the insects described by Mr. Kirby. It is to be hoped that the name will be correctly given in any future lists that are published.—[C. J. S. BETHUNE.

AN EGG-PARASITE OF THE CODLING MOTH BELONGING TO THE FAMILY MYMARIDÆ.

BY A. A. GIRAULT, URBANA, ILL.

The following Mymarid, described years ago, is a parasite of the eggs of the codling moth in Georgia. The record is without a sponsor, as explained beyond, but otherwise I see no reason for not accepting it. Originally the species was described as a parasite of *Lepidosaphes ulmi* Linnæus. I add the following descriptive notes, so that it may be the more easily recognized:

Anaphes gracilis Howard.

Female.—Length, 0.65 mm. Moderately small in size for the genus; visible to the naked eye.

General colour black, suffused with some yellowish; base of abdomen contrasting, yellowish; coxæ, trochanters, all tarsal joints, cephalic tibiæ, both ends of cephalic femora pallid lemon-yellow; the antennæ, venation, cephalic femora, femora and tibiæ of other legs about neutral or dusky-grayish; antennal pedicel somewhat lighter and more yellowish. Eyes dark. Wings subhyaline, slightly fumated proximad and along the distal half of the blade.

Body moderately slender, the abdomen as long as the head and thorax combined, conic-ovate, pointed distad, the ovipositor distinctly exserted, but not very much so, the exserted portion not as long, for instance, as the proximal tarsal joint of the caudal legs.

Fore wings usual in shape to the genus, moderate in width, widest just before the apex, the latter dome-shaped, the marginal fringes long, the longest disto-caudad, slightly longer than the greatest width of the blade and distinctly longer than the longest cilia of the posterior wing, but not very much longer. Discal ciliation of the fore wing rather sparse, absent in the proximal two-thirds of the wing and consisting of about seven or eight short lines in the distal part of the blade. Posterior wings with a single longitudinal line of discal cilia, the lines usually along each edge absent *apparently*.

Legs normal, the proximal tarsal joint longer than the other three, but not especially long; tibial spurs single.

Antennæ 9-jointed, not normal; scape as long as the pedicel and first three funicle joints combined or longer, curved, as long as the club. Pedicel obconic, stout, as long, or nearly, as the next three joints taken together. Funicle with the joints gradually widening distad, the proximal

joints subquadrate, small, the first funicle joint smallest, joint six largest, four times or more larger than the first; all funicle joints short, the distal joint alone longer than wide; funicles two and three subequal, four and five subequal, the latter twice the size of the former, each taken separately, six over twice longer than four or five. Club long, accuminate-ovate, as long as the whole funicle, or very nearly, subequal to the scape; obtusely pointed.

From two specimens, 2/3-inch objective, 1-inch optic (Bausch and Lomb.)

Male.—Unknown.

A species unique for this group because of its antennal structure. (See the figure in its original description.) Black, with a yellowish band about the base of the abdomen.

Described from a single female specimen found in the collections of the United States National Museum, Washington, D.C., labelled "Ex ovo Codling Moth, Tallapoosa, Ga." Remounted in balsam from a tag.

Also another specimen captured on the window of an old pig-shed on a farm at Centralia, Illinois, August 25, 1910 (A. A. Girault). The species must be widely distributed in the United States.

Habitat: United States—Tallapoosa, Georgia; Centralia, Illinois; Washington, D. C.

There is a specimen in the U. S. National Museum collection and one in the collections of the Illinois State Laboratory of Natural History, Urbana, Illinois. (Accession No. 42,221.)

MIASTOR LARVÆ.

These remarkably interesting larvæ, reproduced by *pedogenesis*, are available for laboratory work to a marked degree and must be widely distributed as well as allied forms. Very little is known concerning American species, largely because their habitat is one rarely explored by entomologists. They breed mostly in decaying vegetable matter. We have been very successful in finding them under partially decayed chestnut bark of stumps, fence rails and sleepers which have been cut one or two years earlier. European species have been observed under the bark of a variety of trees and even in sugar-beet residue. These Dipterous maggots with diverging antennæ have a flattened, triangular head, quite different from the strongly-convex, usually fuscous head of the Sciara larvæ occurring in a similar environment. They have a length of from 1/20 to 1/8 of

an inch, and may be found in colonies containing a few large, white larvæ with numerous smaller, yellowish individuals, though the latter appear more common at the present time. Early spring, with its abundance of moist bark, appears to be the most favorable season for finding the larvæ. The writer would welcome the co-operation of entomologists and others in searching for these forms in different parts of the country. He will be pleased to determine specimens found under various conditions, make rearings therefrom if possible, and thus add to our knowledge of the subfamily Heteropezinæ, a group which should be fairly abundant in North America, and one deserving careful study.—[E. P. FELT, Albany, N.Y.

GNORIMOSCHEMA GALLÆDIPLOPAPPI FYLES AND *GNORIMOSCHEMA GALLÆASTERELLA* KELLICOTT.

BY REV. THOMAS W. FYLES, HULL, P. Q.

In the report of the Entomological Society of Ontario for the year 1890, on page 18, and in a paper entitled "A Day in the Woods," I described a Gelechian which produced galls on *Diplopappus umbellatus* (Torrey and Gray); and I said of the species: "These moths differ considerably from those figured and described by Mr. Kellicott in Vol. X, CAN. ENT., p. 201, and from those described by Mr. Riley in the First Missouri Report, p. 172. I would suggest for them the name *Gelechia gallædiplopappi.*"

After 20 years, through the favour of Mr. A. Cosens, of Toronto, I have the pleasure and satisfaction of beholding, *for the first time*, a specimen of Kellicott's moth—of the species certified to be such by Mr. Busck, of Washington.

I find that Kellicott's description of his moth is very accurate, and that the drawing he gives conveys a fair idea of it.

I now re-assert, with all confidence, "These moths (those of *G. gallædiplopappi*) differ considerably from those figured and described by Mr. Kellicott in Vol. X, CAN. ENT., p. 201," etc. And I maintain that the name I suggested for the species I discovered is, in all fairness, entitled to stand, and should not be relegated to a synonymy.

I am not alone in this opinion. On December 24th, 1907, Mr. W. D. Kearfott wrote to me: "Your package with the two moths, also letter and drawings, were safely received Saturday. There is no question that your species is most distinctly different from Kellicott's."

On March 11th, 1909, our late friend, Dr. Brodie, wrote to me: "I have always been under the impression that your described species was distinct from the many lepidopterous gall-producers. And I was surprised to see that Dyar* gives it as a synonym. In this particular I agree with Kearfott and yourself."

For those who have not looked into the matter, it may be well for me to particularize some of the points of difference in the appearance and habits of the two species under consideration.

DIFFERENCES IN APPEARANCE.—In *G. gallæasterella* the prevailing tone is *white* — white thorax; white fore wings, having "a brown patch occupying the costal half of the middle third" of the wing. Fore wings and their fringes much spotted.

In *G. gallædiplopappi* the prevailing hue is *deep Indian red*—thorax red; fore wing red, with a pale divided fascia near the hind margin; unspotted on wing and cilia.

FIG. 6.—*Gnorimoschema gallædiplopappi* Fyles.
A.—Gall on *Diplopappus umbellatus* (x½).
B.—Gall opened to show chrysalis on its mattress.
C.—Larva greatly enlarged.

IN FOOD-PLANTS.—Dr. Brodie pointed out that the gall figured by Kellicott is not one on *Aster corymbosus*, but one on *Solidago latifolia* (CAN. ENT., Vol. XLI, p. 75).

Mr. A. Cosens writes: "The moth *G. asterella* Kell. produces galls which are locally abundant on *S. latifolia* L., but are found very rarely on *S. caesia*, var. *axillaris* Gray" (CAN. ENT., Vol. XLII, p. 372).

*Dyar's List, No. 5621.

Mr. August Busck writes, the species "would seem to infest both *Aster* and *Solidago*" (CAN. ENT., Vol. XLIII, p. 6).

On the other hand, *G. gallædiplopappi* affects that tall and sturdy plant, *Diplopappus umbellatus* Torrey and Gray. I found it every season during my stay at Levis on this plant, and *never on any other*. For 27 years I searched the Golden-rods around Quebec, hoping to find Riley's *G. gallæsolidaginis;* but the only lepidopterous gall I found upon them was that of *Eucosma scudderiana* Clemens. Neither Riley's moth nor Kellicott's appeared in the district.

IN HABITS OF THE LARVÆ.—From Kellicott's account it appears that *G. gallæasterella* forms its galls "a few inches above the ground, the terminal bud developing very little after the larva begins operations."

The larva fills the way of exit for the moth "with a closely-fitting plug of silk." * * * "It then lines the interior with silk and soon changes to a chrysalis" (CAN. ENT., Vol. X, p. 204).

G. gallædiplopappi forms its gall a foot to two feet above the ground, and the growth above it is unaffected.

The larva, when full-fed, spins a slight web above its droppings and directly across the gall, and on this it changes to a chrysalis.

I have opened dozens of the galls, and never found one lined with silk, nor one with the way of exit closed with a plug.

The moths that came from these galls were always true to the type.

In the Annual Report of the Ent. Soc. of Ont. for 1903, page 71, will be found an account and illustrations of two dire foes of *G. gallædiplopappi*, viz.: *Braxon furtivus* Fyles and *Trychosis tunicula-rubra* Fyles. Both of these insects were declared to be new and good species by Dr. Ashmead, of Washington.

DESCRIPTION OF A NEW SPECIES OF ORTHOPTERA FROM TEXAS.

BY A. N. CAUDELL, WASHINGTON, D. C.

Stipator mitchelli, n. sp.—♂ (♀ unknown). Allied to *S haldemanii* and *grandis*, but more heavily built than either of those species. The shape of the cerci of the male is as in *haldemanii*.

Head moderate, no broader than the anterior portion of the pronotum, into which it is deeply set; fastigium of the vertex about one-third as broad as the interocular space; front broadly rounded; eyes medium in size and prominence, a little longer than broad; antennæ long and slender,

much longer than the body. Pronotum large and posteriorly considerably produced over the base of the abdomen, lateral lobes well developed, but not so deep as long, nearly vertical, the posterior margin distinctly sinuous; lateral and median carinæ wholly absent except posteriorly, where the median carina is very indistinctly present; anterior margin truncate, posterior margin rounded. Prosternal spines moderate. Organs of flight wholly concealed. Legs long and stout; anterior tibiæ armed above on the outer margin with three spines, except on the right leg, where there are four, the inner margin armed with two spines;* posterior femora more than twice as long as the pronotum, and much swollen on the basal two thirds, armed beneath along the middle of the inner carina with several small black teeth. Plantulæ of the posterior tarsi short, scarcely half as long as the basal segment of the tarsus. Abdomen large and plump; cerci (fig. 7) about three times as long as broad, very slightly curved inwardly, the shaft nearly cylindrical, apically somewhat flattened, and near the tip with a large triangular tooth, the tooth larger and longer than the apical portion of the cercus and of similar shape, giving the general appearance of the cercus being forked, as shown by the accompanying figure. Last abdominal segment notched, the angles no longer than broad.

FIG. 7.—*Stipator mitchelli*, cercus of male.

General colour green, with pronotum dorsally marked with fuscous posteriorly; the lateral lobes are narrowly bordered with black posteriorly.

Measurements.—Length of pronotum, 12 mm.; posterior femora, 26 mm.; cerci, 2 mm.

Type.—(Cat. U. S. Nat. Mus., No. 13444); Hondo, Texas, March 30, 1908, eating petals of *Opuntia* flowers. (J. D. Mitchell, collector.)

*Probably variable, as in *haldemanii*.

BOOK NOTICES.

DIPTERA DANICA.—Genera and species of flies hitherto found in Denmark. Part III, Empididæ. By William Lundbeck; 335 pp., 141 figs. (Copenhagen, G. E. C. Gad; London, Wm. Wesley & Son.) Nov., 1910; $3.25.

Although among the 164 species of Empididæ described in the present volume there are not many which are also found in North America, no student of this Order can afford to be without this valuable

work on the Diptera of Denmark. The first part, which treated of the Stratiomyidæ, Xylophagidæ, Cœnomyiidæ, Tabanidæ, Leptididæ and Acroceridæ, appeared in 1907; the second part dealt with the families Asilidæ, Bombylidæ, Thereoidæ and Scenopinidæ, appeared in the following year, and the present volume forms the third part. The work is being published in both the Danish and English languages. The method of treatment of each species is similar to that adopted by Schiner in the "Fauna Austriaca," though in many cases it is fuller, especially where bionomic notes are available. The illustrations of anatomical features of value in the determination of the species, and in many cases of the larvæ, greatly increase the value of the monograph. The author follows Brauer's classification, as given in the "Katalog der paläarktischen Dipteren von Becker, Bezzi, Kertesz und Stein."

The family of Empididæ is a large one; about 440 species are recorded from North America and about 675 species from the palæarctic region; 11 species are recorded as common to both regions. These dark, gray or yellowish flies of a medium to a very small size are generally characterized by their somewhat small, more or less globular head and slender bodies. Many species, especially belonging to the genera *Empis* and *Rhamphomyia*, are seen dancing in swarms over water and in other places. The phenomena connected with these dances, which are of an amorous nature, are of great interest. Copulation takes place in the air, and in many of the species one may see the males capture a small insect, which, instead of devouring, they carry to the females, and copulation takes place while the female is engaged in eating this love offering. The physiological bearing of these phenomena is not known, but it is certainly worthy of investigation, as in the case of many other insects, such as certain mosquitoes, Hemiptera and Orthoptera, where feeding and reproduction bear a close relationship. As in the case of the adults, the larvæ are carnivorous and live in the earth, below leaves, in decaying wood and similar damp and wet situations. Little is known, however, concerning the life-histories of the Empids, but, as a group, they present problems of great interest to the entomologist.—C. GORDON HEWITT.

CONTRIBUTIONS TOWARD A MONOGRAPH OF THE BARK-WEEVILS OF THE GENUS PISSODES. By A. D. Hopkins. (Technical Series, No. 20, Part I, Bureau of Entomology, U. S. Dept. Agriculture.)

This is the first part of a bulletin to be entitled "Technical Papers on Miscellaneous Forest Insects," and is modelled on much the same plan

as the author's admirable Monograph of the genus Dendroctonus, which appeared in 1909.

The more general part of the paper contains a valuable account of the taxonomy of the genus, including a full description of the external anatomy of the adults, certain features of the internal anatomy and the characters of the earlier stages. It also contains a brief account of the general habits, life-history and distribution of the genus. Following this is a detailed account of the North American species, which includes, in addition to a key to the species, synopsis of adult, pupal, larval, and primary and secondary sexual characters, tables of distribution, host trees, etc. Thirty species are recognized, of which twenty-three are described as new. These are fully illustrated by twenty-two plates and nine text figures.

As but little has been hitherto known of this important group of enemies of coniferous trees, Dr. Hopkins' masterly work will be eagerly welcomed by all students of forest entomology.

DR. WILLIAM SAUNDERS, LL.D., C.M.G.

The older readers of THE CANADIAN ENTOMOLOGIST will receive with deep regret the announcement that Dr. Saunders has found it necessary to retire from the position of Director of the Experimental Farms of the Dominion, which he has held for the last five-and-twenty years. Owing to advanced age and the disabilities consequent upon it, Dr. Saunders has resigned, to take effect on the 31st of March. He intends to make a holiday tour in Europe, leaving at the beginning of May. This will be the first real holiday that he has taken since he entered upon his duties at Ottawa in 1886.

For thirteen years Dr. Saunders was editor of this magazine, and is therefore widely known amongst entomologists, as well as by his published works on the subject. He has the satisfaction of knowing that he has built up a chain of experimental farms reaching from the Atlantic to the Pacific, and that the whole organization is so complete and in such excellent order that it will not require anything like the same labour and difficulty in the case of his successor. There are very few men anywhere who could have undertaken and so thoroughly carried out such a work, as the whole organization had to be originated and brought into working order by his efforts and constant supervision.

All his friends throughout Canada and the United States will join in hearty congratulations to Dr. Saunders on the completion of his immense task and in expressing the hope that he may live many years to enjoy the rest and recreation which he has so thoroughly earned.—[C. J. S. B.

Mailed April 8th, 1911.