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No. 1

THE OCCURRENCE OF THE WARBLE FLY *HYPODERMA BOVIS* DE GEER IN CANADA.

BY C. GORDON HEWITT, D.SC., F.R.S.C., DOMINION ENTOMOLOGIST,
OTTAWA.

In the early writings on the Warble Fly occurring in the United States, the species was constantly referred to as *Hypoderma bovis* of de Geer, which was supposed to be the species common to Europe and North America. Curtice, in 1891, concluded that the American species was *H. lineata* Villiers, and not *H. bovis*, and Riley in the following year (Insect Life, Vol. 4, pp. 302-317, 1892) discussed the question fully, and concluded that "the older Ox Bot-fly, *Hypoderma bovis*, hitherto supposed to be a common species of both America and Europe, is in reality either a very rare insect in this country, or possibly does not occur here at all." Aldrich (Catalogue of North America Diptera, 1905) states that *bovis* is not positively known from North America.

Subsequent workers on this continent have been accustomed to refer only to *H. lineata* in speaking of the North American species.

Brauer described *H. lineata* Villiers as *H. bonassi* from the larva only, specimens having been obtained in Colorado from the American buffalo. Besides being generally distributed through the United States, according to Riley, it also occurs commonly in Europe. Walker described it from Nova Scotia in 1853 as *Oestrus supplens*.

During the summer of 1912 Dr. Seymour Hadwen, in charge of the Branch Laboratory of the Health of Animals' Branch of the Dominion Department of Agriculture located at Agassiz, B.C., carried out a series of experiments on Warble Flies, and his important contribution to our knowledge of the biology of these insects has now been published (Bull. No. 16, Health of Animals' Branch Dept. of Agriculture, Ottawa). Dr. Hadwen made the interesting discovery that the common species of fly under observation was *H. bovis*, and all the full-grown larvæ collected at Agassiz.

B.C., both from local animals and from cattle imported from Eastern Ontario, in the previous December, were also *H. bovis*. Two larvæ collected at Mount Lehman, B.C., proved to be *H. lineata*.

As this discovery of *H. bovis* in Canada was of unusual interest, I examined the specimens of the collection of the Division of Entomology. The genus was represented by four specimens, which appeared to me to be *H. bovis*, but in order to be certain I submitted them to Prof. G. H. Carpenter, of Dublin, Ireland, who kindly examined them, and states that they are all *H. bovis*. These specimens are from the following localities: New Cornwall, (Lunenburg Co.), N.S., 1913; Brockville, Ont., 1913; St. Henri Levis, Que., 1911; and Southern Alberta, 1910. Our collections also contain larvæ of *H. bovis* from East End, Sask., 1913, and of *H. lineata* from Sarnia, Ont.

In view of the fact that *H. bovis* is evidently widely distributed in Canada, occurring, as our records indicate, from the Atlantic to the Pacific, it would appear to be extremely probable that this species occurs with *H. lineata* in the United States. The economic importance of the species renders the state of uncertainty of the presence or absence of this species all the more remarkable, and further investigation would be very desirable. The adults of the species have distinctive characters. *H. lineata* is smaller than *H. bovis*, it has black hairs on the head and on each side of the prothorax is a tuft of whitish hairs; the disc of the thorax is almost bare and striped longitudinally. The hairs on the head of *H. bovis* are yellow and a band of yellow pubescence stretches across the thorax in front. The larvæ are readily distinguishable by means of the spiny cuticular armature. Mr. C. W. Johnson reared *H. bovis* from larvæ obtained in June, 1910, at Manchester, Vt. (*Psyche*, XVII, Dec., 1910, p. 231).

ON THE PREDACEOUS HABITS OF *SCATOPIHAGA*: A NEW ENEMY OF *MUSCA DOMESTICA*.

BY C. GORDON HEWITT, D.SC., F.R.S.C., OTTAWA.

In view of the increasing attention which is now being paid to the character of the prey of certain groups of Diptera, the following notes on the feeding habits of *Scatophaga stercoraria* L. will be of interest, apart from their economic significance. While

it is known that certain of the flies of the family Cordyluridæ prey upon insects which they capture, the common yellow coprophilous *S. stercoraria* is not usually regarded, so far as I am aware, as a predaceous insect. Yet the observations recently made and forwarded to me (30 Oct. '13) by Mr. George E. Sanders, in charge of the Dominion Entomological Field Station at Bridgetown, N.S., would indicate that this common species destroys, in the aggregate, no small number of other Diptera, especially Muscid flies, for which it appears to display a preference.

Specimens of *S. stercoraria* were found and taken by Mr. Sanders capturing *Musca domestica* L., *Calliphora erythrocephala* Mg., *Stomoxys calcitrans* L., *Fannia canicularis* L., *Pollenia rudis* Fab., and *Orthellia cornicina* Fab.* After seizing their victims, they wrapped their legs around them and the neck of the victim was then pierced from below by thrusts of the proboscis and sucked for a short time. The body was afterwards turned over and the proboscis inserted between the abdominal segments, in which position the fly continued to feed for a long time. In some cases, for example, *Pollenia rudis*, the victim's head was completely broken off.

S. stercoraria was also seen to capture *Bibio longipes* Loew, and a female of *S. merdaria* Fab. was caught preying upon *Scatops notata* L.

Mr. Sanders reports that *Scatophaga* has been seen catching *Musca domestica* on the porch of a house, and, when observing the flies attracted by the sugar bait at the laboratory, it was a common sight to see *M. domestica* captured by *Scatophaga*. A "yellow fly," probably this species, was reported to him as capturing and eating mosquitoes.

The preference of *Scatophaga* for Muscid flies is noticeable. This may be due to the fact that excrement has an attraction for both prey and victims. *S. stercoraria* breeds in excrement and commonly frequents it; *M. domestica* and certain of its allies have similar habits. The significant fact, however, is that *Scatophaga* preys upon *M. domestica* and other common Muscids, not only when they are visiting excrementous matter, but in other places, and these facts place *Scatophaga* in the category of decidedly useful insects.

*I am indebted to Mr. C. W. Johnson for assistance in determination.

THE CHRYSOMELIANS OF ONTARIO.

BY F. J. A. MORRIS, PETERBORO', ONT.

(Continued from Vol. XLV, p. 392.)

On these same raspberry leaves is often found a small yellow beetle with black thorax ornamented by two white spots; it frequents many other leaves besides, such as basswood and hazel, but it is most abundant on raspberry. It is *Bassareus luteipennis*, the first of seven genera that constitute Tribe VI. These seven genera contain over 100 species, about 50 being found in Ontario. Three of the genera, containing over 35 species, are represented right in this wood. *Bassareus* on the raspberry, *Cryptocephalus quadrimaculatus* (the size of the insect as usual in inverse proportion to its name) on the young shoots of white pine where the needles are soft, and *Pachybrachys* on the willow shrubs at the lower end of the wood. The members of this tribe are small, sometimes minute, and stoutly cylindrical in shape, what we would call "chunky"—indeed, *Pachybrachys* (the Greek for "thick-short") is only a grand name for "chunky." Some of the species of *Cryptocephalus* (which means "hidden head") are very pretty, especially *venustus*, which I have found on the blossom of the meadow-daisy, and *mutabilis* taken on birch and spiræa.

As we walk back to the road that we left at Mose Robinson's, we can collect no less than 5 genera of the next or VIIth Tribe. In the hollow at the north-east of the wood, where the clump of willow and dogwood grows, you will find *Xanthonia* on the leaves of the former and *Adoxus* on those of the latter; the first a small and the second a medium-sized beetle, closely resembling each other in shape and general colour; about the trunk and limbs of that newly-felled pine on the bank, *Glyptoscelis*, a fairly large beetle, metallic brown in colour, but looking lighter from its pubescence; on the common Dogbane (*Apocynum androsæmifolium*) you will find *Chrysochus aureus*, a large dazzlingly brilliant bluish-green beetle; it is said to feed on Indian hemp (*Apocynum cannabinum*) and on Milkweed (*Asclepias*), but I have never found it on any milkweed nor on any other species of Dogbane than the common, sweet-scented species with pinkish blossoms; *Apocynum cannabinum* has greenish-white blossoms and no scent; as the Dogbane is filled with a white milky juice just as abundant as that of the

Milkweed, Blatchley's description may be erroneous; on the dog-wood, again, both leaves and blossom, a fifth genus of this tribe (*Colaspis*) is often found.

Returning to the road just east of Robinson's we face east. South of us lie two upland meadows of rough grass, somewhat rocky and covered with hummocks and watery hollows, a favorite place for the Kill-deer plover; here, too, sometimes in the fall is heard the peculiar cry of the Yellowlegs. As I was walking along here, at the end of last April, I heard a strange bird-note—a long, loud whistle, melodious and with something of the plover's plaintiveness about it. After some time I discovered a bird with long narrow wings circling at some height over the meadows, and several times the strange cry was repeated. I brought a friend out with me next week and, with the aid of a field glass, we watched as many as three pairs of the birds feeding, running and flying about these meadows. On alighting, they would raise their wings over their backs till the tips met and then slowly fold them down at the sides, at the same time uttering this long-drawn whistle. The bird I had first heard, however, was certainly calling as it hovered and circled high over the field, and as I stood under it I distinctly saw its neck and wings grow rigid for a moment as it forced the cry out on to the air; it was the Bartramian Sand-piper, and this was its mating call. I had the luck to startle a hen bird off her nest of eggs early in May quite near the fence that we are going along. Once the eggs are laid the birds become very shy and can rarely be approached. But in the mating season they seem fairly tame and we watched one settle twice on the top of a fence-post just north of where we are now, within stone's throw of a farmhouse. I was standing in the roadway at the time and my friend was at the snake-fence, his foot on the bottom rail and his field glasses resting on the top, when I noticed a weasel running along the bottom rail in our direction; it showed not the slightest fear and never hesitated, but, advancing steadily, stepped right over my friend's foot; in its teeth it held by the nape of the neck, limp and lifeless, a large field-mouse, doubtless the family dinner. These creatures are very bold and show the utmost unconcern of human beings. I remember being stopped some years ago by a section boss on the railway, who asked to show me a nest under a culvert that his gang had been cleaning out.

"There," he said, disclosing four little blind nestlings, "what's them?" "Why," I said, "they look like weasels." "That's what they are, I reckon," came the answer, "and the mother fought like a good one for nearly an hour to get back to them. We had to drive her off with stones before we could get at work on the culvert."

Along this stretch of road, within the space of a few rods, we shall find no less than 5 genera belonging to Tribe VIII on our list. Under chips of wood by the roadside in the early spring I have frequently found a small beetle, variegated black with yellow brown stripes, called *Prasocuris*; on the common milkweed the large handsomely marked orange and black *Doryphora clivicollis* and on the bittersweet growing over that stone-pile, its cousin *Doryphora decemlineata*, that ubiquitous pest, the Colorado potato-beetle; in the blossom of the dogwood, a small metallic dark green beetle that feeds also on elm leaves, *Plagioderia viridis*; about the knotweed at the wood's margin, the pretty little *Gastroidea polygoni* with yellow brown thorax and peacock-green elytra; while in the grass, a little further on, I took two specimens of *Lina scripta* as early as the end of April; no doubt hibernated specimens, probably from the willow clump nearby, for that is the favourite food plant of the *Lina scripta*; it is a somewhat variable species, of which I have found two quite distinct forms on the willow—one the normal form at Guelph and the other near Lindsay. There still remains in this tribe a genus that I have so far left unmentioned, the most beautiful of all the family and well worthy of the high compliment (*pace* the economic entomologist) paid it by naturalists—*Chrysomela* (Golden Apple)—or is it an Homeric word, meaning "golden sheaf?" from which the tribe gets its name of Chrysomelini or Chrysomela-like beetles, and the whole family its name of Chrysomelidæ; the scions or clan of Chrysomela. This is a most beautiful beetle; the characteristic appearance being roundish-oval in shape and decidedly convex above; head and thorax mostly dark metallic and wing-covers a creamy white, daintily sculptured with metallic greenish or bluish black. It suggests old ivory inlaid with ebony or jet. In the early days of collecting, this was a beetle I coveted more than any other; the species that above all took my fancy being *Chrysomela scalaris*. There was a brother-collector in town whose cases I was continually poring over. But

it was in my second season as a collector that I first had the luck to "strike ile," and it was right on that dogwood bush behind the north fence of our road. I found here several specimens of a *Chrysomela* rather smaller than *scalaris* with greenish-black head and thorax, elytra cream-coloured and finely sculptured and dotted with metallic greenish black; it proved to be *Chrysomela philadelphica*, and a short search among dogwood shrubs yielded me some 50 specimens of the beetle. This was at the end of June, and in July I migrated with all my bug-and-weed paraphernalia to the Rideau Lakes. It wasn't long before I found grazing on basswood leaves, along with walking-stick insects, whole flocks of a small whitish larva, marked with black, somewhat louse-shaped and so strongly resembling the larva of the Potato-beetle that visions of *Chrysomela scalaris* began again to float before my excited imagination and to haunt my dreams. I separated about 15 of the best-grown lambs of the flock and shepherded them home to a domestic fold. But they seemed to scorn captivity and quite obviously pined in their cardboard box. Twice a day I brought them fresh fodder from their native pasture, but they wouldn't browse worth a cent, and I lost one or two with every moult; less than half a dozen reached maturity, and of these two died in pupating. However, three emerged safely and proved the realization of my dream, *Chrysomela scalaris*, all the more lovely in being home-grown. The knowledge that hundreds of these creatures must have matured about basswood trees where I had made my captures drew me out to their feeding grounds again. This time I searched in vain, not a larva could I see on any of the leaves, still less a mature insect, for the full-fed larva in this genus drops to the ground in order to pupate, and though it was the beetle itself that I had found gregarious on the dogwood, there seemed to be no such luck in the case of this species; at the end of two hours I was still empty-handed. It was when I was passing across a stubble-field in the open, from one part of the edge of the wood to another, that I felt something crawling on the back of my neck. Of course, gentlemen, you all know the extraordinary phenomenon of an insect crawling on the back of the neck. No matter how rare it may have been when it first settled, if once you reach with your hand to make a capture it nearly always—well, if you wish for an exact figure, in

ninety-nine cases out of a hundred—it turns into an aculeate hymenopteron and poniards the cord of your neck with that most venomous of stillettos, the wasp sting; in the hundredth case, of course, it simply flies away. I was on the horns of a dilemma: if that creature was *Chrysomela scalaris*, I wanted it badly; on the other hand, I stood good chances of being stung, literally or figuratively, by its proving a wasp or something worthless or making its escape. My embarrassment was worse than that of the Cockney sportsman (as pictured by Punch) when the bird he was aiming at suddenly settled on the middle of his gun-barrel; because, though I am told this would make a very difficult shot, at least the man knew what he was trying to bag. There were big risks, it was a daring shot, but I took it and grabbed the insect as it was pushing down behind the collar of my negligé. An awful moment, while I waited for telegraphic communication from my neck to my inner consciousness of the sensation of five inches of hatpin jabbed viciously into the quick and centre of one's being, that matter-of-fact people call a wasp-sting; but there was no telegram, this was the 100th chance, and sure enough, when I came to examine my capture, it was what I had been looking for—*Chrysomela scalaris*. Where had it come from? I am certain there was none on the basswood; it had simply dropped out of pure cussedness on to my head, I presume, from the sky. Next season I found three more species—one on willows very like *Chr. philadelphica* of the dogwood, but with the front and sides of the thorax margined with cream; I have taken a great many specimens of this beetle in various places, always on the willow; it is *Chr. bigsbyana*. The second new species was a smaller member of the genus called *Chr. elegans*, first found early in the season crawling on railway ties, which are not its food-plant, but afterwards found feeding in abundance on water smartweed about the surface of a stream a couple of miles south-east of here. There is another species of small size closely resembling this, called *Chr. suturalis*. I have never discovered the food plant to which this beetle resorts about Port Hope, but I have twice found a stray specimen on grass blades. One year in August, when I returned from my holidays, I was looking over my friend's collection of Chrysomelas, mentally checking off their food-plants as

my eye roved from species to species; basswood, dogwood, willow, water smartweed and so on, when suddenly my attention was arrested by a whole row of fine specimens of this beetle. "Hullo!" I exclaimed, "where did you get these?" "Oh, on the beach, just a few days ago." In an instant I had registered a silent vow and next morning hastened off to fulfill it in our old stand-by, the North Wood, equipped for the sacrifice with some sandwiches and a cyanide bottle. All the morning I searched beech trees diligently, without success, and all the afternoon the same, and at last went home, weary and footsore, having got nothing but aching eyes and a stiff neck. In the evening I was round again at my friend's collection. "Are you sure that you got those beetles on the beech?" "Oh, yes, and they were in fine condition; in fact, one of them was still alive. I guess a thunderstorm the day before had blown them out over the lake; when I went down, the southeast wind was washing them up on the beach." My beech, with an "e," was his beach with an "a"; he had taken his specimens on the lake shore. Disappointments like these are bound to occur; I have spent days in search among spiræa and hazels which the collectors say are the invariable food of certain species, and so far the result has been an absolute blank.

We will now move east about a mile, past Davison's old chair factory on the Rice Lake Road, up hill, down dale, and up hill again as far as Bethel. Here we turn south down a grass lane to a wood of pine, oak and maple and skirt along the edge of this wood, keeping close to the fence. Notice that sandy knoll in the wood, just west of us, with a large burrow at the top; I was approaching this one day from the south, gathering morels as I went, when I felt that curious sense of being watched that we sometimes have. Looking up, I saw what I took to be a young collie dog, reddish-brown, sharp-faced, staring straight at me; as soon as it saw me look at it, it made a movement that is very characteristic of the collie, dropped flat on the ground, its head couched between the outstretched fore-paws and so lay, alert and watchful; I took a pace or two forward, when suddenly it did what no collie ever did—dived headlong into a sand-burrow and disappeared. It was a puppy, to be sure, about half grown—a young red fox.

A quarter of an hour's walk southeast brings us to our favorite lunching ground—a huge pine tree surrounded by glacial boulders right at the top of a steep slope facing south; for we are on a tableland here, some 300 feet above Lake Ontario, with a magnificent view, east, west and south. This is probably the old shore line of Lake Ontario—indeed, a few miles west there are clear traces of an old beach five or six miles north of the Lake's present boundary. The top of this hypothetical cliff overlooking an ancient Lake Ontario is clearly marked east and west by its fringe of white pine. East of us there must have been a magnificent bay, for the edge of the tableland recedes in a sharp curve for nearly a mile north, and then comes forward again with a sinuous sweep to the east. Out of the two corners of this bay now proceed southwest and southeast two little trout streams whose union half-way down the sloping valley results in Gage's Creek, a stream that meanders along through five or six miles of level farm land and at last reaches the lake just east of Trinity College School.

After lunch we descend the slope to a rough meadow at the foot on the edge of a tamarack swamp. Here we can examine some genera of Tribe IX of Chrysomelians; on the golden-rod, which earlier in the year was badly eaten by the larva of *Trirhabda canadensis*, we see the mature insect—a large soft-winged beetle of a yellowish colour with a black or dark grey line on the outside of its wing covers and a sutural stripe of the same down the centre of the back. Later in the year you will find two species of *Diabrotica*, commonly known as the spotted and the striped kind, respectively, of Squash beetle, their favorite food (especially in the larval state) being cucumber and melon vines. A third genus of this tribe I got two specimens of, on the edge of the swamp south of this meadow, but I only once have found it abundant, and that was in the Algonquin Park, in a marshy bay at the shore of Cache Lake. It is said to be rare, and Blatchley states its food-plant to be Arrow Arum (*Peltandra*). I found hundreds of it, feeding on a small species of the Skull Cap or *Scutellaria*; it is oblong, soft-winged, light yellow-brown in colour, with two black patches on each wing-cover—a small one at the base and a large one near the apex—its name is *Phyllobrotica discoidea*. One more genus is represented here—*Galernucella decora*—on the willow, and *luteola* on elm shoots

at the west end of the meadow; a third species, *nymphæa*, is found on lily-pads; some species are quite a pest, appearing in immense numbers and destroying a great deal of foliage.

We will now walk west, along the north end of Holdsworth's farm, to the road that runs south between Holdsworth's and a farm of John Hume, the Port Hope seedsman. After crossing the road, we come to a little brook; on the water smartweed that grows in this stream I found three or four years ago quite a number of medium-sized black and light-brown striped beetles that worked a new trick on me in methods of escape and with considerable success. I was used to beetles that took to flight suddenly and also to beetles that dropped from their perch on leaf or plant into the tangle of vegetation below, but, except for the small flea beetles of grape-vine, alder, turnip, horseradish, and so on, I was not prepared for jumpers. But this whole Tribe X consists of jumping beetles, and their hind thighs are greatly thickened in consequence. Their name, Halticini, is taken from the genus *Haltica* or Flea Beetle; the name simply means "the jumper." This beetle of the water smartweed is *Disonycha pennsylvanica*. A much larger beetle of the same genus I have found often on willow bushes by the railway near Carmel, 12 miles north of Port Hope, and also at several points in the Algonquin Park; it is light yellow-brown, with a black margin round each wing-cover and a black stripe down the middle of the same; thighs and abdomen orange-coloured; it is *Disonycha caroliniana* and a most active leaper. There is one more genus of these leapers that I have found, said to be uncommon in Ontario; it is a very pretty beetle of fair size, with a close superficial resemblance (in size, shape and colour) to *Chrysomela lunata*; reddish brown all over, this colour, on the elytra, being broken into irregular stripes by narrow wavy lines of yellow. I have found it abundant on the north shore of the Upper Rideau, feeding always on the Fragrant or Canada Sumach. Blatchley describes it as "common on the sumach," but I have never found it on the poison ivy or the stag horn's "only the fragrant sumach, which is a small shrub," about the size of a gooseberry bush, having leaves almost identical with those of the poison ivy—i. e., divided into three leaflets and slightly toothed on one or both margins; the bark and wood are fragrant, but with a certain pungency, not altogether pleasant.

I shall never forget the time and the place that I first found this beetle—*Blepharida rhois*; for I got that day several treasures—this new beetle, a new fern (the ebony spleenwort), the rock selaginella, a new tree (the red cedar) and a new shrub (the Canada Sumach).

We are now on our way home. First we strike south-west for a couple of miles, through fields and woods; just before we reach the Sowden farm, we pass through some stumps of basswood, round whose base a sheaf of leafy twigs has sprouted. On these leaves I have found a smallish wedge-shaped beetle, reddish-brown in colour, with some small, darker marks on it; its surface is peculiarly striated lengthwise by alternate furrows and ridges. It is called *Odontota rubra*, a leaf miner, feeding between the upper and the under surfaces of leaves and often in the larval stage very abundant on basswood; it is the only representative of Tribe XI known to me.

At the Sowden farm we turn west on the old York coach road from Toronto to Kingston and pass presently through Dale or Bletcher's Corners. Arrived at the railway track, we go south along it to the Iron Bridge over the Ganaraska at the head of Corbett's Pond. Just before we cross, you will notice on the steep embankment to our right hand a great growth of wild convolvulus or Morning Glory. It was here that I first found the *Coptocycla aurichalcea*, a little tortoise beetle of most marvellous brilliance; it looks, when seen alive on its food-plant, like a dewdrop sparkling in the sunshine and equally iridescent, but this dazzling lustre fades after death to a red gold. It was on the south shore of the lower Rideau that I first met this last tribe of the Chrysomelidæ, the Tortoise beetles. Feeding together on wild convolvulus, meadow rue and one or two other plants by the margin of the lake, I found two sorts of beetle—one large and the other small. There were larvæ, as well as beetles of both kinds, on the same plant and often on the same leaf. They proved to be *Coptocycla guttata*, a less brilliant beetle than *aurichalcea*, and *Chelymorpha argus*. I took some larvæ and pupæ as well as imagoes home with me and watched them mature. These insects have devised a most extraordinary means of protecting themselves. From the end of the larva's abdomen protrudes what naturalists are pleased to call a forked process; on this miniature rack the creature's moults are spread and converted

into a sort of tarpaulin by liquid excretions; this is then retroverted and dangles over the creature's back like an umbrella. I wonder if any of you ever came across an old book called the "Voyages and Travels of Sir John Mandeville?" This mediaeval De Rougemont, borrowing some of his choicest traveller's tales from Herodotus, Pliny and others, describes a one-legged race of men in Africa who go so fast that (as the author justly observes) it is marvellous. As disuse leads to atrophy, much use produces hypertrophy, and Mandeville declares these one-legged men have developed such enormous feet that in the heat of the day they sit on the sand and hold their foot as a parasol over their head. In my edition of the work there is a woodcut illustrating this description, in which a native is seated on his one haunch (how to balance one's self must be as great a problem with that race as Columbus tackled in the hen's egg) shading himself from the sun with his foot over his head.

Some naturalists think that these larvæ are seeking protection from the sun in spreading this forked process over their back. But it seems more likely that they do it to escape detection by some bird foe for whom they would be a dainty morsel. What makes me think so is that the pupa, too, is protected in a curious way. The full-grown larva pupates attached by some silk thread to the leaf, more or less exposed and helpless, but, as soon as the pupa forms, almost its entire surface turns greyish or bluish white; it looks like a creature that has died and been attacked by fungus-growth of mildew. It so deceived me that I was on the point of throwing specimens away. It was only when I took one between finger and thumb and felt it writhe firmly under my touch that I realised the deception. Doubtless one more case of protective mimicry.

Now, gentlemen, we are nearly home. We skirt the side of Corbett's Pond, where in May you will sometimes find on the mud flats seven or eight species of plover and sandpiper at a time and, passing along Hope Street, turn up a lane near the C. N. R. bridge at Ontario street. This takes us to DeBlaquière street, and one block down brings us to the plantation of young trees sent from Guelph to Trinity College School a few years ago. Here we cross the cricket ground and gain the school, my home for more than twelve years. We have been out all day and walked some 15 miles and I seem to have done a great deal of talking. I only hope I have not wearied you.

AN UNDESIRABLE FOREIGNER ON THE AMERICAN
CONTINENT (*CRYPTOCOCCUS FAGI* BAERENS).

BY R. W. BRAUCHER, KENT, OHIO.

The writer received a letter dated Oct. 2, 1913, from Mr. L. G. Vair, the Manager of the Canadian Davey Tree Expert Co., of Montreal, which reads in part as follows: "I am mailing you under separate cover a piece of bark cut from a common beech tree which is covered with what looks to be some form of insect. I hope you will be able to identify it and give its full history and control. If it is an insect, I should think it would be hard to control by spraying. The trouble is noticeable all through the woods in the vicinity of Halifax, N.S., and the whole trunk area will be covered just as the specimen is, as will also most of the limbs. It seems to be killing out the beech trees quite rapidly, and is really a menace which something should be done to exterminate."

The specimen was received in due time, but the writer was unable to find anything like it described in American literature, but on pages 234 and 235 of A. T. Gillanders' "Forest Entomology" he found a good illustration of the specimen sent and a description of the pest and its work.

Specimens were sent to Dr. L. O. Howard for verification of the determination, and he reports under date of Nov. 6, 1913, in part, as follows: "I have referred this material to Mr. Sanford, who is of the opinion that it is the European felt scale (*Cryptococcus fagi* Baerens). So far as I am aware, this is the first report of the occurrence of this coccid in North America, and its presence in Nova Scotia is a surprise to me. Doubtless it has been imported on European stock, and measures should be taken to prevent its becoming widely distributed."

Gillanders (page 235) says: "This insect confines its attacks exclusively to the beech (*Fagus sylvatica*), and, by reason of its whitish appearance, must not be confounded with the various species of *Chermes* (Aphidæ) on larch, silver fir, Weymouth pine, etc. It should also be noted that the 'Copper beech' is all but immune from this insect pest. In fact, I have occasionally seen cases where the copper beech was grafted on the common beech, of the pest appearing fairly thick on the stock or common beech

portion, and the copper beech portion above having only here and there the smallest possible speck on it."

The "copper beech" is probably the purple beech (*Fagus atropurpurea*). *Fagus sylvatica* is the common European beech and the specimen from Nova Scotia is doubtless from the American beech (*Fagus grandifolia* Ehrh.), an entirely new food plant for it. If this is the case and it acts like many of our foreign neighbors when they land on our shores, we may have a serious problem on our hands unless prompt measures are taken for its extermination.

From Mr. Vair's report of the conditions in the woods around Halifax, it would appear that this new pest is taking kindly to its new food and new climate. If it once becomes thoroughly established in our beech woods and thrives as it promises to do, it is impossible to foresee the damage that it may cause.

NOTE ON THE OCCURRENCE OF THE FELTED BEECH
COCCUS *CRYPTOCOCCUS FAGI* (BAERENS)
DOUGL. IN NOVA SCOTIA.

The opportunity which has been afforded me of reading Mr. R. W. Braucher's article on the occurrence of *Cryptococcus fagi* near Halifax, N.S., enables me to correct the impression it might convey that this insect had not been previously found in North America.

In August, 1911, specimens of the Felted Beech Coccus *C. fagi* Baerens were sent to me by Mr. Justice Meagher, of Bedford, N.S., which is near Halifax, and as a result of a careful inquiry, which was immediately made, we found that this Coccid was present on both ornamental and forest beeches in the neighbourhood of Halifax, where it had apparently existed for a number of years. Mr. R. Power, Superintendent of the Public Gardens, Halifax, sent specimens of *C. fagi*, taken from the European Beech (*Fagus sylvatica* L.) in the Halifax Public Gardens in September, 1911, and he informed me that he had known it for the last twenty years, and that he kept it in check on the purple variety, but did not spray the common variety.

While it is possible that the Coccid may have been introduced into Canada a number of years ago on ornamental beeches from England, to which opinion I am inclined, its occurrence in Nova Scotia and possibly New England does not necessarily imply introduction. We may be a little too apt on the discovery in the New

World of an insect described from the Old World, especially when it happens to be restricted in its distribution, to ascribe its presence to artificial introduction, when a more complete study of its geographical distribution might conceivably indicate that it was indigenous. Our native insect fauna is far from well known.

Be that as it may, *Cryptococcus fagi* appears to be well distributed in the Halifax district and its serious effects on its host plant, which it usually kills in England and Europe, where I have had the opportunity in the past of studying its occurrence, renders it desirable that care should be exercised to prevent its spread and efforts made to eradicate it on ornamental trees. Theobald (Reports on Economic Zoology, S. E. Agric. Coll. Wye, England, 1905-1912) gives abundant testimony as to the destructive nature of this insect. As a result of considerable experience he has found the Woburn Wash of Mr. Spencer Pickering the most successful remedial measure. This is made as follows: Soft soap, $\frac{1}{2}$ lb.; paraffin oil (kerosene), 5 pints; caustic soda, $2\frac{1}{2}$ lbs.; water, $9\frac{1}{2}$ gallons. The soap is dissolved in hot water, churn in the oil and when well mixed shake in the soda and churn thoroughly, and bring the quantity up to ten gallons with water. This wash is applied during the winter and two or three applications should be made. An effective summer wash is made from soft soap and paraffin (kerosene). Boil 8 lbs. of soft soap and five gallons of paraffin (kerosene) together, and, while they are boiling, add one pint of cold water and stir the mixture well. On cooling it becomes a jelly, which may be stored in pails or boxes. To use, add 10 lbs. of the jelly to every 30 gallons of water. It has been found that on ornamental trees the best results have been obtained by scraping off the felted masses of Coccids and scrubbing with the paraffin wash.

Owing to our Regulations under the Destructive Insect and Pest Act, it is unlikely that this pest will be introduced on beech trees imported into Canada from Great Britain and other parts of Europe, as all such trees are carefully inspected. Further, I am pleased to say that Prof. Brittain, Provincial Entomologist of Nova Scotia, of the Agricultural College, Truro, N.S., is making a careful investigation of the Halifax outbreak.

19th November, 1913.

C. GORDON HEWITT,
Dominion Entomologist, Ottawa

NOTES ON NORTH AMERICAN SPECIES OF NEPTICULA
WITH DESCRIPTIONS OF NEW SPECIES
(LEPIDOPTERA).

BY ANNETTE F. BRAUN, CINCINNATI, O.

Nepticula cratægifoliella Clemens.

Nepticula cratægifoliella Clemens, Proc. Ent. Soc. Phil., I, 83, 1861; Tin. No. Am., 173, 1872; Dyar, List. N. A. Lep., No. 6194, 1902.

Mines of this species, which Clemens named from mine and larva on *Cratægus parvifolia* Ait., occur at Cincinnati on *Cratægus punctata* Jacq. The mines on this species of *Cratægus* sometimes average about 2 mm. in width during the later portion of the mine, but are more often a little narrower, and the frass line is often rather broad. In other respects they agree well with Clemens' description of the mine. The larva, as Clemens notes, is bright green. The cocoon is

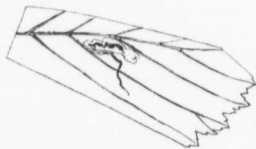


Fig. 1.—Mine of *N. cratægifoliella*

reddish brown, broader at the anterior end, not much depressed. The imago may be described as follows:

Palpi pale ochereous. Tuft ochereous, faintly tinged with red. Antennæ ochereous, partly suffused with fuscous, eye-caps ochereous.

Thorax and fore wings ochereous, the extreme edge of the costa near the base purplish fuscous, and a broad purplish fuscous band at the apex of the wing. Beyond this band the cilia are pale ochereous, giving the appearance of an ochereous apex preceded by a dark band. Cilia opposite the ends of the band concolorous with it. Hind wings and cilia pale grey.

Legs ochereous. Abdomen purplish fuscous above, ochereous beneath.

Expanse: 3.5 mm.

One specimen bred from a mine collected July 8th; the imago appeared July 29th. The mines occur again more abundantly during the last few days of August and the early part of September.

I refer to this species a flown specimen collected by Mr. Fred Marloff, Oak Station, Pa., June 5th, 1910. In this specimen the

eye-caps are yellowish white and the wings expand 4.5 mm. In all other respects it agrees with the bred specimen.

A distinct and very easily recognized species.

Nepticula latifasciella Chambers.

Nepticula latifasciella Chambers, Bull. Geol. Surv. Terr., IV, 106, 1878; Dyar, List N. A. Lep., No. 6200, 1902.

In the description of this species, Chambers notes that it was taken resting on the trunks of chestnut trees, the leaves of which were full of empty *Nepticula* mines.

I have bred a number of specimens on red and scarlet oaks. The mine is a narrow linear tract gradually broadening to its end, where it measures scarcely 1.5

mm. in width. At first the frass is deposited in a broad line through the centre, later scattered across almost the entire breadth and toward the end of the mine collected in a broad band. On red oak, the mine measures approximately 5 cm. in length; on scarlet oak, it is much shorter, often not exceeding 3 cm. The larva is



Fig. 2.—Mine of *N. latifasciella*.

bright green and escapes from the mine through the lower surface of the leaf. Cocoon rough, ovoid and whitish in color. There are at least two (probably four) generations a year. The mines are abundant toward the end of July and at the beginning of September.

Nepticula trinotata n. sp.

Palpi very pale ochereous. Tuft ochereous. Antennae fuscous, eye-caps whitish. Thorax with deep blue reflections.

Fore wings velvety black, with deep blue reflections in the basal third and somewhat irrorated in the apical third, the scales here having pale bluish iridescent bases. At the basal third on the costa is a white spot of variable size, faintly tinted with violet in some lights. At the apical third there is a costal and an opposite dorsal spot, each larger and of a purer lustrous white colour than the spot at the basal third. The costal spot is usually more oblique,

its tip extending outwardly beyond the opposite dorsal spot. Cilia almost entirely pure white. Hind wings and cilia pale silvery gray.

Legs pale grayish ochereous, tarsal joints dark tipped. Abdomen purplish fuscous above, paler and iridescent beneath in the female.

Expanse: 4.5-5 mm.

Ten specimens bred at Cincinnati, O., from blotch mines on

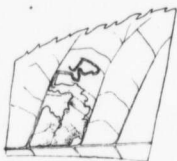


Fig. 3.—Mine of *N. trinotata*.

Hicoria minima (Marsh.) Britton. The mine is at first an extremely narrow linear tract, later suddenly expanding into a broader tract, 1 mm. or more in width, which in turn becomes a blotch, varying in width from 3 to 6 mm.

The mine is almost transparent even in the early linear portion, which thus distinguishes it from that of *N. juglandifoliella* Clemens, on hickory. This is the large blotch mine to which Chambers refers (*Psyche*, III, 66, 1880). The larva is of a dull grayish colour. Cocoon reddish brown.

There are two generations a year, the mines of the first appearing during the early part of July and producing imagoes during the first week of August. The mines of the second generation may be collected at the beginning of September. Up to this time I have found the mines only on the single species of hickory noted above, and never on *Carya alba*, as Chambers says.

Types in my collection.

Nepticula flavipedella n. sp.

Palpi whitish. Tuft usually dark brown, collar creamy white; in one specimen the tuft is reddish ochereous on the face, brown on the vertex. Antennæ fuscous, eye-caps creamy white. Thorax dark purplish brown.

Fore wings dark purplish brown, somewhat shining, cilia with silvery tips. Hind wings and cilia gray.

Fore legs, except the femora, dark brown; middle legs pale silvery, tarsi yellow; hind legs silvery, tibiæ dark brown, tarsi

yellow. Abdomen dark purplish above, paler beneath in the female.

Expanse: 3.5-4 mm.

Three specimens, Cincinnati, O., two bred from mines on swamp white oak (*Quercus platanooides* (Lam.) Sudw.) the other on pin oak (*Q. palustris* Du Roi.) The mine is a very characteristic linear tract. The egg is placed on the upper side of the leaf and the larva for the first few millimeters mines near the upper surface, making a very narrow indistinct mine. Then the mine abruptly enlarges slightly and for a length of 8 or 9 mm. the leaf substance



Fig. 4.—Mine of *N. flavipedella*.

is entirely consumed and the mine rendered transparent. Then follows another enlargement, and the mine, often much contorted, increases very gradually in breadth to the end, where it measures 2 mm. across. This latter portion of the mine is not transparent. The frass is sprinkled in separate grains across the entire breadth of the mine. The accom-

panying figure shows the appearance of the mine when held toward the light. While most commonly found on pin and swamp white oak, the mine occasionally occurs on red and scarlet oaks. There are three generations a year: mines can be collected during early June, the latter half of July, and the early part of September. The larva is usually green, occasionally purplish and escapes from the mine through the lower surface of the leaf. The cocoon is almost white, woven of coarse rough silk.

The moths are almost indistinguishable from specimens of *N. castaneefoliella* Chambers; the only constant difference I have found to separate them is the yellow colour of the middle and hind tarsi of *N. flavipede'la* in contrast with the sordid white tarsi of *N. castaneefoliella*.

Types in my collection.

Nepticula chalybeia n. sp.

Palpi grayish ochereous. Tuft ochereous, collar yellowish white. Antennæ fuscous, eye-caps yellowish white. Thorax steel-gray.

Fore wings very narrow, steel-gray, with faint greenish golden reflections, the apex very slightly tinged with purple. Cilia gray, purple tinged around the apex. Hind wings gray.

Legs gray, tarsi ochreous. Abdomen dark gray, with a purplish luster.

Expanse: 3.5 mm.

Two specimens bred from mines on wild pear, *Pyrus communis* L., at Cincinnati, O. The mine is a short linear tract, brownish green in colour, not exceeding 2 cm. in length and gradually increasing in breadth to the end, where it measures 1.5 to 2 mm. across. The cocoon is small, obovoid and greenish brown. There are three generations a year, and mines may be collected in the early part of June, in July and during the last part of August.



Fig. 5.—Mine of *N. chalybeia*.

Its general pale colour, narrow wings and small size easily distinguish this species from *N. pomivorella* Pack. which mines leaves of apple.

Types in my collection.

***Nepticula apicialbella* Chambers**

Nepticula apicialbella Chambers, Can. Ent., V. 127, 1873; Cin. Quart. Jn. Sci., II, 118, 1875; Dyar, List N. A. Lep., No. 6185. 1902.

Syn. *leucostigma* Braun, Jn. Cin. Soc. Nat. Hist., XXI, 88, 1912.

A larger series, among them a flown specimen in which the white scales at the extreme apex are lacking, and merely the apical cilia are white, establishes the synonymy above given. *Apicialbella* was described from flown specimens. This is the only species I have seen with the oblique fascia.

***Nepticula altella* n. sp.**

Palpi silvery gray. Tuft rust red, a little yellowish behind. Antennæ fuscous, eye-caps yellowish white. Thorax dark purplish brown.

Fore wings before the fascia purple brown, beyond it deep golden brown with purple reflections; the general colour to the naked eye is deep purple before the fascia and brown beyond it. A silvery fascia crosses the wing at three-fifths, and is usually a little broader on the margins of the wings. Cilia gray. Hind wings deep purple, becoming brown toward the tip.

Legs fuscous, tarsi of the middle and hind pair silvery. Abdomen purplish brown.

Expanse: 6.5-7 mm.

Described from three specimens bred on pin oak, *Quercus palustris* Du Roi and nine captured specimens, all from Cincinnati.

The mine is placed on the lower side of the leaf and is very much contorted, winding back and forth, the bends almost con-



Fig 6—Mine of *N. altella*.

tiguous, and the frass is deposited across the entire breadth of the mine. In its early portion, the mine is scarcely visible on the upper side of the leaf, except as a slight discoloration, later it becomes more distinct, because of the partially eaten parenchyma. The mine is extremely long, but measures only 1 to 1.5 mm. in width at its end. The accompanying illustration shows the mine as it appears

when held toward the light; its distinctness has been somewhat exaggerated in the drawing in order to show its course. Cocoon dark brown, somewhat flattened, with projecting edges.

The mines were collected October 15th and produced imagoes the following May; the flown specimens were also taken in May. The species appears to be single brooded.

Types in my collection.

Nepticula opulifoliella n. sp.

Palpi grayish ocherous. Tuft reddish ocherous, collar sometimes pale yellowish. Antennæ fuscous, eye-caps pale shining yellowish. Thorax dark fuscous, with purple and blue reflections.

Fore wings dark fuscous with pronounced purple and blue reflections, shading to bronzy green below the fold. At three-fifths is a broad very shining silvery fascia with faint golden lustre. Cilia gray, extreme tips pearly white. Hind wings and cilia gray.

Legs dark fuscous, except the middle pair, which are silvery. Abdomen purplish fuscous above, paler beneath in the female.

Expanse: 3.5 mm.

Eleven specimens bred from mines on *Opulaster* (*Opulaster opulifolius* (L.) Kuntze) at Cincinnati. The mine is a narrow linear brown tract with a dark line of frass running through it. The cocoon is reddish brown, its anterior end broader and flattened. On July 13th the larvæ were nearly full-fed, and all pupated within a few days. The imagoes appeared July 29th to August 4th.



Fig. 7.—Mine of *N. opulifoliella*.

This species resembles *N. rosefoliella* Clemens, but differs from it in the smaller size, the narrower more lustrous fore wings and the much broader fascia.

Types in my collection.

***Nepticula terminella* n. sp.**

Palpi dull, pale ochreous gray. Tuft on the face dull brownish, on the vertex and head black. Antennæ gray, eye-caps shining white, with a very faint yellow tinge. Thorax bronzy.

Costal half of the fore wing to the fascia, blue-purple, the blue predominating at the extreme edge; below the costa the wing shades into a deep brilliant golden color, becoming more bronzy as it nears the fascia. The fascia is situated just beyond the middle of the wing, is almost straight and has a brilliant silvery lustre. Apical third of the wing blue purple, blue predominating. Just below the apex a double row of silvery scales margins the termen, becoming a single row toward the dorsum and sometimes connected with the fascia. Cilia gray. Hind wings and cilia gray, with a purple tinge.

Legs dark gray, tibiae and tarsi of the fore pair and tarsi of the others, ochereous. Abdomen dark purplish gray above, yellowish beneath toward the tip, anal tuft yellow.

Expanse: 5-5.5 mm.

Twenty-two specimens bred from mines on red oak (*Quercus rubra* L.) Cincinnati, O.; one captured specimen, taken at Oak Station, Pa., May 17th, 1910, by Mr. Fred Marloff.

The mine is a pale greenish gradually broadening linear tract, 3.5 mm. wide at the end, with a blackish line of frass through the centre. Larva yellow even when very young; thus this mine can early be distinguished from the other linear mines on oak. Cocoon brownish ochereous, obovoid.



Fig. 8.—Mine of *N. terminella*.

There are three generations a year, and, in favourable seasons, a fourth. Mines containing full-grown larvæ may be collected in the middle of June, the latter part of July, the end of August and beginning of September, and dur-

ing the latter part of October up to as late as the ninth of November, producing imagoes during the summer within two weeks after pupation. The mines occur most commonly on red oak, but also on pinoak (*Q. palustris* Du Roi) on black oak (*Q. velutina* Lam.) and on *Q. marylandica* Muench.

A cotype in Mr. Marloff's collection.

NEW AMERICAN CHRYSOPIDÆ.

BY NATHAN BANKS, EAST FALLS CHURCH, VA.

The following five new species of Chrysopidæ are among recent additions to my collection from Central and South America. Of particular interest is the *Nothochrysa*, which is quite different from the other species of the genus from South America and more allied to our Californian one.

Chrysopa rufolinea, n. sp.

Yellowish green, a sinuate band of reddish below antennæ, and one across base of the clypeus, a red spot on the cheek, a red line

January, 1914

from base of antennæ up on to the vertex following a groove near the eye; antennæ pale, unmarked; pronotum with a faint dark mark on each side; thorax, legs and the abdomen unmarked. Wings with pale venation, costals partly obscured, gradates hardly infusate, stigma greenish. Pronotum very broad, nearly twice as broad behind as long, narrowed in front. Wings long and slender, acute at tips, divisory veinlet ends much beyond the cross-vein, gradates very close together, the inner series very much nearer outer than to the radial sector, five or six in inner row, eight or nine in outer; marginal forks two and a half times as long as broad; second cubital cell much narrower at tip than the third at base. In hind wings five inner and eight outer gradates. Expanse 30 mm.

From Cali, Colombia, 1000 m (Fassl).

***Chrysopa sarta*, n. sp.**

Yellowish green; no marks on head nor palpi; basal joint of antennæ yellowish, with black outer streak, rest of antennæ (including second joint) black, but getting paler towards tip, pronotum pale, with red marginal stripe; rest of thorax, legs, and the abdomen pale, unmarked. Wings hyaline, unmarked, venation greenish, most cross-veins wholly black, but some costals near stigma are pale, gradates black, and some veins running into hind margin also black; origin of the radial sector black; stigma scarcely distinct; hind wings with veins all pale greenish. Pronotum about as long as broad, not much narrowed in front. Wings moderately slender, acute at tips, fore wings with divisory veinlet ending beyond the cross-vein, second cubital cell much narrower than the third; five inner, seven outer gradates, each much separated from the next, inner series as close to radial sector as to outer series; marginal forks about three times as long as broad; hind wings with four inner and six outer gradates. Expanse 26 mm.

From Orosi, Costa Rica, 500 m. (Garlepp).

***Chrysopa leptana*, n. sp.**

Head reddish yellow; maxillary palpi with last two joints black; basal joint of antennæ yellowish, rest (including the second joint) black; pronotum green, rest of thorax green, with pale spots above base of wings; legs and abdomen greenish, unmarked. Wings hyaline; venation green, cross-veins, gradates, many branches

ending in hind margin, divisory veinlet, base of radial sector, upper side of second cubital cell partly, and bases of branches of radial sector black. Hind wings with costals and some other cross-veins partly black; stigma in both wings long, deep green. Pronotum much broader than long, narrowed in front. Wings not very broad, acute at tips, two or three inner gradates, four or five outer ones, inner series much nearer to outer than to radial sector; marginal forks hardly twice as long as broad; divisory veinlet ends beyond the cross-vein; second cubital cell much narrower than the third. Expanse 24 mm.

From Oaxaca, Mexico (Crawford).

***Leucochrysa luctuosa*, n. sp.**

Face with large spot on clypeus and triangular spot under each antenna reddish, vertex with an irregular red stripe each side; palpi unmarked; basal joint of antennæ with broad red stripe on outer side, about 20 of next joints with black on inner side; pronotum with red stripe on each side (not marginal) more approximate behind the furrow; thorax with red spots each side in front, two on each scutellum, and mark over base of hind wings; basal abdominal segments with red mark each side. Wings with greenish venation, base of radial sector and a portion toward stigma with its branches each side partly black; many costals at margin black, two or three radial cross-veins near base are black in middle; the base of second cubital cell, and part of third, and a few anals near by are black; gradates pale; hind wings with radial sector black near stigma, not at base, outer hind margin blackish for a long distance; stigma in both pairs black at base. In fore wings the inner gradates extend basally, so there are about 15 or 16 of them, 12 in the outer series, the two series farther apart in middle than at either end; radial sector sinuous.

Expanse 5.7 mm.

From Orosi, Costa Rica and Rio Longo, Bolivia (Fassl), Related to *L. azevedoi* Navas (which I have from British Guiana) but much larger, and various minor marks different.

***Nothochrysa tibialis*, n. sp.**

Head yellow, a black streak under eyes, two large black or dark brown longitudinal marks on the vertex; palpi marked with dark; basal joint of antennæ wholly shining dark brown above.

rest of antennæ beyond blackish, but paler towards tips; pronotum with a broad lateral black stripe, almost connected across the furrow; thorax with a broad black stripe over base of wings, anterior edge of mesothorax black; abdomen with a blackish stripe each side above, nearly connected at the tips of the segments; pleura with two black spots; legs pale, tibiæ I and II with a dark mark on outer base. Wings with almost wholly dark brown venation, the subcosta pale, and parts of median, the cubitus and anals at base also pale; hind wings with mostly pale venation, the costals, veins ending in hind margin, and base of radial cross-veins black; stigma narrow, yellow-brown, not distinct. Pronotum a little longer than broad, slightly narrowed in front; wings moderately broad, rounded at tips, the divisory veinlet ends in end-vein of cell, but near its upper end, so that the divisory cell is much broader at base than at tip, six gradates in each series, each gradate widely separated from the next, the inner series much nearer to radial sector than to outer row; the outer marginal forks mostly three times as long as broad; costal area quite broad; in hind wings five or six inner gradates and six outer ones. Expanse 27 mm.

From Rio Longo, Bolivia, 750 m. (Fassl).

ON THE SYNONYMY OF CERTAIN FLORIDA LEPIDOPTERA.

BY WM. BARNES, M.D., AND J. MCDUNNOUGH, PH.D., DECATUR, ILL.

In the August number of *Insecutor Inscitiæ Menstruus*, Dr. Dyar has justified the title of his publication and subjected a recent paper of ours on "Some Apparently New Florida Species."* to a grilling calculated to prevent less enthusiastic entomologists than ourselves from ever again obtruding themselves on the notice of the long-suffering entomological public.

It is not the purpose of this article to justify the causes that led to the article in question; this, if necessary, can be left to other competent individuals; we would merely in the following notes give our own views on the points of synonymy as laid down by Dr. Dyar, for we fear that in several instances his desire to swell the list of synonyms has led him to be a little hasty in his judgment.

*Contributions, Vol. II, part 4, 1913.

C. obliquata B. & McD.

Dr. Dyar is correct in making this a synonym of *laguncularia* Dyar. We overlooked the branching of vein 8 close to the apex of the wing in our examination of the single type specimen.

Acidaliodes eoides B. & McD.

This is not *Pseudcraspedia basipunctaria* Wlk. As stated in our article, the venation is that of *Acidaliodes*; i.e., vein 7 is free and veins 8, 9, 10 and 11 of primaries are stalked, and not 7, 8, 9, 10 stalked with 11 free as in *Pseudcraspedia*. We have four specimens from Stemper, Fla., which agree in venation with Hampson's definition, and may be either *basipunctaria* Wlk. or *penumbata* Hlst., neither of which species we know. There is great superficial likeness between our species and the Stemper specimens, and we are not surprised that Dr. Dyar should have failed to recognize the points of difference especially as Mr. Grossbeck, to the best of our knowledge, had captured no specimens of *eoides*.

Aresia parva B. & McD.

Having no knowledge of exotic *Lithosiidae*, as Dr. Dyar has been kind enough to state, we naturally fell back on Hampson's "Keys" published in the Cat. Lep. Phal. Brit. Mus. and arrived at the conclusion, rightly or wrongly as the case may be, that we were dealing with a Noctuid; finding in Hampson's work, the latest on the subject, no genus suitable for the occasion, we were rash enough, in our wild haste for publicity, to create the genus *Aresia*, which Dr. Dyar promptly makes a synonym of *Afrida* Mæsch. We regret that the original generic definition is not before us, but if Hampson be correct, we would point out that, in *Aresia*, vein 5 of secondaries is lacking, a mere fold occurring in its place and 8 is only joined to cell at base of wing; whereas in Hampson's venation figure vein 8 is from middle of cell and 5 is present. Dr. Dyar, in his paper on the genus *Afrida*, calls attention to the fact that in his specimens 8 is only joined to cell at base, but makes no mention of vein 5. He neither gives any generic characterization, nor did he have any specimens of the generic type before him. It remains therefore to be proven by examination of specimens of the generic type, *tortriciformis* Mæsch, whether these two genera are synonyms.

Regarding the position, Dr. Dyar himself states in the introduction of his article on *Afrida*: "I think the genus very doubtfully placed in the Lithosiidae; I should rather think it a noctuid." If an authority like Dr. Dyar, whose knowledge of exotic Lithosiidae is evidently profound, should be led to such a statement, then surely we may be pardoned for having actually included *Aresia* in the Noctuidae. We accept Dr. Dyar's reference of *parva* to *ydotos* Dyar; the specimens mentioned from Brownsville, Texas, in our original description would fall under *minuta* Druce according to Dr. Dyar's paper.

Anomis serrata B. & McD.

We bow before Dr. Dyar's decision and make *serrata* a synonym of *xanthindyma* Bdv. We had based our supposition that we were dealing with a new species on Dr. Dyar's recent paper on Cotton Moths in the January number of his publication, in which, under *Cosmophila erosa*, no mention is made of the two forms of the ♂ antennæ; we had, unfortunately, no means of consulting the publications on exotic species. We are glad that Dr. Dyar's opinion at least coincides with our own as to the specific distinctness of the two forms.

Psychidae

Dr. Dyar's remarks under this head, and his reference of our species *nigrita* and *pygmæa* as "grass" and "tree-trunk" forms of *Platoeceticus gloveri* Pack., we are not at all prepared to accept. In Europe, where the *Psychidae* have for years been the subject of special study, the larval cases are recognized as one of the best means of specific identification. We would commend to Dr. Dyar's perusal the introduction to the *Psychidae* by Dr. Rebel in Spuler's "Schmetterlinge Europas," where, among other things, it is stated: "Der Sack ist sehr verschieden gestaltet, immer aber für die Art charakteristisch gebaut and bekleidet, so dass sie sich schon an dem Sack meist erkennen laesst." The sacks of our two species are as different from each other as they well could be; the one (*nigrita*) is broader towards the opening and heavily thatched with minute particles of lichen; neither bears much resemblance to Packard's figure of the sack of *gloveri*, which we also found on orange trees in Florida, but which failed to produce the imago;

these sacks differed in various ways from those found on grass. Regarding the venation, it is a well-known fact that in this family the venation is variable and individuals with extra veins frequently occur, usually one of the median or radial branches being involved; but we query greatly whether the venation be of "no value"; our studies of Psychid venation have been very limited, but when such a worker as Hampson divides this family into three subfamilies (Moths Brit. Ind. Vol. I). *Oeceticinae*, *Psychinae*, and *Chaliinae* on the basis of vein lb of primaries sending several, one, or no branches to the internal margin, we are apt to regard such work as authoritative; it at least forms a better basis for classification than such a system as Dr. Dyar would apparently have us adopt where all species with black wings are lumped together, regardless of size, larval sack or venation. Hampson's system, as stated in our paper, would throw *Manatha nigrita* into the *Psychinae* and *Prochalia pygmaea* into the *Chaliinae*. With regard to *Platoeceticus* Packard (Ent. Amer. III, 52) distinctly states that the venation of the secondaries is as in *confederata* Grt.; i.e., with vein 6 absent; an examination of a long series of *nigrita* from both Florida and Brownsville, Texas, has failed to show a single specimen in which all the veins on the secondaries were not present; the presence of eight veins can surely then be accepted as the normal condition. This, combined with a marked difference in sack and food plant, would point to a specific distinctness. Dr. Dyar has frequently (*Megalopygidae*, *Phycitinae*) erected new genera based on much weaker characters than the above. His remark, that he has examined five specimens of *carbonaria* and found no two alike in venation, proves nothing unless these five specimens have been bred from similar sacks collected on similar food-plants. If this be not so, then it would only show that the Psychidæ of the National Museum are in need of a careful revision. Further, Dr. Dyar is very careful not to state in just what particulars these five specimens differ from one another. We do not know whether the specimens referred to by Dr. Dyar, as collected by Dr. F. M. Jones at Biloxi, Miss., are those described as *Euryctarus tracyi* (Ent. News 22, 194). In any case, our *nigrita* could not be confounded with this insect, which is much heavier and stouter, besides differing in venation.

Stenoptycha solanis B. & McD.

We reserve our decision as to whether this species is synonymous with *pterophoralis* Wlk. or not, until we have had a chance to compare specimens with Walker's type. Certainly nothing definite can be ascertained from the original description.

Storterteria unicolor B. & McD.

Our type, a very fresh specimen, certainly shows long hairs on the median vein of secondaries, and this fact led us to place the genus in the Crambinae. We agree, however, with Dr. Dyar, that the species shows great affinity to *albinella* Cram. and are quite ready to sink the generic term as a synonym of *Rupela* Wlk.

Davisia singularis B. & McD.

We learn from Prof. T. D. Cockerell that the genus *Davisia* is preoccupied by Preston, 1910, for a genus of Mollusks. We, therefore, propose the name *Neodavisia* in its place.

Jocara perseella B. & McD.

Dr. Dyar lists this as a synonym of *incrustalis* Hlst. We might note that Hulst's species was described from a single ♀ from Colorado, a locality where we imagine the Alligator pear (*Persea*) would scarcely occur. The description of the larva of *incrustalis* Hlst. given by Dyar in Proc. U. S. Nat. Mus., 1900, p. 284, gives *Nectandra* and *Persea* as food-plants. This larva is presumably referable to our species, but a careful comparison with Hulst's type will be necessary before one can definitely assume the two names to be synonymous, even in spite of the fact that one of Dyar's bred specimens was identified by Hulst; this gentleman's determinations were often erroneous. It is, of course, possible that the locality label was incorrect.

Tetralopha querciella B. & McD.

The fact that this species is labelled *subcanalis* Wlk. in the Nat. Mus. Collection is not final, as without a direct comparison with the type Walker's species are impossible to identify. Dr. Dyar might at least have given us the benefit of the doubt.

Homoeosoma differtella B. & McD.

We can express no opinion as to whether this species is synonymous with *electella* Hlst. from Texas without a careful examination of the types.

A NEW FOSSIL SAWFLY FROM FLORISSANT, COLORADO.

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

During the latter part of August, of the present year, Dr. J. H. Todd and his son, Dr. J. C. Todd made a small collection of fossils in the Miocene shales at Florissant. On looking over the material, I found one new species, which they kindly presented to the Museum of the University of Colorado.

Tenthredella toddi, n. sp.

Length about 8 mm. or a little more (apex of abdomen missing); anterior wing 7 mm.; head and thorax black; abdomen pale (probably green in life), with a dorsal black band which is broad basally, sending a branch on each side to or nearly to the anterior lateral corners of the abdomen, posteriorly rapidly tapering, soon becoming a mere narrow stripe; wings clear, nervures dark; venation as in MacGillivray's figure of *Tenthredella flava* (*Tenthredo flava* Poda) in almost every respect, except that the anal or lanceolate cell of hind wings is petiolate apically (petiole 96 microns long), and the lanceolate cell of anterior wings is joined by the transverse median nervure considerably beyond the middle of the distance from the cross-nervure to the apex. The marginal cell is also decidedly deeper. The following measurements are in microns: *Anterior wing*, depth of stigma, 400; end of stigma to end of marginal cell, 1950; second submarginal cell on marginal, 1025; third submarginal on first marginal, 530; third submarginal on second marginal (beyond cross-nervure of marginal), 400; basal nervure, 530; first discoidal on second, 800, and on third, 640. *Posterior wing*: Depth or width of lanceolate cell in middle, 480.

Among the species described from the Florissant shales, this can only be associated with *Tenthredella submersa* (*Tenthredo submersa* Ckll.), which is about 13 mm. long, and differently coloured. In the present fauna of Colorado, species of this genus differ in the shape of the third submarginal cell; thus *Tenthredella flavomarginis* (*Allantus flavomarginis* Norton) has this cell short, the upper side no longer than the outer; whereas *Tenthredella ferrugineipes* (*Tenthredo ferrugineipes* Cresson) has this cell much longer. In *T. toddi* the cell is of the longer type.

NOTES ON THE POSITIVE HYDROTROPISM OF *GERRIS*
MARGINATUS SAY AND *DINEUTES*
ASSIMILIS AUBE.

BY HARRY B. WEISS, NEW BRUNSWICK, N.J.

Wingless forms of *Gerris marginatus*, which is quite common throughout New Jersey, when removed from a pond containing some three thousand square feet of water and liberated at distances of one, two, three, four, five, six, seven, eight, and nine yards from the water, immediately made their way back to the water without hesitancy. Of course their movements, which consisted of a series of jumps, were more or less clumsy, but all started in the right direction even though purposely headed the wrong way.

When liberated at a distance of ten yards, they had some slight trouble in getting their bearings, but after making several false starts, finally wound up by going in the direction of the water. At a distance of fifteen yards, a longer time and more moving around were required before the right direction was located. At thirty and forty yards away, they seemed to lose their bearings completely and moved aimlessly about in all directions. Even at the end of an hour they were no nearer the water.

The actions of *Dineutes assimilis*, which is also quite common in New Jersey, were somewhat more interesting. These beetles, when liberated three or four feet from the water, scrambled back with difficulty owing to the character of their legs, which were not meant for locomotion on land.

At nine or ten feet from the water, after trying rather awkwardly to walk back, they rose to a height of ten or twelve feet and flew towards the pond, both with and against a slight breeze. At 75 feet from the water, they walked in all directions and then rose in irregular circles to a height of 30 feet and flew to the pond.

On several occasions, when a brisk wind was blowing from the direction of the water, they were carried inland in spite of heroic attempts to fly against it. When liberated at a quarter of a mile from the water, after an aimless existence on the ground for half a

hour, they rose in irregular widening spirals to a height of fifty feet and flew off in the direction of the water. It is not known whether these specimens ever reached the pond, inasmuch as trees obstructed the view. Nevertheless they started in the correct direction even against a slight breeze.

BOOK NOTICES.

The Natural History of the Toronto Region, Ontario, Canada; published by the Canadian Institute, Toronto, 1913; 419 pp., with several illustrations and maps.

This work which has been prepared for the members of the Twelfth Geological Congress, which recently met in Canada, and for all who may have an interest in the history and natural history of the Toronto district, is a most interesting and valuable contribution. The twenty-two chapters (there are twenty-three, but the last describes briefly localities for excursions) have all been written by specialists. The titles of the chapters will give a splendid idea of the scope of the work. These are: I, Toronto, an Historical and Descriptive Sketch; II, The Indians who formerly Inhabited or Visited the Site of Toronto; III, Geology of the Toronto Region; IV, The Climate of Toronto; V, Life zones; VI, The Seed Plants of Toronto and Vicinity; VII, Ferns and Fern Allies; VIII, Mosses and Liverworts; IX, Mushrooms and other Fungi; X, The Algæ; XI, Lichens; XII, Mycetozoa, or Slime Moulds; XIII, Insect Galls of the Vicinity of Toronto; XIV, Zoology; XV, Mammals; XVI, Birds; XVII, Reptiles; XVIII, Amphibia; XIX, Fishes; XX, Invertebrates other than Insects and Mollusks; XXI, Mollusca; XXII, Insects and their Allies.

In Chapter XIII Dr. Cosens discusses briefly the various types of galls and follows with lists of gall insects in the various orders. Useful notes are given with each species. Under Hemiptera nine species, are listed, under Lepidoptera four species, under Diptera 12 species under Coleoptera two species, under Hymenoptera 39 species. Dr. E. M. Walker is responsible for Chapter XXII, the largest in the book, comprising pp. 295-403. This chapter, as already mentioned, is devoted to Insects and their Allies. Although the lists presented are by no means complete, as is stated, they are, how-

ever, of extreme value and will, it is hoped, lead to greater zeal in collecting so that many additions may be made. Unfortunately, entomologists are few in Toronto, and comparatively little systematic collecting has been accomplished outside of two or three of the better known orders, and even in these the work has been confined largely to certain families. It is, however, such lists as these which furnish the foundation upon which to build. Altogether 2,448 species are listed, as follows:

Orthoptera	61
Dermatoptera	1
Plecoptera	2
Ephemera	12
Odonata	60
Hemiptera	92
Neuroptera	8
Trichoptera	5
Coleoptera	1076
Lepidoptera	619
Hymenoptera	263
Diptera	249
	2448

At the end of the lists references are given to the more general descriptive works, useful in identification.

ARTHUR GIBSON.

"ENTOMOLOGY WITH REFERENCE TO ITS BIOLOGICAL AND ECONOMIC ASPECTS."

REVIEW OF DR. FOLSOM'S REVISED ENTOMOLOGY.

Dr. Folsom's Entomology is familiar to all students of the subject, holding as it does a place of its own in the field of Entomology. The revised edition, while no larger than the previous editions, presents many new and interesting facts. The Chapter on Evolution has been omitted and one on Transmission of Disease by Insects substituted.

Most text books of Entomology consider it as a subject in itself ignoring its relation to, and dependence upon, the wider

science of Biology. Dr. Folsom, in meeting this want, by presenting the subject primarily from a general biological standpoint, has created an interest for the average student which most text books fail to do.

I have long felt that the weakest point in our present system of teaching Entomology has been in the undue importance placed upon the memorization of multitudinous details. For the specialist in Entomology the latter system is a necessity, but for the average student, whose time is limited, the general principles of Entomology, as outlined in Dr. Folsom's book, will give the best basis for private study. Moreover, he will acquire an interest in this subject and in the wider one of which Dr. Folsom shows it to be a part. For instance, in his chapter on colour and coloration he has considered his subject from a general standpoint, dealing first with the sources of colour and then with the conditions which may cause variations in the formation of colour in insects; so that with a knowledge of the general principles, as designated by Dr. Folsom, the student is encouraged to develop reason in lieu of memory.

The new chapter on Transmission of Disease by Insects is a valuable addition. This phase of Entomology is one which is receiving a great deal of attention at the present time, and Dr. Folsom has presented the results of modern research in a concise and interesting manner.

The illustrations throughout are particularly fine and appropriate to the text.

The former comprehensive bibliography has been augmented by the titles of one hundred new works and will be found very useful to the student of Entomology.

TENNYSON D. JARVIS.