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The Canadian Entomologist.

VOL. XXXI. LONDON, APRIL, 1899. No. 4.

A SERVICEABLE INSECTARY.

BY F. M. WEBSTER, WOOSTER, OHIO.

With the constantly increasing activity in applied entomology in America, the necessity for rooms or apartments especially adapted for the study of the development of insects is becoming each year more imperative. The insectary has, in fact, become almost as necessary to the working entomologist as has the laboratory to the chemist. While it is especially true in entomological investigations that one must "study nature where nature is," it is equally true that one cannot, in all cases, watch with the necessary care and constant application in the fields that he will be able to do in a fairly well equipped insectary. Not only can forms be transported thousands of miles while in an inactive state and their development watched at close range, as it were, but eggs and larvæ may be brought in during late autumn or winter and studied through their various stages, frequently long before they have appeared outside; and in cases of uncommon or unfamiliar forms this will give the investigator a vast amount of information that he can use to great advantage when the species appears in the fields under a natural condition, perhaps months later.

In the following it is not the intent of the writer to present an illustrated article on a "model" insectary, but to describe one that is in actual use, and the evolution of which has been the direct result of that mother of all invention — necessity. When any demand for certain facilities in order to study any particular species of insect has arisen, and this has constantly been the case, the ingenuity of myself and my assistant has been drawn upon to devise the best methods of accomplishing this end, and thus our insectary at the Ohio Agricultural Experiment Station has come into existence. The only object in presenting this paper is to place in the hands of working entomologists some ideas in regard to an insectary and its equipment, from which they can deviate as their position and requirements may demand. In other words, it may be used as something to work from in their efforts to get that which will best suit their requirements.

The insectary proper is constructed much after the plan of an ordinary greenhouse, the walls being made of hollow tile, and the movable sashes in the roof, for ventilating purposes, are enclosed in dormer-like, wooden frames, covered with swiss or a very thin cotton sheeting in order to prevent the introduction or escape of the most minute insects. A door at one end opens into a workroom, while a window in the roof at the other end is provided with a protected, movable sash like those previously mentioned.

Along three sides extends a bench, such as are in use among florists, except that, in this case, it is only about 30 inches in width, to facilitate the close examination of objects at the far side. A portion of the central space is occupied by a reservoir, and originally we had here also a wider bench.

Wooden benches were tried at first, but these soon decayed, while, as is well known, the larvæ of many species remain long in the earth and to disturb them is fatal, so we were obliged to cast about for something more stable to meet these requirements. We are now using, with apparently perfect success, a bench the construction of which is shown in Plate 3 The bottom is of ordinary stone flagging, two inches in thickness, and supported on a framework made of ordinary gas pipe. The upper side of this flagging is deeply grooved, about an inch from the edge, along each side. For the back of the bench ordinary roofing slate is used, the lower edges being fitted into the groove in the stone and embedded in cement, while the upper edges are held in place by a cap of galvanized iron running along the entire length. For the front a heavy galvanized sheet iron is used, the lower edge, as with the slate, fitting into the front groove in the flagging, while the upper is drawn over and turned under the smaller, horizontal gas pipe, the latter being held in place by a T joint, all of which is shown in the background of Plate 3. Before filling the benches, the inside of this galvanized iron front is coated with asphalt.

The wider, central bench was discarded altogether and the space enclosed by a low brick wall plastered with cement. This enclosed space is filled with earth and will accommodate shrubs and even small trees.

The finished benches, with the whole apartment in actual service, are shown in Plate 4. Formerly we placed soil in the breeding cages, and grew, or tried to grow, the food plants of whatever insects we

happened to be studying therein, but the plants seldom thrive well under such conditions, and the effect on the insects feeding thereon is unsatisfactory and in many cases fatal. Especially is this true where it becomes necessary to transplant from out of doors, as it frequently occurs that we wish to transfer a plant with the larvæ feeding upon it to a position that will enable the movements of the latter to be carefully studied. Under the new arrangement we can either g w the food plant in the benches or transplant it from the garden or field, place our insects upon it, and cover it with a breeding cage, thus eliminating to a considerable extent the objectional features of the old method. Or if we find an insect attacking a plant out of doors we can place one of the cages of the pattern that we are now using over the plant, and pushing the metal base into the soil deftly inclose the whole within our cage without in the least disturbing the insects that we wish to study under the most natural conditions possible.

The breeding cage now in use is shown in Figure 25 and also in Plate 4. It consists of a wooden frame of four upright pieces supporting a wooden top and with an upper base also of wood. Three sides are covered with swiss drawn tightly and fastened along the edges by means of galvanized iron strips about one-fourth of an inch in width, and these are in turn fastened to the wood by tinned staples, such as are used in laying carpets and matting. The remaining side is of glass, which is raised and lowered as required, and works in vertical grooves. By using galvanized iron strips and tinned staples the rusting out of the swiss or other cloth covering is avoided. The lower base is also of galvanized iron, and is shown in Figure 26, as is also the wooden bottom which fits inside of this, and can be used when needed, and when not may be readily removed and laid aside, as it is fastened in place by screws. When used without the bottom it is only necessary to place the cage over the plant or plants and press it down until the metal portion is sunk

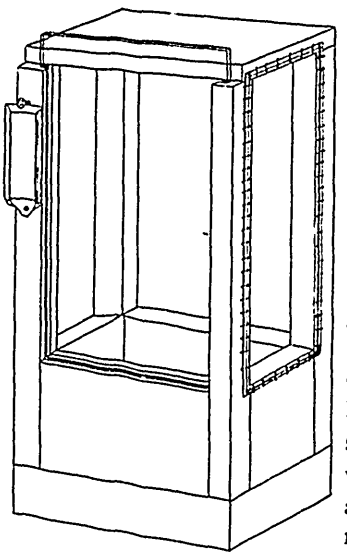


FIG. 25.

into the soil. The cage can be used out of doors as well as in the insectary, and without materially affecting the plant or disturbing the insects feeding upon it. When used with the wooden bottom the metallic base raises this above the damp soil, thus preventing the decay of the lower portion of the cage.

But "one supply reveals another want," and we soon found that there was a need of some method of keeping our notes and records conveniently attached to the proper cage to which they belonged, as well as to protect them from being wetted whenever the benches were wet down with the hose. This led to the use of a holder of galvanized iron with a sliding glass front, fastened to the cages as shown at the left in Figure 25, and also in actual use on the cages in Plate 4. The holder is two by three inches, the sides turned over, and one end over these, while the other end is left a little longer and rounded, with a small hole to pass over a small nail or brad, while the other end is held by a small screw-eye, such as are used on picture frames to which to attach the ends of the cord or wire. The note sheet is folded the proper size and placed in the holder, and the rather close-fitting glass slide pushed in over it. The sheet is so folded that all of the notes will come on the same side, and each space or page is consecutively numbered, and, being all of a uniform size, these sheets when filled or the record finished, can be filed away for permament preservation. This holder cannot easily become detached from the cage to which it is fastened, the notes are preserved from being injured by wet, the galvanized iron does not rust them, and the last record can always be seen through the glass cover without removing it from the cage With slight modifications, this holder can also be used out of doors on shrubs and trees. For this purpose, what shows as the lower end in Fig. 25 is cut square off and a similar triangular piece is soldered to the back of the upper end to accommodate a fine wire which is used not only to attach the holder to the object, but the end running downward along the back is hooked over the lower end of the holder, thus effectually preventing the glass slide from being shaken out by the action of the wind. On cages outside, it is of course used in the same way as in the insectary.

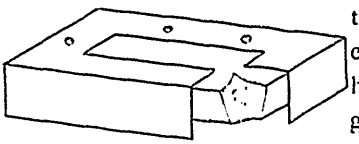


Fig. 25.

SIX NEW OTTAWA PROCTOTRYPIDÆ.

BY W. HAGUE HARRINGTON, F. R. S. C., OTTAWA.

The following descriptions of species which appear to be additions to our fauna were prepared more than a year ago, but were withheld in the hope that more material might be obtained last season. That hope was, however, not fulfilled; largely, perhaps, be it confessed, through lack of sufficient perseverance on the part of the writer in collecting:

1. LYGOCERUS PALLIPES, n. sp.

♀.—Length 1.5–2 mm. Black, finely punctulate and sparsely pubescent. Mandibles and palpi yellowish; antennæ black, except the scape at base and beneath; scape stout, first joint of flagellum about half as long as scape, second as long as pedicel, remaining joints subequal. Legs, including coxæ, yellow. Wings subhyaline, stigma large, yellow. Abdomen stout, pointed at tip.

♂.—Antennæ with joints three to seven dentate; joints eight and nine broadened, two terminal joints slender.

Described from two females and one male captured near Hull, Que., on 2nd, 7th and 14th August, 1897.

2. CERAPHRON CRASSICORNIS, n. sp.

♀.—Length 2 mm. Honey-yellow, finely pubescent and closely finely punctate. Head large, transverse; face not deeply excavated; vertex with impressed line; ocelli black, in very small triangle; antennæ much incrassated, black, except base of scape, which is honey-yellow; scape stout, reaching above ocelli, tapering from base to about middle; pedicel short, first joint of flagellum twice as long and much stouter, second joint less than one-half as long as first, joints three to seven subequal, slightly larger than thick, last obconic not much larger than preceding. Thorax with distinct median furrow; the sutures at base of scutellum with large punctures; posterior margin of scutellum and the postscutellum black, the latter with a strong truncated spine; pleura transversely striated. Legs rather stout, entirely honey-yellow. Wings narrow, abbreviated, reaching only to middle of first abdominal segment. Abdomen stout, acuminate at tip, which is brownish dorsally; first segment with deep and long striæ, black on anterior margin.

This is a large and very distinct species, of which only one female has as yet been taken.

3. APHANOGMUS SALICICOLA, n. sp.

♀.—Length 1.5 mm. Black shining, but with head and thorax microscopically punctate. Thorax strongly compressed laterally, not more than one-half as wide as the large transverse head. Face polished; antennæ clavate, with scape and flagellum piceous, outer joints of club black; first joint of flagellum as long as pedicel; second shorter; three to five small, transverse; six and seven enlarged, subquadrate; terminal joint stout, longer than the two preceding, and rounded at apex. Legs piceous, with the tarsi pale. Mesothorax with hardly perceptible impressed line; pleura polished; scutellum elongate and constricted at base, tip slightly projecting; tegulæ black; wings faintly yellowish, costa brownish, stigmal vein yellow, almost twice as long as marginal, oblique, slightly curved at outer end. Abdomen short.

♂.—Antennæ about as long as body, pedicel short and stout, first joint of flagellum twice as long, second slightly shorter than first, joints three to eight about one-half shorter and gradually stouter, last joint elongate oval as long as first; basal joints subpedicellate with long hairs.

Described from one female and two males bred from galls of a Cecidomyiid, on willow.

4. TELEAS CANADENSIS, n. sp.

♂.—Length 1.7 mm. Black. Front smooth; orbits with fine striæ, cheeks and lower portion of face striated, clypeus transversely striated; a finely punctured band behind the ocelli, occiput smoother, margined; mandibles stout, rufous. Antennæ about as long as the body, moderately stout and finely pubescent; scape reaching to ocelli, pedicel scarcely longer than thick, first joint of flagellum more than one-half as long as scape, second slightly shorter, remaining joints subequal, about one-half as long as first. Mesonotum at sides and base longitudinally striated, smoother medially, with some large scattered punctures, suture at base of scutellum crenate, scutellum rugosely sculptured, spine short and horizontal; tegulæ piceous, wings subfuscous, legs piceous, femora and coxæ darker, trochanters, knees, and tibiæ rufous; pleura striated and rugosely sculptured, the mesopleura smoother centrally. Abdomen short, first and second segments striate, third finely aciculated basally, irregularly longitudinally punctured toward apex.

One male taken at Hull, Que., 26th August, 1894.

5. BARYCONUS CINCTUS, n. sp.

♀.—Length 1.8 mm. Black, with third abdominal segment and the legs rufous or yellowish. Head and thorax closely punctulate and almost opaque; face polished, with a delicate central carina; lower cheeks and face below antennæ with striæ converging to mouth; mandibles yellowish, palpi white. Antennæ black, except base of scape, which is rufo-piceous; pedicel small, first funicular joint twice as long as pedicel, second one-third shorter than first, third as long as pedicel, fourth small, subquadrate; club compact. Mesonotum without furrows; mesopleura with striæ converging toward pectus; metathorax rugosely sculptured. Wings hyaline, pubescent; marginal vein thickened, as long as stigmal. Legs, including coxæ, honey-yellow; the anterior coxæ varying to subpiceous. Abdomen subfusiform, longer than thorax and head, black at base and apex; third segment and part of second rufous; horn reduced to a polished convexity; first and second segments coarsely striate; remainder of abdomen closely finely punctulate.

Described from three females captured 19th and 29th August, 1894, by sweeping the low herbage of sandy pastures within city limits of Ottawa.

Superficially this species resembles *Opisthacanta mellipes*, Ashm., but is readily distinguished by the absence of mesonotal furrows and of the metascutellar spine.

6. BARYCONUS BICOLOR, n. sp.

♀.—Length 1.8 mm. Honey-yellow, with black head. Vertex finely punctulate, face polished, lateral ocelli almost touching eyes, mandibles and labrum pale. Antennæ with scape and pedicel pale yellowish, the latter small, hardly longer than thick; funicle and club black; first funicular joint twice as long as pedicel, second one-third shorter, third as long as pedicel, fourth small transverse; club consisting of six joints subequal in length. Mesonotum punctulate and pubescent, with faint furrows. Wings faintly yellowish, pubescent, with long ciliæ on costal margin; usually hardly reaching to apex of third segment of abdomen, but in one specimen more fully developed and extending almost to tip of the abdomen. Legs yellow, the knees sometimes darker. Abdomen longer than head and thorax; first and second segments striate, third segment almost quadrate, very highly polished, but faintly microscopically punctate, as are also the terminal segments, which, however, are more opaque.

The apex of the horn, which is not prominent, is always black, as are also the apical segments, including about half of third segment.

♂.—Closely resembles ♀ in coloration. Scape and pedicel pale, the latter short, first funicular joint fully twice as long; second, third and fourth shorter, remaining joints subequal with the first, except the terminal joint, which is slightly longer and slenderer.

Described from nine females and five males captured with the preceding species. They were taken by sweeping the grass around open sandy patches, intermixed with some small, closely-cropped raspberry bushes. Although apparently abundant on that occasion, I have not since been able to obtain the species.

This insect resembles a small *Calotelcia Marlattii*, Ashm., but the head is always entirely black, and the antennæ in both sexes are very distinct from those of that species; in the ♂ they are much more slender, with the joints more elongate.

THE NORTHWEST (CANADA) ENTOMOLOGICAL SOCIETY.

All entomologists in the Eastern Provinces of Canada will assuredly be gratified to learn that an Entomological Society has been formed, and is in active operation, in the "Northwest." The following are the officers:

President, - -	Percy B. Gregson, Esq.
Vice-President, -	Rev. Edward John Chegwin, B. A.
Librarian-Curator,	Arthur Douglas Gregson, Esq., J. P.
Treasurer, - -	Percy B. Gregson, Esq.

Among the members may be mentioned: Mr. James J. Brewster, Banff, Alberta; Mr. W. A. Brewster, Edmonton, Alta.; Frank Oliver, Esq., M. P., Edmonton; T. N. Willing, Esq., Olds, Alta.; Right Rev. the Bishop of Calgary and Saskatchewan; John A. Simpson, Esq., M. L. A., Innisfail, Alta.; F. H. Wolley Dod, Esq., Calgary; A. G. Wolley Dod, Esq., Secretary of the Fish Creek Agricultural Society; Dr. H. George, Vice-President of the Innisfail Agricultural Society; Wm. Posthill, Esq., J. P., Vice-President of the Red Deer Agricultural Society; John J. Young, Esq., Editor of the *Calgary Herald;* James H. Tomlinson, Esq., and about thirty-five others who are engaged in agriculture. The labours of the Society are to include Botany, Geology and other branches of Science, as well as Entomology. Communications should be addressed to the President, Waghorn P. O., Alberta.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XXXII. Supplementary Remarks to Earlier Papers.

The following notes relate in large part to additions recently made to the Canadian fauna through the activity of collectors in the Dominion. Several species which their possessors were unable to identify by means of the tables have been submitted to me, and, proving new to the Canadian lists, are incorporated in these pages, that students may have access to the descriptions. The families are taken up in the order of their treatment in the Canadian Entomologist.

Coccinellidæ.

In this family a great number of additions, comparatively speaking, have been made. Some of these are first recorded in Dr. Horn's memoir, entitled "Studies in Coccinellidæ," published in Trans. Am. Ento. Soc., Vol. XXII. Among them may be noted *Smilia misella* and several species of *Scymnus*.

Smilia is substituted for *Pentilia*, hitherto employed in our lists; and the Canadian species, *S. misella*, Lec., is the smallest Coccinellid known from the region, measuring only .04 inch in length. It is shining black, not pubescent, convex, prothorax a little narrower than the elytra, smooth, sides not explanate. Elytra distinctly punctured, suture finely margined. Behind the front angles of the prothorax is an indistinct obliquely impressed line. Dr. Leconte states that it is sometimes abundant on flowers of *Thalictrum*. It is more than probable that *S. marginata*, Lec., will also be found in Canada, in which case it may be recognized by the obliquely impressed thoracic line being distinct and the surface punctate. Both are about the same size.

In the genus *Brachyacantha* I have received two species not hitherto recorded from Canada. Mr. John D. Evans sent a specimen of *B. 4-punctata*, Melsh., taken in Eastern Ontario. Without reference to the generic characters this insect would probably be placed in *Hyperaspis*, but the anterior tibiæ have a spine on the outer margin. It is about the size of *B. ursina*, black, the tibiæ and tarsi pale. Each elytron bears two round reddish or orange spots, one basal, one subapical; these spots being separated from the suture by a space about equal to their own diameters. The male has besides a narrow anterior thoracic marginal line and humeral elytral spot yellow. From Mr. R. J.

Crew I have *B. dentipes*, Fabr., captured at Toronto. It is larger than the foregoing, reaching sometimes a length of .22 inch or more. Colour black, legs wholly or in part pale, head either black with yellow frontal spot (♀), or yellow (♂); the thorax has the sides broadly marked with the latter colour. Elytra with a broad orange or yellow band slightly before the middle, extending from the outer margin nearly to the suture, while near the tip is a rounded spot of the same colour. The markings are variable in extent, but the above description applies to the Canadian form (see Fig. 27).

FIG. 27.

In my paper on Coccinellidæ (number V. of this series) the genus *Scymnus* was not tabulated out, as the species were very poorly determined in collections, and Dr. Horn had just begun the study of them with a view to revision. A short time before the appearance of his paper (cited above) he kindly sent me a synopsis of the Canadian forms known at the moment, and this, with some changes and additions, I append below.

Most of the *Scymni* are broadly oval in outline and quite convex, giving them a nearly hemispherical appearance. A few are more elongate, and present a broken outline at the point of meeting between the prothorax and elytral humeri. All are pubescent. They are found by beating and sweeping during the warm months, while in spring and fall they may be captured on the under sides of stones or of pieces of wood in grassy spots.

Before attempting to trace the species through the use of a table, the student should familiarize himself with the structure called the metacoxal line. This is situated on the first ventral abdominal segment, appearing in most species as a fine raised line, describing a curve or arc behind the posterior coxal cavity, reaching from the inner border of the coxal to the neighbourhood of the outer anterior angle of the segment. It is very readily seen by means of any fairly good hand lens, but it is often necessary to move the hind leg on one side, so that the knee is directed straight backwards, otherwise the structure is obscured or covered up.

Perhaps the reference of *S. terminatus* to Canada may be open to doubt, but since the record is existent I have included it in the table.

A. Metacoxal line not forming a complete arc, either joining the first ventral abdominal suture, or running parallel to it outwardly.

b. Elytra with one or more yellowish spots.

Form oval. Head black or yellowish, thorax black, sides and front margin sometimes yellowish, tibiæ and tarsi always so. Elytra black, with an oval yellow spot on each, one-third from apex, equally distant from side and suture. .06–.08 in..... *flavifrons*, Melsh.

Form elliptical. Blackish, each elytron with two obliquely oval yellowish spots, sometimes coalescent. Legs reddish. .08–.09 in..... *ornatus*, Lec.

bb. Elytra not spotted, but with apex yellow, this colour extending one-fourth or one-fifth along the suture. General colour piceous, head, legs and thoracic margin yellow, abdomen usually so, two basal segments sometimes dark. .06–.075 in..... *terminatus*, Say.

AA. Metacoxal line forming a complete arc, beginning at the inner edge of the hind coxal cavity, thence describing a curve and ending nearly at the anterior angle of the segment.

c. Form broadly oval, outline of sides of thorax with humeri nearly continuous. Elytra never with discal spot, apex often yellow.

d. Elytra pale at apex, sometimes narrowly so.

e. Apical pale space of elytra about one-fifth the length of the suture. Head yellowish, thorax piceous, with a very wide yellow margin. Elytra black, except as stated; abdomen piceous, paler at sides and tip; legs reddish-yellow. .08 in..... *fraternus*, Lec.

ee. Apical pale space narrow.

Thorax partly black above.

Colour black, sides of thorax yellowish, less broadly than in the next species. Elytra with narrow apical pale space, abdomen often indefinitely paler at sides and tip, legs pale, femora more or less piceous. First ventral of male with median smooth area surrounded by short pubescence. .08–.10 in..... *puncticollis*, Lec.

Resembling the preceding species, head and thorax yellow, the latter with median basal spot of variable size. Legs reddish yellow, femora not piceous. First ventral of male without median smooth space. .08–.09 in. *collaris*, Melsh.

ff. Thorax entirely yellowish above, prosternum partly yellow. Head, tip and often also the sides of abdomen, with the legs, of the same colour, rest blackish.
.06–.09 in..... *cervicalis*, Melsh.

dd. Elytra entirely black. Thorax without yellow margin, tibiæ and tarsi usually pale, femora more or less piceous.

Size moderate, metacoxal line at apex of curve nearly reaching the suture between first and second ventrals. .08–.10 in..... *lacustris*, Lec.

Size small, metacoxal line forming an arc, scarcely half as long as the first segment of abdomen.
.05–.06 in..... *punctum*, Lec.

cc. Form oblong oval, more than one-half longer than wide. Thorax narrower than elytra. Sides nearly straight, except near front angles, where they are arcuate. Black, each elytron with a small oval reddish spot near centre, sometimes wanting. Legs dark. .06 in... *punctatus*, Melsh.

The name *hæmorrhous* does not occur in the above table, since it is considered a synonym of *fraternus*. The spotted species, *ornatus*, *flavifrons* and *punctatus*, are quite rarely seen in collections.

Formerly the specimens of *Coccidula* from both sides of the continent were referred to *lepida*, Lec., as it was thought that the difference in colour was merely varietal in character. However, Dr. Horn has separated them as follows, both species being yellowish-red (or a bleached derivative) above, and piceous below, with the markings now described. The head is piceous, the legs yellowish.

Elytra with basal transverse piceous band, which joins at the humeri with a lateral stripe of the same colour reaching about two-thirds to apex. Suture with a blackish stripe connecting the basal band with a cordiform spot which is situated one-third from apex, .12 inch. This is

the Western form, found in Vancouver Island and British Columbia. It has the first two abdominal segments piceous, the rest yellowish, and is the species which I incorrectly called *lepida* in my paper (CAN. ENT., Vol. XXVI., p. 305).....*occidentalis*, Horn.

Elytra as in preceding, except that there is no sutural stripe connecting the basal band with the spot, which is transversely oval, not cordiform. The middle portions only of the first and second ventrals are piceous. Size of the other species. Found in the Eastern Provinces.....*lepida*, Lec.

ENDOMYCHIDÆ.

Quite recently I have received from the Rev. Geo. W. Taylor, a number of specimens of *Aphorista læta*, Lec., a most beautiful insect of this family. He took them at his home near Nanaimo, Vancouver Island. It is more than likely that the insect will be found also on the mainland of British Columbia, and the following description will render it easy of recognition, since the form is unmistakable and closely resembles that of the other species of this and allied genera. It is .28 inch. long, yellowish-testaceous, antennæ blackish, terminal joint more or less pale. The prothorax bears two small black spots, one on each side before the middle, and the elytra have a very large common blue spot which covers most of the surface, leaving only the humeri, side margins and apex pale. It is shown in Fig. 28.

FIG. 28.

Another nice species has been sent for determination by Mr. John D. Evans, who took it in Eastern Ontario. It is *Mycetina testacea*, Ziegl., a small, yellowish-testaceous beetle, of more elongate form than either *perpulchra* or *Hornii*. The antennæ are piceous, but otherwise the colour is quite uniform—aside from a tendency of the sides of the prothorax to become a little paler than the disk. It is distinctly shining above, notwithstanding the covering of yellow pubescence. Length, .15 inch. Mr. Evans writes that he has only a single specimen, taken near Trenton in 1884.

The style of coloration (by lack of all pattern) is so different from that of *M. Hornii* and *M. perpulchra*, the previously-known northern forms, that the present species would not fall into the genus (nor any of the other genera) by the scheme which I used in the generic synopsis on

p. 338 of the CANADIAN ENTOMOLOGIST, Vol. XXVI. The fault may be corrected by changing the wording of the division "ccc" so that it may read "Thorax reddish or testaceous, elytra entirely testaceous or black, with two reddish spots on each."

CHRYSOMELIDÆ.

Mr. R. J. Crew has collected, at Toronto, two species of *Zeugophora* not included in the Society's lists nor in my paper. Since these additions *(Z. Kirbyi* and *Z. scutellaris)* raise the total number of Canadian forms to five, it will be as well to reproduce in part the table recently published by Dr. Horn in Trans. Am. Ento. Soc., XIX., which runs thus:

A. Body, as seen from above, of one colour.

Pitchy black ..... *abnormis*, Lec.

Entirely yellowish..... *Kirbyi*, Baly.

AA. Body above bicoloured.

b. Elytra entirely black. Head entirely yellow, punctures of elytra large and more distant than their diameters..... *scutellaris*, Suffr.

bb. Elytra parti-coloured.

Thorax entirely yellow, elytra with a cordiform discal space, the suture narrowly and the side margin yellow, outer half of antennæ piceous, the elytral punctures very close ..... *puberula*, Cr.

Thorax with a discal piceous area divided at middle by a yellow line, elytra with a common oval or cordiform spot and the apex pale. Antennæ pale..*varians*, Cr.

FIG. 29.

All the species are of nearly the same size, running from about .13 to .16 inch. in length. The name *Kirbyi* replaces *Reineckei* of the check-list. A figure of *Z. varians* is here given (Fig. 29), which will show the form of the genus.

THE ODOUR OF COCCIDÆ.

BY PROF. W. G. JOHNSON, COLLEGE PARK, MD.

I have been much interested in reading the notes upon the odour of scale insects by Professors Webster and Cockerell in the January and February issues of this journal. During my inspections in orchards and nurseries I have frequently detected the odour emitte by *Aspidiotus perniciosus*, mentioned by Webster, especially where the trees were badly infested, and have wondered what relationship it bore to the species. I have detected the most pronounced odours, however, in the genera Chionaspis and Lecanium. The odour produced by the Euonymus scale, *Chionaspis euonymi*, is very unpleasant to some persons. It is most marked upon badly infested, freshly cut twigs. If they are left in a tightly closed room for a few hours, the air will become very foul. When the scales are scraped or disturbed the odour is very offensive. The foulest of all odours emitted by scale insects, with which I have any knowledge, is that produced by *Lecanium nigrofasciatum*, recently described by Mr. Theo. Pergande (Bul. 18, Div. Ent. Dept. Agr.). It is popularly called the peach Lecanium, but I prefer to call it the terrapin scale on account of its close resemblance to that familiar animal. I am not sure, however, but that the term stinking scale would not be more appropriate, as it is certainly the most nauseating creature I have ever smelt. During the past week I was able to determine, specifically, by the scent with unerring accuracy specimens of this insect upon wild goose plum enclosed in a pasteboard box, wrapped with paper, sent through the mail for my examination, without opening the box. Two years ago I saw a seven-year-old peach orchard in Worcester County containing about 1,500 trees that was very badly attacked by this pest. The orchard was examined in September, and the whole atmosphere at that time was charged with this repulsive odour, which could be detected many rods away. Two other cases came under my observation last fall in the Blue Ridge Mountains, in Washington County. One orchard, eleven years old, containing about 900 peach trees, had become so completely overrun by this insect they were of no commercial value. The most repugnant smell emanated from this orchard that I ever encountered. The other orchard, peach also, contained 600 six-year-old trees, all of which were in the same general condition. When these insects are crushed or rubbed with one's finger the odour is very sickening, and can be detected on one's fingers even after repeated washings.

Whether or not this odour is for the purpose of attracting the male I

am not able to say, but I am inclined to think that it is not, especially in *Lecanium nigrofasciatum*. As this insect reaches considerable size, and remains upon the tree over winter, exposed, as a partially matured creature, it seems to me that the foul smell is for the protection of the species from the attacks of birds. On the other hand, I do not think this theory applies to *A. perniciosus* or *C. euonymi*, as neither of these species are sufficiently large to be attractive or available as food for birds. The odour here, therefore, may be for sexual purposes, or for attracting other insects. The former would hardly seem probable, because the sexes are found upon the same twigs, and we should not suppose the male would have any great difficulty in finding the female.

WEST AFRICAN MOTHS.

In the CANADIAN ENTOMOLOGIST, XXVI., pp. 69, 70, Mr. Geo. A. Ehrmann described as new three West African moths. Very recently this gentleman has been so obliging as to forward his types to me for examination. I should like to put on record a few observations on them for the benefit of students of the African fauna.

1. *Syntomis hilda*, Ehrm.

This should stand *Ceryx hilda* with *seminigra*, Holl., as synonym, and not as it does on page 46 of Hampson's monograph.

2. *Syntomis abdominalis*, Ehrm.

This belongs to the Zygænidæ (by the table of families in Cat. Lep. Phalænæ, I.), and should be erased from page 141 of Hampson's monograph. In Vol. I. of the Moths of India it falls into the genus *Tasema*, Walk., but yet differs obviously from that in wing shape. The fore wings are long, the outer margin very oblique, the hind wings small and narrow, quite characteristically Syntomid, which doubtless explains Mr. Ehrmann's erroneous reference.

3. *Pachypasa Nasmythii*, Ehrm.

This is a true Lasiocampid and falls in the genus *Taragama* by the table in the Moths of India. Female. Fore wings moderately broad, somewhat pointed at the apex, the outer margin oblique. Discal cell of both wings short; fore wings with veins 6 to 8 stalked, 9 and 10 on a separate long stalk; hind wings with vein 3 shortly stalked with 4 and 5; intercostal cell as long as discal cell, separate from it except at basal third, and with one distinct humeral vein in the moderately sized lobe. Palpi just reaching the frontal tuft; antennæ shortly pectinated; hind tibiæ with small terminal spurs.

HARRISON G. DYAR, Washington, D. C.

NEW, OR LITTLE KNOWN, ALEURODIDÆ.—II.

BY A. L. QUAINTANCE, BIOLOGIST, GA. EXPT. STATION.

Aleurodes graminicola, n. sp.

Egg.—Size, .25 x .13 mm.; uniformly brownish in colour; unmarked; oblong, truncate at base; pedicel short, attached to one corner; eggs held nearly upright on leaf by short pedicel and truncated end.

Larva.—Length, .7 mm.; width, .3 mm.; oblong-elliptical in shape; colour, yellowish-white; eye spots reddish. There is a marginal fringe all around of white cottony waxen threads. No marginal rim, and but faint crenulation. In other respects, essentially as in pupa-case.

Pupa-case.—Length, 1 mm.; width, .46 mm.; in shape, oblong-elliptical. Under hand lens, yellowish-brown in colour, with a stripe of dark brown, more or less interrupted, along dorsi-meson. Pupa-case slightly raised from surface of leaf by a vertical fringe of white waxen rods. A rounded keel extends along dorsi-meson, more pronounced caudad. No marginal fringe of wax-rods, as in larva; marginal rim very narrow and indistinct. Outer margin of case rather minutely crenulated, the incisions between the wax tubes shallow and usually acute.

Abdominal segments quite distinct along middle line, but gradually fading towards the margins. Second thoracic segment distinct near dorsi-meson; third thoracic segment distinct, sinuate, extending nearly to margin on each side. A median suture extends cephalad from third thoracic segment to margin of case. On cephalic segment is usually a pair of reddish pigment spots, varying much in position and shape. Dorsum destitute of setæ, except a small seta on each side of vasiform orifice. A pair of well-developed setæ extend caudad from caudal margin of case; also a pair of very minute setæ on caudo-lateral margin, a seta on each side.

On each side of keel, along dorsi-meson, are large depressions or pores, usually a pair to each abdominal segment, situated near cephalic margin of segment. The orifices of these are irregularly toothed or lobed, except on cephalic margin, which is formed by caudal margin of the preceding segment.

Vasiform orifice, cordate, about four-fifths as wide as long; the inner lateral margins are somewhat corrugated. Operculum not quite one-half length of orifice, about two-thirds as long as wide, and covered with minute spines, thicker and longer on caudal margin. Lingula somewhat spatulate, extending about three-fourths length of orifice; thickly set with

short spines, thicker and longer on distal end, where it terminates in two small lobes. From the ventral surface of distal end of lingula arises a pair of upward curving setæ, extending caudad almost to caudal margin of vasiform orifice. On ventral surface, rudimentary feet distinct.

Adult ♂.—About .8 mm. long to tip of genitalia; length of front wing .8 mm.; length of antennæ about .516 mm.; length of hind tibia .3 mm.; length of hind tarsus and claw .166 mm. Body uniformly greenish-yellow; wings immaculate; eyes reddish, distinctly divided, larger part ventrad. Antennæ of seven joints. Joint 1, short, obovate, one-half length of second; joint 2, somewhat club-shaped, and obliquely truncate distally; joint 3, long, cylindrical, slightly longer than 1 and 2 together; joints 4, 5 and 6 together, about equal in length to joint 3; joints 5 and 6, subequal in length, and one-third thicker than joint 4; joint 7, very long and tapering, being about equal in length to joints 3, 4, 5 and 6 together; joints 3, 4, 5 and 6 are rather coarsely ringed, joint 7 minutely spined.

On third pair legs, femur about two-thirds length of tibia; tarsi five-ninths length of tibia. Mentum much reduced, about as long as middle tarsi, excluding claw, slender at base, enlarged distally, and tipped with dusky. Operculum, in dorsal aspect, sub-rectangular in outline, somewhat concave on caudal margin, which is minutely setate. Lingula cylindrical, and truncate distally, but spreading at base, extending caudad beyond margin of operculum, somewhat more than length of operculum. On the truncated end is a group of setæ.

Penis slender, tapering, curved upwards, about two-thirds length of valves; valves rather short, stout, clasping at tip. On last segment of abdomen at base of each valve is a short fleshy protuberance. Wings delicately beaded all around; median vein of fore wing extending nearly to tip of wing; basal veinlet apparently arising free from median vein, extending obliquely to caudal margin.

Adult ♀.—Unknown.

Collected on an undetermined grass, July 24, 1898, at Lake City, Florida, by Prof. P. H. Rolfs.

Aleurodes Rolfsii, n. sp.

Pupa-case.—Length, .72 mm.; width, .45 mm.; varying somewhat; regularly elliptical in shape, raised on vertical fringe of white, waxen rods. Colour, clear whitish, with more or less of brownish frequently along dorsi-meson; the inclosed pupa is yellowish, with eyes reddish. Margin

all around minutely crenulated, the indentures between the marginal wax tubes usually rounded and shallow. There is a very narrow submarginal rim formed by the wax tubes. Marginal fringe wanting. Abdominal segments moderately distinct; a straight mesal suture extends cephalad to margin, from first abdominal segment. Four pairs of browish coloured setæ are usually present near the dorsi-meson; a pair on the prothorax; a pair on first abdominal segment; a pair at vasiform orifices, and a pair on caudal end of case, just within the submarginal rim. The cephalic two pairs are usually smaller than caudal pairs. The caudal pair is well developed, the setæ projecting dorso-caudad some distance beyond case. There is a pair of minute setæ on the margin of case near the caudo-lateral region. Dorsum with numerous pores and papillæ, from which arise long, curved, tapering, waxen rods. The papillæ are in a sub-marginal row all around, rather closely set, there being sometimes as many as fifty. These are somewhat variable in number and position, particularly in the thoracic region, where they may occur quite promiscuously on the dorsum. In the abdominal region they occur in more definite order, where they are in four longitudinal, somewhat curved lines. Those of the mesal two rows occur in pairs, a pair to each abdominal segment, except the last segment, where there may be two or more pairs.

Vasiform orifice pyriform, not quite as broad as long; cephalic margin straight; caudal end with acute indenture and finger-like process. Inner lateral and caudal margins corrugated. Operculum sub-elliptical, broader than long; not quite one-half as long as orifice, minutely spined on caudal margin. Lingula well developed, about three-fourths the length of orifice. Distal part of lingula with three pairs of lateral lobes; minutely spined, except at base, and bearing on distal end from below a pair of setæ, which project caudad just beyond orifice. Rudimentary feet moderately distinct.

Adult ♀.—Length to tip of genitalia about 1.20 mm.; length of front wing, 1 mm.; width of front wing, .41 mm.; length of hind femur, .21 mm.; length of hind tibia, .38 mm.; length of antennæ, about .3 mm. Body stout, light brownish-yellow in colour, with caudal margin of head, and the sutures of thorax more or less margined with brownish; legs and antennæ paler; eyes reddish. Front pair of wings marked with spots of smoky-black. There is a small spot at base, caudad of basal veinlet; two irregular spots near middle of length of wing, one on each side of wing; the caudal spot somewhat V-shaped, with the apex of the V turned

distad; the spot on cephalic side of vein is irregularly rectangular, its inner end touching vein at its caudal flexure. At about distal fourth of wing are three irregular sports in a transverse stripe. The vein terminates in the median spot. When seen under a hand lens, these markings appear as two irregular zigzag lines extending transversely across the wing. When the wings are folded the stripes of one side appear continuous with those of the other side.

Antennæ seven-jointed. First joint short, subconical, about one-half as long as second; second, about one-half as wide as long, truncate distally; third, long, slender, five-sixths length of distal four together; fourth, about three-fourths length of fifth, cylindrical; sixth and seventh, subequal in length; sixth, cylindrical; seventh, swollen, tapering distally, bearing a terminal seta. Joints third and distally, rather closely ringed. Eyes completely divided transversely, the larger division ventrad. Mentum long, three jointed; first joint short, about one-third length of second: second long, being rather longer than third; third usual, tipped with black. Rostrum short, conical, bearing three long setæ. In third pair of legs, femur slender, about two-thirds length of tibia; tarsus and claw together as long as femur. Distal joint and claw of tarsus about as long as proximal joint. Vasiform orifice, as seen in dorsal aspect, subcircular; operculum, slightly convex, with its caudal margin concave; minutely setate on margin; lingula projecting some distance caudad, club-shaped; minutely setate. Main vein of fore wing nearer cephalic than caudal margin, making a bend caudad near the middle of its length. Basal veinlet arises distinct from main vein (possibly connected by cross vein at very base) extending obliquely backwards, reaching margin at about one-third length of wing. Wings all around on the margin delicately beaded. On cephalic margin of hind wings at base are seven to nine setæ.

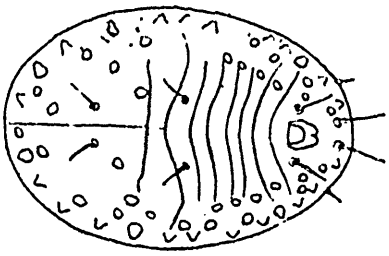
♂.—Length to tip of genitalia about 1 mm.; proportionately smaller than female. Genitalia forcipate, an acute prominent tooth on each valve at base. Penis enlarged at base, tapering and curved upwards, about five-sixths length of valves. In other respects essentially as in female.

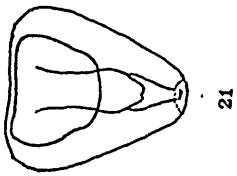
This aleurodid was sent in by a correspondent from South Florida, to Prof. P. H. Rolfs, on leaves of cultivated geranium, to which it was regarded as a severe pest.

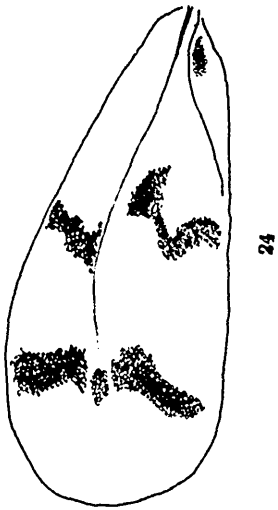
EXPLANATION OF FIGURES.

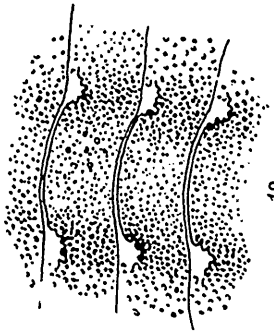
Aleurodes graminicola.

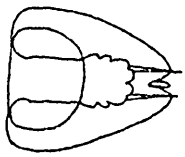
Figure 19.—Illustrating pores on third, fourth and fifth abdominal segments of pupa-case.











Aleurodes graminicola (Figs. 19-21); A. Rolfsii (Figs. 22-24).

Figure 20.—Margin of pupa-case.

Figure 21.—Vasiform orifice, operculum and lingula of pupa-case.

Aleurodes Rolfsii.

Figure 22.—Pupa-case.

Figure 23.—Vasiform orifice, operculum and lingula of pupa-case.

Figure 24.—Wing of adult.

DESCRIPTION OF THE GOPHER MOTH.

BY J. B. SMITH, SC.D., RUTGERS COLLEGE, NEW BRUNSWICK, N. J.

EPIZEUXIS GOPHERI, n. sp.

Ground colour a very pale mouse-gray, the wings with the appearance of being thinly scaled. On the thorax is a slightly warmer, more brown or reddish tinge, while the under side is darker and somewhat more smoky throughout. Primaries with all the lines diffuse and vague, except the s. t., which is distinct and very sharply dentated. The basal line is wanting. The t. a. line is pale, without defined margins, and crosses the wings with scarcely an out-curve. The t. p. line is yet more feebly marked except on the costa, and crosses the wing with a feeble out-curve, a little more marked than the outer margin of the wing itself. In the male this line seems to be better defined than in the female. The s. t. line is whitish, distinct, and irregularly toothed in both directions; that is, inwardly as well as outwardly — as a whole keeping at about the same distance from the outer margin throughout. The ordinary spots are very feebly marked; the orbicular a faint yellowish dot, and the reniform a somewhat larger blotch of the same colour; but in both cases indefinite. The secondaries are distinctly paler, more washed out and becoming almost whitish at the base. Toward the outer margin they are more nearly of the ground colour of the primaries, and here a pale, dentate, submarginal line becomes visible; much less defined, however, than the s. t. line of the primaries. On the under side the fore wings are uniformly smoky gray, without the glossy appearance of the upper side. The hind wings are much paler toward the base, and near the outer margin a faint reproduction of the line on the upper surface is noticeable.

Expands 1.12 to 1.20 inches = 28 to 30 mm.

Habitat.—In Florida; discovered by the late Mr. H. G. Hubbard, in the burrows of the land tortoise *(Gopherus polyphemus)*.

One pair is before me; both specimens received from Mr. Hubbard The male is somewhat crippled and in unsatisfactory condition, though all parts are present; but the female is in very fair shape and has all the characteristic features well marked. The species differs at once from all the other members of the genus by the strongly pectinate antennæ of the male. In no other of the species have we more than a strong serration, and by this one character the species can be easily distinguished. In, other respects it bears a curiously close resemblance to that western form of the common *lubricalis* which I have named *occidentalis*. With the

females only at hand and without a history of the specimen it would be easy to mistake the new species for the California variety, except for the fact that the s. t. line is unusually sharp and strongly dentate in comparison with the vague suffused markings seen in *occidentalis*. Other structural details of the legs and of the palpi do not differ from the usual form found in the genus, and in the male we have that same peculiar formation of the anterior femur which I described in my monograph of the Deltoids and figured. Concerning the life-history of the species and the habits of the larvæ I refer to Hubbard's articles on the insect guests of the Florida land tortoise published in Insect Life, Vol. VI., No. 4, 1894, p. 305-306, and in Proc. Ent. Soc. Wash., Vol. III, No. 5, 1896, p. 299.

MANITOBA BUTTERFLIES.

I have a further addition to make to my list of the Butterflies of Southern Manitoba, as the result of last summer's work. As in Africa of old, something new seems to be constantly turning up. The scarcity of grass in the usual prairie hay meadows drove me into a small "muskeg" of a few acres in extent, in a corner of the river valley, about a mile from my house. It is a veritable Serbonian bog in ordinary seasons—the grave of many a bison and wapiti, judging from the remains, in days gone by, and which has of recent years taken toll from time to time from our domestic herds. In it, at the end of July and the beginning of August, I took three or four specimens of *Thecla acadica*, and the same number of *Chrysophanus thoe*, and also a variety of *C. helloides*, smaller and more faintly marked than any I have taken before—the large form being generally abundant in certain places.

Butterflies were not plentiful last year, especially during the early summer, through the dry, cold weather that prevailed, but I made one notable addition to my collection. For some years I have been unable to do any "sugaring" during the harvest season, but this year I managed to paint a few trees, with the result that during the day time they were visited by several *Vanessa Californica*, of which I took three ♀s, my previous captures being ♂s, and saw several more. *Grapta progne* and *comma*—both varieties of the latter—also were attracted by the trees, and a very few *atalanta*, but nothing else.

At night, I took several species I have not before seen, and I particularly noted the absence of *Catocalas*. *Relicta* and *unijuga* used to be a positive nuisance, frightening all other species away. This year I did not see a single *unijuga*, only a few *relicta* and *briseis*, but several *concumbens*, which used to be very scarce.

E. F. Heath, Cartwright, Man.

ENTOMOLOGICAL BOOKS.

The following is a copy of the circular recently issued by the Customs Department in order to clear up some uncertainty regarding the interpretation of the circular issued in July of last year. It is now made clear that all books on entomology may be imported free of duty:

Customs Department, Canada.

Ottawa, 13th February, 1899.

To Collector of Customs:

The following memorandum was issued on the 28th July, 1898, to customs ports concerned in the importation of entomological books, viz.:

"I beg to advise you that the Minister of Customs has determined that books on entomology, such, for example, as 'Insects Injurious to Vegetation,' by Dr. T. W. Harris; 'Guide to the Study of Insects,' by Dr. A. S. Packard; 'Insects Injurious to Fruits,' by Dr. Wm. Saunders; 'Manual for the Study of Insects,' by Prof. J. H. Comstock; 'Economic Entomology,' by Prof. J. B. Smith; and 'Entomology for Beginners,' by Dr. A. S. Packard, are entitled to free admission under the provisions of item 464 of the Tariff Act."

You are instructed that free importation of books of the above class is not confined to the special works herein described by name, but that entomological works may be classed as industrial books entitled to free entry under tariff item No. 464.

(Signed) JOHN MCDOUGALD,
Commissioner of Customs.

THE ODOUR OF COCCIDÆ.

Apropos of Professor Webster's note, on page 4 of the current volume of the CANADIAN ENTOMOLOGIST, concerning the odour of *Aspidiotus perniciosus*, and Mr. Cockerell's note on page 36 on the odour of Toumeyella, please allow me to remind these gentlemen and your other readers that I recorded a similar instance in the case of *Gossyparia ulmi* in Insect Life, Volume II., page 39 (August, 1889), on the authority of Mr. J. G. Jack. The wording is as follows: "At this time they secrete a great deal of honey-dew which attracts ants and other insects, and gives off, curiously enough, a pungent odour, which Mr. Jack states is noticeable where large numbers of the coccids are at work, but which we have not noticed at Washington, probably on account of the comparative scarcity of the lice."

L. O. HOWARD, Entomologist.

Mailed April 3rd, 1899.