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# The Canadian Entomologist.

VOL. XIII. LONDON, ONT., NOVEMBER, 1881. No. 11

## ON THE LIFE DURATION OF THE HETEROCERA (MOTHS).

BY J. A. LINTNER, ALBANY, N. Y.

Read before the American Association for the Advancement of Science, at its Cincinnati Meeting, August, 1881.

I have been requested by Mr. Edwards, who has presented to the Association an interesting and valuable paper, "On the Length of Life of Butterflies," to supplement it with some remarks on the *Life Duration of the Heterocera*.

The period of time passed by insects in their perfect stage, is an item in their history to which, so far as I know, very little attention has been paid. It has not hitherto been made a special subject of inquiry. When we seek to answer the question, we find that very few of our published observations bear upon it. The little that is known upon this point, in the Heterocera, would not authorise the presentation of these notes before this body, were it not that a confession of our ignorance should, and I hope may, serve as an incentive to the examination of the interesting question.

It must prove a difficult field of investigation. Observations made upon species in confinement, deprived of food and subjected to other unnatural conditions, would give only approximate results. Even here we find our knowledge extremely limited. Outside of the Sphingidæ and the Bombycidæ, scarcely anything has been done by our Lepidopterists in rearing entire broods of species. In these two families the eggs can be easily obtained, either by the "sembling" method (attraction of the male by the exposure of a newly-emerged female), or by simply pinning a captured female. Several species of the Phalænidæ are quite prompt in extruding their eggs upon being pinned, even after having been temporarily subjected to anæsthetic influence. But in the extensive family of Noctuidæ—with the winged forms of which we are so familiar, and of which our knowledge, therefore, should be the more complete—it is difficult to obtain the eggs under the restraint of confinement. I have never

carried an oviposition of a single Noctuid to the perfect stage, nor can I recall a published record of its having been done. Further, in illustration of the veil that still hides portions of the life histories of these forms which rarely obtrude themselves upon our sight except under cover of the night, it may be mentioned that during the thirty years in which my studies have engaged me to a greater or less extent in the rearing of Lepidoptera, I do not recall an instance where I have observed the Noctuidæ *in coitu*, and therefore have no personal knowledge of the time, place, manner or duration of the initiative of Noctuid life.

It is known that in the Attacinæ, among the Bombycidæ, in confinement, the lives of the moths are very brief. The sexes mate a few hours after emerging from the pupæ, and continue in copulation for twenty-four hours or more. Oviposition may be commenced the following day, and completed within four or five days thereafter. Perhaps a week longer will complete the life period of the female—extending in all to about fifteen days. The male usually dies a few days after copulation—several days before the female.

In the Sphingidæ, the lives as observed, in confinement, are longer than in the Attacinæ, but I have no records from which to give comparative duration. Our observations upon the Phalænidæ lead us to believe that, as a general rule, their lives are shorter than are those of the Noctuidæ.

An approximation to the life period of the Noctuidæ may be obtained from the dates when the several species are observed abroad. The published records of the collections made by "sugaring" will furnish convenient data for this. I regret that at my present writing, away from books of reference, I am unable to refer to the papers of Messrs. Thaxter, Norman, Westcott\* and others. From a paper published by myself in *Entomolog. Contrib.*, iv., pp. 43-51, it appears that the period of collection (embracing probably nearly the entire life period, as the examples when first taken at sugar were apparently just from pupæ, and those last taken so worn as to be hardly capable of flight) of quite a number of species was about one month. Among these may be mentioned *Habrosyne scripta*, *Agrotis baja*, *A. subgothica*, *A. bicarnea*, *A. repentis*,† *Hadena verbascoïdes*, *Gortyna sera*, *G. nictitans*, *Leucania pallens*, *L. phragmitidicola*, *L. lapidaria*, *L. pseudargyria*, *Orthodes infirma*, *Orthosia helva*, *Scoliopteryx libatrix* and *Pseudaglossa lubricalis*.

\* *Psyche*, ii., pp. 34-38, 80; *Canad. Entomol.*, vii., pp. 3, 21; *Id.*, viii., p. 12.

† Now regarded as distinct from *A. messoria* Harris.

If, in consideration of the condition of the moths when captured, the probable different time of oviposition and more or less favorable exposure of eggs, we assume that the individuals of a species continue to emerge from the pupa during one-third of the above period, there will remain, as the approximate life duration of these Noctuidæ, a *period of three weeks*.

Mr. Wm. L. Devereaux, of Clyde, N. Y., in giving the results of his collections of Noctuidæ at sugar for two years,\* states that "most of the species remain for about a month." From other data which I have consulted, I think that we shall not be far from the truth if we adopt as the life-period of the larger portion of the Noctuidæ a term of three weeks.

As might be expected in so heterogeneous a family as the Noctuidæ—differing so greatly in general character, coming forth at such different seasons of the year, and varying in the number of the broods,—the life-histories of the several groups vary to the extent of preventing generalization and necessitating specific observations. For example, we find that the genera *Xylina*, *Homoptera* and *Catocala* have their periods of apparition much extended beyond the species above noticed. In the paper by myself, above referred to (p. 51), we find that *Xylina petulca*, *X. disposita* and *X. Bethunei* were observed for a period extending over forty-one, forty-seven and fifty-one days respectively, with a possible prolongation of the lives of some of the later individuals through hibernation and reappearance in the following spring, of six additional months. Seven species of *Catocala* give an average duration of forty-five days, and from Mr. Devereaux's observations, nine species of *Catocala* give an average period of fifty-seven days. These last may have shown a prolonged period from their extending over two years—one of which, from a more favorable season, may have included earlier dates of first appearance. It is proper to state that the above species were selected from the lists, as having been observed for the greatest length of time; the larger number gave considerably shorter terms of apparition.

In concluding these brief notes, which are quite unsatisfactory to the writer, and offered only in compliance with request, I would beg leave to suggest that good service may be rendered to Entomology by the collation from published records, and incorporation in our published lists of insects, hereafter, of the several dates of their collection or observation throughout the entire time of their appearance. The want of such data

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\* *Canadian Entomologist*, vol. xi., pp. 105-109, 1879.

has been felt in the attempt to answer the question of Dr. Wiesmann, as to the duration of life of some of our insects in their perfect state. It would also be of service in the determination of the number of annual broods; it would afford a knowledge of the time for guarding against the initiative of insect attack; it would enable us in many cases to decide upon the best time for putting in our crops; it would enable collectors to seek for specimens for their cabinets when they are to be found; in short, it would furnish an essential part of the life-histories of our species. I commend it to the attention of Entomologists.

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ON THE APHIDIDÆ OF FLORIDA, WITH DESCRIPTIONS  
OF NEW SPECIES.

(*Paper No. 2.*)

BY WM. H. ASHMEAD, JACKSONVILLE, FLORIDA.

Family Psyllidæ (Jumping Plant-lice).

The species belonging to this interesting family have received very little attention from Entomologists generally, and considering the extent of the North American fauna, comparatively few species have been described. Of these almost nothing is known of their habits and development.

In Europe, with the exception of two or three species, as little is known of their life histories as in America. Kollar, in his Treatise on Insects Injurious to Gardens, &c., according to Westwood, *vide* Introduction, vol. 2, p. 437, gives the history of two species. As I do not possess this work, I am unable to state which these are or how much of their history is known.

According to this author, and probably one of those referred to by Westwood, the Pear Tree Psylla, *Psylla pyri* Linn., "comes forth from its winter retreat provided with wings, as soon as the buds of the fruit trees begin to expand. After pairing, the female lays her eggs in great numbers near each other on the young leaves and blossoms, or on the newly formed shoots. The eggs are oblong, yellowish, and look somewhat like grains of pollen. The young insects, soon after they are hatched,

resemble young wingless plant-lice and are of a dark yellow color. They change their skins and color repeatedly and acquire wing-scales or rudimentary wings, then fix themselves to the bark in rows and remain sucking the sap until about to undergo their last change, when they disperse among the leaves and appear in their winged form."

This account has been copied by nearly every economic Entomologist who has had occasion to treat of these little pests. Even Dr. Harris, in his well known Treatise, nor a later writer, Prof. Thomas, give no new facts.

From my studies of some undescribed species in Florida, and other known facts respecting this family, I feel justified in stating that Kollar's account cannot possibly be correct; especially is this true with regard to its coming forth from its winter retreat provided with wings and in his description of the egg. It does not agree with my observations, nor with those of Leon Defour. To this celebrated Frenchman and indefatigable biologist are we indebted for the first accurate description of a *Psylla*'s egg. Those interested will find an account in his "Recherches anatomiques et physiologiques sur Les Hemipteres," p. 358, and on plate xvii., fig. 191 b. c., good figures of the egg. A translated account may also be found in "Thomas' 8th Illinois Report," p. 16.

In the summer of 1879 I noticed for the first time that the leaves of the young Persimmon trees (*Diospyros virginiana*) in the vicinity of Jacksonville were very much discolored, curled and distorted; on most of them, too, were numerous small warty-like galls. A thorough examination under the curled and twisted parts of the leaves revealed numerous small, flattened, hemipterous bugs, arranged in rows, and covered with a fine mealy or powdery substance; on disturbing they secrete large watery globules, the color of milky water.

A careful study of these during the past two years has enabled me to completely work up their life history, as well as the partial histories of other species which I shall now proceed to give, after giving a list of the known N. A. species.

#### Genus *Diraphia*, Waga.

1. *D. vernalis*, Fitch.
2. *D. femoralis*, Fitch,
3. *D. calamorum*, Fitch.
4. *D. maculipennis*, Fitch,

## Genus Psylla.

- |                                     |                                      |
|-------------------------------------|--------------------------------------|
| 1. <i>P. pyri</i> , Linn.           | 6. <i>P. annulata</i> , Fitch.       |
| 2. <i>P. rubi</i> , W. & R.         | 7. <i>P. urticæcolens</i> , Fitch.   |
| 3. <i>P. tripunctata</i> , Fitch.   | 8. <i>P. quadrisignata</i> ? Walker. |
| 4. <i>P. quadrilineata</i> , Fitch. | 9. <i>P. venusta</i> , O. S.         |
| 5. <i>P. carpini</i> , Fitch.       |                                      |

To these I now add

## THE PERSIMMON PSYLLA.

By the middle of April this is found in considerable numbers on the leaves of the young trees, with beaks inserted, almost standing on their heads, and swaying from side to side like the motion of a vessel in a stormy sea. This motion is evidently intended to assist either in inserting the beak or in pumping up the juices of the tree.

At this time they are also caught copulating, soon after which the female begins depositing her eggs. These are very minute, 0.01 inch in length, elongate ovate, pale greenish in color, with a wavy beak beneath at thick end, and a long filament at tip of smaller end, nearly the length of the egg, and extending backwards over it. These are laid along the margin of the leaf, without regard to regularity, the female first preparing for their reception by secreting a thread-like, transparent, gummy substance along the extreme edge of the leaf; she then fastens them in place by the beak, which adheres securely to the gummy substance.

## ITS LIFE HISTORY.

These hatch in from 5 to 6 days (actual observation) and the leaf from their punctures curls completely over them; under this they reside until just before the final transformation. The pupa then comes forth, attaches itself to a leaf or twig, and changes into the perfect fly, escaping through a longitudinal slit in the head and thorax. The young take from four to five weeks to mature and breed throughout the whole summer.

Like the Fig Psylla, the fall brood probably lay their eggs in crevices of the bark and twigs; these hatch at the first breath of spring, feed on the tender new shoots and leaves, and are those found fully matured by the first and second week in April.

10. *PSYLLA DIOSPYRI*, n. sp.

EGG.—Length hardly .01 inch. Elongate ovate, with a long filament at apex of smaller end extending backwards to near its whole length; a

short wavy beak or filament beneath at thick end, which is used for attaching the egg to the leaf.

YOUNG LARVA.—Length about .02 inch. Flattened, elliptical, pale yellowish, pulverulent; head broad, strongly arcuate in front; antennæ short, conical; eyes reddish, large and prominent, situated well back close to thoracic margin; thorax laterally twice dilated back of middle; legs pale; margins fringed with rather long hairs.

PUPA.—Length .10 to .12 inch. Broadly flattened; yellow, greenish beneath; head not so strongly arcuate as in young larva and slightly notched in front; antennæ much longer, apparently 7-jointed, dusky at base; wing-cases very broad and projecting slightly in front of eye and considerably laterally; eyes brownish; abdomen well rounded posteriorly, 8-jointed; legs stout, pale; strongly fringed with long hairs on all sides.

IMAGO.—♂ and ♀ .10 to .12 inch; length of wings .15 inch. Black, shining and slightly pubescent, in certain lights slightly tinged with bronze. Head transverse with a deep frontal notch; eyes prominent, three ocelli black; antennæ filiform, 10-jointed, two basal joints short and stout, dusky, following joints slender, pale yellowish, slightly pubescent, terminal joint thickened, black and tipped with two short bristles; abdomen elongate, somewhat conical, black and shining; metasternum yellowish, epimeral spines long, pale yellowish; wings hyaline, apex of front pair lanceolate, veins yellowish; legs honey yellow, tibiæ shaded with brown, femora dark brown.

The male is easily distinguished by its smaller size and by the usual abdominal differences; otherwise it does not differ from the female.

The sketch on next page, fig. 12, will give one a fair representation of its various stages: *a*, egg; *b*, young larva; *c*, mature larva or pupa; *d*, imago.

#### THE BAY MAGNOLIA PSYLLA.

This handsome and well known tree, *Magnolia glauca*, is quite common along our creeks and swamps, and is noted far and wide for its beautiful fragrant flowers. It is often, however, greatly disfigured by the sting of a Psylla, producing a large gall on the leaves, a fact I ascertained by breeding. This species is evidently a true gall-maker. The galls are quite conspicuous on the leaves, of a large size, greenish yellow in color with a bluish plume, and when fully matured open along the side in the form of a large curved lip.



## ITS LIFE HISTORY.

The eggs I have been unable to find ; it is probably possible that these are laid under the epidermis of the leaf, which may account for my inability to find any, even after a very careful examination of the leaves with my pocket lens. In the interior of the galls, which measure half an inch or more in length, I found the lice in various stages of

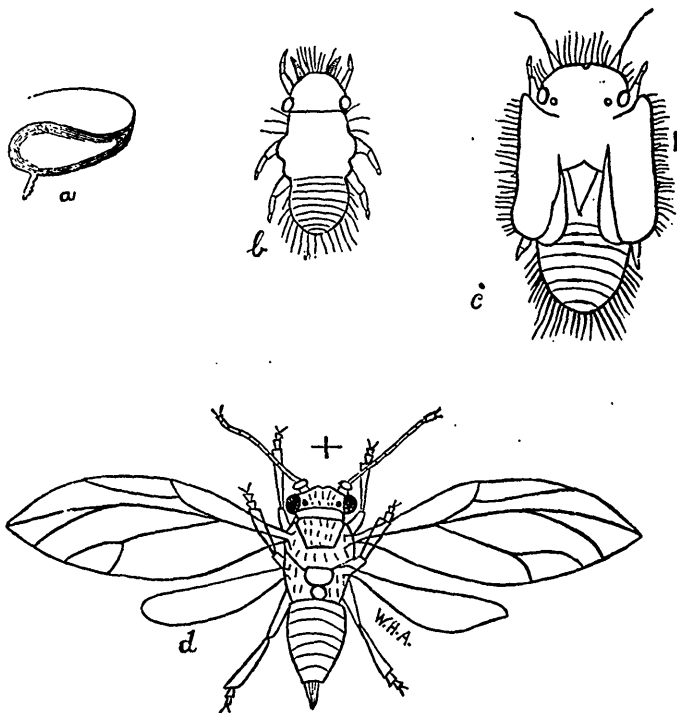


Fig. 12.

growth, generally in the midst of a watery secretion the color of milky water, which almost always fills the galls. Below I give description of different stages :

*PSYLLA MAGNOLIÆ*, n. sp.

**YOUNG LARVA.**—Length hardly .02 inch. Elongate, oval, flattened and pale yellowish in color. Head smaller and less rounded before than in previous species ; eyes situated well forward ; antennæ short, conical ;

abdomen more elongate, the sides of thorax not dilated and without the fringing of hairs, as in previous species.

PUPA.—Length .12 to .14 inch. Elongate, oval. Pale greenish yellow. Eyes brownish, prominent and situated further forward than in previous species; wing cases not so broad, obtusely rounded before and not projecting forward towards eyes; abdomen more elongate and notched posteriorly; legs pale; and is easily recognized by not being pubescent.

IMAGO.—♂ and ♀. Length .12 inch; wing .14. Pale greenish yellow. Head transverse, not projecting much in front, and with a frontal notch, but not deep; three remote yellow ocelli, situated on yellow ground, two close to but back of eyes, and one in front between antennæ; eyes large and prominent; antennæ 10-jointed, filiform, reaching beyond tip of thorax, two basal joints short and stout, pale to tip of 6th, following joints black; collare transverse, very short, præscutum broadly obcordate; mesothorax has two large deep lateral depressions, extending backwards towards scutellum, with a slight central groove; scutellum triangular; abdomen elongate, pointed; wings hyaline, lanceolate, veins pale greenish; legs, epimeral spines and metasternum pale greenish yellow; basal tarsal joint broadly flattened. The usual structural differences distinguish the male.

#### THE ILEX PSYLLA.

During a recent short trip to the sea shore, my attention was called (by my friend, Mr. Curtiss) to a gall on *Ilex cassine*, a shrubby tree growing in the rich hammocks along our coasts. These were found on the terminal new leaves, measured from .2 to .3 of an inch in length, and frequently destroyed the whole shape of the leaf. Cutting these open, I found they were caused by a Psylla, and judging from the size of the pupa, is probably the smallest species known. In the galls the young were covered with a mealy powder, very much resembling certain Coccides, and when disturbed do not appear to secrete the watery globules noticed in the previously described species. Below I give description of the stages as far as ascertained:

#### 12. PSYLLA ILEICIS, n. sp.

YOUNG LARVA.—Length less than .01 inch, oval, flattened, yellow and pulverulent, with reddish eyes and pale legs.

PUPA.—Length scarcely .03 inch. Yellow, pulverulent; legs and antennæ pale, wing cases well developed and obliquely projecting on either side; abdomen rounded.

DESCRIPTION OF THE PREPARATORY STAGES OF  
*LIBYTHEA BACHMANNI*, KIRTLAND.

BY W. H. EDWARDS, COALBURGH, W. VA.

**EGG**—In shape are oblate spheroid, somewhat pointed at base, and a little truncated and depressed at summit; marked by many horizontal striæ, and longitudinally by 18 or 20 narrow, prominent ribs, which proceed from base and terminate, some of them irregularly, at about four fifths the distance to summit, while eight, increasing gradually in prominence, end abruptly at the rim of the summit; these long ribs are cut on either side by grooves perpendicular to the surface of the egg; they are also frequently deflected somewhat from a direct line; color pale green. Duration of this stage about 4 days.

**YOUNG LARVA**—Length just from egg .04 inch; cylindrical; the segments a little rounded, and four times creased transversely; covered with a fine short down; color green, semi-translucent; head twice as broad as 2; obovoid, a little depressed at suture, the vertices rounded; sparsely pilose; color yellow-brown. To 1st moult about 2 days, in July.

**After First Moult**—Length .08 and .09 inch; color brownish-green, the segments curved; head a little broader than 2, shape as before; color yellow-green. To next moult 2 days.

**After Second Moult**—Length .12 inch; same shape; upper side dark green; a faint shade of yellow over and along basal ridge, rather macular; under side, legs and feet lighter green; the segments much specked with faint white on the ridges caused by the creases; on 3, high up, a black dot on either side; head as before; color light green. To next moult 2 days.

**After Third Moult**—Length .26 to .28 inch; color dull green, yellowish along and over basal ridge; specked with pale white, or yellow white, as before; the black dots as before; head green. To next moult about 2 days.

**After Fourth Moult**—Length .4 inch. Four days later the larva reached maturity.

**MATURE LARVA**—.7 to .9 inch; cylindrical, thickened at 3 and 4, the dorsum of last segment abruptly curved down to the end; color dark green, the lower side, and also feet and legs, pale green; each segment four times creased transversely and on the flat ridges so caused are

rows, one to each, of small tubercular flattened points, pale or whitish-yellow; from 2 to 13 a white stripe along base, just over the spiracles, and above this the ground is yellowish for a little way; a medio-dorsal yellow line and sometimes a fine line on middle of side; yellow tuberculated points over the legs, in arcs of from 3 to 6; on foremost ridge of 3rd segment, high on the side, a dead black tubercle, a little raised and rounded, in yellow ring; spiracles in brown ovals; surface covered with a fine short down; head obovoid, green, smooth, sparsely pilose; the ocelli brown.

Occasionally the larvæ in later stages are differently colored. One had the dorsum dark green, edged on either side by a gray line, and successively by a band of yellow, a gray line, and a black band; the 3rd segment was wholly, and 5th partly black. Two others of same brood were green, with a black band along base of body, and black patches on 3 and 11.

CHRYSA LIS—Length .5 inch; helmet-shaped; compressed laterally, the abdomen somewhat carinated; mesonotum high, rounded, sloping abruptly to top of head case, much compressed and sharply carinated, followed by a deep excavation; head case not prominent, square or nearly so at top, a little excavated, the corners sub-pyramidal and scarcely at all produced; along carina of abdomen a yellow line, which forks and passes round mesonotum to top of head case; a slight yellow lateral line on abdomen; color green, either deep, or with a blue or a yellow tint; the abdomen much sprinkled with pale yellow flat points or small spots; a few of these about the head case. Duration of this stage 5 days in July, 7 days in August.

I described and figured *Bachmanni* in both sexes, and also the egg, the two later stages of the larva, and the chrysalis, in *Butterflies of N. A.*, Vol. 2, Part 1, 1874. At that time I was unable to give the complete larval history. In subsequent years I have repeatedly taken the butterfly and observed all of the preparatory stages. It is certain that in this region this species appears in several successive generations, probably four, that the later butterflies hibernate, and the survivors are on the wing early in May, and probably in favorable seasons in April. The first generation in descent from the hibernating females are on the wing in June; the second generation in July; the third in August; and late butterflies emerge from chrysalis in September, and these would be of the fourth generation in descent from the hibernating females. The period from laying of the egg

to emergence of the butterfly is from 15 to 17 days. The only food plant known to me is the Hackberry, *Celtis occidentalis*, and the eggs seem to be nearly always laid on the tender terminal leaves of the branches. By frequent cutting in some trees in my garden I have made them close headed and low, and I never look over them at the proper seasons that I do not find eggs or larvæ of *Bachmanni*. Usually one egg is laid at the end of a branch, in one of the forks, on the leaf stem, but I have seen two eggs on same stem, and occasionally an egg laid on the under side and middle of a leaf. The young larvæ on hatching ascend to the extremity of one of the leaves and remain there, stripping the sides, leaving the midrib untouched, whence it is easy to find them. They eat their way out of the egg a little below the tip, but do not eat the egg shell after emerging, and the empty shell has often guided me to the whereabouts of the



Fig. 13.

young caterpillar. In all stages these larvæ when at rest arch the anterior segments, in the attitude of a Sphinx. When ready to transform they spin buttons of red silk upon the under side of a leaf—chrysalid shells being occasionally discovered in such positions—suspend after the manner of the *Nymphalidæ*, and in about eight hours

pupate. I have noticed no variation in the colors of the larvæ in any brood but the last one of the year.

As *Bachmanni* (fig. 13) has been taken in Ontario, it would be well worth while if some lepidopterist there would seek for its eggs or larvæ on *Celtis occidentalis*, and determine the number of annual generations.

I subjoin notes from my journals of times of appearance and finding of eggs and larvæ :

1873. Between 25th April and 15th May, a worn female taken during my absence from home ; this was evidently a hibernator.

#### 1st Brood.

1873. 11th June, fresh females flying, set one for eggs.

1880. 13th June, found 8 larvæ in younger stages.

1881. 25th June till 9th July, found eggs and larvæ daily ; first butterfly emerged 19th July.

## 2nd Brood.

1874. 4th July, caught female while ovipositing ; the larvae from these eggs were in chrysalis 17th July.  
 1876. 9th July, caught female while ovipositing.  
 1879. 10th and 11th July, found several eggs and young larvae.  
 1873. 11th July, set female for eggs ; found eggs 14th and 23rd July.  
 1881. 1st to 8th July, found eggs and young larvæ daily.

## 3rd Brood.

1872. 1st August, saw female ovipositing and found a dozen eggs ; 21st August, imagos from these eggs.  
 1873. 10th August, female ovipositing ; up to 25th August continued to find eggs ; on 22nd August set female for eggs.  
 1881. 23rd to 26th August, found eggs and larvæ.

## 4th Brood.

1875. 7th September, found a fresh egg, a half grown and a mature larva.  
 14th September, larvae in last stages.  
 1881. 2nd September, butterflies emerged.  
 " 11th " " "

## NEW MOTHS, CHIEFLY FROM ARIZONA.

BY A. R. GROTE.

## HADENA PERPENOA, n. s.

♂. Eyes naked ; tibiæ unarmed ; abdomen tufted ; size moderate. Apparently allied to *Indirecta* and *Cinefacta*, but darker colored, with a certain resemblance to *Mamestra Atlantica* or *Vicina*. Concolorous dark wood brown ; lines faint. The usual markings. A dash connects the claviform with the t. p. line. Stronger costal double marks inaugurate the indistinct median lines ; the t. a. oblique and approaching the t. p. line near internal margin, where it seems to have a strong tooth running backward on the margin. Stigmata subequal, concolorous. S. t. line indicated, twice indented with darker shades. Fringes dark, narrowly cut with pale. Hind wings fuscous, paler at base, with mesial line and discal shade mark ; beneath paler, with discal dot and faintly double extra

mesial line. Thorax concolorous, collar and tegulæ marked with deep brown. *Expanse* 32 mil. One fresh specimen from Arizona.

MAMESTRA BISULCA, n. s.

♂ ♀. Eyes sparsely haired, tibiæ unarmed. Antennæ of the male bipectinate. Colors of *confusa*. Brown, shaded with deep brown and white. A deep brown streak from base to t. p. line along submedian interspace. Cell dark brown. Orbicular concolorous, small; reniform small, more or less white shaded. Median lines near together, feebly indicated by white shades. A deep brown shade on terminal space interrupting s. t. line opposite the cell; this dark shading intrudes again at internal angle, resolving itself into stripes bordering the veins. Pale dots at base of fringe. Hind wings fuscous with pale fringes. Beneath fuscous, dark, sub-irrorate, hind wings pale inferiorly. No lines; discal dots. Head and thorax brown; tegulæ with dark edges. Collar pale tipped. *Expanse* 36 mil. Three specimens; Arizona. This may not remain in *Mamestra*, owing to the pectinated antennæ. From Mr. Neumoegen's collections.

MAMESTRA TRIFOLII, var. *Oregonica*.

Under this name I register Oregon specimens which appear to belong to *Trifolii*, but differ by the concolorous fore wings, wanting the dark dashes to the subterminal line which has no M-mark, or but a faint one. The hind wings have a faintly yellowish tone. The claviform is reduced and rounded. The dark reniform entirely contrasts. Otherwise I see no differences and we have to do probably with a geographical variety. Kansas specimens are somewhat intermediary. Five specimens of the variety are before me.

SCHINIA BUXEA, n. s.

This species has the front flat, eyes naked, palpi ascending, third article distinct, squamation smooth appressed, scales of thorax flattened and broader. Pale yellow, deepening exteriorly to the brown contrasting fringes. Three fine brown lines angulated superiorly cross the outer half of primaries. Hind wings silky, whitish at base, shading to yellowish exteriorly with pale fringes. Body whitish yellow. *Expanse* 29 mil. *Habitat*, South-western Texas.

By its color and contrasting fringes and fine, nearly equidistant, thread-

like, dark lines on fore wings easily separated from the other described forms.

ONCOCNEMIS GRACILLINEA, n. s.

♂. Size extremely small. Eyes naked. Tibiae with a large claw on anterior pair, at the inner extremity of the joint, and an outer spinule. Aspect, style of marking and color of *Cibalis*. Bright gray; apices produced. A fine longitudinal black hair streak below median vein. Indications of transverse lines on costa by trembled blackish shades. Subterminal line white, irregular, preceded by a black diffuse shade from apices, the most noticeable character of the wing, partly broken into cuneiform marks toward the middle. A fine, even, continuous, black terminal line. Fringes gray, darker tipped. Hind wings whitish, subpellucid, silky, a fine terminal line and traces of a mesial line. Fringes whitish. Head and thorax gray. *Expanse* 19 mil. Arizona, Mr. Neumoegen. This neatly marked, 'diminutive species is the twentieth described *Oncocnemis* from North America (see this volume, p. 34). The ground color of the fore wings is almost white, with fine black streakings; and the subterminal shade very prominent, as in *Cibalis*. The scales on the body are partly flattened and wide. The front is full. The species may be catalogued next to *Cibalis*, in my arrangement, among the gray forms.

The genus is numerous in species in our territory. We have a representative of the European *Confusa*, in *Behrensii*, from California. The nearest species to this are *Levis*, *Glennyi* and *Homoena* from Colorado, and *Augustus* from Texas. The only Eastern form is gray, like *Chandleri* from Colorado. It is the *Riparia* of Mr. Morrison, and has been taken on the coast of the Atlantic by Mr. Tepper, and by myself on the shores of Lake Erie. Its describer considered it as a variety of *Chandleri*; but I am more inclined all the time to regard it as a good species, and thus to contradict my own original idea of it, based, however, on a single specimen. I have myself now taken two, and have now seen others, and I believe the characters I have elsewhere pointed out will always distinguish it from *Chandleri*. The gray species are, then, *Chandleri*, *Riparia*, *Major*, *Aqualis*, *Cibalis* and *Gracillinea*. Another interesting group of species is that to which *Saundersiana*, from Canada and Illinois, belongs. This species is the only one, beside *Riparia*, found east of the Mississippi River. Its near ally is *Occata*, from Texas. The yellow-winged species



from the West are becoming well known through recent collections. They are very interesting and look a little like *Anartas*. As yet we have three, *Dayi*, *Hayesi* and *Mirificalis*; I believe there are no European species like them. The Californian *Aterrima*, with black secondaries, is a rather small, pretty, but aberrant species, looking something like a *Tarache* at first sight.

It is interesting to note that *Fruva obsoleta*, from Illinois and Texas, is found in Arizona, from whence, also, Mr. Neumoegen has received a specimen of *Heterocampa Belfragei*. It is then likely that a number of species which as yet we only know from Texas, will be found in Arizona.

#### FRUVA GEORGICA, n. s.

Front with a clypeal protuberance. A little larger than *Fasciatella*, of the same olivaceous buff, dull colored. No lines. Fringes discolorous, blackish. The wing becomes stained with ochreous terminally and a dark shade extends inwardly opposite the cell from the margin. Hind wings fuscous; fringes pale. Beneath pale fuscous, costa of fore wings pale yellowish; fringes dark. The hind wings and fringes on both wings are somewhat silky.

#### CATOCALA ARIZONÆ Grote, Can. Ent., 163, 1873.

This species has been collected in numbers by Mr. Doll and Mr. Neumoegen has kindly presented me with an example. It is totally distinct from *Walshii*, with which I have already compared it. There is the faint glaucous shade on fore wings described by me. The primaries are more brown than in *Walshii*. I have already published my opinion that Mr. Strecker has very briefly and unrecognizably described this species under the name of *Aspasia*. *Walshii* is not found in Arizona. Both myself and Mr. Strecker compare the species with *Amatrix*. The student is referred to the descriptions published of these species.

#### PERISPASTA IMMIXTALIS, n. s.

This species is similarly sized with *Caeculalis*, of the same shining fuscous, quite pale beneath, but without the pellucid impressions on primaries. There can be made out the traces of a pre-apical costal curved line enclosing a slightly paler space. The wings are shaped as in its ally. New York, collected by Mr. Angus and given me by Prof Fernald.

For some time I was inclined to consider this the ♀ of *Caeculalis*, but I make out the frenulum of my type to be single and the specimen therefore a male. The species are small and frail in this Pyralid genus and may be known by the peculiarly shaped wings.

*BOTIS COMMORTALIS*, n. s.

A small form no larger than *Vibicalis*, very distinctly marked and easily recognized. Fore wings brown, crossed by two mesial distinct nearly upright lines. Fringes white. Head and thorax dark. Hind wings pure white, immaculate. Beneath fore wings dark, hind wings white; legs whitish. *Expanse* 11 mil. Havilah, Calif., Mr. Edwards.

This little species must be easily recognized. It is possible that it may be placed more advantageously in an allied genus when the neuriation can be studied.

(To be Continued.)

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ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY  
OF ONTARIO.

The Annual Meeting of the Society was held, according to announcement, in their rooms, Victoria Hall, London, Ont., on Monday evening, Sept. 26, 1881.

A number of those interested in Entomology were present from different parts of the Province, the President, Mr. Wm. Saunders, in the chair. The report of the Council was read and adopted, and the Sec.-Treasurer submitted his financial report, which was duly adopted.

Letters of apology for non-attendance were read from Rev. C. J. S. Bethune, Jas Fletcher, W. H. Harrington, W. Couper and G. J. Bowles.

The President then delivered his annual address, on the conclusion of which the meeting unanimously tendered Mr. Saunders a vote of thanks, with a request that his address be printed in the CANADIAN ENTOMOLOGIST.

The election of officers then took place, when the following gentlemen were declared duly elected:

President—Wm. Saunders, London.

Vice-President—G. J. Bowles, Montreal.

Secretary-Treasurer and Librarian—E. Baynes Reed, London.

Council—Rev. C. J. S. Bethune, Port Hope ; J. A. Moffat, Hamilton ; James Fletcher, Ottawa ; R. V. Rogers, Kingston ; J. M. Denton, London ; W. H. Harrington, Ottawa, and W. Couper, Montreal.

Editor—Wm. Saunders.

Editing Committee—Rev. C. J. S. Bethune, J. M. Denton, E. Baynes Reed.

Auditors—Chas. Chapman, H. Bock.

The report of the Montreal Branch was next read.

Routine business having been transacted, the chairman invited discussion on any Entomological matters.

#### POTATO BEETLE.

Prof. J. T. Bell, of Belleville, remarked that he had found the Potato Beetle feeding in his neighborhood on the "Bittersweet," *Solanum dulcamara*. Mr. Saunders stated that during a recent visit to Colorado, although he travelled much over the plains and through the mountain canons, he found no traces of this insect in any of its stages.

Mr. Chas. Arnold, of Paris, said that in his section the Colorado Beetle after having devoured the potato vines, attacked the tomato plants.

Mr. P. C. Dempsey, of Trenton, stated that he had preserved his tomato vines from injury by the beetle by the free use of Paris Green on his potato plants.

Mr. J. A. Moffat, of Hamilton, stated that he had observed serious injury to be caused to the young plants by the beetle.

Mr. Saunders reported that *Lebia grandis*, one of the beneficial insects which devour the larvæ of the Colorado Beetle, had been found by him in greater numbers than usual, and that he had taken a number of specimens at night when sugaring for moths. Mr. Moffat had also observed it to be common near Hamilton on the Golden-rod, *Solidago*.

#### COTTON WORM.

Mr. Jas. Fletcher had written to ask if any member had made any observations during the year on the moth of the Cotton Worm, *Aletia argillacea*, in reference to which an interesting discussion took place at the last annual meeting.

Mr. Moffat reported having captured several specimens, and Mr. Reed had observed their frequent occurrence attracted by light in the house at night during September.

## CABBAGE BUTTERFLY.

Mr. Saunders reported that as far as he could ascertain, the extreme western limit of this insect did not at present exceed 100 miles west of Chicago. Prof. Bell stated that he was of opinion that in the neighborhood of Belleville the common English Sparrow had proved useful in destroying the larvæ of this butterfly.

The chairman, Mr. Saunders, remarked that this was contrary to the experience of all those who had made a special study of the habits of this sparrow, and enquired whether the Professor had ever examined the crop of the bird for evidences of the presence of this larva, to which the Professor replied in the negative.

## A RARE BEETLE.

Prof. Bell exhibited several specimens of *Alaus gorgops*, one of which he had captured near Belleville; and showed the peculiar points of difference between this insect and our common Eyed Elater, *Alaus oculatus*.

## NEW CLOVER INSECT.

Mr. Wm. Weld, editor of the *Farmer's Advocate*, said that he had lately read in several American papers accounts of the ravages of a new clover insect, that specimens of clover heads had recently been sent him by several correspondents, infested with an insect which he believed to be this new species, and asked whether any of the Entomologists present could give him any information as to where it had occurred and the amount of damage it was likely to cause in this Province.

Mr. Arnold thought from what he had heard from those growing clover in his vicinity that this insect was injuring the crop there. Mr. Saunders said that the insect had not yet come under his observation and that he would be very glad to receive specimens from any person who should find them in this Province.

The insect referred to is the Clover Midge, *Cecidomyia leguminicola*, a small fly which in its larval state devours the ripening seeds in the clover heads.

## PEA BUGS.

Mr. Weld also enquired as to the experience of those present as to the ravages of this pest during the year.

Mr. Arnold said that the Pea Bug had committed more damage this year in his neighborhood than ever before. Some friend had recommended him to enclose a piece of camphor in the bags of seed peas with a view of destroying the insect ; this he had tried and found useless. Mr. Gott, of Arkona, had not found the beetles so plentiful this year as usual. The subject was discussed at some length, and the general opinion expressed that the most feasible remedy was to cease growing peas for a time in any district where the insect had proved seriously destructive, and thus starve them out.

#### THE MAPLE TREE BORER.

Prof. Bell remarked that he had found this borer, "*Clytus speciosus*," not nearly so common as formerly. Mr. Saunders said that he believed it to be increasing in the neighborhood of London, and that some of the street trees had been seriously injured by it ; he also referred to the depredations of another maple borer, "*Aegeria aceris*," a small moth whose larva burrows under the bark of the red maple, "*Acer rubrum*," and in season was quite common on the trunks of the maple trees on our streets. Mr. Reed also reported the maples round his house being much infested by this pest, the empty cocoons being found protruding from the trunks of the trees in quantities during the summer.

A discussion then ensued on the probabilities of new insect pests being introduced from abroad by the importation of grains, seeds and trees, in which several of the members took part. Mr. Weld urged that the Society should call the attention of the Government to the necessity of taking every possible precaution to prevent the introduction of such insects. The President remarked that in his official capacity he had through the Provincial Agricultural Association already brought this matter before the Government, and that some steps in this direction had been taken.

The meeting then assumed an informal character and the members were shown by Messrs. Saunders, Denton and Reed many of the more interesting specimens in the Society's large collections, and also exhibited microscopic specimens illustrating the structure of insects ; the valuable library of the Society was also examined by the members and added to the interest of the gathering.

After enjoying a very pleasant and profitable evening the meeting adjourned.