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DESCRIPTIONS OF A FEW ELATERID AND ALLIED LARVÆ.

BY D. W. COQUILLETT, WOODSPOCK, ILL.

The following larvæ have the usual elongate, sub-cylindrical form and hard integument of the notorious *wire-worm*: they all live in decayed wood, and pupate in cells in the wood.

For the determination of the perfect insects I am indebted to Mr. E. P. Austin.

ELATER NIGRICOLLIS, Herbst.—Body polished, yellowish brown, palest underneath and at the sutures of the segments: a narrow dark brown band at either end of each segment except the first and posterior end of the last segment; these bands pass entirely around the body: the last segment tapers posteriorly to a fine, dark brown point; head dark brown, the jaws black; a prop-leg beneath segment 12; length about one inch. I found several April 25, and enclosed them in my breeding cage, in which was placed some decayed oak-wood and damp sand: the first pupa was noticed August 19, and the beetle issued from it on the 30th of the same month.

ANDROCHIRUS FUSCIPES, Mels.—Body polished white; a brownish band on the posterior end of each segment, and also one on the anterior part of segment one, these bands pass entirely around the body: the last segment tapers slightly posteriorly, rounded at the end, and usually tinged with brown; ventral part of first three segments pale brownish: head brownish above, whitish beneath: no prop-leg beneath segment 12; length about one inch. Several larvæ were collected April 25, and one beetle issued from these on the 29th of May following. As the larvæ which remained in August were all of one size, I concluded that this species requires two years to complete its transformations.

ATHOUS CUCULLATUS, Say.—Body brownish black, the sutures whitish: venter from a little above the spiracles whitish, marked with five rows of brownish spots, those in the outer rows elongate, forming a broken line: those in the next row smaller and placed behind the middle of the segment;

those in the middle row much larger than the others, taper slightly posteriorly and do not extend upon the first three segments; last segment flattened above, with three small tubercles on each outer edge, the hind angles are produced into a two-pronged projection, the inner prongs of which are bent inward, nearly meeting; head dark brown; a prop-leg beneath the last segment; length nearly one inch. I found several of these in some decayed oak-wood April 5, and the beetles which issued from them were first observed July 8. One of these larvæ devoured a Capricorn larva, which I put in the same collecting box. I have also found these larvæ in decayed apple-wood.

CENTRONOPUS CALCARATUS, Fabr.—Body polished light brown; last segment terminates in two, short, thick points; head light brown; no prop-leg beneath the last segment; length slightly over one inch. From larvæ found in early spring, one pupa was observed May 21, and the perfect beetle issued from this on the 29th of the same month.

ON THE NORTH AMERICAN CALPINÆ TO HELIOTHINÆ.

BY A. R. GROTE.

(Concluded from page 77.)

NEUMOEGENIA Gr. (1882).

Form slender; vestiture scaly; clypeus rough, with a superior arched ridge, infra-clypeal plate prominent; wings very wide, entire; apex determinate; external margin regularly rounded. Labial palpi short. Legs slender and apparently unarmed. Eyes naked, unlashd. Abdomen hardly exceeding secondaries. Body untufted on the dorsal line. The type and only species is snow white, with a large, golden, metallic, trigonate, median patch on primaries above, leaving the external margin and costal white, and with a white patch at extremity of median vein and a reddish stain near the base of the wing.

1. *Poetica* Gr. Arizona.

This is one of the prettiest moths allied to *Plusia* in our fauna.

This paper is the result of my studies upon Mr. Neumoegen's collection, commenced last autumn, but interrupted and delayed by my bad health. The first part, already published, was put into shape from my

notes, before I saw a paper of Mr. Smith's on the *Heliothine*, in which the characters used being those previously employed by myself in separating the genera, similar results could not fail to be reached. I had in fact corrected my arrangement in the New Check List, on examining for the first time *Tamila Nundina*. I found, as pointed out by Mr. Smith, that this insect, the type of *Tamila*, is a *Lygranthocia* (= *Schinia* Smith). I had then to arrange my species of *Tamila* differently, and also create a new genus for *Lucens*. Already in the Check List I had taken *Lucens* out of *Heliothis*, and I associated it with *Medii* and *Tumida* in Mr. Neumoegen's collection under a new genus. So far I had gone independent of Mr. Smith. Mr. Smith's paper is an excellent one, and goes much farther than I was able to extend my study. He originally shows that we have two European genera, *Sympistis* and *Heliaca*, in our fauna, and he unites several species, partly unexamined by me, with the genus he calls *Schinia*, but the majority of the species of which I had arranged under *Lygranthocia* in 1875; and I had, while describing the type, given in my "List" a wide value to the genus. In some single cases I thought the tibial armature would give generic characters, and for that reason among others retained some of my own and Guenee's genera as distinct from *Lygranthocia*.

I shall, therefore, bring this paper to a conclusion by pointing out the characters of certain genera. The arrangement of the *Heliothine* which I make differs from Mr. Smith's by my commencing with *Anarta*, *Sympistis*, *Melicleptria*, *Heliothis*, etc., and concluding with *Lygranthocia* as in my New Check List, bringing the genera with bulging clypeus and often white colors before *Tarache*, which may be called the typical genus of the succeeding group. Although I have used natural characters to support my genera, I think comparative characters and the subordinate ones of color and marking should have some weight. As much as possible we should avoid associating species violently dissimilar in general look, on account of their agreement in armature or the structure of the eyes.

As stated in the first part of this paper, the group I have called *Stiriine* presents some resemblances to the *Heliothine* by reason of the often armed tibiae. It is more nearly related to the *Plusiine* by the shape of the wing and the often metallic colors. It has characters which are peculiar, the short thorax and the patagia deflected at the tips. The bulging clypeus allies some of the genera to *Lygranthocia*. I would distinguish *Basilodes* by the conical third palpal joint, while I have explained

the characters of the principal genera in the first part of this paper, so far as I have material before me to examine. The present paper is intended to supply material for the future monographist of the *Noctuidæ*, with my other studies already published, and I need not weigh critically the value of certain points of structure at the present time. A recent paper of mine in "Papilio," upon classification, gives briefly the general conclusions to which my experience has led me. I wish only here to show that a study of natural characters leads to a correspondence between the results of different observers which is not attained in any other way. Important discrepancies may be laid to a failure to study enough material or to examine it thoroughly. By the system of Gueneé the limitation of the genera was made more uncertain; by that of Lederer the confines were more clearly exposed. But no finality can be reached until, all the *Noctuidæ* being known, a final arrangement will be arrived at from the mere futility and unimportance of changes dependent to a considerable extent on the mere temper of the writer. Just as *Thalpochares* obtains as against *Trothusa*, so I should retain *Lygranthocia* as against *Schinia* or my term *Euleucyptera*. It is clearly of less importance what name we give the genus when its limits are agreed upon generally speaking. Even after the minute researches of Lederer and Von Heineman, some species are difficult to place and will oscillate for some time. Many differ in comparative characters only, and about the value of these there will not be easily found an agreement between writers. Gueneé's genera in both *Noctuidæ* and *Geometridæ* are not based on scientific or natural characters, but he arrives at results sometimes identical with those of Lederer. Lederer is decided in his criticism of Gueneé, but not personally hostile or illiberal, hence his remarks have a certain value which they would not otherwise bear. Now quite recently in a monograph which is certainly exhaustive in appearance and the result of a wonderful industry, Dr. Packard very strongly endorses Gueneé and considers his work as superior in value to Lederer's by distinct implication. I myself do not share this opinion, and since my return from Europe in 1867, I have used the natural characters laid down by Lederer and discarded the comparative ones of Gueneé. In fact I could not understand genera comprising "groups" entirely arbitrarily composed, without definition, embracing species with hairy and naked eyes (e. g. *Aplecta*) or with no reference to the structure of the feet. The exceptions to his diagnoses are often more numerous than the typical forms. "Souvent," etc., is a term which seems

to acquire an absolute character with Gueneé. But his descriptions are very good, and he tells you very little in a very entertaining and lengthy way. Lederer is very exact and thoroughly grasps the subject of structure.—perhaps a little too strict in his definitions, but of a far more genuine temper which is everywhere scientific. This brief resumé of the qualities of the two writers who have attained celebrity in Europe, and who are now no longer with us in the flesh, suggested to me the idea that we should be more conservative and less violent in the expression of our opinions. Each new writer seems to offer himself as the measure of that part of creation which he dabbles in, and lays down the law with an absolute assertion which I know from my own experience will be modified as he comes to know more, if he is ever, indeed, to know much. I do not intend either to speak unkindly, or to arrogate to myself the right to speak at all. I almost feel that I am laid under an obligation in being permitted to express my opinions, although I have been writing these twenty-two, and studying for now more than the twenty-five years which have passed away. I hope after I am silent that it will be remembered that I fought against my naturally positive opinions as much as I could. In my first paper I know I expressed myself with diffidence and the likelihood I should make mistakes. It was pretty dark in those days. The Synopsis of Dr. Morris was not published, and I could not get a name for a moth in the length and breadth of the land, except for the few species discussed by Dr. Harris in his *Insects Injurious to Vegetation*. Those half a dozen Noctuids have now grown to nearly 1,700 names, about four fifths of which most of us know all about, or fancy we do. It must be admitted that much of my work was necessarily very difficult, and early mistakes more readily excusable than they are to-day.

LYGRANTHOECIA G. & R.

Type: *Crambus Marginatus* *Haw.*

Eyes naked, unlashd, full. Front moderately bulging, shortly scaled. Infra-clypeal plate not exposed. Fore tibiæ heavily armed; middle and hind tibiæ spinose. Vestiture of mingled scales and hair. The armature of the shortened fore tibiae consists in two long, sub-equal claws, which slightly overlap on the inside, and a series of four, diminishing in size on the outside of the joint. Mr. Smith's figure (3) does not agree with my specimens, in which the outer series is equidistant and the final claw proportionately shorter; they are distributed further along the joint, which

is differently shaped from the figure, the last claw of the outer series being placed much further towards its upper end. The drawing of these parts is a matter of much nicety, and while Mr. Smith may be complimented upon his plate, I am not able to recognise the figure of this species. It is certain that the claws do break off, or are not developed, for in one specimen the outer series is plainly reduced to three.

This generic term might be retained for the following reasons: I use it in 1874-5 in the sense of *Anthoecia* Guen., which cannot be kept, the type, *Cardui*, being also the type of *Melicleptria*. In my list I include 18 species, *Celeris* erroneously, as I show this to be a *Melicleptria*. I retained the genera *Tamila*, *Euleucyptera*, *Schinia*, *Oria*, based on but few species, as distinct. I did this for the reason that I was under the impression that the modifications of the armature of the fore tibiae would give generic characters when all the species were compared, which I never pretended to do, or had the means of doing until very recently. I was also interested in keeping the generic synonymy plain, so that the types might be understood, and, unless I have come to a positive conclusion, I have preferred to keep the old genera alive until the family is monographed. The term "*Schinia*" is "resurrected" by me out of the *Verzeichniss*, where it is used for the three species, *gracilentia*, *trifascia*, *bifascia*; the other species, *tuberculum*, is referred by Hubner to another genus. No other author uses this term before me, and I consider *Trifascia* as typical. *Tamila* is used by Gueneé for a single species, *Nundina*, respecting which I have been in error until last fall, when I examined it carefully for the first time, and found it to be a *Lygranthoecia*. Illness prevented my continuing and finishing my paper (which is now completed with this instalment) until after the appearance of Mr. Smith's paper, in which this fact is first publicly established. Mr. Smith interestingly shows that *Euleucyptera* does not sufficiently differ, so that this genus with its single species must also be retired. As to *Porrina*, I had associated *sanguinea* and *regia*, but now accept the conclusion that the modifications of armature they show are not generic. In my New Check List I kept *Anthoecia* temporarily for the yellow-winged forms, of which *Anthoecia juguarina* Guen. may be considered typical, the number of species of the *marginata* type having grown; it is manifestly only a "color genus," and, as I had previously shown that Gueneé's term was inapplicable, my action was injudicious. I am not satisfied, however, that all of Mr. Smith's *Schinia* belong to *Lygranthoecia*. Except my *Tricopsis chrysellus*, I

assume that they do for the present, in order to complete the matter. My *Tamila tertia* I am sure will come to be separated, and my *Heliothis cupes*. The case of this genus is analogous to that of *Thalpochares*, in which the name is preferred under which the most of the species were placed together, although Hubner had genera which were older for certain single species. Mr. Smith uses *Lygranthoeccia* evidently in this sense in the "Synopsis." The species of *Lygranthoeccia* are:—

1. Rivulosa Guen. Can. southward.
Marginatus Haw.
2. Thoreaui G. & R. Middle and South.
3. Constricta Hy. Edw. Georgia.
4. Saturata Gr. Southern States to Mass.
Rubiginosa Str.
5. Separata Gr. West; the vars. are geographical.
Var. Acutilinea Gr.
Var. Walsinghamii Hy. Edw.
Var.? Coercita Gr.
Var. Balba Gr.
6. Parmeliana Hy. Edw. West.
7. Regia Streck. Texas.
8. Sanguinea Geyer. West and South.
9. Nundina Drury. West and South.
10. Bifascia Hubn. South.
11. Trifascia Hubn. East to South.
12. Gracilentia Hubn. South.
Oleagina Mori.
13. Obliqua Sm.
14. Velaris Gr. West.
15. Tertia Gr. Texas.
16. Albofascia Sm. Texas.
17. Roseitincta Harvey. Texas.
18. Bina Guen. Georgia.
19. Tuberculum Hubn. Georgia.
20. Siren Streck. Texas.
21. Lynx Guen. South and Middle.
22. Brevis Gr. South and West.
Var. Atrites Gr.

23. Meskeana Gr. Tex., Fla.
 Var. Rufimedia Gr.
Pastidiosa Str.
24. Scissa Gr.
25. Limbalis Gr.
26. Arcifera Guen. New York.
 ♀ Var. Arcigera Guen.
 ♂ ♀ *forma typ.* Spraguei Gr.
27. Spinosae Guen. Eastern States.
28. Packardii Gr. Colorado.
29. Mortua Gr. Colorado.
30. Nubila Streck. Texas.
31. Nobilis Gr. Colorado.
32. Errans Sm.
33. Jaguarina Guen. Colorado.
34. Inclara Streck. Texas.
35. Cupes Gr. Texas; Calif.
36. Lupatus Gr. Texas.
37. Gloriosa Streck. Texas.
38. Lanul Streck.
 § *Euleucyptera* Gr.
39. Cumatilis Gr. Colorado.
Sulmala Streck.
40. Tenuescens Gr.

TRICOPIS Gr.

Type: T. Chrysellus Gr.

The infra-clypeal plate is prominent. The armature of the fore tibiae approaches that of *Trifascia*; I have described it Bull. Buff. Soc. N. Sci., in my table of a part of the Heliothid genera, which, now ten years old, is all I have published towards a close examination of the Heliothid genera. The species are silvery white and easily recognized; the honey brown thorax and bands on the primaries agreeably contrast. The genus is not very distinct from *Lygranthoecia*, but I will not draw it in from the structure of the front. Other characters are given in some notes of mine, which at the moment I cannot verify. Our species apparently are three:—

1. Chrysellus Gr. Texas.
2. Hulstia Tepper. Texas.
3. Aleucis Harvey. Texas.

TRIOCNEMIS Gr.

Type: *T. Saporis* Gr.

The essential characters are originally given by me in the posterior thoracic tuft and the tridentate anterior tibiae. Our species resembles the European *Calophas'ri* in appearance. It is a remarkably handsome insect.

1. *Saporis* Gr. Arizona.

RHODOSEA Gr.

Type: *R. Julia* Gr.

This genus contains our handsomest of the pink species, and is allied to *Rhodophora Florida*. It differs strongly by the two-clawed anterior tibiae, the unarmed tibiae, the structure of the front and the narrow wings. The lovely species has the fore wings of a delicate pink, with a pale yellow dash on the cell, the edges and fringe pale yellowish. Fore tibiae abbreviate, with a shorter outer and longer inner terminal claw. Front very bulging, with the infra-clypeal plate centrally exposed. Eyes full, naked, unlashd. Tibiae not spinose. Labial palpi relatively short; tongue moderate. Vestiture hairy. In the shape of the wings there is a resemblance to *Heliophila*. The feet, face and thorax in front are flushed with pink. The species was collected by Prof. Snow, and is probably flower-haunting, as is *Florida*. I named it for my little daughter, who takes an intelligent interest in natural objects, and who came to me when her mother was taken away, now more than ten years ago.

1. *Julia* Gr. New Mexico.

ANARTA Ochs.

I have referred to this genus three species, *Promulsa*, *Nivaria* and *Submarina*, which differ from *Mamestra* and *Dianthoccia* by the untufted abdomen and hairy and longer vestiture. The hairy eyes are full, but the general form is more like *Anarta*; the habitat of the first two is that of elevated regions in the Rocky Mountains or Colorado. I have examined the types of *Orthosia perpurata* and *Mamestra curta* of Mr. Morrison. The eyes appeared hairy (under a pocket lens) and the species the same. In my own mind no doubt exists that they are both referable to my *Anarta nivaria*. This could not be inferred from the way in which they were described. The specimens are too poor to be perhaps certain that they belong to *Nivaria*. I cannot regard *Promulsa* as a *Dianthoccia*, and Mr. Morrison himself says: "We refer this interesting species to

Mamestra provisionally," and again, "we think that it will probably become the type of a new genus" (Ann. N. Y. Lyc. 97).

To conclude, the genera as arranged in my "New Check List," must be modified so far as the *Heliothinæ* are concerned, from Mr. Smith's observations, but I would refer the student to my paper in Am. Ent. Soc. for what seems to me the most natural arrangement of the genera. The genera of the *Stiriinæ*, here fully discussed, may be placed between the *Calpinæ* and *Plusiinæ*, but their arrangement is somewhat optional so far as our present knowledge extends. They have the body shortly scaled, the thorax short, collar and tegulæ deflected or not closely applied, the abdomen weak, untufted, the shape clumsy. The object of the present paper is attained in showing that the *Stiriinæ* have certain structural features taken from the already indicated sub-family groups with which they have hitherto been associated, but united in a different way, and are thus equally entitled to recognition as a sub-family of Noctuidæ.

NEW TABANIDÆ.

BY JOHN MARTEN, CARBONDALE, ILL.

TABANUS ALLANII. Length 15 mm.

Female.—Eyes naked, no ocelligerous tubercle. Front yellowish-gray; callosity chestnut, nearly square, with an unconnected, spindle-shaped line above. Face and cheeks yellowish-gray. Antennæ reddish-yellow, annulate portion black. Palpi yellowish with white hairs. Thorax and scutellum grayish-black with minute golden-yellow pubescence; humerus reddish-brown when denuded; pleuræ and pectus grayish with white or yellow hairs. Abdomen yellow, segments 4-7 black with yellow hind margins, which are expanded into triangles on the middle of segments 4 and 5; first segment black under the scutellum; second segment with a black triangle on the middle, and the third segment with a dark spot on each side of the middle. Venter yellow with a black line through the middle and tip dark. Legs—femora black, yellow at the tips; tibiae yellow, darker at the tips; outer half of front tibia black; tarsi brownish, front ones black. Wings hyaline; stigma yellowish.

Male.—Differs principally in having the colors brighter; the abdomen

has less black, but there are two rows of black spots on all but the last segment, and is slightly darker on the lateral margins. Tibiæ darker.

From North Carolina.

THERIOPECTES TETRICUS.—Length 17 mm.

Female.—Eyes pubescent, ocelligerous tubercle present. Front black; callosity black, shining, with an unconnected black spot above; sub-callous black, denuded. Face and cheeks black with white hairs. Antennae red, third joint black, upper angle projecting but little. Palpi white with white hairs. Thorax grayish-black with the usual gray lines and gray pubescence; humerus reddish-brown; pleurae and pectus gray with long white hairs. Abdomen black, with three rows of white triangles, the middle row indistinct; the sides of segments two and three reddish; hind margins with a fringe of white hairs, which is wanting between the middle and outer triangles. Venter yellowish-red with gray pollen, darker towards the tip. Femora black, yellowish-brown at the tips; tibiae brown, darker on the distal half; tarsi black. Wings hyaline.

From Montana.

THERIOPECTES FRENCHII.—Length 14 mm.

Female.—Front black; callous dark brown with a line extending above; sub-callous black. Face and cheeks black with white hairs; palpi yellowish with minute black hairs. Antennae red, annulate portion of third joint black, angle not prominent. Thorax black with the usual lines; humerus reddish-brown; pleurae and pectus with white hairs. Abdomen black with three rows of triangles, the lateral rows from segments one to four prominent, middle row largest on second segment, on the other segments only an expansion of the hind margins: lateral margins of segments 4-7 yellow with white hairs. Venter reddish-yellow, darker towards the tip, covered with gray pollen. Femurs black, with whitish hairs, brown at the tips; tibiae brown, with white hairs, darker at the tips; tarsi black. Wings hyaline with faint clouds on the cross veins and bifurcation of third vein.

From Montana.

THERIOPECTES SUSURRUS.—Length 14 mm.

Female.—Front gray; callosity brownish-black with black line above; ocelligerous tubercle brown. Face and cheeks white with white hairs; palpi yellow with minute white hairs, and a few black hairs. Antennae

red, distal half of third joint black, angle prominent. Thorax black with four gray lines: humerus reddish-brown; plicuræ and pectus gray with white hairs. Abdomen black with two rows of triangles on segments one to five, a faint dorsal brownish stripe and a little expansion of the white hind margins on four and five. Venter brownish yellow. Femurs black with white hairs, brown at the tips; tibiae brown, darker towards the tips; tarsi black. Wings hyaline, faint clouds on the bifurcation of third vein and middle cross vein.

From Montana.

ON THE EARLY STAGES OF THE DIPTEROUS FLY, *CHRYSOPILA FOLDA*, LOEW.

BY D. W. COQUILLETT, WOODS FOCK, III.

LARVA.—Body polished, yellowish white, nearly cylindrical, anterior part tapers to the head; eleven visible segments; footless; posterior end of last segment deeply notched horizontally and less deeply so vertically; on each side a small notch above sinus of horizontal notch; on under side of each of the two lobes, formed by the horizontal and vertical notches, is an elliptical, reddish-brown raised spot; on under side of last segment, near the anterior end, is a somewhat conical impressed spot, the base of the cone being at the anterior end of the segment; in the middle of this cone is a longitudinal impressed line; length from 20 to 25 mm.

PUPA.—Cylindrical, of about the same width throughout; dark brown; on each of the six segments, anterior to the last one, is a transverse ridge, armed with minute points; last segment somewhat truncated behind, and armed with a few small points, two of which are placed side by side on the ventral side, and these points diverge from each other; on the front of the head are four very small warts, and at the junction of the head and thorax is a transverse row of six small warts, the second from each end being larger than any of the others; spiracles in the form of rough warts, one pair to each of the last eight segments, except the last one; leg-cases reach to the anterior third of the seventh segment, counting from the hind end of the body; wing-cases reach to the anterior end of the above segment; length about 16 mm.

The larvæ from which the above description was drawn were found

May 4 in a plot of ground where onions had been grown the preceding season. I placed several of them in one of my breeding cages, and by the 10th day of May all but one had pupated. The first flies issued May 22. One pupa worked itself about half way out of the dirt in the morning, and while in this position the fly issued during the day.

The first pupæ found out of doors were taken May 9, and the earliest date of capturing the flies was May 21: three days later several pairs were observed united *in situ*.

For the determination of the above species, I am indebted to Dr. Hagen, who writes me that he has compared my specimens with Loew's types.

NOTES ON THE EARLY STAGES OF *LINUS MACER*, LACONRE.

BY D. W. COQUILLETT.

On the 13th of July, 1881, I saw a female *L. macer* busily engaged in gnawing holes in the stem of a green *Helianthus grosse serratus* (Wild Sunflower). There were several holes in the stem of this plant, and in each I found one or two eggs, of an elliptic ovoid form, polished pale yellow, and measuring about two and one-fourth mm. in length. In the stems of other similar weeds, which grew near to this one, I found several recently hatched larvæ. I examined the stems of this same kind of weed at intervals throughout the summer season, and found the larvæ in different stages of their growth, sometimes two or three in the same plant. Late in October I noticed that many of these weeds had been broken off, and the pieces—from one and a half to three feet in length—were lying about upon the ground. These pieces contained a larvæ—evidently of the above species—and at one end, and occasionally at each end, the pith and woody part had been gnawed away, leaving nothing but the bark, and this had evidently been broken off by the wind. I examined a few of these pieces on the 25th of the following April, and found nothing but larvæ: another examination was made on the 12th of the following month, when nothing but larvæ were found, but all were dead.

From these observations it would seem that the eggs are deposited about mid-summer, the larvæ hatch out in a few days, reach their full growth in three or four months, and hibernate in their burrows as detailed above, assume the pupa form early in the following summer, and are changed to beetles shortly afterward, thus completing their transformations inside of a year.

CIRCULAR OF INQUIRY CONCERNING CANKER-WORMS.

The U.S. Dept. of Agr. in November last issued the following circular:

In preparing a bulletin upon the subject of Canker-worms, to be issued from this Department, I find that much of our present information is of little service, for the reason that until the year 1873 two entirely distinct species of Canker-worms were confounded in description, seasons, habits, and geographical distribution. In many of the publications, of late date even, the distinction is made either not at all or insufficiently.

The most widespread and best known species is the Spring Canker-worm (*Paleacrita vernata*, Peck). The female rises from the ground chiefly in spring, and secretes her ovoid and delicate eggs. The second species is *Anisopteryx pomataria*, Harris, and the female rises chiefly in the fall, and lays her eggs in serried and exposed masses.

Will you please give such information as you possess, especially upon the following points, in regard to the occurrence of Canker-worms in your own locality :

1. Which species, if either, is now found in your own locality, or has ever been found?
2. When was it first observed there?
3. During what years has it been especially injurious?
4. During what years has it been entirely unnoticed?
5. Has the appearance of the perfect or parent insect been confined to either season, the fall or the spring, or has it covered both?

Wherever any doubt can or does arise in regard to the species observed, it is particularly requested that specimens may be sent to the Department. All expenses for packing and postage will be reimbursed to the contributors if a request to that effect is made; or boxes and stamps for the return of specimens will be sent to any who will notify the Department of intention to contribute information and specimens.

Observations may be made during all mild weather from the present month (November) until the middle of June. The more frequent and detailed the observations the greater will be their value. If you have not the time or inclination to make these observations personally, you will confer a favor by handing this circular to some person who will be interested.

Should this circular come to the hands of any entomologist familiar with

the two species, I would respectfully ask of such any information they may possess that will throw light on the range and preferred food-plants of either.

Respectfully,

C. V. RILEY, *Entomologist*.

BOOK NOTICES.

Catalogue of British Coleoptera, by Rev. W. W. Fowler, M. A., and Rev. A. Matthews, M. A., London; West. Newman & Co.

This Catalogue differs in some respects from all preceding lists of British Coleoptera. It is, namely, a partial adaptation of the American views by completely separating the Rhynchophora and Heteromera from the remaining series of the order, and the placing of them after the other series. The changes suggested in the relations of the families of normal Coleoptera, in the system of Drs. Horn and LeConte, are not yet in full favor with the conservative students of Great Britain, but may in future win approval as they become better known.

The American system, as it may be briefly termed, is fully set forth in the revised "Classification of the Coleoptera of North America," just published by the Smithsonian Institution. A notice of this work appears below.

The innovations of the system consist in a re-arrangement of the bulk of the families into four sets: Adephaga, with the most perfected exoskeleton and powers of locomotion; Lamellicornia, with the greatest visceral and nervous concentration, and highest development of sense organs; pseudo-tetramera; the remainder constitutes a vast complex of Clavicorn and Serricorn families, which may be divided into several ill-defined sub-series.

Classification of the Coleoptera of North America: by John L. LeConte and George H. Horn.

Prepared for the Smithsonian Institution, Washington, 1883. Crown, 8vo., 605 pages.

The Entomologists of America are placed under renewed and deep obligations to Drs. LeConte and Horn for this new edition of the classi-

fication of the Coleoptera. More than twenty years have passed since the last edition was issued, and during that time no branch of natural science has made more substantial and rapid progress than this department of Entomology. The number of zealous workers in the field has greatly increased, and the accumulated stores of collectors have been subjected to close examination and critical study, chiefly by the distinguished authors of this work, and the results have added to our list of genera and largely to our list of species, which now includes more than 11,000 in all.

In the introduction the external organization of the Coleoptera is fully treated of, aided by illustrations and followed by a useful series of tables of the various orders. The whole of the classification has been revised and brought into harmony with the present advanced condition of knowledge on this subject. The work is very complete and bears evidence of the vast amount of labor and erudition bestowed on it. Collectors everywhere will find it a most valuable guide in their studies and in the arrangement of their collections.

The Pine Moth of Nantucket, *Retinia frustrana*; by Samuel H. Scudder. Crown 8vo., 24 pages, with one colored plate. Published by the Massachusetts Society for the Promotion of Agriculture, 1883.

We tender the author our sincere thanks for this excellent paper, containing the life history of this new enemy to pine trees, to which is appended a brief account of other native species of *Retinia*. The pamphlet is well gotten up, and the colored plate a chromo-lithograph beautifully executed. It represents the insect in its various stages along with the tips of the injured branches.

Report of the Commissioner of Agriculture, of Washington, for 1881 and 1882; 8vo.

We have been favored with a copy of the full report by the Commissioner, and have also received separate reports from the Entomologists, Prof. C. V. Riley and Prof. J. H. Comstock. The full report forms a large octavo volume of 703 pages, and is illustrated with a number of plates and diagrams. The report of the Botanist on grasses suitable for Texas, has 25 plates; that of the Veterinary division on Swine Plague, Fowl Cholera, and Southern Cattle Fever, 12 plates. The report of the Chemist contains the results of an extended series of experiments on varieties of

sorghum and maize, with results of the analysis of the constituents of these plants at different periods of their growth, particularly in reference to the available sugar contained in them. This valuable section of the work is illustrated by 21 plates, and contains also much other useful matter in reference to analysis of soils, fertilizers, etc. There is also a report from the Superintendent of Grounds, in which he gives the good results of mulching the ground with refuse tobacco stems, as a remedy for thrips on foreign grape vines grown under glass, and submits notes on a number of tropical and sub-tropical plants, some of which might probably be cultivated with success in Southern California or Southern Florida.

That part of the report devoted to Entomology is extremely interesting, and contains much that is valuable; it occupies 154 pages and is illustrated by 20 plates. The chief subjects treated of in Prof. Riley's portion are Silk-culture in the United States; Pyrethrum—its history and cultivation; the Army Worm, Scale Insects of the Orange, including the results of experiments with emulsion of kerosene oil for their destruction; Insects affecting the Rice Plant; Corn Insects, the Cotton Worm, Clover Insects. In that part contributed by Prof. Comstock we find a very complete history of the Apple Maggot; also of some allied species of *Drosophila*; a chapter on Lady-birds, and another on Lac Insects, all illustrated by excellent plates drawn by Mrs. Comstock. Some valuable information is also given on methods for destroying Scale Insects with alkaline solutions.

Insects Injurious to Fruits; by William Saunders. Philadelphia: Lippincott & Co., 1 vol., 8vo., pp. 436.

It is with very great pleasure that we announce to our readers the publication of Mr. Saunders' admirable work on the Insects Injurious to the Fruits of North America,—as the volume includes those affecting the orange, the olive and the fig, we think that we may fairly apply this extended title to it. As the readers of the CANADIAN ENTOMOLOGIST are aware, there is no one in Canada, and very few indeed in the whole of America, so competent as our esteemed Editor to produce a work of this character. It is needless for us, then, to say more in praise of the work than that it is the crowning achievement of one who has devoted a large portion of his time and labor during the last twenty years to the practical study of insects, and whose intimate acquaintance with fruit culture in all

its aspects is only surpassed by his complete knowledge of the insects, both injurious and beneficial, that affect the labors of the horticulturist. The book is written clearly and concisely throughout in our author's well-known terse and vigorous style, and is so free from scientific and technical terms that any fruit-grower, no matter how ignorant of Entomology, can readily obtain from its pages all the information that he can possibly require in reference to most of the insect friends and foes of his trees and bushes. The copious illustrations, moreover, are so beautifully executed and so true to nature that any insect referred to can be at once identified, and the proper mode of dealing with it learnt from the accompanying descriptions. But while the work is so practically valuable to those who are specially interested in fruits, we can assure our *Entomological* readers that they will find the volume to be an admirable scientific compendium, containing an epitome of the collective knowledge of the day, and bringing together into one convenient manual the results of the researches of all the leading Entomologists of America. We do not, indeed, think that we are speaking too highly in praise of the work—though we admit that it is saying a very great deal—when we express our opinion that Mr. Saunders' volume will take rank with that standard of excellence, Harris' *Injurious Insects of Massachusetts*, and that he has done for insects affecting fruits at the present day what his justly famed predecessor accomplished long ago for those injurious to vegetation in general.

The plan of the work, inasmuch as it is intended especially for the use of fruit-growers, is the most satisfactory that could be adopted. The insects treated of are grouped together under the name of the particular fruit that they affect, and are arranged in order according as they attack the root, the trunk, the branches, the leaves, the fruit itself. If, therefore, a gardener finds an insect of whose habits he is ignorant, and whose name he has never heard, doing some damage to one of his fruit-bearing trees, or bushes, or vines, he has only to observe to what part of the plant the attack is directed, and then he can at once turn to an illustrated account of the pest, and learn from it all its life-history and what remedies he may most effectively employ for its extermination. On the other hand, if an Entomologist wishes to know in a condensed form what information is available respecting an insect that comes within the scope of the work, he can at once find what he requires by means of the carefully prepared synonymical list and complete index at the end of the book.

The volume is beautifully printed on fine paper, and neatly bound in

cloth; the illustrations—440 in number—are thoroughly well done by competent artists and engravers. The fruits under which the various insects are grouped are twenty in number, viz., the apple, pear, plum, peach, apricot and nectarine, cherry, quince, grape, raspberry, blackberry, strawberry, red and white currant, black currant, gooseberry, melon, cranberry, orange, olive, and fig. As an example of the completeness of the work, we may mention that no less than sixty-four different species of insects are treated of as injurious to the apple alone, besides a number of beneficial parasites, and that these are made clear to the ordinary reader by one hundred and forty-five wood cuts.

We trust that the work will soon find its way into the hands of every intelligent fruit-grower, and that fresh editions of it may continue to be called for during many years to come.

C. J. S. BETHUNE.

Insects Injurious to Fruits; by W. Saunders. Philadelphia: Lippincott, 1883, 8vo. Illustrated with 440 wood cuts, pp. 436. Dedicated to the Fruit-Growers of America.

No one will deny that this book supplies a long felt want, and supplies it well. The author's long and well-known experience as a fruit-grower and entomologist, gives just the qualifications necessary for such work. He knows exactly what fruit-growers want, and in which way and manner the needed information should be given to be useful and at the same time pleasing. Therefore the plan of this book is simple and to the point; the treatment of the enemies plain and sufficient, without tedious length; the remedies recommended backed by experience, and such as can be used by every one. All this seems very simple and easy, just as if everybody could do it. Often, I suppose, will it be said, Why was this book not published long ago?—It is so eminently practical! But it is much easier to give long detailed descriptions than short ones, specially adapted to certain purposes. It is much easier to enumerate a number of proposed remedies than to select just the right one. After all, we should not forget that during late years the busy and prominent students of economic entomology have advanced this department of the science in a manner never equalled before this time.

The plan of the book is as follows: Twenty different fruits—all eatable without preparation (except quince and olive)—are treated in so many chapters. The insects injurious to them are arranged as attacking root, trunk, branches, leaves, fruit, always followed by the enemies of those

enemies—the beneficial insects. The species are profusely illustrated with excellent, often superior wood cuts; the well-known cuts of Mr. C. V. Riley are largely represented, and rather dangerous for all others.

The plain and judicious manner in which remedies are recommended is a decided and prominent feature of the book. There are no ambiguous, no large-mouthed sentences, no humbug about millions lost by such an enemy, or millions saved by such a remedy. There is nothing but plain truth, said in the most unpretentious words. I think every scientific student is deeply obliged to the author for his happy innovation.

Of course the author has, besides his own large experience, used all the rich and splendid discoveries and observations published by other scientists. The absence of quotation marks is entirely justified, as they belong to the history of the natural history, but not to a practical book intended for fruit-growers. Scientific students know where such facts are published, and the author has in the preface fully satisfied all economic entomologists with his acknowledgments. It is obvious that in a book treating of the history of so many species, omissions and sometimes errors cannot be entirely avoided. Since the book is issued and the errors are insignificant, we may safely leave them to be corrected by the author himself. *Bene meruit!*

DR. H. A. HAGEN.

IMPORTANT TO ENTOMOLOGISTS.

In accordance with a resolution passed at a meeting of the Entomologists in attendance at the Montreal Meeting of the American Association for the Advancement of Science, in August, 1882, authorizing me to call and “to provide for similar meetings for Entomological discussions at the future annual gatherings of the Association,” I herewith name Wednesday, August 15th, 3 o'clock p. m., as the time for the first of the series of the Minneapolis (Minn.) meetings, the place of meeting to be named hereafter.

All interested in Entomology are respectfully invited to attend the meetings, and participate in the discussions. J. A. LINTNER.

Albany, June 1, 1883.

I have gathered, since the leaves fell, twenty-one cocoons of *A. luna*, and each one bears evidence that it was spun after the larva left the tree on which it fed.

WARNER W. GILBERT, Rochester, N. Y.