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NOTES ON CANADIAN SPECIES OF THE GENUS *APANTESIS* (*ARCTIA*), WITH SPECIAL REFERENCE TO THE LARVÆ.

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This paper is not by any means intended to be a full treatment of the species of the genus *Apantesis*, occurring in Canada. There is so much yet to be learned about many of the forms that the preparation of such an article is still quite impossible. The intention, therefore, is merely to present the rather incomplete notes we have made at Ottawa, with the hope that they may be of some use to students who are, or who may become, interested in these insects, and also that it may be seen at a glance what work has been done on some of the species, as well as what is still lacking with regard to others. There is considerable doubt as to the validity of some of the species of this genus, and these doubts can only be dispelled by careful and extensive breeding from the egg, taking accurate notes of the larvæ (in their different stages), the pupæ, etc. Large series of many of the so-called species will have to be bred before definite knowledge can be acquired.

The larvæ of this genus, generally speaking, are much the same in appearance. They are usually blackish caterpillars, with spreading tufts of black or reddish bristles. Taking each species separately, they are not difficult to study, but when one begins to compare large series of closely related species, the task is not by any means so easy. Even among those species which have been most studied, we do not seem to have any constant characters whereby to separate the larvæ, and, in view of our limited knowledge of these creatures, a great amount of work is still to be done. As it should not be difficult to obtain most of the moths where they occur, it is to be hoped that local collectors will endeavour to secure eggs from captured females, and thus provide the means for a better knowledge of the earlier stages of these interesting insects.

In Canada there are, as far as we have been able to find out, at least 20 moths belonging to the genus *Apantesis*, and specimens of all of these

have been examined by the writer. Whether some of these are really worthy of specific rank can only be found out by breeding. Undoubtedly, however, some which are now recognized as distinct by some students, will, when they have been reared in numbers from the egg, be found to be simply forms of some recognized species, and not worthy of a specific name. Doubtless, also, some which have been buried in synonymy by other students, will be found, when their earlier stages are sufficiently known, to be worthy of specific recognition.

The following list covers all forms which we know to occur in Canada. Some of these have never been recorded from Canada before, and it is not unlikely that other collectors may be able to add further to this list :

1. *virgo*, Linn.
 " var. *citrinaria*, Neum. & Dyar.
2. *virguncula*, Kirby.
3. *Michabo*, Grote.
 " var. *minca*, Slosson.
4. *parthenice*, Kirby.
5. *rectilinea*, French.
6. *Anna*, Grote.
 " var. *persephone*, Grote.
7. *ornata*, Packard.
 " var. *achaia*, G. & R.
 " var. *ochracea*, Stretch.
8. *arge*, Drury.
9. *Quensellii*, Paykull, var. *turbans*, Christoph.
10. *obliterata*, Stretch.
11. *Bolanderi*, Stretch.
12. *Nevadensis*, G. & R., var. *incorrupta*, Hy. Edw.
13. *superba*, Stretch.
14. *Williamsii*, Dodge, var. *determinata*, Neum.
15. *phyllira*, Drury.
16. *Celia*, Saunders.
17. *figurata*, Drury.
18. *nais*, Drury.
19. *vittata*, Fabricius.
20. *phalerata*, Harris.

The order of the species as given in Dr. Dyar's new catalogue has been followed.

Among the Arctians which have been sent in for examination, there are nine specimens which we cannot satisfactorily place, and it may be that these may prove to be undescribed. It is not advisable, we think, to describe new species of this genus from a few specimens, even if these seem to be fairly constant. When any of these species which are not now very well known, come to be reared in numbers from the same batch of eggs, doubtless many surprises will be experienced, and characters which in the past have been regarded as important by some students, may prove to be anything but constant. In a genus the species of which show such a wide range of variation, great care should be exercised in arriving at conclusions regarding new forms which may appear, and it will only be when every species has been carefully studied from the egg that definite knowledge can be had regarding the insects which constitute this interesting genus of the Arctiidae.

We have been endeavouring to get some idea of the distribution of the different species, and such results as we have obtained are given below, as well as the dates of appearance of the perfect insects.

1. VIRGO.—This species is well known as a moth, and common in many parts of Canada, particularly so in Manitoba and east of that Province. The mature larva is a beautiful creature, and, as might be expected, is one of the largest of the genus. It is 55 mm. in length at rest, 60 mm. when extended, and 8.5 mm. at widest part. In colour it is a deep velvety black, with bunches of stout black barbed bristles from the tubercles on the dorsum, and reddish bristles from the tubercles on the lower portion of sides and on venter. Some specimens are without any markings on the skin, but others have a striking dorsal stripe, the colour varying—bright yellow, dirty whitish, or orange-yellow. This larva also varies as to the colour of the tubercles. In three specimens the writer bred, tubercle i. was black, ii. black (in one specimen this afterwards changed to reddish), iii. black in two specimens, reddish in one, iv., v., vi., vii. and viii. also varying in colour. (CAN. ENT., Vol. XXXIV., p. 23.) Abdominal feet brownish-red. Specimens of the larvæ, collected at Rosthern, Sask., by Mr. T. N. Willing, and given to Dr. Fletcher, had all the tubercles of a bright reddish colour, the bristles being all foxy red, or smoky, and the skin of some specimens mottled with gray. Some examples had a creamy yellow stripe down the dorsum, and others had this stripe broken up into a double spot on each segment.

Further examples collected at Rosthern, also by Mr. Willing, changed to pupæ on June 17, producing the imagoes on July 15. These larvæ Mr. Willing says were very plentiful on *Thermopsis rhombifolia*, Nutt. Five specimens which had been killed by a fungus, and which were still attached to the plants, were received at Ottawa, and afterwards one pupa, with cast skin attached, and two of the bred moths were sent for examination. All the tubercles in these six specimens are distinctly reddish, and the bristles conspicuously red, of about the same colour as those of *Isia Isabella*, S. & A. The five dead larvæ all show the dorsal stripe.

Larvæ which the writer received from Toronto hibernated in the penultimate stage. Specimens which Mr. D. Brainerd collected at Montreal moulted twice in the spring, as did also four larvæ found at Ottawa in early April, by Mr. C. H. Young. From data at hand it would appear that there is only one brood in the year. It would be interesting to rear a large number of the larvæ from the egg, and note all the differences.

Distribution.—Edmonton, Alta., July (F. C. Clare); Blackfalds, Alta., July 1, 2 (P. B. Gregson); Rosthern, Sask. (T. N. Willing); Beulah, Man. (A. J. Dennis); Cartwright, Man. July 15-30 (E. F. Heath); Aweme, Man., July 27 (N. Criddle); Winnipeg, Man., July 3-19 (A. W. Hanham); Rosseau, Ont., July (A. F. Winn); Orillia, Ont., July 3-17 (C. E. Grant); London, Ont. (W. Saunders); Hamilton, Ont. (J. A. Moffat); Grimsby, Ont., July 20 (W. Metcalfe); Toronto, Ont., July 15, 17 (A. Gibson); Port Hope, Ont. (C. J. S. Bethune); Trenton, Ont., July 13, 19 (J. D. Evans); Ottawa, Ont., June 29, July 7, 12, 15, 22, 24 (J. Fletcher, C. H. Young, A. E. Richard, A. Gibson); Rigaud, Que. (J. E. Desrochers); Montreal, Que., July 19, 21, 27 (H. H. Lyman), July 6-17 (Chas. Stevenson), July (A. F. Winn); Little Metis, Que. (Winn); Rimouski, Que. (Winn); St. Hilaire, Que., July 15 (Lyman); Quebec, Que. (T. W. Fyles); Kamouraska, Que. (Winn); Bic, Que. (Winn); Chicoutimi, Que., July (Winn); St. John, N. B., June 10, July 2, 17, 21, 26 (Wm. McIntosh).

VIRGO, var. *CITRINARIA*.—Mr. J. A. Moffat tells me that he has bred two specimens of this variety, which differs in having yellow secondaries, from a batch of larvæ found at the same time at Hamilton, Ont.

2. *VIRGUNCULA* has a wide range of distribution. In Ontario it is a common species in certain districts, but very rare in others. At Toronto during some seasons I have found the moths exceedingly abundant. The life-history of this Arctian was published by the writer in the *CANADIAN*

ENTOMOLOGIST, Vol. XXXIII., p. 325. The mature larva is smaller than that of *virgo*, measuring about 35 mm., and when extended 40 mm.; head black, median suture pale in some specimens, as also the lower half of the epistoma. The skin of the body in some examples is wholly velvety black, in others the same colour but shading to grayish black subventrally. The tubercles are all black, the bristles being distinctly barbed, those from the dorsal tubercles being black, while those from the subventral tubercles are bright rust-red; prolegs, upper portion black, lower portion reddish. None of the larvæ had any markings on the skin. Specimens collected on April 8, at Toronto, only moulted once after coming out of hibernation, and at Montreal, Mr. Brainerd tells me that larvæ which he had, moulted only once in the spring before spinning up. From eggs laid in June we reared moths in August, but many of the larvæ which were mature (Stage VII.), instead of changing to pupæ as the others did, stopped feeding about the middle of August and acted as if they wanted to hibernate. *Virguncula* ought to be bred again to see just to what extent the larvæ vary, and if they ever possess the dorsal stripe. The late Mr. T. G. Priddey, of Toronto, made large collections of these larvæ, but, unfortunately, did not publish any of his observations. Writing on March 20, 1901, he says: "Now is the time to get *Arctia virguncula* larvæ. The first soft day after the dry grass is released from the frozen snow, they generally show themselves for a short time, along with *Spilosoma virginica*, basking on the tops of grass; after then they are hard to find, as they hide away during the day."

Distribution.—Calgary, Alta., July 27, Aug. 18 (F. H. Wolley-Dod); Saltcoats, Assa., July 12 (Willing); Cartwright, Man., June 29, July 3 (Heath); Sudbury, Ont. (Evans); London, Ont. (Saunders); Orillia, Ont., July 5-10 (Grant); Wabigoon, Ont., Aug. 24 (W. McInnis); Toronto, Ont., June 6, 14, 16, 18, 23 (Gibson), June 16, 24 (W. Metcalfe), May 23, June 6 (J. McDunnough); Hamilton, Ont. (Moffat); Trenton, Ont., June 19 (Evans); Ottawa, Ont. Aug. 5 (Gibson); Meech Lake, Que., Aug. 25, 3 worn sp. (Young); Montreal, Que. (Brainerd), July 3 (Lyman), May 24, June 13 (Winn); Cowansville, Que. (Fyles); St. John, N. B., July 9, "rare" (McIntosh); Anticosti Island (W. Couper).

The specimen of the moth which the writer found on the 5th Aug., at Ottawa, was not a complete specimen, but simply one of the primaries of presumably a male, which had become caught in the gauze covering

one side of a mating cage, in which were two males and two females of *naïs*.

3. *MICHABO*.—This species must be very rare in Canada, as we have records of only four specimens having been taken. A coloured figure of the moth is given on plate XLVIII. of Hampson's recent "Catalogue of the Lepidoptera Phalaenæ in the British Museum." Not having seen a good series of this species, I take the liberty of quoting from Dr. Dyar (Jour. N. Y. Ent. Soc., Vol. VIII., p. 36, as follows: "*Michabo* is a peculiar form, in markings close to *virgo*, but in colour so near *arge* that the two are liable to be confused, and have been so in some collections. It is a simpler form than *arge*, the bands retaining their usual shape, only the inner one being occasionally somewhat tooth-like" "The larva doubtless hibernates full-grown. No description is extant, but fortunately I have a blown larva before me from the Riley collection, as well as cast skins from the Department of Agriculture, and some notes (Dept. Agr. No. 2588). The larva is grayish black, head black, the body rather grayish brown, with a broad, distinct, straight, cream-coloured dorsal stripe. Hair rather long and, though coarse, somewhat soft and brownish. Spiracles white. The notes add a more or less interrupted white subdorsal line, but it does not show in the blown or alcoholic specimens nor in the cast skins. The larva is a close ally of *arge*, but differs in the absence (or reduction) of the subdorsal lines. The full life-history is needed."

Distribution.—Grand Forks, B. C., June (H. Brainerd). This specimen is in the collection of Mr. A. F. Winn, of Montreal, who kindly gave me the particulars. Calgary, Alta., June 9 (Wolley-Dod); Aweme, Man. (Criddle).

MICHABO, var. *MINEA*.—A single specimen of the variety, which has been so identified by Dr. Dyar, was sent from Osoyoos, B. C., to Dr. Fletcher by Mr. C. deBlois Green.

4. *PARTHENICE* is by no means uncommon. The moths appear usually in late July and August, generally about the middle of the latter month. Small specimens of *virgo* are often confused with *parthenice*, but the former species can readily be distinguished by the broad lining of the median vein, and the two, or more, discal spots of the secondaries. *Parthenice* has but one discoidal spot. I have never seen the larva of this moth. Saunders describes it as black, with a flesh-coloured dorsal stripe, tubercles yellowish, bearing tufts of stiff hairs which are black on the dorsum and brown on the sides, and feet and prolegs yellowish, tipped with black

The life-history of this species is needed, and, as the moths are fairly common, it ought not to be difficult to obtain eggs. Males of the species were abundant at light, near Ottawa, in August last, but, unfortunately, no females could be captured, or doubtless we could have secured ova.

Distribution.—Victoria, B. C., June 27 (E. M. Anderson); Calgary, Alta., July 23, 25 (Wolley-Dod); Blackfalds, Alta., August (Gregson); Prince Albert, Sask., July 6 (Fletcher); Beulah, Man., July 15, 21, 22 (Dennis); Aweme, Man. (Criddle); Winnipeg, Man., July 18, 19, 27 (Hanham); Cartwright, Man., July, Aug. (Heath); Sudbury, Ont., July 27 (Evans); London, Ont. (Saunders); Amherstburg, Ont., early Sept. (E. B. Reed); Hamilton, Ont. (Moffat); Cæsarea, Ont., Aug. 12 (Gibson); Grimsby, Ont. (Metcalf); Toronto, Ont. (Bethune, Gibson); Cobourg, Ont. (Bethune); Port Hope, Ont. (Bethune), Aug. 13 (Metcalf); Rosseau, Ont., July 28 (Winn); Orillia, Ont., Aug. 10, 17, 18, 31, Sept. 2 (Grant); Trenton, Ont., July 30, Aug. 23-27 (Evans); Ottawa, Ont., Aug. 6, 10, 13, 14, 16, 19, 27 (Fletcher, Young, Richard, Gibson); Meech Lake, Que., Aug. 16, 19, 22, 31, Sept. 6, fresh specimen (Young); Rigaud, Que. (Desrochers); Montreal, Que. (Brainerd), Aug. 9 (Lyman); Murray Bay, Que., Aug. (Winn); Roberval, Que., July 27 (Lyman); Little Metis, Que., July, Aug. (Winn); Quebec, Que., Aug. 6 (Fyles); Jaquet River, N. B., August (Winn); St. John, N. B., Aug. 1-15 (McIntosh).

5. RECTILINEA.—This Arctician is very rare in Canada. We have only three records of its occurrence. The species is supposed by some to be the same as *phyllira*, and larvæ which the writer had from eggs, with the female *rectilinea* correctly associated, certainly answered very well to the description of the larva of *phyllira* as published by Packard. The eggs of *rectilinea* above mentioned were received from Mr. A. Kwiat, of Chicago, and were laid on the 27th and 28th Aug., and hatched on the 5th and 6th Sept. The following notes were taken on the larval stages:

Stage I.—Length when hatched 1.8 mm. General colour dirty whitish, after feeding greenish brown. Head 0.3 to 0.37 mm. wide, black, mouth-parts reddish. Thoracic shield black. Tubercles blackish; bristles long, blackish from dorsal tubercles, and silvery from lateral tubercles. Tubercle i. very small, ii. and iii. large, of about same size, iv. and v. smaller than ii. and iii.; i., ii., iii., iv. and v. are surrounded more or less with reddish brown. In some specimens this colour is hardly perceptible. Bristles from tubercles barbed. Thoracic feet black; prolegs rather paler than venter, semi-translucent.

Stage II.—Length 3 mm. Head 0.4 to 0.45 mm. wide, black, shiny, slightly bilobed; mouth-parts reddish. Body pale brownish, the green food contents showing slightly, more or less, through the skin. Tubercles all shiny black, and large, with exception of i., which is very small; each tubercle but i. bearing a bunch of barbed bristles, those from the dorsal tubercles black, others silvery, or whitish. All the segments are marked with reddish brown blotches and spots. Spiracles black, very small, almost touching tubercle iv. Thoracic feet darker than venter and rather translucent; prolegs paler than venter, setæ short and pale.

Stage III.—Length 6 mm. Head 0.6 to 0.67 mm. wide, black, shiny. In general appearance the larvæ may be said to be black, with pale, slightly yellowish, dorsal, lateral and stigmal stripes. On examination with a lens, however, the skin is seen to be pale, but thickly mottled and suffused with dark brown. All the tubercles are shiny black, and, with the exception of i., large. Tubercles as before, ii. with a polished base. Bristles black, with exception of those from lower lateral tubercles, which are pale. Tubercles on dorsum of segments 12 and 13 bear a few extra long bristles. Thoracic feet shiny black; prolegs concolorous with venter; setæ pale and short. Towards the end of the stage the larvæ lose their dark colour, changing to a reddish brown.

Stage IV.—Length 7.5 mm. Head 0.9 to 1.0 mm. wide, black. In general appearance black larvæ with black bristles, and a pale yellow dorsal stripe, also an indistinct lateral stripe. The skin on the sides of body shows some green, the venter being paler. Tubercles black, bristles barbed, from all tubercles above spiracles pure black. Bristles from lower tubercles mostly pale, rather reddish. Dorsal stripe clear pale yellow, expanded almost into a spot on the middle of each segment. Spiracles small and black. Thoracic feet shiny jet black, prolegs concolorous with venter.

Stage V.—Length 10.5 mm. Head 1.2 mm. wide, black, cheek above ocelli brown; epistoma pale. Body black; dorsal stripe as in last Stage, skin between tubercles ii. and iii. yellowish. Tubercle i. small, ii. large, both i. and ii. black, ii. with a polished base; iii., iv. and v. are now partly brownish yellow, vi., vii. and viii. wholly black. Skin of body below tubercle ii. not so black. Spiracles small, black, round, just in front of tubercle iv. Bristles from tubercles as before, but the pale bristles below spiracles, in some specimens, do not show any red. Thoracic feet as before; prolegs, upper portion shiny black exteriorly, paler below.

Stage VI.—Length 15 mm. Head 1.6 mm. wide, as before, median suture in some specimens pale. In general appearance the larvæ in this Stage are black, hairy caterpillars, either with a dorsal stripe (indistinct or absent on posterior two segments of body) of bright yellow, expanded almost into spots as in Stage iv., or a series of spots, one on each segment, down the middle of the dorsum. In all specimens along the upper portion of sides is also a series of paler yellowish spots. Tubercles as in last Stage, the summits of iii, iv. and v. being pale brownish yellow. Bristles from dorsal tubercles black. In most specimens those from iv. are black, from v., vi., vii. and viii. pale, slightly rusty. Thoracic feet black, shiny; prolegs, upper two-thirds black, lower third pale greenish brown; claspers blackish gray.

Stage VII.—Length 21 mm. In general appearance, black hairy larvæ, with a row of small yellow spots down the dorsum, and conspicuous rows of yellowish subdorsal and lateral tubercles. Head 2.0 mm. wide, subquadrate, flattened in front, slightly bilobed, shiny black; ocelli black; epistoma dull whitish-brown; cheek above ocelli near segment 2 pale brownish; antennæ whitish-brown at base, remainder blackish. Body cylindrical, segments rather deeply divided. Skin dull grayish black, overlaid with patches and streaks of rich velvety black, particularly dorsally and laterally, giving a deep black appearance. Dorsal stripe broken up into a row of yellow spots. All the tubercles, with but few exceptions, yellowish, with a black base, the subdorsal and lateral series most conspicuous. Tubercle i. small, about one-ninth the size of ii., which has a broad polished base. Spiracles black, with a dull yellowish centre, close in front of tubercle iv. Bristles barbed, those on dorsum mostly black, on lower portion of sides pale. Thoracic feet black, shiny; prolegs pale, each with a large black shiny plate anteriorly.

The above larvæ when they stopped feeding were put outside for the winter. Unfortunately, however, none of them came through alive, so we were unable to breed a series of the moths. Possibly some of us may again be fortunate enough to obtain eggs, and rear the species to maturity.

Distribution.—Calgary, Alta. (Willing); Beulah, Man., July 14 (Dennis); Aweme, Man., Aug. 6 (Criddle).

6. ANNA.—This species also seems to be rare in Canada. In 1896 I collected six specimens of the variety *persephone*, and at that time associated them with *virguncula*, probably because they occurred at the same time, and I thought bore a somewhat close resemblance to that species.

Persephone, however, is a larger form than *virguncula*, and the fore wings are more like those of *parthenice*, but the markings are much heavier. *Anna* differs from the variety *persephone* chiefly in having the hind wings wholly black. The larval stages of the *persephone* form were described by Dr. Dyar in Vol. 8, p. 53, of *Psyche*. These larvæ were entirely deep black, with shining tubercles, and stiff black bristles alike in colour throughout. We have never had an opportunity of studying the earlier stages of this species at Ottawa, as it does not occur here to our knowledge. Some of our members may be fortunate enough some time to get ova, and if so it would be interesting to know just to what extent the larvæ vary.

Distribution.—Typical *Anna* has been taken at Toronto, Ont., June 20 (Metcalf), and at London, Ont.; the variety *persephone* at Hamilton, Ont. (Moffat); Toronto, June 6, 27 (Gibson), June 3, 4 (McDunnough); June 18 (Metcalf); Springfield-on-Credit, Ont. (Bethune).

7. *ORNATA*.—This is a western species occurring in Canada, as far as we know, only in British Columbia. It is a rather large, handsome Arctian, some specimens measuring $1\frac{3}{4}$ inches in expanse of wings, but the average width is $1\frac{1}{2}$ inches; a series of the moths will show great variation. Typical *ornata* seems to be rare, most of our specimens and those we have seen being either the form *achaia* or *ochracea*, of which the veins on the primaries are lined. The colour of the secondaries in the species varies from yellow to red. During the past summer Mr. J. W. Cockle, of Kaslo, B. C., kindly sent us a batch of eggs of *ornata*.* These were laid on the 30th June and hatched on the 8th July. The following notes were taken on the larval stages:

Stage I.—Length at first 2.2 mm. Colour whitish, after feeding greenish. Head 0.4 to 0.45 mm. wide, dark brown, shiny. Cervical shield concolorous with head. On each segment there is the usual row of transverse tubercles; these are black; i. small, ii. large, iii. nearly the same size as ii., iv. and v. smaller. Setae long and slender. Tubercles ii., iii., iv. and v. are faintly surrounded with reddish brown. Feet concolorous; thoracic feet semi-translucent.

Stage II.—Length 4 mm. Head 0.5 to 0.6 wide, pale brown, darkened at inside apex of cheeks; ocelli black; mouth-parts reddish. Body pale greenish, with a light bluish dorsal stripe. Cervical shield and

*The female which laid the eggs has since been received, and submitted to Dr. Dyar, who has confirmed our identification.

tubercles black, shiny; tubercles ii., iii., iv. and v. as in last Stage, blotched anteriorly and posteriorly with reddish brown. Mostly black bristles from i., ii. and iii., the others silvery; from lower tubercles mostly silvery bristles, only a few black ones. Bristles barbed. Spiracles black, small, close in front of tubercle iv. Feet concolorous with venter, semi-translucent.

Stage III.—Length 6 mm. Head 0.75 to 0.9 mm. wide; inside half of cheek dark brown, outer half pale brown; ocelli black; mouth-parts reddish-brown; some heads much darker than others. In general appearance the larvæ are brownish caterpillars, with a pale blue dorsal stripe. The tubercles are black and shiny; bristles barbed, from i. and ii. all black, except on thoracic segments, where there are a few silvery bristles; from iii. and iv. mostly black, a few silvery; from lower tubercles mostly silvery. Tubercle i. small, ii. large and with a polished base. Skin of body from the dorsal stripe to lower edge of tubercle ii. pale brown, with a greenish tinge. Between ii. and iii. the skin is pale greenish-yellow, and between iii. and iv. and below iv. the skin is blotched with brown. Venter greenish. Feet semi-translucent. Segments 11, 12 and 13 bear a few very long silvery hairs.

Stage IV.—Length 8.5 mm. In general appearance dark brown, with a pale, bluish-yellow dorsal stripe. Head 1.0 to 1.1 mm. wide, as in last Stage. Tubercles and bristles as in last Stage, some very long slender hairs from segments 12 and 13. Spiracles small, black, close in front of tubercle iv. Later in the Stage the larvæ, under a lens, appear as greenish caterpillars, rather densely blotched and splashed with reddish-brown, and the dorsal stripe loses to a great extent its bluish-yellow colour, becoming rather inconspicuous. The skin along the side just above tubercles iii. and iv. has a yellowish tint. Thoracic feet brownish, rather translucent; prolegs concolorous with venter.

Stage V.—Length 12 mm. Head 1.2 to 1.3 mm. wide, black, with exception of brownish patch just above ocelli. Skin under a lens is brownish, bearing blotches of velvety black. A few days after moulting the blotches are more of a dark purplish shade, or a dull reddish brown. In most specimens the dorsal stripe has disappeared, but in some it is still apparent under a lens. Tubercles as in last Stage; bristles faintly barbed. The bristles from tubercles i., ii., iii. and upper half of iv. are black, those from lower half of iv., and from v., vi., vii. and viii. pale rusty. Spiracles small, black, close in front of tubercle iv. The two posterior segments

bear some extra long slender hairs as before. Venter much paler than dorsum, of a greenish-brown tinge. Thoracic feet shiny black; prolegs concolorous with venter.

Stage VI.—Length 17 mm. Head 1.4 to 1.6 mm. wide, subquadrate, slightly depressed at vertex; black, shiny; epistoma pale; mouth-parts reddish; setæ black and slender; cheek above ocelli pale brownish, mottled with darker brown. Skin of body velvety black on dorsum, grayish-green ventrally. No markings on the body. Tubercles black; bristles from i., ii., iii. and iv. black, those from v. and lower tubercles pale rust-red; bristles faintly barbed. Some long, slender bristles from dorsum of two posterior segments as before. Thoracic feet black, shiny; prolegs reddish. Larvæ do not vary.

On the 3rd September 21 specimens were living, and as they were not feeding very much and looked unhealthy, they were put outside. Later, when they were examined (25th Oct.), every specimen was found to have died. Mr. Cockle retained some of the eggs himself, but he has since told us that his larvæ also suffered a similar fate. Possibly during the coming season eggs may again be secured and more successful results obtained. Mr. Cockle states that the moths are rare at Kaslo.

Distribution.—Specimens of *ornata* have been taken at Osoyoos, B. C. (C. de B. Green); Kaslo, B. C., June 30, July 2 (Cockle); of the form *achaia* at Osoyoos, B. C. (Green); Kaslo, B. C., July 25, 26 (Cockle); of the form *ochracea* at Kaslo, B. C., June 8 (Cockle); Victoria, B. C. (Fletcher), June 7, July 17 (Anderson).

8. *ARGE* is well known, and rather widely distributed in the eastern part of Canada, though I do not think it can, with us, be considered a common species. It seems to be double-brooded. We have no records of any specimens having been taken west of the Province of Ontario. An interesting account of the species has been recently published by Dr. Seifert,* accompanied by an excellent plate showing the variation in the imagoes. The mature larva measures nearly $1\frac{3}{4}$ inches in length, and is grayish black, overlaid, especially on the dorsum, with patches of velvety black. The dorsal and subdorsal bands are cream colour, shaded with pink, and are wide and very distinct. The infra-stigmatal band is nearly the same colour, but is waved and broken, and not nearly so distinct. The tubercles are dull blackish, not polished. The bristles are faintly barbed and rather long, brownish or gray, excepting those from lower

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lateral tubercles, which are rusty. Full-grown larvæ have been infrequently met with at Ottawa in early October.

Distribution.—Hamilton, Ont. (Moffat); Toronto, Ont. (R. J. Crew, Gibson); Trenton, Ont. (Evans); Ottawa, May 27, 28 (Young), Aug. 27 (Fletcher); Rigaud, Que. (Desrochers); Montreal, Que., July 15 (Stevenson), Aug. 12 (Norris); Belœil, Que. (Brainerd).

(To be continued.)

A DAY'S COLLECTING IN FEBRUARY.

February 12th (Lincoln's Birthday), of this year, was unusually warm and spring-like. The temperature rose as high as 52°, and the clear sky and little wind made it a joy to be out in the open, in the sunshine.

I went to Staten Island that day, with the intention of working up some Orthoptera with Mr. W. T. Davis, but the feel of spring in the air was irresistible, and as I was anxious to secure aquatic Hemiptera as early in the season as possible, we went by trolley to some woodland ponds near Richmond. The fields were very wet on the way, but hopping among the dry leaves were young grasshoppers, emerged from their winter's sleep. Some Diptera also were hiding among them, and they were quite active when disturbed.

When we arrived at the pond, a disappointment awaited us. It was nearly all frozen over! However, we pushed through the brambles to the edge, and began to fish under the thin ice. I took on this side of the pond two *Corixa Harrisii*, active. Working our way along the side to the end where the outlet was, we found the water free from ice. On the surface, two species of Podurans were abundant, and an immature Jassid was floating and jumping. We got none of these. Water beetles, also, were swimming about.

The sun, meantime, was melting the ice, and as we got to the opposite side from where we started, quite half the pond was clear. On this side, Haliplidæ and Dytiscidæ were more abundant, swimming freely or else clinging to the stems of the bushes rising from the water, sunning themselves.

On the trunk of a white birch I saw an *Acilius semisulcatus*, about six inches from the surface, on the sunny side. It was alarmed by the noise I made, and dropped into the water. Contrary to what seemed to be the rule, this beetle submerged itself with great ease.

Here, also, I took a Haliplid from a bush, on which there were a

number resting an inch or two from the water. These, however, seemed to be somewhat torpid, as they could be brushed into the net easily, and lay there motionless. Those that fell into the water seemed to experience great difficulty in getting under. We also took two other species of these and a small Hydrophilid, swimming.

As we sat at lunch, several species of Diptera were flying about. We also saw a Hemerobian and one of the Microlepidoptera, which we failed to catch.

We had by this time exhausted the possibilities of this pond, so went to another about a hundred feet away. This was even more disappointing. Thick ice covered it everywhere, except around the roots of a large apple tree, where there was a clear space of about a foot. This was swarming with the Crustacean *Branchippus*.

I wanted to get some Hydrobatidæ, as well as more of the other aquatic, and Mr. Davis suggested Richmond Brook, where we went across fields. The earth was simply sodden.

In the brook there was more life and better collecting. *Gerris remigis* was quite abundant, active, and, in some instances, *in copulo*. Between Mr. Davis and myself we took about 30 specimens. They were found in the backwaters under the overhanging banks, or hiding among the drift.

Clinging to the grains of sand or to small pebbles, in the quieter, deeper portions of the stream, were numbers of another species of *Corixa*, which I have not as yet determined. These insects were exceedingly active and lively, and scurried away before the net like a flock of birds, but we caught many, nevertheless.

On the surface, in some portions, a small Perlid, *Capnia necydaloides*, was to be seen lightly floating. One I took from a *Gerris* that was feeding on it. Several others Mr. Davis and I took as they floated on the water, and two were caught on the white surface of a recently-cut stump, which seemed to have a great attraction for them. When we sought to capture them they ran swiftly away without attempting to take flight, and hid in the cracks of the bark, with which they harmonized in colour.

We also observed some Chironomids resting on the stream; and under stones and among trash at the bottom, Perlid nymphs and Ephemeropterid larvæ were abundant. In a sandy, shallow spot we saw a number of tubes, possibly about two inches long, rising into the water from the bottom, but we did not find the maker. These seemed to consist of silk,

and were coated with grains of sand, which made them about the thickness of a pipestem.

When we left the brook on our return home, we felt that we had had a very successful day. We had gone really on a venture, and we had found much more than we expected, and had a delightful outing into the bargain.

In the early Spring, on such days as this, aquatic insects can be very profitably collected, especially for life-history work. They are active long before any others, as soon as the ice begins to disappear, and present a practically unexplored field to the earnest entomologist. To the mere collector they offer no inducement to compensate for the labour of collecting them, and are exceedingly uninteresting, being ordinarily inconspicuous, sombre in coloration and retiring in habit. But to the scientific worker they present some of the most interesting adaptations to environment and conditions in the entire field of entomology.

Two days later I went to the Mosholu locality in this vicinity, and my experience there illustrates this point. Although I spent a good deal more time there, I saw but few insects flying, all Diptera. My catch was all Coleoptera, none active, all hibernating under stones, and consisted principally of Staphylinidæ, some Carabidæ, one Elater; and also, one active Jassid, undetermined. It was not as good in numbers or variety as the one of the 12th, although the latter locality in Summer is very rich in species and abundant as to numbers.

J. R. DE LA TORRE BUENO, New York.

ÆGIALITES DEBILIS, MANN.

Leconte and Horn, in their "Classification," say of this beetle: "It is of such extreme rarity as to have been seen by but few entomologists." It was with considerable interest, therefore, that I captured my first specimen one March afternoon in 1894. I was lying on a pebbly sea beach, turning over stones, when I came upon *Æ. debilis* on the under side of a stone. From Leconte's description I felt pretty sure that my identification was correct, and it was subsequently confirmed by Dr. Fletcher, of Ottawa. Leconte says the beetle is black, but he had probably seen only dried specimens. Freshly-taken specimens show a distinctly green tinge. The insect is about .15 inch long, and in general shape suggests a small carabid.

Many a subsequent search in the same locality proved fruitless, for the insect's proper habitat, as I afterwards discovered, is not among loose

stones. It is essentially a rock-frequenting species. It occurs in large numbers in some conglomerate boulders on the northern shore of the Queen Charlotte Islands. These boulders lie about half-way between the tide-marks, and the large pebbles embedded in them have become loosened by the action of the water, but still remain in their matrices. It is between these pebbles and the matrices that the beetles live, their compressed forms admirably adapting them for moving in so confined a space.

On the mainland of British Columbia, opposite the Queen Charlotte Islands, the beetle again occurs in considerable numbers. There the shore rocks are of a slaty formation, and the action of the tide tends to separate portions of them into large flakes, beneath which the beetles find congenial shelter. On removing one of these flakes with a chisel a whole colony of *Æ. debilis* is disclosed. I feel sure that the insect might be discovered in many places along our Pacific coast, if carefully sought for. For a long time this beetle was the only representative, not only of its genus, but of its family. Professor Comstock states, however, in his Insect Manual, that another species has recently been taken in California.

The beetle is active all the year round. This morning (Feb. 14th), wanting to examine a few living specimens, I had no difficulty in procuring all I needed, though the ground is frozen hard and covered with snow. I have seen it copulating in February, and have taken both larvæ and pupæ in July. It is extremely deliberate in its movements. Its sharp claws enable it to adhere so firmly to the surface of the rock that it is sometimes difficult to dislodge it without injury. Unlike other marine species with which I have experimented, it shows no objection to entering the water, but does so readily from the top of a half-submerged stone. It seems helpless when floating on the water, but can sink at will when once beneath the surface. I placed some specimens on a stone in a dry dish, and gradually added sea-water till the stone was submerged, imitating the approach of the tide. The beetles remained stationary, and allowed the water to cover them, when a large bubble of air could be seen under their partly raised elytra.

I am in want of a few popularly interesting beetles (*e. g.*, glow-worm, fire-fly, Egyptian sacred beetle, Pyrophorus, Noctilucus, etc.) for use in lectures to young people. I would gladly send a series of *Æ. debilis* to any entomologist who might care to make the exchange.

J. H. KEEN, Metlakatla, B. C.

NEW NOCTUIDS FOR 1903, No. 3—WITH NOTES ON SOME DESCRIBED SPECIES.

BY JOHN B. SMITH, SC. D., RUTGERS COLLEGE, N. J.

The first paper of this series is in the January number of this Journal (pp. 9-14); the second is in the April issue of the Journal of the New York Entomological Society. The present instalment deals chiefly with species found in the Western Provinces of British America and a few others that are likely to occur there. The determination of a new species of *Raucora* from Calgary and Manitoba makes some general remarks on that genus timely. There is a number of excellent collectors now hard at work on the Noctuid fauna of that general region and extending westward to Vancouver, whose work deserves the greatest praise and to whose efforts is due the development of a totally new faunal region for this family of moths.

Acronycta tartarea, n. sp.—Head, thorax and outside of tibiæ blackish; orbits of the eyes nearly white. Primaries uniform, very deep smoky, almost black; the maculation neatly written in velvety black. There is a black basal streak to the t. a. line, which is most obvious at this point, fading toward the costa and inner margin; there is a little spur at the middle of the streak beneath, and above it is bordered by a narrow white line. T. a. line almost obsolete, geminate, outwardly oblique. T. p. line velvety black, preceded by a whitish shade, broken, squarely exerted over the cell, deeply incurved below, the black lunate mark in the submedian interspace forming the most prominent part of the wing. A black streak begins just within the centre of this mark, crosses it and reaches the outer margin above the inner angle. Three white costal dots between t. p. and s. t. lines. S. t. line whitish, diffuse, broken, followed by small black interspaceal spots. A series of black terminal lunules, preceded by whitish shadings. Fringes smoky at base, outwardly white. Orbicular moderate, round, black-ringed, inwardly edged by white scales. Reniform rather large, broadly lunate, narrowly outlined in black, inwardly edged by sparse white scales, centre a little brown tinged. Secondaries white, with a smoky outer border, broadest at apex, and nearly lost at anal angle. Beneath: primaries smoky, the margins paler; a vague pale extra-median line. Secondaries more powdery, with a distinct discal spot.

Expands.—1.40 inches—35 mm.

Habitat.—Calgary, Alberta, June 23, head of Pine Creek.

One almost perfect male from Mr. F. H. Wolley Dod. This is, to my mind, one of the handsomest of our species of *Acronycta*. It resembles a somewhat undersized very dark even *grisea*; but it is actually nearer to *falcula* in structure and details of maculation. I have never seen any tendency in either *grisea* or *revellata* to vary in this direction and believe I have a good species.

Noctua Trumani, n. sp.—Ground colour luteous brown, varying a little from a rusty to a smoky tinting. The head and the tips of the palpi may be paler, more yellowish. Thorax concolorous, collar and patagiæ fairly marked, vestiture rather loose, hairy, with the scaly admixture slight. Primaries without contrasts save that sometimes the reniform, and more rarely the orbicular, are obviously paler than the rest of the wing. All the usual lines are present, slender, brown, very slightly relieved. Basal line single, slender, evenly curved, tending to become lost in the darker specimens. T. a. line single, slender, somewhat irregular, a little outwardly curved in the interspaces, and as a whole a little outwardly oblique: it tends to become lost in the darker examples. T. p. line single, slender, blackish, crenulate, in course parallel to the outer margin, tending to break up into a series of venular dots, which are obvious in all the specimens before me. S. t. line pale, rather even, somewhat diffuse, preceded by a slightly darker shading in the s. t. space, and sometimes further relieved by a darker tint in the terminal space: the tendency is to obscure the line, and in one example it is marked only by the dusky s. t. shade. A dusky terminal line and a yellow line at the base of the dusky fringes. A dusky, somewhat diffuse median shade is obvious in some specimens, extending from the costa between the ordinary spots and from the lower edge of the reniform nearly direct to the inner margin. This shade may be entirely lost, but usually the darkening of the cell between the ordinary spots remains, and even more generally the dusky shade at the lower end of the reniform. Claviform indicated in one specimen only by a line of darker scales, and may be said to be wanting. Orbicular round or a little oval, moderate in size, more or less completely outlined by dusky scales, sometimes annulate with yellowish and sometimes entirely paler than the ground colour of the primaries. Reniform of good size, kidney-shaped, the sides defined by dark scales, upper and lower margins often indefinite, middle of the spot more or less obviously yellow, sometimes contrasting quite strongly, sometimes scarcely relieved from the ground. Secondaries in the male pale yellowish, veins smoky,

with a smoky outer border, through which there is a more or less obvious yellowish shade line: in the female the wings are uniformly smoky, with somewhat contrasting yellowish fringes. Beneath, primaries smoky brown, paler outwardly, more or less powdery, with a more or less obvious smoky outer line: secondaries pale dirty yellowish, powdered along the costa, with an outer extra-median smoky shade line that may cross the costal region only and rarely attains the inner margin.

Expands.—1.20–1.36 inches = 30–34 mm.

Habitat.—Volga, South Dakota.

Four males and one female, in fair condition. Some time before his death the late Judge P. C. Truman sent me several boxes of Noctuids, supposedly duplicates, intended to give me an idea of the general character of his local fauna. The specimens were unmounted and were picked over from time to time to get such species as were being studied. Recently the entire material has been spread, and I find in it the species here described, obviously resembling the *rubifera* series of *Noctua*, but differing from all in the robust build, subequal stumpy primaries and yellowish secondaries, which, in the male, have a broad outer dark shade, in which is a yellowish band. The male antennæ are distinctly ciliated, and the genitalia are unique in having at the lower margin of the harpes a prominent tooth-like process. The tip is gradual, somewhat pointed, and has a dense brush of spinules. The clasper is very stout, short, curved, abruptly drawn into a slender pointed tip. The single median lines, and especially the crenulate t. p. line, are characteristic, while the first impression gained by the wing form is that of a *Taeniocampa* belonging to the *rufula* series.

It is more than probable that this species will be found in the collections of those who have made exchanges with Judge Truman, and it is almost certain to be represented in the collection left by him.

Feltia obliqua, n. sp.—Ground colour ranges from dark luteous brown to smoky or even blackish brown. Head rusty brown, with a more or less obvious dusky line across the front. Collar inferiorly dark brown, limited above by a black line: upper half pale brown, based by a whitish line that serves to relieve the black central line which it borders. Thoracic disk paler than primaries, with a grayish tinge. Primaries very evenly coloured, except that the upper half of wing to the t. p. line is somewhat darker, the markings neatly written and not contrasting. Basal line geminate, black, marked over costal area only, very close to the root

of the wing. T. a. line geminate; inner line scarcely defined, outer line black, included spaces usually a very little paler; in course inwardly oblique from the costa to the internal vein, then with a long outward tooth that nearly or quite reaches the middle of the margin. T. p. line geminate, inner line black or blackish, crenulate; outer line obscure, even, punctiform or entirely lost beyond the costal region: the line as a whole very little outcurved over cell. S. t. line very narrow, pale, strongly denticulate, preceded or followed or both by black sagittate marks, which may be wanting; the line itself sometimes becoming almost lost. A continuous black terminal line, followed by a pale line at the base of the fringes. Orbicular oval, decumbent, of the ground colour, more or less completely outlined by black scales. Reniform small, somewhat kidney-shaped, concolourous, outlined in black or brown. The cell between the spots is black, and a black line extends beyond the reniform to the t. p. line. A black streak or mark extends from the base to the t. a. line, and has attached to it a small, black-margined claviform. There is a diffuse smoky median shade, variably distinct, which crosses from below the reniform close to and parallel with the t. p. line. Secondaries smoky fuscous, a little paler basally in the male. Beneath gray, powdery, with a more or less complete outer line; secondaries also with a discal spot.

Expands.—1.20-1.36 inches = 30-34 mm.

Habitat.—Calgary, Alberta, head of Pine Creek, May 31, June 16; mouth of Fish Creek, June 3, at light: Mr. F. H. Wolley Dod.

This is a small species of the size of *gravis*, with the general *Vancouverensis* type of maculation. The very even colouring on which the maculation is neatly written will serve to define this form. Mr. Dod has sent me two males and two females, no two exactly alike in colour, yet forming a pair of light brown and a pair of dark brown examples. It is probable that the range of variation will prove greater than the series before me indicates.

Feltia Hudsonii, n. sp.—Ground colour, pale ashen gray. Head varying to brown; without distinct markings. Collar brown, with a black, central transverse line, above which is a whitish line: the tip also paler. Disk and patagiæ edged and marked with brownish. Primaries more or less suffused with smoky or blackish. The gray shading obtains through the costal region, along the inner margin, below the median vein, in the subterminal space, and at apex. The orbicular is V-shaped, open to the costa, and of the same general gray colour. The reniform is moderate in

size, oblique, lunate rather than kidney shaped, pale yellow in colour. The claviform extends almost across the median space, is black margined, and filled with blackish. The basal line is gray, margined on each side by black scales, obvious on the costa, and inwardly oblique through the cell. The t. a. line is obvious as an upright, yellowish line through the cell. T. p. line gray through the costal area and over the cell; then chiefly marked by the contrast between the median and s. t. spaces. S. t. line marked only by the contrasting dark terminal space, which is crossed by white rays on veins 3 and 4. There is a broken, black terminal line, and a yellowish line at the base of the fringes. Secondaries white, becoming smoky at the outer margin, glossy, with white fringes. Beneath, primaries smoky, except along the inner margin, where they are white. Secondaries white, with a smoky patch at apex, which tends to form a smoky outer margin.

Expands.—1.28—1.40 inches = 32—35 mm.

Habitat.—Calgary, Alberta, head of Pine Creek, August 7, 16, at light: Mr. F. H. Wolley Dod.

One ♂ and four ♀♀ are at hand, all in very nice condition. Mr. Dod originally sent me this species among some examples of *subgothica*, which it resembles at first sight. It is, however, decidedly smaller, more slenderly built throughout, much paler in colour, with white secondaries in both sexes. The antennæ of the male are less obviously "brush-like" than in the allies, and, all together, the new form is perhaps the best defined of any in this series. I cannot recollect having seen this from any other or previous source.

Carnedes maimes, n. sp.—Ground colour brown, variably tinged from luteous to smoky or ferruginous. Head usually of the suffusing tinge, without obvious markings. Collar with a black central line, sometimes with a white line below it; inferior half of collar pale, contrasting in the dark specimens, not differing much in those that run to reddish or luteous. Thorax ranging from rusty red-brown to blackish without markings, except for a diagonal white line which runs from the costal edge of the primaries across the patagia. This is variably distinct, sometimes prominent; but always traceable in good specimens. Primaries with all the maculation obvious, median vein prominently white; costal region gray powdered or with a luteous tinge; a distinct yellowish bar from the end of the claviform to the t. p. line; ordinary spots prominently pale or white-ringed, with usually more or less contrasting centres. Basal line

white, more or less obvious, edged with black scales, outwardly angled on the sub-costal. A blackish shade below median vein at base. T. a. line geminate, defining lines black, included shade white or of the palest ground; inner defining line often obscure or wanting; outer line sometimes wanting, the white included space then alone obvious: in course it is inwardly oblique from the costa to the median vein, then a little outwardly curved to the submedian, below which it forms a long outward tooth. T. p. line geminate, abruptly bent from costa over the cell, then very even, parallel with the outer margin: the inner defining line is black or blackish, not contrasting, lunulate, broken; outer line blackish, even, broken on the veins, tending to disappear, remaining longest over the costal area; included space pale, sometimes contrasting, sometimes merging into the paler tinting of the s. t. space. S. t. line pale, distinct, very slightly irregular, almost lunulate, in some cases relieved by the darker terminal space and by preceding black spots and dashes in the s. t. space. There is a series of black terminal lunules. Fringes pale, with dusky interlines. Claviform black margined and more or less suffused with black, extending half-way across the median space. The orbicular varies from almost round to an irregular oval, is oblique, white-ringed, the upper margin sometimes cut by the pale subcostal, the centre brown or luteous. Reniform moderate in size, varying from almost lunate to kidney-shaped, pale ringed, the upper and lower edges usually broken by the white vein, centre brown or luteous. The s. t. space on the whole is paler than the median space, and on veins 3 and 4 and 6 and 7 pale rays extend to but rarely indent the s. t. line. The apex is pale. A dusky shade is on the costa in the s. t. space. The cell is black or blackish around the ordinary spots. Secondaries smoky yellow, darkening to blackish outwardly, the fringes whitish. Beneath gray, ranging to smoky or to yellowish; both wings with a more or less obvious outer smoky shade line; secondaries tending to become darker beyond the dark line, and with a small discal spot.

Expands.—1.12 - 1.36 inches = 28 - 34 mm.

Habitat.—Calgary, Alberta, July 27-August 21 (Mr. Dod); Colorado, July 18 (Mr. Kemp); Brandon, Manitoba (Mr. Hanham).

Five males and seven females in fair or good condition are before me. The species is a variable one, no two specimens at all alike and yet evidently all forms of one species. It resembles *Ridingsiana*, Grt., and

so I had it until Mr. Dod sent me a series for comparison. Compared with the Colorado species this is smaller, darker, less powdery in the female, with rays on the veins even less marked. The oblique white line on the patagia is seen in some examples of *Ridingsiana*, and does not seem to be distinctive. With the males only at hand I should hardly venture to separate this species, though even in this sex there are minor differences that seem constant. In the females the distinction is well marked, that of *maines* differing little from the male, while in *Ridingsiana* all the examples of that sex are paler, more ashen, dusty gray, with less contrasting maculation.

Hadena (Xylophasia) sora, n. sp.—Ground colour a deep, somewhat rusty red brown. Head may be a little darker. Thorax may be blackish on disk of patagiæ, the central divided crest lighter. Primaries with the maculation all present, but not contrasting. The basal space is a little the lightest part of the wing; next comes the s. t. space from the middle to the inner margin, and then the apex; but the difference is not striking, and is more a mottling with yellowish or gray. The basal line is geminate, of the brown ground colour. T. a. line geminate; the inner line obscure, the outer narrow, blackish, the included space a little paler; as a whole the line is outwardly oblique, a little outcurved in the interspaces, a longer outcurve from the internal vein to the margin. T. p. line lunate or even crenulate, geminate, the outer line more even; as a whole with a moderate outcurve over cell and an even course below. S. t. line pale, irregular, forming a small W on veins 3 and 4; emphasized by a narrow brown preceding shade and by the dark smoky terminal space. There is a series of blackish terminal lunules, beyond which the fringes are cut with luteous. In the basal space there is a slender longitudinal black line, which runs beneath the sub-median vein, and does not quite reach the t. a. line. Claviform small, concolorous, outlined by black scales, pointed, giving rise from the tip to a somewhat diffuse black line, which extends across the cell to the t. p. line. Orbicular narrow, oval, oblique, not well defined, ringed with yellowish, with or without a pale centre. Reniform large, a little constricted, incompletely outlined, the centre a little smoky. Secondaries smoky brown, a little glossy, the fringe more yellowish. Beneath, smoky over a reddish base; both wings with a more or less obvious discal spot and a smoky outer shade line or band.

Expands.—1.64 - 1.84 inches = 41 - 46 mm.

Habitat.—Calgary, Canada, head of Pine Creek, July 2 and 15; Mr. F. H. Wolley Dod.

Two males in good condition. The species is allied to *auranticolor* and *Barnesii*, but is more even than either, and with a more subdued brown colouring.

Xylophasia ferens, n. sp.—Head and thorax smoky brown; head with a pale interantennal line; collar with a black median line over a pale line, the tip pale; the tips of the thoracic tuftings pale. The tibiae and tarsi are ringed with yellowish. Primaries with all the maculation well written, though not contrasting, the central bar connecting the median lines in the s. t. interspace being the most conspicuous. There is an obscure longitudinal streak, which does not reach the t. a. line at base. Basal line geminate, marked by costal spots only. T. a. line geminate, outwardly bent in the interspaces and a little outwardly oblique. T. p. line geminate, the outer line obscure and partly punctiform, inner line lunulate except in the s. m. interspace. S. t. line pale, broken, a little irregular, forming a small W on veins 3 and 4; apex pale. There is a series of black terminal lunules. The fringes are brown, cut with pale at the ends of the veins. As a whole the terminal space is dark, except at the apex, and the subterminal space is lighter except on costa; a black mark is on the inner margin near base. A broad black bar through the submedian interspace connects the median lines and obscures the claviform. Orbicular small, oblique, outlined by black scales and ringed by white; reniform of moderate size, lunate rather than kidney-shaped; spots paler than the ground, with a central smoky lunule. Between these spots the cell is darker, and the tendency is to form a preceding black spot. There is a sprinkling of olivaceous scales throughout the wing. Secondaries yellowish smoky, darker outwardly, a smoky terminal line, fringes yellowish.

Expands.—1.52 - 1.60 inches = 38 - 40 mm.

Habitat.—Calgary VII., 11 and 12, head of Pine Creek, Alberta.

Two good males from Mr. Dod, who has others. At first sight this species is very like *allecto*; but closer study shows it to be nearer to *runata*, and, as the genitalia make it a *Xylophasia*, its separation from *allecto* is positive. As a *Xylophasia* it is readily distinguished from its allies by the broad wings and clean maculation.

Hadena (Xylophasia) cerivana, Sm.—This is the north-western representative of the eastern *fuitima*, which was at one time considered

identical with the European *basilinea*. Recently Dr. Dyar has referred *cerivana* as a variety to the European *basilinea*. A good series, representing all three of the species, being now at hand, I am confirmed in my previous opinions, and present herewith figures of the ♂ genitalia of each. They are drawn to the same scale, with camera lucida and from mounts not under pressure. The differences are not great, but they are absolute, and show our own forms to be more nearly related than either of them is to the European form.

RANCORA, SM.

Since this genus was described in 1894 a number of examples have come to hand that confirm the original generic separation, though in some forms the collar may be as hoodlike as in *Cucullia* and the primaries nearly as lanceolate. A peculiar ornamental feature, which was not considered of importance when only one species was at hand, turns out to be quite characteristic and permanent: it is a rigid black line or bar which extends through the cell on the under side of the secondaries, from the discal spot to the base, and this does not seem to occur in any species of *Cucullia*.

Some of the species described as belonging to *Cucullia* are better referable here, and two new species are at hand.

Cucullia serraticornis, Lintner, belongs to this genus without reasonable doubt, and it is practically certain that *matricaria*, Behr., is the same thing. The type of *matricaria* is a ♂ in the Strecker collection and is a *Rancora* without any doubt. It is a fairly well-marked species and has white secondaries.

Cucullia solidaginis, Behr., also belongs to *Rancora*, and one of the specimens now before me is out of the type lot from the Strecker collection. One ♂ and two ♀ are from Corvallis, Oregon, taken March and April, at light. This is a dull smoky gray form, with narrow pointed wings and a very obvious hood. The maculation is all very obscure and smoky, not a clear black line occurring anywhere on the wing. The secondaries in the female are very deep smoky brown, and in the male they are smoky outwardly, the base dirty white and somewhat translucent.

Strigata, Sm., is the type of the genus, and is more robust than either of the preceding. The thorax is proportionately much heavier, the collar does not form a hood in even the best specimens, and the primaries are decidedly shorter and broader. The colour is a clear, dark ashen or

bluish gray, and the maculation is clearly written and black. Dr. Dyar can hardly have had both these species before him when he wrote *strigata* as a synonym of *solidaginis*. I have three good males under present observation from as many localities in Washington, taken in March and April. The type came from Victoria, British Columbia.

Albicinerea is a very bright gray species, the markings smoky, but clearly defined. The median lines are very much better marked than usual in this genus, and in one example the t. p. line is completely traceable. The secondaries in the male are smoky throughout and only a little paler at base. Three specimens from Alberta and Manitoba are at hand.

Brucei is a sordid ashen gray form in which the transverse maculation is nearly all lost and the black streakings are accompanied by rusty brown stains. The head and thoracic disk are also rusty brown. The secondaries are dull, even, smoky gray. There is only one male, from Garfield County, Colorado, elevation 6,000 feet.

Cucullia albida, Sm., is also a member of this genus, as is proven by a male example now before me. It is distinct from all the others by the whitish primaries, on which the markings are very faintly written. It is almost as much a *Cucullia* in wing form as is *solidaginis*, and, indeed, except for the totally different colour, is a closer ally to it than to any other species in this genus.

In sexual structures the males are very much alike. In all cases there is a rather slender harpe coming to an oblique or acute point, and there is a long, curved, corneous hook as a clasper. The structure is distinctive for each; but the similarity is obvious. In the antennal structure, also, there is no striking difference between the species.

Rancora Brucei, n. sp.—Ground colour a dull, powdery, ashen gray. Front, centre of collar, disk of thorax and dorsal tuftings of the abdomen tinged with rusty; other thoracic parts a little paler gray; powdery. Primaries with the transverse maculation practically obsolete. The t. a. line is barely indicated by a slightly darker tooth in the submedian interspace. There is a short black streak on the inner margin near the base. There is a slender, continuous black line through the submedian interspace from the base to the s. t. space, and this line is a little relieved by accompanying pale scales. There is a distinct black curved streak above the inner angle, and this is margined with rusty brown. Smaller, less conspicuous streaks are in the two following interspaces, and

another prominent black, brown-bordered streak is in the space between veins 4 and 5; small, brown-shaded streaks follow to the apex. There is a narrow pale line at the base of the fringes, which are cut with smoky brown. The ordinary spots are indicated by two pale cloudings connected by a very narrow black loop. Secondaries dull, smoky gray, the fringes white at apex. Beneath, powdery gray, primaries darker on disk, with a smoky, discal spot: secondaries more powdery along the costal area, and with the characteristic black line in the cell.

Expands.—1.84 inches = 46 mm.

Habitat.—Garfield County, Colorado, 6,000 feet; David Bruce.

One good male received some years ago. I had considered this a washed-out *strigata*, and it is quite possible that specimens are in collections under that name. I am pleased to dedicate so good a species to so good a collector.

Rancora albicinerea, n. sp.—Ground colour whitish ash-gray. Head barred and mottled with white and smoky. Collar with a black, transverse line at lower third, below which the colour is smoky, and above which there is a smoky line before and at the tip. Disk of thorax smoky brown or blackish: dorsal tufts of abdomen also brown or black. On the primaries the maculation is clearly traceable. Basal line indicated on the costa only. T. a. line smoky, single, a little diffuse, irregular across the costal space, forms a long tooth in the submedian interspace and a shorter one above the margin. There is a slender black basal line, which enters into the tooth of the t. a. line, but does not cross it. T. p. line forms a geminate smoky mark on costa, is faintly traceable in a wide curve over the cell, becomes conspicuous below vein 2, and extends obliquely inward from vein 1. There is a series of interspaceal black dashes; those between veins 1 and 2 and 4 and 5 the longest; the lines accompanied by a smoky shading. At the base of the fringes is a series of blackish spots with a gray centre. A median shade is indicated by a curved smoky mark from costa over the reniform. The ordinary spots are very faintly and incompletely indicated by narrow, black or smoky curved marks. Secondaries smoky, a little paler at base, fringes white. Beneath gray, powdery; secondaries with the usual black mark and bar.

Expands.—1.68 - 1.76 inches = 42 - 44 mm.

Habitat.—Calgary, Alberta, April 24, at sallows, head of Pine Creek, No. 34 (Mr. Dod); Rounthwaite and Boucher, Manitoba, end of April.

Three male specimens, of which those from Manitoba came to me

from Dr. Fletcher. All are in good condition and indicate a clear-cut species. On the under side of the cell there is a very dense clothing of long fine hair, which is present in the males of the other species, but is not so well marked. It should be noted that all these species are early fliers, and are on the wing as soon as the season opens. March and April are the dates for such as have any attached.

EXPLANATION OF PLATE 4.

1. Harpe and clasper of ♂ *Acronycta tartarea*.
2. " " " " ♂ *Noctua Trumani*.
3. " " " " ♂ *Eueretagrotis inattenta*.
4. " " " " ♂ *Scopelosoma Colorado*.
5. " " " " ♂ *Hadena finitima*.
6. " " " " ♂ " *cerivana*.
7. " " " " ♂ " *basilinea*.
8. " " " " ♂ " *runata*.
9. " " " " ♂ " *ferens*.
10. " " " " ♂ " *allecto*.
11. " " " " ♂ *Rancora solidaginis*.
12. " " " " ♂ " *strigata*.
13. " " " " ♂ " *albicinerea*.
14. " " " " ♂ " *albida*.
15. " " " " ♂ " *Brucei*.

Eueretagrotis inattenta and *Scopelosoma Colorado* are not mentioned in this paper, but have been recently described from this same general faunal region.

THE TOMB OF THOMAS SAY.

I have just noticed Prof. Webster's note on the tomb of Thomas Say, and it may be of interest to your readers to know that I have recently visited New Harmony, Ind., and met Mr. John Corbin, the owner of the old Maclure home, where stands the tomb of the father of American descriptive entomology. Mr. Corbin, as Prof. Webster states, is much interested in the proper preservation of this tomb, and is much interested also in the history of Thomas Say. In fact, I found many people in the

little village of New Harmony who knew about Say, and who were distinctly of the opinion that his residence in their village sheds lustre on its history. The village library is an admirable one, housed in a beautiful building, and among the treasures of the library are certain of Say's manuscripts, among others, one written upon the day of his death.—L. O. HOWARD, Washington, D. C.

NOTE ON THE GENERIC TITLE TRIFURCULA.

BY A. RADCLIFFE GROTE, HILDESHEIM, GERMANY.

In my "Descent of the Pierids," Jan., 1900, I have used *Trifurcula*, Staud., Iris., VII., 56, for a genus of Andean Pierids, but this name is preoccupied in the Lepidoptera by Zeller, 1848, Staud. & Rebel, Cat. II., p. 221.

Staudinger states (l. c.) that he had at first named the genus *Piercolias*, so this name, though open to criticism, should be used for the Pierid genus with the type *huanaco*, Staud. The morphological value of the neurational character of the primaries of *Piercolias*, which led Staudinger to choose the name *Trifurcula*, does not seem to have been appreciated by him. The gradual progress of R₂ towards the apices, and of M₂ towards the Radius, brings these branchlets in juxtaposition.

SPINNING METHODS OF TELEA POLYPHEMUS.

In reply to the query suggested by Prof. Grote, in the April number of the ENTOMOLOGIST (page 110), with reference to the spinning methods of *Telea*, I have discussed the subject with Dr. Fletcher, whose opinion is that only some of the cocoons are so suspended, but recent search has decided me that in this locality this is the case with the majority.

On April 2nd I found two cocoons on a small willow bush, one suspended, with the leaves firmly attached to the stem; the other had been spun between the overhanging sides of a large leaf that had fallen across the limb, thus forming a complete canopy, but the cocoon was firmly fastened to the twig with a lot of silk. Diligent search amongst the leaves on the ground failed to reveal any fallen cocoons. On April 8th I found two cocoons, both suspended on a wild currant bush, and though there was a pile of dry straw lying against the

bush, which would have afforded a splendid harbour for the larva, yet no signs of any cocoon or silk were found on it.

In all cases where I have bred *Telea* they have attached the leaves and cocoon to the stem with a silken band, which usually entirely surrounds the stem for a distance of over an inch.

I have collected from 2 to 4 dozen of these cocoons each winter for the past three years, and occasionally have found them only very insecurely attached, but in every case where they have been spun amidst a bunch of fallen leaves, they have had the added protection of being fastened to some twig.

Last fall I discovered two cocoons, from which the moths had prematurely emerged, and these were both securely fastened to the end of the twigs.

I shall read with interest all contributions on the subject, as this peculiarity may only apply to western America.

J. WM. COCKLE, Kaslo, B. C.

BOOK NOTICES.

A LIST OF NORTH AMERICAN LEPIDOPTERA, and Key to the Literature of this Order of Insects.—By Harrison G. Dyar, Ph. D. Bulletin of the United States National Museum, No. 52. Washington, D. C., Government Printing Office, 1902. 1 vol. 8vo.; pp., xix., 723.

Students of Lepidoptera throughout North America have been looking forward with great interest to the publication of Dr. Dyar's List, and have been full of hope that it would afford them an authoritative and final settlement of the nomenclature of our butterflies and moths, which for many years has been in a state of change and instability. We fear that this hope will be seriously disappointed. The changes in many instances appear so arbitrary, the multiplication of genera so inordinate, the absolute extinction of many familiar names so far from necessary, that the ordinary student will feel much hesitation in adopting this List as his guide, and unlearning so much that he has known regarding the names of his specimens. He will naturally be inclined to think that the List cannot be final, and that it will be safer for him to wait for further developments before he changes a large proportion of the labels in his cabinet and fills his notebooks with new names.

Since its publication in 1891, Prof. J. B. Smith's List has been generally adopted, and most collections are labelled in accordance with it. Some changes in generic names have here and there been accepted, and specific names have in various cases been dropped into synonymy, their places being taken by others whose authority has been established. These changes, however, have not been numerous, and their propriety has usually been made evident. In the new List, to take the butterflies alone, we find that Dr. Dyar gives 652 species, and divides them into no less than 158 genera. Dr. Skinner's List, in 1898, gave 645 species and 65 genera, and Prof. Smith's, 640 species and 74 genera. While the number of species has been very slightly increased, the number of genera is more than doubled.

These generic names, set forth by Dr. Dyar, are, for the most part, those of Hubner and Dr. Scudder. Thirty years ago controversy raged over the adoption of Hubner's names and those contained in Dr. Scudder's "Systematic Revision of some of the North American Butterflies." Mr. W. H. Edwards, author of the magnificent work on "The Butterflies of North America," led what may be called the conservative party, while those who favoured the revolution ranged themselves under the banner of Dr. Scudder. In process of time the conflict died out, and many of the names so strongly objected to were adopted by common consent, while others were dropped, even by Dr. Scudder himself in his subsequent grand work on "The Butterflies of the Eastern United States and Canada." In the List before us, Dr. Dyar has not implicitly followed Dr. Scudder's final work, but has made a certain number of changes even from it. He may be abundantly justified by "the laws of priority" in nearly all that he has done—we cannot pretend to have such a knowledge of the literature as would permit us to deny it—but it seems a pity that genera should be split up where structural differences do not require it, merely because Hubner set forth a variety of names more than a century ago.

The list is admirably printed, and provides a most welcome reference to the literature of the subject in the case of every genus and species, but we must complain that no mention is made of the familiar generic names that have been dropped, which surely might have been recorded as synonyms. Such old-established names as *Pieris*, *Colias*, *Melitæa*, *Grapta*, *Pyrameis*, *Lycæna*, *Callimorpha*, *Hydræcia* and others have disappeared, and are not even to be found in the very comprehensive

index. This is a great misfortune, as the rising generation of entomologists who accept this book will have nothing by which to connect the new designations with those employed in the older literature.

Time and space will not permit us to discuss the larger field of the Heterocera. Many, no doubt, will be surprised at the arrangement of families, which places the Notodontidæ, Bombycidæ, etc., between the Noctuidæ and Geometridæ. The restoration of the Papilionidæ to the head of the Lepidoptera has been fully justified by Prof. Grote.

The preparation of this list has evidently involved a very large expenditure of time and labour, and we must all acknowledge that the author has placed us under a deep debt of obligation to him. The work, notwithstanding any criticisms that may be passed upon it, is an extremely valuable one, and will be found by its possessors to be most useful, and, indeed, indispensable. Though we may not agree with it on all points, we must admit its excellence and importance, and we beg to congratulate the author on his achievement, and thank him for what he has accomplished. Our hearty thanks are also due to the Smithsonian Institution for its generosity in issuing the work free of charge.

By a strange oversight the CANADIAN ENTOMOLOGIST has been omitted from the periodicals in the list of works quoted, though it is referred to on nearly every page of the book.

ELEMENTARY STUDIES IN INSECT LIFE.—By Samuel J. Hunter, University of Kansas. Crane & Company, publishers, Topeka, Kansas. 1 vol., 8vo., pp. 344. (Price, \$1.25.)

We are glad to welcome a book from the West that aims at popularizing the study of Entomology. Prof. Hunter's object is "to induce the student to become acquainted, through personal observations in the field and laboratory, with some of the important biological problems presented by insects." He carries out his plan in a series of well-illustrated chapters dealing with the lives of some typical insects, their special senses and protective devices, those that live solitary or social lives, their instincts and their relations to plants; the are followed by short descriptions of injurious and beneficial insects, and of the principal orders, and some remarks upon their geographical distribution and their struggle for life. The remainder of the book gives instructions for forming a collection, for breeding specimens in order to observe their life-history and for laboratory work for the study of their structure. The volume is profusely illustrated with two plates and over 250 figures, most of which are original and excellent. It will no doubt be found of much service by beginners in the pursuit of Entomology and by teachers who are called upon to give instruction in Nature Study.

Mailed May 2nd, 1903.