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PREPARATORY STAGES OF LEPTARCTIA CALIFORNIAE WALKER, WITH NOTES ON THE GENUS.

BY G. H. FRENCH, CARFONDALE, ILL.

Continued from page 213.

The first to express this belief and put it in a tangible shape before the public was Mr. A. G. Butler, who published a paper in the Ann. Mag. Nat. Hist., based upon a collection of moths made by Lord Walsingham in Oregon. He states he does not hesitate to say that he believes that the different forms do not represent several distinct species, but different forms or varieties of one extremely variable species. The four names that had been used he retains as names of the four forms they were originally intended to represent, and gives in addition four new names. According to Mr. Butler's idea they would stand as follows :

LEPTARCTIA CALIFORNIAE.

- Var. 1, Stretchii, Butler.
- “ 2, Boisduvalii, Butler.
- “ 3, Dimidiata, Stretch.
- “ 4, Latifasciata, Butler.
- “ 5, Fulvofasciata, Butler.
- “ 6, Californiae, Walker (type).
- “ 7, Decia, Boisduval.
- “ 8, Lena, Boisduval.

He does not describe these in full, but bases his description on the work of Stretch, Ills., Zyg. and Bomb., using the figures on plate 5.

I have before me representations of all but one of Mr. Butler's varieties in my own collection, and those loaned me by my friend, Mr. W. G. Wright, of San Bernardino, California, and three forms that are not referable to any of his. The second variety, *Boisduvalii*, I have not seen : but it is figured by Stretch. From the series I have, I deduce the following brief descriptions, and from them have had made the wood engravings illustrating the different varieties.

LEPTARCTIA CALIFORNIÆ.

Var. 1, *Stretchii*, Butler (Fig. 12). In this the fore-wings are black, with the zig-zag transverse line pinkish white, a spot of same near the posterior angle and a basal dash. Hind wings black, with a few crimson scales in a transverse row beyond the middle. Under side, fore-wings crimson; a black terminal border, broadest at apex; whitish along the costa.



FIG. 12.

Hind wings black, a little red in the outer part of cell.

Two ♂'s from Southern California.

Var. 2, *Boisduvalii*, Butler (Fig. 13). This has the fore-wings black with the transverse band pinkish white, arcuate but not zig-zag, a brief basal dash. Hind wings black with the transverse band, as described by Mr. Stretch, "bright orange red." Described by him from Oregon.



FIG. 13.

Var. 3, *Dimidiata*, Stretch (Fig. 14). Fore-wings black, two whitish spots on the costa and one near posterior angle. In bright examples of this genus three more or less distinct transverse bands may be recognized, usually gray and black with more or less of white blotches in them. The first costal spot here is in band 2 and the other two are in band 3. Hind wings black in my example. Mr. Butler says it



FIG. 14.

may have "a slightly curved series of small ochreous or crimson spots just beyond the middle." Under side, fore-wings black, a broad whitish band from above the cell to posterior angle, and the costal white spot of band 3 repeated. Hind wings slightly flecked with light near the anal angle.

One ♂ from Colorado.

Var. 4, *Albifascia*, French (Fig. 15). This has both wings black with a broad white band across the fore-wings. It is the same as *Boisduvalii*, excepting the crimson band on the hind wings. There is no basal dash or other mark on the fore-wings. Under side, fore-wings black to a little beyond the first third, terminal portion black, attenuated



FIG. 15.

to a point at posterior angle; the rest of wing ochreous white. Hind wings black. Body black, a white line from antennæ back over patagia; sides of anterior and middle femora and sides of anterior tibiæ red, as in the other varieties.

One ♂ from California.

Var. 5, *Occidentalis*, French (Fig. 16). Fore-wings black, a whitish basal dash and three blurred whitish spots in bands 2 and 3. Hind wings black, marked with orange as shown in the figure. Under side, fore-wings orange, a narrow terminal black border, black along the posterior margin, veins narrowly black. Hind wings black with



FIG. 16.

an orange terminal and subterminal band, both united by a broad ray that passes through the cell to outer margin. Stripe on side of abdomen orange.

One ♀ from Northern California.

Var. 6, *Latifasciata*, Butler. (Fig. 17, hind wings with the band *crimson*). Fore-wings black, with three small white spots on bands 2 and 3. Hind wings black, with the median band crimson. My specimen has this band a little more irregular than the figure. Under side, fore-wings with extreme base and terminal third black, the rest crimson, whitish along the edge of the red. Hind wings with the red of the upper surface repeated.



FIG. 17.

One ♂ from Southern California.



FIG. 18.

Var. 7, *Fulvofasciata*, Butler. (Fig. 17, hind wings with the band *yellow*). This is the counterpart of Var. 6, except that the band of the hind wings is pale yellow instead of crimson. My examples show a tendency to a fine pale ray or two from the base of the hind wings towards the yellow bands, while Mr. Wright's specimen does not show this tendency.

Three ♂'s, two from Truckee, Cal., the other from California, but part of State not indicated.

Var. 8, *Californiæ*, Walker (Typical). (Fig. 18, the light parts of

hind wings *yellow*. Fig. 19 shows the under side). Fore wings black, sprinkled with gray scales so as to give a gray cast to the wing; the three transverse-bands distinct; black, with numerous whitish spots; a basal whitish dash. Hind wings, with the light parts pale yellow. In some the central black band is broken, and in others wanting, only the two black rays and terminal border being present.

Under side as in the figure, the yellow pale, and streaked a little at base with red.



FIG. 19.

Ten ♂'s from Truckee, one ♂ from Southern California.

Var. 9, *Wrightii*, French. (Fig. 18, the light parts of hind wings *crimson*. Fig. 19 shows under side). This is like Var 8, except that the light parts of hind wings are crimson instead of yellow, and the fore wings are less gray tinted. The fore-wings have, instead of numerous white spots in the bands, one at posterior angle and two on costa, with the basal dash. The under surface is shown at fig. 19, and is crimson instead of yellow.



FIG. 20.

One ♂ from Southern California.

Var. 10, *Decia*, Boisduval. (Fig. 20, hind wings *crimson*; under side shown in fig. 21). Fore-wings black, the bands more or less marked by whitish spots; basal dash present. Hind wings crimson, a terminal black border, more or less broken. Under side crimson with terminal black border as in fig. 21, or a few intergrades between this and Var. 9, with a transverse band, as shown in fig. 19.



FIG. 21.

Nine ♂'s and one ♀ with three ♂ intergrades with *Wrightii*, and three ♂ intergrades with *Latifasciata*, all from California.

Var. 11, *Lena*, Boisduval. (Fig. 20, the hind wings *yellow*; the under side shown in fig. 21. Fig. 22 shows an extremely light form). Fore-wings black, tinged with gray; the three transverse bands more or less distinct, both by the clear black without gray, and by the whitish spots. In three specimens from Colorado the bands are almost continuous white,



FIG. 22.

as shown in fig. 22. Hind wings yellow, with a terminal black border; sometimes much broken, as in fig. 22. Under side in fig. 21, the light part yellow, more or less red stained at base.

One ♂ from Southern California, three ♂'s from Colorado, two ♀'s from Truckee, Cal., and five ♀'s from other parts of California. Besides this there are two ♀ intergrades with *Decia* from Colorado, four ♀ intergrades with *Decia* from Truckee, Cal., and two ♂'s and one ♀ intergrade with *Decia* from Southern California.

One of the principal variations in these forms is found in the amount of black on the hind wings, ranging from wholly black to a few black spots as a terminal border. The first breaking up of the solid black is found in a single light point near anal angle, then a few pale scales across the wing, next a band of light, in the succeeding stage the basal part invaded by pale rays, and finally all the black obliterate except the terminal border. In the specimens having only the terminal border of black, there is a fine penciling of black along the veins, and in the intergrades between *Wrightii* and *Decia* a gradual fading out of both the transverse band and rays may be found till there is nothing but the obliterate penciling of the veins left. Variety 5, *Occidentalis*, seems to be an irregular form that only partially falls within the line of the regular variation. The fore-wings are black in the red forms, with but little if any gray tint; in the yellow forms, slightly gray tinted, with three more or less distinct transverse bands, which in the gray wings lack the gray tint, and contain in nearly all of them a few white or whitish spots. When only a few spots are present, these are costal in second and third band, and one at posterior angle in third band. Varieties 1, 2 and 4 seem to come from an unusual development of the second band.

The varieties are largely local. The prevailing color of Southern California examples, as seen by the localities under the several varieties, is crimson; the Sierra Nevada and Colorado forms are mostly yellow, and the Oregon and North California forms are orange. These are the prevailing colors. In the Truckee specimens all my males were yellow and females varying from almost a distinctive orange to yellow, with traces of the red tinge along the veins (of hind wings, of course). In Lord Walsingham's collection from Oregon the prevailing color was orange, and we find that color extending into California. But in each of

these localities there is enough intergrading in color to show the affinity of the different forms.

NOTE.—Varieties 4, 5 and 9 are in the cabinet of Mr. W. G. Wright, of San Bernardino, Cal. I think 4 and 5 were obtained by him from Mr. James Behrens, of San Francisco, and probably both were from Northern California.

THE NOCTUIDÆ OF NORTH AMERICA AND EUROPE COMPARED.

(Fourth Paper.)

BY A. R. GROTE, A. M., BREMEN, GERMANY.

Tribe *Arzamini*.

The pale or yellow coloured species of *Gortyna*, the caterpillars being internal feeders, pupating, however, in the ground, prepare us for the *Nonagriini*. We have, however, in North America, a peculiar tribe which I have called *Arzamini*, and which I here interpolate. The caterpillar was first discovered by Prof. Comstock, in Florida Lakes, in the leaf-stalks of the pond lily. This was the larva of *A. vulnifica* var. *melanopyga*, and subsequently in the lake at Ithaca, the larva of the typical *vulnifica* was observed by the same distinguished entomologist. The larva is furnished with nine pairs of spiracles, and passes freely on the water from one leaf to another. Subsequently, the larva of *Sphida obliquata* was described by Prof. Kellicott. The moths of this tribe are related to the Nonagrians, but differ by the bluntly terminating abdomen of the female, recalling certain *Lachneinæ* in appearance. There are two genera: *Arzama*, with three distinct species (of which I owed specimens of *A. diffusa* to my excellent friend Mr. Moffat) in which the front is smooth, and *Sphida*, with the single species *obliquata*, in which the front is tuberculate. This appears not to be a variable or sexual character in the moths, as it may be in certain *Scarabeidæ*, but is in Lederer's opinion, with which I agree, of generic value. If we are not so to consider the tibial armature, or the conformation of the clypeus in the *Noctuidæ*, there remain few characters which we may use as generic. I am disposed to consider, then, *Copimamestra*, which differs from *Mamestra* by the tibial

claw and *Sphida*, which differs from *Arzama* by the clypeal tubercle, as independent genera on the strength of these single characters. The tribe *Arzamini* is not represented in Europe, and, beyond the *Dicopini*, is so far the first distinct structural departure in North America from the European types. While *Dicopis* and allies resemble the *Bombycoidei* or certain *Hadenini* in appearance, the *Arzamini* have a distinct and singular form, and, while their affinities evidently lie with the *Nonagriani*, their peculiar larval structure and habit clearly warrants our considering them as constituting a distinct group or tribe of the *Noctuidæ*. The resemblance in the female abdomen of the *Arzamini* to the Bombycid genus *Eriogaster*, and the unusual larval condition, lends interest to this tribe. May we not consider the *Arzamini* as an American survival of a very ancient form of the *Noctuide*?

Tribe *Nonagriini*.

This tribe differs from the *Hadenini* in the absence of body tuftings, and in the finer, smoother vestiture; only in a few genera is there a median thoracic ridge. In these characters *Gortyna* agrees with the *Hadenini*: the habit of the larva probably associates *Euthisanotia*, a tropical genus with foot-hold in Florida, with *Gortyna*. The present tribe is one of the most interesting of the family. The moths are pale or straw-coloured, some with a warmer, a little red or ochre tint, and the larvæ feed in reeds or grass. *Nonagria* has a stout, clypeal projection, and naked eyes; the larva lives in the stems of *Typha* and *Phragmites*, pupating in its burrow. We have eight North American species described; probably many more remain to be discovered, as the moths must be bred, and are not often captured. In Europe, seven are known. So far as known to me, our species are not like the European, or representative. We have an immense species, with the proportions of a small *Sphinx*, from Florida, my *N. permagna*. Our most usual species, perhaps, in the east, of moderate size, is my *subflava*. No species are known to me from California, but we must expect that they await discovery. These *Noctuidæ*, with boring larvæ, inhabiting swamps, must be an old form of the family, once, at least, of very general distribution. The European genus *Coenobia*, with one species, I have not found in North America, but I discovered a Western American genus *Fota*, with two small species, which, from its clypeal

structure and other characters, seems to belong here. I have described one American species of *Senta*, figured in the Buffalo Bulletin (1874); the figures on this plate are in some copies coloured. Of the European genus *Tapinostola*, two North American species are described, one only have I seen. The European genera *Meliana* and *Calamia*, with single species, are apparently wanting in North America; but we have a peculiar genus in *Ommatostola*, with lashed eyes. *Heliophila* Hüb. (= *Leucania* Ochs.) is, perhaps, the leading genus of the group; and, like *Apatela*, *Agrotis*, *Hadena* and *Mamestra*, contains identical and representative species. The eyes are hairy, the thorax smooth, the male antennæ impectinate, the body rather stout, the legs in some species thickly haired. Probably a resemblance of ornamentation between *Pseudolimacodes niveicostatus* and the European *Heliophila conigera*, led Guenée, although the eyes in the former are naked (but Guenée does not study this character), to describe our species, which I am disposed to refer even to a different sub-family, as belonging to *Leucania*. We have probably one identical species of *Heliophila* with Europe: *H. pallens*. Our *H. pseudargyria* seems to be allied to *lithargyria*, while we have a number of species resembling the European *obsoleta*, *straminea*, *comma*, *littoralis*, etc. No species have yet been found in North America at all resembling the European *evidens*, *conigera*, *vitellina*, *turca*. The well-known "Army Worm" *Heliophila unipuncta*, has been taken in England, and in the Madeira Islands, probably introduced from North America. Although single species may have now a wider range, I think we must conclude that the genus *Heliophila*, in North America, belongs to the European element, and is descended from a former common circumpolar fauna. These insects must be collected at light in the neighborhood of swamps and waters by which reeds and flags grow. In the stems of these we may find, in June and July, the grown caterpillars or pupæ of *Nonagria*. The European genera *Mycteropus*, *Argyrospila*, *Mythimna*, with single or few species, are undescribed in our fauna. It seems probable that our Nonagrians are quite incompletely known, and that in North America, from which twenty-seven species of *Heliophila* are described, while Europe numbers thirty-two, many interesting discoveries await the entomologist in the present group. I have referred here the Californian genus *Zosteropoda*, from the shape of the wings and the tufted legs; and, as in other tribes,

North America is already credited with peculiar genera, with few species, clustering about the two principal genera, which are here : *Nonagria* and *Heliophila*.

Tribe *Scolecampini*.

The body is slender, smoothly haired ; the legs unarmed, thinly scaled, rather long ; the wings vary from rather broad to quite narrow ; the colors are mainly of the preceding group, and the caterpillar of *Scolecocampa* is said to burrow in wood. This tribe, with the *Arzamini*, is exclusively American, and may be considered, equally with that, to be an outgrowth of the Nonagrians. I refer here (see CAN. ENT. XV., 132) the genera *Scolecocampa*, *Eucalyptera*, *Amolita*, *Cilla*, *Doryodes*, *Phiprosopus*. Geyer's figure of *S. liburna* has the primaries shaded with red, a feature I have noticed in fresh Southern examples of the moth. Mr. Morrison seems to have had no notion of the affinities of his *Eucalyptera bipuncta* ; I referred the moth to *Scolecocampa*, the differences seeming only comparative, or of specific value. Since then I found a second Western form, and, although the differences are not very decided, I adopt the genus. In this tribe the ornamentation seems a modification of the usual Heliophilid type. The longitudinal medium stripe, the pale oblique shade to the still pointed primaries, the dots and dotted stigmata, varying in expression in the different genera, are Heliophilid features ; while the oblique and longer palpi, often smoky on the sides, the slender feet and lineal body distinguish the tribe. *Doryodes* is described as a Geometrid by Guenée, and *Phiprosopus* (printed *Phyprosopus*, originally in error) is described, under characteristics which do not belong to the genus and were accidental in the type, equally as a Geometrid by Zeller, who subsequently acknowledged my prior and more correct reference of *P. callitrichoides* to the *Noctuidæ*. The chiloform appearance of most of the genera becomes almost lost in *Phiprosopus*, notwithstanding the narrow wings, while the labial palpi depart from the usual form ; these latter, and the peculiar color, remind one of certain exotic genera allied to *Calpe*, where I was at first disposed to locate the genus. When the immature stages are known, our present views may be modified. Always must our classifications be judged by their reasonableness in reference to the existing knowledge of the whole history of the insects.

Tribe *Caradrini*.

In this tribe, in which the body is still smoothly scaled, or with very slight tufts, the eyes naked, the tibiæ unarmed, the two principal European genera are represented in North America. In *Caradrina*, twenty-eight European species are described, while but eleven have so far been discovered in North America. Of these, *Miranda* seems to be exceedingly near the rare and local European *lepigone*, while others have the European facies. The species of *Pyrophila* (= *Amphipyra*) are interesting as affording one identical species, *tragopogonis*, and one representative, *pyramidoides*. Whether the former is a survival or an importation is uncertain, I have been inclined to believe the latter is the case. The species of *Pyrophila* are large and so exceedingly like the flat species of *Agrotis*, that (when in the south away from my microscope) I mistook *tragopogonis*, communicated to me by Prof. Saunders as injurious to grape, for an *Agrotis*. The unarmed legs separate the present genus; but the habit is similar, as I have observed *pyramidoides* beneath the bark of decaying trees in the woods. Upon the loose bark being removed the moths endeavored to escape by running. Like cockroaches, the smooth greasy-looking vestiture, and the flat shape, evidently facilitate their movements in such places of concealment; I have observed species of *Agrotis saucia*, etc., in their company. The question of whether we should not bring in the *Agrotini*, between the *Caradrini* and the *Orthosini*, is yet, perhaps, an open one. No reasons are given by Lederer for not following the arrangement of older authors; but it is better to conform in such cases to Lederer's example, as it is followed in Europe, and since my main object has been always to bring the two faunæ under the same artificial system, so that they can be compared, the differences and resemblances taken note of. In the present tribe the derivation of one part of our fauna is very clear. The European *pyramided*, and our *pyramidoides*, are descended from one stock. We have apparently failed to take over the other large and showy species of *Pyrophila* found in Europe, as I have seen nothing like them in any North American collection. In the west is found my *Fotella notalis*, a moth apparently allied to *Acosmetia*; this latter, with the other European Caradrinid genera, I have not recognized in North America. I am uncertain as to whether *Adipsophanes* and *Crambodes* should not be included in this tribe; the former genus includes my *miscellus* and *terminellus*, the latter Guenée's *talidiformis*.

THE NORTH AMERICAN CALLIMORPHAS.

A REPLY TO CRITICS.

BY H. H. LYMAN, MONTREAL.

Since my article on the North American *Callimorphas* appeared in the CANADIAN ENTOMOLOGIST for October, 1887, a number of papers upon the same subject, and containing certain criticisms of my views, appeared in subsequent numbers of this magazine, and in *Entomologica Americana*; and, in addition, I received certain letters upon the same subject from entomologists to whom I had sent copies of my article. To these critics I now propose to make a perhaps rather tardy reply:—

Mr. J. B. Smith had spoken before the Entomological Club of the A. A. S. upon this subject, and the discussion had been reported in *Entomologica Americana*, but, as Mr. Smith surmised, I had not seen the report till after my paper was in the hands of the printer; and, although Mr. Smith's paper in the Proceedings of the National Museum appeared before mine, I did not hear of its issue till after the publication of my own. In the CANADIAN ENTOMOLOGIST for December, 1887, appeared Mr. Smith's review of my paper, in which he admitted the correctness of my determination of the true *Lecontei* of Boisduval, and of many of my contentions, though expressing his dissent from others, especially in the matter of nomenclature. There was, however, one typographical error of some importance in that paper, on page 236, line 27, where the figures 6 and 8 should have been 4 and 6. In that paper, Mr. Smith arranged the species of this genus in a slightly different order from that adopted by me, by changing the order of the two forms *Confusa* and *Suffusa*.

This is a small matter, and one about which I am not disposed to quarrel, especially as it seems to me that no linear arrangement of species can ever be quite satisfactory, as to correctly express the full relationship of species, we should require to group them in all three dimensions of space. But the chief issues between us were whether *Vestalis* should be regarded as a distinct species, or only a synonym of *Fulvicosta*, and as to the correct application of the names *Conscita*, *Lactata*, *Confusa*, *Suffusa* and *Reversa*.

In regard to the first point, Mr. Smith conjectured that I had never seen a true *Vestalis*, and he very kindly sent me a specimen as typical of that form. This specimen is certainly very remarkable, as it is much

smaller than any specimen of *Fulvicosta* that I ever saw, measuring only $38\frac{1}{2}$ mm. in expanse, and is, as Mr. Smith says, "whiter and more frail and *Euchates* like," though it has none of the semi-diaphanous appearance of *E. Collaris*. It is, of course, impossible to form a safe judgment upon a single specimen, and I can only say, that if a full series should show constant differences from *Fulvicosta*, and no connecting links be found, I should be inclined to concede the distinctness of this form.

This is one of those cases where it is much easier to see a difference than to describe it. Dr. Packard, however, who described *Vestalis*, wrote to me that he now considered his types to be only small specimens of *Fulvicosta*.

Mr. Smith advanced the opinion that this was the form given by Walker as *Conscita* ♀ instead of *Fulvicosta* as generally supposed; but as I regarded this as extremely improbable, I took a life-size photograph of my specimen and sent it to Mr. A. G. Butler, who wrote: "The small form is unknown to me, though I have seen an example of *Euchates collaris*, under the name of *vestalis*." Mr. Smith also disagreed with me in regard to my citing his name *Lactata* as a synonym of *Conscita* Walk., and argued that *Conscita* ♂ = *Lactata* Smith, *Conscita* ♂ var. b. = *Fulvicosta* Clem. and *Conscita* ♀ = *Vestalis*, and argued that such confusion should militate against Walker's name being retained.

Mr. Walker's errors were no doubt great, especially his placing *Conscita* in a wrong genus; but from what Mr. Butler wrote in reference to the small *Vestalis*, I do not believe that Walker had that form before him at all. His only mistake, after the generic one, was in taking *Fulvicosta*, which had already been described by Clemens, to be the ♀ of *Conscita*, and this, apart from the creation of a partial synonym, was not so very dreadful, seeing that such a relationship would only imply a sexual variation similar to that between the ♂ and ♀ of *Leucarctia Acræa*. I, therefore, maintain my position as to the validity of Walker's name for this form, whether it be a species or only a variety, and in this I am supported by Mr. Butler, who wrote to me as follows: "There can be no question that if *conscita* is a good species (which I do not believe it to be), the first and larger part of Walker's description applies to it, and the mere fact of his referring the wrong female to it will not invalidate that description any more than if Walker had described the male only. Smith's name has not a leg to stand on." Mr. Smith further urged that I was not consistent, and that if his name *Lactata* fell before *Conscita* Walk., my name *Confusa* would

have to give way to *Reversa* Stretch, and added, "I scarcely expect Mr. Lyman's adhesion to this theory." Probably not, but certainly not from the idea which he would seem to imply, as I trust I am not so petty as to allow any desire to have my own name stand, to warp my judgment as to what would be right in the premises.

Mr. Smith claimed that Mr. Stretch's name *Reversa* included *Confusa* as well as *Suffusa* and *Contigua*. I doubt this very much, but let it be assumed that it did, what follows? This is Mr. Smith's reasoning; *Contigua* had priority for one part of Stretch's description, "I separated *suffusa*, and the name stands for the remaining part, viz., *confusa* Lyman, which would remain only as a synonym of *reversa*." This I consider, and I trust Mr. Smith will forgive me for saying it, absolute nonsense, though unlike Mr. Smith's friend at the New York meeting, without any profane adjective.

What Mr. Smith did subsequently to Mr. Stretch's description could hardly affect the application of that name unless he had pointed out that the name *Reversa* covered several distinct species, and proposed that it should be limited to one of them, and then proceeded to give a new name to any other undescribed form.

Mr. Smith did not do this, and naturally so, as he thought, the name *Reversa* included *Contigua*, *Lecontei*, and the form which he undertook to describe as *Suffusa*. He thus proceeded to give a new name to what he considered the only previously undescribed species included by Mr. Stretch in his description. Certainly the greater part of the description of *Reversa* applies to *Suffusa*; Mr. Stretch, especially, saying that the markings "are exactly as in *Clymene*," and Mr. Smith, himself, acknowledged this to me. I, therefore, think that if the name *Reversa* is to stand, it must be for *Suffusa*, and not for the form which may possibly have been referred to in the following bracketed eight words of a sixteen line description: "The basal patch is triangular, (sometimes divided by a narrow, basal brown band)."

I think, however, that as the first half of the description was evidently intended to cover *Contigua*, which Mr. Stretch appears to have considered the stem form, the name should be ignored, except as a synonym, and Mr. Butler wrote that he agreed with me on this point. Mr. Grote, on the contrary, wrote that *Reversa* should stand with *Suffusa* as a synonym.

Mr. Butler found fault with both Mr. Smith and me for using the

name *Callimorpha* for these moths, writing as follows:—"I have strongly objected to the use of this generic name for this group on the following grounds, viz.:—1. The type of *Callimorpha* is *C. jacobææ*, a European *Lithosiid*. 2. There is already a generic name—*Haploa* Hübn.—for the North American representatives of *Hypercompa*. I have pointed out to Smith that there are structural differences between *Hypercompa* and *Haploa*, and although these characters are slight in themselves, I am of the opinion that, taken in conjunction with the utterly different aspect and style of coloration of the species, they should be regarded as sufficient."

Mr. Smith, it will be remembered, in his paper in the Proc. Nat. Museum, '87, 23, held that these "structural differences" were too slight to warrant such a separation, and affirmed, besides, that they were not constant, and for myself I may say, as I wrote to Mr. Butler, that I am not in a position to decide the question satisfactorily, even to myself, and so prefer to leave it to the authorities.

Mr. Grote, in two short communications to the CANADIAN ENTOMOLOGIST, while complimenting me on my plate and on my sorting out of the moths, insisted that my work was not original, and that these forms could not be regarded as distinct until they have been proved so by breeding from the egg.

I am not greatly concerned as to whether my humble work in this department is "original" or not. I contend that it is at least useful, but if the description of a form as a new species is not original, what is to be said of Mr. Grote's own work in the same direction? As to the argument about breeding from the egg, which has also been urged in letters by others, I repudiate it as unscientific and impracticable. If no one was to be permitted to describe a species as new until he had proved it to be such by breeding from the egg, there would long ago have been a complete block in the study of North American entomology, and there would not have been so many specific designations followed by the honoured name of Mr. Grote. Besides, it is not such a long time since a very distinguished entomologist described as a new species a form which he had "established on a sure foundation by breeding from the egg," and which shortly afterwards turned out, upon further breeding, to be only a previously named form of a well known polymorphic species. It is, therefore, difficult to say how much breeding would have to be done before these doubting Thomases could be convinced. I may say, however, that

I held back my paper for several years in the hope of being able to breed the two forms, *Lecontei* and *Confusa*, side by side, but the appearance of such a muddle as the description of *Reversa* Stretch decided me to publish the results of my studies, so far as they had gone, with as little delay as possible.

Dr. Packard wrote that he could not believe in the distinctness of these species, and that Mr. Otto Seifert had bred a good many forms and considered them varieties of *Lecontei*. I immediately wrote to Mr. Seifert to ask for particulars of this most important information, and received an answer in which he said:—"Dr. Packard must have misunderstood me in saying I reared those *Callimorphas*. Showing the doctor quite a number of this insect in great variety I told him they had been caught (by Mr. Putnam Cramer) near Troy, N. Y., in July, all at the same spot." Finally, Dr. Lintner wrote very guardedly that *C. contigua* at least seemed distinct.

It would thus seem that these unfortunate moths, having got the reputation of all belonging to one species, it is impossible to get people to accept the idea that they may really be distinct species, although they are quite ready to accept as such any apparently new form of such difficult genera as *Colias*, *Argynnis* or *Catocala*, even when the difference is so slight as to be hardly perceptible.

I consider the *Callimorphas* far more distinct and more easily separated than the species of very many genera of butterflies and moths which could be named in addition to those referred to above. I have seen in all at least two hundred specimens, and until very recently and since the publication of my paper, I had never seen one that I could not unhesitatingly place at sight. The exception was in the case of a few specimens in the collection of Dr. Bethune, which seemed to indicate a possible linking of the two forms, *Confusa* and *Suffusa*, and I am prepared to admit that possibly these two forms may turn out to be northern and southern varieties of one species, though Mr. Smith disagrees with me strongly on this point.

I hold, however, very strongly with Mr. W. H. Edwards that whenever a form is distinctly and easily separable from previously named species, it is entitled to be treated as a good species, and to be given a specific name until it is proved to be only a variety by breeding, and that in such a case the name should be retained as a varietal name; but with regard to this breeding from the egg, I would point out that the making of these

experiments is just as incumbent upon those who deny as upon those who assert the validity of these specific distinctions.

For myself, I care very little whether entomologists acknowledge that these moths belong to distinct species or not, if they will only regard them as distinct forms or varieties. No good can possibly come from lumping such forms as *Lecontei*, *Contigua*, *Confusa*, *Suffusa* and *Fulvicosta* under one name. Let these names be used if only as varietal names, in order that we may know what writers on the subject refer to, and learn something of the distribution of these interesting forms. If this is done, and those who have the opportunity and time will breed them and publish the results of their experiments, I shall be quite content, and shall have no fear of the correctness of my views being disproved, but even if the results should controvert my belief, I shall be quite satisfied so long as the truth is established.

NOTE ON THE PREDATORY HABITS OF CHÆTOPSIS ÆNEA (WIED).

REV. THOMAS W. FYLES, SOUTH QUEBEC.

In the beginning of July last I discovered in a bed of *Typha latifolia*, in the neighborhood of Montreal, a large number of the larvæ of *Arzama obliquata*. I have visited the spot repeatedly, and have had the larvæ under daily observation. One remarkable circumstance concerning them is that they are liable to attacks from the maggots of a fly belonging to the Ortalidæ, viz. :—The *Chætopsis ænea* of Wiedeman, the *Ortalis trifasciata* of Say. I found that larvæ, in the proportion of about one in every six, had been overcome by these maggots. Some of the victims were quite dead ; some were still writhing. As many as twenty maggots were feeding on one caterpillar, draining away its juices. They were of the usual form, pointed at one end and truncated at the other. When mature, their length was about seven-sixteenths of an inch. I raised a great number of them, feeding them upon injured *obliquata* larvæ. The pupal stage lasted about ten days ; and all through August the flies continued to make their appearance. They are very beautiful. The head is white ; the eyes are dark brown ; the body is green and glossy ; and the legs, antennæ and mouth-organs are brownish yellow. The wings are whitish and hyaline ; they have black tips and two transverse black bars, the hinder of which touches the black tips at the costal edge. I am indebted to Dr. Hagen for the identification of the species.

PREPARATORY STAGES OF PYRAMEIS CARYE, HÜBNER.

BY HARRISON G. DYAR.

The eggs are deposited by the butterflies, singly, on the upper surface of the leaves of the food-plant, the Malva. They are nearly cylindrical, but thicker in the middle, the base and top quite flat, and rather abruptly rounded. The longitudinal ribs project beyond the summit; color green, of a slightly bluer tint than the leaves. Length 7 mm.

FIRST LARVAL STAGE.—Head, cervical spot, anal plates, and alternating row of eight black dots per segment and short hairs, all black. Body dark yellowish. Head without processes, smooth and shiny. The caterpillar spins a web on the surface of the leaf, beneath which it lives and eats the upper portions of the leaf. Length about 2 mm.

SECOND LARVAL STAGE.—Head black and hairy. Body pale purplish black; short spines bearing black hairs, arranged as in the mature larva, black, but the dorsal and sub-dorsal on joints six, eight and ten, yellow. Length 4 mm.

THIRD LARVAL STAGE.—As in the preceding stage, but the sides faintly mottled with yellow, and a geminate yellow dorsal stripe. Length 8 mm.

FOURTH LARVAL STAGE.—Head slightly cordate, bronzy black, with minute, yellow speckles and black hairs. Body purplish black, with small yellow spots, a geminate dorsal yellow line, irregular and interrupted, and a series of irregular supra-stigmatal and sub-stigmated spots. Spines black. Length about 15 mm.

FIFTH LARVAL STAGE.—Mature larva. Quite variable in appearance, but the markings are essentially the same. Head black, covered with many white hairs, and on the vertex about six orange elevated spots bearing black hairs. Body dull greenish and black mottled, varying in intensity of shade from black, through gray, to a dull dirty white, but usually light colored, thus distinguished from its ally, *Pyrameis cardui*. On the body are many orange or yellow spots, appearing to be irregularly placed, but they may be arranged as follows:—A row in sub-dorsal space, three contiguous lateral rows (in one example in which the spots were yellow, the central lateral row was orange), and a supra-stigmatal and sub-stigmatal row, all irregular. Spines black or white, or, in some, the anterior ones black, branched, and each tipped by a black hair. The spines are seven per segment on joints five to twelve (*i. e.*, dorsal, sub-dorsal, lateral and sub-stigmatal), none on joint two, four on joints three

and four, and two on joint thirteen. The body is covered by many small elevated spots producing short white hairs. Venter greenish, mottled with black or brown. Length about 30 mm.

CHRYSLIS suspended by the cremaster, depressed behind the thorax, the thoracic process short and pointed, tapering anteriorly in a ridge, wing cases prominent, abdominal segments small and quickly rounded, cremaster flattened and hooked to the button of white silk, a pointed elevation at each eye, and at the base of the wing cases. Three rows of dorsal pointed elevations on the abdominal segments with two points on the thorax, touched with white, and two large and two small white spots in the depression behind the thorax. Color of chrysalis wood brown, minutely mottled with whitish or darker to black. The caterpillar forms itself a hollow in which it lives, by spinning up one or more leaves of the food-plant. The length of each stage is about four days, and the pupa state lasts about two weeks. In its early stages the insect cannot be distinguished from *Pyrameis cardui*.

Larvæ from Los Angeles Co., California.

BUTTERFLIES AT QU'APPELLE, ASSA.

BY HENRY SKINNER, M. D., PHILADELPHIA.

The following is a list of butterflies caught near Fort Qu'Appelle, Northwest Terr., by Mrs. Cora E. Rose and her two little sons. Mrs. Rose describes the locality as follows:—"Those sent were all caught within a radius of about half a mile, in the territory of Assiniboia, thirty miles north of an old Hudson Bay Post called Fort Qu'Appelle, and distant west from Winnipeg some three hundred and twenty-five miles; the only foliage is willow and poplar."

Papilo rutulus, Bdl.

Pieris protodice, Bdl.

Colias christina, Edws. A number of males and one female, the orange form.

Colias philodice, Godt.

Colias Scudderii, Reak.

Colias eurytheme, Bdl. A number of fine males and one female.

Lycena Scudderii, Edws. Male and female.

Chrysophanus helloides, Bdl. Male and female.

Chrysophanus florus, Edws. Male and female.

Danais plexippus, Linn. One very peculiar looking male expanding only three and one-half inches and having the primaries produced apically in a remarkable manner.

Euptoieta claudia, Cram. This has previously been reported from N. W. Terr. by Geddes; all the books give it a much more southern range, Strecker giving it from Pennsylvania southward and Edwards's northernmost points being Quebec and California.

Argynnis lais, Edws.

Argynnis bellona, Fabr.

Melitea carlota, Reak.

Grapta progne, Cram.

Vanessa milberti, Godt.

Vanessa antiopa, Linn. The expanse is considerably less than in those found here (Phila.)

Pyrameis cardui, Linn.

Pyrameis huntera, Fabr.

Limenitis arthemis, Drury.

Erebia discoidalis, Kirby.

Erebia sine-ocellata, Nov. var.

This is a var. of *epipsodea*, Butler, which, I think, deserves characterization. It has the bright fulvous patch on the superior wings divided into four sections by the sub-costal and discoidal nervules. Above the third median nervure is a small fulvous patch separated from the rest. There are but two black dots on the fulvous, and the white dots, which in *epipsodea* make them ocelli, are wanting. The underside of the superior wings is practically the same as the upper. Described from two specimens, one from Fort Qu'Appelle and the other in the Coll. Am. Ent. Soc., locality unknown. The Fort Qu'Appelle specimen is very much darker than *epipsodea* usually is. *Epipsodea* is quite a variable species, individuals differing in the size, colour and number of the ocelli, also in the extent and number of the fulvous patches. One marked specimen having four white pupilled ocelli.

Chionobas varuna, Edws.

Satyrus, var. *boopis*, Behr.

Satyrus, form *olympus*, Edws. Three specimens. They do not agree entirely with *olympus*, but I did not think they deserved a new name.

Cænonympha typhon, Rott. If this is not a variety of the European form it is most likely a new species. Two examples only.

Pamphila Manitoba, Scud.

Pamphila cernes, Bdl.-Lec.

Thymelicus garita, Reak.

Nisoniades icelus, Lint.

CORRESPONDENCE.

A RARE MOTH.

Dear Sir: Allow me to record the capture, in Canada, of the rare moth *Thysania (Erebus) Zenobia*, Cramer.

On the evening of Aug. 20th, 1888, while sugaring for Catocala in the woods near this village, I came upon the strange visitor. He was sitting, with wings spread, sipping my bait, and was evidently more at ease than I. The sensation which a hunter is said to experience on sighting his first deer came upon me, for I was unprepared for such an encounter. However, the monster was taken.

By a careful comparison of my specimen with the descriptions and with Drury's figure of *T. Zenobia*, and by submitting it to three different Entomologists of eminence, all of whom concur in my opinion, I have placed its identity beyond a doubt.

The only reference, as far as I can find, heretofore published of its occurrence in North America is in the following foot-note in Prof. Grote's Check List of Noctuidæ North of Mexico, P. II., page 43 (1876), viz.:—"Professor Riley informs me that this species occurred at Davenport."

In Vol. XVIII., page 236, of this Journal, Prof. Grote mentions *Thysania Zenobia* as one of the "species which are probably summer birds of passage from the West Indies and South America, following the Gulf Stream, or aided by prevailing winds."

Drury gives Jamaica as its habitat.

It is hard to believe that so frail a creature as an insect, though strong in flight, could have flown two thousand miles, but the ragged condition of the margins of the primaries in my insect, while all the other parts are apparently quite fresh, is evidence of its having fanned many miles of atmosphere.

A. H. KILMAN, Ridgeway, Ont.

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<i>Tenthredopsis Evansii</i> , n. sp., 98.	
<i>Thamnotettix churata</i> , n. sp., 10.	

- ERRATA.—Page 159, line 4 from bottom, for "*Amphixepa*" read "*Ampiscepa*."
 " 161, line 21 from bottom, for "Arizona" read "Arizonæ."
 " 162, " 7 from top, for "in" read "is."
 " 162, " 11 " " " " "boat-shaped" read "boot-shaped."
 " 162 and 163, for "Genura" read "Geneura" wherever it occurs.
 " 178, line 3 from top, for "*Ilucita*" read "*Helcita*."
 " 182, line 14 from top, for "Mr. Percy Crawford" read "Mr. Frazer S. Crawford."
 " 182, line 26 from top, for "Colonel Robins" read "Colonel Doblins."
 " 209, line 4 from bottom, for "Endamus" read "Eudamus."
 " 220, line 3 from top, for "*Phytolacca decandra*" read "*Vcratrum viride*."