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# The Canadian Entomologist.

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## NOTES ON A WINTER HOLIDAY.

BY THE EDITOR.

During a recent holiday, while on a trip South, we spent a day among the Entomologists at Albany, N. Y. To say that it was a pleasant day, an *exceedingly enjoyable* day, would convey but a faint idea of the pleasures there in store for us. Arriving early in the morning, we made our way to the State Museum of Natural History, where we found three veteran Entomologists conspiring to make our brief stay a memorable one. Under the guidance of Messrs. Lintner, Meske and Hill, we were soon enraptured by the sight of the countless rarities contained in the collections of Lepidoptera made by those gentlemen in this vicinity. We have seen many collections in the course of our wanderings, but for multiplicity of species, full series of rarities and matchless perfection of individual specimens, it had never before been our pleasure to witness anything that would compare with the valued stores contained in the cabinets of these enthusiastic collectors at Albany; and without fear of contradiction, it may be said that the Entomologists resident there have contributed more towards our knowledge of the Lepidoptera native to the northern portions of America than any other equal number of collectors in the country. The enthusiasm they have long maintained and their indomitable perseverance have enabled them to overcome almost every obstacle and accumulate such wonderful series of specimens, especially by night captures at sugar, as no less favored Entomologist could look over without feelings almost akin to envy. After one had seen scores upon scores of individuals of some rare Noctuid, which in one's own collection had perhaps long been represented by a treasured fragment, the question would frequently rise as to whether *anything* in this line be rare in the neighborhood of Albany.

During the day we were also privileged to see the magnificent series of *Catocalas* in the collection of Dr. Jas. H. Bailey, and one could only regret that the day was too short to do any sort of justice to the mass of material to be inspected. After laboring busily from early morn until late at night, we parted at the railway station, carrying with us the most pleasant recollections of a day happily spent amidst old and newly-found Entomological friends.

On reaching Washington, Nov'r 23, we paid a brief visit to the Entomological rooms in the Department of Agriculture, where we had expected to find our esteemed friend, Prof. C. V. Riley, but unfortunately business had called him away from home. Through the kindness of Messrs. Pergande and Howard we were shown very many things of interest, especially in the way of insects in their earlier stages, both living in breeding cages and preserved as blown larvæ, and in this way a very pleasant and instructive hour or two was spent. We were sorry to learn from our good friend, Chas. R. Dodge, that "Field and Forest" was about to be discontinued for want of sufficient support. This valued periodical has done good service in the cause of Natural Science, awakening an interest in this direction in many minds, and we feel that in its decease we have lost a valuable aid. It gave us much pleasure to find that veteran Entomologist, Prof. T. Glover, with health almost restored, busily engaged in his Entomological work. Through the affable kindness of Dr. T. V. Hayden, we were shown through the Department of the Interior, that great national laboratory from whence has issued so many works invaluable to the naturalist in every field of labor. After lingering long among the many interesting objects which claimed our attention, we returned laden with useful works and pamphlets on subjects relating to Entomology, deeply impressed with the important work here carried on by a great and progressive nation in the interests of science; and with very pleasant recollections of the great personal kindness shown us by the worthy and distinguished head of this most useful branch of the national service.

The Smithsonian Institution was also visited, with its immense collections and innumerable objects of interest, and through the kindness and liberality of the Secretary, some recent and valuable works on Entomology and kindred subjects were secured for our Society's library.

Passing through Virginia, the Carolinas and Georgia, we landed in Fernandina, Florida, with its historic surroundings, on the 30th day of November, where we found everything assuming a tropical aspect—the

landscape dotted with Palms, Orange trees, Magnolias, Live-oaks and other evergreen trees, and the air so balmy as to at once suggest thoughts of butterfly nets and collecting bottles. Of the latter we had with us a supply, but not expecting to meet with anything on the wing, our insect nets were left folded away in their wintry home. We turned over logs and chips in search of insect life, but found very little to reward our energies. Subsequently, while wandering about in Jacksonville, we saw several butterflies on the wing, most of them new to us; we recognised that charming yellow, *Callitryas cubule* as it floated about among the beautiful roses, jessamines, poinsettias and other flowers in the gardens, and we longed for a net that we might cultivate a closer acquaintance with this and some of the other species which we were unable to determine in their flight. Our old friend, *Danais archippus*, was frequently met with, and reminded us of summer at home. Florida, however, is very poor in insects at this season of the year, but as summer approaches it is in many parts a paradise for the collector. During a week spent in this land of flowers we travelled over 800 miles along its rivers and railways, seeing much of its characteristic scenery, the most southerly point touched being Leesburgh, on Lake Griffin, a little south of the 29th degree of latitude and 300 miles south of Jacksonville by tortuous river travel. Here butterflies were more abundant, and having landed with a very pleasant party in an orange grove, amidst half a million of oranges on 2,500 large bearing trees, one was puzzled what to do first. The oranges were tempting, but the sight of beautiful specimens of *Agraulis vanillæ*, *D. berenice*, with charming *Heliconias*, *Theclas*, etc., was still more overpowering, and with hat in hand, the butterflies were vigorously pursued until several specimens had been secured, but with such imperfect means of capture at hand, the beautiful insects were battered and torn, and our clothing having become covered with malignant burs collected in the chase, we thought it best under the circumstances—the first burst of enthusiasm being over—to devote our attention more particularly to the orange question.

While vigorously consuming oranges, enquiries were made as to whether the trees or fruit were subject to insect enemies. Beyond occasional specimens of the larva of *Papilio cresphontes*, we could not learn of any caterpillar which consumed the leaves, and the only insect which seemed to trouble the orange growers at all was a species of Coccus—*Aspidiotus citricola*—which attacks the bark and foliage of both the orange

and lemon trees, and occasionally, if very numerous, gives the tree a sickly appearance. But such an effect was rare, and one could not help feeling astonished at the luxuriant and vigorous growth of the average orange grove and the symmetry and beauty of the trees laden with their golden fruit, in soil, in most instances, so poor that one wondered where the nourishment came from. In our course up and down the Ocklawaha River, where the trees are everywhere clothed with the beautiful Florida moss, *Tillandsia usneoides*, and the swampy margins decked with brilliant asters and other composite flowers, we observed many Neuropterous insects on the wing, but did not succeed in capturing any; indeed, the catching of an insect seemed insignificant work in the midst of the excitement attendant on the shooting of alligators, herons, ducks and other large game, and at the close of the week there were very few spoils wherewith to grace the Entomological cabinet. Now, a few days later, amidst frosts and snow, the novel recollection of the recent heated butterfly chase, the cooling off under the shade of orange trees, imbibing the sweet rich juice of the fully-ripened fruit, and the additional novelty of a sunburnt brow, all in the midst of the month of December, are things not soon to be forgotten.

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## ON THE PUPATION OF THE NYMPHALIDÆ.

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

In Ent. Mo. Magazine for August, 1878, is a paper by Dr. J. A. Osborne, respecting a discovery made by him of the mode by which the larvæ of the Nymphalidæ attach the chrysalis to the button of silk, and which is "altogether at variance with the account given in Kirby and Spence and other works." Dr. Osborne relates: "In watching the transformation of *V. Urticæ*, I found that the chrysalis was attached to the old skin of the caterpillar by a membrane sufficiently strong and permanent to support the insect during the critical last moments of pupation, and fully explaining why it does not fall down when the tail of the chrysalis is withdrawn from the old skin and thrust up to be attached to the silk." The

author then refers to a communication made by him to *Nature*, vol. xv., p. 7, 1877, on the same subject, and quotes from Figuiet's *Insect World* the following account of the pupation of *Urtica*: "The chrysalis, which is shorter than the caterpillar, is at some distance from the silky net-work to which it must fix itself; it is only supported by that extremity of the caterpillar's skin which has not been split open. It has neither legs nor arms, and yet it must free itself from this remaining part of the skin and reach the threads to which it is to suspend itself. The supple and contractile segments of the chrysalis serve for the limbs which are wanting to it. Between two of these segments, as with a pair of pincers, the insect seizes a portion of the folded skin, and with such a firm hold that it is able to support the whole of its body on it. It now curves the hinder part slightly and draws its tail entirely out of the sheath in which it was enclosed," &c. Dr. Osborne then says: "How this can be conceived possible, considering the utterly soft condition of the newly-excluded pupa, and that the caterpillar skin is now reduced to a packet so small that it covers only the end of the tail of the chrysalis (loc. cit.), in which moreover there are no longer any free segments, I cannot understand. On the other hand, it is very easy to show that the last and sufficient bond of connection between the chrysalis and the old larva skin is a membrane extending from the lining of the latter to the anterior horns of the two lateral ridges bounding the anal area of the chrysalis. . . . I have tested its strength to sustain the weight of the chrysalis and the time during which it resists desiccation and the writhings of the insect, the obvious object of which is, not to get rid of the old caterpillar skin, but to rupture this membrane after the chrysalis has made good its tail attachment to the silk." The communication in *Nature* called out no reply or remark from lepidopterists, and hence Dr. Osborne again recited the facts in the *Ent. Mo. Mag.* The Editors thereof say: "We will be very glad to know if the very reasonable explanation advanced in support of the theory of our correspondent has been elsewhere referred to, and also to have the results of direct experiment by others. So far as we can discover, most of the published accounts are simply copied, or extracted from Réaumur."

As soon as I read this communication, I sought for butterflies of this family, and soon took females of *Grapta interrogationis* and *D. archippus*. The former laid many eggs in a bag, tied over a stem of hop, and the other a few on *Asclepias*. The larvæ from both lots have finished their pupation, and I have carefully watched the process. Dr. Osborne's statement

is correct. The chrysalis of *Grapta* is supported by a narrow, white membrane or ligament, about one-tenth inch long, one end of which is pointed and fastened to the inner side of the larval skin near the extremity thereof, and the other is forked and fastened to the ends of two curved, slightly raised, longitudinal ridges, which are to be found on the ventral side of the last segment. These ends are at the anterior edge of the segment. They project sufficiently to form hooks, as it were, which hold the membrane firmly. In *archippus* the ligament is much larger and stronger than in *Grapta*. It is broad, black, and deeply forked where it attaches to the segment. In this species, instead of low ridges, there are two rows of shining black processes, three in each row, and the outer pair are knobbed, and a little pointed anteriorly. On these outer knobs the ligament is fastened. I do not believe that the chrysalis of *Grapta* ever seizes the loosened skin *for a support*—at any rate any support that such a hold could furnish is not essential, for I have repeatedly raised the skin with forceps entirely off the abdominal segments on the ventral side, so as to discover the distended membrane, and in several cases have cut the skin off just below the membrane at the instant the effort was beginning for freeing the tail. In these last cases the chrysalids were seen to be connected with the skin by the membrane only, and the membrane is the lever by which the chrysalis climbs to the silk. There could not possibly have been any other support.

Réaumur's account of the pupation of the *Suspensi* was drawn up after very extended observations on larvæ of several species of *Vanessa* principally (he says, several hundred caterpillars), and is given at great length. Similar statements are given by subsequent authors, often based on direct observation, but so far as I can discover, one and all describe the process as it would appear to a looker on. I notice in Westwood and Humphrey's British Butterflies, p. 54, what is doubtless an inadvertent error: "The chrysalis carefully withdraws its tail from the skin, *seizing hold of the outside* of the latter by pressing two of the rings of its body together, and enclosing between part of the old skin. *By repeating this process*, it at length pushes its tail upwards, till it reaches the silken button," &c. For *outside*, read *inside*.

Dr. Harris, Ins., 2nd ed., p. 282, gives an account of the transformation of *archippus* with much detail.

"By bending together two of these rings near the middle of the body, the chrysalis seizes, in the crevice between them, *a portion of the empty*

skin and clings to it so as to support itself while it withdraws its tail from the remainder of the skin. It is now wholly out of the skin, to which it hangs suspended by nipping together the rings of its body; but as the chrysalis is much shorter than the caterpillar, it is yet at some distance from the tuft of silk, to which it must climb. To do this, it extends the rings of its body as far apart as possible, then, bending together two of them above those by which it is suspended, it catches hold of the skin higher up, at the same time letting go below, and by repeating this process with different rings in succession, it at length reaches the tuft, &c." "We may see the whole process in the caterpillars of *archippus*," &c. Dr Harris drew his description from nature, and was too careful an observer to commit himself in a case like this beyond what he thought he clearly saw.

In Butterflies of N. America, vol. I., I gave an account of the transformation of *Grapta comma*, taken strictly from my own observations. In this I find no mention of the climbing by the aid of the successive pairs of segments, described by Dr. Harris as taking place in *archippus*, but otherwise my statement agrees substantially with his. I had previously read of the transformations of butterflies in various works, and so was doubtless prepared to receive the common version of the mode, but I described precisely what I thought I saw. I have heretofore repeatedly witnessed this process in various genera, but I find by recent experience that it is impossible with a single observation, or by half a dozen, to determine all the details, and only by watching one point in one example and another in the next, and verifying each again and again, could I feel sure that I had made myself acquainted with this part of the history of a single species. I have watched sixteen transformations of *interrogationis* and two of *archippus*, during the last few days, and will describe at length what I have seen. It may serve to show how the error spoken of originated and has been perpetuated by so many observers, and for more than a century, with no suspicion of wrong till Dr. Osborne made his discovery. In *interrogationis* the period of suspension varies from 6 to 24 hours, according to the state of the weather and degree of warmth. My first observations were made under a clear sky, and mercury about 80° Far., in the middle of the day; the later ones in cool and rainy weather, with cold nights. The larva of this species is suspended from a button of pink silk. At first it holds itself in a circular shape, its head turned in against segments 11 and 12, the lowest part of the curve being at 7th. After two hours, more or less (in warm weather), the curve is relaxed, and the atti-



tude resembles figure 6, the dorsum on last segments being convex, the head turned in opposite 8 and 9, the lowest part of the curve being at 6th. Two or three hours later the body hangs straight, and the four anterior segments are bent almost at a right angle to the others. The head continues to droop, and by this it is made certain that the final change approaches. Presently there is a twitching of the spines, first confined to one segment, but extending soon over the whole body, and changing into a waving motion. This is accompanied by a twisting of the segments beneath the skin, which increases in strength and continues some minutes. Two or three times a spasm of contraction comes on by which the body is lifted up into the last one or two segments and let fall again. Then a creeping movement under the skin commences, extending from the posterior segments forward, and seems to break the skin loose from the body, and one wave after another runs along till the distended skin on the anterior segments bursts. This always takes place on the middle of the dorsum, on the 3rd segment, and the mesonotum of the chrysalis is forced through, splitting the skin up to the head (or first segment), and sometimes splitting the skin of the head also. By the continued creeping movement the body is slowly forced through the rent. As this is oblique, the ventral side of the chrysalis is fully three segments behind the dorsal in the divesting, the skin on the anterior segments fitting tight as a glove, although it is loosening and packing in a mass about the anal feet. In about 90 seconds from the time of the rupture the skin on dorsal side has been pushed back to 10, and the effort begins for the extrication of the tail of the chrysalis from the caterpillar skin. This tail must be withdrawn and fastened outside the skin to the same button of silk which the caterpillar clung to. At this instant the skin covers the ventral side of the chrysalis to 8th segment, but is moving up constantly, and as the chrysalis bends the posterior half of the abdomen sharply back to force the tail out of the sheath, the segments are pinched together and there is at the same time a pinching in of the skin. But there is no seizing of the *outside* of the skin; if there were no other reason, the spines would make this impossible. The tail now free, the chrysalis straightens itself up, and swinging on the ligament, lifts itself towards the silk, the last segment describing an arc of a circle of which the ligament is the radius, and the tail, which at the same instant is curved forward, is brought round and over the considerable packet of the old skin and with precision strikes the silk. An observer, knowing nothing of the

ligament, seeing only the violent contortions, the abdominal segments expanding and contracting to the utmost, while at the same time the chrysalis steadily rises toward the silk, naturally concludes that the one movement is the direct result of the other. When I lifted the flap of skin entirely clear of the struggling segments and cut it off a little below the tail, the bendings and contortions were not interrupted by my interference, nor was the effort to reach the silk in the least abated. Held firm by the stretched ligament, which was in plain view, the body rose, and the tail, which had got well outside the padded skin, and was before complete extrication bent backward, now bent forward, and by the upward swing was brought exactly to the silk. Several times as I was lifting, the skin and chrysalis together were dislodged, and fell into my hand. Then by drawing the skin back the ligament was exposed and it was distinctly seen that it was attached to the chrysalis by the pointed ends of the ridges before mentioned, and that there was no other connection between skin and chrysalis.

After the hooklets of the tail are caught in the silk, the chrysalis whirls one way and then the other, the last segments actively twisting and screwing in order to fasten the hooklets more securely. This movement does not seem to be made for the purpose of rupturing the membrane or for getting rid of the old skin especially, for I noticed that whenever the skin parted and fell just as the silk was grasped, as did sometimes happen, the same whirling and all the movements usually seen followed. It is a wonderful exhibition, and the last act is beyond my comprehension,—namely, the rising of the chrysalis with no external aid save what comes from the ligament. I can only state the fact.

When the rupture of the skin of the caterpillar of *interrogationis* first takes place, and the mesonotum is made to appear, this organ is pressed down and flattened, but in a short time, and before the transformation is completed, it swells out, and becomes nearly as large and as prominent as it ever will be; the head case is pushed forward on the thorax and jammed in, so that on first issuing, the chrysalis is truncated at the anterior side of the mesonotum. When the skin is thrown off, the chrysalis hangs limp and distended, like a long cone, with no prominences except the mesonotum. Presently the segments shorten and become broader, the ends of the wing cases creep nearer the tail, the tuberculated points on the abdomen swell out, the head case pushes up, with its palpi cases, and in course of half an hour the final and characteristic shape is assumed.

The change in these respects is nothing like so striking in *Grapta* as in *Limenitis*, where the chrysalis is greatly hunched and displays a prodigious mesonotum. In this case the chrysalis is at first as limp and shapeless as in *Grapta*, but reaches its proper form in the same way; the segments contracting and the processes growing and maturing as one looks at them.

The transformation of *archippus* presented a close resemblance, but some differences. When first suspended, which it did from a pad of white silk, the larva took the attitude of an oval, the head brought near 12th segment; a few hours later that of figure 6; and finally of a right angle, the head continuing to droop. During the last two hours there was a constant movement of the head, which seemed to rub itself on the anterior legs, and several times and up to within one-half hour of the change, the larva doubled itself up and brought its head to the button of silk, as if greatly annoyed at something there. This I noticed in both the larvæ observed. Finally the body was contracted and lifted up as in *Grapta*, and a slight creeping movement was seen, but there were no twitchings or twistings as in *Grapta*. The creeping became stronger, advancing in waves, and the strain on the anterior segments became severe, till the skin burst on the dorsal line of 2, 3 and 4, and the top of the head also was rent. The slit was oblique, and the ventral side was covered three segments beyond the dorsal. When the body was exposed on dorsum at 10 and 11, the ventral side was covered at 8 and 9, and the skin fitted tight, so that as the body bent back in the movement to free the tail the skin was pinched between the segments. The struggle became violent, the segments all along the abdomen stretching to the utmost, and then contracting forcibly, *one telescoping into the next*; and in this the skin followed the segment, and was drawn in and held for an instant. As this movement ran through the segments successively the skin was pinched at one joint after another, and the chrysalis was evidently rising towards the silk as described by Dr. Harris. Unfortunately I was able to see the transformation in but two examples of *archippus*. In the first one, I set myself to see how the whole change must have appeared to Dr. Harris, as he had described it minutely. In the next one I lifted the flap of skin till I saw the ligament. In so doing the whole thing unhooked from the silk, and as it lay in my hand I pulled back the skin and was able to look at the ligament with a lens. I also lifted the chrysalis by the skin, and the ligament did not part. It did so afterwards only by a strenuous effort.

of the chrysalis, and then remained distended, with its forks in shape. The nature of this organ must be determined by further observations. I had sent to a friend, who is an experienced microscopist as well as entomologist, a chrysalis of *interrogationis* which had been dropped in glycerine at the crisis of pupation, and he writes me thus: "I have examined the preparation, which was in good condition except the separation of the chrysalis from the skin. I see what you call the two ridges, which exist also in the caterpillar and have between them the anus in both caterpillar and chrysalis. Further, I find connected with the skin the whole rectum, and a little more of the intestinal canal, drawn out in pupation. A little below I see a substance which I suppose to be your membrane, about as long as the rectum and structureless. I would suppose that the membrane belonged to the rectum and perhaps the external cover of it, if you had not written that the membrane in *archippus* is black. I took a caterpillar (in spirits) of this species, and opening it, found that the rectum was white, or at least light colored. One should make a section of the caterpillar of *archippus* just after suspension to discover where this black membrane comes from. The use and purpose of the knobs and bars in the chrysalids is doubtless this: in these organs are built up and developed the anal appendages of the imago."

September, 1878.

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NEW N. AMERICAN LEPIDOPTERA, WITH NOTES ON A  
FEW LITTLE KNOWN.

BY A. R. GROTE, A. M.,

*Director of the Museum, Buffalo Society Natural Sciences.*

*Daremma catalpac.*

*Sphinx catalpac* Boisd., pl. 2, figs. 1, 2 (1874).

This species is represented in the Collection of Mr. E. L. Graef by an example from Florida. It is smaller and darker than *D. undulosa* or *D. Hageni*, of a uniform butternut or olive brown tint.

*Emydia ampla*, n. s.

♀. Wings large, body linear, slight. Eyes naked; palpi exceeding the front; maxillæ weak. Antennæ (♀) with converging setose pectinations. Head white; thorax white, black dotted. Fore wings white, silky, with a black dot on the cell and two superposed at the extremity of the cell; one below median vein at basal third and others at base suggesting a basal transverse line. A narrow blackish costal stripe and a terminal distinct interrupted line; fringes white. Hind wings smoky gray with whitish fringes. Beneath entirely blackish or smoky gray with a dark discal dot on hind wings. Abdomen smoky gray. *Expanse* 43 mil. *Habitat*, Colorado (Coll. E. L. Graef).

*Lygranthoecia acutilinea*, n. s.

♂. Eyes naked, body slender, tibiæ armed. Form of *marginata*, *Thoreaui* and *saturata*. Ochrey or olive fuscous with snow white or silvery white lines. Transverse anterior greatly medially and outwardly exerted, preceded by a black marginal line, irregular, raggedly toothed. Cell shaded with whitish or pale ochrey. Reniform marked by black dots. Outer line denticulate, followed by a black line, crossed by white streaks on the median nervules. Subterminal line white, bent inwardly opposite the cell and again before internal margin. Fringes fuscous cut with white. Hind wings whitish with diffuse blackish discal spot and terminal band, the latter interrupted with white above anal angle. Fringes whitish, faintly interlineate. Beneath whitish, powdered with black; primaries blackish to exterior line with double black discal spots, the reniform open, fringes checkered; secondaries mostly whitish with black discal dot and whitish fringes; body pale fuscous. *Expanse* 27 mil. *Habitat* Colorado, Coll. E. L. Graef.

*Heliothis nuchalis* Grote.

This species is very near the European *H. scutosa*, as I find from a specimen of the latter in Mr. Graef's collection. As is the case with *armiger* and *dipsacca*, the American representatives of which I have described as *umbrosus* and *phlogophagus*, we have now a third species nearly related to the European. At the same time extended and careful comparisons of the American and European forms have not been entered into as yet with any of these species of *Heliothis*.

*Melicoleptria oregonensis* Hy. Edw.

This species has been sent me by Dr. Bailey from Nevada (No. 19).

*Chytoryza tecta* Grote.

This genus is characterized by a pellucid impression on the fore wings of the male on the cell before the transverse posterior line. In the shape of the wings it differs from *Pteraetholix bullula* and in the thinner labial palpi. These two genera from Alabama and Texas seem to be our nearest allies to the genera *Anomis* and *Alctia*.

*Catocala coelebs* Grote.

Another specimen of this rare species has been taken by Mr. Hill this season in the Adirondacks. This species has the fore wings black and gray. What is probably a variety of *C. badia*, with brown primaries, but with the lines better marked than in the type, has passed erroneously as *C. coelebs* in several collections I have recently seen. Probably this mistake has led to the belief that *coelebs* was only a form of *badia*.

*Asopia cohortalis*, n. s.

♂. Allied to *squamialis* and with blackish fringes and distinct black terminal line. Head and thorax, basal and terminal fields of primaries ochre brown. Median space shaded with black. Inner line dentate as in *squamialis*, black, preceded by a paler ochre shade. The pale shades are well marked on costa, but do not spread or form blotches as in *squamialis*. Outer line upright, a little bent in on costal region, denticulate, black; it is further removed from external margin than in *squamialis*; between the lines are three costal marks; the two median lines are parallel, the distance between them remaining the same. Hind wings fuscous with double blackish lines; fringes interlined with black; a terminal black line; fringes fuscous. Beneath the primaries show a series of costal marks to the common outer line, which is black; beyond the line the terminal field is shaded with ochre. A dotted terminal black line; fringes fuscous, interlined. *Expanse* 25 mil.; Colorado, Mr. E. L. Graef. The color and position of the outer line are different from *squamialis*.

*Agrotis piscipellis*, n. s.

♂ ♀. A species with simple antennæ, armed tibiæ, naked eyes and untufted thorax, and somewhat flattened abdomen, which resembles *Ufens*

*plicatus* or some of the species of *Homohadena*,\* such as *induta* and *incomitata*. Thorax and fore wings dark but bright brown, veins more or less marked with black, stigmata' obsolete, median lines sometimes obsolete, when present black, narrow, single; t. a. line upright, rivulous; t. p. line denticulate, exserted superiorly, marking venular points, followed by a faint pale shade; s. t. line pale. Hind wings pale at base, smoky outwardly, sub-pellucid, veins darker, no discal dot above or below. Front and tips of palpi very deep brown. Beneath pale, washed with reddish, a common black even line, veins indicated. Thorax and appendages and abdomen beneath rosy brown. Collar unlined. *Expanse* ♂ 34 mil. (Colorado); ♀ 40 (Nevada); from Dr. James S. Bailey. May be placed with the *albalis* group, but resembles no species very nearly. Body not hairy as in *U. plicatus*.

*Agrotis cupida.*

This species seems to be subject to unusual variation. What may be taken as the typical form, or that which is best marked, expands 33-35 mil., the wings are of a brick brown with the stigmata filled with black, a black mark on costa at inception of s. t. line, the s. t. space a little darker than the rest of the wing, the lines well defined. A larger form from Texas expands 40 mil.; it has been reared from the larva by Belfrage (No. 674). It is more red, more unicolorous, the markings less obtrusive. A specimen taken by Dr. Bailey is the size of the typical form, but has the sub-basal and subterminal spaces entirely filled in with black. Then come three specimens in which the fore wings seem a little narrower and the expanse smaller. One is bright orange red, all the markings obsolete. Another is more of the typical shade, but both stigmata are ringed with bright yellow. The third I have described as distinct, under the name *brunneipennis*. This one, from Mr. Thaxter, is a little smaller than the others, expanding hardly over 30 mil. It is dark red-brown, almost immaculate. Whether these three belong to a different species from *cupida* remains doubtful.

*Agrotis cupidissima.*

It seems to me now probable that *lactula* is not sufficiently distinct from this Californian form. In the type of the latter the ground color is

\* I can find no character to separate *Metahadena* from this genus, to which I would accordingly refer *H. atrifasciata* (Morr.)

darker, more purplish brown, while *cupidissima* is pale reddish clay color. But the powdery markings are the same in shape, and, bearing in mind the variation in *cupida*, it seems easy to include *lactula* as a form of *cupidissima*. At the same time the body seems slenderer in the type specimen I have, and the form more compact. These forms all have the collar unlined.

*Agrotis placida*.

A dark form with pale terminal space, but much smaller than *alternata*, which Mr. Hill has taken in the Adirondacks. Four specimens sent me from Nevada may be forms of this species. They all come from Dr. Bailey. One has the fore wings shaded with brown, median and terminal space both paler, markings quite distinct. Another is almost unicolorous blackish with the shadings and markings powdery. Again, another has a reddish cast reminding one of *cupida*, but with pale terminal space. It does not seem possible that these Nevada specimens belong to distinct species, but for some time to come it is evident that our determinations in this group will be provisional unless we can find other characters than coloration and size to distinguish the "species."

*Agrotis alternata*.

A heavier form than *cupida*, the terminal space contrasting and paler. Varies much in tone; some specimens shaded with orange or reddish brown. Generally it seems of a clay color. One specimen from Nevada (Dr. Bailey) may be a distinct species. The median lines are more prominent and shaded with pale scales; the terminal space strongly contrasts. It is more likely, however, to be an extreme variety. *Agrotis orbis* from California may only be a form of *alternata*. I have a specimen from Colorado which seems intermediate, but which I refer to *alternata* provisionally. I have recently identified *Glaca anchocelioides* of Gueneé, which resembles some varieties of *alternata*, but has unarmed tibiae.

*Hadena senescens*, n. s.

♂ ♀. Male antennæ simple, ciliate; eyes naked, lashed. A tuft behind the collar and on the thorax behind. Tibiæ unarmed. Primaries straight along costal margin; wings rather broad. Pale dust color with the costal region to s. t. line of primaries shaded with brown. Lines double. Orbicular oblique, narrow above, rounded below. Reniform large, pale with internal black annulus. Disc between the spots black.



Subterminal space shaded with brown, showing the pale ante-apical dots distinctly. S. t. line marked with black before internal margin as in *vigilans*. A scalloped pale terminal line, interrupting the brown fringes. Hind wings blackish with pale terminal border and discal lunule. Beneath shaded with reddish; dark discal lunules, double common shade lines, pale terminal border on both pair. Head and collar shaded with brown; pectus and legs blackish beneath; abdomen purplish-brown. Front and palpi blackish. *Expanse* 36 mil. Taken by Mr. Hill in September in Lewis Co., N. Y. Allied to *Hadena vigilans*.

*Hadena algens*, n. s.

♀. Eyes naked, with lashes. Head not prominent but, as in *vigilans* and *senescens*, rather closely applied. Stone gray with inconspicuous markings. Collar pale with narrow black edging. A slight black basal dash. Lines and spots inconspicuous. Orbicular bordered on inside with black, edged with pale, subquadrate; reniform narrow, kidney-shape, both spots upright, incompletely edged with black and pale scales. S. t. line pale, irregular, marked with black on submedian fold. A terminal even dotted black line. Hind wings dark gray, reflecting the double lines and discal lunule of under surface. Beneath gray; discal spot of primaries open and nearly obsolete, on hind wings dark shade. The terminal space on both wings paler than rest of wing. *Expanse* 30 mil.; Maine, Prof. Fernald.

The three species here alluded to will be separated eventually from *Hadena*, but at the moment I refer them to the typical genus of the subgroup to which they belong.

*Mamestra novorca*, n. s.

♂ ♀. Eyes hairy. Male antennæ simple. Fore wings of a mossy brownish olivaceous. Orbicular margined with black, open to costa, rounded, moderate. Reniform pale, elongate, subquadrate, erect. T. p. line double, pale centered, followed by points on the veins, outwardly oblique to vein 4, thence inwardly oblique, nearly straight, below reniform to internal margin. Subterminal line pale, irregular, preceded and followed by black marks over the middle of the wing. Fringes concolorous, preceded by small black points and cut with pale. A black median basal dash or shading. Thorax concolorous; tegulæ shaded with blackish. Hind wings whitish at base with discal mark and broad smoky border.

Beneath dusty gray with traces of double common lines and discal marks. *Expanse* 34 mil. Nebraska, Colorado, Dr. James S. Bailey. This species is allied to *Goodellii*, but it more closely resembles the following species, which, owing to the naked eyes, must be separated generically.

*Hadena genitrix*, n. s.

♀. Eyes naked. This species is of a mossy blackish olivaceous with the ornamentation effaced. From the shape of the t. p. line, the position of the reniform and the excavation of hind wings, it is allied to *curvata*. Claviform outlined in part with black. Orbicular spherical, complete, somewhat widely separate from the pale, half-erect, rounded reniform, which is contiguous to the t. p. line. T. p. line pale-centered, double, lunulate, followed by pale points. S. t. line pale; fringes concolorous, cut with pale, preceded by black terminal dots. Hind wings entirely smoky with line and discal mark. Beneath pale, shaded with blackish on disc of fore wings; black discal points, distinct on secondaries and common lines; with sprinkled black scales on both wings. Thorax and head like primaries. *Expanse* 36 mil. Nebraska, Colorado, Nevada, Dr. James S. Bailey. The median lines are further apart than in *M. noverca*, the claviform is indicated, the reniform is somewhat oblique and lies against the t. p. line, which is more uneven than in *M. noverca*. The two species are liable to be confounded unless care is taken.

*Apatela theodori*, n. s.

♂. Eyes naked; tibiae unarmed. Gray shaded with pale brick red. Head and thorax above grayish, metathoracic tuft reddish; abdomen reddish gray. Fore wings gray with pale reddish shadings. Lines fine, black, single. Basal line arcuate. A fine black streak from base along submedian vein. The nervules also scantily marked with black scales. Sub-basal space shaded anteriorly with reddish. T. a. line slightly outwardly oblique, irregularly lunulate. Median shade marked in black on costa, commencing midway between the lines, greatly exerted medially, irregularly dentate, becoming reddish below costa. Median space before the shade gray, behind it reddish. Orbicular and claviform obsolete. Reniform reddish, large, undefined. T. p. line interspaceally dentate, rounded superiorly, thence inwardly oblique. Submedian space gray, except at costa, much invaded by the acutely and deeply dentate s. t. line which is preceded by black V-shaped shades, the one on submedian fold

crossing the space and forming a dash. Terminal space reddish; fringes interrupted. Hind wings white with faint mesial line, fringes white. Beneath white with reddish cast and faint reddish common line. Front with a black line. *Expanse* 43 mil. Colorado, Dr. Theodore S. Bailey, for whom I name the singularly colored species.

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### MICRO-LEPIDOPTERA.

BY V. T. CHAMBERS, COVINGTON, KY.

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#### PHILONOME.

*Philonome Clemensella* Chamb., *ante v. 6, p. 97.*

I have usually taken this species at the same place, about one or two specimens a year, and always within ten yards of the place where I first took it six years ago. The trees in the immediate vicinity were *Gleditschia triacanthos*, *Ulmus americana*, *Prunus serotina* and *Celtis occidentalis*, but it may have fed as larva upon some weeds or shrubs growing near. All of my specimens were taken about the 8th or 10th of July. This year, however, I have captured (June 14th) two specimens (perfectly fresh) on *Gleditschia triacanthos* at another place, where the nearest tree was *Celtis occidentalis*, growing some thirty yards away. Its larva and food plant, however, are not yet by any means certainly ascertained.

The labial palpi are divergent and ascending, and not quite so long as the maxillary pair. I have stated *loc. cit.* that the antennæ are about two-thirds as long as the wing and pale reddish orange; perhaps it would be more correct to say that they are a little more than half as long as the wings, with the base reddish orange, and the stalk white tinged with pale orange or yellow. I have also stated that there is a reddish orange transverse stripe across the top of the thorax before its apex, and this is most

often the case; though sometimes the portion of the thorax behind this streak is reddish orange to the tip, and in perfectly fresh specimens the transverse stripe is made up of raised scales; the oblique white costal streak has its tip produced a little towards the apex, and is margined behind the tip with brown scales. There are two dark brown hinder marginal lines, one at the base of the ciliæ and the other at their tips and running out into the hooks. The abdomen and legs are silvery yellowish and the upper surface of the abdomen is stained with fuscous.

## LAVERNA.

*L. circumscriptella* Zell.

I have not seen Prof. Zeller's specimens, but I have received from Miss Murtfeldt specimens which, with the aid of Prof. Zeller's figure and description, I recognise without difficulty as belonging to this species. The thorax, head and palpi are white, except that the basal part of the second joint of the palpi is stained with brownish. The fore wings are of a pale grayish ochreous, with the dorsal margin from the base nearly to the middle snowy white, the white crossing the fold at the base, and further back again crossing the fold and reaching almost to the costal margin; it is margined behind by two small tufts of raised brown scales, as represented in Zeller's figure, and there is another one on the costa not represented in the figure, which again has a minute brown spot in the white at about the basal fourth, which I do not find in my specimens. The figure also gives a very distinct white streak which leaves the white of the dorsal margin at the fold and curves to the costal margin before the ciliæ; this streak is absent in one of my specimens and much less distinct in the other than it is in the figure. There is a black speck at the hinder angle (indistinct in my specimens) and the apex is dusted indistinctly with brown. *Al. ex.*  $5\frac{1}{2}$  lines.

Miss Murtfeldt informs me that "The larva is a pale, glossy, green, cylindrical worm, which feeds upon the immature seeds of *Oenothera* and pupates within the capsules."

A single ♂ from Texas, and one bred ♀ also from there, lack the curved white line on the fore wings figured by Prof. Zeller, and in some of the other females it is indistinct.

## MEMORANDA.

Tropical residents continue to visit us. I have in my cabinet two examples of *Sphinx (Argens) labruscæ* Linn. One of these was taken at Chicago, the other on a vessel near Mackinaw Straits. Several examples of *Erebus odora* Linn. have been taken here this fall, two very fresh examples having flown into one of our school-rooms during the night.

My setting-pliers, bought several years ago from S. E. Cassino, at Salem, and in constant use since, show decided magnetic polarities. One point attracts, while the other repels steel pins, etc. The upper end has attractive power. The pliers have never been in contact with a magnet, and have probably never lain in the same position for a week. Is the magnetism due to some mechanical action to which the pliers were subjected in the process of manufacture?

O. S. WESTCOTT, Racine, Wis.

## OBITUARY.

It becomes our painful duty to announce the death of one of our correspondents, Mr. W. V. Andrews, of Brooklyn, N. Y., who died on the 20th of October, 1878, after a brief illness, resulting from a sudden attack of paralysis.

William Valentine Andrews was born on the 11th of February, 1811, in Pilton, Somerset, England. At an early age he entered the British service, and served as a private in the Coldstream Guards, rising eventually to the rank of Captain. Subsequently he resigned his commission and removed to Canada, where he resided for several years in London, Ont., engaged in the book and periodical business. From thence he removed to the United States and settled in Brooklyn, where he spent the last few years of his life in the same branch of business, devoting his leisure time chiefly to the study of Entomology, in which he made rapid progress. He had a well arranged collection of Coleoptera and Lepidoptera, and a small but well selected library of Entomological works. His remains were interred at Rosedale Cemetery, New Jersey.

Since his decease his collections and library have been purchased by Mr. John Akhurst, of Brooklyn, N. Y.

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