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NOTES ON CERTAIN BUTTERFLIES, THEIR HABITS, ETC.

No. 1.

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

I. PAPILIO PHILENOR.

On 21st May, 1881, I saw a female *Philenor* fluttering about a low plant in the edge of the woods near my house. Apparently it was a vine just out of the ground—some four or five inches high—and three eggs were laid on the stem. I sent the plant to Mr. Scudder for determination at the Botanical Gardens, but he reported that there was not enough of it for that purpose.

On 1st Aug., I saw a female coursing over the hill side, alighting on various species of plants for an instant; sometimes on clover heads or other flowers, then flying again in short circuits, touching a leaf here and there. Perhaps it was ten minutes before she lingered on one plant longer than usual, though then but for three or four seconds, and I found on examination three eggs laid on the stem just below the terminal leaf. The plant was of the same species I had noticed in May, and I dug it up and planted it in the garden. When at Cincinnati, at the meeting of the A. A. A. S., I learned from Dr. H. S. Jewett that this must be *Aristolochia serpentaria*, a common plant about Dayton, O., and later I received from him several dried examples of it. I had no idea that this was what is spoken of by Dr. Boisduval, Lep. Am., as the food plant of *Philenor*, as it is wholly unlike other species of *Aristolochia* with which I am familiar, they being all vines, and this a low herb. Gray describes it as growing in rich woods, Conn. to Ind., and southward, the stems 8 to 15 inches high, leaves ovate or oblong from a heart-shaped base. The Virginia Snake-root of medicine.

2. PAPILIO MACHAON.

During the winter 1880-81 Mr. Mead sent me a large number of chrysalids of *Machaon*, imported by him from Germany, requesting me to turn

the butterflies loose here as they emerged. The first one was female, out 6th May, when the lilacs were in blossom, and I placed it on the flowers. Others emerged day by day. On 9th, I recorded that I had turned out 40 to 50, but they soon disappeared and were not again seen. I saw one soon after I had placed it on the lilac, pursued by an *Ajax* as if it was regarded as an intruder. In all upwards of 100 were freed. About a week after the last butterfly had emerged, I caught a male near the house on a clover head, and this was the only *Machaon* I saw during the summer. I had planted a large quantity of Fennel, thinking the females might deposit eggs thereon, but diligent search failed to discover any.

3. Effect of Cold Applied to Larvæ.

1. DIANA. In 1873-4, I succeeded in rearing one of these larvæ from the egg to imago, starting with several hundred eggs; there were losses at every stage. The duration of each stage was also very great, of 2nd stage 16 days; of 3rd, 14; of 4th, 17; of 5th, 12 to 5th moult; from 5th moult to pupation 22 days; of the chrysalis 21; the butterfly emerging 9th June.

In Sept., 1880, I obtained about 100 eggs, and as soon as the larvae hatched, I sent most of them to Prof. Fernald, at Orono, Me., to go in an ice house. A few I kept myself and tried to carry them through the winter in a cold room, but by 11th Feb'y, 1881, all had died. Most of those sent to Orono also died from the ice giving out late in the fall apparently, but in one little paper box were a few larvae (10 or 12) still alive when I received it, 7th March. From these I raised 4 butterflies, and could have several more, had I not put one at each larval stage, and one chrysalis, in alcohol. The stages were in duration as follows, beginning at 1st moult, or the next one after hibernation:

No. 1. 2nd stage, 10 days.	No. 2. 2nd stage, 13 days.
3rd " 9 "	3rd " 9 "
4th " 7 "	4th " 5 to 6 "
5th " 6 "	5th " 5 "
5th moult to pupation 13 days.	5th moult to pupation 13 days.
In chrysalis 19 days (♂).	In chrysalis 19 days (♂).
No. 3. 2nd stage, 13 days.	No. 4. 2nd stage, 14 days.
3rd " 9 "	3rd " 9 "
4th " 5 to 6 "	4th " 5 "
5th " 5 "	5th " 6 to 7 "

5th to pupation 14 days.
In chrysalis 21 days (♀).

5th to pupation 10 to 11 days.
In chrysalis 19 days (♂).

No. 1 was 64 days from 1st moult to imago.

No. 2 was 65 " "

No. 3 was 67 " "

No. 4 was 65 " "

Whereas the period of the larva before spoken of (1873-4) was 102 days from 1st moult to imago. The frozen larvae were healthy at all stages, and I lost none after 1st moult, except one in chrysalis.

2. CYBELE.

In Sept., '79, I obtained eggs of *Cybele*, and 7th Oct., I sent 40 larvae just hatched to Prof. Fernald, to go on ice. Others I retained, and tried in the usual way to carry them through the winter, but in Feb'y I found that these were dead. I received the lot from Orono 3rd March, '80. These were nearly 5 months in the sawdust next the ice in house, as Prof. Fernald wrote me. Two days after they reached me several were moving about, and I transferred them from the boxes to violet. The stages were :

No. 1. 2nd stage, 12 days.

3rd " 4 "

4th " 5 "

5th " 7 "

No. 2. 2nd stage, 10 days.

3rd " 6 "

4th " 7 "

5th " 4 "

5th moult to pupation 9 days.

In chrysalis 16 days.

From 1st moult to imago 62 dys.

No. 3. 2nd stage, 8 days.

3rd " 9 "

4th " 8 "

5th " 8 "

5th moult to pupation 12 "

In chrysalis 20 "

1st moult to imago 65 "

The first butterfly emerged 12th May (♂).

Here again, as in the case of *Diana*, above related, the periods were all shortened by the freezing the larvae had undergone, and the larvae were healthier at every stage. In 1874, out of 100 caterpillars of *Cybele* hatched in fall of '73, I obtained but 3 chrysalids, and from these 2 butterflies. From 1st moult to butterfly was 104 days.

In 1874-75, I raised three butterflies, *Cybele*, starting with 219 eggs by count, obtained from one female, 5-7 Sept. The 1st moult occurred (in greenhouse) 13th Feb'y, 1st chrysalis was reached 29th April, and the butterfly emerged 24th May, the period from 1st moult being 100 days. I found the same result in freezing caterpillars from eggs laid by *Satyrus Nephela*, as I related in *Can. Ent.*, vol. xii. It may be assumed that freezing through the winter preserves the lives and contributes to the good health of caterpillars which go into lethargy from the egg, all the way to the imago.

4. On Transportation of Eggs and Young Larvae.

I have frequently had eggs of butterflies sent me from points 5 to 12 days distance by mail, and except in rare instances, the larvae hatched *en route* have died in consequence of the decay of the leaves (food) sent with them. Some leaves, being of a dry nature, like *Celtis*, bear a 6 to 10 days journey from South Florida very well, and usually some larvae reach me alive. Willow does not bear this journey readily, and I have lost several lots of larvae of *Limenitis Eros* in consequence, though in two or three cases they have reached me alive. But Passion-vine has always decayed, even in 5 days. The leaves break loose from the stem and get rolled into a nasty rotten ball, destroying everything in the box. So I have several times lost larvae of *H. Charitonia*. I suggested to Dr. Wittfeld, who sent these, to tie each leaf of Passion-vine to the stem before boxing, to prevent their breaking off, and this has seemed to work better.

On 30th Aug. last, I made an experiment, putting a stem with half a dozen leaves of Passion-vine into an eight-oz. bottle and corking tight. This was placed in a dark closet. Temperature without was high, among the nineties daily. After ten days, I first discovered signs of mould and decay in the leaves, and then only in the tender terminal ones.

At same time I had bottled in similar manner two leaves of Pawpaw, on each of which an egg of *P. Ajax* had been laid that morning. At that season the eggs of *Ajax* would hatch in 4 to 5 days. On the 9th day, I observed the first signs of mould, and that on one leaf only. The other was sound, and two caterpillars were upon it, and both had just cast their skins at 2nd moult, the skins being still present. They had hatched about 5 days before, and though corked up and kept in the dark, were apparently as healthy as though all the conditions had been normal.

I then requested Dr. Wittfeld to bottle leaves of Passion-vine and mail to me packed in a box, which he did. This was in October, and the package was 10 days on the road. Two leaves were rotten and worthless for food, but still held together, and four leaves were sound.

Therefore, it is plain that in corked bottles, or in air tight tins, eggs of butterflies can be forwarded from points 8 to 12 days distant, i. e., Florida, Texas, Arizona, California, Oregon, and the larvae from them will probably reach their destination in good condition.

I received several tin boxes (soda-powder boxes, and not air tight) from Arizona the past season, from Mr. Doll. Three contained eggs of two species of *Lemorias*, viz., *Palmeri* and *Nais*. They were sent on the leaves and stems of Mesquit, on which they had been deposited, and between layers of cotton wadding. As it happened, the eggs, though out 12 days, were but partly hatched when I got them, and the hatching proceeded. Had they hatched two or three days earlier, I should have lost every caterpillar, for the leaves were dry as tinder and unfit for food. I believe, as the result of several observations, that it is not well to place the leaves in cotton in any case, as this seems to extract the moisture from them. Even in so short a journey as from Coalburgh to Philadelphia, 26 to 30 hours, Mrs. Peart has noticed that whenever cotton was in the box with leaves, the latter had suffered.

Eggs should in no case be sent in wood or in paper boxes, as the leaves dry up at once, and any larvæ will starve. I am very anxious to receive eggs of any species of butterfly, especially of all Satyrids in Rocky Mts. to Pacific, including species of *Chionobas*; of all Argynnid and Parnassians; and if any collectors will send me these, or one or more of them, corked in glass, or in air tight tin, I will pay liberally for them, or exchange butterflies for them to any extent. I would gladly give twenty species of butterflies for one lot of eggs which I have hitherto not had.

5. On Irregularity of Number of Moults in Larva of *APATURA FLORA*.

In *Psyche*, vol. 3, p. 159, I enumerated the species of butterflies whose larvæ I had bred from the egg, and gave the number of moults of each. One or two had but three, nearly all had four, and some had five. When the species is two-brooded, and the larvæ of one brood hibernate, they usually pass five moults, but in the summer brood of the same species

there are four.* In the case of *Apatura Celtis*, at Coalburgh, the species being two-brooded, there are five moults in the winter brood, four in the summer. In *A. Clyton*, which here has but one annual brood, there are five moults, the larvæ hibernating. In *A. Flora*, belonging to same subgroup with *Clyton*, as distinguished from *Celtis*, but a Florida species and double-brooded, I cannot speak as to the number of winter broods, but in the summer of 1880, I found four moults only. I received eggs from Indian River in July, and raised nine larvæ to imago. But in 1881, I raised larvæ in August, from eggs received from Indian River, and all passed five moults. Mrs. Peart, who was feeding two of this lot of larvæ, and making drawings of each stage, wrote me 25th Aug. that both had passed 5th moult, and I had discovered the same thing myself.

In 1880, 1st moult, 24th July.

2nd " 28th " 4 days.

3rd " 1st Aug. 3 "

4th " 5-6th " 4½ "

Suspended 14th " 7½ "

In 1881, 1st moult, 3rd Aug.

2nd " 7-8th " 4½ dys.

3rd " 12th " 3½ "

4th " 18th " 6 "

5th " 24-25th " 6½ "

Suspended 1st Sept., 7½ "

In 1880, from 3rd moult to suspension was 13 days; in 1881 was 20 days; and the length of this last period would seem to make an additional moult necessary, but why the stages were so protracted in '81 and so short in '80, I cannot guess. The conditions were similar so far as I know. In '80, I had 4 males, 6 females from chrysalis, in '81 both sexes, though I do not appear to have made a note of the exact number of each. But as all the larvæ in one year passed 4 moults, and all in the other 5, the difference was not sexual.

6. The proportion of chrysalids of *PAPILIO AJAX* which go into premature hibernation does not always increase as the season advances.

Mr. Scudder states this as a rule, in "Butterflies," p. 172. In 1872, I related my observations on *Ajax*, and I say: "It will be noticed that a large percentage of the chrysalids of nearly every brood pass the winter, the proportion *seeming to increase as the broods succeed each other.*" Now

* I omitted to state in that paper, that *Limenitis Disippus* makes its case in the fall either after second or third moult. Of 7 larvæ in Oct., 1881, 5 went into their cases after second moult, 2 after third. I have noticed the same thing in former years, but no larva has passed more than two moults after hibernation. So that this species would have both 4 and 5 moults in the winter generation.

this rule is not absolute. In 1881, from eggs laid by the form *Telamonides*, I had 26 chrysalids, the last of which formed 19th June. From these, 4 butterflies only emerged the same season, and the rest of the chrysalids are now passing the winter. If the rule above set forth held, the proportions should have been reversed, or 22 butterflies should have emerged and 4 chrysalids passed the winter.

7. AJAX, WALSHII and TELAMONIDES.

Mr. Raphael Meldola, in Ann. and Mag. Nat. Hist., xii, 1873, made some remarks on my history of *Ajax*, But. N. A., v, 1, to which Mr. Scudder called attention in Proc. Bost. Soc. Nat. Hist., vol. xvi, 1874, and this last paper closed with these words: "Mr. Edwards had not drawn attention to the fact that *Walshii* and *Telamonides* belonged to the same brood; the former consists of earlier, the latter of later individuals from wintering chrysalids; the second brood of the species (the first from short-lived chrysalids) is *Marcellus*, and made up of the mingled progeny of both *Walshii* and *Telamonides*."

In the "Butterflies," p. 170, Mr. Scudder again refers to this: "The first two (*Walshii* and *Telamonides*) do not appear to represent distinct broods; and this point, to which Mr. Edwards strangely failed to draw attention in the first account of his observations, is one of the most extraordinary features in the history of the insect; for *Telamonides* is not the direct con-seasonal produce of *Walshii*, but both are made up of butterflies which have wintered as chrysalids, those which disclose their inmates earliest producing *Walshii*, the others *Telamonides*; while all butterflies produced from eggs of the same season, and there are several successive broods, belong to *Marcellus*."

The experiments recited in But. N. A. ran through two seasons, 1870, 1871. In the former they began with *Telamonides*, circumstances making it impossible for me to begin with *Walshii*, the earlier form. During the following winter nearly all the hibernating chrysalids were destroyed by a fire which burned my house. But the experiments and observations enabled me to say in the text, "that from *Telamonides* came *Marcellus* the same season, and *Telamonides* in the following spring; that from *Marcellus* came successive broods of *Marcellus* the same season and from the last brood *Telamonides* in the spring." Also, "these observations failed to determine the connection between *Walshii* and the other two forms," and I therefore set myself at work to ascertain what that might be, by breeding

from *Walshii* as well as the other forms, and continued the experiments the season through. Now, in Jan., 1872. Part ix of the But. N. A., which contained *Ajax*, issued, before the chrysalids which hibernated had given imagos. But I had discovered enough during the two seasons, and by outside observations, to enable me to say: "The summing up therefore of this whole series of observations is this: *Walshii* produces *Walshii*, *Telamonides* and *Marcellus* the same season; *Telamonides* produces *Marcellus* the same season and its own type in the spring; *Marcellus* produces successive broods of *Marcellus* the same season, and occasionally *Telamonides*, and the last brood produces *Walshii* and *Telamonides* in the spring; and whenever any of the chrysalids of either brood of *Marcellus* pass the winter they produce the other two varieties (forms), and probably sometimes their own type (individual, i. e., *Marcellus*, taken April, 1867). The chrysalids of *Walshii* that pass the winter of 1871-2 will probably produce *Walshii* or *Telamonides*."

It seems to me that this statement is explicit as to *Walshii* and *Telamonides* together being the product of one or any lot of eggs laid by *Marcellus* ♀ the previous year. As to what the chrysalids of *Walshii* or *Telamonides* might actually produce I could not then state with certainty, for the reason given. Since that first account I have spoken of these forms and their relationships in several papers, and it was hardly necessary for the author of the "Butterflies," ten years later, to call attention to a strange omission in my first account, even had there been such an omission, when subsequent observations described by me made the whole history clear. It certainly was not strange that I did not state as fact more than I then knew. At all events, what I have not discovered about *Ajax* no one has discovered, for my observations to this day are the only ones on record.

NOTE ON CHIONOBAS VARUNA.

BY W. H. EDWARDS.

After the description of this species in the Jan. No. was in type, I received a letter from Mr. A. G. Butler, to whom I had sent an example, with request to be informed if it was *Tarpeia*, spoken of in his Catalogue of Satyridæ as being N. American. Mr. Butler writes: "Your Chionobas

is very distinct from *C. Tarpeia*; the latter comes nearer to *C. Chryxus*, being quite a fulvous species, with blind ocelli on under surface. The band of secondaries also is altogether different in outline"; and Mr. Butler gives me a drawing of the wing and band. His drawing and description in all points named agree with what Mr. Scudder formerly described as *C. Calais*, from a single female taken by Mr. Drexler 20 years ago, at Rupert House, Hudson's Bay, and on carefully comparing this (which remains unique in my collection) with a series of *C. Chryxus* from the Rocky Mts., I see that it is a distinct species, and not *Chryxus*, as of late I had assumed.

NOTE ON LIMENITIS URSULA.

BY W. H. EDWARDS.

In my paper on *L. Artemis* and its alleged second brood, in Dec., 1881, I stated that some caterpillars of *L. Ursula* did go on to chrysalis and butterfly late in the year, in Ohio, though others of same lot went into their hibernacula when half grown; and that I had dissected one female *Ursula* which emerged in September last, and could discover no signs of eggs, or at any rate, there were no formed eggs. Also that I had sent a second female of same lot to Prof. Minot for examination. I now have his report, as follows: "There were certainly no ripe eggs in the abdomen, although there were a great many eggs in an immature condition." I stated in the above mentioned paper, that the existence of the species *Ursula* did not depend on these late, or September butterflies; and the reason is, that the female coming so late, and with immature eggs, the season would either not allow the eggs to ripen, or if it did, and they were impregnated, which would be doubtful, it would not allow the larvæ to hatch and to reach the hibernating stage. There is not time for all this before frosts or cold weather. Of course, the same would hold good of *Artemis*, if possibly any females of a second brood should emerge.

ON TWO GENERA OF PHYCIDÆ.

BY A. R. GROTE.

I find that unless we use neurational characters to separate the genera of *Phycidæ*, that it will be impossible to classify the species with accuracy. All characters drawn from the periphery, the appendages of the body, will

be found subject to very gradual modifications, but I do not think we can afford to reject any of them, because of their relative want of stability. Indeed the neuration in the Lepidoptera seems to be as useful as in the Diptera, although there are certain cases (as I long ago pointed out with regard to *Thyridopteryx*) where it varies not only in the species, but in the opposite wings of the same specimen. I think that we must regard as generically distinct from *Pempelia* the North American species *Pravella*, which has 8, instead of 7 veins to the hind wings (see Bull. U. S. Geol. Surv. 4, 694). For this species, the structure of which I have quite fully described, I propose the generic name *Meroptera*. I also find that our two species, found in Texas and Colorado, and which probably mine the Agave, viz., *Bollii* and *Dentata*, are distinct from the European types of *Zophodia*, to which Prof. Zeller referred *Bollii*, the type of the new genus *Megaphycis*. In the structure of the palpi, shape of the wings, greater size and length of body, our two large species differ strongly.

I have also here to correct a mistake of mine in the use of the term "porrect" in this group as applied to the labial palpi (e. g. in *Pinipestis*). I meant by it *ascending*, whereas it appears that it is equivalent to *extended forwards*. The term appears inconvenient to use, and perhaps I am not alone in mistaking its sense.

A NEW APPLE TREE PEST.

BY CHARLES R. DODGE, WASHINGTON, D. C.

As if the apple tree with its sixty or more insect enemies were not sufficiently afflicted, a distant relative of the Canker-worm has been making itself so notorious in Georgia, as to give apprehension of the total destruction of apple orchards in the locality infested. The insect complained of is *Eugonia subsignaria* Pack., a measuring worm which at times has been a veritable nuisance upon shade trees in New York and Philadelphia.

In pursuance of my duties as a Special Agent of the Census Office (in the fruit interest), and through subsequent correspondence, the following facts were obtained from Mr. Adam Davenport, of Fannin County, in the State named. In his first communication, received some months since, it is stated that the worm made its appearance upon Rich Mountain, a spur of the Blue Ridge, about four years ago, attacking forest and fruit trees ;

and that it had since spread over a large area, doing great damage. Apple trees in June last were as destitute of leaves as in mid-winter, the fruit growing to the size of marbles and falling off.

A late communication—with replies to a series of questions—shows the destruction to be even worse than at first reported. I give Mr. Davenport's own words :

“The insect made its appearance four years ago upon Rich Mountain, since which time it has been spreading in a northern semicircle at the rate of about fifteen miles a year. It is by far the most interesting insect that has plagued this country since the first white settlement. So wonderfully prolific, that in two years it literally covered every tree, bush and shrub, and with the exception of a few varieties, stripped them of their leaves.

“The egg hatches about the first of May, and the caterpillar, which is dark brown, lives about forty days, transforms to a chrysalis, lives in this state about ten days, and emerges a milk-white miller. For two weeks before their first transformation the fall of their excreta, in the woods, resembles a gentle shower of rain, and from its abundance tinges the streams a dark green hue. I have seen trees that had been stripped of their foliage, entirely wrapped up in their silken webs, resembling, when covered with dew, a wrapping of canvas. They constitute a great feast for all insectivorous birds and animals ; it is said that even cattle and sheep eat them with great greed. They have an instinctive way of protecting themselves by losing their hold upon the limb, at the slightest touch, and swinging by their web in the air. For this reason they are easily shaken off into sheets and destroyed ; however, they are so numerous, this remedy is worth nothing except in keeping them off very small trees. This instinct is not lost after leaving the caterpillar state, for if a bird alights upon a tree above the millers, they suddenly drop like a shower of snow to the ground for protection.”

In the *Practical Entomologist*, volume 1, page 57, an anonymous writer gives an account of this insect's attacks on elms in Philadelphia. Dr. Packard, in his *Monograph of the Geometrid Moths*, page 528, mentions only elm as a food plant, but Prof. Thomas, in his *Second Illinois Report*, page 243, says : “I have not noticed them feeding upon that tree, but have twice found them feeding upon apple, upon the leaves of which I have reared them to the perfect insect. In neither case were they numerous.” Prof. Comstock makes brief mention of the insect in his

recent report as United States Entomologist, quoting Mr. Davenport, as above, to the effect that the worms were destroying forests of hickory and chestnut, and were damaging fruit trees. This statement doubtless refers to the season of 1880.

The infested district in Georgia is not less than 60 miles long by 40 wide, and embraces Union County on the east, Gilmer on the west, and Polk County, Tennessee, on the north. They have been injurious two years, but in the summer of 1881 they were most destructive.

It is stated in the Practical Entomologist that the eggs are deposited in masses of fifty upon the limbs of the tree. A piece of apple bark before me presents an irregular patch over three inches long, and $\frac{1}{4}$ to $\frac{1}{2}$ inch broad, the eggs closely crowding upon each other. As there are many hundreds, they have doubtless been deposited by a number of moths, which attests the truth of Mr. Davenport's statement regarding their falling in showers like snow.

They are deposited for the most part on the under side of the limbs on the tops of the trees, and not only upon the bark, but the tufts of moss are covered by clusters of them. The eggs are smooth, dull, irregularly ovoid, slightly flattened upon the sides, rounded at the bottom, while the top is depressed, with a whitish rim or edge, forming a perfect oval ring. Color yellowish brown, resembling brown glue. Length of examples before me, .04 inch; width, lying upon the flattened side, .03 inch; thickness, or smallest diameter, .02 inch. They are deposited in curved or straight rows of a dozen or more (or less), these lines forming masses often of many hundreds.

The name, *Eugonia subsignaria*, is given on the authority of Mr. Davenport, supported by his descriptions in answer to my questions, as I have had no means of determining the species. There is no doubt in my mind, however, of the insect's identity.

NOTE ON THE GENUS TRIPUDIA AND ON THE SPECIES OF SPRAGUEIA.

BY A. R. GROTE.

On pages 231 to 238 of the CANADIAN ENTOMOLOGIST for 1879, I gave a list of the species of *Spragueia* and allied genera. I am still in doubt of the position of *Apicella*, from want of material to examine. It may belong to *Fruva*, which can be readily ascertained. The genus *Tri-*

pudivia may be identical with *Oribates* of Hy. Edwards, described more recently. I have seen the type of *O. Versutus*, and, without being able to compare it, it seemed to me identical with my previously published *Tripudia flavofasciata* Grote, CAN. ENT., 1877, p. 69. The type of *Tripudia* is this species, to which I have joined *quadrifera* of Zeller, from Texas, as a second. Whether the orange species *Muirii* and *limbatus* belong here can be ascertained by proper dissections, which should be undertaken as soon as possible.

The species of *Spragueia* have received two interesting additions since the publication of the List. The first of these is *Pardalis*, collected in Florida by Mr. Thaxter. It is allied to *dama* by the orange fringe of primaries interrupted with dark opposite the cell. The costal spots are smaller and pale; the wing is blacker and there is a pale costal spot at base, wanting in its ally.

The second species is *Funeralis* from Arizona, collected by Mr. Doll. It is of a peculiar silky dark leaden hue, with concolorous fringes. A large pale spot outside the t. p. line on costa. Two pale bands enclosing orange lines and swelling into wider spots at costa, where the outer band encloses a dark streak. The species are similarly sized and are very interesting from their brightly marked and narrow primaries. While recalling the European *Erotyla sulphuralis* in ornamentation, they are structurally distinct, as I have shown (l. c.). Our North American species are now as follows:

SPRAGUEIA Grote.

<i>onagrus</i> Guen. Fla.	<i>dama</i> Guen. Ala., Tex.
Type <i>leo</i> Guen. Ala.	<i>pardalis</i> Grote. Fla.
<i>plumbifimbriata</i> Grote. Tex.	<i>guttata</i> Grote. Tex.
<i>funeralis</i> Grote. Arizona.	<i>tortricina</i> Zell. Tex.
	! <i>apicella</i> Grote. Ala., Tex.
	= <i>truncatula</i> Zell.

A NEW SPECIES OF ICTHYURA.

BY G. H. FRENCH, CARBONDALE, ILL.

ICTHYURA PALLA, n. sp.

Length of body, including anal tuft, .56 of an inch. Expanse 1.10 inches. General color of body and primaries pale gray, the latter rather sparsely sprinkled with dark brown scales. Palpi brown above, scarcely

projecting beyond the head, third joint concealed by the hairs of the others. Front slightly brownish, a tuft of pale gray scales at the base of each antenna, the usual deep brown mark from between the antennæ to the top of the thoracic crest. Primaries with the usual transverse lines almost white. The basal line makes a bend outward on the median vein; from this it goes in a straight course to the submedian vein; from this to the posterior or inner margin it curves a little outward. A second line extends from the costa about one-fourth of the distance from the base obliquely to the posterior margin, near the posterior angle. A third line passes straight across the wing from the posterior margin to the second, a little below the median vein. The fourth begins as a white spot on the costa a little more than two-thirds of the distance from the base, and joins the second on the posterior margin, making the usual "V" as in the allied species. The fourth line is slightly S-shaped in its costal third. Outside the fourth line is a subterminal, somewhat zigzag row of black spots, some of which are often faint or obsolete. In the discal cell there is usually a faint oblique line that seems to be a continuation of the third line, though it does not reach the costa, and the end of the cell sometimes appears like a short line. There are three oblique shades of brownish olive more or less distinct, that cross the wing parallel to the second line; the first, beginning on the costa inside the basal line, faintly borders that line to the submedian vein, and is seen below that vein on the third line; the second outside the second line through its whole course, is darkest next the line; the third from both sides of the fourth line to the middle of the outer border, faint, except along the line. Just outside the S-part of the fourth line are three grayish-yellow spots with a few reddish-brown scales. Secondaries pale smoky gray with a faint whitish line from the fourth of the primaries (as the wings are spread) to the anal angle. Under side, the primaries are about the color of the secondaries above, pale along the costa and terminally, the secondaries paler with a dark transverse line.

Described from 2 ♂ and 3 ♀, all reared specimens.

Larva.—Length 1.25 inch when crawling, body nearly cylindrical, two black tubercles, close together, on the top of joints 3 and 11. On the dorsum are four bright but narrow yellow lines alternating with narrow black ones. The stigmatal line black; above this, or the subdorsal space, an irregular alternation of black and white. Below the stigmata a narrow

yellow line ; below this, or the substigmatal space, the body is flesh color. Head shining black. There are a few gray hairs scattered over the body.

These larvæ were found feeding on willows through the most of September, resting in an enclosure formed of several leaves fastened together at the ends of twigs, but I did not find more than half a dozen in a nest. Those put in breeding cages pupated before the middle of October, mostly in the corners of the boxes. The first hatched April 22, 1881, the last May 8. I took one fresh specimen that had flown to light May 28.

This form is related to *Inclusa* Hub. and *Ornata* G. & R., more nearly to the latter in size and coloration, but differs from both in several particulars. Besides size and color, it differs from *Inclusa* in the coloring of its larva. It differs from *Ornata* in the color of the scales sprinkled over the primaries, the color of the spots outside the fourth line, and the continuance of that line, as it is not here partially obsolete opposite the disc, as well as in some other points. The apices are no more produced than in *Inclusa*, nor is the costa more bent.

ON THE CHALCIDIDÆ OF FLORIDA.

(*Paper No. 2.*)

BY WM. H. ASHMEAD, JACKSONVILLE, FLA.

Genus EUPELMUS, Dalman.

Prof. Westwood, in his *Generic Synopsis*, characterizes this genus as follows: "Antennæ 13-jointed, clavate, third and fourth joints minute; club ovate; thorax long-ovate; collar moderate; thorax depressed in the middle; abdomen long-ovate; *ovipositor exerted*, wings with stigmal branch distant from the union of the subcostal nerve and the costa."

In view of the recent controversy between Prof. Riley and Mr. Howard, in regard to this genus and the genus *Antigaster* of Walsh, I deem it advisable to publish the above from Westwood, *verbatim et literatim*. Just beginning my entomological studies, I do not pretend to take issue with either of these gentlemen, but merely desire to draw their attention to the *ovipositor* in this genus, which both seem to have entirely overlooked, and which, according to above description, is *exserted*.

Now, I have bred a great many specimens of *Antigaster mirabilis* from eggs of *Microcentris retinervis*, and neither this species nor those recently

described by Mr. Howard, have exerted ovipositors. Does this not throw some light on their generic position?

I describe below two new species belonging to *Eupelmus* genus, if Westwood's definition of it be correct. I must acknowledge, however, that the antennæ, wings and formation of thorax strikingly resemble *Antigaster*. The exerted ovipositor would, however, easily distinguish them.

EUELMUS ROSÆ, n. sp.

♀. Length .10 inch; ovipositor .02 inch. Head wider than thorax, greenish-golden, finely transversely punctate and with slight purplish reflections; front purplish, with metallic reflections, beneath eyes greenish and with the punctures converging towards mouth; eyes purplish; antennæ 10-jointed, clavate, scape metallic green to near tip, flagellum black, joints 6 to 9 shorter than the rest and about equal in length; thorax long ovate, collare short, corners bulging, praescutellum depressed, depression extending from corners of collare and converging and uniting towards scutellum, greenish golden, finely transversely punctate and with purplish reflections; the triangular pieces back of praescutellum are greenish with edges well rounded; scutellum highly convex, longer than broad, greenish with posterior half purplish; the side piece is one elongate convex surface extending from before the insertion of the wing to hind coxæ, purplish, with greenish metallic reflections; wings hyaline, iridescent, with yellowish veins; the subcostal joins the costa at less than one-third the length of wing, the vein then extending to more than two-thirds, with a thin stigma near tip; hind wings strongly iridescent; abdomen long-ovate, slightly depressed, purplish black, with slight cupreous and metallic green reflections; ovipositor black, annulated with yellow in the middle; legs—coxæ black, trochanters yellowish, fore and middle femora and tibiæ yellowish, the middle pair slightly dusky in the middle; all tarsi, except at tip, white; posterior femora and tibiae, excepting at knees and tip, which are yellowish, black; a short tarsal spur; tarsi white, brownish towards tip, basal tarsal joint of middle pair of legs slightly widened.

Described June 17th, from one female specimen bred from Cynipidous rose-gall, *Rhodites r. lucidæ* (Ashmead MS). A gall found on a wild rose bush growing along the borders of our rivers and swamps.

EUELMUS CYNIPIDIS, n. sp.

♀. Length .15 inch; ovipositor .05 inch. Head slightly wider than

thorax, greenish golden, with the surface crackled and sparsely covered with short fine hair; eyes brownish purple; antennae 10-jointed, black; thorax elongate ovate, greenish brassy with a slightly elevated, golden, finely transversely punctate shield in centre, extending from collare to two-thirds length of praescutellum, with the posterior end rounded, a depression on either side running squarely off posteriorly perfectly smooth and shining; the scutellum small and convex, with the triangular praescutellar pieces, almost joining, so closely do they press against it; it is brassy but ends posteriorly in a small, flattened, triangular point; abdomen purplish black, flattened above, keeled below; ovipositor at base for one-fifth the length purplish black, balance reddish brown; wings hyaline, veins yellowish to juncture of subcostal with costa, balance brown, a large smoky brown blotch extending across the entire wing from one-fourth the length to near the tip of the wing; legs uniform reddish brown.

Described from one female bred specimen, bred May 2nd, from Cynipidous live-oak gall, *Cynips q. batatoides* Ashmead.

Genus COCCOPHAGUS, Westwood.

COCCOPHAGUS ANNULIPES, n. sp.

♀. Length .04 inch. Vertex of head red, ocelli black and triangularly arranged; eyes greenish, face and around mouth parts green, mandibles tipped with black; antennae 9-jointed, clavate, scape somewhat widened, black, 2nd joint larger than 3rd and 4th, basal half black, apical half greenish yellow, joints 3 and 4 small, red, others gradually widening to club, greenish yellow, club large and black; thorax longer than abdomen, collare very narrow, greyish or greenish; mesothorax red, praescutellum transverse, occupying the whole dorsum; scutellum very large and triangular, the base being as broad as the praescutellum, both sparsely covered with short whitish hairs; beneath, the surface, with the coxae, femora and tibiae are the color of milky water, tibiae annulated with two black bands, tarsi yellowish, ungues black; abdomen obtusely pointed, blackish above, greyish and with an ovipositor-groove beneath; from a stigma on each side issue three long black hairs; wings hyaline, closely covered with short hairs, veins yellowish.

This unique little species was bred from a large brown Coccid scale (*Lecanium* sp.) occurring on *Quercus aquatica*, and the description is made from two female specimens, which hatched April 17th.

CORRESPONDENCE.

EXPERIMENTS WITH YEAST IN DESTROYING INSECTS.

We are indebted to Dr. H. A. Hagen, of Cambridge, for the following letter and the subsequent remarks on this interesting subject :

Kingsworth, Ashford, Kent, Dec. 27, 1881.

DEAR SIR,—

I beg to thank you very much for your letter, dated Nov., 1880, respecting the application of yeast for destroying insect pests. During the past season I have endeavored to follow the instructions contained therein, and as you express a wish to hear of my success or failure, I will attempt to describe my experiments as clearly as possible. As soon as Aphides became noticeable, I procured some German compressed yeast, dissolved an ounce in a little warm water, added a little coarse sugar, and set it to ferment. In about 24 hours I added sufficient water to make up a gallon, and with this syringed a cherry tree attacked by black Aphides. This was on the 16th of June. Four days later I found the tree almost clear of living Aphides, though their dead bodies, or cast skins (I could not ascertain which, although I asked the assistance of an entomological friend) smothered many of the leaves. One remarkable point in this experiment was that a small branch of the tree, loaded with Aphides, hung over a window, and at the request of my wife, I abstained from syringing it. Here the insects remained perfectly healthy, and after a few days were seen to work down the tree and attack the young shoots that had been washed clean. On June 29th I again dressed the tree, and this time destroyed or drove away every Aphide. I may add that the larvae of several Aphidivorous insects were present on the tree, and did not appear greatly affected by the application. Encouraged by the apparent success attending the application, I commenced operations, June 20, on a second cherry tree. This, however, was heavily leafed, and I could not make so much impression, but they evidently did not like the dressing, for they disappeared entirely soon after the second application. I also tried the yeast for Aphides on Guelder Rose (*Viburnum*), Elder (*Sambucus*), Field Bean, and some other plants; also for Currant Grub, but could make no decided mark anywhere. With respect to the Currant and Gooseberry Grubs, the liquid ran from off their bodies clean, and I found it almost impossible to saturate them with it. If the syringing was persisted in, they

would release their hold and fall to the ground, but very shortly crawl up again. To conclude, I was delighted with the apparent success of my first experiment, but all subsequent trials were so discouraging that I fear yeast is too uncertain in its action to supersede many of the washes we have already in use. Again thanking you for your kind letter, I beg to subscribe myself, sir,

Yours most respectfully,

THOS. H. HART.

To Dr. H. A. Hagen, Cambridge, Mass., U. S. A.

This interesting letter by Mr. Thos. H. Hart, who owns nurseries and greenhouses, allows the following conclusions :

I. It is doubtless true that in the experiments of June 16 and 20, the Aphides were killed, as upon the branch not syringed they remained in perfect health.

II. It is doubtless true that the later experiments were a failure.

III. It seems evident that the yeast has not contained *Isaria*, or other fungi obnoxious to insects, to which the first success could be ascribed ; otherwise the later application of the same fluid ought to have had the same effect, or even by the multiplication of the fungi, a more marked effect.

Experiments made in Germany and here had exactly the same result, first success, later failure. In Germany it was made on a jasmine, in a flower pot, and the previously rather sick plant was in 1881 in good health and perfectly free of Aphides. Some currant shrubs on the left side of my house were entirely free through the whole year (without fall generation) after the experiment, though similar shrubs on the right side of my house were badly infested with currant worms ; I had here purposely not applied yeast. After all I believe it can be concluded that a *certain stage* of the yeast solution is needed to make it effective, and that after this stage it becomes indifferent. That yeast solution has killed insects seems to be undoubtedly proved, and it remains only to find out the stage in which its application is successful. It is sure that success, even in a very small number of experiments, cannot be annihilated by failure in other experiments.

H. A. HAGEN.

PIERIS RAPÆ IN NEBRASKA.

DEAR SIR,—

I am sorry to note the appearance of *P. rapæ* in Nebraska. August 3rd, 1881, I first saw a living specimen ; needless to add that it was busily

engaged in a cabbage patch. Others soon appeared, and before cold weather set in it had become quite abundant and larvæ in an advanced stage of growth were found in November. Probably the butterfly crossed the Missouri in the summer of 1880. We are here thirty-five miles west of the river, a distance that could hardly have been traversed in one season. It also appears that the cabbage crop has been almost totally destroyed in the eastern part of Dodge County and farther east, while here a partial crop has been secured notwithstanding the visit of the imported pest, supplemented by an unusual abundance of the Cabbage Plusia. August 1st, 1873, when I left my former home in Bureau County, Illinois, *rapæ* had not yet reached that place; therefore in less than eight years its westward progress upon this parallel has taken it across the State of Iowa and the Mississippi and Missouri Rivers.

The question naturally arises—Will the insect stop short when it reaches the grassy plains of Western Nebraska, or will it press onward to the cabbage gardens of Utah and the Western slope? By the aid of man it might soon cross the plains, even if it subsisted wholly upon cabbages; but being not averse to other cruciferous plants, it will find its way made easy. A mustard-like plant of this family with pink flowers grows along the embankment of the Union Pacific Railway, nearly if not quite throughout the whole distance from Omaha to Ogden. At Ogden Junction it is the most abundant of wild plants. If this plant furnishes a suitable food, *P. rapæ* will have little difficulty in surmounting all obstacles that bar its progress toward the valley of the Salt Lake.

G. M. DODGE.

Glencoe, Dodge County, Nebraska.

EXCHANGES.—I would like very much to effect some exchanges with Entomologists in Canada in Lepidoptera. I have a great quantity of good material in duplicate from our Adirondack region, from the South and West, and from Europe.

W. W. HILL, Albany, N. Y.

DONATION.—We desire to return our sincere thanks to Prof. J. T. Bell, of Belleville, who has kindly sent to our Society a number of very interesting mounted microscopic objects, including Polycistina and Diatomacea from Vancouver Island—a most useful addition to the cabinet of objects in our rooms.