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The Canadian Entomologist.

VOL. XI.

LONDON, ONT., FEBRUARY, 1879.

No. 2

THE GOLDSMITH BEETLE (*Cotalpa lanigera*).

BY THE EDITOR.

This is, without doubt, the most beautiful of our leaf-eating beetles. It is nearly an inch in length (fig. 9), of a broad oval form, with the wing cases of a rich yellow color, with a pale metallic lustre, while the top of the head and thorax gleams like burnished gold of a brilliant reddish cast. The under surface has a polished coppery hue, and is thickly covered with whitish wool; this latter characteristic having suggested its specific name *lanigera* (wool-bearer).

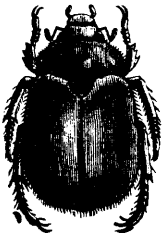


Fig. 9.

This insect appears late in May and during the month of June. It is distributed over a very wide area, embracing most of the northern United States and Canada, and although seldom very abundant, it is rarely that a season passes without more or less of them being seen. During the day they are inactive and may be found clinging to the under side of the leaves of trees, often drawing together two or three leaves—which they hold with their sharp claws—for the purpose of concealing themselves. At dusk they issue from their hiding places and fly about with a buzzing sound among the branches of trees, the tender leaves of which they devour; the Pear tree, the Oak, Poplar, Hickory, Silver Abele and Sweet Gum all suffer more or less from their attacks. Like the May Bug, this beautiful creature is often attracted by light, and flies into open windows on summer evenings, dashing in a bewildered sort of way against everything it meets with, to the great alarm of nervous inmates. In some seasons they occur in considerable abundance, and may then be readily captured by shaking the trees on which they are lodged in the day-time, when they do not attempt to fly, but fall at once to the ground.

The beetle is short-lived. The female deposits her eggs in the ground during the latter part of June, and having thus provided for the continuance of her species, dies. The eggs are laid during the night, singly and at different depths, the number probably not exceeding twenty in all. They are very large for the size of the beetle, being nearly one-tenth of an inch in length, of a long ovoid form and white translucent appearance.

In less than a month the young larva is hatched; it is of a dull white color, with a brown polished horny head and the extremity of the abdomen lead color. The mature larva (fig. 10) is a thick, whitish, fleshy grub, very similar in appearance to that of the common May Bug, familiarly known as "the White Grub." It lives in the ground and feeds on the roots of plants, and on this account it is sometimes very destructive to strawberry patches.

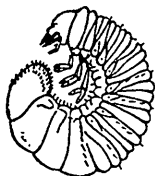


Fig. 10.

Several years are required to bring this grub to maturity; finally it reaches its full growth in the fall, and changes to the perfect beetle early the following spring.

THE SCIENTIFIC NAMES OF INSECTS.

BY GEORGE D. HULST, BROOKLYN, N. Y.

It is our desire in the present article to call attention to two pretty well established laws of nomenclature, that with a few seconding words on our part, the laws may, "to those whom it may concern," preach the importance and necessity of their being observed and obeyed.

1st. "All scientific names must be Latin or must be Latinized." The laws which govern the structure of the Latin language must apply in every case in the making of the binomial combination.

In the making of the binomial, four methods of construction are in use. The generic name is always a noun. The specific name is (a) a proper name in apposition with this, as *Papilio ajax*, the *Papilio* called *ajax*; (b) an adjective giving some description or characteristic, as *Colias occidentalis*—the western *Colias*, *Cossus Centerensis*—the *Cossus* living at

Center ; (c) a noun in the genitive case, giving the food plant, the country in which it lives, or the person in whose honor it is named, as *Pyrameis cardui*—the *Pyrameis* of the Thistle, *Argynnis Edwardsii*—Edwards' *Argynnis* ; (d) a noun with a participle understood governing it, as *Thecla M-album*, the *Thecla* with a white M.

In following these, which we believe include directly or indirectly all combinations, the rules of Latin grammar must apply. Under class "a" a feminine name must not be joined to a masculine noun. It is just the same as saying the girl John, as to utter such a combination as *Melitaea phaeton* or *Danaïs archippus*. Duty in the matter is simple and easy. *Fulius* and *Julia* are exactly the same word, with terminations to express sex. A person comes to us clothed as a man, and professing to be a man, and is called Julius. It transpires afterwards that this person is a woman ; we must, by the compulsion of language and her sex, call her Julia. We must, or ought to, write and say *Melitaea phaetona*, *Danaïs archippa*, and so on through the list.

Under class "b" the adjective must be Latin, and must agree in gender with the generic noun. A word is not necessarily Latin because it ends in *us* or *a*. Combinations to express specific points are important and to be sought after, but should be made according to law, and in all cases the gender of the adjective should agree with the gender of the noun—*e. g.*, we should write—we *must* write, if our worthy Editor will allow me so to say—*Papilio brevicaudus* Saun., not *P. brevicauda* Saun. This error is a wonderfully common one, but can be very easily remedied.

Under classes "c" and "d" mistakes are not often made. But while it may be Latin, it is not always the best Latin, to make a proper name by adding *us* or *ius* to what is English. It certainly is curious that the vast majority of modern Latin names are of the second declension. One can look through a catalogue and not find an example of the third. Still, as long as it is grammatically correct, no fault can be found with a proper name, though it be an anomaly like *Pap. Coon*, or a curiosity like *Hewitsonius*, in place of *Hewitson*, genitive *Hewitsonis*.

Authors are not always to blame for the bad Latin. Their species are tossed from genus to genus, as systematising goes on ; but we have about reached the possible limit of genera, and species are probably settled in the places they will occupy, and, as a rule, all new genera are feminine. Our catalogues ought to give, so far as possible, an end to these errors. It

is a pity that some of them seem to be beyond remedy, some which, by reason of the combination, have a ludicrous meaning, as *Sesia Schmidtiiformis*; some are beyond change, because the specific word has no feminine form, as *Eudaimonia Jehovah*. The former combination is allowable, for the Latin will pass muster; and perhaps the honored Mr. Schmidt is such an attenuated example of that well-known group of the genus homo, that the meaning is after all applicable. But the latter combination cannot be defended. "This is a free country," and each one can follow out his own ideas of what is reverential and fitting, but our freedom gives no right to murder either language or sense. Just translate the binomial, *Eudaimonia Jehovah*, the beautiful female demon Jehovah; I suppose *demon* is right enough, for the insect has long tails, and as Spenser would put it, "fearful horns," but take it altogether, there seems to be, to put it very mildly, some incongruity. We hope Mr. Strecker, who has been our very kind and generous friend, will not leave that name as a monument for future scholars to gaze upon and wonder at. And we wish cataloguists would be bold enough to put such, and all monstrosities, into some proper shape, for the sake of those who read and for the sake of the authors. We would like the future to have kindly feelings towards all of us who will then be the past.

2nd. "Specific terminations must be made to conform to terminations universally received, and subserving a useful purpose." This, of course, if construction and sense will allow. The Tineina, Tortricina, Pyralidina and Geometræ have each, as a rule, certain specific terminations. Mr. Packard has done the science a good turn in his "Geometrid Moths," by giving the proper terminations to all specific names. But grammar and sense are the highest law, and so there may be redemption even for Mr. Schmidt from his sad fate.

We are aware much can be said against these laws, which we do not pretend are laws as uttered by competent authority. There are two arguments to defend their disobedience: (a) the following of them will make now, and for all time to come, endless confusion; and (b) the specific name is not an *adjective*, but a term to express the individual—as we say among men, its *Christian name*. It is as proper to say *Mary Thomas* as to say *John Thomas*. It is as proper to say *Argynnis montinus* as to say *Argynnis montina*. It is the *Argynnis* whose given name is *montinus*. To the argument "a" we say, then we ought to give up the pretence of writing scientific names in Latin. There is no possible con-

fusion to those who understand that language, and check lists and catalogues create the nomenclature of those who do not. To the argument "b" we say, while we confess what would otherwise be grammatical errors are thus justified, it is impossible to look upon this family idea as existing in fact. Gender may be arbitrary in some languages, but it is arbitrary to the individual word only. The sun may be considered masculine, but then *all suns* are masculine. If *Papilio* be masculine, then all *Papiliones* are masculine. And, taking the generic name as a family name, so that promiscuously masculine and feminine words may be joined to it, there are already existing and universally received names which could not thus be used—*e. g.*, *Pyrameis cardui*, and all names, such as *Argynnis Edwardsii*, named in honor of any one. If the specific name is an individual name, it is indeclinable unless with the generic name. And surely, then, these must be *Pyrameis carduus* and *Argynnis Edwardsius*. Again, if specific names are given names, they should always be begun with a capital letter—which in descriptive adjectives (more common as names of the *Geometræ* and *Noctuæ*), no one ever thinks of writing. And yet, again, it is impossible to get a noun or name idea in specific names which is an adjective. We remember how the old Puritans ransacked the Bible and their own brains to get expressive names for their children; but they gave the names in the noun form. It was *Charity*, not *Charitable*—or at the most, if an adjective, it was grammatical in its use. The adjective idea remains permanent. *Hepialus argenteo-maculatus* is, it is true, the *Hepialus* called by that name; but it is as well true that it is the *Hepialus* that is silver-spotted. We may be dull, and that may be the explanation, but we cannot comprehend that the names of insects are arbitrary, as are the names which designate men and women.

Can we not rightly make an appeal for the observance of these laws?

ANNUAL REPORT OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO FOR THE YEAR 1878.

The Annual Report of our Society to the Department of Agriculture of Ontario has just issued from the press, and will be mailed to our members in the course of a few days.

ON GRAPHIPHORA AND NEW N. AM. NOCTUIDÆ.

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

Director of the Museum, Buffalo Society Natural Sciences.

As our acquaintance with the numerous forms of this group increases the arbitrary division of the individuals into species and the species into genera becomes a matter of increasing difficulty. At the same time this does not absolve us from a careful study of the organism in all its parts, and a correction of former groupings becomes as obligatory as the publication of the original observation. The limits of the genera *Mamestra* and *Graphiphora* are not always easy to establish from the imago, widely though they are usually separated. Both are distinguishable by the hairy eyes from all naked-eyed Noctuæ, and by the unarmed tibiæ from all genera (e. g. *Agrotis*) which have one pair or more spinose. But *Mamestra* is tufted more or less obviously on thorax and dorsum of abdomen, and *Graphiphora* (= *Taeniocampa* of authors) is without these tufts. Specimens received from California, and not in very good condition, have been referred by me to *Mamestra* and *Dianthoecia*, which, from fresh material received from Dr. J. S. Bailey, I now refer to *Graphiphora*. These are :

*Graphiphora puerilis.**Mamestra puerilis* Grote, Bull. B. S. N. S., II., p. 9.*Graphiphora rufula.**Dianthoecia rufula* Grote, Bull. B. S. N. S., II., p. 64 (May, 1874).

The genus *Dianthoecia* is established for *Mamestras* with exerted ovipositors. I have elsewhere expressed the idea that such a division is untenable, because species very similar in general appearance are separated by it. And in *Graphiphora* we have species with the ovipositor exerted (*oviduca*) and not (*incerta*). So far as I can see, the relative position of the ovipositor may vary in one species. The type of *rufula* has it exerted. Fresh females show no evidence of it. There is a variation in the color of *rufula* from reddish to gray, which is interesting. The variety at first sight looks like a different species, but I have a specimen which seems to me intermediary in shade, and we have a wide range of color in *incerta*. Among the species which I now range among the *Graphiphoræ* is

Graphiphora modesta.

Dianthoecia modesta Morrison, Proc. Bost. Soc. N. Hist., 144, Nov., 1874.

I retain in *Mamestra Dianthoecia meditata* Grote, which shows a series of minute abdominal tufts at base, and on this and other accounts does not seem to me to be intimately allied to *modesta*.

The species of *Graphiphora* may be divided according to the structure of the male antennæ. At the present time I only indicate the following two genera which we may not be able to distinguish from *Graphiphora*. I am not able to distinguish them myself, but am more concerned to draw in genera of my own erection at the present writing. Renewed attention must be paid to them when more material is accessible. These are *Orthodes* of Gueneé and *Pseudorthodes* of Mr. Morrison. A small species hitherto referred to *Himella*, and found both in California and the East, I now refer to *Graphiphora*.

Graphiphora furfurata.

Himella furfurata Grote, Proc. Ac. N. S., Phil., 201, 1874.

I have only the type of *fidelis* before me. I now think that this species should not be separated generically from *Graphiphora*. It approaches in appearance *G. contrahens*. If we divide the genus into groups we may use *Himella* for the group in which the males have impectinate antennæ and the species a slender habitus. I believe, however, as above stated, that *Orthodes* will be used as a sub-genus, when *Himella* may come to fall away altogether.

Graphiphora fidelis.

Himella fidelis Grote, Proc. N. S. Phil., 201, 1874.

I can also find no characters to warrant the separation of *Acerra*. The two species are Californian and are characterized by the large fused stigmata. They approach in structure to *incerta*. The abdomen seems shorter than usual.

Graphiphora normalis.

Acerra normalis Grote, Bull. B. S. N. S., II., 162 ; Check List, pl. 1, fig. 4.

Graphiphora muricina.

Acerra muricina Grote, Bull. B. S. N. S., III., 85.

In ornamentation *G. Behrensiana* resembles these two species, and the abdomen also seems shorter than usual.

Among the species of *Mamestra* which may come to be removed to this genus is *M. lorea* Guen. Several other species show no or little tuftings, and their position cannot be considered definite until we have fresh reared specimens and can be guided also by our knowledge of the preliminary stages.

Graphiphora Garmani, n. s.

♂. Roughly haired. Eyes hairy. A stouter and larger form than *incerta*. Antennæ brush-like, not pectinate, the joints knobbed. Rich brown with obsolete ornamentation. Stigmata approximate, concolorous, moderate, entire, ringed narrowly and the reniform incompletely with black. T. p. line double, even, with pale included shade, much as in *contrahens*, but more sinuate inferiorly. Subterminal line brought into prominence by black scales sub-apically and again more noticeably below vein 4. Fringes concolorous, cut indistinctly with pale at extremity of nervules. Hind wings dusty, with warmer fringes; discal spot from under surface apparent. Thorax dark brown, untufted. Beneath the wings show discal dots and faint exterior line. The color is light brownish, somewhat irrorate. *Expanse* 36 mil.

One good specimen from Northern Illinois, collected by Prof. N. H. Garman. At once distinct from any of the varieties of *incerta* by the impectinate antennæ.

Graphiphora perbrunnea, n. s.

♂ ♀. A small form with ciliate antennæ and hairy eyes, allied to *puerilis* by the white discal mark and in color recalling *Hadena fractilinea*, but more reddish. Veins black. Reniform narrow, black, bordered outwardly by a white streak. Median space superiorly shaded with black. T. p. line even, angulated on vein 5 opposite the disc, followed by venular dots. Orbicular indistinct, concolorous, defined by black scales. Fringes black with white venular dots. Veins broadly marked with black on terminal space. S. t. line shaded anteriorly with brown. Ground of the wing bright reddish brown. Hind wings blackish with contrasting pale reddish fringes. Thorax reddish brown, abdomen blackish with reddish lateral and anal hairs. Beneath pale with distinct exterior common line even on fore wings, dentate on secondaries, which latter show the discal dot distinctly. Feet dotted. Pectus pale reddish.

Expanse 30 mil. Several fresh specimens from California near San Francisco, given me by Dr. James S. Bailey.

Heliophila dia, n. s.

♂. This is a small species allied to *commoides*, but no larger than *ligata*. All the veins are striped with white. The median vein more broadly so. The transverse posterior line is a distinctly continuous series of venular dots. No dark shades accompanying the median vein, which is a distinctive character. The color is that of *commoides*, but a little paler. Hind wings fuscous, whitish towards the base; fringes pale. Thorax pale gray. Beneath paler, the inception of the common line shows as a black mark on costa. Tibiæ well clothed. Head and fore tibiæ dusky. Eyes hairy. The ground color of primaries is seen to be pale dull yellowish with longitudinal brownish shadings. No dark shade along internal margin. Three fresh males examined, sent from San Francisco to Dr. James S. Bailey. *Expanse* 28 to 32 mil.

I have recently seen in Eastern collections three determinations of species of Noctuidæ which are probably authentic, at least there is nothing that I can find in print which contradicts the idea that they are correctly determined. I found a specimen of *Copablepharon absidum* Harvey labeled *Aedophron grandis* Strecker. A specimen of *Schinia gracilentia* Hübner named *Heliiothis imperspicua* Strecker. A specimen of *Aspila rhexiae* Abb. & Smith labeled *Heliiothis spectanda* Strecker. Some species from California, so briefly described in Mr. Strecker's work as to be unrecognisable, are also in part identical with species previously published by myself. But none of these species under MSS. names of Dr. Behr's can be considered as described in a manner which will lead to their identification. For instance, *Dryobota Californica* is, as I learn, *Xylomiges hiemalis*. It is merely compared with a European species which has naked eyes, whereas in the Californian insect the eyes are hairy, and it is not related to the European species of *Dryobota*. I am much interested in finding out all of these species and several others described by Mr. Morrison. Any one having any of Mr. Morrison's species authentically determined, which are marked with a— in my Check List, I would be much obliged were they to be communicated to me. This is especially needed in the genera *Taeniocampa* and *Polia*. Of these I only know *T. modifica*.

NOTES ON THE LIFE-HISTORY OF THE BLISTER-BEETLES
AND ON THE STRUCTURE AND DEVELOPMENT
OF HORNIA.

BY PROF. CHAS. V. RILEY.

(Abstract.)

At the Hartford (1874) meeting of the Association, Mr. Riley described the newly-hatched larva of some of our common Blister-beetles; but all attempts to trace their habits had proved futile, both in this and other countries, until 1877, when he discovered that they preyed on the eggs of locusts (Acrididæ). In a paper published in the last volume of the Transactions of the Academy of Sciences, of St. Louis, the life-history of several of our common Blister-beetles is traced. The present paper gives a brief resume of the facts there recorded, showing that the beetles belonging to the genera *Epicauta* and *Macrobasis* go through the same curious hyper-metamorphoses as do other species of the family *Meloidæ*, and especially as *Meloe* and *Sitaris* were already known to do. The larva hatches as an active, pale-brown, long-legged creature, termed *triungulin* on account of its three-clawed tarsus. It then changes to what Mr. Riley calls the *Carabidoid* stage, in which it is white, less active and fleshy; then to what he calls the *Scarabæidoid* stage, in which it is still more degraded and clumsy; then hardens to what he calls the *Coarctate larval* stage, in which it is perfectly helpless and resembles the puparium of many Diptera; then to the final larval stage, in which it is again white and soft and more or less active; then to the true pupa state; and finally to the beetle; existing, thus, in eight distinct states (including the egg), instead of the four in which ordinary insects occur.

The paper is principally devoted, however, to the life-history of a very anomalous, wingless genus of this family, the *Hornia minutipennis* Riley. This insect is degraded and subterranean, and was found in the cells of a common Mason-bee, the *Anthophora abrupta* Say. Its life-history, which was not known at the time the species was described, has been completely made out by Mr. Riley during the past summer. The eggs, which are laid loosely in the burrows of the bee, hatch during the early part of June. The *triungulin* is extremely active, and, in all essential characters, very similar to that of *Sitaris*, one species of which, in Europe, likewise

develops in the cells of *Anthophora*. By means of its tarsal claws and of a pair of pre-anal spinnerets and claspers, it holds on very tenaciously to the hairs of the bee, and is carried on the same into the bee-burrow. When the bee-egg is laid, and before the cell is capped over, this triungulin disengages itself from the bee, and at once pounces upon the bee-egg. After having sucked the contents of this last, it throws off the triungulin skin and assumes the *Carabidoid* stage; thereafter it feeds upon the honey-paste stored by the bee, and, within the cell, goes through all the hyper-metamorphoses characteristic of the family. All the later stages, however, take place within the puffed skin of the *Scarabæidoid* larva, the *Coarctate* larva being well separated therefrom, but the third or final larva having such a delicate skin that it is not easily separated from this last when shed. There is but one brood annually, the pupa state being attained in August, and the beetle maturing all its parts during the autumn, and lying within its numerous coverings until the following May.

The paper contains some interesting details as to the effects of rain both on the bee-larva and the *Hornia* larva; on the vicissitudes that befall the triungulin, its fratricidal propensities when two or more are enclosed in the same cell, and on its adaptability to food supply.

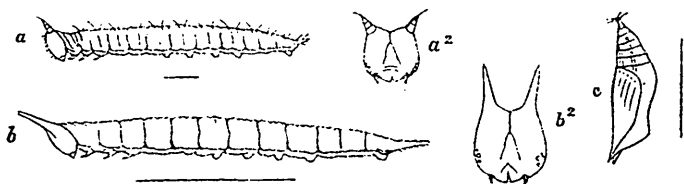
DESCRIPTION OF THE PREPARATORY STAGES OF *CENONYMPHA GEMMA*.

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

EGG—Globular, smooth under a low power, but under a high one, seen to be reticulated in irregular hexagons, the ridges flat and broad, and having at the bottom of each depression a white point; color yellow-green. Duration of this stage in August 3 days, in October 6, in April 6. The egg is laid on grass, which is the larval food plant.

YOUNG LARVA—Length .12 inch; cylindrical, a little thickest in middle, tapering slightly both ways from 8th segment, and ending in two divergent tails, each of which is thick at base and round, tapers to a blunt

point, which emits a white bristle; color of body white; over the surface scattering white hairs. In a few days, and during this stage, the color changes to whitish-green and stripes appear, green and white alternating from dorsum to feet; head sub-pyriform, one-half broader than 2nd segment, broader than high, flattened frontally, and with a slight angular depression at summit; on each vertex a straight, round, divergent horn, thick at base, pointed at top; the horn when magnified is seen to be in three sections, each smaller than the one below it, giving out at the end one or two bristles; color of head and horns blackish-brown (figs. *a*, *a*²). Duration of this stage in August 6 days, in October 9, in April 6.



EXPLANATION OF CUT.—*a*, young larva of Gemma magnified; *a*², head of same; *b*, mature larva magnified; *b*², head of same; *c*, chrysalis.

AFTER FIRST MOULT—Length .18 inch; thicker in middle segments than at last stage, and tapering posteriorly more rapidly; the tails longer, more slender, brown-tipped; each segment several times creased, and upon the summit of each ridge so caused is a row of white tubercles, each with a short white hair; color dark green, banded and striped longitudinally with white; on middle of dorsum a dark green band edged on either side with pale green, and next, on the extreme part of dorsal area, a white stripe; a similar stripe over feet, and between these on middle of side are two white lines contiguous; under side bluish-green; legs and feet green; head sub-pyriform, higher in proportion than at first stage, the top excavated roundly; on each vertex a long, tapering, divergent horn, slightly curved forward, the length being about equal to length of face; color of head brown, pale in front and green-tinted; from base of each horn a dark stripe passes down the side, and in front is a second stripe; horns dark brown. Duration of this stage in August 5 days, in October 10, in May 7.

AFTER SECOND MOULT.—Length .34 inch; shape as at last stage, the tails longer in proportion; color pale green, striped as before;

head deep green in front, dull green at back, the stripes brown and horns brown. Duration of this stage in August 5 days, in May 8.

AFTER THIRD MOULT.—Length .55 inch ; one day later .75 to end of horns, which are held in the plane of the body, the face being bent down as in *Apatura* ; shape as at last two stages ; in the summer and fall larvæ the color of body is now reddish-buff, the dorsal band dark brown ; the sub-dorsal stripe reduced to a broken dark brown line, only distinct at the extreme hinder end of each segment from 3 to 10, making in effect a line of spots ; on the middle of the side a dark brown stripe ; at base a rounded ridge, buff colored, and beneath it a brown line ; head shaped as before, but higher and the horns less divergent ; color of face green, with brown stripes as before ; the horns brown in front, and as well as the head gray-brown behind ; as the larva advances the green of the face is replaced by brown, and the colors of the body change gradually to buff and reddish-gray, the former the dorsal color, the other of the sides (figs. *b, b'*). There was no fourth moult, the stage just described lasting till maturity, at which the larval length was .90 to .95 inch. In the summer (August) brood the larva ceased feeding on the eighth day after the third moult, spun a button of white silk, suspended on the ninth day, and changed to chrysalis on tenth. The larva which I fed in October became lethargic 3rd November. On 24th of that month, after a few warm days, it was discovered to be active, and had recently passed its third moult. It fed at intervals (being kept in a warm room) till the 1st of February, when it suspended and made chrysalis on 4th.

On 17th April, 1878, I captured a female *Gemma*, and obtained a number of eggs, from which eight larvæ reached chrysalis. All these were green at third moult, and to maturity, and the chrysalids were green.

LARVA OF SPRING BROOD, AFTER THIRD MOULT—Color bright yellow-green ; the medio-dorsal band dark green ; on the sides three yellow lines (one sub-dorsal and heavier than the other), and at base a yellow raised stripe ; tails pink-tipped ; head greenish-white on front face and at back, the stripes dark brown, the horns reddish-brown. Time from third moult to chrysalis 5 to 6 days.

CHRYSALIS—Length .52, greatest breadth .14 inch ; shape cylindrical, thickest at 6th and 7th segments ; slightly depressed on dorsum behind base of mesonotum, which is rounded, rather prominent, carinated ; head case truncated, sloping at a low angle from the mesonotum, beveled

at the sides, and ending in two long, three-sided palpi cases, which are sharp and divergent, with an angular depression between them; a cross section of one of these cases would give a right angle, the long side a little convex; wing cases flaring on the dorsal side; color of dorsum and the entire abdomen, in the summer and fall examples, sordid yellow-buff, the wing, antennæ and palpi cases all more yellow; the surface finely streaked with brown, mostly longitudinally and always irregularly; from base of mesonotum to last segment a brown band; the wing cases show an irregular, wavy, brown stripe on the disk and another on the costal margin, and each nervule ends in a blackish dot (fig. c).

In the spring brood the chrysalids were from .46 to .50 inch, breadth .14; color blue-green, the dorsum streaked irregularly with paler or whitish-green; the wing cases finely granulated with pale green, and without any stripe, but the nervules end as in the other form, in blackish dots; there are also two such dots on the inner side of the antennæ cases, at about half their length; the outer edge of the wing cases cream color, and this is continued along the head and palpi cases; the keel of mesonotum lightly marked by same color. Duration of this stage in May and June 8 days.

The attitude of the larva when suspended is peculiar. From last segment to 4th the body hangs almost perpendicular, the dorsal side incurved and ventral correspondingly curved outward; the anterior segments are bent at a right angle, the head being turned down upon second segment. In *Sosybius*, the only other species of *Cœnonympha* whose early stages are fully known to me, the attitude of the suspended larva is that of figure 6. *Gemma* in its larval stages resembles an *Apatura* (*Celtis*) more than it resembles *Sosybius*. It holds the head bent under so that the horns are nearly or quite in the plane with the back. The chrysalis differs materially from any Satyrid chrysalis known to me, that is, from *Sosybius*, *Eurytris* or *Nephele*.

The figures of both larva and chrysalis of *Gemma* in Boisduval and LeConte, Plate 62, are quite wrong, and must have been drawn from some other species. The larva figured has no horns, and moreover is round headed. *Gemma* is not uncommon in this region, but I have found it restricted to certain localities, in open woods, or near woods, and at the proper season I can always find examples by visiting these places. It is three brooded, and, as shown above, I have raised each brood from the egg.

I know no other butterfly which moults three times and no more, but I have verified the fact in this case repeatedly, keeping the larvæ in separate glasses and watching them through all their changes. I use half pint glasses, with tin tops, for all my larvæ, except the largest, as the *Papilios*, and for these also in their earlier stages, so that it is easy to examine and observe them. No larva moults without an interval of abstention from food, and absolute rest for 24 or more hours, and at this time the skin over head and second segment becomes white and swollen, making it impossible that a moult should be coming on without opportunity of knowing it. Nearly all larvæ moult four times, but *Philenor* alone of the *Papilios* bred by me, moults five times. Some of the hibernating larvæ moult but four times, as *Nephele* and *Eurytris*, others five times, as the large *Argynnids*. Some *Argynnids* which have a summer as well as winter brood, moult four times in the summer. So do *Tharos* and *Nycteis*, but five times in the hibernating brood. *Archippus* moults four times, as does *L. Bachmanni*, the species of *Limenitis*, and *Apatura*, though perhaps *A. Clyton* in some cases passes five moults in the winter brood. It is therefore something quite unusual for a species to be limited to three moults only, as in the case of *Gemma*.

DESCRIPTIONS OF SOME NEW SPECIES OF TABANIDÆ.

BY C. P. WHITNEY, MILFORD, N. H.

Chrysops cuculux.

♀. Length $6\frac{1}{2}$ -9 m. m. Face and cheeks black, shining, separated by yellow pollinose stripes. Frontal callus black, ocellar space blackish ferruginous, the yellow pollen between somewhat infuscated. Palpi blackish ferruginous. Antennæ: first two joints yellow, the second infuscated; third black, base fulvous. Thorax and scutellum black with white hairs, the usual stripes obsolete. Abdomen black, first two segments with a pale yellow lateral spot, seldom attaining the posterior margin of the second segment. The posterior segments with white hairs forming centrally obsolete triangles. Venter black clothed with white hairs. Feet black, sometimes tinged with ferruginous, posterior tarsi yellowish at base.

Wings: root, costal cell, three-fourths of the first basal and the abbreviated cross-band brown. The second basal cell is usually filled as far as the first, but more obscurely. There is sometimes a trace of a cloud beyond the stigma. The cross-band does not attain the posterior margin but crosses the fifth cell, the proximal end of which frequently contains a hyaline spot. A halo along the distal margin.

Seventeen ♀. June, Milford, N. H. One ♀ in Cambridge Museum.

This species is near *sordidus* O. S., but is smaller, lacks the gray posterior margins of the abdominal segment, the cross-band is more abbreviated and lighter colored, and the second basal cell is farther infuscated.

Chrysops nigribimbo.

♀. Length 5-6 m. m. Face ferruginous. Callosities and cheeks dark brown. Palpi brownish. Antennæ black, basal joint yellowish. Front cinereous, callus and ocellar space black. Thorax and abdomen black, sometimes viridescent, the thoracical lines obsolete. Legs varying from black to fulvous; the front coxæ, proximal half of front tibiæ, and the base of the four posterior tarsal joints being lighter colored. Wings: costal cell and stigma yellowish. Cross-band obsolescent, existing only as a brownish-yellow tinge usually vanishing entirely before it reaches the posterior margin, which it sometimes does in the fourth cell. First basal cell filled with the same tinge as cross-band. Second infuscated at extreme base only. In some examples a faint apical cloud is visible under the lens, occupying the extreme distal part of marginal and submarginal cells.

Milford, N. H. Abundant in Pine woods in July.

Chrysops cursim.

♀. Length 7-8 m. m. Face, cheeks and palpi yellow. Antennæ yellow, annulate portion black. Front covered with yellow pollen. Frontal callus fulvous margined above with an interrupted black line. Space around ocelli black. Thorax greenish-brown with yellowish stripes. Scutellum greenish-gray, usually with a transverse fulvous streak. Abdomen yellow. Second segment with two oblique oval spots anteriorly connate, attaining neither margin. The remaining segments with emarginate transverse stripes on the anterior portion. In some examples these stripes are abbreviated, forming two spots similar to those on the second segment and decreasing to the fifth. Venter yellow, apically infuscate.

Legs yellow, anterior half of front tibiae, front tarsi, tips of middle and posterior tarsi, extreme tip of posterior femora and distal third of posterior tibiae, black. Wings: costal cell, about one-fourth of first basal, extreme base of second, cross-band, apical spot and a cloud on fifth vein, brown. The cross-band is narrowed posteriorly, reaching the margin in the fourth cell and barely crossing the vein into the fifth. The apical spot is narrow, extending along the costa and filling the apical third of the second submarginal cell.

Six ♀. July. Milford, N. H.

Tabanus superjumentarius.

♀. Length 16-19 m. m. Palpi long, slender, gray, thickly beset outwardly with short black hairs. Face and cheeks gray, with white pollen and hairs. Antennae black, base of joints reddened, upper angle of third joint prominent. Front without ocellar tubercle, coarctate anteriorly, gray with a central brown spot and brown vertex with black hairs. Callus chestnut brown, higher than wide, fusiform above. Eyes naked, unicolorous. Thorax chocolate brown, with white stripes, the middle one narrow, geminate, abbreviate. Thorax and scutellum densely clothed with white hairs. Humeri and pleurae pale carneous with black pile. Abdomen tapering, black, with dense appressed glossy hairs. Segments 3 to 6 faintly margined posteriorly with white, which expands centrally into small triangles on the anterior segments by a few white hairs. Venter black, whitish pollinose laterally, the segments margined with white and with white ciliae. Legs black, with black hairs, base of tibiae testaceous interiorly. Wings tinged with fuliginous. Base, costal cell and stigma pale yellow. A faint cloud on divarication of third vein. First posterior cell slightly coarctate.

Two ♀. July 4. Milford, N. H.

Tabanus Dodgei.

♀. Length 12-14 m. m. Face and cheeks densely covered with light gray pollen and long white hairs. Palpi whitish with white and a few black hairs. Antennae pale yellow, third joint black, upper angle rounded. Front parallel, gray, no ocellar tubercle, callus dark chestnut brown, rectangular, a little wider than high, and frequently emarginate above. A disconnected ovate lanceolate spot above. Eyes pubescent, purple, with two parallel green stripes, the upper wider, and wider than

the intermediate space. Thorax brown with broad white stripes. Scutellum brown with black hairs. Abdomen brown with two broad white stripes of sub-equal width with the space between. Hind margin of segments white. Venter dark, covered with gray pollen, hind margins white. Feet yellowish, base of femora and tips of tarsal joints infuscated. Wings hyaline, costal cell and stigma pale yellow. Veins brown. First cell open.

Nine ♀ received from Mr. G. M. Dodge, Glencoe, Nebraska, to whom the species is affectionately inscribed.

Tabanus sparus.

♀. Length 9-11 m. m. Palpi yellowish-white with a few short white and black hairs. Face gray with white pollen. Antennæ fulvous, third joint compressed, upper angle obtuse, annulate portion black, short. Eyes large, naked, unicolorous, dark green with a purple reflection. Front coarctate, gray, no ocellar tubercle. Callus rectangular, a connate line above. Thorax brown with light gray stripes. Scutellum concolorous. Abdomen dark brown, the segments with white margins, the central triangles smaller than the oblique lateral ones, which are frequently disconnected from the margin on the posterior segments. Venter dark fulvous, black posteriorly, segment margins white. Legs varying from blackish brown to pale yellow, the base of tibiæ being lightest. Wings hyaline; stigma pale yellow. First cell open.

Milford, N. H. June and July. Abundant. One ♂, Prof. F. G. Sanborn, same locality, resembles ♀ closely, but the black on abdominal dorsum prevails and the tip of venter is darker.

This species resembles *pumilus* Macq., but is larger; the spots on second segment coalesce with the margin, the eyes are unicolorous, while *pumilus* has two bright green parallel stripes on purple ground.

PARASITE ON THE COMMON HOUSE-FLY.—Prof. Leidy recently stated that in examining various common animals of our household, he found a thread-worm infesting the house-fly. The worm is from a line to the tenth of an inch in length, and lives in the proboscis of the fly. It was found in numbers from one to three in about one fly in five. This parasite was first discovered by Mr. H. J. Carter, the well-known naturalist, in the house-fly of India, who described it as *Filaria muscæ*.—*Science-Gossip*.

CORRESPONDENCE.

SCARCITY OF PAPILIONIDÆ IN NOVA SCOTIA AND NEW BRUNSWICK.

DEAR SIR,—

During the months of July and August last I visited several places in New Brunswick and Nova Scotia, and was everywhere, alike, surprised at the scarcity of Papilionidæ this year. Where last summer there were swarms of *Argynnis aphrodite*, *Colias philodice*, *Nymphalis arthemis*, *nephele*, *alope* and *Pieris rapæ*, I did not see two dozen examples in all. The only *arthemis* I have seen this year is one obtained from a mature larva I picked up on the side-walk near my own residence. I have one *disippus* taken near St. John, July 1st. This species I think is rare here at any time; *turnus* is also rare. *Melitæas* have been about as abundant as usual; *Vanessa antiopa* much less numerous. The commoner kinds of moths which enter our houses at night are remarkably scarce.

In Nova Scotia I found large numbers of the larvæ of *Cynthia cardui*, and later here I have seen the imagines very abundant. *Huntera* is much less common. At Parrsboro', N. S., I found on cultivated grounds several young maples quite defoliated by the larvæ of *Orygia leucostigma*. A careful search failed to discover any on the larch, poplar, willow, mountain ash and other trees and shrubs which were planted thickly around. On the opposite side of the street I saw a small apple tree swarming with these caterpillars, but they do not appear to do as much injury to the apple as to the maple tree. I suggested to the owner of the apple tree that they might be picked off and destroyed before they commenced spinning, but he evidently thought it would be too much trouble. There will likely be a good crop of these caterpillars next year.

CAROLINE E. HEUSTIS, Carleton, St. John, N. B.

DEAR SIR,—

For some two or three years back there has been no little discussion of the question, "What constitutes a genus?" The opinions of many of our lepidopterists and others have been given to the gain of us all. We each had our opinions before the reading of these articles, but now are able intelligently to give a reason for our opinions. And probably the majority have been convinced that the creation of genera upon minute differences is not only unnatural, but ill-advised and unnecessary.

But with the Catalogues of Edwards and Strecker before me, and after viewing the varying conflict between Messrs. Strecker and Grote, I would like to ask "What constitutes a species?" There is certainly a wide difference of opinion among authors upon the subject, and if we are properly, and with profit, to read their articles and study their books, we ought to know the basis upon which they work. I am aware there is, properly speaking, in nature, no such thing as a species defined by precise limits. It is impossible to tell where variety leaves off and species begins, and where one species ceases to be one, and becomes two. But when a person becomes (by the fact that he gives a "Check List" or a "Catalogue" to the public) a professed systematist, we, "the public," have some right to the ideas of truth upon which their work is based. Apart from right, however, I am sure information on this subject will be of general interest and profit. May I therefore ask our friends to "rise and explain?"

Very truly yours,

GEO. D. HULST, Brooklyn, N. Y.

DEAR SIR,—

The paper by Mr. Robert M. Grey in your January number is of great interest. In it Mr. Grey takes the ground that the four Eastern so-called "species" of *Limenitis* are plastic forms of an original species modified by the environment and with essentially differing ranges in latitude and vertical height. The intermediary individuals which bear out this statement, and Mr. Grey's experience in collecting the different forms, are important witnesses to the truth of his discovery. I wish to point out the fact that, in experiments in breeding these different forms, we may not expect to rear all four from one brood of larvæ, as a proof of Mr. Grey's correctness. These forms of *Limenitis* stand evidently in an intermediate position between varieties and species. We may expect, indeed, more or less reversion to be made clear by breeding experiments with them. But we may suppose that these forms, either from climatic or other influences, are partially crystallized. This seems to be inferable from their greater distinctness, more intense than in the cases selected from European butterflies by Weismann and shown in *Papilio Ajax* by Edwards. Experiments will doubtless allow us to arrive at some conclusion respecting the oldest of the forms, which may prove to be *arthemis*.

A. R. GROTE, Buffalo, N. Y.