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THE TIGER-SWALLOW-TAIL (*Papilio Turnus, L.)*

BY JAMES FLETCHER, OTTAWA.

Just about the time the lilac bushes open their fragrant blossoms the grand insect shown at figure 9 may be seen either hovering over gardens and sipping the nectar of flowers, or sailing majestically down some woodland glade. It generally appears at Ottawa about the first of June,

Figure 9.

and may be seen for a month or more. Farther to the north it comes later, not appearing at Nepigon, north of Lake Superior, until the end of June. This insect has many characters which make it of interest to the collector. Its size and beauty make it a striking object in the spring landscape. Although it varies in abundance in different years, it is generally one of the first treasures of the young collector, and is prized accordingly. The variations it presents in different latitudes and the habits of its remarkable caterpillar are of great interest to the student. In the north, including the whole of Canada, the males and females are like our figure, having the ground colour of a pale lemon yellow, with rich black markings. The broad margin is more or less powdered with blue scales, particularly on the hind wings, which are further ornamented with a conspicuous orange-red spot, bordered with black and blue, near the hind angle, and in the females there is another large spot of the same colour at the upper angle. In the Southern States the specimens of both sexes are larger and more highly coloured, and besides a black dimorphic form of the female also occurs. No specimen of a black male has ever been taken. The only approach to this melanic form is the beautiful suffused variety which is figured below. The range of the Tiger-Swallow-tail is very extended. I have some specimens from the arctic circle and others from the tropics, while from east to west it occurs from Newfoundland to Alaska. The eggs are laid by the females singly on the upper side of the leaves of its food plants. They are about one-twentieth of an inch in diameter, sub-globular and smooth, at first of a pale transparent green, much yellower at the base by reason of a more or less abundant waxy substance which fastened them to the leaf; after a few days they turn reddish, and just before the young larvæ hatch they are almost black. The time of hatching varies with the weather from ten to twenty days. The caterpillars are very different in appearance during their various stages. In the first stage the general appearance is black, with white spots and tubercles, and a conspicuous white saddle-shaped mark on the back. This mark also appears after the first and second moults, but is then of a pinkish cream colour. After the second moult the ground colour of the body usually changes to greenish brown. After the third moult the green colour is much more decided, and the caterpillar assumes more of the shape and markings of the full-fed larva. The thoracic segments are now enlarged and the saddle-shaped mark is almost obliterated. There is a yellowish band in front of segment 2, and another on the hinder edges of segments 5 and 12; that on 5 is followed closely by a black line on the front edge of segment 6. This black line does not show when the caterpillar is at rest. The head is pink brown. On each side of segment 4 now appears a pear-shaped yellow eye-like spot, the larger end outwards. This spot is edged by a fine black line; inside there is a heavy black line enclosing a violet spot.

Towards the smaller end of this yellow spot is a short black bar. The sides of the body are also ornamented with rows of violet spots, two upon segment 4, and four upon 5, 8, 9, 10 and 11, and two upon 12. On segments 6 to 11 there is one small spot below each spiracle. These spots are more distinct upon some specimens than upon others.

After the fourth or last moult the colour is invariably velvety green, paler beneath, the saddle-shaped mark has disappeared and the yellow marks are all more conspicuous. The full-grown caterpillar is shown at figure 10, and is a formidable looking creature. For two days before it suspends itself to change to the chrysalis, it gradually assumes a purplish brown tint, and the violet spots become more distinct than they were before. The full-grown larva is about one inch and a-half in length when walking. When at rest it is shorter and thicker, the head is drawn in out of sight and the body assumes a wedge shape, large in front, tapering rapidly to the last segment. When in this position the yellow spots on segment 4 have the appearance of two large open eyes. This appearance may possibly act as a protection from some of its enemies. When ready to turn to a chrysalis, it leaves its food-plant and seeks some place to pupate. It suspends itself to a silken mat and supports its body by means of a silken girdle around the middle. It changes to a chrysalis the second day after suspension. The newly formed chrysalis is very beautiful, being mottled with green, dove colour, black, and white, the two eye-like spots on segment 4 being very distinct. After a few hours, however, the green nearly all fades out and the chrysalis darkens to the tint of dead wood. In all parts of Canada there is only one brood of this butterfly. The eggs are laid in June and July and the caterpillars pupate late in the summer and go through the winter in the chrysalis state. The habits of the caterpillar are sluggish. From the first they spin a mat of silk to rest upon when not eating and sally out to feed. When very young they eat into the edge of the leaf upon which they hatch; but as they grow larger they crawl away to other leaves near at hand, and return again to rest upon the same leaf, all the time there is food at a convenient distance; when this is all consumed they move off to a fresh

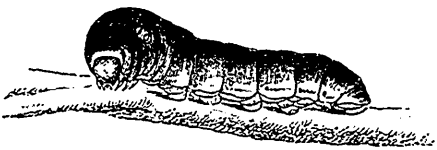

Figure 10.

branch and start another centre of operations. This mat is so spun as to curl the leaf up somewhat and form a platform, so that in case of rain the caterpillar is raised above the wet leaf. When disturbed they have a special means of defence, in the shape of an orange forked scent-organ, which they can protude at will from an orifice in the second segment. At the same time a strong pungent odour is emitted. The caterpillars possess this organ in all their stages, but seldom use it except in the last stage. The food-plant of this insect is very varied. In this district it is most frequently found upon apple, cherry, ash, birch and aspen trees.

Figure 11 represents a very beautiful suffused melanic male, which

Figure 11.

was taken in July, 1888, by Mr. Robert Mackenzie, at Collins Inlet, upon the Georgian Bay, eighteen miles east of Killarney, Ont. As this is the only approach to a black male which has so far been discovered, it has been thought well to have it photographed and engraved. The specimen is in very fine condition, the black and yellow clear and unfaded. The red eye-spot at the anal angle is distinct, and there is another between the extremities of the second and third median veinlets of the hind wing. A few scales of blue shadow the spot at anal angle. There is a conspicuous cloud of the same colour between the second and third median veinlets and a smaller one between the first and second. At the apex of hind wing there is a light cloud of red scales, and a slight tinge of red between the extremities of costal and first subcostal veins.

THE CLASSIFICATION OF OUR BUTTERFLIES.

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

At different times, in making notes for a general list of our Lepidoptera, I have taken up the arrangement of our butterflies, and, although such a list must now be undertaken by some one else, I think it worth while to set down the conclusions to which I had come.

For myself, I have preferred to consider all the true butterflies as more nearly related to each other than to the *Hesperidæ* and *Paleohesperidæ*. In other words, the latter seem the equivalent, structurally speaking, of the other butterflies. The characters by which modern "families" are recognized are unequal, and perhaps these groups are really of no more than sub-family value. But, granting these groups to be as they are now held, families, the sequence, with the *Papilionidæ* at the head, seems less reasonable than that which commences with the *Nymphalidæ*, or the so-called "four-footed" butterflies. And this on general grounds. For it is a clear departure from the usually six-footed type, that the anterior pair should be shortened and rendered more or less useless for walking purposes. It is probably not to be assumed that the families evolved from each other, but evolution was simultaneous and unequal. The character of the shortening of the fore-feet appears in a less degree in other families of butterflies, and probably exists as a tendency latent in the whole group. The fore-feet become gradually disused in walking, and this disuse is followed by a modification of structure. We are tied to a linear series in our catalogues and classifications, and the real descent and sequence in time of our butterflies can never be made out and never displayed in our artificial arrangements. We are conditioned by our own physical structure. Our appreciation of what surrounds us is limited by the imperfection of our senses. We cannot *see* evolution, and the actual progression of growth escapes us. Only by reasoning do we recognize the doctrine of descent. It is easier for us to construct a genealogical tree than to prove its correctness beyond reasonable doubt.

Undoubtedly such drawings assist our comprehension of the possible *modus operandi*, but the artist must be exceedingly well up before he thus gives the reins to his imagination. In the best case they are not facts, and must not be accepted as such; they are, it may be, ladders for the mind, which we may climb if we will, to find at the top perhaps as imaginary a result as Jack attained from his bean-stalk. To draw such a tree may be pardonable, but to believe in it afterwards, as representing real succession, is an infirmity of the scholar's mind. Who can tell the real succession in time and place? There may be assumed a certain progression in the development of form, but beyond this there is nothing to justify our pretence that we are classifying our Lepidoptera according to real descent. Nature or natural selection deals with individuals; if the type persists, it is represented by species.

It may be that certain species of tropical *Papilio* are more recent evolutions, newer species, than many *Nymphalidæ;* but the four-footed butterfly must have come, one would think, from a six-footed ancestor. Hence, in a linear series, we may commence reasonably with the *Nymphalidæ.* Again, the habits of the larvæ of these latter are very complex, and seem to have been slowly modified and acquired. Mr. Edwards has told us much about them. The larvæ themselves are most curious objects, leaving the usual range of larval forms. In certain genera from South America are curious horns attached to the head, reaching backwards and reminding us of the flower spurs of *Aquilegia.* The larvæ of the *Papilionidæ,* as I have elsewhere said, are not without resemblances to the Hawk moths. As to pupation, it may be assumed that cocoon-making, or spinning, is older than its disuse. Almost all the "higher" groups, that is, groups which may have issued from a former complex, show some modification of this habit in the direction of its disuse. Thus the Hawk moths, which may have come from a common ancestry with the *Ceratocampinæ,* probably first passing through a type analogous to existing *Smerinthinæ,* have very generally discarded cocoon-making. In discussing all these matters, we must be careful not to put the cart before the horse, as the Chippeways did, who held the pretty notion that the butterfly made the south wind, and not the south wind the butterfly.

The *Papilionidæ,* in the consistency and form of the body, in its hairiness, in the dark and bright contrasting colors, in the tailing and structure of the secondaries, show certain approximations to the *Hesperidæ,* so that our placing them at the end of the true butterflies does not do violence to their structure. And as they are six-legged butterflies, we should naturally finish with them. The departure, which probably exists as a tendency in the group, is here not expressed, and they are like the *Hesperidæ* in this respect. But we must not look upon the *Papilionidæ* as a connecting link *(Uebergang)* to the *Hesperidæ.* They are, in most respects, as far from the skippers as any other true butterfly. The coincidences at best indicate that, in certain characters, the *Papilionidæ* stand nearer to the common ancestor than the *Nymphalidæ.* But whether our surmises are right or wrong—and that they are right or wrong cannot be proved, and is a matter of mere reasonable probability—we stand in need of a linear series for our catalogues and collections. This is a practical want, and we must meet it by the most philosophical means possible. We are offered a certain character in the true butterflies, the different modifications of the front pair of feet, and this character it is clearly philosophic and practical to use. We must not be influenced by slighter characters to overturn our conclusions, or by vague general considerations which are wide of the result we are aiming at, which is a *reasonable* sequence for our species, genera and families of butterflies.

I find that Mr. Wallace says that the *Danaidæ*, no less than the *Papilionidæ*, have developed complicated adaptations to the surrounding organic and inorganic universe. Adaptation, mimicry and dimorphism, depend evidently on climate and surroundings, and are not any proof of higher structural value in themselves. They are phenomena called forth by circumstance, with the plastic butterfly as the wax for the seal. Perhaps this very plasticity is a proof of a certain weakness of type, just as weakness of character in us is displayed by our attending to every wind that blows. "In the extensive family of *Nymphalidæ*," says Mr. Wallace, "we find that several of the larger species, of feebler structure, have their wings modified; while the powerful species, which have all an excessively rapid flight, have exactly the same form of wing in Celebes as in the other islands." Size or relative beauty are no guide for a structural arrangement.

I should commence, then, the linear series of our butterflies with the four-footed butterflies: First the *Nymphalidæ*, following these with the *Satyridæ*, which differ by the blistering of the veins of the fore-wings, and are considered by writers generally as a distinct "family." There have to be general considerations guiding our arrangement of the genera; and the knowledge requisite to form these is hardly gathered yet. A mere technical description of form and structure is not of itself sufficient. Comparisons are needed of all the stages. Again, in the stringing together of the mass of detail, the general principles which should guide us in estabishing the higher divisions are lost sight of. The *Satyridæ* are evidently "lower" than the *Nymphalidæ*, perhaps retaining in habits and markings traces of a former physical condition of the globe. I have written briefly, originally, on the habits and conditions of *Oeneis semidea*, and I regard this genus as a low, perhaps the lowest type of Satyrid. We now come to a series of "families" of butterflies in which the shortening of the fore-feet is confined to the male sex. These are the *Libytheidæ*, as I have thought, a very old form of butterfly (Can. Ent. XVIII., 163), the *Erycinidæ*, to which I would refer my genus *Feniseca*, and the *Lycæindæ*, in which the male fore tibiæ end in a hooklet. We now come to the six-footed butterflies, which we may divide into three "families," the *Pieridæ*, the *Parnassidæ* and the *Papilionidæ*. The *Hesperidæ*, which differ by the proportions of the body and position of the wings, fall into two groups, as the fore tibiæ are with or without epiphysis, and may then follow. The series of butterflies may be closed by my *Paleohesperidæ*, with spinose tibiæ,—moth-like butterflies preparing us for the *Castniadæ*, and apparently relics of a stage between moth and butterfly surviving in the North American fauna.

There is, I think, nothing to be gained by cataloguing our Lepidoptera upside down, as seems to be proposed by Packard, commencing with the supposed "lowest" moths. Theoretically we may conceive that the moths are "lower" than the butterflies, and that in some unknown way the latter have come from moth-like ancestors. Palæontological proof is now wanting, but there is some circumstantial evidence to be gathered that such has been the case. If there has been evolution, then butterfly-like forms cannot have produced moths, but the reverse. At a later epoch in the history of creation than the origin of butterflies, changes of climate have evidently taken place. The winter now finds the butterflies in all stages. The lethargy of the half-grown caterpillar seems to have survived from a time when the winters were longer, came more suddenly, than at present. It was no longer time for the butterfly to grow, or the food plant formerly then perished. Now there is time and food, but the butterfly will not yet believe it, needing the evidence of centuries, and prepares to winter. In the moths I only have observed that certain species remain as caterpillars within the cocoon until spring.

For practical purposes, as well as for the work of comparing the faunæ of North America and Europe, and arriving at some conclusions as to geographical distribution and origin of the different forms, in which I am much interested, we may arrange the butterflies as here suggested. But whether we assume eight "families" of the true butterflies, or only four, or only one, the sequence and the principle remain unaltered. The characters by which modern "families" are defined, chiefly by German authors *und solche die es werden wollen*, are of unequal morphological value, therefore unnatural and, it seems to me, unphilosophical.

NOTE ON THE LARVA OF THYATIRA PUDENS, GUEN.

BY HARRISON G. DYAR, RHINEBECK, N. Y.

As far as I am aware no description of the larva of this insect has been published, and hence I present the following:—

T. pudens.—Mature larva. Head white, with four black spots, two covering the eyes and the others near the summit of the head. A few short, whitish hairs. Body semitransparent, whitish, flecked with opaque white spots on the dorsum and more thinly on the venter. Stigmatal space covered by a blackish shading, more distinct anteriorly ; a darker dorsal line. Spiracles pale brown. Cervical spot whitish, concolorous with body. A few short pale hairs.

The larvæ feed singly on dogwood (*Cornus florida*), each forming a place of concealment by spinning one or more leaves together by the edges. They mature by the middle of June and pupate in a slight cocoon on the ground, the winter being passed in the pupa state. The pupa has its greatest diameter through the wing cases, the abdominal segments tapering. It is dark brown, approaching black, the brown color showing more distinctly between the segments. Body punctured. Thorax, wing and leg cases finely wrinkled. Cremaster, thick, 1 mm. long, furnished with stiff, spiny hooks.

This larva well deserves its name of *pudens*, on account of its modest habits, remaining concealed in its leafy house, and appearing much disturbed if exposed. Its actions recall those of the larva of *Eudamus tityrus*.

The insect has only one brood annually.

Larvæ from Duchess County, N. Y.

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

BY G. H. FRENCH, CARBONDALE, ILL.

EGG.—Diameter .03 inch. Globular, smooth. Color whitish, with a pearly lustre. Duration of this period here four days, in the mountains of California six days.

YOUNG LARVA.—Length .07 inch. Cylindrical, six rows of tubercles from which spring hairs as long as the body. Color pale gray, head black, hairs gray. Duration of this period four days.

After 1st Moult.—Length .15 inch. Cylindrical, eight rows of tubercles, from which spring tufts of hair. Color dull pale horn yellow, a whitish dorsal line; tubercles black, the hairs gray; head with the top and sides black, clypeus whitish; legs whitish. Before the close of the preceding stage the body was slightly reddish purple. Duration of this period three days.

After 2nd Moult.—Length .25 inch.—Head slightly bilobed; color smoky greenish black; tubercles black, the hairs gray; a dorsal creamy, slightly orange tinted line, and a line of lateral spots of the same color situated between the second and third rows of tubercles, counting from the dorsal line; head pale horn yellow, the upper part black, a small black spot on each side, and a small smoky spot in the centre of the front; feet concolorous with the body. Duration of this period seven days.

After 3rd Moult.—Length .50 inch; shape as before. Color smoky gray, rather dark; dorsal stripe orange, an orange spot each side of the second tubercle on each joint, counting from the dorsal line; tubercles black, each supporting a cluster of spreading brown hairs, those on joints 6 to 11 mostly about the length of the diameter of the body, those on the other joints containing a few that are much longer, the anterior and a few on joint 12 yellow, a long pencil of brown hairs on 13; head dark amber, two blackish patches in front. Duration of this period six days.

After 4th Moult.—Length .60 inch. Color gray, made so by a fine mottling of black and sordid white; the cluster of hairs from each tubercle thick and spreading, the central hairs black, the outer hairs of the cluster gray; the dorsal line, lateral spots and head unchanged.

MATURE LARVA.—Length .70 inch. There was scarcely any change after the first of this period, As before, the body is cylindrical, with eight rows of tubercles, supporting tufts of spreading hairs, the most of these black with a few gray hairs round the outside of each cluster; the length of the hairs on the middle of body about the diameter of the body, those on the posterior part of the body about twice as long, the pencil from joint 13 about four times as long as those on the back of the middle joints; tubercles still black; head amber, with a prominent blackish spot in the centre of the anterior part of each cheek. Duration of this period 57 days.

CHRYSALIS.—Length .45 inch; length of wing and tongue cases .25 inch, extending almost to posterior part of joint 5; depth of joint 1 .14 inch; of joint 2 .15 inch; of joint 3 .16 inch; from this it tapers slightly to joint 7, from this more abruptly to the end; no hooks at anal extremity; cylindrical, anterior end rounded, the head sloping to the antennæ cases at a little less than 90 degrees; wing and antennæ cases slightly roughened, abdomen slightly punctured. Color, chestnut brown, antennæ cases and outer edges of wing cases a little paler. Duration of this period from 205 to 234 days.

There is but one brood in a season, and unlike most of our insects, it has two periods of what might be called suspended activity. One of these, the pupal period, is common to all insects undergoing complete transformations; the other, just before pupation, an unusual one, unless with a species that hibernates in the larval state. By looking over the different periods, we find them as follows:—

Egg	period....	6 days.
1st larval	"	4 "
2nd "	"	3 "
3rd "	"	7 "
4th "	"	6 "
5th "	" ...	57 "

After the fourth moult the larvæ grew to their full size in a few days, and then remained in a quiescent state, unless disturbed, during the remainder of the period. They passed the last moult July 25th, but did not pupate till September 20th. I could not see that they ate anything during this time of about 50 days, the period of our dry, hot weather, though fresh food was furnished them every day. At first I thought this might be due to their translation from their home in the Sierras to our warmer climate, and that succeeding broods would behave differently; but the second brood raised followed the same course as their ancestors.

When preparing to pupate, they constructed loose cocoons of gray silk mingled with hairs from their own bodies, either in folded leaves or next to the dirt in the corners of their breeding box. In this they resemble our Arctians generally.

The eggs from which the larvæ furnishing these notes were obtained were sent me by my friend, Hon. C. F. McGlashan, of Truckee, California. They were received by me July 5, 1885, just hatched, after having been on the road six days. Those I bred the next year hatched in four days. The food plant given me was Pentstemon, but I fed them on *Ribes Aureum*, or Missouri Currant, which they ate readily; and I am of the opinion, that like other Arctians, they are rather general feeders.

The only species, besides this, that has a period of summer hibernation in the Bombycidæ, so far as I have noticed, is the larva of *Arachnis Picta*, Pack., described by Mr. Stretch in his Illustrations of Zygaenidæ and Bombycidæ, page 84. This larva was found May 8th and did not pupate till the middle of August, making at least 98 days without food. The *Leptarctia* larvæ remained quiet under the food given them on the earth of the breeding box, unless disturbed, when they would run rapidly, like the species of *Arctia*. I believe Mr. Stretch says the Arachnis larvæ emitted a fluid just previous to pupation, similar to that emitted by a moth when coming out of chrysalis. I did not notice whether these did the same or not.

The genus Leptarctia was founded by Mr. R. H. Stretch in his book, already referred to, in the time of its publication from 1871 to 1873. At the time of writing the description of the genus he does not seem to have known of Walker's description of *Californiæ*, as he says nothing about it till the close of the work in an addenda. He gives three species, *Lena* and *Decia* by Boisduval, and *Dimidiata* named by himself. Walker described *Californiæ* in 1855 in British Mus. Cat. Lep. Het. Vol. 3, placing it in the genus *Nemeophila*. In 1868 Boisduval described the same form as *Adnata*, together with the two already mentioned, *Lena* and *Decia*, placing them in the genus *Lithosia*, but stating that in his opinion they did not belong in that genus, but in one near *Nemeophila*. Dr.

Packard, in his "Synopsis of the Bombycidæ of the United States, 1864", does not mention any of the forms of *Leptarctia*, hence we may presume that he had not seen any of them. In the note already referred to, at the close of the volume, Stretch restores *Californiæ*, and gives *Lena* as a synonym. Grote, in his "New Check List of North American Moths, 1882", gives three names as species, *Decia*, *Lena* and *Dimidiata*, giving *Californiæ* as a synonym of *Lena*. The Brooklyn List, 1881, gives the same three names without *Californiæ*.

This is, as far as I have observed, a synopsis of the history of the forms that have been placed under the genus *Leptarctia* as species. Stretch figured several forms, but grouped them as varieties under the three species he gave. While, for lack of a large series, or the knowledge that could come from breeding, these writers have treated of these forms as species, yet there has been something of a feeling among Lepidopterists for several years that there was really only one species, and all the different forms but varieties, and that such would ultimately be proven.

(To be continued.)

PRELIMINARY CATALOGUE OF THE ARCTIIDÆ OF TEMPERATE NORTH AMERICA, WITH NOTES.

BY JOHN B. SMITH, NEW BRUNSWICK, N. J.

(Continued from page 200.)

As the descriptions are short and so generally unknown, I will reproduce them here:—

"Var. *hybrida*: Primaries of *D. bella*, but the yellow belts indistinct, secondaries of typical *D. ornatrix*, but with the ground colour red as in *D. bella*, and with a white edged, interrupted black belt across the discoidal cell.

"Hab.—United States.

"Var. *intermedia*: Primaries with the yellow belts very pale, so that the white borders of the black spots show faintly; secondaries exactly like *speciosa*.

"Hab.—United States."

Genus CALLIMORPHA Latr.

This genus has been so thoroughly discussed by Mr. Lyman and myself in CAN. ENT., XIX, 181-191 and 235-239, that it is scarcely necessary to say anything more here.

The synonymy to the date of my monographic revision in the Proc. U. S. Natl. Mus., 1887, pp. 338-353, is there given with the complete bibliography. Nothing worthy of record has been published since that time, and I therefore add a list of the species for completeness only. As this genus has been monographically treated, I adopt my own order of species :—

C. clymene Brown.
  interruptomarginata DeB.
  comma Wlk.
C. colona Hbn.
  clymene || Esp.
  carolina Harr.
C. lactata Smith.
  ♂ *conscita* Wlk., in part.
C. lecontei Bdv.
  var. *militaris* Harr.
  confinis Wlk.
C. contigua Wlk.
  reversa Stretch, in part.
C. suffusa Smith.
  lecontei ‡ Stretch et auct.
  reversa Stretch, in part.
C. confusa Lyman.
  lecontei ‡ Smith et auct.
  reversa Stretch, in part.
C. fulvicosta Clem.
  ♂ *conscita* Wlk., var. *b*.
C. vestalis Pack.
  ♀ *conscita* Wlk.

Genus EPICALLIA Hbn.

1816—Hübner, Verzeichniss, 182.

Head small, retracted; palpi short; tongue short and weak, about half the length of thorax; ocelli small; antennæ short, simple in the ♂. Legs rather well developed, the middle and hind tibiæ fully spurred; spurs small, those of posterior tibia close together. Claws of tarsi simple.

Primaries with but 11 veins, 8 being wanting: 2, 3 and 4 are from a short stalk out of the end of the median; 5 from the cross vein rather close to the stalk, 6 and the stalk bearing 7, 9 and 10 from the end of the subcostal; 10 therefore *not* from the subcostal. Secondaries with 3, 4 and 5 close together from the end of the median; 6 and 7 together from the end of the subcostal; 8 as usual from the subcostal.

The above description is based upon *E. virginalis.* Mr. Butler thinks the American entomologists have mistaken the type of *Epicallia.*

He says, Ann. Mag., N. H., 1881, ser. 5, v. VIII., p. 310:—"Why Dr. Packard and others have placed this species in *Epicallia*, of which *E. villica* is type, it would indeed be hard to say. Setting aside other differences, the utter dissimilarity of the male antennæ should have been sufficient to keep them widely separated. The pattern and colour of the wings, the less woolly and smaller thorax, and the barred abdomen are all characteristic of *Hypercompa;* in fact, with the exception of the rather shorter costal margin of primaries, which may, perhaps, be regarded as a generic character, I can see nothing to distinguish it from that genus." Mr. Butler claims *dominula* and allies as *Hypercompa (Callimorpha* Stgr.), and says our species of *Hypercompa (Callimorpha)* differ generically from the European species, and should be referred to *Haploa* Hüb. *Villica*, according to Butler the type of *Epicallia*, is placed in *Arctia* by Staudinger.

Without expressing any opinion on the subject, I refer the matter to some one having the material for study.

E. virginalis Bdv.

1852—Bdv., Lep. Calif. (Ann. Soc. Ent. Fr.), 49, *Chelonia.*
1855—Wlk., C. B. Mus. Lep. Het., III., 611, *Arctia.*
1860—Clem., Proc. Ac. N. Sci., Phil., XII., 529, *Arctia.*
1862—Clem., App. to Morris Syn., 337, *Arctia.*
1864—Pack., Proc. Ent. Soc., Phil., III., 108, *Epicallia.*
1867—Grt. & Rob., Tr. Am. Ent. Soc., I., 333, pl. 6, f. 42, ♂, *Epicallia.*
1873—Stretch,* Zyg. & Bomb., 70, 238, pl. 3, ff. 2, 3, 4, and pl. 10, f. 1 (larva) *Epicallia.*
1874—Pack.,* Rept. Geol. Surv., 1874, p. 559, *Epicallia.*
1875—Edw.,* Proc. Cal. Ac. Sci., V., 186, *Epicallia,*
1876—Stretch, Rept. Surv. West. 100 Mer, V., 802, *Epicallia.*
1881—Butler, Ann. Mag., N. H., Ser. 5, VIII., 310, *Hypercompa.*

var. *ochracea* Butler.

1881—Butl., Ann. Mag., N. H., Ser. 5, VIII., 310, *Hypercompa.* Cites Stretch, Zyg. & Bomb., p. 71, pl. 3, f. 2, as type.

var. *guttata* Bdv.

1852—Bdv., Lep. Cal. (Ann. Soc. Ent. Fr.), 48, *Agarista.*
1853—H.-Sch., Lep. Exot., 72, f. 464, *Pleretes.*
1862—Morris, Synopsis, 132, *Alypia.*

1864—Pack., Proc. Ent. Soc., Phil., III., 109, pr. var.
1867—G. & R., Trans. Am. Ent. Soc., I., 334, an sp. dist.
1869—Bdv., Lep. Cal. (Ann. Soc. Ent., Belg. XII), 74, *Callimorpha.*
1873—Stretch, Zyg. & Bomb., 70, pr. var.
1875—Edw., Proc. Cal. Ac. Sci., V., 186, pr. var.
Habitat—Vanc., Calif., Or., Colo., Ariz.

Genus PLATARCTIA Packard.

1864—Pack., Proc. Ent. Soc., Phil., III., 109.

I have no notes of this genus, never having had a specimen that belonged to me absolutely.

P. borealis Moeschler.
1860—Moeschl., Wien. Ent. Monatsch., IV., 360, pl. 9, f. 3, *Arctia.*
1864—Grt., Proc. Ent. Soc., Phil., III., 74, =*parthenos.*
1864—Pack., Proc. Ent. Soc., Phil., III., 111, *Platarctia.*
1867—Pack., Proc. Bost. Soc., N. H., XI., 35, *Platarctia.*
1869—Beth., CAN. ENT., I., 45, *Platarctia.*
1873—Strk., Lep. Rhop. et. Het, 24, =*parthenos.*
1882—Grt., New List, 15, *Platarctia.*
Habitat—Can., Labr.

Mr. Grote lists this as a distinct species without comment, and I follow his lead. It is the opinion of those with both species, I believe, that *parthenos* and *borealis* refer to varieties of the same form.

P. hyperborea Curtis.
1831—Curt., App. to Ross. Narr., 2nd Voy., LXXI., p. 17, *Eyprepia.*
1855—Wlk., C. B. Mus. Lep. Het., III., 611, *Arctia.*
1857—Wlk., C. B. Mus. Lep. Het., VII., 1692, *Arctia.*
1860—Clem., Proc. Ac. N. Sci., Phil., XII., 529, *Arctia.*
1862—Morris, Synopsis, Supplt., 340, *Arctia.*
1868—Grt. & Rob. Tr. Am. Ent. Soc., II., 71, *Platarctia.*
Habitat—Arctic America.

P. parthenos Harris.
1850—Harr. in Ag. Lake Sup., 390, pl. VII., f. 4, *Arctia.*
1855—Wlk., C. B. Mus. Lep. Het., III., 608, *Arctia.*
1860—Clem., Proc. Ac. N. Sci., Phil., XII., 529, *Arctia.*
1862—Morris, Synopsis, Supplt., 337, *Arctia.*

1863—Saund., Syn. Can. Arct., 4, *Arctia.*
1864—Pack., Proc. Ent. Soc., Phil., III., 110, *Platarctia.*
1868—Saund.,* CAN. ENT., I., 5, *Platarctia.*
1869—Bethune, CAN. ENT., I., 45, *Platarctia.*
1871—Saund.,* CAN. ENT., III., 225, *Platarctia.*
1872—Lint.,* Ento. Contr., II., 132, *Platarctia.*
americana ‡ Wlk.
1855—Wlk., C. B. Mus. Lep. Het., III., 607, *Arctia.*
1868—Grt. & Rob., Tr. Am. Ent. Soc., II., 71, pr. syn.
Habitat—Can., Lake Sup., White Mts., Vt., N. Y.

P. yarrowi Stretch.
1873—Str., Zyg. and Bomb., 221, pl. IX., f. 7, ♂, *Arctia.*
1876—Str., Rept. Geog. Surv. West, 100 Mer., V., 800, pl. 40, ff. 1 and 2, *Arctia.*
1882—Grt., New List, 15, *Platarctia.*
1883—Moeschl., Stett. Ent. Zeit., 44, 116, *Arctia.*
Habitat—Labr., Arizona.

Genus EUPREPIA Ochs.

1810—Ochs., Schmett., III., 298.

Von Heineman's characterization gives for this genus:—Antennæ ♂ and ♀ ciliated, joints with two stouter bristles; anterior tibia with claw at tip. Primaries with accessory cell present. Based upon an examination of *E. caja*, the reference of that species to this genus is an error, since *caja* has the male antennæ pectinated, the fore tibia with but a small spine at tip, primaries without accessory cell. In *caja* the tongue is obsolete, palpi short, head retracted. All the tibiæ shorter than femora; spurs normal, but minute. Claws simple. Primaries with 3, 4 and 5 nearly equidistant from the cross vein or end of median; 6 from cross vein, very little below end of subcostal; 7, 8 and 9 on a long stalk out of end of subcostal; 10 from subcostal before the end of the cell; secondaries with 3, 4 and 5 nearly equidistant from end of median; 6 and 7 together from end of subcostal.

Pudica is said to be the type of the genus!

E. caja Linn.
1758—Linn., Syst. Nat. Ed., X., 500, *Bombyx.*
1767—Linn., Syst. Nat. Ed., XII., 819, *Bombyx.*

1781—Fabr., Sp. Ins., II., 198, *Bombyx*.
1787—Fabr., Mant. Ins., II., 128, *Bombyx*.
1816—Hübn., Verzeichniss, 181, *Zoote*.
1852—Bdv., Lep. Cal. (Ann. Soc. Fr.), 49, *Arctia*.
1855—Wlk., C. B. Mus. Lep. Het., III., 601, *Arctia*.
1860—Moeschl., Wien. Ent. Monatschr., IV., 360, *Arctia*.
1864—Grt., Pr. Ent. Soc., Phil., III., 74, an. sp. Amer. (?).
1867—Pack.,* Proc. Bost. Soc., N. H., XI., 33, *Euprepia*.

americana Harris.

1841—Harris, Rept. Ins., Mass., 246, *Arctia*.
1850—Harris in Ag., Lake Sup., 391, pl. 7, f. 5, *Arctia*.
1855—Wlk., C. B. M., Lep. Het., III., 607, *Arctia*.
1860—Clem., Proc. Ac. N. Sci., Phil. XII., 529, *Arctia*.
1862—Clem., App. to Morris Syn., 336, *Arctia*.
1863—Saund.,* Proc. Ent. Soc., Phil. II., 28, *Arctia*.
1863—Saund., Syn. Can. Arct., 3, *Arctia*.
1864—Pack., Proc. Ent. Soc., Phil., III., 114, *Euprepia*.
1869—Grt., Tr. Am. Ent. Soc., III., 537, an sp. dist., *caja*.
1872—Lintner,* Ent. Cont., II., 134, *Euprepia*.
1873—Stretch, Zyg. & Bomb. 95, pl. 4, f. 4, ♀, ib., p. 239 (larva) =*caja*.
1873—Strecker, Lep. Rhop. et. Het., 24, *caja*.
1875—Edw., Proc. Cal. Soc. Sci., V., 187, *Euprepia*.
1875—Bunker,* CAN. ENT., VII., 149, *Arctia* (life list).
1876—Lyman,* CAN. ENT., VIII., 20, *Arctia*.
1878—Strk., Proc. Dav. Ac. Sci., II., 273, pr. syn.
1882—Grt., New List, 15, =*caja*.

var. *utahensis* Edw.

1886—Edw., Ent. Amer., II., 166, *Euprepia*.
Habitat—Northern U. S., N. Y., Can., Labr., Alaska, Vanc., Calif., Utah.

I have made no attempt to give the bibliography of the European species. It would have made the references too voluminous, and the European literature is rather easily kept track of.

E. opulenta Hy. Edw.

1881—Edw., Papilio, I., 30, *Euprepia*.
Habitat—Yukon River, Alaska.

Genus CALLARCTIA Pack.

1864—Pack., Proc. Ent. Soc., Phil., III., 114.

This genus is unknown to me in nature, unless Mr. Stretch's reference, hereinafter cited, is correct. In that case it needs no special characterization.

C. ornata Pack.

1864—Pack., Proc. Ent. Soc., Phil., III., 115, *Callarctia.*
1882—Stretch, Papilio, II., 147, =*Arctia achaia !*
Habitat—San Mateo, Calif.

Mr. Stretch's note, giving the above synonymical reference, seems to have been carefully made, and the description shows nothing to the contrary. The reference bears all the more weight since Mr. Stretch is not a lumper, and has shown in the past great deference to Dr. Packard's *dicta* in this family. Grote & Robinson's species must, therefore, drop as a synonym, while Dr. Packard's genus must fall. I leave the positive reference to others.

THE ASSOCIATION OF OFFICIAL ECONOMIC ENTOMOLOGISTS

will hold its first annual meeting in the City of Washington, D. C., on November 12th, 1889, at 11 o'clock, a. m., in the Entomological rooms at the U. S. National Museum.

According to the resolution of the Association at the Toronto meeting, the annual meeting was to be held on the date and at the place where the Association of Agricultural Colleges and Experiment Stations should next meet. The date and place for the latter meeting having been fixed, the above notice is hereby given to all members of the Association of Economic Entomologists. All titles of communications to be read should be sent to the Secretary as soon as possible, and those desiring enrolment as members will also please communicate with the Secretary.

JOHN B. SMITH, Rutger's College, New Brunswick, N. J.

CORRESPONDENCE.

THE FARMER'S OWN INSECTICIDE.

Dear Sir: Take plants of Pokeweed, (*Phytolacca decandra*), roots, stems and leaves; cut them into manageable lengths; make a decoction —a sap-kettle will be useful for the purpose. Let the liquor cool, and then apply with a sprinkler. This will exterminate the currant-worm, rose-slug and other pests of the garden.

THOMAS W. FYLES.

GNOPHÆLA VERMICULATA, Grote.

Dear Sir: Last year Mr. Bruce published a description of the larva of this insect, giving the food-plant as *Mertensia virginica* (L.) As Prof. J. B. Smith has repeated this record in CAN. ENT. XXI., p. 174, it becomes especially necessary to point out that it is probably erroneous. In the first place, *M. virginica* is not known to occur in Col ado, and the species known from the Platte basin, in that State, are *M. sibirica*, Don., *M. alpina*, Don., and *M. paniculata*, Don.,—the last a new record, being reported from Denver by Miss A. Eastwood. Secondly, the larva of *G. vermiculata* is common in Custer County from 8,000 to 10,000 feet alt., and is found on *Mertensia sibirica*, although I have rarely found it also on *Echinospermum floribundum*, Lehm. I think, therefore, we may regard *M. sibirica* and *E. floribundum* as the known food-plants of *G. vermiculata*, and throw over *M. virginica* as erroneous, unless Mr. Bruce has anything to say to the contrary. I have elsewhere described the larva and pupa of this insect, and as I have since found the egg, this will be a convenient time to offer a description:—*G. vermiculata:* egg, diam. one mill; spherical, flattened at base; pale yellow, smooth, rather shiny. Laid in clusters on leaves of *M. sibirica*. Micawber Mine, Brush Creek, Custer Co., Colo., about 10,000 feet alt., or over. August, 1889. *G. vermiculata* occurs very abundantly in the higher regions of the Arkansas Basin in Colorado, but I have not heard of it on the Pacific slope. It flies lazily by day, visiting especially the flowers of *Senecia* and *Gymnolomia*.

West Cliff, Custer Co., Colo. T. D. A. COCKERELL.

Mailed November 5th.