

Technical and Bibliographic Notes / Notes techniques et bibliographiques

The Institute has attempted to obtain the best original copy available for filming. Features of this copy which may be bibliographically unique, which may alter any of the images in the reproduction, or which may significantly change the usual method of filming, are checked below.

L'Institut a microfilmé le meilleur exemplaire qu'il lui a été possible de se procurer. Les détails de cet exemplaire qui sont peut-être uniques du point de vue bibliographique, qui peuvent modifier une image reproduite, ou qui peuvent exiger une modification dans la méthode normale de filmage sont indiqués ci-dessous.

- Coloured covers/
Couverture de couleur
- Covers damaged/
Couverture endommagée
- Covers restored and/or laminated/
Couverture restaurée et/ou pelliculée
- Cover title missing/
Le titre de couverture manque
- Coloured maps/
Cartes géographiques en couleur
- Coloured ink (i.e. other than blue or black)/
Encre de couleur (i.e. autre que bleue ou noire)
- Coloured plates and/or illustrations/
Planches et/ou illustrations en couleur
- Bound with other material/
Relié avec d'autres documents
- Tight binding may cause shadows or distortion along interior margin/
La reliure serrée peut causer de l'ombre ou de la distorsion le long de la marge intérieure
- Blank leaves added during restoration may appear within the text. Whenever possible, these have been omitted from filming/
Il se peut que certaines pages blanches ajoutées lors d'une restauration apparaissent dans le texte, mais, lorsque cela était possible, ces pages n'ont pas été filmées.

- Coloured pages/
Pages de couleur
- Pages damaged/
Pages endommagées
- Pages restored and/or laminated/
Pages restaurées et/ou pelliculées
- Pages discoloured, stained or foxed/
Pages décolorées, tachetées ou piquées
- Pages detached/
Pages détachées
- Showthrough/
Transparence
- Quality of print varies/
Qualité inégale de l'impression
- Continuous pagination/
Pagination continue
- Includes index(es)/
Comprend un (des) index

Title on header taken from: /
Le titre de l'en-tête provient:

- Title page of issue/
Page de titre de la livraison
- Caption of issue/
Titre de départ de la livraison
- Masthead/
Générique (périodiques) de la livraison

Additional comments: /
Commentaires supplémentaires:

This item is filmed at the reduction ratio checked below /
Ce document est filmé au taux de réduction indiqué ci-dessous.

10X	12X	14X	16X	18X	20X	22X	24X	26X	28X	30X	32X
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The Canadian Entomologist.

VOL. XIX.

LONDON, NOVEMBER, 1887.

No. 11

COMPARATIVE TABLES FOR THE FAMILIES OF BUTTERFLIES.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

The need of a better knowledge of the actual structure of butterflies among those in this country who follow their study, is shown by the persistence with which an antiquated classification is adhered to,—a classification whose only value is historical, which conceals affinities and takes no account of the progress of investigation. In the hope of stimulating the examination of objects and not of books, the following Table for the determination of the four families of butterflies, originally prepared for my forthcoming work on the New England species, is here published. As will be seen, it includes in the analysis every stage of life, and while it intentionally oversteps the boundaries of New England in some respects, it does not, for the earlier stages, pretend to cover the outer field, excepting where it seemed important for some special purpose. Many of the characters here tabulated have never before been pointed out; others are the common property of science; that all characters are exhausted, or that some, and especially those drawn from the earlier stages, may not with increase of information require modification, is by no means maintained.

A. *Imago* of variable size, usually rather slender, with ample wings. Head in a vertical plane, the tongue being inserted opposite the lower half of the eye. Antennæ approximate at the base, the space between them not equalling half the vertical diameter of the eye, the tip of the club rarely curved and never produced to a distinct point. Eyes with no overhanging pencil of bristly hairs, though in rare cases (some *Lycaeninae*) a small tuft of hairs occurs at the base of the antennæ; cornea of eyes not extending over the posterior fourth of the ocellar globe. Front tibiæ rarely (*Papilioninae*) with any epiphysis, and hind tibiæ with only terminal spurs. Inner edge of hind wings rarely (*Papilioninae*) plaited, but

extending beneath and partially embracing the abdomen; fore and hind wings in repose resting in the same plane. *Egg* either distinctly higher than broad and then vertically ribbed; or sub-globular and then smooth or reticulate; or broader than high and then usually echinoid or tiarate. *Larva at birth*.—Head usually broader and higher than the body; the latter either with ranged appendages (of various shapes) generally longer, often much longer, than the segments; or with fleshy tubercles, especially on the thoracic segments. First thoracic segment with no distinct corneous dorsal shield. *Mature larva* variable in form, but generally cylindrical, often spinous, never with a strongly contracted and distinct neck, and without distinct thoracic shield. Generally constructing no place of concealment. *Chrysalis* generally (excl. Lycaenidæ) more or less angulate or with projecting shoulders, very rarely (in our species never) enclosed in a cocoon.

1. *Imago*.—Clypeus not only occupying the face, but extending also over half the crown of the head, and separated from the epicranium by a distinct (in *Danais*, slight) transverse furrow between the antennæ. Base of the antennæ wholly separate from the inner edges of the eye. Prothoracic lobes tolerably large and above tumid. Wings with the outer margins usually crenulate, dentate, sinuate, or angulate; front pair with two inferior subcostal nervules, originating at the extremity of the cell; inner margin of hind wing always embracing the abdomen. Tetrapod, the fore legs being unused and atrophied, especially in the ♂, but in both sexes the terminal appendages of the last tarsal joint absent (excepting in *Libythea*, where the claws are present in the ♀), and both spines and spurs of tibiae obsolete. *Egg* either reticulate and then sub-globular, or else vertically ribbed over at least the upper half of the egg, and then never more than one half as high again as broad. *Larva at birth*.—Head generally larger, never smaller, than the thoracic segments and generally scabrous; when of the same size, the corneous crown of the head is never encroached upon by the integument of the first thoracic segment, and the body is covered either with series of very long hairs (in which case most of them are acicular and not clubbed at the tip) or with extremely short and distant acicular hairs. *Mature larva* generally cylindrical, the head usually held in a vertical position, larger than the segments behind it, free and posteriorly contracted. Body

furnished with continuous rows of spines or smooth lenticular warts, or with discontinuous rows of fleshy tubercles, or with short pile; in the last case either the head is tuberculate or the last abdominal segment is furcate, or both. *Chrysalis* generally angulate, often strongly angulate, or if rounded, with shouldered prominences. It always hangs in a reversed position by its tail alone, except in the rare case of a few Satyrinæ, which are rounded, without special prominences, have no cremastral hooks, and undergo their changes in a crevice or a cell in the ground. Fam. I.—*Nymphalidæ*.

2. *Imago*.—Clypeus occupying but little more than the face and separated from the epicranium by a slight suture between the antennæ. Bases of antennæ inserted in distinct sockets, which either clearly infringe on the inner edge of the eye, or are open next that edge. Prothoracic lobes minute, generally appressed to a mere lamina. Wings with the outer margin generally entire, especially in the fore wing, but the hind wing often tailed; fore wings with only one inferior subcostal nervule arising at the extremity of the cell; inner margin of hind wings generally but not always embracing the abdomen. Hexapod, the front legs being employed in walking, and not atrophied excepting in some males (*Lycaenidæ*, esp. *Erycininæ*), where they are partially atrophied, and sometimes have the tarsi reduced to a single unarmed joint. *Egg* either smooth, or else reticulate (and then tiarate or hemispherical), or else vertically ribbed (and then greatly elongated, nearly or quite twice as high as broad). *Larva at birth*.—Head always smaller or no larger than the thoracic segments and usually smooth; when of the same size, either the corneous portion of the crown is partially covered by the integument of the first thoracic segment, or the body is furnished with very long or very short hairs, almost all of which are clubbed at the tip. *Mature larva* cylindrical, or anteriorly enlarged, or onisciform. Head usually held in an oblique position, generally small, contractile and not free. Body never furnished with spines, but either naked, or furnished with discontinuous rows of tubercles (in which case the head is always smaller than the succeeding segments), or with short pile (when the head is uniform and the last abdominal segment entire), or with fascicles of longer hairs. *Chrysalis* angulate or rounded, often

with no prominences whatever. It hangs in various positions, but is always attached not only by its tail, but also by a silken girth around the middle, and in rare cases is also enclosed in a feeble silken cocoon. Some few tropical Erycininae are said to lack the transverse girth.

a. Imago of small size and delicate structure. Front of head between the eyes much narrower than high. Eyes not projecting beyond the general contour of the head, notched on the inner margin, to give room for the antennal sockets. Antennae including the club straight. Metathorax only slightly separated from the mesothorax. Median cell of fore wings closed by a weak vein; median nervure of hind wings with three branches; the inner margin never plaited. Fore legs with no tibial epiphysis, sexually heteromorphous, the tarsi of the ♂ being more or less atrophied. Dorsal margin of the eighth abdominal segment of ♂ entire. Upper organ of ♂ genitalia with long, slender, strongly curved lateral appendages. Egg tiarate or hemispherical, and more or less deeply reticulate. *Larva at birth*, so far as known, furnished with numerous long, tapering hairs arranged in longitudinal series. *Mature larva*, so far as known, either onisciform or cylindrical; in the latter case the body is furnished with longitudinal series of fasciated hairs. *Chrysalis* usually short and stout, always bluntly rounded in front, the body rarely furnished with projections, and these invariably rounded. Median girth always close to the body at all points, the ventral surface of the body lying in a nearly uniform plane. Cremaster not at all or but slightly protuberant, the hooks inferior or apical. Fam. II. *Lycaenidae* (Erycininae + Lycaeninae).

b. Imago of medium or large size. Front of head between the eyes as broad as high. Eyes prominent, not infringed upon by the antennal sockets. Antennae straight, or, especially the club, sinuate. Metathorax markedly separate from the mesothorax. Median cell of fore wings closed by a strong vein; median nervure of hind wing with three or four branches, the inner margin sometimes plaited. Fore legs of both sexes as complete as the other pairs, sometimes with an epiphysis on

the inner side of the tibiae. Dorsal margin of the eighth abdominal segment of ♂ notched or produced to a hook. Upper organ of ♂ genitalia with no lateral processes. *Egg* subglobular and smooth, or very much elevated and longitudinally ribbed; (one known exception occurs in *Parnassius*, in which it is tiarate, but where, in contradistinction to the *Lycaenidae*, it appears to be overlaid with raised polygonal plates). *Larva at birth*, so far as known, furnished with longitudinal series of clubbed or forked hairs or with prickly tubercles. *Mature larva* cylindrical or enlarged anteriorly, covered with very short pile (in some exotic forms with long hairs), mostly arranged in transverse rows, or with rather infrequent and irregularly distributed minute hairs, and often also with series of fleshy tubercles or filaments or glabrous scarcely elevated warts. *Chrysalis* elongate, unimucronate or bimucronate in front, generally with numerous angular projections. Median girth frequently free from the body for a considerable part of its course by the ventral extension of the wing sheaths, the ventral surface of the body being generally bent near the middle. Cremaster strongly protuberant and free, the hooks apical. Fam. III. *Papilionidæ* (*Pierinæ* + *Papilioninæ*).

B. *Imago* of small or medium size, usually robust, with rather small wings. Head in a horizontal plane, the tongue being inserted opposite the middle of the eye or even higher. Antennae widely separated at the base, the space between them more than equalling half the vertical diameter of the eye, the tip of the club more or less distinctly pointed and recurved. Eyes usually overhung at the outer base of the antennae by a curving pencil of bristly hairs, the cornea extending over almost the entire ocellar globe. Almost invariably the front tibiae have a foliate epiphysis on the inner side, and the hind tibiae a middle pair of spurs in addition to the terminal pair. Inner edge of hind wings plaited, the fore and hind wings in repose often resting in different planes. *Egg* never noticeably higher than broad, hemispherical and smooth or domed and vertically ribbed. *Larva at birth*.—Head always broader and higher than the body, the latter with ranged fungiform appendages, never, excepting on the seventh and eighth abdominal segments, so long as the segments. First thoracic segment with a distinct corneous dorsal shield. *Mature larva* cylindrical but slightly flattened beneath and stoutest in the middle,

never spinous, generally minutely and coarsely pilose, with a large head, slender neck, and a transverse corneous shield on the upper surface of the first thoracic segment. Always living in concealment. *Chrysalis* smooth and uniform, rarely with a mucronate head, always enclosed in some sort of a cocoon. Fam. IV. *Hesperidae*.

THE NUPTIALS OF THALESSA.

BY W. HAGUE HARRINGTON, OTTAWA.

For several years I have observed with much interest the oviposition of our large and handsome "long-stings," but not until this summer have I been able to witness their actions preparatory to this duty. Although the males are frequently numerous when the females are ovipositing, the sexes pay no attention to one another, and this fact led me frequently to wonder at what time mating occurs. Last year I had, in company with Mr. Fletcher, observed the males in strange positions, with the tip of the abdomen applied to the bark, or inserted in a crevice, and had suggested that they were awaiting the emergence of the female. The supposition was, however, not proven, and the actions observed were still a matter of conjecture, and for further observation.

On the afternoon of the 7th June last, I visited some old maples (*Acer saccharinum*) for the special purpose of making observations on *Oryssus*. The trees are in different stages of disease and decay, and are correspondingly infested by such borers as *Dicerca divaricata*, *Tremex columba*, *Xiphydria albicornis*, *Oryssus Sayi*, etc., while they attract naturally numbers of our larger Pimplidæ, such as *Thalessa*, *Xorides*, *Ephialtes* and *Xylonomus*. Upon these trees during their season could generally be found many specimens of *Thalessa*, but I had never seen one emerge from its prison into the warmth and light of its adult existence. Upon a tree which for years had been much bored by *Tremex*, etc., I, upon the above date, saw several specimens of *T. atrata* and *T. lunator* ovipositing, and at some distance below them a group of males in an evident state of excitement. Three of these had their abdomens inserted more than half way under a flake of bark. Here, I congratulated myself, was an opportunity to ascertain whether a female was about to emerge. With my knife I pried off the piece of bark, and beheld the head of an

insect just appearing through the wood. The males had flown away when disturbed, and I was afraid that they might not return before the female emerged, but two came swiftly back and commenced to pay her attentions before much more than her head was visible. As soon as she was out of the burrow she was embraced by one, and copulation apparently followed, but did not last long, as she began to crawl up the trunk, and when I interfered to prevent her getting out of sight, the male flew away. However another was ready to take his place, and the pair were almost instantly *in coitu*. A few seconds later the female attempted to fly, and fell to the ground; the male disengaged himself and flew away, and his partner then did the same, starting with a strong and rapid flight.

Visiting another tree not many paces distant, I saw a group of more than a dozen males of *lunator* in very evident anxiety and excitement, their long antennae quivering, and their whole demeanor evidencing some powerful emotion. I peeled off a piece of bark at the centre of attraction, but found no sign of any insect coming forth. An hour or so later, when returning from my ramble, the group was even larger, and several were probing a crevice within an inch of the space from which I had stripped the bark. Thinking that the female might be here, I cut off another piece of bark, but could find no signs of her, although the males were so excited as even to settle on my hands.

Proceeding to the tree from which I had previously seen a female emerge, I found several males clustered about three inches from where she had come out. Two had the abdomen flexed and the tip inserted in a small aperture in the bark. Stripping off this fragment of bark, I found that a female was there, and had gnawed her passage so nearly through the bark as to have pierced the surface. The males fluttered excitedly around, and, as in the first instance, she was embraced before she had wholly emerged, and copulation was effected as soon as she was out. Being in a hurry, and wishing to preserve the specimens, I boxed them, the other males flying around me in great excitement until this was achieved.

Two days later I was able to visit the same locality for the purpose of making further observations on these insects. On tree number one I saw at some distance up the trunk a small cluster of expectant males. By standing on the top of a dilapidated and shaky fence, I was just able to reach the spot and with my knife remove the covering of bark. As my position was too precarious for comfortable observation, I secured the

female as she emerged and carried her to another tree upon which were some males. As soon as she commenced to crawl up the trunk, she was eagerly followed and embraced by one of the more active males. Copulation took place with four different males—the female falling to the ground on each occasion, and being again seized as she crawled up—the last union continuing $2\frac{1}{2}$ minutes, after which she flew away unattended.

On proceeding to tree number two, I found a very large and strongly excited cluster of the males in the immediate vicinity of the spot from which I had cut the bark on the former day. They were about twenty in number, and were packed so closely together that those in the centre could scarcely be seen. Like the inmates of a burning theatre, they trampled over one another in their excitement. Displacing them with some difficulty, I hewed off a slice of bark and revealed the female cutting her way to a new life, her head being partially visible. Her ardent admirers immediately swarmed around and endeavored to get their abdomens down the burrow, an undertaking in which they impeded one another so greatly that the only result was wedging the female in and preventing her from emerging. The cluster was soon so dense that she was entirely hidden, and as there seemed no prospect of her getting out for some time under the circumstances, I began to drive off, or rather to forcibly remove one by one, her besiegers. After nearly all were removed, I saw that one of the few remaining had his abdomen inserted its full length in the burrow. As the female was still unable to emerge, I drove off the remaining males, and as soon as the way was clear she came rapidly out. There was instantly fierce rivalry for her favors, but eventually one stronger, or more agile, than his fellows, succeeded in his desires, the pair remaining about $1\frac{1}{2}$ minutes *in coitu*, after which the female ceased apparently to have further attractions.

The foregoing notes (written upon the second date of observation) show that the males are able to determine where a female is making her way outward—some time, perhaps, as in the last case recorded, many hours before she appears. Whether this is ascertained by the sense of hearing or smell, or a combination of both, I do not attempt to say, but the antennæ are evidently largely used in locating her, as may be readily seen by the way in which the bark is examined with them. When there is a crevice or aperture, the male bends his abdomen—at the suture between first and second segments—until it is at right angles to the thorax, and endeavors to insert it in the said crevice or aperture. He has

then the attitude of a female insect ovipositing. As has been mentioned, if the hole is large enough the abdomen will be fully inserted, and it is perhaps possible that copulation may take place while the female is yet in the burrow. On emergence she is instantly seized, the legs of the male clasping the yet unfolded wings with the abdomen, and thus preventing her from flying. From the large number of males always about at this season, it is probable that the female seldom, if ever, emerges unattended. After the very brief honeymoon, she is no longer an attraction to the opposite sex, and is able to proceed unmolested with her work of depositing the germs of a future generation. I may add that of the pair confined by me the male died the same or following day, while the female was strong and vigorous until she unadvisedly entered a cyanide bottle.

STRAY NOTES ON MYRMELEONIDÆ, PART 3.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

(Continued from page 156.)

The following species are very interesting, as they possess no spurs at the end of the tibiæ. From N. America are four species, two not yet described. All agree in the following characters: They are very slender, more or less hairy or villous; head small, narrow; antennæ long, as long as head and thorax, or at least prothorax, stout, cylindrical, becoming gradually thicker but not clavate; labial palpi a little longer than the maxillary ones; last joint very little thickened to the middle, where a superior depression makes the apical half about cylindrical; legs short, not very thick, with numerous spines and bristles, but no spurs; first joint of tarsi longer than the following, but shorter than the apical one; abdomen of male considerably longer, of female shorter than the wings; appendages of male short approximate, cylindrical with strong hairs and spines, enlarged at the base to reach the dorsum of abdomen; between them below a very small triangular plate; female with two short flat appendages inferiorly; upper part rounded, split in the middle; wings elongate, narrow, enlarged to the bluntly pointed tip; post-costa oblique; venation dense, and sprinkled more or less with brown; costal space of front wings with two series of areoles (one species) or with one series, but the transversals in the apical half (or less) forked; at the extreme

base of the hind wings of the male is a small white free knob, homologous to the larger and darker knob of *Palpares* and *Acanthaclisis*. The larva of one species is known; it differs from all others and was described by me as perhaps belonging to *Acanthaclisis congener*.

Mr. McLachlan has described the female of a species from Turkestan as a new genus, *Maracanda amoena*, which has the same characters as the N. American species, with one series of areoles in the costal space of the front wings. The only exception is that the apical joint of the labial palpi are said to be very much dilated, what is not to be found in the N. American species. I do not know *M. amoena*, but I should think that its difference from *M. imbecillus* Stein., from Greece, should be proved. *M. conspurcatus* Kolenati, from the same locality with *M. amoena*, can not belong to *Crecagris plumbeus*, where it is quoted by Brauer and McLachlan, as its size is by far too small and only very little larger than *amoena*. I can not compare the two Australian species, said to have no spurs.

I possess a couple of *M. imbecillus* Stein (Berl. Ent. Zeit., vii., p. 421) from Montenegro, Europe, which agrees entirely with *M. amoena*, and can not be identified with any other described species. The legs have no spurs,* contrary to Stein's description, but bristles, yellowish-brown, straight, half shorter than the basal joint. After this rather long preamble, I come to the question if perhaps some Myrmeleon, just as among Phryganids some Limnophilids have spurs which can be wanting or aborted, at least on the fore legs.

There are a number of N. American Myrmeleon, *M. longicaudus*, *M. ferus*, *M. nebulosus* and others, which nobody would separate from *M. conspersus*, except by the presence of spurs. Some have two series of areoles in the costal space, and some only one series, as in *Maracanda*. Nevertheless none of the seventeen *M. conspersa* before me has a spur, and none of the six *M. longicaudus* and the six *M. contaminatus* lacks spurs. Therefore I have the species without spurs described as belonging to *Maracanda*, and propose provisionally for the other a new genus, *Brachynemurus*.

Maracanda, McLachlan.

This new genus is described in A. Fedtschenko's Voyage in Turkestan, vol. ii., 5, Moscow, 1875. The largest part is in the Russian language. As the N. American species without spurs at the tips of the tibiae must

* Mr. H. J. Kolbe, Assistant of the Berlin Museum, has kindly compared Stein's type and confirms my statement.

be compared with this genus, and as only one Entomologist in the U. S. reads Russian, I give here a translation (by Prof. J. D. Whitney, in Cambridge, Mass.).

Maracanda, nov. gen.

Tibiae haud calcaratae. Antennae breves, robustae, clava elongata. Palpi breves, labiales articulo ultimo valde dilatato. Pedes breviusculi, tarsorum articulo primo multo longiori quam secundus, sed breviori quam ultimus. Abdomen alis brevius. Alae elongatae, angustatae, post-costa obliqua; alae posticae anticis paulo breviores; femina.

This genus, by the want of the spurs on the tibiae, is related to *Gymnocnemia*. The short, thick antennae, the construction of the palpi, however, make it impossible to put the species described below in the same genus with *G. variegata*, the typical species of the genus *Gymnocnemia*.

Remark—*Myrmelcon occultus* Walk. and *M. malus* Walk., from Australia, also do not have spurs on the tibiae (in the description of these species, however, this peculiarity is not mentioned). It is very probable that both these species ought to be included in the genus *Maracanda*.

1. *Maracanda amocna*, McLachl., n. sp., p. 2, pl. i., fig. 1.

Pallide flava. Antennae brunneae, vix pallido-cinctae. Caput thoraxque lineis tribus longitudinalibus fusco-nigris supra signata. Abdomen nigrum vel fuscum, utrinque et infra flavo-lineatum. Pedes flavi, femoribus extra nigris, tibiis in medio et ad apicem nigris, articulisque tarsorum ad apices nigris. Alae albido-hyalinae, punctis plurimis (praecipue apicem versus) nigris conspersae, venis venulisque albidis, nigrostriatis, pterostigmate nigro-signato, femina.

Long. corp. circ. 15 m.m.; exp. alar. 34 to 40 m.m.

Habitat in deserto Kisil-kum; five specimens were collected May 12, 1871, in the region of sand-hills about 10 versts west of Djusebai Springs.

Antennae longer than the head and the front part of the thorax, gradually passing into a thick elongated clavate form, cinnamon colored with the exception of the basal joint; the cinnamon color of the remainder of the joints passes with a whitish color on the articulations; the body is bright yellow. The head has above three small elongated dusty lines, which unite with each other in front; on the side from the end of these dark spots there extends a single dusty transversal line; a single knotted line of the same color is seen on each of the antennae; finally a single elongated dusky line extends along the front of the head. The labrum is

not long, but rounded on the front margin ; the labial palpi are somewhat longer than the maxillary, with the terminal joint much broadened, pointed, outside with a dark, large shining spot. The prothorax has parallel margins, and above three long black or dusty lines, equally distant from each other. On the meso- and metathorax these lines are separated with distinct spots, among which appear a few small black lines and spots ; upon the side of the thorax two dark lines are seen on each side. Legs short and not very thick, bright yellow, covered with shining hairs ; on the outer side of each femur a dusty or reddish line ; each tibia is surrounded in the middle with a dark ring, frequently wanting in the posterior tibiæ. The abdomen is almost entirely black or dusty, with broad yellow rings on the sides and lower surface ; at the extremity of the abdomen are found two broad triangular plates, rounded off towards the end, approximate, surrounded internally with black bristles and covered externally with black hairs ; under these plates are placed two auxiliary palpi, one under each plate, the lower half of the following abdominal segment deeply cleft in the middle, and with a lengthened fringe joins a long cylindrical growth. The wings are long and narrow, the posteriors somewhat narrower and shorter than the anterior pair, whitish transparent, sprinkled with a great number of delicate black spots, particularly thickly grouped along the radius and the inner margin of the wings, and form an almost unbroken line along the outer series of gradate veinlets. The venation is very open (few transversal veins) ; the veins are pale whitish or whitish yellow, over the greatest part on the minute black spots ; the posterior wings have dark lines and spots in a small number ; pterostigma whitish and black internally. (McLachlan.)

Of course I am unable to decide if the Russian translation of the English original is exact ; at least only in one place (genitals of female) I find some difficulty in understanding it.

2. *Maracanda conspersa*, Rbr.

M. conspersus, Rbr., 327, 3—Walk., 329, 47.

Body hairy, black, with whitish spots, very slender ; head small, face pale, above with a broad transversal blackish band, in which the antennæ are inserted ; this band is excised below in middle ; before the labrum on each side a brownish spot ; vertex cut straight in front, very little notched in middle, black, with a faint yellow lateral dot ; before the vertex a transversal pale band ; antennæ long, 7 m.m., strong, cylindrical, a little thicker

to the tip, which is bluntly pointed but not clavate; black, very faintly annulated with pale on a few basal segments; maxillary palpi short, brown, or blackish brown, base of cylindrical joints pale, last joint very little incurved, cut at tip, as long as 3rd and 4th together, 3rd a little longer than 4th, thicker on tip.

Labial palpi a little longer, basal joint pale; second longer, enlarged to tip, a little incurved; last joint longer, thicker to middle, above depressed, cylindrical, tip blunt; both joints blackish, pale on articulation.

Prothorax short, before the middle a transversal flat furrow, front margin slightly rounded; black with three yellow dots anteriorly and a posterior stripe on each side; with some white hairs, intermixed with black ones; mesothorax dull brownish gray, with a few scattered white hairs, two yellow dots anteriorly and four in a transversal series in the middle; the conical suture ending in the posterior margin pale yellow with a middle dagger-shaped black line, and on each side a shorter black line; in front of it two globular black shining elevations, which are approximate and like two ocelli; metathorax similar with some yellow spots.

Abdomen (male) longer than the wings, very slender, about cylindrical, blackish hirsute; brown, shining, darker below and at the apex; segments 2 to 4 with two pale dorsal longitudinal lines, which are sometimes partly confluent; the two following segments with two pale spots in middle; appendages brown, clothed densely with black hairs, straight, the base triangularly dilated to reach the dorsum of the segment; shorter than the last segment. Abdomen (female) much shorter than the wings, less slender, apical half thicker; color similar, but the long pale dorsal lines represented only by two middle and two apical spots; genital parts in the last segment with many strong black spines; upper part divided in two pale tubercles; below with two short brown appendages.

Legs short, pale, with white hairs, intermixed with a few black ones, principally at tip, densely sprinkled with black, the femurs sometimes nearly blackish; tip of tibia black; tarsi with apex of the two basal joints, the two following entirely, and tip of fifth, black; claws long, incurved, brown; spurs wanting.

Wings short, broadest before the bluntly-pointed apex; hyaline with white shades, a little fumose, the anteriors closely sprinkled with fuscous; venation dense, veins fuscous interrupted with white; around the transversals after the mediana and after the 4th vein, brown shades, sometimes forming brown streaks on the disk and near the hind margin; two series

of areoles in the costal space except near the base; hind wings less spotted.

Length of body, male, 32 to 44 m.m.; female, 21 to 27 m.m. Exp. al. 42 to 60 m.m.

Habitat.—I have before me 8 males and 9 females. From Canada; Upper Wisconsin River, Kennicott; from Hamilton, Ontario, Moffat; Michigan, a couple in alcohol, Capt. Meade; Ludington, Mich., Pierce; Port Huron, Mich., Hubbard; from New Jersey, Uhler; from S. Carolina, Zimmerman, the type of *M. Talpinus* Klug.; from Savannah, Ga., the type of *M. irroratus* Burm., vol. ii., p. 995, No. 11, with the label in Burmeister's hand-writing; from Millin, Scriven Co., Ga., July, by Morrison; from Florida, Norton.

The range of the species is very large; the largest specimens are from Canada and Michigan, the smallest from Georgia. The wings are more or less sprinkled.

The species has been raised from a larva which I had supposed to belong to *Acanthaclisis congener*, but Mr. Redtenbacher rightly doubted my determination. I have besides the described larva from Wyoming before me, one from Port Huron, Mich., and one from Crescent City, Fla., both collected by Mr. Hubbard. I can not find any difference between them and a larva from Ludington, Mich., by Mr. Pierce, who intends to describe the full history of the species raised by himself.

When I was still in Europe, I had determined "with some doubt" this species as the *M. abdominalis* Say. The large material now at hand has shown me years ago that Say's species is a different one. As there exist before Burmeister two different *M. irroratus*, Rambur's name has the priority; his type is a female. The *M. irroratum* Oliv., Encycl., viii., p. 126, No. 30 (copied by Walk., p. 408, No. 207), from Italy and Greek Archipel., is probably *M. imbecillus* Stein. The *M. irroratus* Klug., Symb., pl. 35, f. 6, from Arabia Felix, has visible spurs. The type is in the Berlin Mus.; I can not determine the species, but believe it is not a *Creagrís*. After Mr. Taschenberg, there can be no doubt that the type of Burmeister of his *M. irroratus* in the Halle Museum, is different from his type in Winthem's Coll. The type in the Halle Museum is *M. longicaudus* Burmeister, after his type in Winthem's Coll. *M. contaminatus* Burm. is the female of *irroratus* type (in Winthem's Coll.); Mr. Taschenberg's description is conclusive. *M. nebulosum* Oliv., Enc. Meth., viii., 127, 35, from New York, is *M. conspersus* Rbr.; the description of

the color of abdomen excludes the other related species. *Myrm. contaminatus* was mentioned in a note to *M. irroratus* Burm., ii, 995, 11. The probable type was described in Giebel Zeits., vol. 52, 214, 30.

3. *Macaranda signata* Hag.

Body hairy, yellow, striped with brown; not very slender. Head small, face yellow, eyes margined with bright yellow, which is followed inside by a black line in the groove and another median one; antennæ brown with a bright yellow ring, followed on the face by a brown triangular spot; vertex elevated; its front margin notched in middle and on each side; above dark brown, sides and occiput largely yellow, also two transverse interrupted bands; a pale transversal band before the vertex, separated from the antennæ by a narrow brown one; maxillary and labial palpi as in *M. conspersus*, yellow, apical joint light brown; prothorax yellow, above with a broad brown band with a fine yellow median line and a yellow stripe on each side; sides whitish-villous; thorax yellowish with brown stripes, the pattern similar to *M. conspersa*. Abdomen of male about as long as the wings, less slender. whitish-villous, yellow, very finely sprinkled with blackish dots; sides and apex blackish-brown; a fine black median line on 3rd and 4th segments; appendages as in *M. conspersa*; abdomen of female much shorter than the wings, black, the apical half with some ill-defined yellow marks on the sides and tip of segments; legs in shape and color as in *M. conspersa*, but joints 3 and 4 black only on tip. The genitals are light brown, similar to *conspersa*.

Wings hyaline, not sprinkled; veins brown, interrupted with yellow; pterostigma yellow, faintly darker inside; venation as in *conspersa*, with the important exception that the costal space of front wings has only one series of areoles; the transversals in the apical half of the wing are forked.

Length of body, male, 27 m.m.; female, 21 m.m. Exp. al., 46 m.m.

Hab.—A female, fully developed, from White Fish Point, Lake Superior, by Mr. Hubbard, but the yellow color of the body is more slate color. Ludington, Mich., Mr. Pierce. The couple before me, in bad condition, were sent in 1881; later, when Mr. Pierce worked here, these specimens were mislaid and only turned up now. I am certain that this species was not among the specimens brought over with him. The male apparently has been transformed only a short time ago, therefore it can be presumed that its abdomen has not attained its full length.

4. *Maracanda Henshawi* Hag.

Body very slender, hairy, striped with yellow. Head very small; face yellow, black near antennæ; two small black dots on each side and one in middle; antennæ longer than head and prothorax, stout, cylindrical, tip narrowed; black, the basal joint and the articulations yellow; maxillary palpi pale with a brownish tinge, apical joint brownish; labial palpi white, apical joint after basal third dark brown; vertex elevated, black anteriorly, with a thin silvery felt; above yellow with two transversal black lines and some spots near occiput; prothorax black, a fine yellow median line and a yellow dot each side of the line near the front margin; sides largely yellow, with a blackish stripe; mesothorax black, anteriorly with two narrow lines, followed by a median one and two faint lines on each side, all yellow; metathorax black with a yellow cross of spots and lines; sides of thorax black, with two yellow lines; abdomen very slender, black, segments 2 to 6 with a dorsal yellow band, split by a faint black median line; appendages short, straight, cylindrical, brown, with a brush of black hairs; base going upward to dorsum; below between them a small black triangular plate, with yellow tip; legs short, thin, pale, femur externally black; tibiæ with white hairs, and some black bristles around tip; four anterior tibiæ sprinkled with black externally; tip of all, and tip of joints of tarsi black, more on last joint; no spurs; claws incurved, reddish-brown. Wings hyaline, narrow; costal space with one series of areoles and the transversals in the apical fourth of wing forked; veins brown interrupted with yellow; pterostigma small, yellow, with a blackish spot internally; wings very little sprinkled; along the anterior longitudinal veins the transversals shaded with brown; front wings with an oblique dark stripe parallel to the hind margin of the apex; hind wings less sprinkled along the anterior longitudinal veins.

Length of body 30 m.m.; exp. al., 40 m.m.

Habit.—Umatilla, Oregon; one male, June 24, 1882, collected by Mr. S. Henshaw.

This species is directly separated from the two foregoing by its small size, and by anterior face of the vertex being black.

5. *Maracanda? pygmaea* Hag.

Myrmelcon pygmaeus Hag., Syn. N. Am. Neur., p. 231, No. 13.

The type collected in Mexico by Mr. Deppe is in the Berlin Museum. Not knowing anything more about this smallest described species than

what is given in the Synopsis, I have not re-copied my description. The species arrived just in the last moment, when my manuscript was to be sent to Washington, therefore I have not given more details. The characters quoted—antennæ short, club large, almost orbicular; wings short the apex very much dilated; the venation peculiar, simple—make it doubtful if *M. ? pygmaea* belongs to this genus.

FURTHER INJURY TO LIVING PLANTS BY WHITE ANTS.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

More than twenty-five years since (Proc. Boston Soc. Nat. Hist., v. 7, p. 287-288) I published an account of serious injury to living grape-vines in hot-houses in Salem, Mass., by our common species of white ants. *Termes flavipes*. No further notice of their injury to living vegetation appears to have been taken until a few years ago, when Prof. J. H. Comstock, then government entomologist, stated (Rep. Comm. Agric., 1879, 207-8) that they had been found in Texas and Florida "girdling the bark of orange trees and guava bushes near the surface of the ground, or eating out the interior of sugar-cane and other plants." "When white ants infest living plants," the report goes on to state, "they attack that part which is at or just below the surface of the ground. In the case of pampas grass, the base of the stalk is hollowed; with woody plants, as orange trees and guava bushes, the bark of the base of the trunk is eaten, and frequently the tree is completely girdled; with sugar-cane the most serious injury is the destruction of the seed cane."

Still more recently, Dr. H. A. Hagen published in the CANADIAN ENTOMOLOGIST (v. 17, p. 134-136) another instance here in Cambridge where living maple trees were largely infested by them, though the ants appeared to have done little damage, the trees being "apparently in good condition," but one of them being felled it was found that for a couple of feet above the ground, to the depth of an inch from the surface, the trunk was extensively burrowed by the white ants.

In this same article, after referring to the injury reported from Salem, Dr. Hagen adds: "The earth in the hot-houses here in Cambridge is largely infested by white ants, but as far as I know, no destruction of

plants has been observed." This is no longer true, for in the autumn of 1886 I was asked to look at the green-house connected with Mt. Auburn Cemetery, to see if anything could be done to prevent the loss of geranium cuttings by an insect, which turned out to be the same culprit. The bed in which the cuttings were set was a long shallow wooden box or tray placed against the northern wall of the green-house; the tray was filled with moistened sand and kept constantly warm by being directly over a chamber heated by hot-water pipes. The ants thus found the precise condition which they prefer, warm moisture, and the wooden sides of the tray showed everywhere the characteristic gauges of the insect. The geranium cuttings were plunged near together in the sand, and the ants entering at the cut end had eaten out everything but the rind, and by the time they had penetrated the cutting above the level of the sand, the drooping leaves gave sign of the injury to the plant. Some, the leaves of which had begun to turn black, were found to have been eaten to the very bases of the terminal leaves, and a good deal of injury had been done, hundreds of cuttings having been destroyed; the trouble had been going on, I was told, for a year. As a light porous soil is required for the culture of the cuttings, and a receptacle allowing the passage of the water with a certain freedom, I recommended that the bottom of the tray be made of slate or tiles of the material from which flower pots are made, and the sides of zinc or other metal, high enough to come several inches above the sand.

ON COLIAS ERIPHYLE EDW., AND C. HAGENII EDW.

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

In my last paper I showed that *C. Hagenii* was a yellow form of *C. Eurytheme* Bois., and I am now prepared to say that *Hagenii* is identical with *Eriphyle*, and the name gives way to this. I described *Eriphyle*, Tr. Am. Ent. Soc., v., 202, 1876, from about thirty individuals of both sexes, taken in British Columbia, at Lake Lahache, by the late G. R. Crotch; and related that they were submitted to Mr. Henry Edwards, who pronounced them distinct from any of the Pacific coast species, an opinion with which I agreed. I said they came nearest *Philodice*, and pointed out the differences, which seemed to be decisive against their being of that

species; and concluded thus: "Mr. Mead brought from Colorado, in 1871, a *Colias* very close to this from Lake Lahache, and which in Reakirt's paper on the Butterflies of Colorado (Pr. Ent. Soc. Phil., 1867, p. 14) is doubtless the one called *Philodice*. The same form was brought from Montana, by Dr. E. Coues, when engaged in the Boundary Line Commission. For the present I shall give no opinion as to these, but they seem to me nearer *Eriphyle* than to *Philodice*." In this last expression I was right. The under sides of the *Eriphyle* were quite free from markings, sometimes completely so, except the discal spots, but some examples showed more or less of the sub-marginal spots and the other patches which are found in both *Philodice* and *Eurytheme*. Now on comparing the 12 examples of *Eriphyle* still remaining in my collection with examples of *Hagenii*, there is no doubt of the identity of the two. I can match every *Eriphyle* by a *Hagenii* in either sex. The name *Hagenii* therefore is sunk, and this form will be known in future as *Colias EURYTHEME*, tetramorphic form ERIPHYLE (pronounced E-riph'y-le).

The following letter, referring to above, is of importance as showing that twice Mr. Edwards came to the same conclusion independently concerning this species.—EDITOR, per J. F.

Coalburgh, W. Va., 24th Oct., 1887.

The Editor Canadian Entomologist:

MY DEAR SIR.—To-day, in clearing some loaded shelves, I came on a bundle of Dr. Coues' Reports "On the Collections of Insects made by Dr. Elliott Coues, U. S. A., in Dakotah and Montana, during 1873 and 1874"—Washington, 1878; of which I supplied the paper on Lepidoptera. And to my surprise, for I had quite forgotten particulars of the paper, not having lookèd at it for years, I find that I therein named the Colorado *Colias*, afterwards called *Hagenii*, as ERIPHYLE. The paper was written several years before it was printed, so that this description of *Eriphyle* really preceded the one printed 1876, Tr. A. E. Soc., and is headed *Colias Eriphyle* Edw., new species. After describing it I added these lines:

"I first received examples of this species from Mr. T. L. Mead, who took them in Colorado, in 1871, and was disposed to regard them as a variety of *Philodice*. Subsequently I received about 50 specimens, taken by the late G. R. Crotch, in British Columbia, and later, 1874, several specimens, which were taken by Mr. Pywell on the line of the Northern

Pacific Railroad west of Bismarck. This material enables me to judge with confidence of the distinctness of this species. It is not, in my opinion, a variety of *Philodice*, nor is it *Occidentalis*, Scudder, to which it bears some resemblance."

This paper is not referred to in my Catalogue of 1874.

NOTE ON SOUTHERN MOTHS FOUND IN THE NORTH.

BY A. R. GROTE, A. M.

Not unfrequently do I read of the capture of Southern *Noctuidæ* found in Canada and the Northern United States, with the added remark that the specimen was so fresh that it must have just escaped from chrysalis. These remarks are made while I am always (for ten or fifteen years past) saying that these are wind visitors, immigrants. So lately of *Erebus odora*. Now were this moth really found here as a larva, its large Cataline caterpillar must have been found. It is improbable that the food plant of *odora* grows in the North. The scales are strongly adherent in all these *Noctuidæ fasciata*; the "fresh" moth has flown a thousand miles, more or less, according to my theory, which I seem to support alone, and of which then nobody can rob me. In fact I would rather be wrong, because then my ideas are not appropriated. Hübner has a weakness for considering the *Noctuidæ fasciata*, Geometers; so *Ptichodis bistrigata* (CAN. ENT., 12, 87), *Eulepidotis alabastraria* (not known to me), *Crochiphora flavistriaria* (CAN. ENT., 12, 118) and others. Knowing *Brotis vulneraria* only from figures, I think it is a Noctuid and a wanderer from the South. *Erebus odora* may breed in Florida, in Texas, New Mexico, So. Colorado, but not with us. This is my theory of immigration from the South; no other writer agrees to it or advocates it. Right or wrong, it is my own. The great question with these species is the limit of successful hibernation, continuous residence, breeding. The Northern food plant must be produced by my opponents.

CHANGE OF ADDRESS.—Miss Eleanor A. Ormerod, from Dunster Lodge, Spring Grove, Isleworth, to Torrington House, Holywell Hill, St. Albans, England.

Mailed November 1st.