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*American Entomological Society, Philadelphia*

S. F. BAIRD.

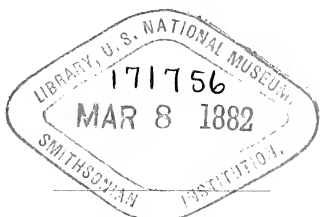
PROCEEDINGS

OF THE

# ENTOMOLOGICAL SOCIETY

OF

PHILADELPHIA.



VOL. II.

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## LIST OF PAPERS.

---

	Page
<b>BASSETT, H. F.</b>	
Descriptions of several supposed new species of Cynips, with remarks on the formation of certain Galls . . . . .	323
<b>BLAKE, C. A.</b>	
Description of a supposed new genus and species of Saturniidae from the Rocky Mountains . . . . .	279
<b>BLAND, JAMES H. B.</b>	
Descriptions of a few supposed new species of North American Coleoptera . . . . .	319
<b>CLEMENS, BRACKENRIDGE, M. D.</b>	
American Micro-Lepidoptera . . . . .	119, 4
North American Micro-Lepidoptera . . . . .	415
<b>CRESSON, E. T. /</b>	
Description of a new species of Masaris from the Rocky Mountains . . . . .	69
List of the North American species of Bombus and Apathus	83
On the North American species of the genus Nomada . . . . .	280
On the North American species of several genera of Apidae	373
<b>EDWARDS, WM. H.</b>	
Description of certain species of Diurnal Lepidoptera, found within the limits of the U. States and British America	501, 78, 14
Description of certain species of Catocala, found within the United States . . . . .	508
<b>GROTE, AUG. R.</b>	
Additions to the Catalogue of U. States Lepidoptera	273, 64, 30
A revision of the species of Cymatophorina, found in the United States and British America, with descriptions of new species . . . . .	54
Descriptions of North American Lepidoptera . . . . .	433, 334
Description of a new species of North American Gortyna	431
Description of a new species of North American Papilio	441

	Page
HAGEN, H., M. D.	
Observations on certain N. A. Neuroptera, by H. Hagen. M. D., of Königsberg, Prussia; translated from the original French MS., and published by permission of the author, with notes and descriptions of about twenty new N. A. species of Pseudo-neuroptera, by Benj. D. Walsh, M. A. . . . .	167
OSTEN SACKEN, BARON R.	
Contributions to the Natural History of the Cynipidæ of the United States and their galls . . . . .	33
REAKIRT, TRYON.	
Notes on Central American Lepidoptera, with descriptions of new species . . . . .	345, 135
Contributions towards a Monograph of the genus <i>Crocota</i> . . . . .	371
SAUNDERS, WILLIAM.	
On some hitherto undescribed Lepidopterous larvæ . . . . .	28
Descriptions of two new species of Arctiidæ . . . . .	59
STAINTON, H. T.	
Observations on American Tineina . . . . .	130
UHLER, P. R.	
Hemipterological Contributions . . . . .	361, 155
Orthopterological Contributions . . . . .	543
WALSH, BENJ. D., M. A.	
On Dimorphism in the Hymenopterous genus <i>Cynips</i> ; with an Appendix, containing hints for a new Classification of Cynipidæ, including descriptions of several new species, inhabiting the Oak-galls of Illinois . . . . .	443
See Dr. Hagen's paper . . . . .	167
WEIDEMEYER, J. WM.	
Catalogue of North American Butterflies . . . . .	513, 143

PROCEEDINGS  
OF THE  
ENTOMOLOGICAL SOCIETY  
OF PHILADELPHIA.

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VOL. 2.      MARCH, APRIL AND MAY, 1863.      No. 1.

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STATED MEETING, MARCH 9.

President BLAND in the Chair.

Fourteen members present.

REPORTS OF COMMITTEES.

The Committees on the papers of Dr. Clemens and Mr. Edwards, read February 9th, reported in favor of their publication in the Proceedings of the Society.

DONATIONS TO CABINET.

40 COLEOPTERA (*Chalcophora angulicollis*, *Ancylochira rusticorum*, *A. lauta*, *Melanophila Drummondi*, *Melanactes densus*, *Necrophorus guttula*, *Eulabis pubescens*, *Amphidora littoralis*, *Coniontis puncticollis*, *Eleodes cordata*), from S. S. Rathvon, Lancaster, Pa.

19 DIPTERA (*Psilopus siphon*, *P. patibulatis*, *P. scobinator*, *Dolichopus cuprinus*, *D. bifractus*, *Pelastoneurus vagans*, *Gymnopternus obscurus*, *G. despiciatus*, *G. exilis*), from Dr. T. B. Wilson.

15 DIPTERA (*Psilopus filipes*, *Pelastoneurus lackus*, *Gymnopternus*

*lebilis*, *Argyra albicans*, *Diaphorus spectabilis*, *Medeterus nigripes*, *M. veles*, *Saucropus superbiens*), from E. T. Cresson.

10 COLEOPTERA (*Odontocheila mexicana*, *Tetracha geniculata*, *Cicindela roseiventris*, *Calosoma striolatum*, *Semiotus cuspidatus*, *Copris prociua*, *C. cuprinus*, *Eurystemus ciliatus*, *Callichroma melancholica*, all from Mexico, and *Necrophorus pustulatus* from Pennsylvania), from Aug. R. Grote, New York.

10 LEPIDOPTERA (*Argynnis Atlantis* ♂ ♀, *Melitæa Mylitta*, *Vanessa Atalanta*, *V. Progne*, *Grapta Faunus*), from Wm. H. Edwards, Newburgh, New York.

9 COLEOPTERA (*Tylonotus bimaculatus*, *Saperda obliqua*, *Goes debilis*), from William Wenzel.

2 DIPTERA (*Scellus exustus*), from I. A. Pool, Chicago, Ill.

1 DIPTERA (*Tachytrechus vorax*), from William Evett.

The following LEPIDOPTERA, from the Committee on Collecting Fund, were kindly determined for the Society by Mr. Aug. R. Grote of New York:—*Lachmæus tessela* Packard (Type), *Notodonta cucullifera* H.S., *Notodonta badia* Pack., *Notodonta concinna* A.&S., *Notodonta unicornis* Walk. (The genera of these three latter species will have to be revised.), *Crocota opella* Grote (Type), *Dryopteris rosea* Walk., *Lacinia expultric* Grote (Type), *Nephelodes violans* Gn., *N. rubeolans* Gn., *N. minians* Gn., *Apatela americana* Harris, and *Acidalia persimilata* Grote (Type).

#### DONATIONS TO LIBRARY.

*Materials for a Monograph of the North American Orthoptera*, by Samuel H. Scudder. From the Author.

*List of Orthoptera collected on a trip from Assiniboia to Cumberland*, by Samuel H. Scudder. From the Author.

*Description of some species of Nocturnal Lepidoptera found in Canada*, by Rev. C. J. S. Bethune, M.A. From the Author.

*Prairie Farmer* (Chicago, Ill.), Nos. 7 to 10 of Vol. 11. From the Editors.

The following works were deposited by Dr. T. B. Wilson:—

*Magasin de Zoologie*, par M. F. E. Guérin-Ménéville. 1831--1845. 15 Vols. 8vo.

*Revue Zoologique*, par la Société Cuvierienne; publiée sous la direction de M. F. E. Guérin-Ménéville. 1838—1848. 11 Vols. 8vo.

*Revue et Magasin de Zoologie, par M. F. E. Guérin-Ménéville.*  
1850—1861. 13 Vols. 8vo.

*Proceedings of the Zoological Society of London. Part 1, for January to April, 1862.* 8vo.

#### WRITTEN COMMUNICATIONS.

Letters were read from Messrs. Homer F. Bassett, dated Waterbury, Conn., Feb. 16, 1863, and Samuel Auxer, dated Lancaster, Pa., March 3, 1863, acknowledging their election to Corresponding Membership in the Society.

The following papers were presented for publication in the Proceedings:—

“On some hitherto undescribed Lepidopterous Larvæ, by William Saunders, London, Canada West.”

“Additions to the Catalogue of United States Lepidoptera, No. 3, by Aug. R. Grote.”

“Contributions to the Natural History of the Cynipidæ of the United States and of their galls. Article 3rd, by Baron R. Osten Sacken.”

And were referred to Committees.

#### ELECTIONS.

The following gentlemen were elected *Corresponding Members* of the Society:—

Prof. Jared P. Kirtland, Jr., of East Rockport, Ohio.

J. P. Wild, of Egg Harbor, New Jersey.

Aaron B. Belknap, of New York.

Robert Bancker Talbot, of New York.

R. W. DeForest, of New York.

Joseph Bridgham, Jr., of New York.

## AMERICAN MICRO-LEPIDOPTERA.

BY BRACKENRIDGE CLEMENS, M. D.

## TINEINA.

**STROBISIA** Clemens.

Proc. Acad. Nat. Sci. May 1860, p. 164.

**S. levipedella.**—Fore wings dark brownish, with a cupreous hue. The apical half of the wing is darker than the basal half. About the middle of the costa is a short, oblique white streak and another of the same hue midway between it and the tip of the wing, perpendicular to the costa and of nearly triangular form. Beneath the first costal streak are two short, longitudinal dashes, one on each side of the fold of the wing, and two others of the same hue, parallel, and beneath the second costal streak. Cilia with a violet iridescence. Hind wings dark brownish.

Antennæ dark brownish. Head whitish beneath. Labial palpi white, third joint dark brownish exteriorly. Feet annulated with white.

When it alights after a flight, *it walks in a wavy line and turns round several times in a circle.*

I have a single specimen, taken on wing the 1st of June.

**PARECTOPA** Clemens.

Proc. Acad. Nat. Sci. June 1860, p. 209.

**P. Robiniella.**—Fore wings fine brown, somewhat golden, shaded with dark brown. Along the costa are *three oblique silvery streaks*, the one nearest the base of the wing, short, and the others extended to the middle of the wing, each shaded along their margins with dark brown. On the inner margin are three silvery dorsal spots, placed opposite the spaces between the costal streaks. Near the tip of the wing *is a transverse, narrow, curved silvery line*, passing from the costa to the inner angle. At the base of the cilia are two black converging lines, which do not meet opposite the apex of the wing. Cilia silvery white, tipped with dark fuscous. Hind wings dark brown, cilia the same.

Antennæ dark brown, very slightly annulated with whitish and the extreme tip silvery-white. Head dark brown, tuft and face silvery-white. Labial palpi dark fuscous, the third joint silvery-white. Feet annulated with white.

The larva mines the leaf of the locust, making a blotch mine, on the *upper surface* of the leaf, with a number of lateral galleries running out from it, on each side. Its habits in all respects are similar to those of *P. lespedezæfoliella*. I am unable to indicate exactly the month in which it should be sought, as I have mislaid the notes made on this species; but I think it can be found in the latter part of spring. I have always found the mines untenanted at the time the leaf is mined by *Lithocolletis Robiniella*.

In the Fifth Annual Report of New York State Agricultural Society, Dr. Fitch describes two locust leaf-miners. The first *Anacamptis Robiniella*, is unquestionably a *Lithocolletis*. If Dr. Fitch has been led into no error it is a new species, and the specific name must be changed. The other species, *Argyromiges Pseudacaciella*, is identical with *Lithocolletis Robiniella* Proc. Ac. Nat. Sci. Nov. 1859, p. 319, first described by myself a year or two previously in the Entomologist published in London, by W. H. Stainton. *P. Robinella* and *L. Robinella* are the only miners I have found in the leaf of the locust, although I have examined the leaves yearly for several years in succession. And I will candidly say, that I do not think there can be two species of *Lithocolletis*, that mine the leaves of the Locust, for Dr. Fitch's history of *Anacamptis Robiniella* is contradictory and at variance with the natural history of the genus. His description of larva shows, that it belongs to the second larval group (see Proc. Ac. Nat. Sci. Nov. 1859 p. 318) the mines of which are invariably *flat and situated on the upper surface of the leaf*; but according to his description the mine is on the *under surface and tent like*. The flattened *Lithocolletis* larvæ cannot make a mine similar to that of the cylindrical larvæ, in consequence of the different formation of their heads. In all probability Dr. Fitch has been led into error respecting the insect he has named *Anacamptis Robiniella*, and I am unable to recognize in his description of the imago, any of the species of *Lithocolletis* known to me.

**BRENTHIA** Clemens.

Proc. Ac. Nat. Sci. May 1860, p. 172.

*The second joint of the labial palpi almost tufted.*

**B. inflatella.**—Fore wings dull orange; in the middle of the wing dark fuscous, dusted with white. At the base of the wing are three or four small spots of a beautiful metallic green, and two others of the same hue, on the disk, between which, on the costa, is a small white spot. At the apical third of the wing is a curved metallic green band, extending from the costa to the inner angle, beginning on the costa in a small white spot. A little beyond the metallic line, towards the base of the wing, on the inner margin, is a small spot of the same metallic hue. Near the hinder margin is a subterminal dark fuscous line, which from the costa to the middle of the wing is overlaid with metallic green scales, and on the costa between the two transverse lines, is a white spot. Cilia fuscous, white in the middle of the wing. Hind wings dull fuscous, with two iridescent spots near the inner angle. Abdomen with two iridescent spots near the tip.

Antennæ fuscous, annulated with white. Head and labial palpi grey varied with fuscous. Feet dark fuscous annulated with white.

I have before me a single specimen taken on the wing in July.

**COLEOPHORA** Zeller.

Proc. Acad. Nat. Sci. Jan. 1860, p. 4.

Wings with long cilia. Hind wings very narrow, lanceolate. The subcostal vein is attenuated towards the base of the wing and near the middle of the wing divides into two branches. The median vein runs near the inner margin of the wing and divides into two short branches. The discoidal vein, often indistinct, is simple and free.

The fore wings are lanceolate, often nearly caudulate. The discoidal cell is closed, long and narrow. The subcostal vein is rather remote from the costa and throws off from the cell three branches to the exterior margin, and two to the tip of the wing from the exterior end of the cell, sometimes a furcate branch. The median vein gives off two very short branches from its extreme end to the inner margin behind the tip. The submedian has a long fork at its base.

Head above and in front smooth. No ocelli. *Antennæ sometimes thickened with scales to the middle*, generally slender, simple, basal joint elongated, frequently with a tuft of hair. Labial palpi slender, rather porrected, with a slender prolonged tuft from the second joint, the third joint pointed. Tongue scaled, about as long as the anterior coxæ or a little longer.

The larva is a case bearer, changing to a pupa *within the case*.

*Antennal stalk simple, basal joint tufted.*

**C. leucochrysellæ.**—Fore wings immaculate white, slightly tinted with yellowish at the extreme apex. Cilia yellowish-white. Hind wings dark fuscous, cilia the same. Antennæ annulated with black and white. Head and labial palpi white. Feet annulated with white and brownish.

Taken on wing in the latter part of July.

*Antennal stalk simple, basal joint not tufted.*

**C. concolorella.**—The entire insect is of a uniform, rather dark yellow-ochreous color.

Taken on wing, 13th of June. A single specimen.

I have other species belonging to this genus, but as they are not in perfect condition, I forbear to describe them.

**MARMARA** new gen.

Hind wings setiform. The subcostal vein is faint, attenuated and simple. The discal vein, free, central and two-branched. The median vein simple.

Fore wings narrowly lanceolate. The disk long, narrow and closed. The subcostal vein is well defined from the base to the first marginal



branch which appears to be a continuation of it. But from the origin of the first marginal branch, the vein is greatly attenuated and is deflected towards the middle of the wing, and subdivides into two branches opposite the point at which the first marginal branch attains the costa. The two branches into which the subcostal divides are delivered one to the costa just behind the tip and the other midway between this and the costal end of the first marginal branch. The median vein is two-branched and is well defined from the base to its branches, all of which are attenuated. The posterior branch is short, and the next is delivered to the tip of the wing and receive an oblique discal vein from the last branch of the subcostal, which closes the disk. The submedian vein is simple.

Head smooth, with oppressed scales. Ocelli—? Antennæ one-third less long than the fore wings. Labial palpi slender, ascending, not higher than the vertex; the second joint is scaly, the third smooth. Beneath the labial palpi are small, ascending maxillary palpi. Tongue naked, as long as the fore coxa and femora.

The larva is much flattened, and the segments separated by deep incisions particularly on the sides. The head is extremely thin, circular, with a peculiar appendage in front of the mandibles, similar to that found in the larva of *Lithocolletis* of the *second group*, which it likewise resembles in form. Like these it has three feet and *three abdominal prolegs* and one terminal pair, all very short. It leaves its mine at maturity to weave a white, semi-transparent cocoon within some crevice of the bark of the tree on which it feeds or upon the ground. The exterior of the cocoon is covered with little froth-like globules, which resemble minute pearls.

The imago rests with the front part of the body elevated, and I believe, the fore feet applied to the breast, like the members of the genus *Tischeria*. The antennæ are held extended at the side of the head, and have a constant trembling motion.

**M. salictella.**—Fore wings dark fuscous, with a silvery-white band at the basal third of the wing, and a slightly oblique one of the same hue, in the middle, inclined towards the inner angle. Near the tip of the wing is a dorsal and costal silvery-white spot opposite each other. Behind the dorsal spot, is a narrow, somewhat curved white streak, extending from the apical cilia to the middle of the wing. Cilia silvery-grayish at the tips. Hind wings grayish-fuscous.

Antennæ grayish-fuscous. Head silvery-white. Labial palpi silvery; the hairs of the second joint touched with fuscous. Maxillary palpi dark fuscous.

The larva mines the young branches of the yellow willow tree. I

have always found it in those that spring from the trunk. Its mine is extremely long and very narrow, being only a tract beneath the young and delicate cuticle of the branches, sufficiently wide to accommodate the body of the miner. At first it is difficult to detect the mine, but after some months it is easily traced by the elevated line of reddish-brown matter that marks the course of it. Thus it is easily found in early spring before the buds have expanded, and the larva may be sought in April and is easily reared. In the spring the larva is of a dark lemon-yellow color without markings, and at this time the larva can be seen through cuticle of the branch. About the middle of May or rather about the 10th of the month, the larva will be found banded alternately with red and yellow, with two black dorsal dashes on the *second segment*. (I regard the head as the first.) This is the indication that it has reached its maturity and in a day or two it cuts the cuticle and leaves the mine to weave its cocoon, sometimes in the angle of a bud on the branch of which it has been feeding, and sometimes on adjacent substances.

In rearing this insect, it is simply necessary to thrust the branches of the willow into wet sand contained in some convenient vessel and to protect them so that the larvæ cannot wander after leaving their mines.

The perfect insect appears after a pupation of about a month, or as in the case of one specimen specially observed in 26 days. It may be found as an imago, therefore, about the middle of June.

#### GLYPHIPTERYX, Hübner.

Wings oblong or elongate, with moderate long cilia. Hind wings rather ovate or lanceolate. The costal vein is conspicuous, free and simple. The subcostal simple, attenuated towards the base. The discal vein gives rise to two discal nervules. The median subdivides into three branches, the upper two arising from a common base.

In the anterior wings the secondary cell is distinct and the subcostal vein subdivides into four branches, the first arising behind the secondary cell and three from its hinder end, the last of which is delivered to the tip of the wing. Beneath these are three nervules thrown off from the middle of the disk. The median is 3-branched, giving off the nervules somewhat aggregated.

Head smooth. Forehead broad. Ocelli large. Antennæ slender, short, not one-half as long as the fore wings, with distinct joints. Lab-

ial palpi arched, reaching about the middle of the front, (but in the dried specimen decumbent or porrected) cylindrical, slightly hirsute; terminal joint pointed, as long as the second. Tongue naked, of moderate length.

**G. impigritella.**—Fore wings dark bronzy-brown, with a conspicuous, curved silvery-white streak, arising from the basal third of the inner margin, where it is widest and curving to the middle of the wing *and dark margined on both sides*. On the costa are five short, silvery-white streaks, the first oblique, the others nearly perpendicular, all of which are *black margined internally*, the lines which form these margins are more or less distinctly extended across the wing. That of the first and second costal streaks meet just above the end of the conspicuous dorsal streak from the inner margin. Between the costal streaks, the wing is slightly touched with golden-brown. Opposite the first and second costal streaks, is a small white spot on the inner margin, the curved black marginal line of the second costal streak touching its inner side. At the tip of the wing is a conspicuous round black spot, and beneath it, in the cilia, is a silvery gray hook, and the cilia of the extreme tip is slightly touched with a silvery hue. Hind wings and cilia of the same hue as the fore wings.

Antennæ and head dark bronzy-brown. Labial palpi whitish, with fuscous exteriorly. Feet annulated with white.

Taken on wing in July.

This insect is very like *G. equitella* of Europe. The darker color of our species, the dark margined silvery streaks and the absence of silvery-violet spots, are the chief differences. The European species burrows in the shoots of *Sedum acre* (Stone-croper Wild Orpine) and probably our species may be found in the same plant or another of the genus *Sedum*.

#### GRACILARIA Zeller.

Proc. Acad. Nat. Sci. Jan. 1860, p. 6.

Wings with long cilia. Hind wings narrowly lanceolate; the costa is concave or excised in the middle. The costal vein is short, entering the costa at the beginning of the concavity. The subcostal vein is simple and runs near the costa, and is much attenuated posteriorly. *The discal vein runs through the middle of the unclosed cell, arises at the base of the wing much attenuated, and is connected by an inosculation, minute branch with the subcostal vein about the middle of the wing, and becomes furcate at its extremity.* The median vein is placed near the inner margin and is three-branched.

Fore wings lanceolate. The discal cell is long and narrow and the subcostal vein is attenuated towards the base, and gives off a single, rather long, marginal branch, quite near the base of the wing. From

the hinder portion of the discal cell nine nervules are given off, four of which go to the costa, and five to the hinder margin. The submedian vein is simple.

*Head and face smooth.* Without ocelli. Antennæ filiform, as long as the fore wings. Labial palpi slender, ascending, cylindrical; the second joint with appressed scales, *not tufted*; the terminal joint pointed. Maxillary palpi rather long, filiform. Tongue clothed with scales.

In the small species of this genus, the maxillary palpi are less developed, and the labial palpi are almost drooping. In the dried specimen the labial palpi are almost always more or less drooping.

The species of this genus are elegant in form and often gaily colored or prettily mottled. The position of the imago at rest is extremely characteristic, but not peculiar to it. The front of the body is elevated by the fore legs being held vertically, so that the tips of the wings touch the surface on which the insect rests. The imago appears to be about to poise itself on its wing-tips, or to have raised its head into a position of profound attention. The larvæ have only fourteen feet; when young they mine the leaves, but at a later period of growth many of the species construet cones, by rolling up a portion of the leaf. They devour the inner portion of the cone, which thus becomes discolored and easily observed.

The description of the species below was made originally from a poor specimen, and I therefore take this opportunity to amend it from a perfect specimen which I mistook at first for a distinct species.

**G. venustella.**—Proc. Ac. Nat. Sci. Jan. 1860, p. 6. Fore wings dark fuscous, with four equi-distant costal streaks, the first, near the base of the wing, quite short; the second extended obliquely across, or nearly across, the wing and constricted or partially interrupted near the middle; the third likewise oblique, but narrower than the second, extended to the middle of the wing; the fourth, near the tip of the wing, slender, curved, nearly vertical to the costa and *all dark-margined internally*. The basal portion of the inner margin is white. Cilia dark fuscous, at the tip of the wings white, touched with black at their ends, and having a few black-tipped scales in the middle of the white spot. Hind wings dark fuscous, cilia the same.

Antennæ fuscous. Head and face white. Labial palpi white, the 2nd joint fuscous at its end and the third with a broad fuscous ring, leaving the extreme tip white.

Taken on wing the 25th of July.

**GELECHIA** Zeller.

*Hind wings trapezoidal, slightly or deeply emarginate below the apex.*

The costal vein is simple; often there is a narrow *intercostal cell* between the costal and subcostal veins at the base of the wing. Most frequently the subcostal vein is bifid about its apical third, rarely the subcostal vein is simple. The median vein is 3-branched and nearly always the two upper or superior branches arise from a common stalk, or from one point. The discal cell is sometimes closed, when it gives rise to a single nervule; sometimes unclosed, when there is a single free discal nervule or none. When the subcostal vein is simple, there are *two discal nervules*.

Fore wings oblong or elongate, pointed or obscurely pointed. The apical nervule of the subcostal vein is usually furcate and terminates in the costa before the apex and below it are five veins from the posterior end of the discal cell. Sometimes the apical vein is trifid.

Head smooth. With or without ocelli. Antennæ with joints thickly set. Labial palpi moderately long, or long, reflexed; the second joint beneath slightly broader than the basal joint, with appressed scales, hardly resembling a brush, sometimes quite smooth; the terminal joint slender, almost needle-like, *smooth* and pointed. Maxillary palpi very short. Tongue of moderate length, clothed with scales.

This genus is of great extent and comprises a considerable diversity of species. The imago is extremely active.

The habits of the larvæ are extremely varied, feeding upon leaves flower-buds, young shoots, in the interior of grains and seeds. The species that feed in buds and shoots are mostly in the larva-state in spring and the beginning of summer; those that feed in and upon leaves are met with in summer and autumn and those that feed on seeds do so in the autumn and winter.

**G. nigratomella.**—Fore wings shining white. The apical portion of the wing is pale brown and contains an oblique white streak margined internally, on the costa, with dark brown. Beneath the tip is a small black spot, towards which the oblique white streak is directed. Along the costa, between the tip and the costal end of the white streak, are two or three white spots and the cilia of the apex of the wing are touched with dark brown. On the middle of the costa is a short oblique, dark brown streak. Hind wings and cilia a little darker than the fore wings.

Antennæ pale yellowish. Head and face whitish. Labial palpi, second joint fuscous externally except at the extreme tip where it is white; terminal joint white with a dark external fuscous line.

**G. mediofuscella.**—Fore wings very pale yellowish, with a dark brown spot along the costa, extending from near the basal third of the wing to the fold, oblique on its internal edge. At its angle on the fold is a blackish-brown dot and

another of the same hue obliquely above it on the edge of the spot. Exteriorly the spot is lost along the costa in dark fuscous dispersed atoms, with which the apical portion is dusted. Hind wings shining pale gray; cilia tinted with yellowish.

Antennæ annulated with dark fuscous and whitish. Head yellowish white.

Labial palpi whitish, with two dark fuscous spots on the exterior of the second joint; terminal joint dark fuscous at the base and thence to the tip dotted with fuscous atoms.

**G. fuscopunctella.**—Fore wings dark gray, with three dark fuscous spots along the costa; a small one near the base, beneath which obliquely are two small ones of the same hue, one on each side of the fold; one at the beginning of the costal cilia, sometimes indistinct, beneath which, in the middle of the wing, are two dark fuscous dots, one placed above the other; and midway between the two costal spots is a larger costal spot, with a dot of the same hue beneath it in the disc. The largest costal spot and that nearest the base of the wing, are slightly margined beneath with pale brown. The hinder border, at the base of the cilia, has three or four dark fuscous dots. At the basal end of the fold is a dark fuscous dot and another at the extreme base of the costa.

Antennæ dark fuscous. Head dark gray. Labial palpi gray; second joint dark fuscous externally; terminal joint with two blackish rings one near the middle and one near the tip.

**G. gilvomaculella.**—Fore wings dark brownish, with an indistinct yellowish spot on the costa near the base of the wing; one of the same hue on the middle of the costa, extended indistinctly or diffusely to the fold, where there is a blackish-brown spot; a yellowish streak on the costa near the tip, with an opposite one of the same hue on the inner margin. Cilia yellowish. Hind wings dark grayish, cilia grayish-fuscous.

Antennæ dark fuscous. Head fuscous, somewhat yellowish in front. Labial palpi dark fuscous, the end of the second joint yellowish-white and somewhat varied with yellowish; terminal joint with the extreme tip, and a short streak about the middle, *internally*, yellowish-white.

**G. longifasciella.**—Fore wings dark purplish-brown, with a broad white band, beginning on the costa near the base and curving towards the middle of the inner margin, of which it covers at least one-third. Near the beginning of the cilia of the inner margin, it is constricted or pointed, and then dilates into a white spot behind the tip. Cilia whitish. Hind wings pale grayish; cilia the same.

Antennæ annulated with white and purplish-brown. Head white. Labial palpi, second joint dark fuscous, with the tip white; terminal joint white, the extreme tip and middle fuscous.

I have two mutilated specimens from Mr. A. S. Packard, Jr.

**G. Labradoriella.**—Fore wings dark fuscous, with a white spot on the costa at the extreme base, and two white bands, one near the base of the wing, and inclined towards the anal angle, the other near the tip and parallel with the hinder margin; between the two bands, on the costa, is a rather large white spot.

Antennæ dark brown. (The head is entirely denuded of scales and the labial palpi have been broken off.)

I have a single specimen from Mr. A. S. Packard, Jr., collected in Labrador.

#### PHYLLOCNISTIS, Zeller.

Proc. Acad. Nat. Sci. Nov. 1859, p. 327.

**P. Liriiodendronella.**—Fore wings silvery-white, the posterior portion of the wing pale golden, *with a broad pale golden streak* along the middle of the wing above the fold, arising at its base. About the middle of the costa *is a pale golden, oblique costal streak black margined on both sides*, which coalesces with the posterior end of the median streak. The costal cilia silvery, *containing three diverging black streaks*. The apical spot black, with a silvery scale or two before and behind it, and at the extreme apex, two black lines in the cilia, diverging from the apical spot. In the cilia of the hinder margin is a black, curved line, and at the beginning of the cilia of the hinder margin, is a dorsal silvery spot. Hind wings silvery-gray; cilia the same.

Antennæ, head, labial palpi silvery-white.

The larva mines *the small terminal leaves* of the branches of the Tulip-Tree. It is without feet. The body tapers from the head, the terminal portion being slender and pointed, deeply incised, almost moniliform. Head thin and flat. It makes a broad, linear mine *on the under side of the leaves*, leaving a brownish "frass" line. The mine is much contorted and very long, so as often, if not always, to take up the entire under surface of the leaf, winding over it so as to detach nearly all the under epidermis. This is extremely delicate and of a bluish-white color and often the greater portion of it is detached by abrasions.

The larva may be taken from the beginning to the latter part of July. My own specimens were found on the 22nd of July, at which time they were nearly full fed. Taken in the latter part of this month it is very easy to rear the larva and obtain the most perfect imagos.

#### TISCHERIA Zeller.

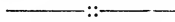
**T. Quercitella.**—Fore wings orange-yellow, apical portion of the wing reddish-brown, dusted with dark brown. Hind wings pale yellowish, towards the apex reddish-brown and the apical cilia dark brownish.

Antennæ, head, labial palpi dark orange-yellow.

The larva makes a white, blotch mine on the upper surface of the leaves of oak in September and October. About the middle of the mine is a spot whiter than any other part, circular and more opaque.

On this spot, when full fed, the larva spins a circular whitish cocoon. The head of the larva is circular; body flattened, tapering posteriorly. Head dark brown; *second segment* with a dorsal dark brown spot divided by a paler vascular line; body pale yellowish-green, immaculate.

I have before me a single specimen whose wings are not fully grown.



Description of certain species of **DIURNAL LEPIDOPTERA** found within  
the limits of the United States and British America. No. 1.

BY WM. H. EDWARDS.

- |  |                                     |
|--|-------------------------------------|
| 1. <i>COLIAS ALEXANDRA</i> , nov. sp.  | 7. <i>HESPERIA LOGAN</i> , nov. sp. |
| 2. <i>THECLA CLOTHILDE</i> , nov. sp.  | 8. " <i>DELAWARE</i> , nov. sp.     |
| 3. <i>HESPERIA MYSTIC</i> , nov. sp.   | 9. " <i>UNCAS</i> , nov. sp.        |
| 4. " <i>HURON</i> , nov. sp.           | 10. " <i>OCOLA</i> , nov. sp.       |
| 5. " <i>CONSPICUA</i> , nov. sp.       | 11. " <i>MANDAN</i> , nov. sp.      |
| 6. " <i>PONTIAC</i> , nov. sp.         | 12. " <i>OMAHA</i> , nov. sp.       |
| 13. <i>HESPERIA WYANDOT</i> , nov. sp. |                                     |

*COLIAS ALEXANDRA*, nov. sp.

*Male*. Expands from  $1\frac{9}{10}$  to  $2\frac{2}{10}$  inches. Upper side bright lemon-yellow, with a greenish tinge on the inner half of secondaries; base of wings and costa of primaries slightly powdered with black scales; fringe *yellow*.

Primaries have a broad black marginal band, the inner edge of which is usually not crenated, but is parallel to the margin, with a small angular projection upon the submedian interspace; at the apex it curves slightly and extends a little way along the costal margin, less than in *C. Philodice*; on the inner margin it terminates as in that species; this band is crossed to the fringe by the yellow nervules; on the arc is a narrow black mark, in length not exceeding half the arc, sometimes a little dilated and then enclosing a yellow point.

Secondaries have a narrow margin terminating acutely before the anal angle, crenated within and crossed by the yellow nervules; sometimes on the arc is a minute spot of paler color, but this is usually wanting.

Under side: primaries same yellow as above, pale at apex and on inner margin; costal margin slightly powdered with minute black scales



and edged with pale roseate; discal spot as above; otherwise immaculate. Secondaries wholly greenish-yellow, covered with black scales; discal spot small, rounded, silver-white, without a border; otherwise immaculate; nor is there a pink tinge at base as in *Philodice* and many species of *Cotias*; edge of costa pale roseate to the end of the costal nervure only; fringe of both wings yellow.

Palpi pale yellow; legs and antennæ pale roseate; club blackish above, brownish-yellow below and at tip.

*Female.* Expands  $2\frac{3}{10}$  inches. Upper side less brightly colored, having a greenish tinge throughout, and without a marginal band; fringe yellow and otherwise as in the male.

Variety *a.* Female; expands  $2\frac{1}{10}$  inches. Primaries have the apex bluish-white, and an obsolete macular band, indicated only by clusters of scales along the margin and apex and by a line of scales anterior to these; on the under side of secondaries the hind and inner margins have a bluish tint.

From Pike's Peak; in the Society's collection; 6 males, 1 female. The second female is from the collection of Mr. George Newman and was taken among the Rocky Mountains, some years ago, by Mr. Wood.

#### THECLA CLOTHILDE, nov. sp.

*Male.* Expands  $\frac{8}{10}$  inch. Upper side fuscous, sprinkled, next the base of primaries, with a few scales of deep metallic blue; on secondaries this color extends from the base through the disk to the hind margin.

Under side uniform light greyish-brown, with a silky gloss; a transverse row of deep orange spots, each edged without by a few dark scales and a whitish border, commences on the costa of primaries, three-fourths the distance from the base, and terminates at the lowest branch of the median nervure; secondaries have a submarginal row of similar spots and a second irregular row crosses the disk; anal angle tinged with orange.

Body fuscous above; blue-grey below; antennæ dark with fine white rings; club dark with reddish-brown tip.

Taken near Quebec, C. E., by Rev. Mr. Provancher.

#### HESPERIA MYSTIC, nov. sp. (Plate 1, fig. 3 & 4.)

*Male.* Expands  $1\frac{2}{10}$  inch. Primaries fulvous, with a wide, brown

hind margin, sinuous within; stigma large, velvet black; from its outer extremity a black line runs along the arc; a reddish-brown patch nearly fills the space between the line and the margin.

Secondaries have the disk tawny more or less shaded with brown along the arc and towards the inner margin.

Under side ochrey-yellow, the dark portions of the upper surface indicated by a slight reddish or brownish shade; a band of indistinct pale yellow spots crosses the disk of primaries and secondaries have a similar band parallel to the hind margin besides a spot near the base.

Body above covered with yellowish-green hairs; below greyish-yellow; palpi yellow; antennæ and club black above, yellow below; club chestnut-red at tip.

*Female.* Expands  $1\frac{3}{10}$  inch. Primaries have the base brown and a patch like that beyond the stigma of the male; in some specimens, the whole surface is brown except a bent row of whitish-yellow spots across the nervules and the cell; secondaries as in the male.

Under side reddish-brown with distinct yellow spots disposed as in the male; the color is sometimes chestnut-red and the spots deep yellow; the basal half of the inner margins of primaries dark brown or blackish.

Connecticut; Michigan; Canada West.

HESPERIA HURON, nov. sp. (Plate I, figs. 1 & 2.)

*Male.* Expands  $1\frac{4}{10}$  inch. Primaries tawny, the hind margin pale brown, broad and projecting in dentations upon the interspaces; the stigma large, almond-shaped, silky-black edged with velvet-black at its outer extremity and with a small velvet bar upon its inner side; connected with it posteriorly is a rounded, velvety, brown patch; on the costa, near the apex, is a spot of tawny cut into three by the nervures, and, below this, in the brown margin, are two others.

Secondaries brown with a tawny tinge on the disk and inner margin; near the anal angle a tawny projection reaches the edge of the wing.

Under side of both wings ochrey-yellow, except the costal margin and apex of primaries, which are slightly reddish; base of primaries brown; the dark portions of the upper surface indicated by a dark shade.

Body covered with greenish hairs above; below greyish; palpi pale

yellow; antennæ black above, yellow below; club reddish with the under side of the tip velvet-black.

*Female.* Expands  $1\frac{6}{10}$  inch. Upper side less tawny, often nearly blackish; besides the small costal and marginal spots, which are transparent, are two larger transparent spots in the disk; along the inner margin, a tawny dash, and a bar, more or less distinct, from the base across the cell; disk of secondaries obscure tawny, with three or four distinct large spots near the outer angle, and a faint tawny projection to the edge of the wing near the anal angle.

Under side greyish-brown, reddish on costa of primaries next the base, with same spots as above; a dark brown band from the base to the first transparent spot; at the inner angle pale brown; across the disk of secondaries an indistinct belt of whitish spots and two near the base.

Illinois; Georgia; Texas; Washington, D. C.

#### HESPERIA CONSPICUA, nov. sp.

*Female.* Expands  $1\frac{4}{10}$  inch. Upper side dark glossy brown with greenish hairs at base of wings; primaries have a bent row of semi-transparent yellow spots, commencing on the costa one-third the distance from the apex and terminating on the middle of the inner margin; the first three and the fifth of these spots are narrow and of equal length, the fourth exterior and smallest, the sixth a little larger than the fifth, the seventh twice the size of the sixth and nearly rectangular, the eighth and last sometimes obsolete; secondaries have, in the disk towards the costa, four yellow spots, the second largest and oblong, the others small and of nearly equal size; fringe light brown.

Under side chesnut-brown, with a smoky tinge on the disk and inner margin of primaries, and a slight yellow tinge on the whole surface of secondaries, most conspicuous along the hind margin.

Body above covered with greenish hairs; abdomen yellow; palpi yellow; antennæ yellow with narrow brown rings interrupted on the under side; club velvet-black above, chestnut-red below.

Male unknown.

Lansing, Michigan, from Mr. Miles.

#### HESPERIA PONTIAC, nov. sp.

*Male.* Expands  $1\frac{2}{10}$  inch. Primaries tawny, obscure at the base,

bright on the disk, with a broad, brown hind margin that occupies nearly half the wing, from a point on the costa, one-third the distance from the apex and to the middle of the inner margin, deeply concave towards the apex and with an even edge; the tawny portion taking nearly the shape of the wing; nervures black and conspicuous, especially at the extremity of the cell; the stigma is a black velvety bar in a line with the arc.

Secondaries dark brown, with a tawny spot in the disk near the outer angle, cut into four by the nervures; the second from the costa largest and oblong; fringe tawny.

Under side brown, with a tinge corresponding to the same color above.

Body covered with greenish hairs; beneath yellowish; palpi yellowish; antennæ dark above, yellow-grey below; club velvety-black, with a fulvous tip. Female not known.

Lansing, Michigan, from Mr. Miles.

#### HESPERIA LOGAN, nov. sp. (Plate 1, fig. 5.)

*Female.* Expands  $1\frac{2}{10}$  inch. Primaries have the hind margin broad, brown, and shaped as in *Pontaic*, slightly dentated on the inner edge; within the cell, next the arc, is a rhomboidal tawny spot; the rest of the cell, the base and the inner margin brown; a small space without the arc is slightly brown; the band on the disk clear tawny, sickle-shaped, broad next the inner margin, narrowing rapidly towards the apex, curving around the cell and gradually diminishing till it disappears on the costa at one-third the distance from the apex: divided by the black nervures into spots.

Secondaries have the disk bright tawny, making one large spot nearly the shape of the wing, and which approaches the edges nearest at the outer angle; the margins brown and about one-half the width of the hind margin of primaries.

Under side glossy greenish-yellow; the secondaries immaculate: the primaries with a large brown patch next the base; the same color borders the inner margin and tinges the inner angle. The outer half of fringe of primaries brownish, the inner the same hue as the wings.

Body covered with greenish hairs; beneath pale yellow; palpi yel-

low; antennæ blackish above, yellowish beneath; club black, ferruginous at tip.

Lansing, Michigan, from Mr. Miles.

Philadelphia, from Mr. Newman.

*HESPERIA DELAWARE*, nov. sp.

*Male.* Expands  $1\frac{3}{10}$  inch. Upper side uniform, glossy honey-yellow, slightly obscure at the base of the wings; the nervures brown; costal edge of primaries brown; hind margin with a narrow brown border which extends a little distance on the costal and inner margin, attenuated at either extremity; the stigma resembles that of *Zabulon*, being a slight blackish bar upon the arc.

Under side nearly same color, a little paler; base and inner margin of primaries blackish.

Body above greenish-black; sides of abdomen same color as the wings; beneath paler; palpi reddish-yellow; antennæ yellow with transverse black lines on upper side; club reddish, black beneath the tip.

*Female.* Same size; wholly like the male, except the stigma.

Variety *a.* Female: primaries with a wide brown margin, and secondaries brown except a small space on the disk.

Philadelphia, from Mr. Newman.

*HESPERIA UNCAS*, nov. sp.

*Male.* Expands  $1\frac{3}{10}$  inch. Primaries silky-brown, except a small ochrey-yellow space on the disk, mostly back of the stigma; the costa next the base sprinkled with fine yellow scales; near the apex are three yellow-white spots and two faint spots in the margin below these; near the end of the stigma a small wedge-shaped spot of paler color than the disk; stigma long, narrow, with a slight bend downwards and a vitreous gloss.

Secondaries have the margins brown, broadest on costa; disk yellowish, obscured by brown hairs, beneath which appear, indistinctly, a transverse row of lighter spots; fringe white.

Under side greenish-yellow, sprinkled with brown except on the inner margins of both wings; the spots on primaries repeated in white; secondaries have a row of white patches connected by white lines, coming from the base around the costa to the middle of the wing, there connected with another patch nearer the base; these white spots edged

posteriorly with brown; the inner half of the wing yellowish, immaculate.

Body above greenish; abdomen and palpi yellowish-white; antennæ brown above, yellowish below; club black above and beneath the tip, reddish on the sides.

*Female.* Expands  $1\frac{5}{10}$  inch: of duller color; a large greyish spot corresponds to the stigma of the male, posterior to which the yellow spots are arranged in a transverse, irregular band; a faint tawny band across secondaries.

Philadelphia, from Mr. Newman.

#### HESPERIA OCOLA, nov. sp.

*Male.* Expands  $1\frac{5}{10}$  inch. Upper side dark glossy brown with an olivaceous tint; a large sagittate transparent spot at the origin of the third median nervule and a small transparent spot in the angle above; on the costa are one or two minute similar spots; secondaries immaculate; fringe greyish-brown.

Under side same color as above without the olivaceous tint, the whole surface much wrinkled longitudinally; spots as above.

Body same color as the wings, below greyish; abdomen yellow, with a median brown line, on either side of which are two brown lines; palpi brownish-yellow; antennæ black; club black with a red tip.

In some specimens the transparent spots are nearly or quite obsolete.

*Female* similar to the male, but of duller color.

Georgia; Florida; Texas.

#### HESPERIA MANDAN, nov. sp.

Expands  $1\frac{1}{10}$  inch. Upper side brown, spotted with ochrey-yellow; primaries have a marginal series of small spots, with two of larger size that are submarginal; a straight transverse row on the disk of large, angular spots, interrupted against the submarginal; two others in the cell, separated by a circular brown space.

Secondaries have a small spot near the base, another on inner margin, a large, rounded one in the disk, and a submarginal series of small spots and points.

Under side: primaries almost wholly ochrey-yellow, the spots corres-

ponding with those above, but enlarged and confluent; secondaries pale reddish-brown, with rounded spots of soiled white, corresponding generally with those above, but larger; the submarginal row is complete, and the margin is bordered by lunules; near the base is a second spot on the costa of equal size with the other.

Lake Winnipeg, from Mr. R. W. Kennicott.

This species is allied to *Paniscus* and *Sylvius* of Europe.

#### HESPERIA OMAHA, nov. sp.

*Male.* Expands  $\frac{8}{10}$  inch. Upper side brown with spots and patches of fulvous; fringe fulvous.

Primaries have the basal half of costal margin fulvous, a rounded spot on the costa a little beyond this, and a diagonal band running from the middle of the inner margin towards the apex, but not reaching it, contracted near its upper extremity.

Secondaries have a discal band, bent at a right angle, narrow next the costa, with a prominent tooth at the angle; a small rounded spot near the base.

Under side pale brown, lightest on secondaries, especially along the hind margin, with same spots as above; the upper half of hind margin of primaries is also fulvous; the margins edged by a black line.

Taken at Pike's Peak; from the collection of Mr. Newman.

#### HESPERIA WYANDOT, nov. sp.

*Male.* Expands one inch. Upper side brown; primaries have a zigzag series of white spots, of which three are on the costa near apex, four below in a diagonal line, that, if protracted, would strike the middle of the inner margin, and two below the last of these; discal are white, a curved white bar near it, within the cell, and a small mark above, the three forming an interrupted ring; outer half of central edge alternate black and white, as is also the fringe of both wings.

Secondaries have a submarginal row of indistinct white spots and a second of larger ones across the disk, obsolete next inner margin.

Under side pale brown with the nervures whitish; same spots as above, but dilated; on secondaries are three spots near the base; anal angle blackish.

Body dark grey; palpi white; antennæ black and white in fine rings. interrupted on the under side and there yellowish; club ferruginous.

*Female.* Expands  $1\frac{1}{10}$  inch; resembles the male.

Taken on Long Island by Mr. Calverley; at Washington, D. C., by Mr. Drexler.

This species resembles *Malvae* of Europe, and would come under the head of *Syrichthus* of Boisduval, and *Pyrgus* or *Thymele* of other authors. Great confusion exists in the *Hesperidæ* and the names and limits of genera are by no means agreed upon. It is understood that Mr. Scudder intends monographing our species, and, therefore, I have temporarily placed those above described under *Hesperia*, in accordance with his practice and that of Dr. Harris.

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#### S T A T E D M E E T I N G, APRIL 13.

President BLAND in the Chair.

Eighteen members present.

#### REPORTS OF COMMITTEES.

The Committees on the papers of Baron Osten Sacken and Messrs. Saunders and Grote, read March 9th, reported in favor of their publication in the Proceedings of the Society.

#### DONATIONS TO CABINET.

114 COLEOPTERA (*Cicindela soluta*, *C. campestris*, *C. hybrida*, *C. germanica*, *C. concolor*, *Dromius 4-notatus*, *Cychrus rostratus*, *Carabus nitens*, *C. auratus*, *C. arvensis*, *C. catenulatus*, *C. violaceus*, *C. regalis*, *C. granulatus*, *C. cancellatus*, *C. Escheri*, *Procrustes impressus*, *Calosoma sycophanta*, *C. inquisitor*, *Necrophorus ruspator*, *Scydmaenus ruficornis*, *Trox sabulosus*, *T. perlatus*, *Ateuchus pius*, *Copris hispanus*, *Geotrupes putridarius*, *G. sylvaticus*, *G. hypocrita*, *Dorcus parallelipipedus*, *Euchlora viridis*, *Cetonia vidua*, *C. ignicollis*, *C. lucidu-*



*la*, *C. floricola*, *Epicometis hirtella*, *Julodis Ehrenbergii*, *J. sulcata*, *Perotis chlorana*, *Rhynchites æquatus*, *Eccoptogaster destructor*, *Orchesia micans*, *Stenaspis squamosa*, *Rhagium mordax*, *Cerambyx cerdo*, *Oberea oculata*, *Pogonocherus hispidus*, *P. fascicularis*, *Rosalia alpina*, *Gracilia pygmaea*, *Saperda carcharias*, *S. populnea*, *S. tremula*, *Clytus temesiensis*, *C. arvicola*, *C. arietes*, *Purpuricenus budensis*, *Dorcadion glycyrrhizæ*, *Morimus lugubris*, *M. tristis*, *M. funestus*, *Lamia punctata*, *Mylabris cichorii*, *Sagra splendida*), from Aug. R. Grote.

213 COLEOPTERA (*Bembidium lævigatum*, *Pterostichus honestus*, *P. purpuratus*, *P. obscurus*, *Platynus hypolithos*, *P. melanarius*, *Dicælus purpuratus*, *Anisodactylus discoideus*, *Bradycellus atrimediæ*, *Peltis 4-lineatus*, *Tritoma unicolor*, *T. pulchra*, *Dacne heros*, *Ischyryus 4-punctatus*, *Bolitophagus corticola*, *Priocera castanea*, *Thaneroclerus sanguineus*, *Clerus nigripes*, *Mycetophagus bipustulatus*, *Alindria cylindrica*, *Brontes dubius*, *Adelocera marmorata*, *A. pennata*, *A. impressicollis*, *Athous scapularis*, *A. opalinus*, *Smodicum cucujiforme*, *Rhanus unicolor*), from H. T. Fay, Columbus, Ohio.

40 COLEOPTERA (*Cicindela Lecontei*, *C. vulgaris* var., *C. lepida*, *C. dorsalis* var., *Cychnus niagariensis*, *Oncideres cingulatus*, *Saperda calcarata*), from John Akhurst, Brooklyn, N. Y.

3 COLEOPTERA (*Morimus funestus*, *Conognathus variabilis*) from Dr. Samuel Lewis.

2 COLEOPTERA (*Clerus 4-signatus*, *Hydnocera unifasciata*) from J. H. B. Bland.

1 COLEOPTERA (*Corymbites fulvipes*), from George Newman.

The following LEPIDOPTERA, from the Committee on Collecting Fund, were kindly determined for the Society by Mr. Aug. R. Grote of New York:—*Perophora Melsheimerii* Harris, *Ctenucha Latreillana* Kirby, *Eucætes egle* Harris, *Hypantria textor* Harris, *Phragmatobia (Arctia) rubricosa* Harris, *Crocota quinaria* Grote (Type), *Gastropacha velleda* Stoll., *Nerice bidentata* Walk., *Closteria americana* Harris, *C. albosigma* Fitch, *Ciris (Eudryas) Wilsonii* Grote (Type), *Eutortricodes testacea* Paek., *Lacinia cymatophorides* Gn., *Grammophora trisignata* Walk., *Mamestra adjuncta* Boisd., *M. arctica* Boisd., *Hadena chenopodii* Albin., *Calæna herbimacula* Gn., *Prodenia commelinæ* A.&S., *Chamyris cerintha* Tr., *Parthenos nubilis* Hübn., *Catocala cara* Gn., *C. selecta* Walk., *C. parta* Gn., *Boamira*

*umbrosana* Gn., *Angerona crocataria* Fabr., *Metanema inatomaria* G. *Hæmatopsis grataria* Fabr., *Dyspteris abortinaria* H. S., *Baptria albofasciata* Grote (Type), *B. albovittata* Gn., *B. elaborata* Grote (Type), *Galleria cereana* Fabr., *Tetracis crocallata* Gn., *Heterophleps triguttaria* H. S., *Arctia phalerata* Harris, *A. virgo* L., *Glaphisia tri-lineala* Pack., *Cyrtosia pallida* Pack., *Ophiusa bistrians* Hübn., *Ag-nimonia anilis* Drury, *Clisiocampa sylvatica* Harris, *Anthæcia rivulo-sa* Gn., *Gortyna nebris* Gn., and *Deilephila celerio*.

970 COLEOPTERA (*Cicindela splendida*, *C. Lecontei*, *C. macra*, *O-mophron tessellatum*, *Calosoma Willcoxi*, *Carabus Lapilayi*, *Dyschir-ius sphaericollis*, *D. globulosus*, *Leptotrachelus dorsalis*, *Apristus piceus*, *Blechrus linearis*, *Axinopalpus biplagiatus*, *Pinacodera platicollis*, *P. limbata*, *Callida punctata*, *C. smaragdina*, *Platynus ruficornis*, *P. ec-cavatus*, *P. æruginosus*, *P. picipennis*, *P. lutulentus*, *P. picticornis*, *P. pusillus*, *Pterostichus constrictus*, *P. caudicalis*, *P. abjectus*, *Lophoglos-sus scrutator*, *Amara basillaris*, *Badister pulchellus*, *Dicælus splend-idus*, *Chlænius erythropus*, *C. solitarius*, *C. niger*, *C. lithophilus*, *Spon-gopus verticalis*, *Harpalus troglodytes*, *H. erythropus*, *Oodes fluviialis*, *Tachys proximus*, *T. vivax*, *T. mendax*, *T. dolosus*, *Haliplus triopsis*, *Hydroporus niger*, *H. parallelus*, *H. dispar*, *H. lineolatus*, *H. affinis*, *H. convexus*, *Hydrocanthus iricolor*, *Matus bicarinatus*, *Hydrophilus mixtus*, *Philhydrus perplexus*, *P. diffusus*, *P. cinctus*, *Berosus palles-cens*, *Catops clavicornis*, *Scydænus cribrarius*, *Ctenistes Zimmer-manni*, *Tyrus humeralis*, *Aleochara fuscipes*, *Gyrophæna dis-imilis*, *G. vinula*, *G. corruscula*, *Bolitobius pygmæus*, *B. cinctus*, *Xantholinus em-mesus*, *X. obscurus*, *Cryptobium latebricola*, *Lathrobium longiusculum*, *L. puncticolle*, *Sunius discopunctatus*, *Palaminus testaceus*, *Oxyporus 5-maculatus*, *O. femoralis*, *Stenus flavicornis*, *S. stygicus*, *Bledius rub-iginosus*, *Lathrimæum sordidum*, *Hister 16-striatus*, *H. Harrisii*, *H. bi-notatus*, *H. americanus*, *H. subrotundus*, *Tribalus americanus*, *Paro-malus bistriatus*, *Saprinus Javeti*, *Scaphidium 4-guttatum*, *Bæocera apicalis*, *Scaphisoma suturale*, *Toxidium grammariodes*, *Olibus pusil-lus*, *O. nitidus*, *Carpophilus hemipterus*, *Conotelus obscurus*, *Epuræa rufa*, *Nitidula zizac*, *Omosita colon*, *Meligithes sævus*, *Cryptarcha picta*, *Bactridium nanum*, *Trogosita corticalis*, *Colydium lineola*, *Sil-vanus planatus*, *S. imbellus*, *Læmophlæus adustus*, *Mycetophagus mul-tipunctatus*, *Litargus 4-spilotus*, *Dermestes pulcher*, *Helichus striatus*,

*Heteroceris mollinus*, *Lucanus lentus*, *Chæridium capistratum*, *Aphodius oblongus*, *A. terminalis*, *A. vittatus*, *Euparia abdita*, *E. gracilis*, *Geotrupes opacus*, *Dichelonycha subvittata*, *Euryomia melancholica*, *Agrilus arcuatus*, *A. plumbeus*, *A. fallax*, *A. interruptus*, *A. defectus*, *A. politus*, *Brachys æruginosus*, *B. purpurea*, *B. lævigata*, *Throscus punctatus*, *Eucnemis amœnicornis*, *Adelocera impressicollis*, *Elater areolatus*, *E. hepaticus*, *E. sanguinipennis*, *Ludius attenuatus*, *Dolopius limosus*, *Adrastus recticollis*, *Melanotus incertus*, *Limonius basillaris*, *Oxygonus obesus*, *Asaphes decoloratus*, *Zenoa picea*, *Eucinetus morio*, *Telephorus angulatus*, *T. flavipes*, *T. imbecillis*, *T. scitulus*, *Polemius laticornis*, *Ditempus bidentatus*, *Malthinus occupitalis*, *Attalus scientus*, *Thaneroclerus sanguineus*, *Clerus nigripes*, *Hydrocera pallipennis*, *Cupes cinerea*, *Ptinus latro*, *Amphicerus bicaudatus*, *Hylesinus aculeatus*, *Bruchus erythrocerus*, *Spermophagus robinix*, *Brachytarsus limbatus*, *B. brevis*, *Apion Sayi*, *Epicærus fallax*, *Magdalinus armicollis*, *M. barbatus*, *Magdarus undulatus*, *Mononychus vulpeculus*, *Copturus oculatus*, *C. operculatus*, *Conotrachelus anaglypticus*, *Analcis foveolatus*, *A. æreus*, *Sphenophorus pulchellus*, *S. uubilis*, *S. cariosus*, *Silophilus remotepunctatus*, *S. oryze*, *Anthonomus 4-gibbus*, *Smodicum cucujiforme*, *Liopus angulatus*, *L. facetus*, *L. cinereus*, *Ecyrus exiguus*, *Goes debilis*, *Psenocerus supernotatus*, *Oberea amabilis*, *O. perspicillata*, *Pachyta bivittata*, *Saperda cretata*), in exchange from Benj. D. Walsh, of Rock Island, Illinois.

## DONATIONS TO LIBRARY.

*Proceedings of the Academy of Natural Sciences of Philadelphia*, Nos. 10—12 for 1863, and *Silliman's American Journal of Science and Arts*, for January and March 1863. Presented by Dr. Thos. B. Wilson.

*Essay on some of the insects of Massachusetts which are beneficial to vegetation.* By F. G. Sanborn. From the Author.

*Proceedings of the Entomological Society of Philadelphia*, for January and February 1863. From the Publication Committee.

The following works were deposited by Dr. T. B. Wilson:—

*Annales de la Société Entomologique de France*, 3 série, Tome 8, 4 série, Tome 1 and Tome 2, Trim. 1—3. 8vo.

*Entomologische Zeitung. Herausgegeben von dem entomologische Vereine zu Stettin.* 1861 & 1862. 2 Vols. 8vo.

*Tijdschrift voor Entomologie. Deel 5, and 6, Stuk. 1—2.*

*Wiener Entomologische Monatschrift. Bd. 1—6, and 7, Nr. 1.*

*Transactions of the Entomological Society of London, 3rd Series, Vol. 1, parts 1—4.*

*Revue et Magasin de Zoologie, par M. F. E. Guérin-Méneville.* 1862, Nos. 1—12. 8vo.

*Natural History of the Insects of China. By E. Donovan. New Edition by J. O. Westwood.* 1 Vol. 4to.

*Handbuch der Entomologie. Von Hermann Burmeister. Bd. 1—5, in 6 Vols. 8vo.*

*Entomologie ou Histoire Naturelle des Insectes. Par M. Olivier.* 4 Vols. 4to.

*Revision der europäischen Otiiorhynchus-Arten. Von G. Stierlin.* 1 Vol. 8vo.

*Spix & Martius. Delectus Animalium Articulatorum in Brasilia collectorum. Descriptions by M. Perty.* 1 Vol. Folio.

*The Entomologist's Useful Compendium. By George Samouelle.* 1 Vol. 8vo.

*Die Europäischen Formiciden. Von G. L. Mayr.* 1 Vol. 8vo.

*Die Staphylinen-Fauna von Ostindien, insbesondere der Insel Ceylan. Von G. Kraatz.* 1 Vol. 8vo.

*Monographia Pselaphidarum et Scydmaenidarum Britanniae. By Henry Denny.* 1 Vol. 8vo.

*Catalogue of the Coleopterous Insects of Madeira in the Collection of the British Museum. By T. Vernon Wollaston.* 1 Vol. 8vo.

*Catalogue des Lépidoptères d'Europe et des Pays Limitrophes. Par Staudinger & Wocke.* 1861. 1 Vol. 8vo.

*Catalogue Synonymique des Coléoptères d'Europe et d'Algérie. Par J. Gaubil.* 1849. 1 Vol. 8vo.

*Catalogus Coleopterorum Europæ. Von Prof. H. Schaum.* 1859. 1 Vol. 8vo.

*Exotic Butterflies. By William Hewitson. Part 45. 4to.*

## WRITTEN COMMUNICATIONS.

Letters were read from Messrs. Joseph Bridgham, Jr., and R. B. Talbot, dated New York, March 18th and 31st, 1863, and from Prof. Jared P. Kirtland, dated Cleveland, Ohio, March 26th, 1863, severally acknowledging their election to Corresponding Membership in the Society.

The following papers were presented for publication in the Proceedings:—

“A revision of the species of Cymatophorina found in the United States and British America, with descriptions of new species, by Aug. R. Grote.”

“Descriptions of two new species of Aretiidæ, by Wm. Saunders.”  
And were referred to Committees.

## NEW BUSINESS.

Mr. J. Frank Knight moved that a “Committee on Insect Architecture” be added to Article 1 of Chapter 5 of the By-Laws of the Society.

Mr. Cresson announced the death of the Rev. James H. McFarland late a Resident Member of the Society.

## ELECTIONS.

The following persons were elected *Corresponding Members* of the Society:—

Mrs. Lucy W. Say, of Newburgh, New York.

Rev. Daniel Ziegler, of York, Pennsylvania.

On some hitherto undescribed LEPIDOPTEROUS LARVÆ.

BY W. SAUNDERS,  
of London, Canada West.

**Vanessa Milberti**, Godart.

Length one to one and a quarter inches. Color dark yellowish-grey streaked with black at the sides, a black dorsal stripe, and a lateral band of dull orange mixed with yellow and grey on each side above spiracles; spines black, excepting those close to the under surface which are of a greenish-yellow color. Under surface bright greenish-yellow with a central line of black spots.

Food-plant. Nettle.

**Arctia Americana**. Harris.

The full grown larva of this species I reared several years since but neglected at the time to describe it. The following is a description of the larva as it hibernates for the winter.

Length three-eighths of an inch. Head black, body dark brown with transverse rows of tubercles from which spring dense tufts of intermingled white and black hairs.

It completes its growth in the spring and enters the chrysalis state late in May or early in June. Like the "*Caja*" of Europe, it feeds readily on the common garden lettuce.

**Arctia parthenice**, Kirby.

Length one and three-quarters to two inches. Head black, with a light spot on each side. Body black with a dorsal flesh colored stripe. A transverse row of prominent tubercles on each segment of a yellowish flesh color, from which spring tufts of stiff hairs which are black on the back and brown on the sides of the body. Feet and prolegs, yellowish tipped with black.

Like that of *Americana* this larva hibernates when partly grown and completes its growth the following spring. It feeds readily on lamb's quarter (*Chenopodium album*) or even on grass.

**Ecpantheria scribonia**, Stoll.

It cannot be correctly said of the larva of this species that it is un-

described since two descriptions of it have appeared. One will be found in "Harris' Insects Injurious to Vegetation" the other in "Dr. Morris' recent Synopsis of the Lepidoptera of North America," but these descriptions do not agree with each other, hence further evidence is necessary to settle the point. The subjoined description will be found to agree most closely with that of Harris, and observations on this species for three successive seasons convince me that no striking variations in the larvæ occur.

Length two and a half inches. Head bilobed, black and shining, reddish at the sides. Body black with a brownish shade on sides towards under surface. Each segment with an irregular transverse row of elevated tubercles from which spring tufts of rigid black shining hairs. The spaces between each segment from fourth to tenth inclusive are banded with red, bands wider and more conspicuous from sixth to ninth. Color of underside varies from reddish to yellowish brown, feet reddish, legs brown thickly clothed with short hairs.

These larvæ attain their full growth in the fall and hibernate through the winter under logs, the bark of decayed trees, &c. When aroused from their torpor by the warmth of spring they feed a little on grass or almost any other green thing they meet with before going into chrysalis. I have found them in the fall feeding in the wild sunflower (*Helianthus decapetalus*.)

**Catocala concumbens.** Walker, C. B. M. 1198.

Length two to two and a half inches, onisciform. Head flat, dark greyish intermixed with red. Upper surface dirty brown with a lightish chain-like dorsal stripe and a very small fleshy protuberance on each side of this stripe on each segment. On the ninth segment is a small protuberance of a brownish color and on the eleventh a mark resembling an oblique incision. A thick lateral fringe of short hair close to the under surface. Under surface pinkish with a central row of round black spots which are larger about the middle of the body and much smaller towards the extremities.

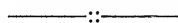
Food-plant. Willow.

**Plusia balluca,** Geyer. C. B. M. 904

Cylindrical or nearly so, length one and a half to one and three-

quarter inches. Head hairy and of a dull brownish-red color. General color brownish-red covered on the upper surface with closely set yellowish spots. Two black branching spines on first and last segments, on the second, four of the same color, and on third and fourth, four of a reddish color. All the other segments armed each with seven spines, all yellowish, excepting a single row of a reddish color on each side of the body, a broken yellow lateral stripe close to spiracles.

Food-plant. Hops.



Additions to the Catalogue of U. S. LEPIDOPTERA, No. 3.

BY AUG. R. GROTE.

ARCTIOIDEA, H. S.

Gen. **CROCOTA** Hübn.

**C. opella** Grote, Proc. Ent. Soc. Vol. 1, p. 345. (See plate 2, fig. 1, ♀.)  
From the Collection of Mr. Theo. Bunte, Philadelphia.

**C. quinaría** n. sp. (See plate 2, fig. 2, ♀.)

Anterior wings brownish, reddish along the costa and in the terminal space and showing five irregular whitish spots. Of these, three are disposed along the internal margin, the centre one being the largest; the fourth and smallest surmounts the third spot near the internal angle and a fifth, irregular shaped, shows near the costa and beyond it the discal spot black. Posterior wings reddish with discal spot and terminal band, black. Under surface of the wings reddish, darker on the anterior pair which show the discal spot and an interrupted transverse subterminal line, black. Abdomen reddish, thorax and head brownish. Exp., one inch. *Hab.* Canada. (Coll. Ent. Soc. Philada.)

From the Rev. Chas. J. S. Bethune, Cobourg, C. W. Resembles *C. rubricundaria* in size but is very distinct from that species. The species generally under this genus are subject to considerable variation and there appears to be some confusion in their nomenclature and syn-



onyms. I do not consider *Arctia rubricosa* Harris, as a synonym of *Crocota rubricundaria* Hübn. (See App. to Morris' Synopsis.) Harris' figure and description point to a much larger species belonging to a different genus, a specimen of which I have determined in the Collection of this Society. The description of *C. opella* was by error placed under *Lithosina*. The place for this genus is unmistakeably under the present family.

## LITHOSINA, H. S.

Gen. **HYPOPREPIA**, Hübn.

**H. Packardii** n. sp. (See plate 2, fig. 5, ♀.)

Anterior wings entire, silky, dark steel grey with a yellowish well defined spot on the costa near the apex. A band of the same color on the internal margin, well defined and commencing near the internal angle and continuing to the base of the wing, showing a spot of the same shade as the ground color. Posterior wings rose color with a wide greyish border not extending quite to the anal angle. Under side of the wings showing the markings of the upper. Head rose color. Antennæ darkish. Thorax yellowish. Abdomen rose color. Exp. eleven sixteenths of an inch. (Coll. Ent. Soc. Philad.)

A female taken in Pennsylvania.

In coloring, this species resembles *H. fucosa* Hübn., of which latter species *Lithosia miniata* Kirby and *Gnophria vitatta* Harris, are undoubtedly synonyms.

I have dedicated this species to Mr. A. S. Packard Jr, of Brunswick, Maine, an Entomologist to whom I am indebted for many kindnesses.

## DENDROMETRINA, H. S.

Gen. **AMPHIDASYS** Treitschke.

**A pænularia** n. sp. (See plate 2, fig. 3, ♂.)

Anterior wings brownish-grey with a greyish semi-circular band at the base enclosing a dark brownish space wider at the costa. Median

space dark brownish defined by two darker undulating lines. Terminal space greyish tinged with brown and with a terminal lunulated black line. Entire wing mottled with black. Posterior wings resembling anterior. Basal half dark brownish defined by a black irregular median line, showing a black discal spot with a white streak inside. Terminal half of the wing greyish tinged with brown and with a darker sub-terminal shade line. Terminal margin with a black lunulated line. Entire wing mottled with black. Thorax whitish anteriorly, grey posteriorly.

Collar black. Head and abdomen greyish, latter crested. Under surface of wings showing the markings of the upper without the brownish tinge in the terminal spaces. A male. Exp.  $1\frac{3}{4}$  inch. Middle States.

Kindness of Mr. J. Akhurst.

Manifestly distinct from *A. (?) quernaria* A & S., and *A. cognataria* Gn., with specimens of which latter species, I have compared it.

## PHYTOMETRINA, H. S.

Gen. **EUPITHECIA** Curtis.

***E. miserulata*** n. sp. (See plate 2, fig. 4, ♀.)

Clear greyish, silky. Anterior wings with a black interrupted terminal line and with a greyish fringe interrupted with black. Discal spot linear, black. Terminal space shaded with dark grey. From the costa several ill defined darker shade lines traverse the wing to the internal margin, the best defined of which is wavy running outside of the discal mark. Posterior wings clear greyish showing a discal spot, with a black interrupted terminal line and greyish fringe as on anterior wings. From the internal margin, between the anal angle and the base, two wavy lines cross the wing; near the base are others indistinct, interrupted. Under side clear greyish showing the discal spots and two wavy dark grey lines on both wings. Head, palpi, thorax and abdomen greyish. Exp.  $\frac{3}{4}$  to  $\frac{7}{8}$  inches. (Coll. Ent. Soc. Philadelphia.)

Northern Virginia.

This species which is a true *Eupithecia*, differs specifically from the description of the Californian *E. subapicata* Gn., and is the only species belonging to this genus I am acquainted with from the Atlantic Slope.

Contributions to the Natural History of the CYNIPIDÆ of the United States  
and of their galls. Article 3rd.

BY BARON R. OSTEN SACKEN.

Since my first articles on this subject (*on the Cynipidæ of the oak*, in Proc. Ent. Soc. Phil., Oct. 1861, and *Additions*, etc., *ibid.* Sept. 1862), I have continued to work out the collections of galls and their inmates I had on hand; a large supply of materials I owe to the liberality of Mr. Norton. Thus I found myself able, in addition to the *Cynipidæ* of the oak, described in the above quoted papers, to prepare one on those of *the blackberry* and *the rose*, which I submit herewith to the friends of entomology.

The present publication does not exhaust the materials contained in my collection and I hope, in one or two more articles, to bring them also before the entomological public. As all these papers, although disconnected, serve to complete each other, thus gradually accumulating a store of materials for the future monographer, I have preferred to publish them henceforth under a general title.

NEW YORK, March 6, 1863.

CYNIPS-GALLS ON THE BLACKBERRY—(*Rubus* sp.)

The two cynipideous galls heretofore found on the blackberry bushes of this country are the produce of two species of the genus *Diastrophus* Hartig. This deserves to be noticed, as the first and only insect of this genus, described by Hartig, was also reared from a gall on the blackberry. Two more species have been described since by Mr. Giraud (Verh. Zool. Bot. Gesellsch. Wien, 1859, p. 368), the one reared from a gall on *Centaurea scabiosa*, the other captured in the net.

The genus *Diastrophus*, as all the other of Hartig's genera, has not been defined anywhere. From Mr. Hartig's analytical sketch (Germ. Z. II, p. 186, and from the addition to it, given l. c. IV, p. 410), we merely gather that *Diastrophus* has 15 (♂) and 14 (♀) jointed antennae, five-articulate maxillary and three-articulate labial palpi. The characters taken from the number of joints of the palpi, are, in my

opinion, of little practical value, as anybody can satisfy himself by trying to count them. As for the number of joints of the antennæ, it seems to vary. One of the species described below (*D. nebulosus*) has 14 (♂) and 13 (♀) joints; Giraud's *D. scabiosæ* has the same number; of his *D. areolatus* he possessed only the ♀ and it likewise has 13 joints. The other N. American species, however, which I describe below (*D. cuscutaeformis*) has, like Hartig's *D. rubi* 15 (♂) and 14 (♀) joints.\* What Hartig says about the antennæ of the ♂ (l. c. p. 410, at bottom), "that the last joint is subdivided in two joints of nearly equal length, thus making 15 joints", seems to indicate a structure similar to that of *D. cuscutaefomis* ♂, where the 15th joint appears to be a mere subdivision of the 14th.

One of the most curious circumstances connected with the history of two North American blackberry galls, observed by me is, that besides the *Diastrophus*, apparently the genuine originator of the gall, they produce another gall-fly, probably parasitical, belonging to the genus *Aulax* Hartig, and showing the most striking resemblance in size, coloring, and sculpture, to the *Diastrophus*, their companion. The one is the very counterpart of the other, hardly showing any differences, except the strictly generic characters! This seems to be again one of those curious instances, so frequent in entomology, of the resemblance between the parasites and their hosts! By rearing a considerable number of galls of *D. nebulosus*, I obtained this species as well as its parasite almost in equal numbers. By cutting some of the galls open, I ascertained that a single specimen of the gall frequently contained both species, thus setting aside a possible doubt whether these insects are not produced by two different, although closely similar galls.

From the gall of *D. cuscutaeformis* I also obtained an *Aulax* (comp. below).

The genus *Aulax* Hartig (*Aylax* in Germ. Z. II and III, *Aulax* in vol. IV, p. 412) is not much better defined than *Diastrophus*, and I owe the determination of both to Dr. Rheinhard, in Bautzes, Saxony.

*Aulax*, according to Hartig, has the antennæ 15 or 16 jointed (♂), 14 or 15 jointed (♀). The three species described by Giraud have all 14 (♂) and 13 (♀) joints.

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\* I have to add, however, that I can count only 13 joints in the ♀ specimens of *D. rubi*, kindly sent me by Dr. Rheinhard.

My *A. sylvestris* has 14 (♂) and 12 (♀) joints. Another North American species, parasitical in the gall of *Rhodites radicum* O. S. is, in this respect, like the preceding.

The striking difference in the structure of the abdomen of the ♂ and the ♀ is, as Mr. Rheinhard informs me, a peculiarity of this genus. As to the position of *Aulax* in the system, that assigned to it by Hartig is somewhat doubtful, as, according to his statement, some of its species are true gall-producers (*Psenides*), others parasites (*Inquilinae*). The further observations of Giraud have not dispelled these doubts. Of the European 16 species at present described, seven are said to produce galls on *Salvia*, *Scorzonera*, *Papaver rhoeas*, *Hieracium* and *Glechoma*; three have been reared from galls of other species, (two from *Rhodites*-galls on the rose, one from an oak-gall of *Andricus*).

The N. American *Aulax* known to me at present, are all parasites. *A. sylvestris*, described below, lives in the gall of *Diastrophus*; *Aulax semipicea* Harris is obtained from the root-gall of the rose (*Rhodites radicum* O. S.), and was mistaken by Dr. Harris for the originator of this gall. A third species, *A. futilis*, which I described in my paper on the Cynipidæ of the oak (Proc. Ent. Soc. Phil. I, p. 64) is somewhat doubtful, as I was not well acquainted with the characters of the genus *Aulax* at that time, and have accidentally broken since the only specimen, which I reared from the gall of *Cynips q. futilis* O. S. I moreover possess three other species, all reared from rose-galls, and of one of which (*A. infuscatus* O. S.) I give a short description below.

This inconstancy in the habits of the species of the same genus is rather anomalous, and requires further observation. I would remind here of a very common reniform gall occurring on *Vaccinium* in this country, and from which, although collected quite abundantly, I never reared anything but two *Chalcidii*: a *Decatoma* and a *Pteromaloid* insect. Would this be considered as a sufficient proof that either of these insects is the originator of the gall? The neuration of the wings of the species of *Aulax*, especially the form of the radial area, undoubtedly establishes their relationship to the parasitical Cynipidæ (*Inquilinae*).

Hartig says (l. c. III, p. 334) that the radial area in *Aulax* is closed in some species, open in others. Judging by the structure of this area in *A. sylvestris* and *A. semipicea*, I am inclined to believe that this character, at least in this genus, is a very indefinite one, as the closing

of the radial area is not so much due to a vein, as to a thickening of the margin of the wing, which appears like a prolongation of the subcostal vein. This thickening is more or less apparent in different species, and hence, doubts may often arise as to the radial area being open or closed. (Hartig himself, pag. cit., calls it, in some species, *half-closed*.)

The two N. American *Diastrophus*-galls and their insects may be described as follows.

**RUBUS VILLOSUS (?)**. *Blackberry. Elongated, abrupt, pithy swelling on the twigs, from an inch to three inches in length.* **DIASTROPHUS NEBULOSUS** n. sp.

This deformation, chiefly due to a hypertrophy of the pith, in consequence of the sting of the insect, is very common in the environs of Washington. Its color is generally dark red or reddish brown; its shape oblong; its surface generally uneven with irregular tubercles, or with deep longitudinal furrows, dividing the whole gall in four or five parallel ridges. The full-grown specimens are usually 2 or 3 inches long, and from  $\frac{3}{4}$  to an inch in diameter. A transverse section of the gall shows a large number of oblong cells, about 0.13 long, arranged for the most part near the middle of the gall; their intervals are filled with soft pithy matter and harder woody fibres. From galls collected in the fall, the insects usually come out during the winter and in the spring.

Besides the *Diastrophus* and the *Aulax*, I have reared from these galls parasites belonging to the genera: *Cullimome* (two species), *Ormyrus* and *Eurytoma*.

**Diastrophus nebulosus** n. sp.—Pitch-black, smooth and glossy above, antennæ and feet red; wings hyaline *areolet distinct*, second transverse vein and tip of the subcostal slightly clouded; length, ♂, 0.08—0.1; ♀, 0.1—0.11.

♂ antennæ 14 jointed; third joint slightly excised below.

♀ “ 13 “ third joint entire.

Head pitch-black, mandibles more or less reddish, tip black; face also sometimes tinged with brownish or reddish, especially round the mouth, the face is sculptured with fine scratches, (aciculated) convergent towards the mouth; its middle shows an elongated, smooth swelling; above antennæ, the head is smooth and shining; antennæ reddish sometimes darker at tip, (♂) 14, (♀) 13-jointed; the 3d joint of the ♂ is the largest, excised beneath; last joint longer than the preceding, but shorter than the two preceding taken together, pointed, almost conical; last joint of the ♀ as long as the two preceding together, subcylindrical, pointed, showing slight indications of a subdivision into three joints;

thorax pitch black, collare and humeri aciculated, reddish in some specimens; the smooth, shining space on the pleuræ is aciculated below, near the coxæ; the mesothorax is smooth and shining above; interval between the parapsidal grooves smooth; scutellum gibbose, black, densely sculptured, with two pits at base; abdomen pitch-brown, slightly tinged with red at base, second segment\* equal to half the length of the abdomen; the third somewhat shorter, the following very short; feet, including coxæ, reddish, onychia blackish; wings hyaline, radial vein not reaching the anterior margin; both transverse veins and the two latter segments of the subcostal more or less infuscated; areolet distinct, of moderate size, slightly petiolate that is, separated by a short stout vein from the adjoining corner of the radial area; two almost obsolete narrow, diverging pale brownish streaks in the apical area; they are frequently altogether indistinct.

Numerous ♂ and ♀ specimens. The coloring is more or less brownish or reddish, according to the degree of maturity of the specimens.

**Aulax sylvestris** n. sp.—Pitch-black, antennæ reddish, feet yellowish-red; space between the parapsidal furrows somewhat punctate anteriorly; areolet distinct; wings hyaline; length, ♂, 0.09—0.1; ♀, 0.1—0.12.

♂; antennæ 14-jointed; second and third segments of the abdomen not differing much in length; the others short.

♀; antennæ 12-jointed the second segment of the abdomen occupies almost the whole of its surface.

Head black, face aciculate, the scratches converging towards the mouth, front and vertex glossy and shining. Thorax black; prothorax opaque, finely pubescent, sculpture indistinct; dorsum of the mesothorax shining, although a strong magnifying power shows that it is minutely punctured; pleuræ with a large, smooth and glossy square space, the lower side of which is somewhat aciculated; scutellum gibbose, deeply rugose-punctate, with the two usual basal pits; abdomen pitch brown, verging in chestnut brown or yellowish brown below; feet reddish yellow; wings hyaline; veins yellowish brown, not clouded, radial area open (that is, not limited by a vein along the costa).

Many ♂ and ♀ specimens.

As stated above, there is the most striking resemblance in sculpture and coloring between this species and the preceding. In order to complete their descriptions, I will add here a detailed comparison between them.

\* In order to avoid a possible misunderstanding, I remind here, that in this paper, as in my preceding papers on *Cynipidæ* I call *second* segment that which is *apparently* the first, thus following Dr. Rheinhard's terminology. (See my paper: On the *Cynipidæ*, etc., Proceed. Entom. Soc. Phil. Vol. I, p. 48 in the note.)

**Diastrophus nebulosus.**

♀ antennæ, 13 jointed, last joint as long as the two preceding taken together, etc.

♂ antennæ 14-jointed; 1st joint longer, last joint shorter than in *A. sylvestris*.

Prothorax (collare) and humeri aciculated.

Thorax smooth and very shining above, without any vestige of a sculpture, except the usual furrows.

Interval between the anterior ends of the parapsidal grooves (near the prothorax) smooth; the two short, intermediate grooves usually apparent there, are hardly perceptible.

♂ abdomen oval, more or less attenuated and pointed (not truncate) behind; it is compressed from above that is, its vertical diameter is longer than, or at least equal to, its transverse diameter.

♀ abdomen in structure, like that of the ♂ (with the usual sexual differences); that is, the second and third segments of the abdomen do not differ considerably in length.

Sheath of the ovipositor concealed.

*Wings.* Subcostal, first and second transverse veins much stouter than the others and clouded with brown. Second transverse vein slightly arched and shorter than in *A. sylvestris*.

**Aulax sylvestris.**

♀ antennæ, 12-jointed, last joint longer than the two preceding taken together, subcylindrical, showing a subdivision in three joints.

♂ antennæ, 14-jointed; first joint shorter, last joint longer than in *D. nebulosus*.

Prothorax and humeri indistinctly punctured and finely downy.

Dorsum of the thorax appearing minutely punctured under a strong magnifying power, and therefore somewhat less shining than in *D. nebulosus*.

Interval between the anterior ends of the parapsidal grooves with some distinct punctures; the two short, intermediate grooves are apparent.

♂ abdomen bell or funnel-shaped, truncate behind; it is compressed from the sides, that is, its transverse diameter, at the broadest place is shorter than its vertical diameter.

♀ abdomen very different in structure from that of the male, as the second segment occupies almost its whole surface, the following ones being either concealed under it or protruding but little beyond it; the abdomen is strongly compressed from the sides, that is, its vertical diameter is much longer than the transverse one; seen from above, the abdomen appears somewhat bell-shaped in outline, being oval and truncated at top.

Sheath of the ovipositor directed upwards and protruding distinctly.

Subcostal, etc., not, or very slightly, stouter than the radial vein, not clouded with brown.

Second transverse vein straight and longer than in *D. nebulosus*.



The consequence of this last difference is that the radial area of *Aulax* is broader, resembling in this respect those of the other *Inquilinae*, whereas the narrower, although short, area of *Diastrophus*, with the areolet nearer its basis, is more like those of the true Cynipidæ (*Psenides*). Other differences between the two species are, that *A. sylvestris* has the areolet slightly larger, that its feet are somewhat paler, etc.

**RUBUS** sp. *Blackberry. A number of small, round, hollow bodies, forming a cluster round a branch.* **DIASTROPHUS CUSCUTÆFORMIS** n. sp.

I possess two specimens of this gall, collected near Bladensburg, Md., and kindly communicated to me by Mr. Hitz.

The globular, seedlike bodies, each having about 0.1 in diameter and producing a single insect, are (in one of my galls) from 60 to 70 in number, and occupy a space of about an inch and a half on the branch. They are pressed closely together and offer some resemblance to the seeds of *Cuscuta*, when found in winter attached to a stem. Many of the round bodies emit more or less strong spines, which impair in a measure the regularity of their form. The consistency of their shell is woody; their color brownish, like that of the branch.

I was unable to ascertain on what species of *Rubus* this gall occurs.

Besides the *Diastrophus*, originating this gall, I have obtained from it an *Ormyrus* and an *Aulax*, which, as far as I can judge from a single specimen, is my *A. sylvestris*, also reared from the other blackberry-gall.

**Diastrophus cuscutæformis** n. sp. Pitch brown or black; antennæ and feet red; *areolet wanting*; wings hyaline, a small brown cloud near the anterior margin, on the angle formed by the second transverse vein and the tip of the subcostal; ♂ 15 (?), ♀ 14 jointed antennæ.

This species is like *D. nebulosus* in sculpture and coloring, with the following differences: 1. The ♀ antennæ are 14 (and not 13-jointed); the last joint is *shorter* than the two preceding taken together, subconical, pointed; the ♀ antennæ (at least in the only specimen of that sex which is in my possession) have the 14th joint elongated and subdivided by a somewhat indistinct suture in two unequal halves, the posterior one being the shortest and thus forming a minute 15th joint.

2. The color of the antennæ is somewhat more brownish. 3. The face is aciculated all over its surface, without any smooth spot in the middle. 4. The scutellum is drawn out into a point, almost subconical. 5. The wings have no areolet (two specimens have an irregularly formed areolet on the left wing only); this cell, however, cannot even be considered as a true areolet, as, instead of being formed by a bifurcation of the second transverse vein, it occupies the lower corner of the radial area. 6. The brown cloud near the tip of the subcostal vein is larger and more distinct; this portion of that vein is very stout, dark brown, and is distinctly attenuated before reaching the margin, whereas in *D. nebulosus* it has the appearance of touching the margin, and is paler brown and less distinctly attenuated. 7. The pale brown clouds, in the form of streaks, towards the tip of the wing, which exist in *D. nebulosus*, are wanting here.

One ♂ and eight ♀ specimens. The ♂ is easily distinguished by the third antennal joint, excised below. The coloring of this species, like that of the preceding, is frequently more or less brownish or reddish, especially on the face, the collare and the humeri, according to the maturity of the specimens.

## CYNIPS-GALLS ON THE ROSE.

### I. THE GALLS.

I am acquainted with eight cynipideous galls on the different kinds of roses of this country. My account of them is, perhaps, not so complete as I would desire it, as most of these galls have not been observed by myself, but were communicated to me by others.

1. *An agglomeration of hard cells round a branch, the whole covered with long and dense greenish filaments and forming a moss-like mass of an inch and a half or more in diameter.* This, or a similar gall (see Reaumur, vol. III, Tab. 47) is well known in Europe under the name of the *bedeguar*, (from the Hebrew *bedeguach*, said to mean *rose-apple*), and was formerly used medicinally. I cannot discover any difference between the gall-fly obtained in this country and some European specimens of *R. rosae*, communicated to me by Mr. Rheinhardt. One specimen of the gall from New York, was communicated to me by Mr. Glover; another, with numerous female *Rhodites* reared from it, by Mr. Norton. Mossy galls of similar appearance, but much smaller,

occur frequently on rose leaves. I do not know whether they are the produce of the same insect. Besides the ordinary parasites, a beautiful *Eupelmus* with rudimental wings and two elevated ridges on the mesothorax, has been reared from this gall.

2. *Hard, woody, irregular swelling of the branches, generally about two inches long and about half an inch or a little more in diameter.* This is the gall of *Rhodites dichlocerus* Harris (Harris, Insects, etc., p. 549, Tab. VIII, p. 8, of the 3d edition). Specimens from New York and Connecticut were communicated to me by Mr. Akhurst and Mr. E. Norton. The ♂ and ♀ insect are described below under the above name. *Aulax*, *Callimome*, *Ormyrus* and *Eurytoma* were reared from this gall.

Several ♀ specimens of *Rhodites* apparently identical with *R. dichlocerus* were labelled in Mr. Norton's collection as having been reared from the elongated, densely prickly rose-gall (comp. below, No. 8). If this is not a mistake, it would lead to one of the two conclusions: either the insects obtained from the two galls offer some nice distinctions which escaped my scrutiny, or the prickly gall No. 8 is a mere variety of the other.

3. *Oblong or rounded swellings of the small branches.* They vary in appearance, as there is sometimes one more or less oblong swelling, containing two or three cells, and about one third of an inch long, sometimes a series of three or four such swellings, which, although continuous, do not coalesce entirely, each preserving its rounded shape. In this respect this gall is very different from the preceding, which, in the majority of specimens, is a more continuous swelling, tapering at both ends.

When cut open, the galls appear more hollow than those of *R. dichlocerus*, and this for the very plain reason that, although being smaller, they produce insects, and consequently contain hollows, of the same size. There also seems to exist a constant difference in the color of both galls; the specimens of the gall of *R. dichlocerus* in my possession have a more or less dark, purplish-red skin; those of the other gall are either green, when found on young, green twigs, or they have the color of a dead branch. I found this gall near Washington, and reared from it (besides the *R. verna* n. sp. described below), *Eurytoma*, *Ormyrus*, *Eupelmus*, *Tetrastichus* and *Pteromalus*. A small moth had also taken refuge within one of the probably empty galls.

4. *Rounded, warty, sometimes very large gall, smooth on the outside, occurring on the roots of roses and containing numerous cells, with an intervening pithy matter.* This is the gall described by Dr. Harris (l. c. p. 549), as the gall of *Cynips semipicea* Harris. But Dr. Harris's description of this insect does not refer to the true originator of the gall, *Rhodites radicum* n. sp. (described below). Dr. Harris says: they resemble closely the *dark varieties* of *C. dichlocerus* in color and in the little furrows of the thorax, *but their legs are rather paler and they do not measure more than one-tenth of an inch in length.*" *R. radicum* is much larger than one-tenth, and its legs instead of being paler, are on the contrary conspicuous among those of the other *Rhodites* by the intensity of their brownish-red color. Dr. Harris's description probably refers to a parasite (perhaps an *Aulax*).

Specimens of this gall have been communicated to me by Mr. Norton and Mr. Akhurst. *Eurytoma*, *Callimome*, *Ormyrus* and an *Eupelmus*, with rudimental wings, have also been reared from it.

5. *Rounded, smooth, abrupt swellings of the branches.* The outside of this gall (form, color and skin), is not like the preceding. Some of them remind by their appearance the galls of *Diastrophus nebulosus* on the blackberry. They are easily distinguished from *R. dichlocerus* (No. 2), as they rise abruptly from the branch, whereas the other gall is gradually tapering at both ends. The substance of this gall is rather soft, corky, with numerous cells. The form is more or less oblong, sometimes almost round; my specimens measure from three-fourths of an inch to an inch and a quarter in length; the largest is a little more than three-fourths of an inch broad.

Mr. Norton, to whom I owe the communication of this gall, reared from it a very large number of specimens of an *Aulax*. Until further proof I cannot, however, consider this insect as the originator of the gall. I am also doubtful, whether several specimens of *Rhodites* (described below as *R. ignota* n. sp.) in Mr. Norton's collection, marked as being obtained from "smooth rose-galls," belong here, as precisely similar specimens were reared from another gall (comp. gall. No. 7).

***Aulax pirata*** n. sp.—Black, with reddish-yellow feet and antennæ; base of coxæ black; thorax pubescent; wings hyaline; length ♂ 0.08, ♀ 0.1.

Head black, mandibles somewhat reddish; face finely pubescent, a longitudinal protuberance between the mouth and the antennæ; the interval between it and the eyes is finely aciculated, the scratches converging more or less to-

wards the mouth; antennæ reddish (somewhat brownish in some of the ♀); 14-jointed in the ♂, the third joint very strongly excised on the underside, with projections on both sides of the excision which give this joint an almost reniform or crescent-shaped appearance; last joint but a little longer than the preceding; ♀ antennæ 12-jointed, third joint without excision, last joint much longer than the preceding, although not quite as long as the two before last taken together; thorax black, finely pubescent, finely but densely sculptured, and therefore not very shining, although not opaque; parapsidal grooves not deep, and distinctly apparent only from a side view; intermediate grooves indistinct, shallow, convergent; pleuræ with a large, polished space, which appears aciculated only under a strong magnifying power; scutellum protuberant, deeply rugose, opaque, with two small pits at the bottom; abdomen black, polished; in the ♂ elliptical, base finely pubescent above, the third segment longer than the second; the following ones contracted; the tip finely punctured and pubescent; in the ♀ somewhat rhomboidal on a side-view, flattened from the sides; the second segment occupies nearly the whole of its surface; the following ones contracted; the last one finely pubescent; sheath of the ovipositor exerted above the abdomen, pointing upwards; (the structure of the ♀ abdomen is exactly the same as that of *A. sylvestris*, n. sp. described on page 37); wings hyaline, veins pale; second transverse vein somewhat arched; margin of the wing inside of the radial area thickened, so as to make it appear closed; areolet of moderate size.

A large number of ♂ and ♀ specimens.

6. *Round galls, about 0.3 or 0.4 in diameter, covered with prickles about as long as the diameter of the gall.* Sometimes three or four of these galls are in a cluster. This is the gall of *Rhodites* (Cynips) *bicolor* Harris (l. c. p. 548). Gall and fly were communicated to me by Mr. Norton; the fly is described below. Besides other parasites, numerous specimens of an *Aulax* were reared from it by Messrs. Norton and Akhurst. This *Aulax* is hardly different from *A. pirata*, described above.

7. *Round galls of the size of a pea, covered with a white efflorescence, on the leaves of Rosa carolina.* Sometimes two or three of these galls coalesce, thus forming an elongated mass of more irregular shape. The leaf is often almost wholly obliterated, the galls growing near the central rib. The substance (at least that of the dry galls which I have for examination), is hard and woody. Each gall contains several cells. They were communicated to me by Dr. Foreman, who found them in Maryland, but, except a *Callimome*, I obtained nothing from them.

Among the galls communicated to me by Mr. Norton, there is a

single specimen of one, which is not unlike the preceding, and may be the same gall; it consists of a mid-rib of a leaf, on which are four rounded galls, somewhat, although not entirely coalescent, each retaining its rounded form; the specimen is about 0.8 long, the diameter of each of the galls being 0.15 or 0.2. The surface is finely, irregularly netted, yellowish and not whitish-mealy like the other. From this gall were obtained two ♂ specimens, which apparently belong to the species described below as *R. ignota*. The latter species was labelled in Mr. Norton's collection as being reared from a "smooth rose-gall." (See above, No. 5).

8. *Elongated swelling of a twig, covered with numerous, dense prickles*. I owe to Mr. Glover a specimen of this gall, a section of which shows cells, evidently belonging to a cynipideous insect. The originator of the gall is unknown to me; but in Mr. Norton's collection several ♀ specimens of an insect apparently identical with *R. dichlocerus* were labelled as being reared from a similar gall.

## II. RHODITES Hartig.

The genus *Rhodites*, in Europe as in N. America, seems to be exclusively confined to the rose. Five European species are known, all producing galls on this shrub. Six North-American species, which all share the same mode of living, are described below; one of these species (*R. rosæ* L.) is common to Europe and N. America.

*Rhodites* as a genus, is very easily distinguished by its general appearance, although it is no more satisfactorily defined than the other cynipideous genera. Hartig, for instance, counts 15 and 16 joints on the antennæ, whereas I never found more than 14 in both sexes. The last joint shows, it is true, a kind of suture in the middle, but this suture is no true division of a joint, as can be easily ascertained by comparing it to the other divisions; moreover, it occurs in both sexes and may even be indistinctly perceived in some of the other joints. The third joint is the longest, generally as long as, or a little longer than, the two following taken together. The underside of the last abdominal segment is drawn out here in a long point, which seems to be peculiar to the genus; in *Diastrophus* for instance, the tip of this segment is more or less truncated.

The sexes are frequently distinguished in this genus by the coloring of their abdomen and wings; the neuration as well as the sculpture of the thorax are generally the same in both sexes.

*Analytical table for the determination of the species.*

## MALE SEX.

1. Whole abdomen black.....2  
Basal third of the abdomen red ; areolet small, often wanting.....**R. dichlocerus** Harris.
2. A stump of a vein, or at least a pointed or angular projection inside of the radial area on the second transverse vein.....3  
No such stump or projection, the second transverse vein, inside of the radial area, being smooth.....5
3. A short, brown line or projection, like the stump of a vein, on the underside of the areolet, near the angle directed towards the tip of the wing; elongated brownish clouds, indefinite in outline, in the apical area.....**R. bicolor** Harris.  
No such line or stump .....4
4. A more or less distinct brown spot or cloud at the tip of the radial vein, near the margin of the wing; another on the transverse vein between the areolet and the margin; *space of the radial area between these two clouds hyaline*; no glossy, shining spots on the pleuræ.....**R. ignota** n. sp.  
Radial area tinged more uniformly than in the preceding species; pleuræ with smooth spots, which are much more glossy than their surroundings.....**R. rosæ** Linn.
5. Parapsidal grooves remarkably deep; areolet small, radial and apical areæ clouded.....**R. radicum** n. sp.  
Parapsidal grooves very moderate, areolet of ordinary size; hardly any distinct clouds on the radial and apical areæ.....**R. verna** n. sp.

## FEMALE SEX.

1. Whole body pale chestnut.....**R. dichlocerus** Harris.  
Body black.....**R. radicum** n. sp.  
Head and thorax black, abdomen red.....2
2. Whole abdomen red.....3  
Three or four of the last segments black.....**R. rosæ** Linn.
3. No stump or projection on the second transverse vein, inside of the radial area; the latter and its surroundings clouded with pale brownish.....**R. verna** n. sp.  
A stump of a vein or a pointed or angular projection on the second transverse vein, inside of the radial area.....4
4. Radial area and its environs clouded; a short brown line, like the stump of a vein on the underside of the areolet.....**R. bicolor** Harris.  
Two small, but well-marked clouds occupy both sides of the radial area, its middle being hyaline.....**R. ignota** n. sp.

*Description of the species.***Rhodites dichlocerus** Harris.

Syn. *Cynips dichlocerus* Harris, Ins. of Mass. 3d edit. p. 549.

♂ 0.1 long, black, base of abdomen red.

♀ 0.14 long, brownish red, antennæ black, except the three basal joints.

♂ Head black, dark reddish behind, sometimes also with a reddish spot on the inside of the eye; mandibles (except tip) and labrum red; two basal joints of the antennæ often reddish-brown. Thorax black, subopaque, pubescent, punctate and rugose, parapsidal grooves well marked, intermediate grooves flat, with a shining bottom; often a reddish spot on the pleuræ, immediately over the anterior coxæ, sometimes one on the scutellum; abdomen black, yellowish-red at base; this red has more extent on its sides (where it sometimes reaches the third segment), than on its back; feet red; coxæ red with black base, sometimes black with reddish tip; tip of tarsi black; wings hyaline; the second transverse vein curved or angular; areolet either of moderate size, or very small, or altogether wanting, its sides coalescing into one stout vein (this is quite often the case with this species).

♀ Head brownish red, cheeks generally more brownish; antennæ: three basal joints, except the very tip of the third, red; the remainder black; thorax brownish red, sculpture as in the ♂; abdomen brownish red; pointed tip of the lower half of the last segment, brown; wings pale brownish; radial area and surroundings clouded with pale brown; areolet extant; second transverse vein angular.

Numerous ♂ and ♀ specimens; the latter more common. Mr. Harris does not notice the difference in color of the ♂ and the ♀; he only mentions a darker variety, which may be the ♂. Some of the ♂ specimens are much smaller than the others, and with much less red at the base of the abdomen.

The gall is described above (No. 2).

**Rhodites radicum** n. sp.

♂ 0.13 long; coxæ black.

♀ 0.15 long; coxæ dark reddish, their base black.

Head and antennæ black; two basal joints of the latter sometimes reddish-brown; mandibles reddish; thorax black, somewhat shining, densely, but very finely and uniformly sculptured, so as to give its surface a silky appearance; parapsidal grooves *broader and deeper than in the other species*, running down to the humeri; intermediate grooves short, but well marked; pubescence of the thorax above scattered and hardly apparent, except on a side-view; pleuræ with two smooth and shining oblong spaces; humeri very rugose, scutellum likewise; abdomen black, shining, sometimes brown; borders of segments sometimes paler; feet dark red, two hind pairs of femora infuscated, especially at base; tips of tarsi brown; wings: radial and apical areæ and a portion of the cubital clouded with brown; areolet rather small; its angle, directed towards the base of the wing, is for the most time pale, subobsolete; the portion of the cubital between the first transverse vein and the areolet is often subob-



solete or obsolete in this species; the second transverse vein is smooth, without projection inside of the radial area, although sometimes slightly angular.

The sexes in this species are more alike than in any other; they are, however, easily distinguished by the structure of the abdomen.

The specimens which I possess in considerable number, were communicated to me by Mr. E. Norton.

As already noticed above, Dr. Harris's *C. semipicea* cannot possibly refer to this species. (Compare about it the description of the gall, under No. 4.)

**Rhodites rosæ** Linn.

♂ Black.

♀ 0.13—0.15 long, abdomen red, black at tip.

♀ Head and antennæ black, mandibles reddish, thorax black, pubescent, smooth and but finely sculptured, parapsidal grooves not deep, and quite indistinct when viewed from above, stopping some distance before reaching the humeri, intermediate furrows well marked, shining at bottom, pleuræ with two oblong, shining spots, abdomen red, the four last segments black; feet red, coxæ and tip of tarsi black, wings pale brownish, with a brown cloud on the radial area and its surroundings; the second transverse vein, which is angular, has a small, but distinct projection within the radial area; areolet of moderate size.

The sculpture of the thorax is not dense enough to render it opaque and it retains some of its gloss; in this respect it resembles the *R. verna*. By all means, the black tip of the abdomen renders this species sufficiently distinct.

The male seems to be very rare, as among 200 specimens which passed through my hands, thanks to Messrs. Norton and Akhurst, there was only a single ♂. I was unfortunate enough to lose it in attempting to paste it on paper. The glimpse I had of it was sufficient to show that its abdomen was black, and its wings less tinged with brown. (The European *Rhodites rosæ* ♂ has also a black abdomen.)

The gall of this species has been described above (under No. 1); it is similar to the European gall, known as the *bedeguar* of the rose. I could not perceive any difference between my specimens of the European *R. rosæ* Linn. and the American insect.

**Rhodites verna** n. sp.

♂ 0.1—0.11 long, body black, feet red, coxæ black.

♀ 0.15 long, abdomen red; feet, including the coxæ, red; base of the latter black.

Head and antennæ black, mandibles reddish, thorax black, *finely, not densely sculptured, somewhat shining, pubescent, parapsidal grooves moderately deep;*

they touch the humeri: the intermediate grooves generally appear as smooth lines, unless viewed obliquely; scutellum rugose on the sides, more smooth in the middle, but, in general, *not so rough in appearance as in most other species*; abdomen (♂) black, (♀) red, *fringed with pale yellowish hairs on the hind borders of the segments*; tip of the point on the underside of the ♀ abdomen brown; basis of ♂ femora brownish; wings ♂ hyaline, ♀ somewhat tinged with brown and with a more or less distinct cloud on the radial area and its surroundings; in both sexes, the second transverse vein has no projection within the radial area and is arcuate; the areolet is of a moderate size, larger in ♀.

Two ♂ and 16 ♀ specimens reared by me in Washington, from the galls. These have been described above (No. 3).

The fringe of pale yellow hairs on the border of the ♂ abdominal segments seems to be peculiar to this species, as it is quite distinct in all my specimens, whereas I do not notice it in the numerous specimens of other species, communicated to me by Mr. Norton.

*R. verna* resembles in coloring *R. bicolor* and *R. ignota*; but the latter is easily distinguished by the peculiar coloring of its wings; *R. bicolor* by its less pubescent, more roughly sculptured, and therefore more opaque thorax and scutellum, the structure of its second transverse vein, etc.

#### **Rhodites bicolor** Harris.

♂ 0.15 long, black; feet red, coxæ black.

♀ 0.15—0.16 long, abdomen red; feet and coxæ, except at the base, red.

This species is so much like the preceding, in both sexes, that it will be sufficient, for its recognition, to notice the differences.

Thorax less pubescent, somewhat more roughly sculptured and therefore more opaque; parapsidal furrows somewhat deeper; the intermediate furrows appear as *distinct ridges* when viewed obliquely; scutellum, likewise, more deeply rugose; the smooth, glossy spots existing on the pleuræ of some other species *are hardly apparent here*, these spots being sculptured more or less like the remainder of the pleuræ; the brownish cloud on the radial area of the ♀ is more intense; the ♂ wing is also somewhat clouded along the stout veins and has two indistinct clouds in the apical area; the second transverse vein has a light projection about its middle, in the radial area (in some specimens this projection is very small); the veins forming the *anterior* angle of the areolet, as well as the portion of the cubital vein, preceding the areolet, in this species are thin, often subobsolete; said portion of the cubital vein being often merely indicated by a brownish streak (without vein): *there is a short, pale brown line, as if a stump of a vein, close by the posterior angle of the areolet*, (that is the angle, which is nearer the tip of the wing), on its out and underside. This last mark, trifling as it seems to be, exists in precisely the same degree of distinctness, in the nine specimens which I have before me.

A single ♂ and 8 ♀ specimens, communicated by Mr. Norton and

reared by him from the gall (see above, No. 6). The male is considerably larger than that of *R. verna*.

**Rhodites ignota** n. sp.

♂ 0.12—0.13 long, black; feet red; coxæ and base of femora black.

♀ 0.14 long, abdomen red; feet, including coxæ, red.

Head and antennæ black, mandibles brownish red, thorax black, densely rugose, opaque; parapsidal furrows not very distinct, intermediate ones likewise; the latter, in some specimens, have the appearance of small ridges; no distinct, smooth, shining spots on the pleuræ, especially in the ♀; wings: second transverse vein angularly bent, with a projection in the middle, inside of the radial area; (in some specimens, especially the ♂, this projection is quite large, like the stump of a vein); radial area shorter than in the other species, the radial vein being slightly arched; the margin of the wing within this area is thickened, so as to appear like a vein, closing the area; a brown spot between the areolet and the anterior margin; another one at the tip of the radial vein, near the margin; (in the ♂ these spots have often very little extent, appearing only like brownish margins along the veins); *the space of the radial area between these spots is hyaline*; the tinge of the ♀ wing is somewhat yellowish, whereas that of the ♂ is more hyaline.

The thorax of this species is proportionally smaller than the thorax of *R. verna* or *bicolor*, and hence the body has a more slender appearance.

Four ♂ and two ♀ specimens were in Mr. Norton's collection, with labels indicating that they had been obtained from a "smooth rose gall". Is it the gall described above under No. 5? This seems doubtful, as two other males, apparently of the same species, were reared from quite a different gall, described under No. 7.

### ERRATA.

Some corrections in my paper have become necessary in consequence of my having made a change in the latter part of my manuscript, and having forgotten to introduce a corresponding alteration in the preceding text. These corrections refer all to page 35 and are as follows:—

Line 1 and 2 from the top. Instead of Another North American species parasitical in the gall of *R. radicum*, read: My *Aulax pirata*, parasitical on rose-galls, is, etc.

Line 15 and 16. For *Aulax semipicea* Harris is obtained, read: *Cynips semipicea* Harris is probably an *Aulax*, obtained etc.

Line 17. Strike out the word *was*.

Line 23. For *three* read *two*.

Line 24. For *A. infuscatus* read *A. pirata*.

Line 2 from the bottom, for *A. semipicea* read *A. pirata*.

On page 39, line 8 from the bottom, after the word antennæ, add: Length, ♂ 0.08; ♀ about 0.1.

## S T A T E D M E E T I N G, M A Y 11.

President BLAND in the Chair.

Thirteen members present.

## R E P O R T S O F C O M M I T T E E S.

The Committees on the papers of Messrs. Grote and Saunders, read April 13th, reported in favor of their publication in the Proceedings of the Society.

## D O N A T I O N S T O C A B I N E T.

43 LEPIDOPTERA (*Papilio Zolicaon*, *P. Calchas*, *P. Polydamus*, *P. Philolaus*, *P. Agesilaus*, *Callidryas Eubule*, *C. Eurytheme* ♂, *C. Argente*, *C. Galaetina*, *Terias Nise*, *Anthocaris Sara* ♂ ♀, *Rhodocera Clorinde*, *R. Cipies*, *Marinus Thetys*, *Heliconia Charitonia*, *H. phætusa*, *Heterochroa Laura*, *Agraulis Vanillæ*, *A. Calippe* ♂, *Colaenis Juno*, *Melitæa Chalcedon* ♂ ♀, *M. Anicia* ♀, *Vanessa Californica*, *Victorina Stelenes*, *Euptoicta Hegesia*, *Amphirene epaphus*, *Castnia Quiteria*, *Bacotis Parthenis*, *Cremna Orpheus*, *Limnas Melander*, *L. Barca*, *Smerinthus ophthalmicus* ♂ ♀), from Wm. H. Edwards.

26 COLEOPTERA (*Oxycheila tristis*, *Pseudoxycheila bipustulata*, *Callichroma vittata*, *C. Dejeanii*, *C. velutina*, *Stemodonta regalis*, *Oncideres pustulatus*, *Crosotes plumicornis*, *Mallosoma submetallica*, *Golofa Encas* ♂ ♀, *Strategus Alæus*, *Allorhina columbica*, *Aphistonus Afzeli*, *Pasimachus morio*, *Arhopalus speciosus*, *Cetonia hæmorrhoidalis*, *Silpha micans*, *Strategus Julianus*, *Copris hamadryas* ♂ ♀), from Aug. R. Grote.

## D O N A T I O N S T O L I B R A R Y.

*Journal of the Academy of Natural Sciences of Philadelphia, new series, Vol. 5, Part 3, and the Proceedings, No. 1 for 1863.* From Dr. Thos. B. Wilson.

*Insectes recueillis en Afrique et en Amérique, par A. M. F. J. Palisot de Beauvois.* 1 Vol. Folio.

*An Introduction to Entomology or elements of the Natural History of Insects, by Kirby and Spence.* 4 Vols. 8vo.

*British Entomology, by John Curtis.* 3 Vols. 8vo. From Mrs. Lucy W. Say.

*Histoire générale et iconographie des Lépidoptères et des chenilles de l'Amérique septentrionale, par Boisduval et Leconte.* 1 Vol. 8vo. From Dr. Brackenridge Clemens.

*The Entomologist's Annual for 1863.* From E. T. Cresson.

The following works were deposited by Dr. T. B. Wilson:—

*Boston Journal of Natural History, Vols. 1, 2, 3 (Nos. 3 & 4), 4 (Nos. 2—4), and 6.*

*Entomologische Zeitung. Herausgegeben von dem entomologische Vereine zu Stettin.* 1863, Nos. 1—3.

*Wiener Entomologische Monatschrift.* Bd. 7, Nr. 2.

*Revue et Magasin de Zoologie, par M. F. E. Guérin-Ménéville.* 1863, No. 1.

*The Zoologist, for January, February and March, 1863.*

*Orthoptera descripta et depicta a T. de Charpentier.* 1 Vols. 4to.

*Horae Entomologicae, adjectis tabulis novem coloratis. Auct. T. de Charpentier.* 1 Vol. 4to.

*A Supplement to the appendix of Captain Parry's Voyage for the discovery of the North-west passage, in the years 1819—20, containing an account of the subjects of Natural History.* 1 Vol. 4to.

*Natural History of the Insects of India. By E. Donovan. New Edition by J. O. Westwood.* 1 Vol. 4to.

*Nomenclator Zoologicus. Auctore L. Agassiz.* 1 Vol. 4to.

*Essai d'une Classification de la famille des Cérambycides et matériaux pour servir a une Monographie de cette famille. Par M. James Thomson.* 1 Vol. Royal 8vo.

*Genera et species Curculionidum, cum synonymia hujus familiae. Auct. C. J. Schoenherr.* 8 Tomes in 13 Vols. 8vo.

*Scopoli. Entomologia Carniolica.* 1 Vol. 8vo.

*Histoire Naturelle des Coléoptères de France. Par M. E. Mulsant.* 7 Parts. 8vo.

*Mémoire sur les Insectes nuisibles à l'Agriculture. Par M. J. Macquart.* Pamphlet. 8vo.

*Die Forst-Insecten. Von J. T. C. Ratzeburg.* 3 Vols. 4to.

*Entomologische Beiträge. Von J. T. C. Ratzeburg. Pamph. 4to.*  
*Untersuchung des Geschlechts-Zustandes bei den Sogenannten Neutris*  
*der Bienen und über die Verwandtschaft derselben mit den Königinnen.*  
*Von J. T. C. Ratzeburg. Pamphlet. 4to.*

*Über Entwicklung der fusslosen Hymenopteren-Larven, mit besonderer Rücksicht auf die Gattung Formica. Von F. D. C. Ratzeburg. Pamphlet. 4to.*

*Notes on the Locusta septentrionalis Americanæ decem septima. By Nathaniel Potter, M. D. Pamphlet. 8vo.*

*On Nycteribia, a Genus of Wingless Insects. By J. O. Westwood. Pamphlet. 4to.*

*General remarks upon the Coleoptera of Lake Superior. By John L. Leconte. Pamphlet. 8vo.*

#### WRITTEN COMMUNICATIONS.

The following papers were presented for publication in the Proceedings:—

“Additions to the Catalogue of United States Lepidoptera, No. 4, by Aug. R. Grote.”

“Description of a new species of Masaris from the Rocky Mountains, by E. T. Cresson.”

And were referred to Committees.

Letters were read

From the Secretary of the Smithsonian Institution at Washington, D. C., acknowledging the receipt of recent numbers of the Society's Proceedings.

From Mrs. Lucy W. Say, dated Newburgh, N. Y., April 20th, 1863, acknowledging her election as a Corresponding Member of the Society, and transmitting donations to the Library.

The following communication was read from Baron Osten Sacken:—

#### “APPEAL TO ENTOMOLOGISTS.

The first volume of the “Monographs on North American Diptera” by Herman Loew, published by the Smithsonian Institution, is already in the hands of the friends of American Entomology.

The second volume, containing the family of *Dolichopodidæ* will appear in the course of the summer.

The families of *Asilidæ*, *Empidæ*, *Tipulidæ*, *Tabanidæ* and *Stratiomyidæ* will be taken up next.

It is evident that the value and usefulness of these publications depends in a great measure on the amount of material on which they are based and it is highly desirable that the abundance of such material should, as far as possible, insure the completeness of the monographs and hence, their more lasting value.

I therefore beg to appeal to the friends of Entomology in North America, requesting them to direct their attention, during the coming summer, to the order of Diptera in general and to the above named families in particular. All collections of diptera sent to me either directly (see my address below) or through the Smithsonian Institute, will be made useful for the increase of the knowledge of the North American dipterological fauna and due credit will invariably be given to the discoverers of new species.

The wishes of the collectors respecting the naming of specimens or exchanges, will be, as far as possible, complied with.

R. OSTEN SACKEN.

NEW YORK, May 7th, 1863.

My address is:—

BARON OSTEN SACKEN,  
Care of *MM. Schepeler & Co.*,  
52 Exchange Place,  
New York."

#### UNFINISHED BUSINESS.

Mr. Knight's motion, made at the last meeting, to "add a Committee on Insect Architecture to Art. 1 of Chap. 6 of the By-Laws," was taken up and unanimously adopted.

#### NEW BUSINESS.

On motion, the thanks of the Society were unanimously tendered to Mrs. Lucy W. Say, of Newburgh, N. Y., and to Brackenridge Clemens, M. D., of Easton, Pa., for the valuable donations to the Library made by them this evening.

#### ELECTION.

On ballot, the following members were elected to serve as a "Committee on Insect Architecture" until the next annual election:—

J. Frank Knight,  
Charles A. Blake,  
Samuel Lewis, M. D.

**A revision of the species of CYMATOPHORINA, found in the United States and British America, with descriptions of new species.**

BY AUG. R. GROTE.

Curator of Entomology, Buffalo Society of Natural Sciences.

The family contained in the present paper, and for which I have retained the name proposed by Dr. Herrich-Schæffer, has been recognized by most modern Entomologists and the position assigned to it, at the head of the Noctuæ, is justified by its affinities with the concluding families of the preceding group of Bombyces.

This is seen in the pterogostic characters as well as the general appearance and ornamentation of the species comprised under it.

The number of known species belonging to this family is small, and they appear to be confined to the temperate regions of the globe.

An exception is found in *T. vicina* Gn., reported from Java, but doubtfully. I have not seen this species but am inclined to believe that in this instance, as is frequently the case, the reported locality of the species brought to Europe has been altered from the right one through accident or design.

The characters of this family are well defined. The antennæ are simple, more or less velvety or pubescent in the male. The palpi moderately slender, well clothed with hair, porrect. The thorax is convex; feet short; abdomen long and slender. Anterior wings heavy, velvety, more or less bombyciform in appearance. Posterior pair having the costal and subcostal nervules distinct from their inception.

The genera fall into the two following sections:—

I. VERÆ.

Anterior wings of dull, usually greyish, colors; no spur at internal angle.

II. FALSÆ.

Anterior wings of varied and bright colors; with a more or less prominent spur at internal angle.

To the first section belong the genera *Cymatophora* and *Leptina*.

The species of *Leptina* bear a strong general resemblance to each other. The orbicular spot is absent. The reniform spot is rounded,



small, lighter than the rest of the wing with a black mark in the centre. There is a humeral spot limited by an oblique line and a costal darker shade near the apex from whence the transverse posterior line traverses the wing to the internal margin.

I have described one new species and regret not to have been able to identify *L. Doubledayi* Guenée.

No American species of *Cymatophora* are known to me and I have not identified Mr. Walker's *C. caniplaga* from Canada.

To the second section belong the genera *Gonophora*, *Thyatyra* and *Lacinia*. It is this section which has been classed among the Noctuidæ by some authors chiefly on account of a superficial resemblance which the species present to the genus *Plusia*. This is seen more particularly in our native species. The resemblance is however accidental and a study of the pterogostic characters show the intimate relationship of this second section with the species of the first and the correctness of their present classification.

The genus *Gonophora*, separated from *Thyatyra* by Bruand, has been suppressed by M. Guenée and the species on which it was founded reunited to *Thyatyra*, and this course has been generally followed by continental authorities. In the present paper I have retained this genus, following Mr. Walker in this respect, as the study of our native species has led me to believe the separation justified and the genus as it stands well constituted.

I have separated from *Thyatyra*, *T. cymatophoroides* Gn., and a constant variety of that species, *expultrix* m., and propose for them the following genus:—

**LACINIA** nov. gen.

Antennæ moderately long, stout, simple in both sexes. Proboscis short. Palpi porrect, extending beyond the head, third joint short, moderately slender; second densely pilose. Anterior wings straight along the costa, somewhat depressed at the tip. Exterior border very convex, curving inward near internal angle which is furnished with a well developed spur. Apex acute, internal margin much shorter than costal. Abdomen moderately stout, extending well behind the hinder wings especially in the male in which it is furnished with tufts of hair along the sides and underneath.

In this genus the costal nervule of the inferior wings shows a greater upward curve beyond the point of its contiguity with the subcostal,

than in *Thyatira* and in this respect it approaches *Gonophora*. The ornamentation partakes of the peculiarities of both sections.

The following is a table of the genera:—

#### Section I. VERÆ.

- A. Size moderate. Antennæ short, stout, pubescent or pectinated in both sexes. . . . . 1. CYMATOPHORA.  
 A. Size small. Antennæ long, slender, nearly simple or slightly pubescent in both sexes. . 2. LEPTINA.

#### Section II. FALSÆ.

- B. Ornamentation in well defined spots; reniform and orbicular spots indistinct. Costal margin rounded . . . . . 5. THYATYRA.  
 B. Ornamentation in lines and irregular shaded marks; reniform and orbicular spots distinct. Costal margin straight. . . . . C.  
 C. Exterior margin moderately oblique. Proboscis moderately long; third joint of palpi very slender. Abdomen of the male not tufted underneath . . . . . 4. GONOPHORA.  
 C. Exterior margin convex. Proboscis short; third joint of palpi moderately slender. Abdomen of the male tufted beneath . . . 3. LACINIA.

In the following Catalogue of the described species of this family proper to our Continent, I have noted the Collection in which I found and determined the specimen and the locality in which it was reported to have been taken.

### CYMATOPHORINA, H. S.

*Noctuo-Bombycidæ*, Boisd., Guen., Walker.

#### CYMATOPHORA Treitschke.

*caniplaga* Walker, C. B. M. Noct. 1, p. 18.

Canada (Walker).

**LEPTINA** Guenée.

Walker, C. B. M.

**dormitans** Guenée, Noct. 1, p. 15. Walker, C. B. M. Noct. 1, p. 10.

Middle States. Coll. Mr. E. L. Graef, Brooklyn, L. I.

I am inclined to believe that the "alar. expanse" given by Guenée (27 mm) for this species is erroneous, as the ♂ specimen I have before me in perfect condition, and which conforms in all essential particulars to Guenée's description, is smaller than *L. ophthalmica* Gn., to which the same expanse is given. In his note to this species, M. Guenée remarks on its small size, which would corroborate this opinion.

**ophthalmica** Guenée, Noct. 1, p. 15, pl. 3, fig. 6. Walker, C. B. M. Noct. 1, 10.

Middle States. Coll. Ent. Soc. Phila.

This species is the most recognizable of the genus by its whitish thorax and humeral spot. Appears to be of rare occurrence.

**latebricola** nov. sp.

Anterior wings straight along the costa; exterior margin not so oblique as in the two preceding species. All the lines very indistinct. Thorax and humeral spot dark grey. Base clouded with blackish without any visible defining line. Median space greyish, lightest near the basal shade and showing the discal spot, as in all the species of this genus, rounded, light, small, with a black centre. Terminal space darker than median, with a black shade near the apex on the costa, and the transverse posterior line faintly visible, sinuate. Posterior wings greyish with discal lunule and a marginal darker line. Under surface of wings greyish without definite markings; a discal lunule and the traces of two very indistinct bands on the inferior wings. Abdomen greyish, blackish on the two first rings; lighter underneath.

A female. Exp.  $1\frac{1}{4}$  inch. New Jersey. Collection Ent. Soc. Phila.

Resembles *L. dormitans* (which it exceeds in size) in the markings and coloring, but differs by the straight costal, and less oblique exterior, margin, in which respect it approaches *L. Doubledayi*, but differs greatly from Guenée's description of that species.

**Doubledayi** Guenée, Noct. 1, p. 15. Walker, C. B. M. Noct. 1, p. 10.  
New York State (Guenée).

**LACINIA** Grote.

**cymatophoroides** Guenée, Noct. 1, p. 13. Walker, C. B. M. Noct. 1, p. 8.

Middle and Eastern States. Coll. Mr. E. L. Graef, Brooklyn, L. I., and Ent. Soc. Phila.

Both sexes alike. In the specimens I have seen I have detected no differences or intermediary individuals between this and the following.

**expultrix** m. Plate 2, fig. 6. ♀ = ♀ *cymatophoroides* Gn., Noct. 1, p. 14. = Var. β. Walker, C. B. M. Noct. 1, p. 8.

Maryland, Middle and Eastern States and Canada.

Both sexes alike. Differs from the typical *cymatophoroides* by the absence of the black spots at the base and internal angle and the strongly marked bands on the anterior wings. I have been tempted to separate this from the preceding species of which it is a singular and constant variety. After examining a number of individuals of both sexes from different localities, I have not been able to detect any variation or intermediary specimens between this and the foregoing, than which it is of much more frequent occurrence.

Collections of Messrs. Stephen Calverley, Harvey J. Rich and E. L. Graef, of Brooklyn, L. I., of the Rev. Chas. J. S. Bethune, of Cobourg, C. W., and of Ent. Soc. Phila.

**GONOPHORA** Bruand.

Walker, C. B. M. = *Thyatira* Ochs., H. S., Guen., Boisd.

**scripta** Gosse, Can. Nat. 249. Walker, C. B. M. Noct. 1, p. 6. = *abrasa* Guenée. Noct. 1, p. 12, pl. 3, fig. 2. Morris Cat. p. 26.

Middle and Eastern States and Canada. Coll. of Messrs. Stephen Calverley and F. W. Tepper, Brooklyn, L. I.

M. Guenée's figure of this species is approximately correct, there is however no indication of the spur at the internal angle of the anterior wings, which is sufficiently prominent in an individual I have before me. This species is the representative on this Continent of the European *G. derasa* L. and resembles that species closely; the most observable differences consisting in the greater width of the greyish basal

space at the top, and in the more pinkish shade of the anterior wings, characters, which appear to be specific and constant.

**THYATYRA** Ochs.

**pudens** Guenée, Noct. 1, p. 13, pl. 3, fig. 1. Walker, C. B. M. Noct. 1, p. 8.  
New York State (Guenée).

—————:—————

**Descriptions of two new species of ARCTIIDÆ.**

BY WILLIAM SAUNDERS,  
of London, Canada West.

**Arctia celia**, nov. sp.

*Male.* Palpi black above, yellowish beneath. Head yellow with black lateral stripes. Antennæ brown, pectinated. Thorax yellowish-white, deeper in color towards the head, with two short black stripes in front, and three longer and larger on disk, one central and one on each tegula.

Primaries very dark brown with white stripes; costa edged with yellowish to about the apical third of the wing. A wide stripe having its origin at the base of the median vein and from thence deflected towards the posterior angle where it grows narrowly linear; from this two branches proceed, the first about the centre of the wing extends in a straight line to the costa; the second obliquely towards the apex, terminating under the costal edge; a subterminal zigzag line forming a distinct W crossed at the top by the oblique band.

Secondaries lightish brown, with two irregular yellow spots about the middle of the wing, and a stripe of the same color extending from the base along the submedian vein to within a third of the hind margin; inner margin yellow. Under surface of wings lighter in color with the same markings. Cilia brown intermixed with white. Wings expand 14 lines.

Abdomen yellow with a dorsal macular band black, and a row of black spots on each side; under surface whitish with black bands. Legs black, spotted with yellow, and with tufts of yellow hairs at their base.

*Loc.* Toronto, C. W. From Rev. C. J. S. Bethune, Cobourg, C. W.

***Arctia decorata*, nov. sp.**

*Female.* Tongue bright yellow; palpi black. Antennæ black, slightly pectinate. Head black with a tuft of yellow hairs between the antennæ. Thorax ochre-yellow, with two small linear spots on front, and three large ones on disk, one central and one on each tegula; and a small spot on each side at base of primaries.

Primaries deep velvety-black, with rich ochre-yellow stripes; one on costa terminating at the apical third of the wing; one broad straight central stripe along the median vein to within a third of the hind margin, slightly enlarged at the tip, where it is joined at an acute angle by a smaller stripe which terminates just under the extremity of the costal band. This central stripe is notched or obscurely furcate about the middle; the lower part of the notch extends a very short distance towards the hind margin, terminating in a point; and in a line with this further towards the posterior angle are one or two very minute yellow dots. Inner margin with a border of the same color gradually widening towards the base.

Secondaries bright red, widely bordered with dull black excepting on the inner margin; a small red dot set in the black border not far from the apex. Under surface of wings paler with the same markings. Cilia varies in color on different parts of the wings, from ochre-yellow to dark brown. Wings expand 16 lines.

Abdomen deep black with a patch of ochre-yellow or orange on each side at base; wide where it joins the thorax, and narrower at its termination on the third segment; a yellow dot on each side of fourth and fifth segments, and one on centre of back near tip. Under surface of body entirely black.

*Loc.* Near St. Catherines, C. W. From D. W. Beadle, Esq.

PROCEEDINGS  
OF THE  
ENTOMOLOGICAL SOCIETY  
OF PHILADELPHIA.

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VOL. 2.                      JUNE ——— SEPTEMBER, 1863.                      No. 2.

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STATED MEETING, JUNE 8.

President BLAND in the Chair.

Thirteen members present.

REPORTS OF COMMITTEES.

The Committees on the papers of Messrs. Grote and Cresson, read May 11th, reported in favor of their publication in the Proceedings of the Society.

DONATIONS TO CABINET.

141 PSEUDONEUROPTERA (*Termes flavipes*, *Psocus venosus*, *P. Nova-Scotæ*, *P. lichenatus*, *P. semistriatus*, *P. abruptus*, *P. corruptus*, *P. aurantiacus*, *Acroneuria abnormis*, *Perla flavescens*, *P. varians*, *P. decipiens*, *P. occipitalis*, *P. producta*, *Chloroperla bilineata*, *Isopteryx imbecilla*, *Tæniopteryx fasciata*, *Nemoura completa*, *Batis femorata*, *B. alternata*, *B. arida*, *B. sicca*, *B. debilis*. *Potamanthus cupidus*. *Palingenia limbata*, *P. bilineata*, *P. flavescens*, *P. interpunctata*, *P. pulchella*, *P. terminata*, *Ephemera flaveola*, *E. excrucians*, *Bætisca obesa*, *Cloc ferruginea*, *C. fluctuans*, *C. vicina*, *C. dubia*, *C. mendax*, *Calopteryx maculata*, *Lestes rectangu-*

*laris*, *L. unguiculata*, *L. hamata*, *L. forcipata*, *Agrion irene*, *A. Ramburii*, *A. exsulans*, *A. putridum*, *A. apicale*, *A. civile*, *A. binotatum*, *Gomphus spinosus*, *G. fraternus*, *G. vastus*, *G. graslinellus*, *G. fluvialis*, *G. amnicola*, *Anax junius*, *Æschna clepsydra*, *Æ. constricta*, *Cordulia lateralis*, *Pantala hymenæa*, *Celithemis eponina*, *Plathemis trimaculata*, *Libellula quadrimaculata*, *L. luctuosa*, *L. pulchella*, *Mesothemis simplicicollis*, *M. corrupta*, *M. longipennis*, *Diplax rubicundula*, *D. vicina*, *D. semicincta*, *D. ambigua*, *D. intacta*, *Perithemis domitia*), 11 NEUROPTERA (*Sialis infumata*, *Coniopteryx vicina*, *Bitacus strigosus*, *B. stigmaterus*, *Macronenu zebtratum*), 14 ORTHOPTERA (*Ecanthus bipunctatus*, *Spectrum femoratum*, *Acridium emarginatum*, *A. americanum*, *Conocephalus ensiger*, *Tragocephala viridifasciata*, *T. infuscata*), 6 LEPIDOPTERA (*Nathalis Iole*, *Libythea Motya*, *Callimorpha militaris* var.), 112 HYMENOPTERA (*Cynips confluentus* Harr.—*aciculatus* O. S., *C. quercus-palustris*, *Pelecinus polycerator*, *Ichneumon devinctor*, *Pezomachus minimus*, *Anomalon flavicornis*, *Ichneumon suturalis*, *Microgaster militaris*, *Glyphe viridescens*, *Hedychrum ventrale*, *H. speculum*, *Philonthus zonatus*, *Perilampus triangularis*, *Bembex monodonta*, *B. fasciata*, *Monedula ventralis*, *Pompilus tropicus*, *P. biguttatus*, *P. petiolatus*, *Scolia confluenta*, *Tiphia tarda*, *Formica aphidicola*, *F. latipes*, *Eumenes fraterna*, *Zethus spinipes*, *Nomia heteropoda*, *Nomada bisignata*, *N. vincta*, *Epeolus lunatus*, *E. scutellaris*, *Cælixys 8-dentata*, *Megachile brevis*, *M. latimanus*, *Ceratina dupla*, *Macrocera binotata*, *Anthophora sponsa*), 20 HOMOPTERA (*Calaphis betulella*, *Aphis carduella*, *A. maidis*, *A. rudbeckiæ*, *A. vitis*, *Lachnus caryæ*, *Byrsocrypta vagabunda*, *B. populicaulis*, *Pemphigus formicetorum*, *Aphana sulcipes*), from Benj. D. Walsh, Esq., of Rock Island, Ill.

200 determined European COLEOPTERA, from Dr. Samuel Lewis.

120 determined European COLEOPTERA, from Aug. R. Grote.

10 COLEOPTERA (*Nausibius dentatus*, *Saperda puncticollis*, *Chrysomela scalaris*, var.), from C. F. Parker.

7 COLEOPTERA (*Mycetophagus Melsheimerii*, *Atimia confusa*), from Henry Feldman.

#### DONATIONS TO LIBRARY.

*Wiener Entomologische Monatschrift*. Bd. 1—6. 8vo. From the Vienna Entomological Society.

*Die Noctuinen Europa's mit Zuziehung einiger bisher meist dazu gezählter Arten des asiatischen Russland's, Kleinasien's, Syrien's und Labrador's*. Von Julius Lederer. 1 Vol. 8vo. From the Author.

*Proceedings of the Academy of Natural Sciences of Philadelphia, for Murch, 1863*, and *Silliman's Journal of Science and Arts, for May, 1863*. From Dr. T. B. Wilson.

The following were presented by Prof. S. S. Haldeman:—

*Lettre A. S. E. Mr. Fischer de Waldheim, ou relation d'un voyage*



*fait en 1844, en Suède, en Danemarck et dans le nord de l'Allemagne, par M. le Comte Mannerheim.* Pamphlet. 8vo.

*Description d'une nouvelle espèce de Prionien provenant de la république de Venezuela. Par M. A. Sallé.* Pamphlet. 8vo.

*Note sur les Longicornes de la Collection de Banks. Par M. A. Chevrolat.* Pamphlet. 8vo.

*Note sur deux araignées venimeuses de la Russie Méridionale qu'on croit être le Tchim des Kalmouks, par Victor de Motschoulsky.* Pamphlet. 8vo.

*Uebersicht der Arten der Gattung ASTACUS, par Erichson.* Pamphlet. 8vo.

*Orthoptera Nova Americana. Auct. H. de Saussure.* Pam. 8vo.

*Remarks on Entomology, chiefly in reference to an Agricultural benefit, by W. D. Brincklé, M. D.* Pamphlet. 8vo.

*The Zoologist, for July, 1843.* Pamphlet. 8vo.

*Essais Entomologiques, No. 6. Par A. D. Hummel.*

*Faunæ Insectorum Germanicæ initia oder Deutschlands Insecten. Von D. G. W. F. Panzer.* 5 Vols. 16mo.

*Note sur un nouvel insecte hyménoptère fossile, par M. H. de Saussure.* Pamphlet. 8vo.

*Note sur un nouveau genre de Guêpes. Par M. H. de Saussure.* Pamphlet. 8vo.

*Coléoptères de Syrie. Par M. A. Chevrolat.* Pamphlet. 8vo.

*Zoological Contributions, Nos. 1, 2 and 3. By S. S. Haldeman.* Pamphlets. 8vo.

*Cryptocephalarum Boreali-Americæ diagnoses cum speciebus novis musei lecontiani. Auct. S. S. Haldeman.* Pamphlet. 4to.

*Descriptions of North American Coleoptera, chiefly in the Cabinet of J. L. Leconte, M. D., with references to described species. By S. S. Haldeman.* Pamphlet. 4to.

*Monographie du genre GEORISSUS Latr, par Victor Motchoulski.* Pamphlet. 8vo.

*De Coleopteris, quæ Oskar et Alfredus Brehm in Africa legerunt, disseruit J. H. Apetz.* Pamphlet. 4to.

*History, Transformations and Internal Anatomy of CORYDALUS CORNUTUS, by S. S. Haldeman and Joseph Leidy, M. D.* Pamp. 4to.

*Observationes quædam Entomologicæ de Oxybelo uniglume atque Miltogramma Conica. Auct. C. T. Siebold. Pamphlet. 4to.*

*Rappel des Coléoptères décrits par Palisot de Beauvois, aux genres actuellement adoptés, avec synonymie. Par M. A. Chevrolat. Pamphlet. 4to.*

#### WRITTEN COMMUNICATIONS.

The following papers were presented for publication in the Proceedings:—

“Descriptions of certain species of Diurnal Lepidoptera, found within the limits of the United States, and British America, No. 2, by Wm. H. Edwards.”

“List of the North American species of *Bombus* and *Apathus*, by E. T. Cresson.”

And were referred to Committees.

#### ELECTIONS.

Mr. Thomas B. Neely, of Philadelphia, was elected a *Resident Member*, and Rev. J. H. Brakeley, of Bordentown, N. J., a *Corresponding Member* of the Society.

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#### Additions to the Catalogue of U. S. LEPIDOPTERA, No. 4.

BY AUG. R. GROTE.

#### SYNTOMOIDEA, H. S.

Gen. **CTENUCHA**, Kirby.

**C. Cressonana**, n. sp.

Anterior wings blackish-brown with the median vein, its two middle branches and the submedian nervule, striped with white. Costal margin yellowish-white. Exterior margin fringed with white. Base of the wing tinged with metallic blue. Posterior wings blackish-blue, fringed with white. Collar and thorax metallic blue; tegulæ bordered with white. Head orange, metallic blue between the eyes. Palpi yellow.

lowish, terminal joint black. Abdomen metallic blue above, blackish beneath. Legs and antennæ black. Expands  $1\frac{1}{4}\frac{3}{8}$  inch.

*Hab.* Pike's Peak. Collection Entom. Soc. Philad.

This species is intermediate between *C. Latreillana* Kirby and *C. venosa* Walker, and very distinct from either.

In size it approaches the former, and in the shape of the wings and markings of the anterior pair, the latter species.

In *C. venosa* the stripes on the anterior wings are however yellow, and there is a third on the subcosto-inferior nervule which is wanting in *C. Cressonana*. The two terminal joints of the palpi in *C. venosa* and *C. Latreillana* are black, while in the species just described the terminal joint alone is black. The white fringe on the posterior wings in *C. venosa* is interrupted with black about two-thirds of the width of the wing from the anal angle; in *C. Cressonana* the fringe is entirely white.

I have dedicated this species to my friend, Mr. E. T. Cresson, of Philadelphia.

## EUDRYINA.

### CIRIS, n. gen.

Antennæ bi-pectinate in both sexes (?). Pectinations straight, extending along the inside of the antennæ from the base to the tip. Anterior wings with the costal margin straight; apex rounded, acuminate; exterior margin less oblique than in *Eudryas*; internal margin straight. Thorax and abdomen stout, latter crested only on first segment.

This genus, founded on a Texan species of which a description follows, shows a great affinity to *Eudryas*; the most observable differences are presented by the pectinated antennæ and the somewhat broader and stouter wings. In the shape of the anterior wings it resembles the genus *Ovios*, represented by an African species *O. capensis*, H. S.

The pterogostic characters, owing to paucity of material, I have not been able to examine.

*C. Wilsonii*, n. sp. (See plate 3, fig. 1.)

Anterior and posterior wings white. Antennæ doubly pectinated to the tips; stem white, powdered with black at base. Palpi black, powdered with white atoms. Head black; tegulæ white. Thorax

and collar as in the two species of *Eudryas*. Legs white, thickly clothed with hair. Anterior and posterior pair of feet black, annulated; middle pair white. Abdomen pure white above and beneath, with two black crests on the first segment. Anterior wings with a broad costal band, dark greenish and powdered with whitish atoms, not extending to the base or apex of the wing and showing the orbicular and reniform spots underneath distinct, dark green. At the base of the wing there are two annular bluish spots and a smaller one of the same color beyond the reniform spot. Terminal space reddish-purple shaded with blue, intersected by a lunulated white line, whitish along the nervules and edged with a light greenish shade band which is continued along the internal margin and terminates in a pyramidal mark darker and clearly defined. Posterior wings with a reddish-purple spot at anal angle apparently the commencement of a terminal band which is however discontinued.

Under surface of wings white with a reddish-purple spot at apex of anterior and anal angle of posterior pair. Expands  $1\frac{3}{8}$  inch.

A single specimen, which I regard (somewhat doubtfully) as a female, taken in Western Texas by Mr. E. T. Cresson and now in the collection of this Society.

I have dedicated this hitherto undescribed species to Dr. Thomas B. Wilson of Philadelphia.

## DENDROMETRINA, H. S.

Gen. **BAPTRIA**, Hübn.

H. S. Exot. p. 50. *Odezia*, Boisd., Guenée.

**B. albofasciata**, n. sp. (See plate 3, fig. 2, ♀.)

Wings black; anterior pair with a broad white band traversing the wing from the costa to internal angle, widest near the centre. There is a white spot on the costa near the apex; fringes black. Posterior wings with the traces of a white median band. The fringe near the costal angle is touched with white.

Under side showing the markings of the upper with the base of the anterior wings, the legs and under side of abdomen powdered with whitish atoms. The median white band on the posterior wings distinct.

A female. Expands  $1\frac{3}{8}$  inch. Collection Entom. Soc. Philad.

*Hab.* Pike's Peak. Resembles the following which it much exceeds in size.

*B. albovittata*, Guenée, U. & P. Vol. 11, p. 520. Zeller, ubi (?). (See plate 3, fig. 3, ♀.)

Resembles the European *B. tibialata*. Appears general in its distribution through the Middle States. Expands  $\frac{5}{8}$  to 1 inch.

Several specimens of both sexes. Collection of Entom. Soc. Phila. and of Mr. E. L. Graef, Brooklyn, L. I.

*B. infulata*, n. sp. (See plate 3, fig. 4, ♂.)

Anterior wings blackish-brown with a distinct yellow band, darker near the costa, extending half way across the wing, running in an oblique direction towards the exterior margin. A similar band runs in an inverse direction to the internal margin. Two bluish, metallic, undulating lines run from the costa across both anterior and posterior wings outside of the yellow bands and are more apparent on the under surface. Posterior wings blackish-brown with a broad yellowish band running entirely across the wing, apparently a continuation of the second band on the anterior wings.

Under surface black showing the yellow bands and the two metallic blue lines. Base of the wings, under surface of abdomen and legs powdered with yellowish atoms. Base of the anterior wings showing also some broad metallic bluish marks.

Expands  $\frac{7}{8}$  to 1 inch. Collection of Entom. Soc. Philad. Several specimens of both sexes taken in Northern Virginia.

This species resembles the *Erota* of Cramer from Surinam. That species is, however, larger, appears to have but a single bluish metallic line and the yellow band on the anterior wings is continued without interruption from the costa to the internal margin.

*B. elaborata*, n. sp. (See plate 3, fig. 5, ♂.)

Anterior wings blackish at the base and terminal space with a broad yellow band traversing the median space of the wing, interrupted at the centre and contracting as it reaches the internal margin. Posterior wings with the basal half yellow showing a few powdered black atoms at extreme base and with the terminal margin entirely black. There is a faint terminal metallic line and a black line runs through the yellow median bands.

Under side resembling the upper with the legs and under surface of body powdered with yellow atoms.

A male. Expands  $\frac{7}{8}$  inch. Collection of Entom. Soc. Philad.

*Hab.* Virginia. Resembles *B. infulata* but is, I think, distinct. There is but a single metallic line and the disposition of the yellow median bands is different.

## NOCTUINA, H. S.

Gen. **DIPHThERA**, Ochs.

**D. Graefi**, n. sp. (See plate 3, fig. 6, ♀.)

Anterior wings broad, entire, velvety, pale buff shaded with whitish grey. Subterminal line alone distinct, black, bordered on the inner side with white, disconnected, irregular. Reniform spot large, same color as the rest of the wing, ill defined, margined with black, more distinct on the side nearest the base of the wing; orbicular spot small, faint, not easily discerned. Costal margin with four black spots. Two indistinct shade lines in the median space meet in a small black spot on the internal margin of the wing. Two small black spots near the base of the wing, the outer and larger one apparently the claviform. Terminal margin with six black dots; fringes white. Posterior wings whitish with a discal mark, a median wavy line and an interrupted line on the outer margin greyish; fringes white.

Under side whitish with the markings on the posterior wings more distinct, showing a basal streak beyond the discal mark. Thorax and head same color as anterior wings. Antennæ blackish with the first joint white. Abdomen paler than thorax. Expands  $1\frac{1}{2}$  inch.

*Hab.* Middle States. Collections of Messrs. Edward L. Graef and Stephen Calverley, Brooklyn, L. I.

This species closely resembles *D. fallax*, H. S., in the markings of the anterior wings and, though presenting some superficial resemblance to the genus *Acronycta*, shares the characteristics of the genus to which I have referred it.

I dedicate this species to Mr. E. L. Graef, of Brooklyn, L. I., to whom I am indebted for many courtesies.

In referring to the Plate which accompanies this article I must commend the ability of the artist, Mr. A. Hochstein, of New York.

Description of a new species of **MASARIS**, from the Rocky Mountains.

BY E. T. CRESSON.

**Masaris vespoides** n. sp.

*Male.* (Plate 4, fig. 1.) Length  $9\frac{1}{2}$  lines; expanse of wings 15 lines. Head coarsely punctured, sparsely clothed with pale hairs; face above the antennæ flat; eyes large, with a deep, narrow sinus above the insertion of the antennæ; ocelli placed in an equi-lateral triangle on the vertex; clypeus convex, subquadrate, deeply emarginate at the apex with the angles rounded; labrum rounded at tip, hairy; mandibles somewhat obtuse, with two small indentations on the inner edge near the apex; antennæ smooth, a little longer than the head and thorax together, first joint short and thick, second very small, third to sixth joints somewhat flat and about equal in length, each joint being about twice as long as the first and second together, seventh joint two-thirds as long as the sixth, rather flat and broader than the preceding joints, the five apical joints formed into a broad oval knob slightly convex above and concave beneath, these five joints are apparently soldered together with the sutures very indistinct above but more distinct beneath. Prothorax prominent, closely punctured, hairy. Mesothorax oval and convex in front, sparsely hairy, closely and confluent punctured; somewhat flat before the scutellum where it is sparsely punctured, shining and with the posterior margin truncate. Scutellum semicircular, convex, sparsely punctured and shining. Wing-scale elongate and reniform. Metathorax somewhat flat, densely punctured, hairy, the posterior angles terminating on each side with an acute spine. Legs hairy, rather short, the posterior pair longest; anterior femora clavate, broadest near the base, and curved inward; tibiæ shorter than the femora, somewhat excavated on the inner edge towards the base; anterior tarsi ciliated beneath, and all, except the posterior pair, have the first joint as long as the remaining joints taken together; intermediate femora short, thick, not clavate, sinuate beneath; inner edge of the tibiæ deeply excavated from the middle to the base and sulcate, broadly dilated in the middle and somewhat suddenly constricted towards the apex; posterior femora somewhat clavate; tibiæ longer than the

femora and constricted at the base, with the tip armed with two unequal spurs, one of which is rather short, simple and curved, the other nearly twice as long, stout and deeply bifid; first joint of the tarsi as long as the tibiæ, narrow, cylindrical and curved inwards; tarsal claws simple. Superior wings rather long and narrow, with one marginal and two submarginal cells, the first submarginal somewhat longer than the marginal, the second submarginal about two-thirds as wide as the first submarginal and much narrowed towards the marginal; the third discoidal cell elongate and bent about its middle towards the second submarginal, which receives the second recurrent nervure in the middle. Abdomen with seven segments, elongate, convex above, gradually narrowed posteriorly, retractile, curved under; segments minutely punctured, shining, somewhat transversely sulcate on their disk and with their sides rounded from the base; first segment short, flat on its anterior face; apical segment narrow, subquadrate, sinuate on the sides, and deeply and widely emarginate at the apex, disk with two longitudinal carinæ each bearing a small obtuse tubercle on the posterior third of the segment. Abdomen beneath flat, smooth and shining, with a bifid projection on the anterior part of the second and third segments, that on the third segment being much more prominent and armed posteriorly with an acute spine; apical segment deeply bifid.

Head black; clypeus, apex of the labrum, middle of the mandibles, a transverse line, dilated in the middle, between the antennæ, and the outer and inner orbit of the eyes above the antennæ, yellow; antennæ above with the base of the first and the second joints black, the apex of the first, inner side of the second and the four following joints yellow, the apical joints yellowish varied with fuscous, beneath blackish, margined on the inner side with yellowish, except the sixth joint which is tinged with fuscous. Prothorax black; its anterior margin above, and an oblong spot beneath the wings, yellow. Mesothorax black, a small, obsolete, yellowish spot on each side near the wing-scale. Scutellum black, a yellowish bilobed spot on the apex. Metathorax black, posterior angles yellow. Wing-scale yellow, except the anterior inner corner which is black. Wings stained with yellowish, nervures honey-yellow about the base, blackish towards the apex. Legs yellow, the coxæ and trochanters, except their tips, and the base of the femora black; tarsi, except the first joint, reddish-yellow. Abdomen black;



each segment above with a more or less broad yellow transverse band, almost confluent with the posterior margin; the anterior margin of the yellow band on first segment is angulated on each side, widens outwardly, narrow on the disk and slightly indented in the middle; the yellow bands of the second, third and fourth segments are deeply and somewhat squarely indented on each side with black, and slightly so on the disk, the yellow band on the second segment is divided into three parts by the indentation on each side becoming confluent with the black of the posterior margin; on the fifth and sixth segments the yellow band is broad, covering two-thirds of the segment, very slightly indented on the middle of the anterior margin; apical segment narrowly margined with black on the sides and tip, anterior part more broadly margined with black and produced posteriorly into a triangle, truncate at its apex with its sides somewhat rounded; the small tubercles on the disk are blackish. Abdomen beneath black, a spot on each side of the second and third segments, and a broad transverse band on each of the fourth, fifth and sixth segments, yellow.

*Female.* Length 8 lines; expanse of wings  $14\frac{1}{2}$  lines.

In structure, it differs from the male as follows:—General form more short and stout. Eyes smaller and wider apart; a transverse carina between the antennæ; clypeus transversely rugose anteriorly, deeply and triangularly indented at the apex; antennæ short, not much longer than the head, rounded, first joint short and thick, second very small, third about as long as the three following joints together, fourth, fifth, sixth and seventh joints about equal in length, but gradually broader towards the apex, the five apical joints formed into an elongate-oval knob, as long as the four preceding joints together. Prothorax with the sides wider and somewhat flattened. Mesothorax more flat, with a distinct longitudinal dorsal carina, and another, rather indistinct, on each side of the disk between the wings. Metathorax with the posterior angles not so strongly produced. Legs shorter and simple, anterior tarsi not ciliated beneath. Abdomen with six segments, shorter, scarcely curved under and very slightly attenuated posteriorly; upper surface more distinctly punctured, semi-opaque and scarcely sulcate; apical segment broadly rounded at tip, without carinæ or tubercles on the disk; abdomen beneath slightly convex, without projections on the 2nd and 3rd segments, apical segment long and broadly rounded at tip.

In color, it differs as follows:—Head entirely black except the outer and inner orbit of the eyes above the antennæ, a transverse spot on the anterior margin of the clypeus, and the sides of labrum at base, which are yellow; antennæ above blackish with the third, fourth and fifth joints yellowish, beneath reddish-yellow with the base and apex black. Prothorax not so broadly margined anteriorly with yellow, but separated in front of mesothorax by a black line; no yellow spot beneath the base of the wings. Mesothorax and scutellum entirely black. Metathorax with the posterior angles slightly tipped with yellow. Legs yellow with the femora entirely black except the extreme tips. Wings rather darker. Abdomen not so broadly banded above with yellow; the bands of the first four segments resemble those of the male, that on the basal segment being interrupted in the middle; the band on the fifth segment is deeply indented on its anterior margin, and with a small transverse black spot on each side; apical segment with a large yellow spot on each side, confluent with the lateral margin of the segment; abdomen beneath with two small yellow spots on the disk of the second segment, and a narrow yellow band, more or less interrupted in the middle, on the third and fourth segments, and a small yellow spot on each side of the fifth segment.

*Variety.* (Plate 4, fig. 2.) Differs from the female above described as follows:—Sides of clypeus and labrum margined with yellow; the transverse yellow spot on the anterior margin of the clypeus larger; a yellowish spot on the mandibles near the base. Prothorax with the anterior margin entire, but the yellow is produced posteriorly into a point on each side of the mesothorax in front; the yellow spot beneath the base of the wings is present, as in the male. Mesothorax profoundly impressed on each side between the wings; the yellow spot on each side near the wing-scale is present, but much larger than in the male. Scutellum with a yellowish bilobed spot posteriorly. Metathorax with the posterior angles strongly produced and yellow. Legs colored as in the male. Wings stained with fuscous towards the apex. Abdomen: the second, third and fourth segments have the yellow bands with the anterior margin more or less indented in the middle, but on each side, instead of being squarely indented, the yellow band encloses a transverse black spot, which is largest and nearest to the disk on the second segment; the band on the fifth segment is very broad, deeply and some-

what squarely indented in the middle and with a very small black dot on each side; abdomen beneath with a dot on each side and a transverse spot in the middle of the second segment, and an uneven transverse band on the third, fourth and fifth segments, yellow, that on the fifth segment is narrower, divided in the middle with black, and with the yellow extending posteriorly on each side of the segment.

*Hab.* Pike's Peak. Collected by Mr. Winslow J. Howard.

One male and two female specimens in the collection of the Entomological Society of Philadelphia.

The male of this species differs remarkably in several points of structure from the type of the genus, *M. vespiformis*, as delineated by Messrs. Saussure and Schaum. It differs as follows:—The knob of the antennæ is much broader, and more of an oval. The neuration of the superior wings is different from that given by Dr. Schaum.\* The marginal cell is not so long, the first submarginal more elongate, the second submarginal without any projection towards the marginal, the second discoidal cell much longer, the third discoidal not so square, but more elongate and bent towards the second submarginal. The figure given by M. Saussure† represents the neuration of the wing of our species much better, although the third discoidal cell is also too square. The singular structure of the anterior and in particular the intermediate tibiæ, and the posterior tarsi; the bifid styloid spine at the tip of the posterior tibiæ, and the simple tarsal claws‡ are characters not noticed in *M. vespiformis*. The tip of the apical segment of the abdomen above, instead of being bifid, as seems to be the case in *M. vespiformis*, is deeply and broadly emarginate, and the carinæ and tubercles on its disk are very conspicuous. The projections on the second and third ventral segments are also differently constructed from those of *M. vespiformis*, that on the second segment being less developed and bifid, while that on the third segment is strongly developed, bifid, and bearing an acute spine posteriorly.

\* Ann. Soc. Ent. Fr. 3 sér. 1, pl. 20.

† Monog. des Masariens, pl. 5, f. 4.

‡ I am satisfied that the tarsal claws in this species are simple, and that the styloid spine at the tip of the middle tibiæ is deeply bifid, as I have examined them repeatedly with a strong magnifying power, and am quite convinced that it is the effect of no optical error, as suggested by M. Saussure (l. c. p. 17).

The antennæ of the female also differs somewhat from the figure given by M. Saussure (l. c. pl. iv. fig. 3c.) and Dr. Schaun (l. c. pl. 20. f. 7). The basal joint is scarcely half as long, and the knob (or the 5 apical joints), is much broader, and more of an oval.

Taking all these differences of structure into consideration, it remains, therefore, a question, whether they are sufficient wherewith to establish a separate genus.

I must say here, that the rough plate accompanying this paper should not be taken as being correct in every particular, but will enable any one to recognize the species which it represents. Unfortunately it was printed off before several corrections were made, which I will mention here, so that no one may be misled. The neuration of the wings are not sufficiently correct, particularly in fig. 2. In fig. 1, the antennæ are rather too long in proportion to the insect, and also in fig. 1*a*, the first joint of the posterior tarsi should be as long as the tibiæ, and curved inward. The antennæ of the female (fig. 2*b*) should have the third joint much longer and the basal joint a little shorter.

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#### EXPLANATION OF PLATE 4.

(All the figures are enlarged.)

- Fig. 1. *Masaris vespoides*, ♂.
- |                |  |                  |
|----------------|--|------------------|
| “ 1 <i>a</i> . | ib.                                    | profile.         |
| “ 1 <i>b</i> . | ib.                                    | face.            |
| “ 1 <i>c</i> . | ib.                                    | antennæ.         |
| “ 1 <i>d</i> . | ib.                                    | apex of abdomen. |
| “ 1 <i>e</i> . | ib.                                    | middle leg.      |
| “ 2.           | <i>Masaris vespoides</i> , ♀, variety. |                  |
| “ 2 <i>a</i> . | ib.                                    | face.            |
| “ 2 <i>b</i> . | ib.                                    | antennæ.         |

## S T A T E D M E E T I N G, J U L Y 13.

President BLAND in the Chair.

## R E P O R T S O F C O M M I T T E E S.

The Committees on the papers of Messrs. Edwards and Cresson, read June 8th, reported in favor of their publication in the Proceedings of the Society.

## D O N A T I O N S T O C A B I N E T.

A large and very fine collection of determined European LEPIDOPTERA, from Wm. H. Edwards, of Newburgh, N. Y.

50 COLEOPTERA (*Cychrus niagarensis*, *Panagæus crucigerus*, *Chlænius niger*, *Bolbocerus Lazarus*, *Ludius attenuatus*, *Atimia confusa*, *Arhopalus speciosus*, *Saperda candida*, *Physocnemum brevilineum*, *P. lineum*, *Eudocinus Mannerheimii*), 12 LEPIDOPTERA (*Eudryas grata*, *Plusia simplex*, *Hadena xylinoides*, *H. miseloides*, *Agrotis suffusa*, *Placodes cinereola*, *Erastria carnicola*), from Harvey J. Rich, of Brooklyn, N. Y.

35 HYMENOPTERA (*Diastrophus nebulosus*, and galls, *D. cuscuteformis*, *Aulax pirata*, *A. sylvestris*, *Rhodites verna*, *R. radicum*, and gall, *R. rosæ*, *R. bicolor*, *R. ignota*, *R. dichlocerus*, and gall, *Calliome magnifica*, *C. brevis*, *C. dichlocerus*, *C. advena*), from Baron R. Osten Sacken.

20 COLEOPTERA (*Hippodamia Lecontei*, *Chrysomela philadelphica*, *Agriotes mancus*, *Corymbites pulcher*, *C. tarsalis*, *Acmæops proteus*, *Carabus Lapalayii*, *Phelopsis obcordatus*, *Aphodius fossor*, *Emmesa connectens*), from Wm. Cowper, of Quebec, Canada.

1 LEPIDOPTERA (*Smerinthus modestus* ♀), from Aug. R. Grote, of Buffalo, N. Y.

1 COLEOPTERA (*Goes tessellatus*), from C. F. Parker.

## DONATIONS TO LIBRARY.

*Silliman's American Journal of Science and Arts, for July, 1863,*  
from Dr. T. B. Wilson.

*Descriptions of some species of Lepidoptera, from the Northern  
shores of Lake Superior, by Dr. T. W. Harris,* from J. W. Wiedemeyer.

*The Insect Hunter's Companion, by Rev. Jos. Greene, M. A.,* from  
Dr. Samuel Lewis.

*Prairie Farmer, (Chicago, Ill.) Vol. 11, Nos. 11 to 26.*

The following works were deposited by Dr. T. B. Wilson:—

*Gronland geographisch und statistisch beschrieben. Aus dänischen  
Duellschriften von Anton von Etzel.* 1 Vol. 8vo.

*The Journal of Entomology, Nos. 5—8.* London. 8vo.

*Tijdschrift voor Entomologie. Deel 6, Stuk. 3 & 4.*

*The Zoologist, for April and May, 1863.* 8vo.

*Wiener Entomologische Monatschrift. Bd. 7, Nr. 3 & 4.* 8vo.

*The Entomologist, by E. Newman.* 1 Vol. (Complete.) 8vo.

*Revue et Magasin de Zoologie, par M. F. E. Guérin-Ménéville.*  
1863, No. 2 & 3. 8vo.

*Proceedings of the Linnean Society of London, Zoology.* Vols. 1—  
6. 8vo.

*Annales de la Société Entomologique de France. 4<sup>e</sup> série, Tome 2.*  
Trim. 4. 8vo.

*Annales de la Société Entomologique Belge. Tome 6.* Royal 8vo.

*Exotic Butterflies. By W. C. Hewitson. Part 46.* 8vo.

*Naturgeschichte du Insecten Deutschlands. Von Dr. W. F. Erich-  
son. Coleoptera. Bd. 1—3, and 4 Lief. 1—3.* 8vo.

*Genera des Coléoptères d'Europe. Par Jacquelin Du Val.* 2 Vols.  
Royal 8vo.

## WRITTEN COMMUNICATIONS.

The following papers were presented for publication in the Proceed-  
ings:—

“ American Micro-Lepidoptera, by Brackenridge Clemens, M. D.”

“ Observations on American Tineina, by H. T. Stainton.”

And were referred to Committees.

The following Communication was read from Baron R. Osten Sacken :

“ Mr. Walsh just communicates me that he bred *Lasioptera solidaginis* O. S., described by me in these Proceedings (Vol. I, p. 368) in great numbers, from the *lepidopterous gall* on *Solidago*, and not from the gall of *Trypeta solidaginis*. He also bred the same *Lasioptera* from exactly similar galls on *Vernonia fasciculata*.

“ Thus the doubts which I entertained when the above quoted paper was written, are now solved.

“ I may mention here that *Trypeta asteris* Harris is nothing but a synonym of *T. solidaginis* Fitch, as I have ascertained in Mr. Harris's collection in Boston. Whether this fly really also produces galls on *Aster*, remains to be decided by observation. In Mr. Harris's manuscript catalogue of his collection, which is still preserved, he had written originally, opposite the number, designating this fly : ‘ produces galls on *Solidago*.’ Later, however, he struck out the word *Solidago* and put *Aster*, in pencil, in its stead. Although the name *T. asteris* is older, I think that the name of *T. solidaginis*, as the more appropriate one, should be preserved, the more so, as there exists another *T. asteris* of Haliday.”

#### NEW BUSINESS.

On motion, the thanks of the Society were unanimously tendered to Wm. H. Edwards, Esq., of Newburgh, N. Y., for the large and beautiful collection of European Moths, presented by him this evening.

#### ELECTIONS.

On ballot, Mr. Tryon Reakirt, of Philadelphia, was elected a *Resident Member*, and the following persons were elected *Corresponding Members* of the Society :—

F. W. Tepper, of Brooklyn, N. Y.

R. W. Kennicott, of the Grove, Cook Co., Ill.

Edward Tatnall, Jr., of Wilmington, Del.

Henry S. Sprague, of Buffalo, N. Y.

Description of certain species of **DIURNAL LEPIDOPTERA** found within the limits of the United States and British America. No. 2.

BY WM. H. EDWARDS, NEWBURGH, NEW YORK.

- |  |  |
|--|--|
| 1. <i>Parnassius Sayii</i> , nov. sp.    | 4. <i>Lycæna Amica</i> , nov. sp.        |
| 2. <i>Colias Christina</i> , nov. sp.    | 5. <i>Melitæa Texana</i> , nov. sp.      |
| 3. <i>Colias Helena</i> , nov. sp.       | 6. <i>Anthocaris Ausonoides</i> , Boisd. |
| 7. <i>Chionobas Chryxus</i> , Doubleday. |  |

**PARNASSIUS SAYII**, nov. sp.

*Female*, 2½ inches. Upper side: primaries white, with a broad semi-transparent margin which encloses a transverse row of white, lunular spots; base black: a large rounded spot in the cell, another nearly same size on the arc, and a patch on the inner margin: between the cell and the sub-marginal row are three white spots running from the costa, each surrounded with black; no red spot; fringe of both wings white with black points at the tips of the nervures.

Secondaries white, with a narrow semi-transparent margin, and a sub-marginal row of black lunules; base and abdominal margin to the end of the body deep black, sending out a hook which passes around the extremity of the cell; a large pink spot on the costa, another on the disk, both edged with black: on the abdominal margin, below the black space, are two small connected black spots, placed transversely, each enclosing a pink spot

Under side: primaries as above; on secondaries are four black spots across the base, each marked with a few pink scales; the black spots on the abdominal margin re-appear as three separated spots, the middle one largest and triangular, each showing a few pink scales.

Body black above, below covered with yellow hairs; at the extremity of the abdomen a horny pouch shaped as in *Nomion*: palpi yellow: antennæ yellowish with fine black rings: club black.

From the Society's collection. Taken at Pike's Peak.

I am not certain whether this species may not be the one taken for *Nomion*, which is a Siberian species, said in the British Museum Catalogue to be found in the Rocky Mountains and California. I have examined several specimens of the true *Nomion*, and it is described



and figured by Boisduval in his *Species Général*, vol. 1. Although there are some points of resemblance between the two, the differences are decided. They are much alike in the general color, in the shape of the black abdominal border, and of the horny pouch of the abdomen; but the present species is much smaller in size, with no red spots on primaries, or at the base of secondaries above; the fringe is not alternate black and white, as in *Nomion*, and there are several other points of difference. *Nomion* is a conspicuous species, from its large size and the number and brilliancy of the red spots on both wings.

*COLIAS CHRISTINA*, nov. sp.

*Male*. Expands  $2\frac{1}{10}$  inch. Upper side: primaries bright yellow, with a large, deep-orange patch on the disk, which reaches neither the costa nor the base, and occupies about one-half the space inside the border; the border is broad, black, crossed by the yellow nervures nearly or quite to the margin, and resembles *C. Eurytheme* in the outline of its inner edge; discal spot small and black; edge of costa rose-red.

Secondaries lemon yellow with a paler orange patch which is confined to the outer limb, reaching neither the costa nor abdominal margin; the border narrow, with a very even inner edge, also crossed by the yellow nervures; discal spot large, deep-orange; fringe of both wing long, rose-red.

Under side: primaries same yellow, the basal half pale-orange; costal margin sprinkled with fine black scales; between the nervules three or four sub-marginal brown points or clusters of scales; discal spot as above.

Secondaries more greenish, covered uniformly with fine black scales; an obsolete sub-marginal row of brown points; discal spot small, round, silver-white, in a reddish brown circlet about which are a few scales of same color; a few rosy scales at the base; fringe and costal edge of each wing rose-red; palpi pale yellow; legs and antennæ rosy; club blackish.

In three specimens out of four there were no traces of the sub-marginal points.

*Female*. Expands  $2\frac{5}{10}$  inches. Upper side wholly pale yellow, without a border; discal spots as in the male, that of secondaries being more yellowish; fringes rose-red.

Under side paler and immaculate, excepting the discal spots; the basal half of primaries brownish yellow instead of orange; otherwise like the male.

Taken at the portage of Slave River, by Mrs. Bernard C. Ross, late of Fort Simpson, for whom I have the honor to name this fine species.

*COLIAS HELENA*, nov. sp.

*Male*. Expands  $1\frac{5}{10}$  inch. Upper side greenish yellow, deepest colored on secondaries, sprinkled with black on the costa of primaries and at the base of the wings; border of primaries broad, black, much advanced on the costa, not crossed by yellow nervures; that of secondaries of medium width, short, terminating midway on the margin; both borders erose on inner edge; primaries have a slender, black, discal mark; secondaries only an indistinct pale point, fringes rose-red.

Under side: primaries in color much as above, with a similar discal mark; secondaries dark greenish yellow, covered with fine black scales; discal spot small, round, silver-white, with no border; at the base a few rosy scales; body black above, yellow beneath; collar rosy; palpi yellow with rosy hairs at extremity; legs and antennæ rosy; club brown.

*Female*. Expands  $1\frac{7}{10}$  inch. Upper side soiled white with a slight green tinge; primaries have brownish-black border, very broad at the apex, terminating in a point at the inner angle, the inner edge on the inferior nervules emarginated; secondaries have a narrow border at outer angle only; discal spots as in the male; fringes rose-red.

Under side: primaries same white as above, the apex and costal margin washed with yellow; secondaries as in the male.

From Mackenzie's River, taken by Mrs. Ross.

*LYCÆNA AMICA*, nov. sp.

*Male*. Expands  $1\frac{1}{10}$  inch. Upper side silvery-blue, brownish along the margins, with a narrow, straight discal mark on primaries; fringe white. Under side glossy greyish white; primaries have a narrow discal mark and a curved row of six minute black spots across the disk; secondaries have a nearly straight row of five minute spots, besides two on the costa, one of which is in the middle, the other near the base, all

edged with white; there is also a sub-marginal row of points and small brown lunules, sometimes obsolete.

From Mackenzie's River, by Mrs. Ross.

*MELITÆA TEXANA*, nov. sp.

*Male.* Expands  $1\frac{5}{10}$  inch. Upper side blackish brown, mottled with fulvous at the base of the wings, and sprinkled with small white spots; these form, on primaries, an interrupted sub-marginal line, and an abbreviated line of three spots from the costa, besides five or six others irregularly placed; on secondaries, a bent line across the disk and a sub-marginal row of faint crescents; fringe blackish, except in the emarginations, where it is white.

Under side: primaries ochrey-yellow next the base, and beyond, dark brown; the apex and hind margin paler brown; a sub-marginal row of crescents; the white spots re-appear of larger size.

Secondaries buff next the base, reticulated with reddish-brown lines; a white band crosses the disk corresponding to the spots on upper side; beyond to margin clouded with brown, with a row of crescents, the third from the anal angle largest and whitish, all surmounted by blackish spots.

Texas.

*ANTHOCARIS AUSONOIDES*, Boisduval: mentioned in description of

*A. Sara.* Ann. Soc. Ent., X. p. 286. 2d Ser.

*Male.* Expands  $1\frac{6}{10}$  inch. Upper side white; primaries have the apex blackish, enclosing a white patch on the costa and two or three white rays along the ends of the nervules; costa slightly sprinkled with black; a black, narrow, sinuous spot on the arc; fringe alternate white and black.

Secondaries have a mottled appearance from their transparency; fringe white with black points at the ends of the nervules.

Under side: primaries as above, except that the apex is faintly clouded with dull green; secondaries mottled with dull green disposed in three jagged, transverse bands and a demi-band on the inner side between the marginal and central; the marginal band deeply scolloped; the bands more or less connected.

*Female.* A little larger, resembles the male.

California, from Dr. H. Behr. Youcon River, from Mr. R. W. Kennicott. Pike's Peak, in the Society's collection.

The resemblance to *Ausonja* is very close, but not more so than to *Tugis* or to *Simplonia*, two other European species.

**CHIONOBAS CHRYSXUS**, Doubleday: figured in Genera of Diurnal Lepidoptera, but not described.

*Male.* Expands 2 inches. Upper side: primaries brown, with a broad, ochrey yellow band across the nervules, not reaching the costa; within this band are two round, black spots, the upper one largest and between the discoidal nervules; the other minute, between the second and third median nervules.

Secondaries ochrey yellow, bordered with brown at the outer angle; a minute black spot near the anal angle; fringe of both wings alternate black and whitish.

Under side: primaries paler, the upper spot reproduced, and having a white pupil; the whole wing, except the band, marked by fine, dark brown streaks, at the apex and on the costa interspersed with white.

Secondaries mottled with brown and white, the latter color predominating next the base; a broad, sinuous band crosses the disk, darkest on the edges; the minute spot reproduced.

*Female.* A little larger, of an uniform dull ochrey yellow; primaries have three spots, the two outer ones with white pupils.

Taken near Pike's Peak; from the Society's Collection.

The female of this species much resembles the female of *C. Taygete*, from Labrador.

List of the North American species of **BOMBUS** and **APATHUS**.

BY E. T. CRESSON.

The great difficulty that has attended the discrimination of the European Bombi, on account of the many variations, will doubtless be experienced with our own species, until a correct knowledge of them is obtained. A mere examination or comparison of the specimens will not surmount this difficulty,—their haunts must be examined, and the only way in which the species and their varieties can be correctly separated, is either by capturing or breeding the individuals from their nests. As yet no such information has been obtained of our species, and to make a beginning, we must do the best we can in separating them by examining and comparing specimens, until we obtain by experience such knowledge as will enable us to produce a correct division of these insects. It is my purpose, therefore, in this paper, to give a list of our species with their characters, together with a few notes which may be of service to future monographists of this group.

Gen. **BOMBUS** Latr.

*Bombus* Latr. Hist. Nat. Ins. xiv, 63. (1802).

*Bremus* Jurine, Hym p. 259. (1807).

The latest, best and most detailed description of the characters of this widely distributed genus, is thus given by Mr. Smith, in his *Catalogue of the Bees of Great Britain*, (p. 207):—

“*Body* oblong and densely pubescent. *Head* subtriangular. *Antenna* geniculated, filiform, longer than the head. *Ocelli* placed in a slight curve in a transverse impression on the vertex. *Labrum* transverse, its anterior margin ciliated. *Mandibles* stout, grooved exteriorly towards their apex, which is rounded. *Labial palpi* four-jointed; the first joint elongate, longer than the mentum, the second joint about one-fourth as long as the first, ciliated at the sides; the third and fourth joints minute, placed outside and near the apex of the second joint. *Paraglossæ* short, broad, and rounded at their apex. *Labium* linear, very pubescent, and about one-third longer than the labial palpi. *Maxillary palpi* two-jointed. *Superior wings* with one marginal and three submarginal cells, the second submarginal cell much narrowed towards the marginal, receiving the first recurrent nervure about the middle; the third submarginal narrowed towards the marginal, receiving the second recurrent nervure near

its apex. *Posterior legs* in the *females* have on the upper and under margins of the tibiæ externally, a dense fringe of stiff hairs, forming a corbicula or pollen-basket; the exterior surface of the tibiæ smooth, shining, and broadly dilated; the basal joint of the tarsi elongate, broad, flattened, and slightly concave exteriorly, deeply notched at the base, forming a stout tooth; the exterior margins ciliated with short stiff hairs; the claws bifid. In the *males* the tongue is more elongate and slender; the mandibles have a dense fringe of curled hair on their inferior margins; the antennæ are more slender, and longer; the posterior tibiæ are not furnished with a corbicula, and are slightly thickened; the basal joint of the posterior tarsi not notched at the base; the abdomen has an additional segment, and the antennæ an additional joint."

The difference in the shape of the posterior tibiæ and first joint of the posterior tarsi of the males, will more easily distinguish it from the female sex, as it is often troublesome to count the joints of the antennæ and the segments of the abdomen; but a very conspicuous character with which to distinguish the sex, and for which, apparently original, observation, I am indebted to Benj. D. Walsh, Esq., of Rock Island, Ill., is the difference in the shape of the tarsal claws:—in the male the inner tooth of the claw is almost as long as the outer, while in the female and worker the inner tooth is very short. This character, as far as I have observed, is constant.

Between the *female* and the *worker*, there seems to be no external characters, excepting size, by which to distinguish them, the worker being the smallest, and yet in a large series of some of our common species, the size gradually diminishes from the largest female to the smallest worker, making it quite impossible to divide them without more explicit characters. However, as there seems to be some confusion of opinion amongst authors, regarding the difference in size between the females and the workers, and in the absence of any satisfactory solution of the matter, it may be interesting to cite here a few passages on this subject. Reaumur (Ins. vi.) says:—"The nests seldom contain more than 50 or 60 inhabitants; these are of different sizes: the females, of which there is more than one in a nest, are the largest, and probably alone survive the winter; the males are of the middle size, as is also one description of working-bees, or neuters; the other neuters are the smallest, no bigger than the hive bee. These two sorts of neuters, it is most likely, are appropriated to different kinds of work; the largest being the strongest, and the others the most lively, active and expert." Huber (Trans. Linn. Soc. Lond. 1802, vi, p. 218) says:

“The males of Bombi are always smaller than their females; the difference is greater or less according to the species; in some, the females are at least double the size of the males, in others they are only a few lines longer. The size of the males and the females scarcely varies in each species, but the workers have not so fixed and uniform a size; some are so small that they would not be taken for Bombi; others are so large that one would be tempted to take them rather for females than for workers; nevertheless their size is never equal to that of the mothers, and a glance of the eye is sufficient to compare them, and to put each one in the place which it ought to occupy.” Again, on p. 284, he says:—“The form of the maxillæ of the female is entirely like that of the worker; its legs are equally capable of being charged with pollen, the colors of both are generally distributed in the same manner upon all parts of the body; it appears, that if to so many relations, we add that of fecundity, we shall make of the workers as many small females; for the difference of size is the only exterior character by which they can be distinguished.” And again, on p. 290, he says:—“Among the workers there were assuredly small females, which I should have recognized, if I had been able to find in them any distinctive character.” St. Fargeau (Hym. i, 448) says:—“When the birth of a certain number of workers has made the work more easy, and the arrival of provisions more active, comes the period when the Mother Humble-Bee lays eggs of males and at the same time eggs of females. These females, at least some of them, acquire a size much above that of the mother, founder of the nest. They are in this respect intermediate between the latter, and the small barren workers, which first came into the world. Like the workers they share in the common labors, and, like their mother, they become fecundated by connection with the males born at the same period as themselves. These males are also smaller than the males which will be born at the end of the summer. \* \* \* \* Then the population increases in proportion to the number of these young females, of medium size, which have just been hatched; the number of males especially appears to increase rapidly, which would lead me to believe that they gave birth to males only. The female founder continues nevertheless her laying, and, towards the end of August, there are raised, in each nest, several females of the largest size (from three to eight, as far as I have been able to see). It is these

which will pass the winter, benumbed by the cold, and which are destined to the subsequent propagation of the species in the following year."

Thus it seems that Reaumur and Huber consider all workers, except the largest females, while St. Fargeau seems to think that all are females except the smallest, which he calls the workers.

The opinion of St. Fargeau is probably the most correct, although there is no doubt that the workers vary in size as well as the females. An examination of the sexual organs, however, may show some differences of structure between the two sexes.

Our species of *Bombus* are quite numerous, and many of them very handsome.

The following table may facilitate the determination of the species:—

\* *Thorax above entirely yellowish.*

§ Abdomen yellowish and black.

† *Apex black.*

1st segment yellow.....	Sp. 1—2.
2d segment yellow.....	Sp. 3.
1st and 2d segments yellow.....	Sp. 4.
1st, 2d and 3d segments yellow.....	Sp. 5.
Mixed with black and yellow.....	Sp. 6.

†† *Apex yellowish or whitish.*

First 3 segments yellow.....	Sp. 7.
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§§ Abdomen entirely yellowish-white in certain lights.....Sp. 8.

\*\* *Thorax above yellowish, banded with black.*

§ Abdomen whitish or yellowish and black.

† *Apex black.*

First 5 segments yellow.....	Sp. 9.
“ 4 “ “ .....	Sp. 10—11.
“ 3 “ “ .....	Sp. 12—13.
“ 2 “ “ .....	Sp. 14—16.
Third segment yellowish.....	Sp. 17.
Fourth “ “ .....	Sp. 18—19.

†† *Apex white or yellowish-white.*

First 3 segments black, remainder white.....	Sp. 20.
1st, 2d and 4th segments black.....	Sp. 21.
1st, 3d and 4th “ “ .....	Sp. 22.
1st, 4th and 5th “ “ .....	Sp. 23.
1st and 4th “ “ .....	Sp. 24.



§§ Abdomen yellow, reddish or fulvous and black.

† *Apex yellowish or fulvous.*

3d, 4th or 5th segments black.....Sp. 25—29.

†† *Apex black.*

1st and 2d segments yellow and reddish; rest black.....Sp. 30.

1st segment yellow, 2d, 3rd and part of 4th reddish.....Sp. 31.

1st and part of 4th segments yellow, 2d and 3rd reddish.....Sp. 32.

“ “ “ “ 2d, 3d & part of 4th reddish.....Sp. 33.

1st and 4th segments yellow, 2d and 3rd reddish.....Sp. 34.

1st and 2d segments yellow, 3rd and 4th reddish.....Sp. 35.

§§§ Abdomen entirely yellowish or reddish, or both.

Anterior half yellow, posterior reddish.....Sp. 36.

2d and 3rd segments reddish.....Sp. 37.

3d and 4th “ “ .....Sp. 38.

All yellowish except anus.....Sp. 39.

\*\*\* *Thorax above black.*

Abdomen with the first 3 segments more or less yellow or red Sp. 40—42.

“ reddish, except the 1st and last segments.....Sp. 43.

“ all black.....Sp. 44.

1. *B. Virginicus.*

*Apis Virginicus* Oliv. Encycl. Méth. Ins. iv, p. 66. (1789).

? *Apis griseo-collis* De Geer, Mém. Ins. iii, p. 576, pl. 28, fig. 13—14. (1773);  
Oliv. Encycl. Méth. Ins. iv, p. 64. (1789).

*Bombus Virginicus* Fabr. Syst. Piez. p. 346. (1804); St. Farg. Hym. i, p. 470.  
(1836); Kirby, Faun. Bor. Am. iv, p. 274. (1837); Smith, Brit. Mus. Cat.  
Hym. ii, p. 398. (1854); Greene, Ann. Lyc. Nat. Hist. N. Y. vii, p. 170.  
(1860).

*Female.* Head black, clothed more or less with yellowish hairs above the antennæ. Thorax above and on the sides pale yellow, more sparse on the disk. Wings vary from sub-hyaline to violaceous. Legs black, except the base of the femora beneath which is sometimes clothed with yellowish hairs; tarsi brown, basal joint rufous on the inner side. Abdomen with the first segment above pale yellow, remaining segments black; sometimes the anterior margin of the second segment in the middle, is sparsely clothed with short yellowish hairs. Beneath black. Length 9—12 lines.

*Worker.* Differs from the female only in size, and undergoes the same variations in color. Length 5—7 lines.

*Male.* Head clothed above and below the antennæ with yellowish, intermixed with a few black hairs; eyes very large and prominent.

Thorax above and on the sides tawny-yellow. Wings subhyaline, more or less embrowned. Legs black; femora beneath clothed with long yellowish hairs. Abdomen with the first segment above yellowish; anterior part of the second segment in the middle yellowish or yellowish-brown; remaining segments black. Beneath black, more or less mixed with yellow. Length 7—9 lines.

A very common species. Fifty (18 ♀, 24 ♂, 8 ♂) specimens examined. Can., Conn., N. Y., Del., Pa., D. C., Ill., Mo., Miss., Tex. (Coll. Ent. Soc. Phila., and Mr. E. Norton.)

I have with some doubts placed De Geer's *Apis griseo-collis* as a synonym of this species. De Geer says:—"The Bees of this species, which are of a medium size and very hairy, although less upon the abdomen than elsewhere, have been found in Pennsylvania by M. Acrelius, where they make their nests in the ground. I have only the workers and the males. Their color is black, but the thorax and a part of the anterior portion of the abdomen are entirely covered with hairs of a yellowish-gray, or olive color. The wings are brown and shining, and the eyes of a dusky brown. The male is large, with large eyes which cover almost the whole of the head, as is usual in all the male Bees. The upper lip is yellow, and the black color of the abdomen and of the legs is shining, and approaches somewhat a deep blue. The working Bee, which is of the usual form of the Humble-Bees, is much smaller than the male; its upper lip is black like the rest of the head, and the black color of the abdomen and of the legs has no blue shade." The figure given by De Geer, of his species, represents the abdomen as being entirely black. Olivier seems to have seen De Geer's species, and thinks it distinct from his *Apis Virginica*, previously described. Therefore, if *griseo-collis* and *Virginicus* should prove to be the same species, which is quite probable, then the former name must, according to priority, take precedence.

In defence of the synonymy of *B. Virginicus*, given above, I have to say, that the briefness of the Linnean and Fabrician descriptions of *Apis Virginica* are such, that it is impossible to say, with any degree of certainty, whether they refer to our common *Bombus Virginicus* or *Xylocopa Virginica*, both species having the thorax and basal segment of the abdomen yellowish. In 1770, Drury described and figured (Illust. Ins. 1, p. 96, pl. 43, fig. 1) a species, without name, which, according

to the description and figure, is certainly our common *Xylocopa* or carpenter-bee. During the next year, Linnæus, in his "Mantissa Plantarum," gives Drury's species the name of *Apis Virginica*, and describes it thus:—"hirsuta pallida, abdomine, excepto primo segmento, atro." Fabricius, in his Syst. Ent., and Ent. Syst., and Gmelin, in ed. Linn. Syst. Nat., give the same description of *Apis Virginica*, quoting Drury's description and figure, and as if they had not seen the insect. they give no additional characters, and we are, therefore, obliged to give these quotations as referring to *Xylocopa Virginica*. Olivier, in Encycl. Méth. (1789), although he quotes all former descriptions of *Apis Virginica*, gives us in a very few words, the first indication of the existence of *Bombus Virginicus*, having, no doubt, had that species before him when he wrote his description, because he says that *the head is black, with a few yellow hairs in front*, which is the case with the *Bombus*, but not with the *Xylocopa Virginica*. In 1804, Fabricius in his Syst. Piez. creates the genus *Bombus* and places Drury's species in that genus; he also describes under the genus *Centris*, a species which he calls *Carolina*, and which is nothing more or less than the same species as described by Drury. We are then to suppose that his *Bombus Virginicus* is the *Apis Virginica* of Olivier, and not of Drury and Linnæus, whom he quotes. Mr. Say, in Bost. Journ. (1837), doubting the accuracy of Fabricius in placing his *Carolina* in the genus *Centris*, made an examination of the generic characters and found it to be a *Xylocopa*, a genus created by Fabricius in the same volume in which he describes his *Centris Carolina*. Mr. Say gives a description of both sexes of this species, but allows it to retain the name of *Carolina*, and quotes Drury's *Virginica* (which was described over 30 years before) as a synonym. Mr. Westwood, in his new edition of Drury's work (1837), transfers the *Apis Virginica* of Drury to the genus *Xylocopa*, and quotes Fabricius' *Bombus Virginicus*, Syst. Piez., as the same thing. Finally, Mr. Smith, in his British Museum Catalogue of Hymenoptera, ii, p. 362 (1854), quotes both Drury's and Fabricius' species as distinct; to the former he gives the same references as he gives to *Bombus Virginicus* on p. 398, and indicates that both *Xylocopa Virginica* (Drury), and *Xylocopa Carolina* (Fabr.), as distinct species, are in the Collection of the British Museum. Amid all this confusion, our only course is to fall back on what little proof we

have, and transfer all references of *Apis Virginica*, previous to that of Olivier, to *Xylocopa*, and place the discovery of *Bombus Virginicus* to the credit of Olivier, who gave the first indication with which we are able to separate it from the *Apis Virginica* of Drury, Linnæus and Fabricius. Therefore, I offer the following as, probably, a more correct view of the synonymy of the latter species.

**XYLOCOPA VIRGINICA.**

- Apis Virginica*. Drury, *Illust. Exot. Ins.* i, p. 96, pl. 43, f. 1 (1770); Linn. *Mant. Plant.* p. 540. (1771); Gmelin, ed. Linn. *Syst. Nat.* p. 2784; Fabr. *Syst. Ent.* p. 380. (1775); *Ent. Syst.* ii, p. 318. (1793).  
*Centris Carolina* Fabr., *Syst. Piez.* p. 357. (1804).  
*Xylocopa Carolina* Say, *Bost. Jour.* i, p. 412. (1837); St. Farg., *Hym.* ii, p. 207. (1841); Smith, *Brit. Mus. Cat., Hym.* ii, p. 363. (1854).  
*Xylocopa Virginica* Westw., edit. Drury, *Illust. Exot. Ins.* i, pl. 43, fig. 1. (1837); Smith, *Brit. Mus. Cat., Hym.* ii, p. 362. (1854).

**2. *B. impatiens*.**

*Bombus impatiens* Harris, *Cat. Ins. Mass.* 2d edit.

*Male*. Head black, with a mixture of yellowish hairs below the antennæ and on the cheeks and vertex. Thorax pale yellowish. Wings hyaline. Legs black, with pale hairs at base of the femora beneath. Abdomen with the first segment above pale yellow; remaining segments black. Beneath sparsely clothed with yellowish hairs. Length 7 lines.

*Female* and *worker* not seen.

Seven specimens. Can., Conn., Pa., Ill., Mo. (Coll. Ent. Soc. Phil., and E. Norton.)

The coloration of this species is so much like that of *B. Virginicus*, that, at first, I supposed it to belong to that species, but the males above described are so different from what I have taken for the males of *B. Virginicus* that they can scarcely be of the same species. A specimen in the collection of Mr. Norton, labelled *B. impatiens*, was compared with specimens so named in the Harris collection, and the above description made from it. It may be that this species and the males of *B. Virginicus* are mixed up, but until we have more conclusive evidence of their identity, it is probably best to keep them separated.

**3. *B. Marylandicus*.**

*Apis Marylandica* Fabr. *Ent. Syst. Suppl.* p. 273.

*Bombus Marylandicus* Fabr. *Syst. Piez.* p. 346.

“Large. Head black, labium ferruginous. Antennæ black, first

article ferruginous. Thorax hairy, ferruginous. Abdomen hairy, black, second segment yellow. Posterior legs very hairy. Wings blackish-violaceous. *Hab.* America."

Unknown to me. Is it a *Bombus*?

4. *B. vagans*.

*Bombus vagans* Smith, Brit. Mus. Cat. Hym. ii, p. 399.

*Female.* Head black, often more or less yellow on the vertex. Thorax above and on the sides yellow, sometimes slightly intermixed with black between the wings. Wings fusco-hyaline. Legs black; in some specimens the base of the femora below have a few yellowish hairs; tarsi brown. Abdomen with the first two segments above yellowish, remaining segments black, except in two specimens which have the apical segment slightly mixed with yellow. Beneath black. Length 8—12 lines.

*Worker.* Colored as the female. Length 6—7 lines.

*Male.* Head yellowish, slightly mixed with black, with a thick tuft of bright yellow in front below the antennæ. Thorax above and on the sides pale yellow. Wings subhyaline, faintly clouded on the apical margins. Legs black; femora clothed beneath with yellowish hairs. Abdomen with the first two segments above pale yellow; remaining segments black, except the apical one, which is sometimes mixed with yellowish. Beneath clothed with yellowish hairs. Length 6—8 lines.

Forty-two (14 ♀, 19 ♂, 9 ♂) specimens examined, from various localities:—Can., Me., Conn., Pa., N. J., Del., D. C., Va., Ill. (Coll. Ent. Soc. Phil. and E. Norton.)

5. *B. perplexus* n. sp.

*Male.* Head black, with a tuft of pale hairs in front below the antennæ; vertex yellowish. Thorax bright honey-yellow. Wings hyaline, apical margins faintly clouded. Legs black; base of femora beneath yellowish. Abdomen with the three basal segments bright honey-yellow, the third segment having a slight admixture of black; remaining segments black. Beneath black, slightly mixed with yellowish. Length 8 lines.

*Female* and *worker* not seen.

One specimen. Connecticut. (Coll. Mr. E. Norton.)

This species closely resembles *B. Hudsonicus*, but the form of the

body is more elongate and not so compact as that of the latter species, and the color is much brighter.

6. **B. bimaculatus** n. sp.

*Male.* Head black, mixed with yellowish on the face and vertex. Thorax honey-yellow. Wings sub-hyaline, slightly stained with yellowish. Legs black, clothed with yellowish hair, especially on the femora beneath. Abdomen with the whole of the first segment above, and the second, except a few black hairs on the middle and a round black spot on each side, pale honey-yellow; the fourth segment mixed with black and yellow; the third and apical segments black. Beneath yellowish hairy. Length  $7\frac{1}{2}$  lines.

*Female* and *worker* unknown to me.

One specimen. Connecticut (Coll. Mr. E. Norton.)

7. **B. Hudsonicus**, n. sp.

*Male.* Head with a tuft of yellow hairs in front and on the vertex. Thorax above and beneath yellowish. Wings subhyaline. Legs black, femora beneath clothed with yellowish hairs. Abdomen with the first three segments yellowish above; the remaining segments black, the two apical segments having a mixture of pale hairs. Beneath sparsely clothed with yellowish hairs. Length 7 lines.

*Female* and *worker* not seen.

Two specimens. Hudson's Bay Territory. (Coll. E. Norton.)

8. **B. pallidus** n. sp.

*Female.* Head black, with fuscous hairs at the insertion of the antennæ and on the vertex. Thorax above and beneath pale ochraceous, shading into pale fuscous posteriorly. Wings dark fuscous, tinged with violaceous. Legs black, thickly clothed with short pale hairs; tarsi pale, inner side of basal joint golden in certain lights. Abdomen above pale ochraceous, base of the first, and the three apical segments shaded into pale fuscous. Beneath black, sparsely clothed with short pale hairs. Length 11 lines.

*Worker* and *male* not seen.

One specimen. St. Louis, Mo. (Coll. E. Norton.)

In taking a dorsal view of this singular species, with the head turned from us, the upper surface of the thorax behind the insertion of the wings, the base of the first, and the three apical segments of the ab-

domen are pale fuscous. If we turn it around, with the head towards us, this color disappears, and the whole surface seems to be pale ochraceous with a silky gloss. In examining this specimen, it occurred to me that it might be a very faded specimen of our common *B. Pensylvanicus*, for if we convert the pale fuscous into black, and the pale ochraceous into yellow, we will have the exact coloration, superiorly, of that species; but the hairs of the legs being pale ochraceous, and with the sericeous appearance of the insect, would be sufficient, in my estimation, to render it distinct, and it would scarcely be possible for the colors to change so greatly, particularly so, as the specimen, apparently, has never been in spirits.

9. *B. borealis*.

*Bombus borealis*, Kirby, Faun. Bor. Amer. 4. p. 272.

“Body clothed underneath with black, above with tawny hairs. Face and vertex with a tuft of yellowish ones; thorax, between the wings, with a black hairy band; wings somewhat embrowned, with black nervures; legs black; abdomen above with a thick coat of tawny hairs palest at the base; anus black. Length of body 8 lines. Taken with *B. sylvicola*.”

In the collection of the Entomological Society there is a single female specimen from Canada (kindness of Mr. Saunders), which answers to the above description, except that the abdomen beneath is sparsely clothed with yellowish hairs, and the length of the body is 9 lines. I do not feel justified in separating them.

10. *B. fervidus*.

*Apis fervida* Fabr. Ent. Syst. Suppl. p. 274.

*Bombus fervidus* Fabr. Syst. Piez. p. 352; St. Farg. Hym. 1, p. 470.

*Female*. Head black. Thorax anteriorly and pleura yellow; a black band between the wings. Scutellum yellow. Wings fusco-hyaline, slightly tinged with violaceous. Legs black. Abdomen above yellow, excepting the two apical segments which are black. Beneath black. Length 10 lines.

*Variety*. The yellow color deeper, the black band between the wings is broader, and the face and vertex is clothed with pale yellow hairs.

*Worker*. Colored same as the female. Length 6—7 lines.

*Male*. Head yellow in front and on the vertex. Thorax above tawny-

yellow, mixed with black on the pleura; a broad black band between the wings. Wings subhyaline. Legs black, slightly mixed with yellowish on the femora beneath. Abdomen with the first four and the posterior margin of the fifth segments above tawny-yellow, the remaining segments black. Beneath yellowish. Length 7 lines.

Twenty-seven (14 ♀, 10 ♂, 3 ♂) specimens examined. Can., Conn., N. Y., Penn., Del., Va., Ks., and Utah. (Coll. Ent. Soc. Phil., and E. Norton.)

I have seen no specimens so large as mentioned by St. Fargeau,—13 lines.

#### 11. *B. Pennsylvanicus*.

*Apis Pennsylvanica* De Geer, Mém. iii. p. 575, pl. 28, f. 12. (1773).

*Apis Americanorum* Fabr. Syst. Ent. p. 380. (1775); Ent. Syst. ii, p. 319. (1793); Oliv. Enevel. Méth. iv. p. 66. (1789).

*Bombus Americanorum* Fabr. Syst. Piez. p. 346. (1804); St. Farg. Hym. i, p. 472. (1836).

*Female*. Head black, often more or less yellow on the vertex. Thorax with its anterior portion above yellow; between the wings black. Scutellum black, generally mixed with yellow. Wings blackish-violescent. Legs black; tarsi brown, basal joint rufous on the inner side. Abdomen with the first segment above generally more or less yellow, sometimes almost all black; second and third segments yellow, remaining segments black. Length 9—12 lines.

*Worker*. Differs in no respect from the female, except in size; in color it undergoes the same variations. Length 6—8 lines.

*Male*. Head black, intermixed with obscure yellowish on the face and vertex; eyes very large and prominent, almost contiguous on the vertex. Thorax above and on the sides tawny-yellow, with a blackish band between the wings; in some specimens the thorax is entirely yellowish. Wings fusco-hyaline, darkest along the costa and towards the base. Legs black; hairs of the basal joint of the posterior tarsi pale; tarsi brown. Abdomen with the first three segments tawny-yellow, slightly mixed with blackish on the base of the first segment; remaining segments black. Beneath black, sparsely clothed with pale hairs. Length 10 lines.

Eighty specimens examined from Conn., N. Y., N. J., Penn., Del., Md., Va., Ill., Mo., Ks., Fla., Tex. (Coll. Ent. Soc. Phila., E. Norton.)

This is our most common species, and has generally been known



and cited by authors as the *Americanorum* of Fabricius, but De Geer described it two years previously under the name of *Pensylvanica*, as having the scutellum and the first segment of the abdomen all yellow, while that of Fabricius had those parts apparently all black. However, the series of specimens which I have examined show that they are one species, and that the color of the scutellum and the first segment of the abdomen vary very much in the mixture of black and yellow. The most abundant variety is intermediate between that of the De Geer and Fabricius, it having the scutellum and the first segment of the abdomen more or less mixed with yellow. Olivier was the only one who suggested that De Geer's species was a variety of *Americanorum*, and yet, for some unknown reason, he allowed the latter name to remain. No one since Olivier seems to have taken any notice whatever of De Geer's species, nor of Olivier in placing it as a synonym of *Americanorum*.

Two fine ♀ specimens from Florida vary in having the first segment of the abdomen above jet-black, with a small patch of yellowish in the middle of the posterior margin of the segment.

12. **B. sonorus.**

*Bombus sonorus* Say, Bost. Journ. Nat. Hist. i, p. 413.

"Body yellow; head black; thorax with a broad black band in the middle; wings violaceous-black; tergum with the first, second and third segments yellow, with others black; beneath black. Length ♀ four-fifths of an inch. Inhabits Mexico."

"Resembles the *fervidus* Fabr., so closely that it may readily be mistaken for it, but that species has only two segments of the tergum clothed with yellow hair; that of the second one, however, is so much elongated as to conceal a considerable portion of the next segment. The color is a much deeper yellow than that of *fervida*."

Unknown to me. Say is certainly mistaken in stating that *fervidus* has only two segments of the abdomen yellow; it has the first four segments yellow.

13. **B. Arcticus.**

*Bombus Arcticus* Kirby, Suppl. Parry's 1st Voy. p. cexvi. Curtis, Ross' 2nd Voy. Append. p. lxiv. (1824.)

? *Apis alpina* O. Fabr. Fn. Grønland, p. 199. (1780.)

"*Female*. Body covered with long black hairs, but those that clothe

the base and apex of the thorax, and the anterior half of the upper side of the abdomen, are of a pale yellow. Some black hairs are visible at the base of the last yellow segment of this part of the body. The antennæ are as long as the head. The wings are a little tinged with brown, and their nervures are black. The tarsi are covered with short reddish hairs. Length 11 lines.

“*Male*. Much smaller than the female. The hairs of the whole trunk or intermediate segment of the body, are pale yellow intermixed with some black ones. The legs, also, particularly the anterior pair, are clothed with long yellowish hairs. Length 7 lines.”

Arctic America. Unknown to me.

Mr. Kirby gives his reasons, at some length, for considering this species identical with that of O. Fabr., who mistook his for the *Apis alpina* of Linné (See l. c. p. ccxvii), and which species Mr. Smith (Bees of Great Britain, p. 222) quotes as a synonym of *B. nivalis* Dahlb., a species with the apical segments of the abdomen yellow, and consequently quite different from *B. Arcticus*.

#### 14. *B. pleuralis*.

*Bombus pleuralis* Nyl. Notis. ur Sällsk. pro Faun. et Flor. Fenn. Förh. 1. 231.

“♀. Black, thorax anteriorly and pleura yellow; scutellum and two first segments of the abdomen yellow. Length 20 millim.

“♂. Same as ♀ except that the hairs of the face are yellow; those of the belly mixed with yellowish, and those of the scutellum almost all black. Length 14 millim. Sitka.”

Not seen.

#### 15. *B. scutellaris* n. sp.

*Female*. Head black. Thorax with its anterior portion above and on the sides yellow; a broad black band between the wings. Scutellum yellow. Wings blackish-violaceous, darkest toward the base. Legs black. Abdomen with the two basal segments above yellow; remaining segments black. Beneath black. Length 13 lines.

*Worker*. Excepting size, there is no difference between this and the female. Length 9 lines.

*Male*. Not seen.

Four (2 ♀, 2 ♂,) Fla., Tex., (Coll. Ent. Soc. Phil., E. Norton, and Smith. Inst.)

This is a handsome species. It agrees with the description of *B. pleuralis* from Sitka, but besides its larger size, the difference of locality is so great that I have considered it safe to separate them.

16. *B. Groenlandicus*.

*Bombus Groenlandicus* Smith, Brit. Mus. Cat. Hym. ii, p. 393. 23.

“*Female*. Length 9—10 lines. Black; the pubescence on the face black, that on the vertex is also black; the face elongate. Thorax, above, anteriorly and posteriorly having a long loose yellow pubescence, between the wings a broad band of black; wings subhyaline, stained with fuscous towards their base; the legs have a black pubescence. Abdomen, the two basal segments covered with long yellow pubescence, the apical ones with black. *Hab.* Greenland.”

Not identified.

17. *B. medius* n. sp.

*Worker?* Head black. Thorax anteriorly pale yellowish, with a broad black band between the wings. Scutellum pale yellowish. Wings blackish-violaceous. Legs black. Abdomen black, with the third segment above pale yellowish. Beneath black. Length 7 lines.

One specimen. Utah. Dr. Suckley. (Coll. Smith. Inst.)

18. *B. Californicus*.

*Bombus Californicus* Smith, Brit. Mus. Catal. Hym. ii, 400. 57.

*Female*. “Black; the pubescence on the head black, that on the thorax before the wings fulvo-ochraceous, posteriorly and beneath black; the legs black; wings fuscous. Abdomen, the pubescence black, except that on the fourth segment, which is yellow. Length 10 lines.”

*Worker*. Same as female, except that the hairs on the head are yellow. Length 6 lines.

*Male*. “The pubescence as in the female, differing only in having that on the face yellow. Length 5—6 lines.”

*Hab.* California. (♂, Coll. Ent. Soc. Philad.) *Female* and *male* not seen. In the worker the hairs are rather long, and those of the third segment of the abdomen above cover the anterior part of the yellow of the fourth segment, giving the band of yellow on that segment the appearance of being very narrow.

19. *B. dubius* n. sp.

*Worker?* Head black. Thorax anteriorly pale yellowish; between

the wings black. Scutellum yellowish, mixed with black. Wings fuscous. Legs black. Abdomen above black, with the fourth segment yellowish-white. Beneath black. Length 7 lines.

One specimen. Western Kansas. (Coll. E. Norton.)

Closely allied to *B. Californicus*, but differs by the more elongate head, the yellowish scutellum, and in the scape of the antennæ being much shorter.

20. *B. occidentalis*.

*Bombus occidentalis* Greene, Ann. Lyc. Nat. Hist. N. Y., 7, p. 11 & 170.

*Female*. Head black, with a tuft of yellowish hairs below the antennæ. Thorax yellow anteriorly and laterally, with a broad black band between the wings. Scutellum yellowish, intermixed with black. Wings fusco-hyaline, nervures black. Legs black; tarsi brown; corbicula golden-yellow. Abdomen above with the first three segments black, the apical segments white. Beneath black, with the posterior margin of the fifth and sixth segments fringed with whitish hairs. Length 10 lines.

*Worker*. Colored same as the female. Length 7 lines.

*Male*. Colored same as the female, except that the hairs on the clypeus and vertex are mixed with yellowish, and those of the body beneath more or less pale. Length 7—8 lines.

Forty-two (2 ♀, 36 ♂, 4 ♂) specimens examined. California, Puget's Sound, Ft. Vancouver, (Coll. Ent. Soc. Phila., E. Norton, and Smith. Inst.)

A very pretty species, and seems to be the most common of our Western ones. The hairs of the body are rather long, and those on the third abdominal segment above cover the anterior half of the fourth segment.

21. *B. proximus*, n. sp.

*Worker?* Head black. Thorax anteriorly pale yellowish, posteriorly black mixed with yellowish. Wings subhyaline. Legs black; corbicula pale. Abdomen above black, with the third segment yellowish-white, and the two apical segments white. Beneath black, slightly mixed with pale hairs. Length 7 lines.

One specimen. Utah. Dr. Suckley. (Coll. Smith. Inst.)

Resembles *B. medius*, but the head is shorter, the body more compact, the wings clear, and the apical segments of the abdomen are white.

22. *B. modestus*, n. sp.

*Female.* Head black, slightly mixed with pale hairs on the vertex. Thorax before the wings yellowish-white; remainder black. Wings hyaline, faintly clouded on the apical margins. Legs black; inner side of the basal joint of posterior tarsi golden in certain lights. Abdomen above with the first, third and fourth (except the posterior margin) segments black; second yellowish-white; posterior margin of the fourth, and the remaining segments white. Beneath black. Length 7 lines.

One specimen. Youcon River, Arctic America. Mr. R. Kennicott. (Coll. Smith. Inst.)

23. *B. terricola*.

*Bombus terricola* Kirby, Faun. Bor. Am. iv, p. 273, Pl. 6 f. 4 ♀.

*Female.* Head black. Thorax with its anterior portion above bright yellow, remainder of the thorax black, except a slight admixture of yellow on the scutellum. Wings fusco-hyaline. Legs black; hairs of the posterior tibiæ and the tarsi pale brown. Abdomen with the first, fourth and fifth segments above black; second and third bright yellow; anus yellowish-white. Beneath black. Length  $9\frac{1}{2}$  lines.

*Worker.* Same as the female, except that the scutellum is altogether black, and the smaller size. Length 7 lines.

*Male.* Unknown to me.

Two specimens; Canada West, ♀ (Coll. Ent. Soc. Phila.), Hudson's Bay Territory, ♂ (Coll. Mr. E. Norton).

For the beautiful female specimen, the Society is indebted to Mr. William Saunders, of London, C. W.

24. *B. Howardii*, n. sp.

*Male.* Head black, mixed with yellow on the face and vertex. Thorax lemon-yellow above and beneath, with an indistinct blackish band between the wings. Wings hyaline, slightly stained with yellowish; nervures brown. Legs black, slightly yellowish on the base of the femora beneath; hairs of the tibiæ and tarsi pale brown. Abdomen with the first, anterior portion of the second, and the fourth segments above black; the posterior margin of the second and the whole of the third segments above lemon-yellow; the three apical segments very

pale yellow or a dirty white. Beneath black, sparsely clothed with pale hairs. Length  $8\frac{1}{2}$  lines.

*Female* and *worker* not seen.

One specimen. Pike's Peak. (Coll. Ent. Soc. Phila.) Collected by Mr. Winslow J. Howard, after whom it is named, and who has already discovered in that locality some new and very interesting species of Hymenoptera.

25. *B. frigidus*.

*Bombus frigidus* Smith, Brit. Mus. Cat. Hym. ii, p. 399. (1854).

*Bombus Carriei* Greene, Ann. Lyc. Nat. Hist. N. Y. vii, p. 170. (1860).

*Female*. Head black, mixed with yellowish on the vertex. Thorax yellow, with a black band between the wings. Wings fusco-hyaline. Legs black; base of femora beneath clothed with yellowish hairs; corbicula fulvous; tarsi brown, inner side of basal joint rufous. Abdomen above with the two basal segments yellow; the third black, and the remaining segments fulvous or yellowish-fulvous. Beneath black, mixed with a few pale hairs. Length 7—8 lines.

*Worker*. Colored same as the female. Length 5—6 lines.

*Male*. Colored same as the female, except that the hairs on the head and legs are all yellow. Length  $6\frac{1}{2}$  lines.

*Variety*. The black band on the third segment of the abdomen above is very indistinct.

Twenty (13 ♀, 4 ♂, 3 ♂) specimens examined. Great Slave Lake; Youcon River, Arctic America. Mr. Kennicott, (Coll. Smith. Inst.) Puget's Sound, (Coll. E. Norton).

The antennæ of the male of this species, unlike any other known to me, have the flagellum somewhat suddenly thickened at the base, and gradually narrows to the tip.

In some specimens the hairs of the third dorsal segment of the abdomen cover the anterior part of the fourth segment, giving the abdomen the appearance of having two black bands.

The variety of the male has the abdominal segments very much contracted, and the black band on the third segment is so indistinct that it would seem to belong to another species, but I think it is merely a variation.

The description of *B. Carriei* Greene, answers so well to that of *B. frigidus*, that I have no doubts of their identity.

26. *B. Kirbiellus*.

*Bombus Kirbiellus* Curtis, Ross' 2nd Voyage, Append. p. lxii.

"*Female*. Pl. A, fig. 2.—Black, a broad margin in front of the thorax, hinder margin of scutellum, and the abdomen, excepting the third segment and the apex, clothed with long yellow-ochreous hairs; wings yellowish, excepting the posterior margin, the nervures piceous; inside the tarsi with the pile bright ferruginous; tips of spurs, apical joint of tarsi, and base of claws sub-castaneous. Length 10 lines.

"*Neuter*. Similar to the female but much smaller, the hairs beyond the black on the abdomen are generally orange, and the whole of the tarsi, excepting the basal joint, is sub-castaneous. Length 7 lines.

"*Male*. Black, antennæ as long as the thorax, compressed at the apex; face and crown of head clothed with long yellow and black hairs; thorax yellow with hairs, having a transverse black band between the wings; basal half of abdomen yellow, the remainder orange, with a narrow black band across the middle; wings slightly yellow at the costa, the posterior margin slightly stained with brown, nervures piceous; basal joint of tarsi clothed inside with bright ferruginous hairs; spurs, base of claws, and apex of tarsi ochreous. Length 7½ lines."

Arctic America. Unknown to me.

27. *B. polaris*.

*Bombus polaris* Curtis, Ross' 2nd Voyage, Append. p. lxiii.

"*Female*. Black; a broad band across the anterior portion of the thorax, the scutellum, and abdomen clothed with long yellow hairs, whitish towards the apex of the abdomen, with a few black hairs on the sides of the third segment, a band of the same color on the fourth, and a very slight one on the fifth segment; tarsi clothed with black pile internally, the outside of the basal joints brownish, the edges ferruginous. Length 10 lines.

"*Male*. Black, clothed with yellow hairs; head black, with a patch of yellow hairs on the face, and another on the back of the head, a blackish band across the centre of the thorax, and an indistinct narrow one on the third and fourth segments of the abdomen, the apex orange; inside of tarsi clothed with yellowish pile. Length 6 lines.

"*Remarks*. A pair only of this species was preserved; in size and many respects it resembles *B. Kirbiellus*, but the indistinct and some-

what double band of black hairs across the abdomen will distinguish it, and the yellow pile inside of the tarsi in the male and the black in the female, are sufficient characters, I think, to justify its being separated from the former species."

Arctic America. Unknown to me. Probably a variety of the preceding species.

I have before me two male specimens from Methy Portage, Arctic America, (Coll. Smith. Inst.) which answer very well to the description above given. They are nearly 6 lines long, and in coloration they closely resemble the workers of *frigidus*, but differ very much from the males of that species.

28. *B. strenuus*, n. sp.

*Female*. Head black, mixed with dark fuscous on the vertex. Thorax anteriorly and laterally yellowish; a broad black band between the wings. Scutellum yellowish, somewhat mixed with black. Wings fusco-hyaline, darkest along the costa and towards the base. Legs black. Abdomen with the three basal segments yellowish; the fourth black, and the two apical segments more or less fulvous or yellowish-fulvous, mixed with black. Beneath black. Length 10—12 lines.

*Worker*. Not seen.

*Male*. Colored same as the female, except that the head has a mixture of yellowish below the antennæ and on the vertex; the legs have the hairs yellowish, particularly on the posterior pair; the fifth segment of the abdomen is nearly all black, and the two apical segments entirely fulvous. Length 7 lines.

Five (4 ♀, 1 ♂) specimens examined. Youcon River, Arctic America, and Hudson's Bay Territory. Mr. Kennicott. (Coll. Smith. Inst.)

A very fine species. Two of the female specimens have the two apical segments almost entirely black, and therefore this species may, although improbably, prove to be a variety of *B. Arcticus*.

29. *B. Sitkensis*.

*Bombus Sitkensis* Nyl. Notis. ur Sällsk. pro Faun. et Flor. Fenn. Förh. 1. p. 235. 19.

"Hairy, yellow; on the third and fourth segments of the abdomen blackish, with the hairs on the head and back of thorax mixed with blackish; corbicula either fuscous or inclining to fulvous. In the ♂,



the hairs are of a more pure yellow, with three, more or less distinct, narrow bands of the abdomen, and the hairs in the middle of the back of the thorax mixed with black.

“Small. ♀, 17 millim., anterior wings 14; ♂, 10—14, anterior wings 9—12; in this the black hairy band of the abdomen is often transversely divided by yellow hairs of the margin of the third segment; ♂, 12 millim., long, with the wings somewhat longer, hairs narrowly banded on the base of the third abdominal segment, on the fourth and fifth almost entirely black; anus fulvous-yellow. Feet black, hairy, in ♀ ♂, yellow hairy in ♂. Sitka.”

Not seen.

30. *B. affinis* n. sp.

*Female.* Head black. Thorax in front and on the sides yellow; between the wings black. Scutellum yellow. Wings fusco-hyaline. Legs black. Abdomen with the whole of the first and the sides and posterior margin of the second segments above yellow; remainder of the second segment rufo-fulvous; remaining segments black. Beneath black. Length 8 lines.

*Male.* Colored same as the female, except a slight admixture of yellowish hairs on the vertex. Length 8 lines.

*Hab.* Canada, ♀, Mr. W. Saunders. (Coll. Ent. Soc. Phila.), and New York, ♂. (Coll. E. Norton).

31. *B. melanopyge*.

*Bombus melanopyge* Nyl. Notis. ur Sällsk. pro Faun. et Flor. Fenn. Förh. 1, p. 236.

“Hairy, yellow, with the hairs on the head and the back of the thorax, between the wings subfasciate, intermixed with blackish; on the second, third and base of the fourth segments of the abdomen fulvorange, on the following blackish; body beneath yellow hairy. Length of the body and anterior wings, 11 millim. Sitka.”

Not seen.

32. *B. lacustris*, n. sp.

*Female.* Head black, mixed with yellowish in front and on the vertex. Thorax anteriorly and laterally yellowish, mixed with blackish; between the wings blackish. Scutellum yellowish. Wings subhyaline, apical margins clouded. Legs black; base of femora yellowish

beneath; corbicula fuscous; tarsi brownish, inner side of the basal joint bright rufous. Abdomen above with the basal segment and the posterior margin of the fourth segment yellowish; the second and third segments reddish; remaining segments black. Beneath black, mixed with yellowish hairs. Length 8 lines.

*Worker.* Colored same as the female, except that the yellowish fringe on the fourth abdominal segment is not so conspicuous. Length  $6\frac{1}{2}$ —7 lines.

*Male.* Colored same as the female, except that the hairs of the head and the anterior part of the thorax are more yellowish, with a very slight mixture of black, and the black band between the wings much more distinct. Length  $6\frac{1}{2}$  lines.

Six (3 ♀, 2 ♂, 1 ♂) specimens examined: Lake Athabasca, and Great Slave Lake. Mr. R. Kennicott. (Coll. E. Norton and Smith. Inst.)

This is closely allied to *B. ternarius* and *ornatus*, but differs from both species.

### 33. *B. ornatus.*

*Bombus ornatus* Smith, Brit. Mus. Cat. Hym. ii, p. 398. 52.

“*Female.* Length 7 lines.—Black; the pubescence on the head black, mixed with yellow hairs at the insertion of the antennæ; the thorax has a rich fulvo-ochraceous pubescence, and has a broad black band between the wings, the sides of the thorax anteriorly yellow; the legs have a black pubescence, with a few pale hairs at the base of the femora beneath; wings fusco-hyaline. Abdomen, the pubescence on the basal segment yellow, on the three following segments it is fulvous, having a narrow border of yellow, which divides it from the black pubescence which clothes the apex.

“The coloring of the male and the worker is the same, but less bright, and the pubescence is longer in the male than in the other sexes.

“*Hab.* North America; Hudson’s Bay; Arctic America.”

Unknown to me. Very closely allied to *B. ternarius*.

### 34. *B. ternarius.*

*Bombus ternarius* Say, Bost. Jour. Nat. Hist. 1, p. 414.

*Bombus Huntii* Greene, Ann. Lyc. Nat. Hist. N. Y. 7, p. 172.

*Female.* Head black, more or less yellow on the face and vertex. Thorax with its anterior portion, sides, and the scutellum lemon-yellow;

a broad black band between the wings. Wings subhyaline, apical margin stained with brown. Legs black; base of femora beneath clothed with yellow hairs; tarsi brown. Abdomen with the first and fourth segments above lemon-yellow; second and third segments bright fulvous; the two apical segments black. Beneath black, intermixed with yellowish. Length 10 lines.

*Worker.* Same as the female, except size, and the colors are not so bright. Length 5—6 lines.

*Male.* Colored same as the female. Length 7 lines.

Sixteen (5 ♀, 10 ♂, 1 ♂) specimens examined. Me., Conn., Penn., Kansas, Utah, Puget's Sound, and Arctic America. (Coll. Ent. Soc. Phil. and E. Norton).

This is a beautiful species when fresh; in alcoholic specimens the yellow is faded to a dirty white, and the fulvous color becomes more of a reddish hue. I see no reason why *B. Huntii* Greene, should be separated from this species, the colors are situated exactly the same, although faded by alcoholic immersion; and if the abdominal segments were not unnaturally distended, the entire length of the insect would not exceed 10 lines.

35. *B. flavifrons* n. sp.

*Female.* Head yellow in front and on the vertex. Thorax yellowish, mixed with blackish above, with a blackish band between the wings. Wings subhyaline, slightly stained with fuscous. Legs black, with pale hairs; femora beneath densely clothed with yellowish hairs; inner side of the basal joint of tarsi golden yellow in certain lights. Abdomen with the two basal segments above yellowish; the third and fourth fulvous; the remaining segments blackish. Beneath black, clothed with yellowish hairs. Length 8 lines.

*Worker.* Colored same as the female, except that the band between the wings is much more distinct, the color of the third and fourth segments of the abdomen above is more reddish, and the black color of the apical segments somewhat mixed with reddish. Length  $5\frac{1}{2}$  lines.

*Male.* Resembles the female, but the hairs are somewhat longer, and those on the face more dense; the color of the third and fourth segments of the abdomen above same as that of the worker; the legs and the abdomen beneath are thickly clothed with yellowish hairs. In

one specimen the base of the third segment of the abdomen above is mixed with black. Length 7 lines.

Eleven (3 ♀, 1 ♂, 7 ♂) specimens examined. Ft. Youcon, Arctic America; Hudson's Bay Territory, and Kansas. (Coll. Ent. Soc. Phil. E. Norton, and Smith. Inst.)

The black color on the apical segments of the abdomen of the worker, being mixed with red, would seem to connect it with *B. praticola* of Kirby, which I have not identified, but, for the present, it would probably be better to keep them separated.

36. *B. praticola*.

*Bombus praticola* Kirby, Faun. Bor. Am. 4, p. 274.

"*Female*. Body black, clothed above with yellowish hairs. Head with a tuft of yellowish hairs below the antennæ, and on the vertex; thorax black between the wings, which are embrowned; legs with yellow hairs at the base; anterior half of the abdomen yellow, posterior ferruginous. Length of the body 7 lines."

British America. Unknown to me.

37. *B. sylvicola*.

*Bombus sylvicola* Kirby, Faun. Bor. Amer. 4, p. 272.

*Female*. Head black; the vertex and a tuft of hairs below the insertion of the antennæ, yellowish. Thorax yellowish, with a broad black band between the wings. Wings subhyaline, varied with fuscous. Legs black; femora beneath with yellowish hairs. Abdomen above yellowish, with the second and third segments reddish. Beneath black, mixed with pale hairs. Length 8—9 lines.

*Worker* and *male* not seen.

Four specimens. Youcon River, Arctic America, and Great Slave Lake. Mr. R. Kennicott. (Coll. Smith. Inst.)

I take the specimens before me to be the same species as described by Mr. Kirby, under the above name, although he does not mention the position of the reddish bands on the abdomen. His description was taken from a single specimen (sex not mentioned) captured in Lat. 65°.

38. *B. rufo-cinctus* n. sp.

*Male*. Head black, hairs on the vertex and a tuft in front below the antennæ yellow. Thorax yellow, with an indistinct band between

the wings. Wings hyaline, slightly clouded on the apical margins. Legs black, femora clothed beneath with yellowish hairs. Abdomen with the third and fourth segments above reddish, remaining segments yellow. Beneath sparsely clothed with yellowish hairs. Length 7 lines.

*Worker.* Colored same as the male, except that the hairs of the face are black. Length 5 lines.

*Female.* Not seen.

Two specimens from Pike's Peak (Coll. Ent. Soc. Phila.), collected by Mr. W. J. Howard.

39. **B. nidulans.**

*Apis nidulans* Fabr. Ent. Syst. Suppl. 274.

*Bombus nidulans* Fabr. Syst. Piez. 349.

"Head and antennæ rather long. Thorax yellow, a black band between the wings. Abdomen yellow, anus slightly fulvous. Feet black. *Hab.* North America."

Unknown to me. Probably an *Apathus*, and may be a variety of *A. elatus*.

40. **B. Antiguensis.** ✓

*Apis Antiguensis* Fabr. Syst. Ent. p. 380; Ent. Syst. 2, p. 318; Oliv. Encycl. Méth. Ins. iv, p. 66.

*Bombus Antiguensis* Fabr. Syst. Piez. p. 346.

"Size of *A. violaceus*. Head black, immaculate. Thorax hairy, black. Abdomen black, anterior part yellow. Wings fuscous. Feet black. *Hab.* Antigua."

Unknown to me.

41. **B. ephippiatus.** ✓

*Bombus ephippiatus* Say, Bost. Journ. Nat. Hist. 1. p. 414.

"Body black; pleura pale yellow; wings dusky, tinged with violaceous; tergum pale yellow towards the base; this color is gradually narrowed behind and terminately on the third segment, forming somewhat of a semi-oval, with its base to the thorax and confluent with the color of the pleura. Length less than half an inch.

"Inhabits Mexico."

Not seen.

42. *B. pulcher* n. sp. ✓

*Female.* Head black. Thorax above black, lemon-yellow on the sides. Wings fusco-hyaline, slightly tinged with violaceous. Legs black. Abdomen with the first, part of the second, and centre of the third segments above bright lemon-yellow; balance of the second and third segments above bright rufous; remaining segments black. Beneath black. Length 11 lines.

*Hab.* Jalapa, Mexico. Mr. J. Akhurst. (Coll. E. Norton.)

This is the handsomest species of *Bombus* known to me, and were it not for the rufous color on the second and third segments of the abdomen, which is very conspicuous, I should have considered it as the *B. ephippiatus* of Say, but he mentions no such color in his description.

43. *B. Carolinus.* ✓

*Apis Carolina* Linn. Syst. Nat. 2, p. 959; Fabr. Syst. Ent. p. 379; Ent. Syst. 2, p. 316; Oliv. Encyc. Méth. Ins. iv, 64.

*Bombus Carolinus* Fabr. Syst. Piez. p. 342.

“Hairy, black; abdomen above fulvous, the first and last segments black. *Hab.* North America.”

Unknown to me.

44. *B. violaceus.* ✓

*Bombus violaceus* St. Farg. Hym. 1, p. 473.

“Black. Feet black; hairs of the under part of the tibiæ and tarsi rufous. Wings fuscous, with a violet reflection. *Female.* Length 13 lines. *Worker,* like the female. Length from 5 to 7 lines. North America.”

I have not seen this species, and doubt very much that it occurs in North America. The British Museum have specimens of it from South America.

In addition to the species above described, the following European species have been mentioned as found in North America:—

*B. hortorum* Linn. Smith, Entom. Annual, 1857, p. 30. Lake Winnepeg.

*B. Derhamellus* Kirby, Faun. Bor.-Amer. 4, p. 273. Arctic America.

*B. hyperboreus* Dahlb. Schiödte, in Etzel's Grönland, p. 611. Greenland.

*B. balteatus* Dahlb. Schiödte, = *Kieckhefer's* “ ” “

In the collection of Mr. Norton, there is a single specimen, a worker, collected in New Jersey, by Mr. J. Akhurst, which answers so well to the description given by Mr. Smith of that sex of *B. pratorum*, a European species, that I do not feel justified in separating them.

## ADDITIONS.

The preceding page had not been printed more than twelve hours before I received a copy of the June number of the "Journal of Entomology," for 1861, in which I find a paper by Mr. Frederick Smith, describing several North American species of *Bombus* and *Apathus*. This being the first opportunity that I have had of examining the above number of that valuable publication, the omissions, &c., are consequently unavoidable, and although unfortunate, yet I am glad of the opportunity of having the additions made, before the printing of my paper has been finished and copies distributed.

The three following species of *Bombus*, all of which are unknown to me, must be added to the foregoing list; those of *Apathus* will be found hereafter under that genus.

21.—22. *B. modestus*.

*Bombus modestus* Smith, Journal of Entomology, i, p. 153.

"*Female*. Length 9 lines. Black, pubescent; the clypeus very smooth, shining, and delicately punctured. Thorax: the pubescence above before the wings yellow; the scutellum with a slight admixture of fulvous hairs; the wings subhyaline; the pubescence on the legs black, that on the basal joint of the posterior tarsi within ferruginous, the claw-joint of the tarsi obscurely ferruginous. Abdomen: the third and fourth segments clothed with yellow pubescence, the fifth with black, and fringed on its apical margin with yellow hairs, the apical segment has also a thin clothing of hair of the same color.

"*Worker*. Length  $5\frac{1}{2}$  lines. The pubescence similarly disposed to that of the female, but paler, that on the apical segments white.

"*Hab*. Oajaca, Mexico. In the Collection of the British Museum."

22. The name *modestus*, used for the new species of this number, on p. 99, being preoccupied by Mr. Smith, should be changed to *moderatus*.

42.—43. *B. laboriosus*.

*Bombus laboriosus* Smith, Journal of Entomology, i, p. 153.

"*Female*. Length 8 lines. Black, pubescent; the head entirely

black, with the clypeus very smooth and shining, and delicately punctured. The thorax with black pubescence above and beneath, that on the sides pale yellow; the pubescence on the legs entirely black; the wings fusco-hyaline, the nervures black. Abdomen: the three basal segments clothed with pubescence of a pale yellow, somewhat lemon-colored; that on the third segment not quite extending to the lateral margins; the apical segment thinly sprinkled with ferruginous hairs.

“*Worker*. Length 5 lines. Colored like the female.

“*Hab*. Oajaca, Mexico. In the Collection of the British Museum.”

43.—44. **B. diligens.**

*Bombus diligens* Smith, Journal of Entomology, i, p. 154.

“*Female*. Length 10 lines. Black, and clothed with black pubescence; wings dark brown, shining. The pubescence on the thorax short and dense, except on the disk above, which is smooth and shining; the three apical segments clothed with ferruginous pubescence. the apical segment smooth and shining in the middle.

“*Hab*. Oajaca, Mexico. In the Collection of the British Museum.”

Gen. **APATHUS** Newm.

*Apathus* Newm. Ent. Mag. ii, p. 404 (1834).

*Psithyrus* St. Farg. Ann. Soc. Ent. Fr. i, p. 366 (1832); Hym. ii, p. 424 (1841):  
nec. *Hubner*.

This genus is parasitic on that of *Bombus*, and resembles it very much in general appearance. The characters with which to distinguish it from *Bombus*, are as follows:—The posterior tibiæ are destitute of corbiculæ, and are convex exteriorly; the basal joint of the posterior tarsi has no tooth at its base above. In the *female* the apex of the abdomen curves under, and the apical segment beneath has the lateral margins elevated. The mandibles have a single notch, while those of *Bombus* are distinctly toothed. This genus has no workers.

The males may be distinguished from those of *Bombus* by the posterior tibiæ being exteriorly convex and thickly coated with short hairs. The males of the latter genus have the exterior surface of the posterior tibiæ concave in the centre, with a few scattered hairs, and are fringed at the exterior margins.



Nothing is yet known of the economy of our species, and so far only a few have turned up. An examination of the nests of *Bombus* will doubtless bring more species to light. The following are all the species that have been identified.

1. *A. laboriosus*.

*Bombus laboriosus* Fabr. Syst. Piez. p. 352.

*Female*. Head black, pale yellowish on the vertex. Thorax above and on the sides pale greyish-yellow. Wings subhyaline, stained with yellowish. Legs black. Abdomen shining black; sparsely hairy on the disk; sides of the third segment slightly mixed with yellowish. Beneath black. Length 10 lines.

*Male*. Not seen.

Two specimens. Canada (Coll. Ent. Soc. Phila.) and Connecticut. (Coll. E. Norton.)

There is no doubt that this is the same species as described by Fabricius under the above name, although he does not mention the mixture of yellowish hairs on the sides of the third abdominal segment, which is quite plain in the two specimens before me.

2. *A. intrudens*.

*Apathus intrudens* Smith, Journal of Entomology, i, p. 154.

*Female*. Black: a tuft on the vertex and another in front of the anterior stemma pale yellow; the thorax clothed above with pale pubescence, which is continued down the sides in front of the tegulæ; the thorax smooth and shining behind the scutellum; the legs with very short black pubescence; the wings fusco-hyaline. Abdomen nearly naked, shining, incurved and very acute at the apex, the margins of the segments thinly fringed with black pubescence.

*Hab*. Oajaca, Mexico. In the British Museum Collection."

Unknown to me.

3. *A. fraternus*.

*Apathus fraternus* Smith, Brit. Mus. Cat. Hym. ii, 385.

*Male*. Length 10 lines.—Black; the face below the insertion of the antennæ densely covered with dark fuscous pubescence; the flagellum very slender, the joints subarcuate; on the vertex the pubescence is mixed with fulvous. Thorax clothed with short fulvo-ochraceous

pubescence, on the middle of the disk it is black; the wings fuscous, darkest towards their base; the legs clothed with short dark fuscous pubescence. Abdomen elongate, narrowed towards the apex; the two basal segments clothed with short fulvo-ochraceous, and the apical segments with short black pubescence."

*Female.* Not seen.

One specimen. New Wied, Texas. (Coll. Smith. Inst.)

4. *A. contiguus* n. sp.

*Male.* Head black, yellowish on the vertex. Thorax lemon-yellow, more or less black between the wings. Wings fusco-hyaline. Legs black, tarsi pale, inner side of the basal joint rufous. Abdomen with the first two segments above lemon-yellow; rest black. Beneath black. Length 7—8 lines.

*Variety.* The anterior portion of the second abdominal segment above mixed with black, especially on the sides.

*Female.* Not seen.

Four specimens. Conn., Penn., Del. (Coll. E. Norton, and Ent. Soc. Philad.)

This species closely resembles *Bombus vagans* Smith, and probably parasitic on that species.

5. *A. citrinus*.

*Apathus citrinus* Smith, Brit. Mus. Cat. Hym. ii. 335.

*Male.* Head black, slightly mixed with yellowish on the vertex. Thorax pale lemon or greyish-yellow above and on the sides, more or less mixed with black between the wings. Wings subhyaline, stained with fuscous along the nervures. Legs black, tarsi pale, inner side of the basal joint golden in certain lights. Abdomen with the first three segments above pale lemon or greyish-yellow; remaining segments black. Beneath black. Length about 7 lines.

*Variety?* The yellowish hairs of the body much deeper in color, the wings darker, the fourth segment of the abdomen above mixed with yellowish and the hairs of the tarsi reddish. Length 6 lines.

*Female.* Not seen.

Six specimens. Mass., Conn., N. Y., Ill. (Coll. E. Norton, and Ent. Soc. Phila.)

The *variety* may be a distinct species, but there being only a single

specimen, I do not care to make a new species of it, until more have been accumulated.

6. *A. insularis*.

*Bombus interruptus* Greene, Ann. Lyc. Nat. Hist. N. Y., vii, p. 11 & 173. ♀.

(nec *Psithyrus* St. Farg.)

*Bombus Suckleyi* Greene, " " " 168. ♂.

*Apathus insularis* Smith, Journal of Entomology, i, p. 155, ♀.

*Female*. Head black, with the hairs at the insertion of the antennæ and on the vertex, yellow. Thorax yellow above and on the sides; black between the wings. Wings fusco-hyaline. Legs black; femora tinged with dark red; tarsi pale. Abdomen above shining black, with the sides of the third, fourth and fifth segments yellow. Beneath black. Length about 10 lines.

*Male*. Head black, mixed with yellow on the vertex. Thorax above and on the sides yellow; black between the wings. Wings subhyaline. Legs black; tarsi pale. Abdomen above with the second, third (or its anterior part), and the middle of the three apical segments black; rest yellowish. Beneath black, mixed with pale hairs. Length 7—8 lines.

*Var. a*. Having the second and third abdominal segments mixed with yellow on the disk; anus black. Length 8 lines.—*B. Suckleyi* Greene.

*Var. b*. Having the first three and sides of the fourth and fifth abdominal segments yellow; rest black. Length 6½ lines.

*Var. c*. Having a distinct black band between the wings; the second abdominal segment mixed with yellow on the disk; the fifth segment entirely black, and the apical segment mixed with pale fulvous. Length 6½ lines.

Fifteen (4 ♀, 11 ♂) specimens examined. Methy Portage, Arctic America; Puget's Sound; Ft. Steilacoom, W. T.; Vancouver's Island. (Coll. E. Norton and Smith. Inst.)

The female of this species so much resembles that of *A. campestris* of Europe, that, at first, I thought they were the same species, and am still doubtful whether the differences are sufficient to separate them; but until a more critical examination and comparison of the two species can be made, they had better be kept separated. The name *interruptus* having been used by St. Fargeau for a species of this genus, the name proposed by Mr. Smith should take its place.

The female specimens from which Mr. Greene made his description of this species, have the hairs on the dorsal surface of the abdomen rubbed off, although, generally, the hairs on that part of the abdomen are much scattered and sparse.

The only differences that I can see between the females of this species, and *campestris*, are that the former species has the hairs of the head yellowish, while those on the head of the latter species are entirely black; the black band in the middle of the thorax of *campestris* is broader and more distinct.

The males above described, and which I think belong to this species, present no characters by which they could easily be separated from those of *campestris*, and they vary just as much in the coloration.

The specimen, before me, of *B. Suckleyi* Greene, which seems to be the typical specimen (as it has the word "Type" attached to the pin), is a ♂, and not a ♀, as indicated in Mr. G's description; and the apical segment is apparently altogether black, and not yellowish. However, in considering the many variations which occur in the males of *A. campestris*, I am inclined to believe that this is the male of *A. insularis*, as well as the other two varieties described above.

*Var. c.*, of the male, answers in many particulars to the description given of the male of *B. Sitkensis*, but as it seems more related as a variety of *A. insularis*, it would probably be best to allow it to remain here, until more specimens have been accumulated. It is certainly an *Apathus*.

#### 7. *A. elatus*.

*Apis alata* Fabr. Ent. Syst. Suppl. p. 274.

*Bombus elatus* Fabr. Syst. Piez. p. 352.

*Male*. Head black, sometimes mixed with whitish on the clypeus. Thorax lemon-yellow with a black band between the wings. Wings fusco-hyaline. Legs black, more or less whitish on the femora; inner side of the posterior tibiæ and basal joint of tarsi golden-rufous in certain lights. Abdomen bright-lemon yellow, except the two apical segments, which are tufted with black. Beneath black, mixed with yellowish on the sides. Length 7—10 lines.

*Var. a.* Having the hairs on the fifth abdominal segment mixed with black, and the tufts on the anus tinged with fulvous.

*Var. b.* Having all the abdominal segments yellowish, except the anus, which is black.

*Var. c.* Having the whole of the thorax black, except the anterior portion above, and a few hairs on the scutellum which are yellowish.

*Var. d.* Having the whole of the thorax yellowish, except a slight admixture of blackish between the wings.

*Female.* Not seen.

Twenty-two specimens examined. Mass., Conn., N. Y., N. J., Penn., Del., Md., Ill. (Coll. E. Norton, and Ent. Soc. Phila.)

Although Fabricius described this species as having the thorax entirely yellow, it will be seen above that it varies from almost all yellow to almost all black. The most common variety, however, has a black band between the wings. The yellowish color of this species, as is generally the case with most of the bees, often fades to a dirty white; the color when fresh is doubtless a bright lemon-yellow.

It may be possible that *B. nidulans* of Fab., is only a variety of this species, as some of the specimens before me have the anus tinged with fulvous.

This species resembles *Bombus fervidus* very much in coloration, and may possibly be parasitic on that species.

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In concluding this paper I would state that I have done the best I could in separating the species of this group, and it may be that I have made too many new species, but when we consider the great difficulty experienced by authors in bringing about a correct division of the European species, it will perhaps be a sufficient excuse for any such errors that I have made in this paper.

I desire, here, to express my thanks to Mr. Edward Norton, Dr. Thos. B. Wilson, and the Smithsonian Institution, for the loan of specimens, and for much valuable assistance.

## INDEX TO SPECIES.

## BOMBUS.

	<i>Page</i>		<i>Page</i>
<i>affinis</i> .....	103	<i>Marylandicus</i> .....	90
<i>alpina</i> .....	95	<i>medius</i> .....	97
<i>Americanorum</i> .....	94	<i>melanopyge</i> .....	103
<i>Antiguensis</i> .....	107	<i>moderatus</i> .....	99, 109
<i>Arcticus</i> .....	95	<i>modestus</i> .....	109, 99
<i>balteatus</i> .....	108	<i>nidulans</i> .....	107
<i>bimaculatus</i> .....	92	<i>occidentalis</i> .....	98
<i>borealis</i> .....	93	<i>ornatus</i> .....	104
<i>Californicus</i> .....	97	<i>pallidus</i> .....	92
<i>Carolinus</i> .....	108	<i>Pennsylvanicus</i> .....	94
<i>Carrici</i> .....	100	<i>perplexus</i> .....	91
<i>Derhamellus</i> .....	108	<i>pleuralis</i> .....	96
<i>diligens</i> .....	110	<i>polaris</i> .....	101
<i>dubius</i> .....	97	<i>praticola</i> .....	106
<i>ephippiatus</i> .....	107	<i>pratorem</i> .....	108
<i>fervidus</i> .....	93	<i>proximus</i> .....	98
<i>flavifrons</i> .....	105	<i>pulcher</i> .....	108
<i>frigidus</i> .....	100	<i>rufo-cinctus</i> .....	106
<i>griseo-collis</i> .....	88	<i>scutellaris</i> .....	96
<i>Grœnlandicus</i> .....	97	<i>Sitkensis</i> .....	102
<i>hortorum</i> .....	108	<i>sonorus</i> .....	95
<i>Howardii</i> .....	99	<i>strenuus</i> .....	102
<i>Hudsonicus</i> .....	92	<i>sylvicola</i> .....	106
<i>Huntii</i> .....	104	<i>ternarius</i> .....	104
<i>hyperboreus</i> .....	108	<i>terricola</i> .....	99
<i>impatiens</i> .....	90	<i>vagans</i> .....	91
<i>Kirbiellus</i> .....	101	<i>violaceus</i> .....	108
<i>laboriosus</i> .....	109	<i>Virginicus</i> .....	87
<i>lacustris</i> .....	103		

## APATHUS.

<i>citrinus</i> .....	112	<i>interruptus</i> .....	113
<i>contiguus</i> .....	112	<i>intrudens</i> .....	111
<i>elatus</i> .....	114	<i>laboriosus</i> .....	111
<i>fraternus</i> .....	111	<i>Suckleyi</i> .....	113
<i>insularis</i> .....	113		

## STATED MEETING, AUGUST 10.

President BLAND in the Chair.

## REPORTS OF COMMITTEES.

The Committees on the papers of Dr. Clemens and Mr. Stainton, read July 13th, reported in favor of their publication in the Proceedings of the Society.

## DONATIONS TO CABINET.

30 COLEOPTERA (*Cicindela unicolor*, *Galerita atripes*, *Brachycantha tau*, *Languria puncticollis*, *Typocerus lunatus*); 10 LEPIDOPTERA (*Trochilium tipuliformis*, *Hamadryas Bassettella*), from H. F. Bassett, of Waterbury, Conn.

15 COLEOPTERA (*Haplochile pygmæa*, *Platynus erythropus*, *Harpalus viridæneus*, *Lachnosterna errans*, *Pelidnota Lucæ*, *Podabrus pruinosus*, *Polycaon ovicolle*, *Mordellistina bicinctella*), from Henry Ulke.

6 COLEOPTERA (*Pterostichus hudsonicus*, *Ancylochira Nutalli*, *Adeocera obtecta*, *Lepyrus colon*), from E. T. Cresson.

2 NEUROPTERA (*Mantispa brunnea*), from Robert Kennicott, of Cook Co., Illinois.

1 COLEOPTERA (*Chalcolepidius viridipilis*), from P. J. Ridings.

The following LEPIDOPTERA from the Committee on Collecting Fund, were kindly determined by Mr. Aug. R. Grote, of Buffalo, N. Y.—*Otenucha Cressonana* Grote (Type); *Baptria infulata* Grote (Type), and *Platypterix genicula* Grote.

## DONATIONS TO LIBRARY.

*Proceedings of the Academy of Natural Sciences of Philadelphia, for April and May, 1863*, and the *Proceedings of the Boston Society of Natural History*, Vol. 9, pp. 193—224. From Dr. T. B. Wilson.

*Monographs of the Diptera of North America. By H. Loew, and R. Osten Sacken.* From the Smithsonian Institution.

The following are deposited by Dr. T. B. Wilson:—

*Revue et Magasin de Zoologie. Par M. F. E. Guérin-Méneville.* 1863.—No. 4.

*Journal of the Proceedings of the Linnean Society of London. Zoology. Nos. 25 & 26. 8vo.*

*Annales de la Société Entomologique de France. 4<sup>e</sup> Série, Tome 3, Trim. 1. 1863. 8vo.*

*The Zoologist, for June, 1863. 8vo.*

*Stettiner Entomologische Zeitung. Jar. 24. No. 4—6.*

*Wiener Entomologische Monatschrift. Bd. 7, Nr. 5. 8vo.*

*Transactions of the Entomological Society of London, 1807—1812. 1 Vol. 8vo.*

*Transactions of the Entomological Society of London. Vols. 1—5; New Series, Vols. 1—5. 10 Vols. 8vo.*

#### WRITTEN COMMUNICATIONS.

Letters were read

From the Secretary of the Entomological Society of London, dated 12 Bedford Row, July 14th, 1863, acknowledging the receipt of recent numbers of the Society's Proceedings, and returning thanks for the same.

From Messrs. Robert Kennicott, dated The Grove, Ill., July 23rd, 1863; Edward Tatnall, Jr., dated Wilmington, Del., July 20th, 1863; Henry S. Sprague, dated Buffalo, N. Y., July 27th, 1863, and Frederick Tepper, dated Brooklyn, July 27th, 1863, acknowledging their election as *Corresponding Members* of the Society.

From George H. Horn, M. D., dated Camp Independence, Owen's Valley, California, July 1st, 1863, giving an account of his Entomological researches in California.

The following papers were presented for publication in the Proceedings of the Society:

"Notes on Central American Lepidoptera, with descriptions of new species, No. 1, by Tryon Reakirt."

"Catalogue of North American Butterflies, by J. W. Weidemeyer."

"Hemipterological Contributions, No. 1, by P. R. Uhler."

"Observations on certain North American Neuroptera, by H. Hagen, M. D., of Königsberg, Prussia; translated from the original French MS., and published by permission of the author, with notes and descriptions of sixteen new North American species of *Pseudoneuroptera*, by Benj. D. Walsh, M. A."

And were referred to Committees.

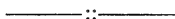


## ELECTIONS.

The following persons were elected *Corresponding Members* of the Society:—

W. O. Currier, of Providence, Rhode Island.

John Tepper, of Brooklyn, New York.



## AMERICAN MICRO-LEPIDOPTERA.

BY BRACKENRIDGE CLEMENS, M. D.

## TINEINA.

## GELECHIA.

**G. angustipennella.**—Fore wings white, dusted with fuscous from the basal third of the wing to the apex. with a blackish brown dot in the middle of the wing behind the tip, and two dark fuscous dots near the costa at the base of the wing, beneath the second of which is an oblique, short fuscous streak. Cilia fuscous. Hind wings dark fuscous, cilia the same.

Antennæ white dotted with fuscous above. Head and thorax white. Labial palpi white, second joint with a dark fuscous spot near the ends of the second joint; terminal joint with a broad blackish brown ring at the tip, leaving the extreme apex white.

**G. punctiferella.**—Fore wings white. Near the base of the fold is a blackish dash, and above this in the middle of the wing is a blackish dot and a third one of the same hue, so placed posteriorly as to form a triangle with the other two. Immediately behind the latter and above the end of the fold, are two blackish dots, placed one above the other. Around the apex and posterior margins, the wing is dusted with dark fuscous. Cilia yellowish brown. Hind wings yellowish brown, cilia the same.

Antennæ yellowish-brown. Head and thorax rather sordid white. Labial palpi whitish, second joint dusted externally in the middle with fuscous; terminal dusted with fuscous, extreme apex white.

**G. gilvolinella.**—Fore wings pale yellowish, dusted with dark fuscous, especially towards the tip and along the costa from the middle to the tip. Near the tip is an oblique, pale yellowish line from the costa, extended to a spot of the same hue beneath the tip. Behind this line in the middle of the wing is a blackish brown dot. Between the costal end of the line and the tip of the wing are two or three small pale yellowish costal dots, and a few on the mar-

gin beneath the tip, sometimes indistinct. Cilia yellowish fuscous. Hind wings fuscous, cilia the same.

Antennæ annulated with yellowish and fuscous. Labial palpi fuscous; terminal joint yellowish, fuscous at the base.

**G. apicilinella.**—Fore wings pale yellowish dusted with fuscous, with a fuscous dot near the middle of the fold, and two others of the same hue beyond it in the middle of the wing, placed longitudinally. The apical portion of the wing is more freely dusted with fuscous than that towards the base; the cilia at the extreme tip, *touched on their ends with fuscous, so as to make a fuscous line.* Cilia very pale yellow. Hind wings rather paler than the fore wings, cilia concolorous.

Antennæ annulated with pale yellow and fuscous. Head and labial palpi pale yellowish.

**G. pullifmbriella.**—Fore wings dark fuscous, tinted with yellowish, with an indistinct black dot in the middle of the fold, one of the same hue in the middle of the wing above it, and one likewise blackish brown in the middle of the wing above the beginning of the cilia of the inner margin, the former rather indistinct. Hind wings somewhat lurid.

Antennæ dark fuscous. Head rufo-fuscous, face beneath somewhat yellowish. Labial palpi dull ochreous; second joint somewhat fuscous beneath; terminal joint with fuscous atoms.

The following table of species may facilitate the recognition of species. Some of them included in the table have been described in the Proc. Ac. Nat. Sci., May, 1860, p. 162.

*Fore wings white or yellowish.*

*With no sharp markings in apical cilia.*

1. With an oblique line near tips.

Fore wings white, or yellowish with costa white.....**nigratomella.**

Fore wings yellowish-fuscous.....**gilvolinella.**

2. With a large, median, costal patch.....**mediofuscella.**

3. With discal spots or dots

Well dusted with fuscous, nearly to the base.....**angustipennella.**

Slightly dusted with fuscous.....**punctiferrella.**

4. Without distinct dots, wings nearly unicolorous.....**cerealella.**

*With sharply marked line in apical cilia*.....**apicilinella.**

*Fore wings dark gray or dark brown, without roseate hue.*

*Fore wings with bands.*

1. Bands transverse.

With two white bands and a costal spot.....**Labradoriella.**

With one concave yellow band.....**Agrimoniella.**

With one band near the apex, doubly curved.

Hind wings apex produced.....**flexurella.**

Hind wings apex rounded.....**mimella.**

2. Band long, longitudinally curved, white.....longifasciella.

*Fore wings with costal spots or dots.*

The spots black.....fuscopunctella.

The spots rather indistinct, yellowish.....gilvomaculella.

*Fore wings with discal spots.*

Hind wings broader than the fore wings.....Rhoifruetella.

Hind wings as narrow as fore wings.

Fore wings dark fuscous, tinted with yellowish.....pullifimbriella.

Fore wings grayish, dusted with fuscous.....detersella.

*Fore wings with a roseate hue.*

With alternate white and dark brown bands.....roseosuffusella.

Without distinct bands.....rubidella.

#### HOLCOCERA new gen.

Hind wings slightly excised along the costa. Subcostal vein simple, attenuated towards the base. The discal vein is oblique, and gives off two branches, one central, the other a curved medio-discal branch. Median vein three-branched, the two superior branches arising from a short common stalk. The submedian distinct.

Forewings elongate-lanceolate. At the discal third of the wing the subcostal vein sends off a marginal branch, and at the end of the disc, two others to the costa behind the tip and a furcate apical branch near its end, the lower branch running into the apex of the wing. Beneath the apical are five nervules the posterior two of the median vein arising close together. The submedian forked at the base.

Head large, smooth, with hairlike scales. Face broad, not tapering, rounded. No ocelli. Antennæ about one-half as long as the fore wings; basal joint in the ♂, ciliated in front, rather long, flattened, concave within, articulates with the stalk by means of a nodule, at the junction of which with the stalk, *it is sharply excised*, and the stalk beneath, microscopically pubescent; in the ♀ the basal joint is long, cylindrical, stalk scarcely pubescent beneath. Labial palpi cylindrical, ascending equal to the vertex, rather widely separated; second joint slightly thickened beneath with scales, rather longer than the terminal; terminal joint, slenderer than the second, smooth and pointed. Maxillary palpi very short. Tongue scaled at the base, as long as the thorax beneath.

The perfect insects bear some resemblance to those of the genus *Gelechia*; they are sluggish in their motions and flight.

**H. chalcfrontella.**—Fore wings pale yellowish, dusted with fuscous, so as to produce two or three illly defined fuscous spots along the costa, from the middle of the wing and one on the middle of the inner margin. Near the tip is a wavy fuscous line, and the ends of the nervules are touched with the same hue. In the middle of the wing is a blackish brown dot, and usually one of the same hue beneath it in the fold. Above the end of the fold, are two blackish-brown dots in the middle of the wing, one above the other. Hind wings yellowish-fuscous, cilia the same.

Antennæ basal joint pale yellowish, stalk dark fuscous. Head pale yellowish. Labial palpi fuscous, the end of the second joint pale yellowish, and the extreme tip of the terminal joint yellowish in the ♂.

This insect appears to be a variable one. 1st. Sometimes the wings are *entirely fuscous, with but little yellowish*, when of course, the costal markings are not distinguishable, *but the dots are conspicuous*. 2d. Sometimes the forewings are yellowish-fuscous, with the median dot distinct, but those at the end of the fold indistinct, and the costal markings wanting. The dots on the middle of the wing and above the end of the fold, are the most constant markings.

**H. purpurocomella.**—Fore wings uniform dark purplish-fuscous, with an indistinct, blackish median dot and two of the same hue in the middle of the wing above the fold. Hind wings dark yellowish-fuscous, cilia the same. Head and thorax fuscous with a reddish hue. Face tinted with yellowish. Labial palpi fuscous.

**H. gilbociliella.**—Fore wings pale yellow, with a black dot in the middle of the wing, and slightly dusted with fuscous towards the apex. Hind wings pale ochreous-fuscous.

Antennæ dark ochreous. Head and labial palpi pale yellowish.

The fore wings of the female are more dusted with fuscous than those of the male.

**H. modestella.**—Fore wings fuscous, the basal portion of the wing is paler and shining, and has a faint grayish hue; in the middle of the wing is a dark fuscous spot.

Antennæ, head and labial palpi, fuscous.

#### YPSOLOPHUS Haw., Zell.

Wings elongate with moderate cilia.

Hind wings trapeziform, slightly retuse before the apex; with an intercostal cell. Subcostal vein furcate. Discal vein curved, with a central nervule. Median vein three-branched, the two superior nervules given off from a common stalk. Submedian vein distinct; internal obsolete.

Fore wings narrow; discal end narrow. The apical branch of the subcostal vein is furcate and enters the costa behind the tip, and behind it are three subcosto-marginal branches. The posterior branch of the median is furcate. Submedian furcate at the base.

Head smooth. Ocelli none (?). Antennæ setaceous, remotely denticulated in the ♂, microscopically ciliated. Labial palpi with the second joint beneath *formed like a brush, with the hairs produced in front*; the terminal joint *smooth, pointed, recurved and needlelike*. Maxillary palpi not perceptible. Tongue of moderate length, clothed with scales.

The labial palpi in the imagos I refer to this genus, are not so much like a brush as are those of *Y. parenthesesellus* of Europe, for a specimen of which I am indebted to Mr. H. T. Stanton of London. In our species the second joint of the palpi has not the long brushlike hairs along its under surface, but are arranged almost into a tuft at the end of the joint.

The species described by Dr. Fitch, under the generic name of *Chal-tochilus*, belong to this genus. I have been unable to recognize any of the following in his descriptions.

**Y. punctidiscellus.**—*Wings narrow.* Fore wings pale ochreous, dusted and brown; along the costa towards the base paler, rather whitish. At the base of the fold is a brown dot, two of the same hue about the middle of the wing, and one or two, likewise brown, at about the end of the disc. Near the tip is an indistinct yellowish line, with a brown band exterior to it. The hinder margin has a series of blackish dots at the base of the cilia. Cilia similar in color to that of the fore wings. Hind wings somewhat plumbeous gray.

Antennæ annulated with pale yellowish-brown and deep brown. Head pale yellowish brown. Labial palpi, second joint dark fuscous, pale ochreous at the end; terminal joint pale ochreous.

**Y. pauciguttellus.**—Fore wings rather dull, uniform earthen brown, irregularly and sparsely dotted with dark brown. Cilia concolorous with the wing. Hind wings brownish, *with a bluish irridescent hue.*

Antennæ dark brownish, not annulated. Head dark brownish. Labial palpi, second joint dark brown, whitish at the end; terminal joint dark brownish, striped internally with whitish.

**Y. unicipunctellus.**—*Wings rather broad.* Fore wings pale brownish-ochreous, with a purplish hue, slightly dusted with blackish. In the fold about the middle is rather an indistinct blackish dot, and one of the same hue in the middle of the wing about the end of the disc, *with two or three white scales on its interior margin.* Around the hinder margin is a series of blackish dots. Cilia uncolorless with the fore wings. Hind wings brownish.

Antennæ annulated with yellowish and brown. Head brownish-ochreous.

Labial palpi, second joint brown, whitish at the end; terminal joint yellowish white, sometimes dusted with brownish.

#### DEPRESSARIA.

Wings with moderate cilia.

Hind wings rather broad, generally with the *inner margin emarginate opposite the submedian vein and dilated or rounded opposite the internal vein*. The costal vein is long and contiguous to the costa. Subcostal vein simple. The discal vein distinct, throwing off two branches. Median 3-branched, the two superior on a short common stalk.

Fore wings oblong, rounded at the apex. Discal cell long and rather narrow. The subcostal vein sends off four branches to the costa, the first from the basal third of the wing, the last, or apical furcate. From the discal vein two branches are thrown off. The median vein is 2-branched, the posterior, given off opposite the third subcosto-marginal branch, being forked. The fold is thickened towards its tip and the submedian is forked at its base.

Head smooth, scales not appressed. Ocelli none. Antennæ with joints compressed, hardly denticulate, not pubescent. Labial palpi moderately long, reflexed; second joint beneath thickened and roughened with scales, *resembling a brush*; third joint slender, smooth, pointed. Maxillary palpi very short. Tongue of moderate length, scaled. *Abdomen flattened above, with projecting scales at the sides*.

The larvæ of this genus are extremely active, and feed on a variety of substances; some in rolled up leaves of composite plants, some in the leaves, and others in the umbels of the *Umbelliferæ*; many of the latter descend from the plant on the slightest agitation, so that considerable caution is necessary in attempts to collect them. The full fed larvæ descend to the ground and change to pupæ among the fallen leaves. The perfect insects have the peculiarity of sliding about when laid on their backs.

**D. atrodorsella.**—Fore wings yellow ochreous, with several (6 or 8) black costal dots from the base to the tip of the wing. On the basal portion of the disc is a black dot, beyond which, on the disc, is a rufous colored patch, extended towards the tip of the wing, and partially interrupted over the middle of the subcosto-marginal nervules. Cilia rufous. Hind wings yellowish.

*Thorax black.* Antennæ dark fuscous. *Head above rufous, face blackish brown above, yellowish beneath.* Labial palpi pale yellow; second joint dusted with

blackish exteriorly; terminal, with two dark fuscous rings, one near the base, the other near the tip.

I have before me a single specimen.

**ENICOSTOMA?** Steph.

Wings broad, ovate. Cilia of hind wings rather long.

Hind wings broadly ovate; costa straight, hind margin rounded to the base, scarcely retuse before the tip. Costal vein long, entering the costa behind the tip; subcostal simple attenuated towards base; discal vein oblique, with two branches, the lower one arched. Median 3-branched, the two superior from a common point. The fold slightly thickened. Submedian and internal distinct.

Fore wing, the first subcostal branch arises about the basal third, beyond which are three branches, the apical furcate near the tip, both branches entering the costa just above it. The origins of the first and second branches separated. Discal vein has two branches. Median 3-branched, the two posterior form a common point. Fold thickened. Submedian with basal fork.

Head rather rough\* (?). No ocelli. Antennæ scarcely one-half so long as fore wings, filiform, slightly denticulate beneath. Labial palpi arched, the whole of the terminal joint being above the vertex; second joint long, twice the length of the terminal, flattened, with appressed scales, except at the tip; terminal smooth, cylindrical, slender. Maxillary palpi not perceptible. Tongue at least twice the length of labial palpi, scaled.

**E? Packardella.**—Fore wings gray, tinted along the costa, especially at the base, with roseate; slightly streaked and dusted with deep brown. From the base of the wing on the costa, arises a deep brown irregular stripe, which bends towards the inner margin to about the middle of the fold, and thence curves to the middle of the costa, and throws off towards the inner margin, a short hook margined internally with white, and above it a streak towards the base of the wing with white in the angle. Hind wings pale gray.

Antennæ fuscous, tinted with roseate at the base. Head gray. Labial palpi gray; second joint tinted with roseate and dusted with fuscous; terminal with a fuscous ring near the tip.

I have before me a single specimen, in tolerably good condition, received from Mr. Packard.

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\* Almost too much denuded to determine.

**BRACHILOMA** new gen.

Wings with rather short cilia.

Hind wings broadly ovate; costa arched; hind margin circular. The costal vein is long removed from the costa. The subcostal vein bifid beyond the discal, and with scarcely a distinct basal origin. The discal vein has a sweeping curve, with a branch on the side of the median system. The median 3-branched, the two superior branches arising at the junction of the discal with the median. Submedian and internal distinct.

Fore wings oblong, rounded behind. The subcostal sends five branches to the costa, the first from the middle of the wing. The discal vein is oblique and sends off a branch from the subcostal and median side. Median 3-branched, aggregated, and arising opposite the origin of the last subcostal branch. Submedian long, with basal fork.

Head somewhat rough. Ocelli none. Antennæ pubescent beneath, about one-half as long as fore wings. Labial palpi recurved, with tips quite equal to the vertex, smooth, cylindrical; second joint rather thick, with appressed scales; terminal slenderer than the second, pointed and about one-half as long. Maxillary palpi short, distinct. Tongue short, (?) scaled. Abdomen short, compressed laterally, slightly tufted.

**B. unipunctella.**—Fore wings pale ochreous, with a single black discal dot. Hind wings similar in color to the fore wings.

Antennæ and head pale ochreous brown. Labial palpi, second joint pale brownish; terminal joint, white.

I have a single specimen, received from Dr. Jno. G. Morris, of Baltimore.

**PIGRITIA** Clemens.

Proc. Acad. Nat. Sci., May 1860, p. 172.

**P. ochrocomella.**—Fore wings pale yellow, with a broad band of fuscous atoms in the middle, and at the tip broadly dusted with the same hue. Hind wings fuscous, cilia the same.

Antennæ dark ochreous. Head shining pale ochreous.

A single specimen, a male, and as in other species of this genus, is without labial palpi.

**P. ochreella.**—Fore wings, hind wings and the cilia of each, shining ochreous and immaculate.

Antennæ russet-colored. Head and labial palpi ochreous.

A single specimen.



**TINEA** Zeller.

Proc. Acad. Nat. Sci., Sept. 1859, p. 257.

**T. acapnopennella.**—Fore wings white, with two small spots of fuscous scales on the costa near the base, one nearly at the base, the other within the basal third. In the middle of the fold is a small spot of brown scales, and obliquely above it in the middle of the wing, another of the same hue. Towards the tip of the wing is a spot of brown, rather dispersed scales, reaching the hinder margin beneath the tip. Cilia white. Hind wings dark gray.

Antennæ yellowish. Head whitish. Labial palpi white dusted with fuscous.

I have before me a single specimen, slightly worn.

The following insects differ in some respects from the genus to which they appear to belong, and instead of indicating them as a new genus, I have concluded to describe them as a group of the genus *Tinea*. The principal difference between the members of the group below, and the genus, is in the neuration of the hind wings; and even here, the type is essentially the same, except that they are so much more narrow and differently formed, that the submedian and internal veins are obsolete.

Group **HOMOSETIA**.

Hind wings very narrow, linear-lanceolate. Internal border without basal angle, *costa arched at the basal third, and concave thence to the tip. Without submedian or internal veins.* The subcostal vein is simple, much attenuated, from the middle to the base, and enters the costa behind the tip of the wing. The cell is closed by a *very indistinct* discal vein and gives rise to two branches; the upper one, sometimes attenuated towards its origin, is delivered to the tip of the wing; the lower one, sometimes on a common stalk with the superior branch of the median vein, runs to the hinder margin beneath the tip. The median vein runs near the inner margin, is 3-branched, the posterior vein becoming quickly identified with the margin.

Fore wings narrow, lanceolate. The costal vein almost identified with the costa. The subcostal attenuated towards base, and gives off at the basal third, a long marginal branch, and from the hinder part of the discal cell four branches; the discal vein throws off two branches. The median is 3-branched, the posterior, sometimes attenuated at its origin, remote from the others. The fold is thickened at its end. Submedian, simple.

Head rough. Ocelli none. Antennæ filiform with joints closely set, more than one-half as long at the fore wings. Labial palpi, cylindrical, smooth, slender, much separated, and depressed; the second joint furnished with a few bristles; terminal joint slenderer than second, about one-half as long. Maxillary palpi, folded, 5-jointed. Tongue scarcely as long as labial palpi.

**T. tricingulatella.**—Fore wings gray, slightly dusted with fuscous. At the base of the costa is a fuscous spot, and at the basal third of the wing a fuscous band scarcely extended to the inner margin. In the middle of the wing is a broad, irregular band, dark fuscous internally and externally, of a brassy brown color. Near the tip of the wing are two irregular somewhat curved bands, fuscous tinted with a brassy hue, and between each of the bands on the costa are fuscous spots, leaving the costa from the middle to the tip alternately dotted with fuscous and pale gray. At the extreme apex the wing is slightly dusted with fuscous. Cilia pale. Hind wings fuscous with a brassy lustre.

Antennæ grayish. Head blackish, gray above; face whitish. Labial palpi whitish; second joint fuscous externally.

I have before me a single specimen.

**T. costisignella.**—Fore wings tawny, with about eight white costal spots from the base to the tip of the wing, separated by dark brown costal spots. The tip of the wing and the inner margin from the middle to the tip varied with white and dark brown, so as to produce irregular spots. Cilia whitish, spotted with dark brown, especially beneath the tip. Hind wings dark brown, with a brassy hue; cilia pale.

Antennæ dull tawny. Head whitish. Labial palpi tawny yellow.

Taken in damp places in woods, the first of June.

I have a single specimen.

#### CHAULIODUS? Treit.

Wings with long cilia.

Hind wings very narrow, linear lanceolate; the costa is dilated about the basal third and thence concave to the tip. The costal vein is distinct and enters the costa beyond the dilated part. The subcostal vein much attenuated, and bifid beyond the discal vein, which is obliquely curved and gives rise to a discal branch. The median vein is distinct, 3-branched, the posterior a little remote. The submedian is almost obsolete.

Fore wings narrow, lanceolate. No secondary cell. Discal cell long and narrow. The first subcostal branch is rather long, and arises about

the middle of the wing; three other branches are given off, rather remote from the first, the apical branch being furcate, with both branches entering the costa behind the tip. Discal vein obliquely inclined towards the base, with two branches. The median vein with three rather long branches, the posterior arising nearly opposite the middle of the space between the 1st and 2d subcostal branches. Submedian, furcate at the base.

Head smooth, broad in front, forehead rounded. No ocelli. Antennæ filiform, about one-half as long as the fore wings, with joints closely set, basal joint short, (with short hairs in *Chauliodus*.\*) Labial palpi recurved, so as to equal the vertex; second joint subelavate, slightly thickened with scales towards the end; terminal joint cylindrical, slightly roughened, nearly equal in length to the second, pointed. No maxillary palpi. *Tongue wanting*. (In *Chauliodus*, short and naked.)

**C? canicinctella.**—Fore wings dirty whitish towards the base, apical half fuscous varied with blackish. An irregular whitish band near the tip, inclined towards the base, margined externally with a short black line from the inner margin, and with two short exterior black dashes, one in the middle of the wing, one on the costa. The internal edge of the fuscous portion of the wing is inclined towards the tip and margined with whitish. The extreme apex is blackish and the cilia around it whitish sprinkled with black. Cilia fuscous. Hind wings fuscous.

Head and labial palpi whitish; the terminal joint of the latter, with two fuscous rings, one about the middle and one at the tip.

I have before me two mutilated specimens, one simply with a pair of wings, received from Mr. A. S. Packard, Jr., and numbered by him 790.

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\* In the specimen before me, the basal joints have been denuded by mites.

## Observations on American TINEINA.

BY H. T. STAINTON.\*

*Tinea biflavimaculella*. This is closely allied, if not identical with *Tinea Spilotella*. (See Linn. Ent. VI, p. 108 *Rusticella* var. *b.*) *Spilotella* appears confined to the N. of Europe occurring in Finlands and Scotland.

*T. dorsistrigella* is allied to *T. ferruginella*, but the markings are much whiter, and the dorsal streak is broader.

*T. lanariella* is identical with our every-where abundant *T. biselliella*.

*T. nubilipennella* is identical with our *T. fuscipunctella*.

*Xylesthia pruniramiella*. This curious genus appears to be rather allied to *Ochsenheimeria*; another strange genus in this vicinity. *Hapsifera* was founded by Zeller in the Isis of 1847, p. 32.

*Amydria effrenatella*. I am disposed to place this in the genus *Euplocamus*; the palpi are very like those of *E. tessulatella*, Z. (Linn. Ent. VI, p. 96.)

*Anaphora plumifrontella*. I am utterly perplexed with this; we have no European form at all resembling it.

*Lithocolletis lucidicostella* and *argentifimbriella*. These are allied to the group of *Cramerella*, *Tenella*, and *Heeginella*.

*Lithocolletis basistrigella*. This is nearly allied to a South European species *Suberifoliella* (Zell. Entomol. Zeitung, 1850, p. 208), but it is smaller, the basal streak is shorter, the subapical streaks are more distinct, and the ground color is darker.

*Tischeria citrinipennella*. This is rather intermediate between the European *Complanella* and *Marginea*; it possesses a black spot at the anal angle, as in the last named species.

*Phyllocnistis vitigenella*. This is closely allied to our *Suffusella* and *Saligna*, but it is smaller and the position of the subapical dorsal streak is different.

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\* Communicated in a letter to Dr. Brackenridge Clemens, dated Lewisham, near London, September 26, 1860.

*Coleophora coruscipennella*. This is very nearly allied to our *C. Fabriciella*, but the anterior wings are a little browner. The antennæ quite agree with those of *C. Fabriciella*.

*Plutella vigilaciella*. This is our *P. Porrectelli*; you will find the larva in gardens on *Hesperis matronalis*.

*Plutella limibipennella*. This is our *P. Cruciferarum*; it seems cosmopolitan, as I have seen specimens from various parts of the globe. Probably wherever man eats cabbages *Cruciferarum* will occur.

*Argyresthia oreasella*. This seems quite identical with our *A. Andereggiella*.

*Bedellia? Staintoniella*. Certainly a *Bedellia*, and I cannot distinguish it specifically from our *sommulentella*, only it is smaller.

*Cosmopteryx? gemmiferella*, a true *Cosmopteryx*, but your specimens are not all the same species: four of them I take to be the true *Gemmiferella*—these have the central fascia reddish-orange, edged with silvery violet; this fascia is considerably broadest on the costa, its hinder margin being formed by two silvery-violet spots, which are no means opposite; at the apex of the wing is a short silvery white scale, preceded by a violet-silvery spot, with which it is not connected.

The other two specimens, for which I propose the name *Cosmopteryx Clemensella*, differ from *Gemmiferella* in the anterior wings being darker, the orange fascia is paler, not so reddish, its margins are pale golden, instead of silvery-violet, and its hind margin is almost straight (thus very different from *Gemmiferella*); finally, the apical streak is continuous, not interrupted and of a silvery-white throughout. I shall describe this in an early number of the *Intelligencer*, in some remarks on the extra-European species of *Cosmopteryx*.\*

*Anorthosia punctipennella*. This seems to be allied to *Cleodora*, and I do not feel confident that it is generically distinct.

*Gelechia Agrimoniella* allied to *G. ligulella* and *G. tæniolella*, but quite distinct.

*Gelechia? roseosuffusella*; a true *Gelechia* allied to *G. decurtella*. (H. S. Tineides Tab. 72, f. 539.)

*Gelechia Rhoifruetella*. This has considerable resemblance with

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\* The Entomologist's Weekly Intelligencer, Vol. IX, 1860-61, No. 212, p. 31.

our *G. Populella*, but the anterior wings are broader and blunter, and the anterior segments of the body are not pale.

*Gelechia?* *rubidella*; a true *Gelechia*, somewhat allied to *G. ericinnella*, but smaller and the anterior wings narrower.

*Gelechia detersella*. I am uncertain about this; it is perhaps allied to our moss-feeding *G. affinis*. The name *detersella* must be altered, that name having been used by Zeller for a Sicilian species of the genus. (Isis 1847.)

The genus *Gelechia* as at present constituted, is very elastic and includes a variety of slightly different forms. *Gelechia subocella* is our most discordant species.

*Strobisia iridipennella* and *Strobisia Emblemella*. These are very different from any thing in Europe, and the form of wing in *Iridipennella* is so peculiar that you are clearly justified in forming a new genus; it is not improbably a connecting link between *Gelechia* and *Glyphipteryx*.

*Butalis flavifrontella* and *Butalis matutella*. Zeller has described in the Linnæa Entomologica, Vol. X, several North American species of *Butalis*. His *Basilaris*, p. 230, is perhaps identical with your *Flavifrontella*, and his *Impositella*, p. 241, may have been described from a worn specimen of your *Matutella*.

*Stilbosis tesquella*. This is a very curious insect resembling in form of wing *Asychina æratella*; the ornamentation is more like some of the *Lavernæ*.

*Chrysocorys Erythriella*. This is a true *Chrysocorys*.

*Brenthia Pavonacella*. I am disposed to consider this not a Tineina, but rather one of the Pyralidina allied to *Simæthis*, but I have never observed the strutting habit in any of our species.

*Pigritia laticapitella*. This is an obscure looking insect of doubtful location, reminding me most strongly of some of our aberrant *Butalidæ*.

## S T A T E D M E E T I N G, SEPTEMBER 14.

President BLAND in the Chair.

Twelve members present.

## REPORTS OF COMMITTEES.

The Committees on the papers of Messrs. Reakirt, Weidemeyer and Uhler, read August 10th, reported in favor of their publication in the Proceedings of the Society.

## DONATIONS TO CABINET.

94 HETEROPTERA (*Callidea dilaticollis*, *Corimelæna tibialis*, *Stiretrus atricapillus*, *Stiretrus erythrocephalus*, *Stiretrus decemguttata*, *Zicrona exapta*, *Æthus longulus*, *Agonoscelis versicolor*, *Proxys crenatus*, *Pentatoma cruciatum*, *Pentatoma calceata*, *Strachia histrionica*, *Catacanthus incarnatus*, *Spartocera erythromelas*, *Vulsirea pulchella*, *Pachylis laticornis*, *Rasahus roseus*, *Pirates picipes*, *Pirates mutillarius* ♂ ♀, *Aceratodes cruentus*, *Aceratodes albirenis*, *Largus humilis*, *Dysdercus fulvo-niger*, *Acinocoris calidus*, *Lyggæus unifasciatus*, *Lyggæus fasciatus*, *Serinetha coturnix*, *Edessa nigridens*, *Arvelius albo punctatus*, *Spartocerus geniculatus*, *Leptoscelis guttata*, *Platymeris formicaria*, *Macrina juvenis*, *Paryphes lactus*, *Tesseratoma Chinensis*, *Ectrichotes gigas*, *Aspongopus cuprifer*, *Piezogaster alternatus*, *Crinocerus galeator*, *Rhodnius prolixus*, *Metapodius terminalis*, *Stenopoda*, *cinerea*), from Harvey J. Rich, of Brooklyn, New York.

7 COLEOPTERA (*Polyphylla variolosa* ♂ ♀, *Lichnanthe vulpina*, *Myodites fasciatus*), from James Ridings.

## DONATIONS TO LIBRARY.

*Report to the Councils of Philadelphia on some of the insects injurious to our Shade Trees. By Prof. Joseph Leidy. From the Author. Prairie Farmer (Chicago, Ill.), Vol. 12, Nos. 1 to 11.*

The following works were deposited by Dr. T. B. Wilson:—

*Monographie des Cétoines et genres voisins, par M. H. Gory et M. A. Percheron. 1 Vol. Royal Svo.*

*Essai Monographique sur la Famille des Throscides*, par M. H. de Bonvouloir. 1 Vol. Royal 8vo.

*Histoire physique, politique et naturelle de l'île de Cuba*, par M. Ramon de la Sagra. *Animaux Articulés*. 1 Vol. and Atlas.

*Journal of Entomology*, Nos. 1—4. 8vo.

*Verhandlungen des Zoologisch-botanischen Vereins in Wien*. Bd. 1—7. Literatur Bericht & Register of Bd. 1—5.

*Verhandlungen der kaiserlich-königlichen zoologisch-botanischen Gesellschaft in Wien*. Bd. 8—12, and Register of Bd. 6—10.

*Entomologia Parisiensis*. Par A. F. de Fourcroy. 1 Vol. 16mo.

*Illustratio Iconographica Insectorum, quæ in Musæis parisinis observavit et in lucem edidit J. C. Fabricius, præmissis ejusdem descriptionibus; accedunt specières plurimæ, vel minus aut nondum cognitæ. Auctore A. J. Coquebert*. 1 Vol. 4to.

*Bibliotheca Entomologica*. Von Dr. H. A. Hagen. Bd. 2. N—Z. 1 Vol. 8vo.

*Mantissa Insectorum*. J. C. Fabricius. 1 Vol. 8vo.

*Memorias sobre la Historia Natural de la Isla de Cuba*, par Felipe Poey. 2 Vols. 4to.

#### WRITTEN COMMUNICATIONS.

A letter was read from Mr. Aug. R. Grote, dated New York, Aug. 13th, 1863, making the following statement:—

“I have learned from Mr. Cutler of Hoboken, N. J., that he has bred *Lacinia cymatophoroides* and *L. expultric* from the larva. Mr. Cutler states in general terms that the larva of the former species is brown with pearly spots on the anterior segments. It is also well clothed with hair anteriorly. The larva of *L. expultric*, on the contrary, is light green without the pearly spots, and uniformly but very slightly clothed with hair. The larva of both species feed on the pin oak, are full grown in June, the imago appearing in July. From these statements, should they be correct, the separation of these species is justified not alone on the difference of larval coloring, which might be accidental, but on the difference of ornamentation.”

The following paper was presented for publication in the Proceedings: “Additions to the Catalogue of U. S. Lepidoptera, No. 5, by A. R. Grote.”

And was referred to a Committee.



## Notes on Central American LEPIDOPTERA, with descriptions of new species.

## No. I.

BY TRYON REAKIRT.

The insects to be noticed in this and succeeding papers, forming a collection made by Mr. Osmun Zoettling, will give the entomologist a fair illustration of the Lepidopterous fauna of the region, included between the isthmus of Tehuantepec and Panama. Full synonyma of species already described, are given.

## PAPILIONIDÆ, Leach.

## PAPILIO, Linné.

1. *P. Troilus*, Linné.

- Linn. Mus. Lud. Ulric. p. 187. n. 6. (1764.)  
 Linn. Syst. Nat. II. p. 746. n. 6. (1767.)  
 Fab. Syst. Entom. p. 444. n. 7. (1775.)  
 Goeze. Entom. Beiträge III. p. 31. n. 6. (1779.)  
 Cram. p. 25. t. 207. f. A. B. C. (1780.)  
 Fab. Sp. Ins. II. p. 3. n. 9. (1781.)  
 Herbst. t. 17. f. 3. 4. (mas.) t. 20. f. 2. (fem.) (1783.)  
 Fab. Mant. Ins. II. p. 2. n. 9. (1787.)  
 Fab. Ent. Syst. III. i. 4. n. 10. (1793.)  
 Godt. Enc. M. IX. p. 60. n. 97. (1819.)  
 Boisd. et. Lec., p. 26. t. 10. (1833.)  
 Lucas. Pap. Exot. p. 37. t. 19. (1835.)  
 Boisd. Sp. Gén. I. p. 334. n. 176. (1836.)  
 Cat. Brit. Mus. p. 15. (1844.)  
 Doubled. and Hewits. p. 13. n. 85. (1846.)  
 Cat. Lepidop. Gray. p. 26. n. 106. (1852.)  
*Euphæades* Tr. Hübn. Verz. bek. Schmett. p. 83. (1816.)  
*P. Ilioneus*. Sm-Abb. Ins. of Georgia, I. t. 2. (1797.)  
 Petiv. Gazoph. p. 51. n. 523. (1767.)

## Chiapas.

2. *P. Epidaus*, Boisd.

- Boisd. MSS. Doubled. and Hewits. p. 15. n. 138. t. 3. f. 1. (1846.)  
 Cat. Lepidop. Gray. p. 34. n. 161. (1852.)

## Honduras.

This beautiful species, named by Boisdual and figured in the Genera of Diurnal Lepidoptera, is a Southern representative of a group peculiar to America, of which *P. marcellus* is the type.

*Male.* Head and antennæ, black; palpi, yellowish-white; upper part of thorax, black with two yellow lines, lower part, yellow; a black dorsal band on the abdomen, sides, doubly striated with yellow, conjunctive at the anus; femora, black, tibiæ and tarsi, olivaceous.

Wings, semi-diaphanous; expanse, 3.69 inches.

Upper surface, pale yellow. Anterior wings, costa, black; seven narrow transverse black bands, all touching the costal, and the two first, extending to the interior margin. The first, passes through the cell near the base of the wing; the second, extends to the middle of the inner margin, passing through the insertion of the medio-posterior nervule; the third, to the medio-central nervule; the fourth, almost obsolete, is midway between the third and fifth, reaching to the middle of the cell; the fifth falls on the medio-posterior nervule, near its extremity; the sixth and seventh are very faint, the one being near the fifth, and the other contiguous to, and parallel with a black border on the outer margin. The discoidal cellule and the triangle, formed by the costal border, the fifth and seventh bands, are perfectly transparent.

Posterior wings, anal margin, black; two black bands continued from the anterior wings; the first, near the anal edge, unites with the black marginal line at a point, about two-thirds the length of the wing, covering a red mark resembling a thickened sigma, from which it is separated by a small white line; a yellow crescent intervenes between a curved continuation of the first band and a red lunule interior and posterior to the former; this curve is faintly connected, by brownish atoms, with the second black line, which passes through the middle of the wing. A broad blackish-brown border, contains seven marginal lunules, greenish-white, of which the fourth and fifth are the largest; the sixth is bisected by a black line; emarginations, whitish. Tail, linear, white on the inner side and outer extremity. A portion of a red line, contiguous to the second black band on the under surface, is visible above, on account of the semi-transparency of the wings. The nerves and nervules, on the anterior wings, as far as the fifth band, are yellow, beyond that, blackish-brown; on the posterior, yellow.

Below, markings same as above, but paler. Three red crescents, on the posterior wings, each having a white line or lunule, above and below; a red line on the outer edge of the second black band, connects with the third of these crescents.

3. *P. Polyeaon*, Cram.

- Cram. p. 17. t. 203. f. A. B. (1780.)  
 Fab. Sp. Ins. II. p. 19. n. 78. (1781.)  
 Herbst. t. 41. f. 1. 2. (1785.)  
 Fab. Mant. Ins. II. p. 10. n. 89. (1787.)  
 Fab. Ent. Syst. III. i. p. 33. n. 96. (1793.)  
 Godt. Enc. M. IX. p. 41. n. 48. (1819.)  
 Lucas. Pap. Exot. p. 6. t. 2. (1835.)  
 Boisd. Sp. Gén. I. p. 361. n. 1. (1836.)  
 Cat. Brit. Mus. p. 17. (1844.)  
 Doubled. and Hewits. p. 16. n. 152. (1846.)  
 Cat. Lepidop. Gray. p. 35. n. 173. (1852.)  
*Calaides Polyc.* Hübn. Verz. bek. Schmett. 86. (1816.)  
 ♀ *P. Androgeos*. Cram. p. 24. t. 16. f. C. D. (1775.) p. 117. t. 350. f. A. B. (1782.)  
 Fab. Ent. Syst. III. i. p. 75. n. 43. (1793.)  
 Var. ♀ *P. Pyranthus*. Cram. p. 17. t. 204. f. A. B. (1780.)  
*P. Glaucus*. Fab. Mant. Ins. II. p. 3. n. 18. (1787.)  
*P. Laodocus*. Fab. Ent. Syst. III. i. p. 8. n. 23. (1793.)  
 Merian. Ins. Surinam. p. 31. t. 31. (1719.)  
 Seba. Mus. IV. t. 39. f. 2. 3. (1765.)

## Honduras.

4. *P. Asterias*, Drury.

- Drury. I. t. 11. f. 2. 3. 5. (1770.)  
 Cram. p. 193. t. 385. f. C. D. (1782.)  
 Fab. Mant. Ins. II. p. 2. n. 13. (1787.)  
 Fab. Ent. Syst. III. i. p. 6. n. 16. (1793.)  
 Godt. Enc. M. IX. p. 58. n. 91. (1819.)  
 Boisd. et Lec. p. 14. t. 4. (1833.)  
 Lucas. Pap. Exot. p. 38. t. 20. (1835.)  
 Boisd. Sp. Gén. I. p. 332. n. 175. (1836.)  
 Cat. Brit. Mus. p. 15. (1844.)  
 Doubled. and Hewits. p. 16. n. 161. (1846.)  
 Cat. Lepidop. Gray. p. 37. n. 184. (1852.)  
*Euphœades Ast.* Hübn. Verz. bek. Schmett. p. 83. (1816.)  
*P. Ajax*. Clerck. Icones. t. 83. f. 3. 4. (1764.)  
*P. Polyxenes*. Fab. Syst. Ent. p. 444. n. 10. (1775.)  
 Goeze. Ent. Beiträge. III. p. 41. n. 7. (1779.)  
 Fab. Sp. Ins. II. p. 4. n. 13. (1781.)  
*P. Troilus*. Sm. Abb. Ins. of Georgia. I. t. 1. (1797.)  
 Chiapas.

5. *P. Cresphontes*, Cram.

- Cram. p. 106. t. 165. f. A. B. p. 107. t. 166. f. A. (1776.)  
 Herbst. t. 39. f. 1—3. (1785.)  
 Fab. Mant. Ins. II. p. 10. n. 88. (1787.)  
 Lucas. Pap. Exot. p. 23. t. 15. (1835.)  
 Cat. Brit. Mus. p. 17. (1844.)  
 Doubled. and Hewits. p. 17. n. 169. (1846.)

Cat. Lepidop. Gray. p. 39. n. 194. (1852.)

*Heracles Oxilus*. Hübn. Verz. bek. Schmett. p. 83. (1816.)

*P. Thoas*—var. Boisd. Sp. Gén. I. p. 355. n. 197. (1836.)

Honduras.

6. *P. Thoas*. Linné.

Drury. 1. t. 22. f. 1. 2. (1770.)

Linn. Mant. I. p. 536. (1771.)

Cram. p. 108. f. A. B. (1776.)

Goeze. Ent. Beiträge. III. p. 71. n. 4. (1779.)

Herbst. t. 40. f. 3. 4. (1785.)

Fab. Mant. Ins. II. p. 10. n. 87. (1787.)

Fab. Ent. Syst. III. i. p. 32. n. 94. (1793.)

Godt. Enc. M. IX. p. 62. n. 103. (1819.)

Boisd. et Lec. p. 31. t. 12. (1833.)

Boisd. Sp. Gén. I. p. 355. n. 197. (1836.)

Cat. Brit. Mus. p. 17. (1844.)

Doubled. and Hewits. p. 17. n. 170. (1846.)

Cat. Lepidop. Gray. p. 39. n. 196. (1852.)

*Heracles Thoas*. Hübn. Verz. bek. Schmett. p. 83. (1816.)

Seba. Mus. IV. t. 38. f. 6. 7. (1765.)

Nicaragua.

7. *P. Echelus*, Hübn.

♂ *Princeps dominans Ech*. Hübn. Samml. Exot. Schmett. (1806–27.)

Boisd. Sp. Gén. I. p. 287. n. 113. (1836.)

Doubled. and Hewits. p. 18. n. 210. (1846.)

*Parides Ech*. Hübn. Verz. bek. Schmett. p. 87. (1816.)

♀ *Priamides Marcus*. Hübn. Samml. Exot. Schmett. (1806–27.)

*P. Marcus*. Cat. Lepidop. Gray. p. 55. n. 259. (1852.)

Nicaragua.

8. *P. Caleli*, nov. sp.

*Male*. Head, antennæ and palpi, black; thorax and abdomen, black, spotted with red; anus bordered with red; legs, black. Upper surface covered with bluish reflections; expanse 3.50 inches.

Superior wings, sinuate, black, shading into brown at the extremities. An irregular truncated triangle, extends, from the sub-median nervure to the medio-superior nervule; the lower side, is parallel with the outer margin, the upper, touches the median nervure; the base, rests on an imaginary line drawn from a point on the sub-median nervure, one-third its length from the margin, to another on the median nervure a little below the medio-posterior nervule. This triangle is divided by the medio-central and posterior nervules into three parts. The lower two, forming its base and middle portion, are greenish; the apex, occu-

pying the upper part of the medio-central interspace, itself triangular, consists of two portions, the outer, forming the base of the new triangle, of a whitish yellow ellipsoid; the inner or apex, contained in the angle formed by the median nervure and medio-central nervule. is greenish. Within the cell, opposite the medio-superior nervule and above the whitish ovoid, a small spot of white atoms. Fringe, brownish.

Inferior wings, dentate, black; centre of the wing occupied by a red spot, palmate, divided by the nervules into six parts. The first, in the lower third of the discoidal cellule, has the remaining five, radiating from it; the second, third and fourth, occupying the disco-central, and the medio-superior and central interspaces, are cuneiform and truncated, the third and fourth being the longest; the fifth, of the same length as the second, has its sides parallel, and occupies the medio-posterior interspace; the sixth is linear, extending along the medio-posterior nervule. Emarginations, reddish.

Below, superior wings, brownish-black, blue reflections near the base; a transverse white band, is divided into three parts by the median nerve and nervules; the two largest, occupy the same relative position as the whitish marks on the upper surface, the third is a mere dot in lower angle of the medio-superior interspace. Inferior wings, blackish-brown; a macular band, of pink, divided by the nervules into six spots, extends from the post-apical nervule to the interior margin. The first, second and third are cuneiform, truncated; the fourth and fifth, parallellograms, the latter having its sides equal; the sixth, a round spot near the anal margin. These are all below the discoidal cellule and correspond to the lower parts of the markings on the upper surface.

Guatemala.

This species, found near the Copán river, closely resembles *P. Cymochles* E. Doubleday, but is larger and differs in the arrangement of the whitish marks on the superiors, and in the size and palmation of the red spots on the inferior wings.

9. *P. Sesostris*, Cram.

Cram. p. 34. t. 211. f. r. G. (1780.)

Godt. Enc. M. IX. p. 38. n. 40. (1819.)

Lucas. Pap. Exot. p. 28. t. 14. (1835.)

Boisd. Sp. Gén. I. p. 299. n. 131. (1836.)

Cat. Brit. Mus. p. 13. (1844.)

Doubled. and Hewits. p. 19. n. 213. (1846.)

Cat. Lepidop. Gray. p. 58. n. 267. (1852.)

*Princeps dominans* Ses. Hübn. Samml. Exot. Schmett. (1806-27.)

*Parides* Ses. Hübn. Verz. bek. Schmett. p. 87. (1816.)

Var. *P. Childrenæ*. G. R. Gray, in Griffith's Anim. Kingdom. t. 38. 1.8. (1832.)  
Honduras.

10. *P. Tonila*, nov. sp.

*Female*. Head, antennæ and palpi, black; thorax and abdomen, above black, below spotted with red; legs black. Upper surface, superior wings curved, blackish-brown; expanse 3.38 inches. A transverse white band, extends from the sub-costal nervure to the medio-central nervule, occupying the lower part of the discoidal cellule, the inner angle of the medio-superior interspace and the middle of the medio-central area. Fringe, brown.

Inferior wings lobed, blackish-brown; a red macular band, on the disc, composed of seven spots; the first, second and third are triangular, truncated; the fourth, fifth and sixth, oblong; the seventh, linear, extends along the anal margin. Emarginations, pink.

Below, superior wings marked the same as above; the space between the costal nervure and the second sub-costo-marginal nervule, from its insertion, to beyond the insertion of the apical nervule, is white; a white spot in the angle formed by the sub-costal nervure and second nervule. Inferior wings, same as above, but the spots in the red band are lighter colored and smaller, the seventh or linear being omitted.

Guatemala.

This species may possibly be the female of some described *Papilio*, which I have been unable to identify from unsatisfactory diagnoses.

11. *P. Thymbræus*, Boisd.

Boisd. Sp. Gén. I. p. 302. n. 136. (1836.)

Doubled. and Hewits. p. 19. n. 288. t. 4. f. 3. (1846.)

Cat. Lepidop. Gray. p. 65. n. 289. (1852.)

Chiapas.

12. *P. Tulana*, nov. sp.

Head, antennæ and palpi, black; thorax and abdomen, black spotted with red; legs black.

Upper surface, uniform dark brown; expanse 3.63 inches; superiors, curved, entire; inferiors, undulate, a marginal row of seven red lunules; emarginations, whitish; tail, short and narrow. Below, the markings are paler, otherwise the same as above.

Chiapas.

13. **P. Philenor.** Linné.

- Drury. I. t. 11. f. t. 4. (1770.)  
 Linn. Mant. I. p. 535. (1771.)  
 Fab. Syst. Ent. p. 445. n. 12. (1775.)  
 Fab. Ent. Syst. III. i. p. 6. n. 18. (1793.)  
 Sm. Abb. Ins. of Georgia, I. t. 3. (1797.)  
 Godt. Enc. M. IX. p. 40. n. 47. (1819.)  
 Boisd. et. Lec. p. 29. t. 11. (1833.)  
 Lucas. Pap. Exot. p. 15. t. 8. (1835.)  
 Boisd. Sp. Gén. I. p. 324. n. 167. (1836.)  
 Cat. Brit. Mus. p. 15. (1844.)  
 Doubled. and Hewits. p. 19. n. 230. (1846.)  
 Cat. Lepidop. Gray. p. 66. n. 291. (1852.)

*Laertias Ph.* Hübn. Verz. bek. Schmett. p. 84. (1816.)

*P. Astenous.* Cram. p. 26. t. 208. f. A. B. (1779.)

Fab. Mant. Ins. II. p. 2. n. 15. (1787.)

Chiapas.

14. **P. Phaon,** Boisd.

- Boisd. Sp. Gén. I. p. 320. n. 161. (1826.)  
 Doubled. and Hewits. p. 20. n. 239. (1846.)  
 Cat. Lepidop. Gray. p. 69. n. 311. (1852.)

Honduras.

15. **P. Polydamus,** Linné.

- Linn. Mus. Lud. Ulric. p. 192. n. 11. (1764.)  
 Linn. Syst. Nat. II. p. 747. n. 12. (1767.)  
 Drury. I. t. 17. f. 1. 2. (1770.)  
 Goeze. Ent. Beiträge. p. 34. n. 12. (1779.)  
 Cram. p. 33. t. 211. f. D. E. (1779.)  
 Fab. Sp. Ins. II. p. 8. n. 29. (1781.)  
 Fab. Mant. Ins. II. p. 4. n. 31. (1787.)  
 Fab. Ent. Syst. III. i. p. 14. n. 42. (1793.)  
 Godt. Enc. M. IX. p. 39. n. 44. (1819.)  
 Boisd. et Lec. p. 37. t. 15. (1833.)  
 Lucas. Pap. Exot. p. 33. t. 17. (1835.)  
 Boisd. Sp. Gén. I. p. 321. n. 162. (1836.)  
 Cat. Brit. Mus. p. 14. (1844.)  
 Doubled. and Hewits. p. 20. n. 241. (1846.)  
 Cat. Lepidop. Gray. p. 67. n. 299. (1852.)

*Ithobalus Poly.* Hübn. Samml. Exot. Schmett. (1806-27.)

Hübn. Verz. bek. Schmett. p. 88. (1816.)

Seba. Mus. IV. t. 44. f. 14. 15. (1765.)

Honduras.

16. **P. Copánæ,** nov. sp.

Head and antennæ, black; palpi, white, third article covered with

black hairs; thorax above, black, below spotted with yellow; abdomen, greenish-black, with three rows of yellow, and one row of white streaks on the sides, a yellow band below; femora and tibiae grayish, tarsi, black.

Wings, greenish black, shining; expanse 4.83 inches. Anterior wings, sinuate, extremities, dark brown; a marginal row of five yellow sagittate spots, arcuated interiorly; the first in the disco-central area, is very small; the second, occupying the medio-superior interspace, is the largest, extending to the cell; the three following decrease in size, as they approach the posterior angle; the fifth, is almost bisected by an interruption of the ground color. The costal nervure and first sub-costal nervure, are margined with whitish-green, above the insertion of the apical nervule.

Posterior wings, dentate; a macular band, yellow, on the disc, composed of seven spots; the first is doubly concave; the second, rectilinear; the third, oblong; the fourth, fifth and sixth, oval; the seventh, round and minute; a marginal row of obsolete yellow lunules; crenations, yellow.

Under side, base of primaries black with greenish reflections; disc, light brown; the arcuate band is more distinct than above; the first spot is omitted, the second, lengthened, passing into the discoidal cellule, the fifth, bisected by the sub-median nervure; costa margined with yellow. Secondaries, coppery, metallic; a marginal row of seven spots, red bordered with black, resembling chevrons in form.

Guatemala.

This, one of the largest species of that group, which Hübner designated as the sub-genus, *Ithobalus*, and of which *P. Polydamus* is our only indigenous representative, was found near Copán. Distinguishable from all congeneric associates by the arcuated band on the anterior wings, the lustrous brilliancy of its upper surface is alone surpassed by the *Morphidæ*.



## CATALOGUE OF NORTH AMERICAN BUTTERFLIES.

BY J. WM. WEIDEMEYER.

The annexed list includes all the specimens of diurnal lepidoptera so far described and ascertained as inhabiting the geographical division of North America—extending from the Isthmus of Panama to Greenland and the Arctic regions. In the matter of references obsolete writers have been disregarded, and the best known and most readily accessible works only are quoted. Whenever reliable figures could be traced, they have been indicated, as affording additional facility for determining species; it will be an easy matter to turn from these to their accompanying descriptions. Many of the figures in the works of authors of good repute—such as Cramer, Drury, Herbst—are clumsily drawn and defective in coloring; when cited, I have had occasion to allude to some of their shortcomings. Recent discoveries of an immense number of new species that closely resemble the typical insects have rendered the concise Latin descriptions of Linné and Fabricius unreliable, and of little value; they can now only be regarded in instances where species afford prominent characteristics. Nor can the “habitat” so carelessly given by the older authors be accepted, unless corroborated by later authority. Numerous errors have been perpetuated by recent compilers in copying “hard names” from preceding writers, wrong references are given, species confounded, and the names of both genera and species misspelt or distorted, by careless transcription, or lack of industrious research. It may be well to make the precautionary remark that greatly differing sexes, or climatical variations of the same insect, have frequently been catalogued as distinct species. Much scientific investigation will be required before all distinctions of sex, variety and species, can be satisfactorily established.

The system of classification adopted is entirely in accordance with that of Doubleday and Westwood, in their “Genera of Diurnal Lepidoptera,”—which, although not free from defects, may be accepted as the most complete work of its kind. Considerable care has been taken to fix on the best authenticated specific names; their synonymms will be found alongside, in *italics*. For the purpose of removing some confusion, it has been deemed advantageous to affix a number of short notes and explanations at the termination of the various families.

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*Wood*.—"Index Entomologicus."

*White*.—In "Zoologist Magazine;" London.

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SECTION RHOPALOCERIDÆ.

Ist family PAPILIO.

Genus 1. **TEINOPALPUS.**

Unrepresented.

Genus 2. **ORTHOPTERA.**

Unrepresented.

Genus 3. **PAPILIO.**

- agesilaus** <sup>1</sup> (*protosilaus*), BdvI. Sp. G. p. 263; Esper, Ausl. S. t. 52. Mexico, Central America.
- arcesilaus**, Lucas, R. M. Z. 1852; Morris Syn. p. 11. United States.
- ajax** <sup>2</sup> (*marcellus*), Herbst. t. 42; BdvI. & L. t. 1; Abbot & S. t. 4; Cramer, t. 98. United States.
- asterias** (*troilus*), Esper, Ausl. 11, ♂, 61, ♀; Herbst, t. 18, ♂, 17, ♀; Lucas, P. E. t. 20, ♂, BdvI. & L. t. 4, ♂; Drury, I. t. 11, ♂ ♀; Abbot & S. t. 1, ♂ ♀; Cramer, t. 385 ♂, 207 ♀; Harris, t. 4, ♂ ♀. United States, Mexico, West Indies, Canada, New Foundland.
- aselepius** (*cincinnatus*), Hbr.-Geyer, t. 7; BdvI. Sp. G. p. 346. Mexico, Cen. Am.
- andræmon**, Hübner, Exot. f. 97; BdvI. Sp. G. p. 343. ♂ ♀. West Indies, Central America.
- anchises**, Esper, Ausl. t. 6, ♂; Clerck, t. 29; BdvI. Sp. G. p. 291. ♂ ♀. Mexico, Central America.
- anchisiades** (*anchises*, *isidorus*?) Esper, Ausl. t. 13, ♂ ♀; Herbst, t. 9, ♂ ♀; Cramer, t. 318, ♂ ♀; Gray, Cat. Lep. t. 5, var. Central America.
- aristor**, BdvI. Sp. G. p. 332. Mexico, West Indies, Central America.
- alopius**, Gray. Mexico.
- aconophas**, Gray, Cat. Lep. t. 11, ♀. Mexico.
- antiloachus** <sup>3</sup>, Catesby, t. 83. United States!
- abderus**, Hopffer, t. 1, ♂. Mexico.
- belesis**, Gray. Mexico.
- branchus**, Gray, Cat. Lep. t. 7, ♀, p. 62, ♂. Central America.
- columbus**, Herr-Sch. C. B. Z. M. V. XVI; Trans. Ent. S. 1851, t. 10. W. Indies.
- eresphontes** <sup>4</sup> (*thoas*), Cramer, t. 166 ♂. 165 ♀; Herbst, t. 39, ♂, BdvI. & L. t. 12. ♀; Drury, I. t. 22. United States, Mexico, W. Indies, Cen. Amer.
- celadon** <sup>5</sup> (*sinon*, *marcellinus*, *protosilaus*), Duncan, t. 4; Drury, I. t. 22; Herbst, t. 44; Cramer, t. 317—; Morris, Syn. p. 10. West Indies.
- caiguanabus**, Poey, Mem. N. H. t. 15, ♂ ♀. West Indies.
- cymochles**, Gray, Cat. Lep. t. 10, ♂. West Indies.

- choridamas**, Bdvl. Sp. G. p. 318. West Indies.
- cebatus**, Doubleday. Mexico.
- docimus**, Gray. Central America.
- daunus**, Bdvl. Sp. G. p. 342, ♂; Proc. Ent. Soc. Phil. 1, p. 278, ♂. U. S., Mex.
- daphnis** (*aristodemus*, *temenes*), Esper, Ausl. t. 59; Bdvl. Sp. G. p. 357; Martin. Psyche, t. 8. Mexico, West Indies.
- erostratus**, Trans. Ent. Soc. V, t. 3. Central America.
- epidaus**, Dbdy & W. t. 3. Mexico, Central America.
- eurymedon** <sup>6</sup>, Ann. S. E. F. 1852; Lucas, Rev. Z. 1852; Morris, Syn. p. 4. U. S.
- glaucus** <sup>7</sup> (*turnus*, ♀ var.), Herbst, 17, dusky yellow var., Esper, Ausl. t. 5, brown var.; Bdvl. & L. t. 8, black var.; Cramer, t. 139. U. States.
- garamas**, Hbr.-Geyer, t. 6. Mexico.
- homerus**, Esper, Ausl. t. 45; Dbdy. & W. t. 4; Donovan, N. R. t. 20 ♀. W. Indies.
- iphidamas** (*arcas*), Bdvl. Sp. G. p. 292; Gray, Cat. Lep. t. 8, ♂ ♀. Mex., C. Am.
- idæns** (*exander* is ♀, *copyis* is var.), Lucas, P. E. t. 7. ♀; Chenu, t. 8, ♀, Donovan, India, t. 19. ♂; Bdvl. Sp. G. 299 ♂, 277 ♀. Mexico, Cent. Amer.
- machaonides** (*lycoracus*), Esper, Ausl. 45; Lucas, P. E. t. 18. West Indies.
- Montezuma**, Westwood, Arc. Ent. t. 18. Mexico, Central America.
- Marchandii**, Bdvl. Sp. G. p. 350. " " "
- mylotes**, Gray. " " "
- marcellus** <sup>8</sup> (*sinon*, *ajax*), Bdvl. & L. t. 2; Esper, Europ. t. 51. United States.
- mezentius**, Gray, Cat. Lep. t. 3; Ann. Nat. H. 1844. Mexico.
- neodamas**, Dbdy. & W. p. 529; Herr. Schf. C. B. Z. M. V. 1862; Lucas, R. Z. t. 10. West Indies.
- numicus**, Hopffer, t. 1, ♂. West Indies.
- oebalus** (*pallas* is ♂), Hewitson, ♀; Gray, Cat. Lep. t. 6, ♂; Bdvl. Sp. G. p. 360, ♀. Mexico.
- oxynius** (*augustus*), Hbr.-Geyer, t. 23, ♂; Bdvl. Sp. G. p. 358, ♂. West Indies.
- ornythion**, Bdvl. Sp. G. p. 354. Central America.
- palamedes** (*calchas*, *chalcas*!), Herbst, t. 42, ♂; Bdvl. & L. t. 5, ♀; Esper, Ausl. t. 56, ♂; Cramer, t. 93, ♂; Drury, I, t. 19, ♀. U. S., West Ind.
- pharnaces**, Gray, Cat. Lep. t. 5; Ann. N. H. 1846. Mexico, Cent. America.
- photinus**, Gray, Cat. Lep. t. 11, ♂, p. 65, ♀; Ann. N. H. 1844. Mexico.
- phaon**, Bdvl. Sp. G. p. 319. Mexico, Central America.
- pausanias**, Gray, Cat. Lep. p. 69; Trans. E. S. 1852, t. 6, ♂. Cent. America.
- protodamas**, Bdvl. Sp. G. p. 322; Hubner, Exot. f. 114. Cent. America.
- polycaon** <sup>9</sup> var. (*piranthus*, *laodocus*), Herbst, t. 41 ♂, 12 ♀; Chenn, t. 6, ♂; Lucas, P. E. t. 2, ♂; Cramer, t. 203 ♂, 204 ♀; Esper, Ausl. t. 49 ♂, 20 ♀. West Indies, Central America.
- pelaus** (*imerius*, *augias*, *ornofagus*), Westwood, Arc. E. t. 18. ♂; Menetries, Bull. Mosc. III, t. 10; Bdvl. Sp. G. p. 367. West Indies.
- panares**, Gray, Cat. Lep. t. 10, ♀. Mexico.
- philenor** (*astinus*), Herbst, t. 19, ♂; Esper, Ausl. t. 11, ♀; Bdvl. & L. t. 11. ♂; Drury, I, t. 11, ♂; Lucas, P. E. t. 8, ♂; Abbot & S. t. 3, ♂ ♀; Say, t. 1, ♂; Cramer, 208, ♂. U. S., Mexico, West Indies, Cent. America.
- palnus**, Fabricius, Syst. Entom. III. West Indies.

- polydamas** (*archidamas?*), Cramer, t. 211, ♂; Esper, Ausl. t. 7 ♂, 6 ♀; Herbst, t. 10, ♂; Chenu, t. 20, Lucas, P. E. t. 17; Drury, I, t. 17; Bdbl. & L. t. 15. United States, West Indies, Central America.
- pilumnus** <sup>10</sup>, Bdbl. Sp. G. p. 340. ♀; Ménetries, Cat. St. P. t. 7, ♀. U.S. Mex.
- philolaus**, Bdbl. Sp. G. p. 250; Ménetries, Cat. St. P. t. 7. Mexico, Cent. Amer.
- protesilaus** <sup>11</sup>. Lucas, P. E. t. 21; Herbst, t. 43; Cramer, t. 202; Duncan, t. 4. West Indies, Central America.
- pirithous** (*piranthous! lycophron* is ♂), Bdbl. Sp. G. p. 352 ♂; 358 ♀; Hubner, t. , ♂; Hewitson, t. , ♀. West Indies.
- perrhebus**, Bdbl. Sp. G. p. 305, ♂ ♀. Central America.
- Rogerii**, Bdbl. Sp. G. p. 278. ♀. Central America.
- rhetus**, Gray, Cat. Lep. t. 11, ♀, p. 65, ♂. Mexico, Central America.
- rutulus**, Bdbl. Ann. S. E. F. 1852; Morris, Synop. p. 3; Lucas, Rev. Z. 1852. U. S.
- sesostris** (*tullus* is ♀; *Childreæ* is ♀ var.; *proteus*), Herbst, t. 10, ♂; Esper, Ausl. t. 12, ♂; Lucas, P. E. t. 14, ♂; Cramer, t. 211 ♂, 277 ♀; Griffith, t. 38, ♀ var.; Bdbl. Sp. G. p. 299 ♂, 295 ♀. Cent. America.
- sinon** (*protesilaus*), Bdbl. & L. t. 3, ♀; Morris, Synop. p. 9. U. S. West Ind.
- serapis** (*arrhipus! arripus* is ♀), Bdbl. Sp. G. t. 5, ♂. Central America.
- thoas** <sup>12</sup> (*cresphontes*), Herbst, t. 40; Esper, Ausl, t. 49; Cramer, t. 167. Cen. Am.
- turnus** <sup>13</sup> (*alcidamas, glaucus* is ♀ var.), Herbst, t. 41, ♂; Esper, Ausl. t. 48, yellow ♀; Bdbl. & L. t. 6, yellow ♀; Cramer, t. 38, ♂; Lucas, P. E. t. 18, ♂ var.; Say, t. 40, yellow ♀. U. S. W. Indies, Can. Hudson's Bay.
- troilus** (*ilioneus*), Herbst, t. 20, ♂; Bdbl. & L. t. 10, ♂; Cramer, t. 207, ♂; Esper, Ausl. t. 3, ♀; Lucas, P. E. t. 19 ♀; Abbot & S. t. 2, ♂ ♀. U. States. Canada, Mexico, West Indies.
- thymbræus**, Doubleday & W. t. 4; Bdbl. Sp. G. p. 302. Mexico, Cent. America.
- thersites** <sup>14</sup> (*acamas* is ♀), Donovan Nat. R. t. 24 ♂, 18 ♀; Bdbl. Sp. G. p. 353 ♂, 360 ♀. West Indies.
- ulopas**, Gray, Cat. Lep. p. 69. Mexico.
- Villiersii**, Bdbl. & L. t. 14; Morris Syn. p. 12. United States?, West Indies.
- xenarchus**, Hewitson, t. 3 ♂. Mexico.
- zetes**, Trans. Ent. S. V. t. 3. West Indies.
- zestos**, Gray, Cat. Lep. t. 10 ♀. Mexico, Cent. America.
- zolicaon** <sup>15</sup> (*zelicaon! machaon*), Bdbl. Ann. S. E. F. 1852; Morris, Synop. p. 4. Lucas, R. & M, Z. 1852. Labrador, United States.

Genus 4. **LEPTOCIRCUS.**

Unrepresented.

Genus 5. **EURYCUS.**

Unrepresented.

Genus 6. **PARNASSIUS.**

- clarius**, Morris, Syn. p. 14; Chenu, p. 42; Eversman, Bull. Mosc. XVI, t. 9, ♂ ♀; Duponchel, Supp. t. 43; Bdbl. Ann. S. E. F. 1852; Herr.-S. Europ. f. 628. United States.

- clodius* (*clarius*), Morris, Synop. p. 15; Menetries, Cat. St. P. p. 73; Ann. S. E. F. X. United States.
- intermedius* <sup>16</sup> (*delius*), Herr. S. Europ. f. 317 ♀. United States?
- Sayii*, (*nomion*), Morris, Syn. p. 14; Bdvl. Sp. G. t. 6; Edwards, Proc. E. S. Pa. 1863. United States.
- smintheus*, Doubleday & W. t. 4 ♂, Edwards Proc. A. N. S. 1861. United States.

## REMARKS ON FAMILY "PAPILIO."

1. Frequently confounded with *P. protesilaus*, to which it bears close resemblance. Its distinction is not clearly established. 2. It is not fully determined whether this species and *P. marcellus* are varieties, or distinct. 3. A patched-up insect, undoubtedly counterfeit. 4. Drury's figure is a compromise between *P. thoas* and *P. cresphontes*. 5. *P. marcellinus* corresponds so nearly with this one, that little doubt remains of their identity. 6. Closely resembles *P. rutulus*, and will probably prove a mere variety. 7. A remarkable dark "aberration" of various shades, of the ♀ of *P. turnus*,—chiefly confined to the Southern United States: north of Pennsylvania the ♀ is usually yellow; dark ♂ entirely unknown. 8. There is considerable difference of opinion concerning the identity of *P. marcellus* and *P. ajax*. 9. ♂ and ♀ differ much: insects that have the look of distinct species are included under the same name. Some confusion here. 10. Will probably prove to be the ♀ of *P. daunus*. 11. The difference between this and *P. agesilaus* does not seem well established. 12. Good authorities are divided on the question whether *P. thoas* be a distinct species, or only a climatical modification of *P. cresphontes*. 13. The figure of Lucas represents a dwarfed variety, derived from Hudson's Bay and other northern latitudes. 14. The sexes strikingly vary in coloring. 15. The resemblance to *P. machaon* is close. This seems hardly more than a variety of that well known European insect. 16. Included here on the authority of Ménétrés. Doubtful as an American insect. 17. *P. polices*, said by Boisduval (Spec. Gen. p. 261) to inhabit the Antilles, is an African species.

## 2nd family PIERIS.

Genus 1. **EUTERPE.**

- charops** (*marina* is ♂), Bdvl. Sp. G. t. 18 ♀; Chenu. f. 122 ♀; D. & W. t. ♂. Mex.  
**flisa**, Herr. S. Ausser E. f. 93. Mexico.  
**nimbice**, Doubleday & W. t. 4; Chenu. f. 123; Bdvl. Sp. G. p. 409 ♂ ♀. Mexico.  
**sebennica**, Herr. S. Ausser E. f. 89. Mexico.  
**teutila**, Doubleday, Ann. N. H. XIX. Mexico.

Genus 2. **LEPTALIS.**

- antberize**, Hewitson, Exot. B. t. 27. Mexico.  
**cubana**, Herr. S. Cor. B. Z. M. V. XVI ♂ ♀. West Indies.  
**euryope**, Hewitson, Exot. B. t. 27. Mexico.  
**eunœ**, Doubleday, Ann. N. H. XIV. Mexico.  
**jethys**, Bdvl. Sp. G. p. 423. Mexico.  
**melite** <sup>1</sup> *var.*, Cramer, t. 153; Herbst, t. 76; Swainson, Zool. I. t. 15 ♂ *var.* y.  
 Bdvl. Sp. G. p. 423. Mexico, Central America.  
**nehemia** (*cydne*) Gray, Zool. M. t. 75; Bdvl. Sp. G. p. 528 ♂ ♀. Mexico.  
**nemesis** (*atthis* is ♀), Humb. & B. Zool. II. t. 35; Bdvl. Sp. G. p. 421. Mexico,  
 Central America.  
**praxinœ**, Doubleday, Ann. N. H. XIV. Mexico.  
**ramesis**, ? Central America.  
**spio**, Doubleday & W. t. : Chenu. f. 124; Bdvl. Sp. G. p. 420. West Indies.

Genus 3. **LEUCOPHASIA.**

Unrepresented.

Genus 4. **PONTIA.**

Unrepresented.

Genus 5. **PIERIS.**

- balidia** <sup>2</sup>, Bdvl. Sp. G. p. 529 ♀. Mexico, West Indies.  
**cronis** <sup>3</sup>, Cramer, t. 60; Herbst, t. 101. West Indies?  
**calydonia**, Bdvl. Sp. G. p. 439. Central America.  
**elodia**, Bdvl. Sp. G. p. 529 ♂ ♀. Mexico, West Indies.  
**evonima**, Bdvl. Sp. G. 493. West Indies.  
**fabia**, ? West Indies?  
**frigida**, Scud. Pr. B. S. N. H. 1861 ♂ ♀; Morris Syn. p. 318 ♂ ♀. Labr., Green'd.  
**habra**, Doubleday & W. t. 6. Central America.  
**helvia**, Humb. & B. t. 41; Bdvl. Sp. G. p. 488. Mexico, West Indies.  
**isandra**, Bdvl. Sp. G. p. 490. Mexico, Central America.  
**ilaire** (*margarita*, *mysia*, *molpadia*), Chenu. t. 19 ♂; Poey, Cent. Lep. ♂ ♀; Hub-  
 Geyer, f. 259, ♀; Hubner, Exot. t. ♂. Mexico, West Indies.  
**josephina**, Hubner, Exot. f. : Bdvl. Sp. G. p. 532 ♂ ♀. Mex., W. Ind., Cen. Am.  
**joppe** <sup>4</sup>, Bdvl. Sp. G. p. 495 ♂ ♀. West Indies.  
**lycimnia** (*limnoria*?), Lucas, P. E. t. 25 ♂; Herbst. t. 105 ♂ ♀; Cramer, t. 105,  
 ♂ ♀. Mexico, West Indies.  
**menapia**, Felder Wien, E. M. 1859 ♂ ♀; Morris, Syn. p. 19. United States.



- monuste** <sup>5</sup> (*cleomes. orseis*), Herbst, t. 88 ♀; Cramer, t. 141 ♂; Bdvl. & L. t. 16 ♂ white ♀; Morris, Syn. p. 16 ♂ ♀. U. States, W. Ind., Cent. Am.  
**marana**, Ann. Nat. H. 1844. West Indies.  
**marginalis**, Morris, Syn. p. 321 ♂ ♀; Scud. Pr. B. S. N. H. 1861 ♂ ♀. U. States.  
**oleracea** <sup>6</sup> (*casta. cruciferarum*), Harris, Agass. L. S. t. 7; Kirby, Fauna B. A. IV, t. 3; Morris, Syn. p. 19, 315; Scudder. P. B. S. N. H. 1861; Harris, p. 270. United States, Canada, Labrador, Nova Scotia.  
**pallida**, Scudder, Pr. B. S. N. H. 1861 ♂ ♀; Morris, Syn. p. 321 ♂ ♀. U. States.  
**protodice**, Bdvl. & L. t. 17 ♂ ♀; Morris, Syn. p. 17, 317 ♂ ♀. U. S., Mex., C. Am.  
**salacia**, Bdvl. Sp. G. p. 489 ♂ ♀; Godart. Ency. Meth. IX. West Indies.  
**sysymbrii**, Bdvl. Ann. S. E. F. 1852; Morris, Syn. p. 17. United States.  
**tau**, Scudder, Pr. B. S. N. H. 1861 ♂ ♀; Morris, Syn. p. 322 ♂ ♀. U. States.  
**vallei** <sup>7</sup> (*virginia*), Hubner, Exot. f. ; Bdvl. Sp. G. p. 494 ♂ ♀. West Indies.  
**virginia**, Lucas, P. E. t. 33 ♂; Hbr.-Geyer, f. 693 ♂. West Indies.  
**venosa** <sup>8</sup> (*autodice, callidice, leucodice*), Bdvl. Sp. G. p. 539 ♂ ♀; Scudder, Pr. B. S. N. H. 1861 ♂ ♀; Morris, Syn. p. 320 ♂ ♀. United States.  
**Viardii**, Bdvl. Sp. G. p. 439 ♂.

Genus 6. **ZEGRIS.**

Unrepresented.

Genus 7. **NATHALIS.**

- iolie** (*irene*), Chenu. f. 140 ♀; Doubleday & W. t. ♂; Morris, Syn. p. 22; Bdvl. Sp. G. p. 589. United States, Mexico, West Indies.  
**felicia**, Poey, Mem. N. H. t. 18 ♂ ♀; Herr. S. C. B. Z. M. V. 1862. West Indies.

Genus 8. **ANTHOCHARIS.** (*Anthocaris!*)

- ausonoides** <sup>9</sup> (*ausonia; belia* is ♂), Bdvl. in litt; Edw. Pr. E. S. Ph. 1863 ♂ ♀. U. S.  
**creusa**, Doubleday & W. t. 7. United States.  
**genutia** <sup>10</sup> (*Herminierii*), Morris, Syn. p. 20 ♂ ♀, Hubn. Exot. f. ; Donovan. Ins, India, t. 27 ♂. United States.  
**lanceolata**, Bdvl. Ann. S. E. F. 1852; Morris, Syn. p. 21. United States.  
**sara**, Bdvl. Ann. S. E. F. 1852; Morris, Syn. p. 21 ♂ ♀. United States.

Genus 9. **IDMAIS.**

Unrepresented.

Genus 10. **THESTIAS.**

Unrepresented.

Genus 11. (*Hebomoia*) **IPHIAS.**

Unrepresented.

Genus 12. **ERONIA.**

Unrepresented.

Genus 13. **CALLIDRYAS.**

- agaritha**, Bdvl. Sp. G. p. 623 ♂ ♀, Mexico.  
**argante** (*hersilia, cypris*), Herbst, t. 110 ♂, 111 ♀; Cramer, t. 173 ♂, 99 ♀; Lucas, P. E. t. 40 ♂. United States, Mexico, Central America.

- cypris** (*neocypris*), Hubner, Exot. f. ; Donovan, Nat. R. t. 40 ♂; Bdvl. Sp. G. p. 623 ♂ ♀. Mexico, Central America.
- drya** (*eubule*), Bdvl. Sp. G. p. 616 ♂ ♀; Menetries, Bull. M. III, p. 118 ♀; Hubner, Exot. f. ♀. West Indies, Central America.
- evadne** <sup>2 3</sup> (*almeone, statira*), Lucas P. E. t. 40: Herbst, t. 104 ♀; Cramer, t. 141, ♀, 120 ♀. West Indies.
- eubule** <sup>1 1</sup> (*sennæ, marcellina*), Cramer, t. 163 C. ♂, 120 ♀; Herbst, t. 110 ♂, 112 ♀; Duncan, t. 8 ♂; Morris, Syn. p. 25 ♂ ♀; Bdvl. Sp. G. t. 6 ♀; Donovan, Nat. R. t. 8 ♀; Abbot & S. t. 5 ♂ ♀. West Indies, Central America.
- Gadartiana** (*orbis*), Poey, Cent. L. ♂ ♀; Swainson, Z. I. t. 34 ♀; Bdvl. Sp. G. p. 630 ♂ ♀. West Indies.
- marcellina** (*eubule*), Bdvl. & L. t. 24 ♂ ♀; Cramer, t. 163, A. B. ♂; Journ. of Enty. 1861; Morris, Syn. p. 26 ♂ ♀. United States, Mexico.
- neleis**, Bdvl. Sp. G. p. 629 ♂ ♀. West Indies.
- philea** (*melanippe, aricia*), Lucas, P. E. t. 41 ♂; Herbst, t. 110 ♂, 111 ♀, 113 ♀; Cramer, t. 173 ♂, 94 ♀, 361 ♀. West Indies, Central America.
- thalestris** (*philea vary*), Hubner, Exot. f. ♂ ♀; Bdvl. Sp. G. p. 621 ♂ ♀. W. Ind.

Genus 14. **GONEPTERYX.** (*Rhodocera.*)

- clorinda** (*Swainsonia, Godartii*), Lucas P. E. t. 42 ♀; Bdvl. Sp. G. t. 19 ♂. Mexico, West Indies.
- Guenéana**, Bdvl. Sp. G. p. 601 ♂ ♀. Mexico.
- Lacordairei**, Bdvl. Sp. G. 600. Mexico.
- Lorquini**, Ann. S. E. F. United States.
- lyside**, Morris Syn. p. 24 ♂ ♀; Poey Memor. N. H. t. 15 ♂ ♀; Bdvl. Sp. G. p. 603 ♂ ♀. United States, West Indies.
- mærula** <sup>1 2</sup> (*ecclipsis*), Bdvl. & L. t. 23 ♀; Herbst. t. 103; Cramer, t. 129; Donovan India, t. 27 ♂. United States, West Indies.
- rhamni** <sup>1 3</sup>, Bdvl. Sp. G. t. 6; Herbst. t. 103 ♂; Esper. Europ. t. 4 ♂ ♀. U. S.

Genus 15. **COLIAS.**

- alexandra**, Edwards, Pr. E. S. Pa. 1863 ♂ ♀. United States.
- Boothii** <sup>1 4</sup> (*hecla*), Ross, 2d P. Ex.; Herr. S. Europ. f. 459. Arctic America.
- chione**, Ross, 2d P. Ex. Arctic America.
- christina**, Edwards, Pr. E. S. P. 1863 ♂ ♀. United States.
- cæsonia** <sup>1 5</sup> (*philippina*), Bdvl. & L. t. 22 ♂ ♀; Lucas, P. E. t. 39 ♂; Chenu. t. 23. United States, Mexico, West Indies.
- eurytheme** (*chrysotheme, amphidusa*), Ann. S. E. F. X. Scudder, P. B. S. N. H. 1862 ♂ ♀; Morris, p. 29 ♂ ♀. U. S. Can. Brit. N. A., Hudson's Bay.
- eurydice** (*Wosnezenskii*), Menetires, St. P. t. 1 ♂; Morris, Syn. p. 32. U. States.
- edusa** <sup>1 6</sup>, Herbst. t. 114 ♂ ♀; Esper. Europ. t. 4 ♂ ♀; Wood. t. 1 ♂ ♀. United States, Canada.
- helena**, Edwards, Pr. E. S. Ph. 1863 ♂ ♀. United States.
- interior**, Scudder, P. B. S. N. H. 1862 ♂ ♀. Lake Superior, Arctic America.
- Labradorensis**, Scudder, P. B. S. N. H. 1862 ♂ ♀. Labrador.
- nastes** <sup>1 7</sup>, Bdvl. Icon. t. 8; Herr. S. Eur. f. 37, 401; Morris, p. 30 ♂ ♀. Labrador.
- occidentalis**, Scudder, P. B. S. N. H. 1862 ♂ ♀. U. States, Can. Arctic America.

**philodice** <sup>18</sup> (*pelidne, europome, dorippe, hyale, phicomene*), Bdvl. & L. t. 21 ♂ ♀ :  
Lucas, P. E. t. 39 ♂ ; Cram. t. 14 ♂ . U. S. Labr. Can. Huds. B. Greenl.  
**rutilans** (*Vautierii* is ♀), Bdvl. Sp. G. t. 19 ♂ p. 649 ♀ . United States.

Genus 16. **TERIAS.** 19

- aesiope**, Menetries, St. P. t. 2. Mexico, West Indies.  
**agaritha**, Bdvl. Sp. G. p. 623. Mexico.  
**amelia**, Poey, Memor. N. H. t. 18 ♀ ♂ . West Indies.  
**albina**, Poey, Memor. N. H. t. 24 ♂ ♀ . West Indies, Central America.  
**arabella**, Lefebure? t. 16; Herr. S. C. B. Z. M. V. 1862. West Indies.  
**albula**, Cramer, t. 27; Herbst, t. 90. West Indies.  
**bulæa**, Bdvl. Sp. G. p. 680; Poey, Memor. N. H. t. 18. West Indies.  
**citrina**, Poey, Memor. N. H. t. 18 ♂ ♀ . West Indies.  
**dina**, Poey, Cent. Lep. ♀ ; Bdvl. Sp. G. p. 666 ♂ ♀ , Hbr.-Geyer, f. 951 ♂ . W. Ind.  
**delia** <sup>20</sup> (*daira*), Herbst. t. 117 ♀ ; Bdvl. & L. t. 18 ♂ ♀ ; Cramer, t. 273 ♀ . U. S.  
**elatheæ**, Herbst. t. 117; Cramer, t. 99 ♂ ; Lucas, P. E. t. 39. U. S. W. Ind. C. Am.  
**euterpe**, Menetries, Moscow III. t. 2. West Indies.  
**ebriola**, Poey, Memor. N. H. t. 24 ♂ ♀ . West Indies.  
**fornsi**, Poey, Memor. N. H. p. 451 ♂ ♀ . West Indies.  
**gratiosa**, Doubleday & Westw. t. 9. Central America.  
**gnathene**, Bdvl. Sp. G. p. 680. West Indies, Central America.  
**Gundlachia**, Poey, Mem. N. H. t. 24 ♂ ♀ ; Herr.-S. C. B. Z. M. V. 1862 ♂ ♀ . W. Ind.  
**hyona**, Ménétris, Moscow, III, t. 11, Bdvl. Sp. G. p. 667. West Indies.  
**hecabeoides**, Ménétris, St. P. t. 2. Mexico, West Indies.  
**iradia**, Poey, Memor. N. H. t. 18 ♂ ♀ . West Indies.  
**Jægerii**, Ménétris, St. P. t. 2. West Indies.  
**jucunda**, Bdvl. & L. t. 19 ♂ ♀ ; Morris, Syn. p. 35 ♂ ♀ . United States.  
**lisa** (*nisa, smilax*), Bdvl. & L. t. 19 ♂ ; Morris, Syn. p. 34 ♂ ♀ . U. States, W. Ind.  
**larææ**, Herr.-S. C. B. Z. M. V. XVI. West Indies.  
**lucina**, Poey, Memor. N. H. t. 18 ♂ ♀ . West Indies.  
**moina**, Poey, Memor. N. H. t. 18. West Indies.  
**musa**, ? West Indies.  
**midea**, Ménétris, Mosc. III, t. 2; Bdvl. Sp. G. p. 659 ♂ ♀ . U. States. W. Ind.  
**mexicana**, Hbr.-Geyer, f. 917; Bdvl. Sp. G. t. 19 ♂ ; Chenu, f. 150 ♀ ; Duncan, t. 8 ♂ . United States, West Indies.  
**nicippe** <sup>21</sup>, Bdvl. & L. t. 20 ♂ ♀ ; Lucas, P. E. t. 38 ♂ ; Chenu, f. 149 ♂ ; Herbst, t. 107 ♂ ; Cramer, t. 210 ♂ . United States, Mexico, West Indies.  
**pyro**, Bdvl. Sp. G. p. 667. West Indies.  
**palmyra**, Poey, Memor. N. H. t. 24 ♂ ♀ . United States. West Indies.  
**proterpia**, Lucas, P. E. t. 38 ♂ ; Morris, Syn. p. 35 ♂ ♀ ; Hbr.-Geyer, f. 803 ♂ .  
United States, Mexico, West Indies, Central America.  
**sinœæ**, Bdvl. Sp. G. p. 683. West Indies.  
**stygula**, Bdvl. Sp. G. p. 661. West Indies.  
**sulphurina**, Poey, Memor. N. H. t. 18 ♂ ♀ . West Indies, Central America.  
**thymetus** (*euterpe*), Ménétris, Mosc. III, t. 11; Bdvl. Sp. G. p. 662 ♂ ♀ . W. I. Mex.  
**venusta**, <sup>22</sup> Bdvl. Sp. G. p. 658. West Indies.  
**Westwoodii**, Bdvl. Sp. G. p. 666 ♂ ♀ . West Indies, Mexico.

## REMARKS ON FAMILY "PIERIS."

1. The North American variety is nowhere figured, but is described in Bdvl. Sp. G. p. 423. 2. This may prove only a variety of *P. elodia*. 3. Doubtful as a North American species. 4. Probably a mere variety of *P. monuste*. 5. The figures of Boisduval & Leconte are the only reliable ones. ♀ at times dusky. The figures of Cramer and Herbst are bad, and easily mislead. 6. Variable in color and distinctness of veining. 7. May prove a local variety of *P. virginia*. 8. This name is acceptably proposed by Mr. Scudder, to identify the North American species, which has hitherto been confounded with three European insects. 9. Boisduval in letters says, that the North American insect, although very similar to, is not identical with, *P. ausonia* of Europe, as hitherto supposed. 10. The long palpi appended to Donovan's figure—similar to *Libythea* are fictitious. 11. *C. eubule* and *C. marcellina*, are regarded as being distinct. The only figures that entirely correspond with the insect taken within the United States, are those of Bdvl. and Leconte; most others, including Abbot and Smith's, seem to represent the tropical species, *C. eubule*. 12. Herbst's and Cramer's figures are unsatisfactory. 13. *G. rhamni* has been reported as being indigenous to California. Its claim to North American nativity is not well founded. 14. *C. Boothii* and *C. chione* are probably sexes of same species. 15. Subject to considerable climatological variation and modification, as regards size, outline and coloring. 16. May probably be referred to *C. eurytheme*. 17. Probably a northern modification of *C. philodice*. 18. The white variety of ♀ is nowhere figured. Collectors at times have bleached the yellow ♂ to pair *in collections* with the pale ♀. 19. Some of Poey's many West Indians may prove to be sexes or varieties of well-known species. 20. A doubtful species; the ♂ is probably *T. lisa*, and the ♀ *T. jucunda*. 21. A citron-colored variety is sometimes taken in Pennsylvania. 22. Supposed to be a variety of *T. nise* ♀. 23. Varies much in size and coloring.

## HEMIPTEROLOGICAL CONTRIBUTIONS.—No. 1.

BY P. R. UHLER.

## Fam. ODONTOSCELIDÆ.

**CORIMELÆNA**, White.1. *C. minuta*, n. sp.

Blue-black, dull, the upper surface densely, minutely, roughly punctured all over. Head subtriangular, acutely rounded in front, rather acute at tip, the lateral margins sinuated; tylus a little longer than the lateral lobes, recurved at tip; antennæ yellow, the last two joints dusky; rostrum pale piceous. Thorax broader than long, the transverse impression of the middle almost effaced; the humeri rather prominent. Scutellum very high, convex, about as broad as long, reaching the genital-bearing segment, slightly sinuated at the lateral margins, not emarginated, nor striated. Hemelytra but little narrowed towards the tip, orange, with a narrow, black, slightly waved line near the interior margin, punctured only at the base. Venter polished, finely punctured at the sides, the antepenultimate and following segment margined with yellow at the sides. Legs black, tibiæ piceous, becoming paler towards their tips; tarsi testaceous.

Length 2 millim. Humeral breadth  $1\frac{1}{2}$  millim.

*Hab.* Cuba. Prof. Poey. Cabinet of the Entomological Society.

2. *C. extensa*, n. sp.

Elongate-oval, brownish-brassy, shining. Head rather long, subtriangularly rounded, the sides sinuated, the surface finely, densely punctured, with a small smooth spot at each side of the middle at the base; tylus scarcely longer than the lateral lobes, minutely recurved at tip; antennæ pale rufo-piceous, but little dusky upon the apical joints; rostrum dark piceous. Thorax nearly one half broader than long, densely, scabrously punctured, especially at the sides, humeri but little prominent, shallowly emarginated above, and very slightly so beneath. Scutellum much longer than broad, becoming a little narrower posteriorly, moderately convex, closely punctured, at the sides confluent so; lateral margins waved, not deeply sinuated at base, the apex obliquely rounded, reaching the base at the genital-bearing seg-

ment; each side a little before the middle, with an oblique shallow impression. Hemielytra pale yellow, with a narrow black punctate stripe, which does not reach the tip, enlarges to the base, and is closer to the interior than to the exterior margin, the striæ which bound the stripe become confluent before the middle. Beneath polished, punctures scattered, the penultimate segment margined laterally with an abbreviated yellow line. Legs brassy, polished; tarsi rufo-testaceous.

Length  $4\frac{1}{2}$  millim. Humeral breadth  $2\frac{1}{2}$  millim.

*Hab.* Near Fort Benton. Mr. John Pearsall.

3. *C. incerta*, n. sp.

Form and general appearance of *C. basalis*, Germar. Black, shining. Head not so broadly rounded in front; not depressed, but almost regularly convex, the surface much more deeply, but less densely punctured, tylus not fully as long as the lateral lobes, which, at the extreme tip are a little divaricated, acute, yellow. Thorax similar in form to that of *C. basalis*, the sides a little more deeply sinuated, the excavation interior to the humeri much shallower, the surface at sides posteriorly more coarsely and closely punctured. Scutellum subsinuated at base, the surface much more coarsely, deeply, uniformly punctured all over. Corium short, bluntly triangular, orange, with a streak upon the long stria at tip, continued a little upon the interior margin, and a spot upon the exterior margin black. Connexivum yellowish, the posterior margin of the abdomen interruptedly margined with yellow. The remaining characters as in *C. basalis*.

Length 3 millim. Humeral breadth  $2\frac{1}{4}$  millim. ♂.

*Hab.* Cuba.

The type belongs to the Cabinet of the Etomological Society.

4. *C. ciliata*, n. sp.

Broad, short, deep black, the sides of the thorax and abdomen sparingly ciliated with long piceous hairs. Head large, broadly rounded in front, the surface broadly obsolete impressed before the middle, finely, closely punctured, at base almost impunctured; antennæ rufo-piceous; rostrum reaching the middle coxæ. Thorax broad, moderately convex, finely punctured, the punctures becoming deeper and denser at the sides. Scutellum broadly rounded, moderately convex, the sides near the base rather strongly, broadly sinuated, the surface finely, dis-

tinely punctured, the punctures becoming more dense and coarse each side at base. Corium broad, very bluntly oblique at tip, closely punctured, except upon the interior margin, the three impressed striæ become confluent before the tip. Beneath smooth, shining, very finely punctured, except upon the disk, where the punctures become very few. Coxæ and legs rufo-piceous; tarsi testaceous. The usual carbon-black area is present each side of the pectus.

Length 5 millim. Humeral breadth 3 millim.

*Hab.* San Francisco.

The unique specimen in my collection was kindly given me by Dr. John L. LeConte.

5. *C. denudata*, n. sp.

Similar to *C. unicolor*, Beauv. in form, but more narrowed posteriorly, brassy black, very glossy. Head short, broad, slightly sinuated before the eyes, the tip subtruncated, the tylus slightly, and the margins very narrowly recurved, the surface finely, obsoletely punctured; antennæ pitchy-black, paler at the points of articulation; rostrum piceous, reaching the middle coxæ. Thorax very convex, hardly elevated above the scutellum at base, impunctured, except at the sides, where it is longitudinally, shallowly impressed; humeral angles slightly prominent, the impression anterior to them shallow, transverse. Scutellum not suddenly arched upon the disk, obliquely declining behind, the lateral margins slightly waved; moderately sinuated at base, the basal middle impunctured, the sides closely punctured, but posteriorly less so, and near the base with a few very large punctures, the extreme tip triangularly produced, impressed, scabrous. Corium acute at tip, punctured, with three approximate submarginal striæ. Beneath finely punctured, the antepectus and disk of the venter posteriorly almost impunctate. Tarsi piceo-rufous.

Length  $4\frac{3}{4}$  millim. Humeral breadth 3 millim. ♂.

*Hab.* Louisiana.

6. *C. cyanea*, n. sp.

Bright steel-blue, polished, form of *C. ciliata*. Head broad, finely, densely, confluent punctured, each side between the eye and ocellus with a short distinct sulcus; antennæ and rostrum piceous, the latter scarcely reaching the intermediate coxæ. Thorax much broader than long, moderately convex, finely punctured upon the disc, very coarsely

so each side. Scutellum confluent punctured each side and behind, the surface beyond the disk a little broken and obsolete ridged, the lateral edge waved, very moderately sinuated at base. Corium broad, distinctly, approximately bistrate, densely punctured, excepting the interior margin. Pectus black. Venter finely punctured. Legs blue-black with a tinge of piceous; tarsi testaceous.

Length 5 millim. Humeral breadth  $3\frac{1}{4}$  millim.

*Hab.* California. Dr. Geo. H. Horn.

Fam. PACHYCORIDÆ.

**AUGOCORIS**, Burm.

**A. Poeyi**, n. sp.

Blackish-purple, the upper surface with large, irregular wrinkles; form rather more slender than in *A. pallidus*. Head blackish-purple, polished, each side with several irregular impressions, sparingly punctured and rugulose, lateral margins recurved, sinuated; tylus prominent, stout, projecting much beyond the lateral lobes; bucculæ white; antennæ black; rostrum piceous, pale upon the middle, reaching beyond the middle of the venter. Thorax finely but not very closely punctured, the humeral angles more acute than in *A. pallidus*, Beauv.; the anterior and lateral margins, a broad longitudinal complete stripe upon the middle and a large spot at the sides anteriorly yellowish red. Anterior and posterior edge of the postpectus white. Scutellum very rugulose, punctured more closely than the thorax, the exterior edge all around white, the surface with three large trifarious reddish spots; the basal ones placed at each corner, with one branch running to the exterior margin, another running to the base, and the third running inwardly; the apical spot with one branch running to the apex, and the other two branches running obliquely outwards, upon the disk is a longitudinal streak of the same color. Venter orange yellow, finely punctured, the sides with a series of sub-quadrate black spots, the spots upon the genital segment, a large round one on the preceding segment, a smaller round one each side of the second segment, and two smaller ones behind the disk, also black; the penultimate segment margined posteriorly with white. Lateral margins of the pectus reddish-white. Legs blackish-violet, the femora beneath and at base lurid.

Length 13 millim. Humeral breadth 7 millim.

*Hab.* Cuba. Prof. Poey. Cabinet of the Entomological Society.



**PACHYCORIS**, Burm.1. **P. Wilsonii**, n. sp.

Rather less robust than *P. nitens* Dallas, the scutellum subtruncated at tip, and oblique each side before the tip. Head blue-black, with a large yellow patch on each side of the tylus, upon which the punctures are few and obsolete; the lateral margins recurved almost to the eyes, very slightly sinuated. Thorax violet, or blue-black, the punctures minute, remote, sides almost straight, the margins broadly recurved, the surface with eight orange spots, which are a little longer than in *P. nitens*, those of the anterior angles run along the lateral margins to beyond the middle, the post-humeral ones reaching the base of the scutellum. Scutellum with fourteen large orange spots, arranged 5, 4, 3, 2, punctured like the thorax. Pectus with large transverse yellow spots near the coxæ, and the lateral spots of the upper surface distinctly exhibited upon it. The first ventral segment, and a long transverse spot each side of the remaining segments orange. Legs steel blue, more or less orange at base.

Length 10–11 millim. Humeral breadth 7–7½ millim.

*Hab.* Cuba. Cabinet of the Entomological Society.

It varies very much in coloring, and one of the varieties offers the same style of coloring as is met with in the yellow variety of *P. Klugii*, Burm.

I desire to dedicate this species to Dr. T. B. Wilson, as a slight testimonial of the high esteem in which I hold the many kind assistances that he has extended to me in my studies of the Hemiptera of this country.

2. **P. Stallii**, n. sp.

Form and general appearance of *P. nitens*, Hope, but polished deep black, or slightly tinged with purplish, above very minutely scabrous, more coarsely, closely, deeply punctured; tylus much longer than the lateral lobes, the head not so acutely narrowed at tip, the lateral margins not recurved. The spots orange-red, small, ovate, arranged similarly to those of *P. nitens*, but two less in number (those of the humeri being wanting), and the spot of the anterior angle placed near the middle of the lateral margin and elongate-oval in form. Lateral margins of the thorax a little more strongly recurved, against this the depressed submargin is densely punctured. Posterior margin of the scutellum dis-

tinctly recurved. Surface beneath immaculate, metallic bluish-violet, highly polished; punctures of the venter distant, almost obsolete, entirely wanting upon the disk. Pectus coarsely, closely punctured.

Length 12 millim. Humeral breadth 8 millim.

*Hab.* Cape St. Lucas, Lower California (John Xanthus.)

## HOMOPTERA.

### CERCOPIDÆ.

#### MONECPHORA, Amyot et Serv.

##### *M. fraterna*, n. sp.

Dark brown, finely, densely punctured. Head and face dull red, polished, frontal carina, labrum and rostrum bright red, the latter tipped with blackish; vertical carina arched, reaching the middle of the vertex, more or less brown, excavated, its surface irregular; stemmata red, eyes dull red. Thorax dark brown, with a transverse reddish-yellow line upon the middle, lateral carinate margins red, the surface with an oblique, and several irregular smaller impressions each side anteriorly. Scutellum like the thorax in color, punctured a little more coarsely, shallowly impressed on the middle. Hemelytra rounded at tip, dark brown, with two reddish-yellow transverse lines composed of linear spots, the first band placed a little before the middle, the other a little behind the middle. Pectus red, polished, with brown areas. Abdomen brown, with the incisures and lateral margins red. Legs red, the femora a little tinged with brown; apices of the tarsi brown.

Length to tip of Hemelytra 11 millim. To tip of abdomen 7 millims. Humeral breadth 4 millims.

*Hab.* Cuba. Prof. Poey. Cabinet of the Entomological Society.

#### CLASTOPTERA, Germar.

##### 1. *C. undulata*, n. sp.

Form of *C. proteus*, Fitch, chocolate-brown, polished; head cream-yellowish, the face inferiorly white, front with a broad dark brown band below, above this are seven interrupted narrow bands; labrum and rostrum dark piceous, the tip of the latter whitish; vertex with an irregular transverse brown band; jugum prominent, transversely marked with brown and cream color, sulcated. Eyes cream color, the inferior half brown. Thorax transversely ribbed, the anterior and

posterior margins and a biarcuated medial band brown. Scutellum sulcated to the tip, which is dark brown, two whitish lines gradually approach each other towards the tip, and across the middle is a linear impressed constriction. Hemelytra chocolate-brown, clothed with yellowish pubescence, the costal and apical cellules hyaline, across the middle is an irregular wavy whitish band, near the apex is the ordinary callous spot. Wings dusky hyaline. Legs brown, with a short white line at the knees.

Length to tip of Hemelytra 4 millim. Thoracic breadth  $1\frac{3}{4}$  millim.

*Hab.* Cuba. Poey. Cabinet of the Entomological Society.

2. *C. stolid*a, n. sp.

Form of the preceding, polished, brownish-black. Head yellow, front with a broad brown band, above which are seven or eight less deep brown, transverse striæ interrupted in the middle; labrum pale brown, rostrum dusky at tip, the eyes dark brown. Thorax transversely finely ribbed, dark brown, the anterior and lateral margins yellowish. Scutellum dark brown, indistinctly longitudinally sulcate near the tip. Hemelytra paler brown, three of the apical cellules subhyaline, upon the middle three yellow spots arranged transversely, the middle one much smaller, the ordinary apical callous dot present. Abdomen brownish-black. Legs yellow, apices and spines of the posterior tibiæ, and apices of all the tarsi dark brown.

Length to tip of hemelytra  $2\frac{1}{2}$  to  $4\frac{1}{2}$  millims.

*Hab.* Cuba. Cabinet of the Entomological Society.

**JASSUS** Burm. emend.

*J. Kennicottii*, n. sp.

Fulvous, beneath yellowish, form a little more robust than in *J. clitellarius*, Say, the vertex a very little more angular, the face more oblique. Face yellow, obsoletely streaked with fulvous, with two round black dots just below the line of the vertex, placed transversely; vertex with a transverse fulvous line; eyes black, divided in the middle by a yellow line; ocelli red. Thorax fulvous, the posterior margin and a transverse line on the middle yellow; pectus yellow, obsoletely marked with fulvous. Scutellum with a transverse impressed line behind the middle, and behind this the surface is depressed, the posterior margin

yellow. Hemelytra fulvous, with a dark brown streak in the middle; the costal margin, exterior, apical and interior veins, and a stripe separating the corium and clavus greenish yellow; wings dusky hyaline, the veins more or less blackish. Tergum yellow, blackish on the disk. Venter pale yellow, more or less tinged with reddish or dusky. Legs pale yellow, the nails blackish.

Length to tip of wings  $6\frac{1}{2}$  millim. To tip of abdomen 5 millim.

*Hab.* Near Baltimore. July 7th and 12th. Rare.







PROCEEDINGS  
OF THE  
ENTOMOLOGICAL SOCIETY  
OF PHILADELPHIA.

VOL. 2.      OCTOBER ——— DECEMBER, 1863.      No. 3.

STATED MEETING, OCTOBER 12.

President BLAND in the Chair.

DONATIONS TO CABINET.

67 COLEOPTERA (*Hydaticus bimarginatus*, *Philhydrus bifidus*, *Corymbites inflatus*, *Lichnanthe vulpina*, *Trichodes Nuttalli*, *Clytus marginicollis*, *Haltica splendida*, *Calopteron aulicum*, *Oonthophagus limbatus*, *Pyrophorus rusticus*, *Lachnopus niveoirroratus*, *Pachnæus litus*),  
8 HETEROPTERA (*Dysdercus Schlangenbuschii*), from John Akhurst, of Brooklyn, New York.

15 HETEROPTERA (*Pachycorus Fabricii*, *Sephina limbata*, *Pachylis laticornis*, *Dysdercus mimus*, *Lygæus unifasciatus*, *Lygæus costalis*, *Evagoras tricolor*, *Camptopus diversipes*, *Archimerus brunnicornis*, *Mictis triguttatus*, *Conorhinus dimidiatus*, *Metapodius declivis*), from Prof. S. S. Haldeman, of Columbia, Pa.

13 COLEOPTERA (*Cicindela ægyptiaca*, *Notiophilus semipunctatus*, *Carabus clathratus*, *C. convexus*, *C. excellus*, *C. Fuminii*, *C. glabratus*, *C. Hemprichii*, *C. Hoppii*, *C. hortensis*, *C. maurus*, *C. Ulrichi*), from Aug. R. Grote of New York.

4 COLEOPTERA (*Elater collaris*, *Prionus lævigatus*, *Strangalia deleta*), 1 DIPTERA (*Xylophagus lugens*), from James Ridings.

1 COLEOPTERA (*Strangalia scalaris*), from Robert Frazer.

## DONATIONS TO LIBRARY.

*How to collect and observe Insects*, by A. S. Packard, Jr. From the Author.

*Proceedings of the Entomological Society of Philadelphia, June—September 1863.* From the Publication Committee.

The following works were deposited by Dr. T. B. Wilson:—

*A Manual of European Butterflies, on the plan of Stainton's Manual of British Butterflies and Moths.* By W. F. Kirby. 1 Vol. 12mo.

*Exotic Butterflies*, by W. C. Hewitson. Part 47. 4to.

*Wiener Entomologische Monatschrift.* Bd. 7, Nr. 6—8. 8vo.

*Revue et Magasin de Zoologie, par M. F. E. Guérin-Méneville.* 1863. Nos. 5 & 6. 8vo.

*The Zoologist for July, 1863.* 8vo.

*Die Familien der Blattwespen und Holzwespen*, von Dr. Theodor Hartig. 1 Vol. 8vo.

*Naturgeschichte der Insekten*, von P. Fr. Bouché. 1 Vol. 8vo.

*Entomographien.* Von W. F. Erichson. 1 Vol. 8vo.

*Narrative of a second voyage in search of the North-West Passage*, by Sir John Ross, with Appendix. *Insects by John Curtis.* 2 Vols. 4to.

*Die Myriapoden*, von C. L. Koch. 2 Vols. Royal 8vo.

*Description des Chrysidés du Bassin du Léman*, par Frédéric Chevrier. 1 Vol. 8vo.

*Etudes Entomologiques, rédigées, par Victor de Motschulsky.* Parts 1—10 in 2 Vols. 8vo.

*Annales de la Société Entomologique de France*, 4 série, Tome 3, 2 Trim. 8vo.

*Stettiner Entomologische Zeitung*, Jahr. 24, Nos. 7—9. 8vo.

*Histoire Naturelle des Insectes Coléoptères (Suites à Buffon)*, Vol. 6 and Atlas, par M. Th. Lacordaire. 8vo.

*Magazin der Entomologie*, von Dr. E. F. Germar. 4 Vols. 8vo.

## WRITTEN COMMUNICATIONS.

The following Communication was read from Mr. Cresson:—

“On the 11th of September, 1863, a nest of *Bombus Pensylvanicus* De Geer, was captured near Gloucester, New Jersey. It contained 6 females, 34 workers, and 21 specimens of *Apathus elatus* Fabr., all males. No males of *B. Pensylvanicus*



were found in the nest. Among the specimens of *Apathus elatus*, the variation was considerable; all had the black band between the wings, but some had the anus entirely black, some black tipped with fulvous or yellow, some entirely yellow and others entirely fulvous. This last variation is doubtless the *B. nidulans* of Fabr., and seems to confirm my supposition (Proc. Ent. Soc. Phil. ii, pp. 107 and 115), that it is an *Apathus* and a variety of *A. elatus*.

"On the 7th of October, 1863, a nest of *Bombus Virginicus* Oliv., was captured near Kaighn's Point, New Jersey. It contained 30 females, 38 workers and 34 males. No *Apathus* were found in the nest. All the females, excepting one specimen, were of the largest size; the workers were all small, varying from 5 to 8 lines long; the males were mostly 7 to 8 lines long, although one specimen measured only  $4\frac{1}{2}$  lines. I could not perceive any tendency to vary in the coloration of the different sexes.

"In my paper on the N. American Bombi (Proc. Ent. Soc. Phila. ii, p. 90), I described a male specimen, named by Dr. Harris *Bombus impatiens*, as distinct from those which I took to be the males of *B. Virginicus*, expressing, however, a fear that I might have these two kinds of males mixed up. The capture of the nest of *B. Virginicus*, above noticed, seems to confirm my fears, as all the males found in the nest were precisely like those described by me as *B. impatiens* Harris. Those males which I described (ibid. p. 87) as belonging to *B. Virginicus*, are so different from those males found in the nest of that species, they cannot possibly belong to the same species. I am, therefore, disposed to separate from *B. Virginicus*, those specimens which I previously thought might be a variety of that species, and which differ by having the anterior portion of the second segment of the abdomen above, more or less clothed, especially in the middle, with rather short hairs, similar to those on the first segment, but generally shaded with brown. It may be named

"***Bombus separatus*, n. sp.**

"*Female*. Head entirely black. Thorax above and on the sides yellow, sometimes tawny-yellow, with a round patch of black on the disk between the wings. Scutellum yellow, sometimes tawny-yellow. Wings fusco-hyaline, apical margins fuscous, nervures black. Legs black, tarsi brownish, basal joint rufous within. Abdomen with the first segment above yellow, sometimes tawny-yellow, the hairs more dense and longer on the sides; anterior part of second segment in the middle more or less yellow or tawny-yellow, remainder of the abdomen black. Length 10—11 lines.

"*Worker*. Same as the female, except that almost the whole of the first and second segments of the abdomen above is brown, and the smaller size. Length 6 lines.

"*Male*. Described under *B. Virginicus* (ibid. p. 87.)

"*Hab*. Rock Island, Ill. (Walsh), Penn.. Canada (Saunders), 4 ♀, 2 ♀, 6 ♂. Collection of the Entomological Society of Philadelphia.

"Differs from *B. Virginicus* as follows:—Body shorter and more compact: the hairs of the thorax are more dense and with the exception of the round spot of black hairs on the disk, there is no mixture of black between the wings which are broader, longer, and much darker than in *Virginicus*, the wings of

which are hyaline, faintly stained with fuscous. The second segment of the abdomen above has some short yellowish or yellowish-brown hairs in the middle of the anterior margin, and the hairs on the middle of the first segment are sometimes shaded with brown. In 110 specimens before me of *B. Virginicus* ♀, ♂ and ♂, there is not the least change in the color of the hairs on the first segment of the abdomen which are always yellowish-white, and there is no mixture of yellowish hairs on the second segment. The description of this species (ibid. p. 87) should be altered to read as follows:—

“**Bombus Virginicus.** Oliv.

“*Female.* Head black, clothed more or less with yellowish hairs above the antennæ. Thorax above and on the sides yellowish-white, somewhat mixed with black between the wings. Legs black, except the base of the femora beneath, which is sometimes slightly clothed with yellowish hairs; tarsi brown, basal joint rufous on the inner side. Abdomen with the first segment above yellowish-white, the hairs less dense in the middle of the segment; remaining segments black. Beneath black. Length 9—12 lines.

“*Worker.* Differs from the female only in size. Length 5—7 lines.

“*Male.* Colored like the female and worker, except that the face below the antennæ, the cheeks, vertex, femora and abdomen beneath more or less clothed with yellowish hairs, those on the face below the antennæ entirely yellowish. Length 4½—7 lines.

“To the list of synonyms of this species (ibid. p. 87), add *Bombus impatiens* Harris, Cat. Ins. Mass. 2d edit. Cresson, Proc. Ent. Soc. Phil. ii, p. 90 ♂.

“Since writing my remarks on the *Apis griseocollis* DeGeer, (ibid. p. 88), I am rather inclined to think that the males and workers described by him, belong, not only to two different species, but to different genera. His description of the worker is probably that of *Bombus Virginicus* Oliv., but his description of the male, seems to refer to the male of *Xylocopa Virginia*, — the ‘large’ size, ‘with large eyes which cover almost the whole of the head,’ the ‘yellow upper lip,’ and the ‘blue shade of the abdomen and legs,’ are conspicuous characters in the male of the latter species, but not in *B. Virginicus*, or any other species of *Bombus* known to me. It is probable that M. Acrelius may have captured males of *X. Virginia* in the vicinity of the nest where he found the worker of his *griseocollis*, and from the similarity of the coloration, he, as well as DeGeer, may have thought that they belonged to the same species.”

The following papers were presented for publication in the Proceedings:—

“Description of a supposed new species of *Saturnia*, from the Rocky Mountains, by Charles A. Blake.”

“On the North American species of the genus *Nomada*, by E. T. Cresson.”

And were referred to Committees.

Observations on certain N. A. NEUROPTERA, by H. HAGEN, M. D., of Königsberg, Prussia; translated from the original French MS., and published by permission of the author, with notes and descriptions of about twenty new N. A. species of PSEUDONEUROPTERA.

BY BENJ. D. WALSH, M. A.

[N. B. In September 1862, I published in the Proceedings of the Philadelphia Academy of Sciences, a paper on the Pseudoneuroptera of Illinois, (pp. 361-402), describing over forty species which I supposed to be new. Shortly afterwards I forwarded duplicates of most of these species to Dr. Hagen. The following Article from his pen was received by me in April, 1863; and it is most gratifying to find that his views in most cases coincide with mine. The new species now described by me, were all found within four miles of Rock Island, Illinois, with the exception of *Heterina texana* received from Texas through Mr. Uhler. None of my specimens are alcoholic—B. D. W.]

PSOCINA.—Psocus.

‡‡ *Tarsi 2-articulate. Discoidal cellule closed, quadrangular.*

PS. PURUS Walsh. New to me. One ♀.

PS. SEMISTRIATUS Walsh. One ♂, three ♀. Allied to *Ps. quietus* Hagen. Is it different? *Ps. quietus* is described from a ♀ in bad condition, from the State of New York (Coll. Winthem), and another ♂ from Georgia. The latter seems to me identical with *semistriatus*, the former is possibly different—the wings are partly deficient, the pterostigma entirely. The specimen from New York has the “black spots on the nasus.” The description of *Ps. quietus* must apparently be revised, or possibly entirely erased. [See note 1.]

PS. PERPLEXUS Walsh. A specimen, apparently identical, was received by me from Mr. Walsh, in 1860.

PS. LICHENATUS Uhler (auctore ipso). New to me ♂ ♀. A cabinet name of Mr. Uhler's. [See note 2.]

‡‡ *Tarsi 2-articulate. Discoidal cellule open, absent.*

PS. GEOLOGUS Walsh. Very like *Ps. salicis* Fitch, of which I possess only a single specimen, possibly a little immature. The neuration is exactly similar. *Ps. geologus* is deeper colored, of a brown approaching to blackish; the antennæ are a little more robust and the wings a little longer. It remains to prove whether *Ps. salicis* is an immature ♀ and *Ps. geologus* a ♂ of one and the same species. It is a difficult

question to decide with dried specimens gummed on paper. Finally it remains to be proved, whether both are not identical with *Ps. pedicularius* Linn.=*Ps. domesticus* Burm. They are certainly closely allied. Mr. Walsh has correctly remarked to me that on page 13 of my Synopsis the pterostigma of *Ps. salicis* should be said to be "posteriorly," or rather apically truncated, instead of "anteriorly." [See note 3.]

*PS. CORRUPTUS* Hagen. The specimen sent me by Mr. Walsh seems in reality to belong to this species, but its wings are more deeply colored and the hyaline apical spot is subobsolete, while it is very visible in the five individuals in my collection. Mr. Walsh writes me word that "*Ps. corruptus* is not the other sex of *Ps. abruptus*," (as I have suggested in the Synopsis,) "because the latter is very common, and the former very rare." But this is well known to be the case in some European species. You may find thousands of ♀♀ of *Ps. bipunctatus* together, and not a single ♂. It is the same thing with *Ps. variegatus*, and especially, as it seems, with those species that live in some sort of society, while with the others, e. g., *Ps. lineatus*, the two sexes are common. I have seen 12 specimens of *Ps. abruptus* all ♀, and 6 of *Ps. corruptus* all ♂. Finally, I have received in the same package and from the same places, (Washington, Dalton, Pennsylvania mountains,) the two species together. I agree with Mr. Walsh, (p. 362,) that the neuration of *Ps. abruptus* may be reduced to the normal type of *Psocus*, but there are aberrations which I shall take occasion to explain at some future period, to justify the language used by me in the Synopsis. [See note 4.]

#### PERLINA.

In this difficult family my materials are now very rich, received from the Arctic and Subarctic regions and from Baron Osten Sacken, &c.; but they require a careful revision, which I hope to give them during the coming summer. For the present I may say that *Acroneuria rupinsulensis* Walsh is distinct from the *Acr. abnormis* received from Mr. Walsh, and this last differs from the species referred by me to *abnormis*, a specimen of which has been sent to me by Mr. Uhler as coming from Illinois. [See note 5.] The genus *Pteronarcys* requires an entire revision, and for that end I noted in London the form of the genital organs. Mr. Walsh is perfectly right in saying (p. 365) that

the "postcostal space" is different and opposed to the "postcubital space." He views the subject exactly as I do.

### EPHEMERINA.

Mr. Walsh's method of breeding the Imago from the Subimago in this family, is the only correct way to arrive at a more perfect knowledge of it, and I have endeavored myself to do the same thing here. But as in each species the ♂ and ♀ imago are often very different, and the ♂ and ♀ subimago different again, and as lastly living Ephemera are too different from the dried specimens to be able to determine them from descriptions taken from dried specimens, we ought to have for each species EIGHT DESCRIPTIONS! Some considerable work yet to be done, before we can arrive at a correct knowledge of this family!

### BÆTIS.

**B. FEMORATA** Walsh. I am not convinced that this is Say's species. *1st.* The ♂ ought to have "the caudal setæ hardly twice the length of the body," or about 25 mill. (one inch), while the ♂ subimago (Walsh) possesses setæ only as long as the abdomen. Again, the ♀ of Say's species ought to have the setæ nearly as long as the ♂. *2nd.* Say says, "thighs banded with reddish brown near the middle and at tip," so there are *two bands*, which are not met with in Mr. Walsh's species. *3rd.* Says says, "wings snowy white;" we cannot say that in *B. femorata* Walsh, the wings are of that color.

In Mr. Walsh's description it is said, "abdomen with joints 1—5 whitish;" but joint 1 is piceous, and it is 2—6 which are whitish. He is right in remarking, that I erred in abridging Say's language. After all, we may possibly agree with him, that the description of the legs is correct, for it corresponds with the legs of the ♂ Imago; but it seems to me that the length of the setæ is opposed to his opinion. This beautiful species is new to me. [*See note 6.*]

**B. ALTERNATA** Say, (Walsh.) This species is new to me and is very probably the species of Say. The individuals mentioned by me (Syn. p. 49) are different—the venter fuscous, &c.

Walsh Pseudoneur. p. 368 Bætis § A, and p. 370 Bætis § B, "First tarsal joint *large*, always *larger*," &c., is apparently an error, for "*long*" and "*longer*." [*See note 7.*]

B. ARIDA Say (Walsh.) There is nothing in Say's brief description which opposes the identity of *B. arida* Walsh and Say. The words "anterior tibiæ whitish obscure at base and tip," were a little suspected by me, but I see that in reality the ♂ (Walsh) has the tibiæ a little pale. Two ♂ ♂ received from Mr. Walsh in 1860, one of which is much smaller than the other, have the tibiæ altogether black. [See note 8.] The "orbit" is, according to Say's Glossary, "an imaginary border around the eye." "Vertex with a small black spot each side on the orbit," agrees very well with the ♀, but the tibiæ of the ♀ are all black. I cannot find the ♀ from Washington (cited Syn. p. 46), but after a careful revision of my other Ephemerina, I find I have not received this species except from Mr. Walsh.

B. SICCA Walsh. A good species. "Abdomen piceous above except the last segment;" I can see no different color, or even different shade of color, in the last segment. [See note 9.] It seems to me that the base of the first joint of the anterior tarsi is black. [See note 10.] I have received a ♂ of this species from Washington, and in 1860 I also received from Mr. Walsh, along with a small specimen of the ♂ ♀ imago, a ♂ subimago, which probably belongs to this species. The character of the [anterior] legs being short in the ♂ is a good one, and so is that of the brown incisures of the setæ; but in any case it seems to me that a more precise comparative description, with indications of differences, would still be desirable. [See note 11.] The ♂ from Washington, for example, is partly intermediate between *arida* and *sicca*, for the setæ have only some dark incisures at their base. In ♂ ♂ of the genus *Bætis*, sometimes the form of the penis is a very good and easily seen character, but I cannot get to see this organ in these two species. Possibly it can be more easily done in the living specimens. After all, I am convinced that these are two different species.

B. DEBILIS Walsh. I only know the pair received from Mr. Walsh. The diagnosis of Walker is too brief, but it contains nothing contradictory. The ♂ has the penis bifid, black, the two bifurcations straight and parallel, a little tapering towards the tip. This character is very easily seen, because the color of the apical parts of the abdomen is altogether pale.

B. ALBA Say. There is an Article by Dr Williamson, "on the

*Ephoron leukon*, usually called the White Fly of the Passaik River," in the Trans. Amer. Phil. Soc., (Philadelphia, 1802, Tom. V., No. VII. p. 71—4.) I extracted in London the following description:—"Eyes large and prominent; ocelli none; wings membranous, reticulate; hind wings one-half shorter, narrower, and covered by the front wings; antennæ setaceous, half an inch long, [apparently the anterior legs are meant, *Hagen*,] six-jointed and with a basal joint; two anal appendages  $1\frac{1}{2}$  inch long, divergent, with from 15—20 joints; tip of the ♂ abdomen with two elbowed claws,  $\frac{1}{10}$  inch long, curved inwards. Length of the insect  $\frac{1}{2}$  inch; body not thicker than a grain of rye; abdomen narrower. Wings, abdomen and legs white, eyes black, body fuscous, flight like that of a *Libellula*. They appear about 15 minutes after sundown. The chrysalis is like the imago; the chrysalis appears and immediately afterwards the imago appears. The ♀ lays two eggs. They are as numerous as snow-flakes. Passaik River, N. J., Belville Bridge, 2 miles, for 3 weeks after the 20th of July."

I think this is the *B. alba* Say, Hagen, of which I have only seen a subimago in very bad condition from the Red River of the North. As Dr. Williamson's data are very precise, one might easily verify the species upon the spot. [See note 12.]

The genus *Bætis* is a difficult one. *B. obesa*, *fusca*, *debilis*, *arida*, *ignava*, *fuscata*, *invaria*, *annulata*, *femorata*, *luridipennis*, *basalis*, and *noveboracana*, I have described only from the short descriptions of Say, Walker, &c. Of the seven others, *B. tessellata*, a poor alcoholic specimen, is possibly not a *Bætis*, and for the six remaining species my materials were very slight when I wrote the Synopsis. I have received since some very fine Ephemera from Baron Osten Sacken. *B. vicaria* is different from any species described by Mr. Walsh.

#### POTAMANTHUS.

*P. ODONATUS* Walsh, (= *P. nebulosus* Walker.) ♂ imago, Saskatchewan, R. Kennicott, 1860. Head, antennæ and thorax above and beneath black, highly polished. Abdomen piceous above with paler incisures, brown beneath, the incisures paler; anal processes brown; penis bifid, apex divaricating; the two exterior setæ very robust, brown, the incisures darker; the middle seta fine, white, the incisures fuscous, alternately wide and narrow on the basal half, uniform behind the middle and towards the tip becoming very wide. Anterior legs pice-

ous; four hind legs brown. Wings hyaline, the terminal third of the anterior wings brown abruptly, the extreme border of the tip hyaline; cross-veins hyaline, fuscous on the apical third; costal veins yellowish, the apical stigmatal part darker. Five ♂.

Subimago ♂. Very similar to the imago, but differs as follows:—the general color is the same, but not polished; setæ shorter, without incisions, pilose, the middle one piceous and stouter than in the imago. Anterior wings similar to the imago, but the hyaline part dull or sublurid; posterior wings pale yellowish, the apical third grayish brown. One ♂.

Imago, length ♂ 9—11 mill. Expanse ♂ 18—22 mill. Exterior seta ♂ about 22 mill. Interm. seta ♂ about 10 mill. Ant. leg ♂ about 10 mill.

Subimago, length ♂ 9 mill. Expanse ♂ 19 mill. Interm. seta ♂ about 8 mill. Ant. leg ♂ about 7 mill.

The coloration of the wings in this species is almost like that of *P. marginatus* Zetterst., a very common species with us. On comparing my description of the specimens from Saskatchewan, I believe that they are identical with *Potamanthus* (palingenia) *nebulosus* Walker. In 1861 I noted in London that the wings of *nebulosus* are brown on their apical one-third, so that Mr. Walker's description agrees very well. I think *P. odonatus* Walsh, is also identical with this species from Saskatchewan. The character "with a definite outline" = the extreme tip hyaline. [See note 13.]

*P. CUPIDUS* Say, Walsh. (= *Potamanthus* [palingenia] *concinuus* Walker.) I have compared the 2 ♂ 1 ♀ imagos from Washington, (April,) described by me as *P. concinnus*, and they agree very well with Mr. Walsh's description of *P. cupidus* ♂ imago, except that they are a trifle bigger; but a third ♂ imago received from Washington has exactly the same dimensions. I have also received two ♀ subimagos from Washington and Maryland, which are apparently *P. concinnus*. Specimens of the subimago ♂ ♀ sent me by Mr. Walsh differ from Say's description in the [4 posterior] tarsi not being black. [See note 14.] I have also received from Mr. R. Kennicott from Saskatchewan 2 ♂ 1 ♀ subimago of *Pot. cupidus*. As the species is said by Say to be common at Cincinnati about May 15th, it would be easy to verify it.

I received from Mr. R. Kennicott in 1860, from Saskatchewan, 6 ♀



imagos, which differ from the ♂ imago of *nebulosus* Walker, (= *odonatus* Walsh,) described above as coming from Saskatchewan, in the head and prothorax being marked with yellowish, the anterior legs brown, the exterior setæ white with larger black incisures on their basal half, and the wings hyaline. The ovarian valve is pale, oval, deeply excised and bifid on the apical half. Length ♀ 9 mill. Expanse ♀ 25—28 mill. Ext. seta ♀ 15 mill; intermed. seta ♀ 8 mill. Ant. leg ♀ 7 mill. It is difficult to determine whether this ♀ belongs to *P. odonatus* or to *P. cupidus*, for, as before stated, I received ♂ ♂ of both these species from the same locality. [See note 15.]

It will thus be seen that I reduce the four described N. A. species of *Potamanthus* to two. After all, it is possible that they may be different; but with the materials before me and the published descriptions, it is impossible to be sure of the fact.

It is remarkable that the American species of *Potamanthus* constitute a special group, from the fact of the intermediate seta being much slender and shorter than the exterior seta, while in the *Potamanthus* of Europe they are equally robust and equally long.

#### PALINGENIA.

In Ephemera there is no doubt that many new genera will have to be established. *Cænis*, *Oligoneuria*, and *Ephemerella*, are good genera, and the few known species resemble one another. But *Potamanthus*, *Palingenia*, *Bætis* and *Cloe* will have to be separated, and M. Pictet himself has perceived that these genera are composed of very different types. *Palingenia*, for example, ought to be separated as follows:—

1. PALINGENIA. Wings large, opaque, with numerous cross-veins. Two very long setæ ♂ or short and hairy ♀; the intermediate seta very rudimentary. Anterior legs ♂ more robust, of moderate length, with the femora equal in length to the tibiæ; the other legs feeble, short and in a rudimentary state; the first joint of the tarsi free in the anterior legs alone. The ♀ remains in the subimago state and does not moult. Eyes ♂ almost contiguous. Ancient type—*P. longicauda* Swammerd. *P. fuliginosa* Boeh. (Black Sea.) *P. lata* Walker (Silhet.) *P. atrostoma* Weber (Brazil.) *P. dorsalis* Burm.? (Brazil; I am only acquainted with ♀.)

2. DIFFERT. Eyes widely separated. Intermediate seta ♀ as long as the others, hairy at the tip. Anterior legs ♂ slender, very long,

with the tibiæ much longer than the femora; the other legs feeble but long. The ♀ remains in the subimago state?—*P. virgo*. *P. puella*. *P. alba*. *P. albifilans* (Para.) *P. umbrata* (Amazon.) *P. latipennis* Walker, (Para.)

3. DIFFERT. Intermediate seta ♂ (Is it so in ♀?) very long; I am unacquainted with the exterior setæ. Anterior legs feeble, long, and with the tibia longer than the femur. Eyes ♂ almost contiguous.—*P. spec. nov.* (Rio Janeiro.) An *P. Hécuba* Hagen?

4. DIFFERT. Eyes ♂ widely separated. Setæ long; intermediate seta ♂ ♀ very rudimentary. Legs equally robust and long; anterior legs ♂ scarcely longer, with their femora and tibiæ equal in length.—*P. dorsigera* Hagen, (Buenos Ayres.) Two new species from Mexico.

5, 6, 7. Mr. Walsh's groups A B and C. In the groups 1—3 the membrane of the wings is more delicate, being always folded up in the dead specimen.

The 7th group, Mr. Walsh's subgenus C, is most widely separated from the rest, and is apparently a well defined genus. We must retain for the first group the name of Palingenia. The second group is doubtless a very good genus. As to the 4th group we may perhaps unite it with the 6th, Mr. Walsh's subgenus B. The 5th group I do not know.

My revision of the N. A. Ephemerina in the Synopsis is not as complete as I could wish, for it was impossible for me accurately to re-examine the Ephemerina of the British Museum in 1861, because I had not my own types with me as in 1857. *P. viridescens* Walker, is probably *P. bilineata* Say, Walsh, subim. ♀, but larger (exp. 51 mill.) and of the color of my ♀ subimago from Ohio, referred to below.—*P. occulta* Walker is probably *P. bilineata* Say, imago.—*P. bicolor* is a ♀ subimago of the same group, perhaps of *P. limbata* Pictet.

Of groups 5 and 6 the species are—

1. *P. VITTIGERA* Walsh. I do not know this species, which is apparently a very interesting one. [See note 16.]

2. *P. BILINEATA* Say, Walsh. (*P. limbata* Hagen.)—*P. limbata* Guérin, Ramb. ♀ imago. (Rambur's description is word for word that of Guérin.)—*Bætis angulata* Walker, ♂ imago.—*P. viridescens* Walker, ♀ subimago.—♂ imago (very large, length 18 mill. Exp. 38 mill. Seta 60! mill. Ant. leg 16 mill.) ♂ ♂ subimago and ♀ subimago

from Rock Island.—♂ ♂ ♂ imago, ♀ imago and ♀ subimago from Chicago.—♂ imago from Red River of the North.—♂ imago North Am.—♀ imago from St. Louis.—♀ subimago from Ohio (paler.)

Besides the above, I have an abnormal ♂ from Rock Island, which, after a careful examination, I believe to be a variety of this same species. Length 20 mill. Exp. 30 mill. Seta 32 mill. Ant. leg  $10\frac{1}{4}$  mill, (femur 3 mill, tib.  $3\frac{1}{4}$ , tarsus 4 mill.) It resembles the ♂ of *P. limbata* Walsh, but is of a deeper color, the yellow less bright, the brown stripes wider and of a deeper color; the front legs with the femur, tibia, the first joint of the tarsi, the tip of the three following, and the whole of the last, as well as the claws, black; the four hind legs of a bright yellow with only the last tarsal joint and its claws black. Wings hyaline, marginal band of the front wings of a deep brown, the hind wings not bordered with brown; all the veins and cross veins blackish, except at the base; some cross veins in the basal portion of the front wings not far from the costa, and some in the middle of the hind wings, bordered with black. Setæ pale brown, the incisures scarcely marked, with the base of a few of the joints yellow beneath; intermediate seta present but indistinct.

It now remains to compare this abnormal ♂ with *P. bilineata* Say, Walsh. I have before me, besides the ♂ from Rock Island mentioned above, of which the dimensions are so great, 5 ♂. Three from Chicago are very much alike. Length 18—20 mill. Exp. 38 mill. Seta 45 mill. Wings a little fumose, hind wings with the exterior border blackish. Ant. leg 14 mill; hind legs yellow, the tip of tarsal joints 2—4, black beneath or not black. Setæ brown with the basal half of the joints yellow. Body of a deep color. Abdomen long, with two yellowish or fulvous spots on each joint. One ♂ from Red River of the North, (determined as *bilineata* Say, by Mr. Uhler,) resembles the three from Chicago, but the band at the tip of the hind wings is subobsolete. Finally, a ♂ without any precise habitat, with the band of the hind wings altogether absent. I remark that the relative proportion of the tarsal joints is far from being constant; for I see that 3 is sometimes as long as 2, sometimes shorter, and even one-half shorter (♂ Uhler.) The ♂ from Rock Island is large, its setæ and legs are longer and its wings more fumose. [See note 17.]

It seems to me that the shortness of the front legs, in common with

the shorter setæ and the considerably longer abdomen, are remarkable characters. It is true that we sometimes find Ephemeroideous imagos with the legs shorter than common, and that they are animals which sometimes have their legs damaged in the larval state and replaced by shorter ones; but then the two anterior legs are not ordinarily of exactly equal length as they are here.

3. *P. LIMBATA* Pictet, Walsh. (*P. bilineata* Hagen.) The identity with Pictet's species remains to be proved; it may be altogether new.—♂ ♂ ♀ imagos, ♀ subimago Rock Island, 1860.—♂ ♂ imagos Washington.—♀ imago St. Louis.—Length ♂ ♂ imagos from Rock Island. 16 mill. Exp. 29—32 mill. Seta 39 mill. Ant. leg 12 mill. They agree with the ♂ ♂ from Washington (cited p. 41 of Synopsis), but they are a little smaller. The description of these ♂ ♂ must be corrected, because the abdomen shows on the dorsum of each segment a median black band which does not attain the base except in the three penultimate segments, and may even be altogether absent in the anterior segments (♂ from Washington.) Finally, in place of "anterior feet fuscous, basal articles of the tarsi yellow," read "articles of the tarsi yellow at the base." The words "penis apex incurved, oval," must be erased, for I do not find that it differs from that of the other species. The brown margin of the hind wings is very narrow and may even be altogether absent.

4. *P. SPEC. NOV.* An *P. vittigera* Walsh ♀?—♀ imago Rock Island; ♀ subimago Philadelphia.—♂ imago [*P. vittigera* Walsh? B. D. W.]—The ♀ imago from Rock Island differs from the two described ♀ imagos of *P. limbata* as follows:—1st. The size is larger; length 25 mill. Exp. 52 mill. Setæ broken. 2nd. The prothorax is visibly longer, less wide near the thorax. 3rd. Segments 3—6 of the abdomen have more brown, the [brown] bands joined at the tip, so as to form only two basal oval [fulvous] spots. 4th. The 4 hind legs have only the last joint of the tarsi as well as the claws brown. 5th. The wings are hyaline. 6th. The intermediate seta is a little longer (2 mill.)—Is it *P. limbata* Pictet, Walsh? or the ♀ of *P. vittigera* Walsh? The ♀ subimago from Philadelphia (Coll. Winthem, mentioned Synopsis p. 41,) has the same dimensions and apparently belongs here. The colors are more obscure; on the abdomen there is only a wide brown dorsal band; the wings are yellowish gray, and the legs are as in the imago.

It remains to compare this ♀ imago from Rock Island with *P. bilineata* Say, Walsh (*limbata* Hagen.)—♀ Imago from Chicago, expanse 44 mill. Seta 30 mill.; Ant. leg 11 mill.; abdomen in bad condition.—♀ Imago from St. Louis in alcohol has the dimensions given in the Synopsis. [Length 29 mill. Exp. 46 mill. Seta 20 mill.]—On comparing the ♀ from Rock Island with these two, it seems to differ in its larger size, in its general color being yellow, very like that of ♀ *limbata* Walsh (*bilineata* Hagen,) in its hind wings being without bands, and in the color of the feet and of the setæ. [See note 18.]

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*P. FLAVESCENS* Walsh, ♂ ♀ imago. New to me. A good species. Easy to separate from similar *Bætis* by the relative proportions of the basal joints. Joint 1 is shorter than 2; 2=3; 4=1.

*P. INTERPUNCTATA* Say, Walsh. *P. PULCHELLA* Walsh, and *P. TERMINATA* Walsh, I have not yet found time to examine. It seems to me that the ♂ ♂ from Maryland, referred to in the Synopsis under *Bætis verticis* Say, are *P. pulchella*, and the ♂ ♂ from Washington *P. terminata*. [See note 19.]

#### EPHEMERA.

*E. NATATA* Walk. Cat. I now possess ♂ ♀ imago and subimago from Saskatchewan.

*E. DECORA* Hagen, differs in reality from *E. decora* Hagen, Walsh, by the characters mentioned, and is rather yellow than luteous. The ♀ described by me is exactly like the ♂ and is from Chicago, the habitat of Mr. Walsh's species. It is possible his species may be *E. simulans* Walker Cat., but the dimensions are a little too small and rather those of *E. hebes*.

*E. NOV. SPEC.* I have received from New York ♀ imago of a new species. It is very large, (length 19 mill. Exp. 42 mill.) the wings hyaline and much spotted, the abdomen very bright yellow immaculate. It resembles somewhat *E. danica* of Europe.

*E. PUDICA* Hagen, is probably no Ephemera but a *Bætis*. Joints 1—3 of the tarsi in all the feet are long and equal, 4 a little shorter, 5 equal. I am vexed that I did not entirely omit this solitary specimen of a ♀ subimago with the head and the tip of the abdomen both gone.

**E. FLAVEOLA** Walsh. A very good and interesting species, received by me from Mr. Walsh in 1860. [See note 20.]

**EPHEMERELLA** Walsh.

**E. EXCRUCIANS** Walsh. New to me. I must study the genus further. Are the eyes really simple? [Beyond all doubt. B. D. W.] I suspect that some *Potamanthus*, Pictet, (a genus which comprehends very different species,) must in that case enter *Ephemerella*. *Leptophlebia* Westwood, is *Potamanthus*.

**BÆTISCA** Walsh.

**B. OBESA** Say, Walsh. Both genus and species new to me; very curious.

**CLOE.**

**C. VICINA** Hagen, Walsh. A new species with four wings, but probably *C. posticata* Say. *C. vicina* Hagen, has only two wings and the colors are paler, a reddish brown. I have received from Mr. Uhler, from Maryland, a ♂ imago of a *Cloe* n. sp. very like *C. vicina*, but it has four wings. [See note 21.]

**C. UNICOLOR** Hagen, Walsh. It is the species described by me, which has four wings. I only know 3 ♀ from Washington and 1 ♂ from Pennsylvania.

**C. DUBIA** Walsh. A new species. In *C. vicina* the thorax is a pale fulvous, and the tip of the abdomen deep brown, immaculate.

**C. MENDAX** Walsh. A new species.

**C. FLUCTUANS** Walsh. Very like *C. undata* Pictet, of which I possess 2 ♀ from New York and Red River of the North (Kennicott) with their setæ annulated with brown. The two species cannot be identical, for the number of cross-veins and their arrangement is very different. Otherwise the abdomen of the ♀ is spotted in a very similar manner with little dark dots. The two ♀ of *C. undata* have very numerous cross-veins, like *C. ferruginea* Walsh, the abdomen "freckled" in the same manner. They resemble *C. fluctuans*, but are a little larger, besides having some brown clouds on the hyaline part of their wings. The setæ have brown incisures; but in one specimen of *undata* Walsh, (the other one has no setæ) the basal incisures are brown.

**C. PYGMÆA** Hagen. I only possess one ♀ imago in bad condition.

It is the smallest Ephemerinous species known. It belongs to Mr. Walsh's section B "four wings, cross-veins sparse."

#### CÆNIS.

C. HILARIS Say=AMICA Hagen. I do not possess this species. It is in the Berlin Museum; and I have no other remarks to make on it than those in my description.—I received in 1860, from the upper Wisconsin River, through Mr. Uhler, a new species *C. nigra* mihi.

#### ODONATA.

SYNOPSIS p. 65, 4th line from bottom, for "two antecubital transverse nervules," read "Pterostigma regular."

IBID. Line 2 from bottom, "the 4th apical sector broken." This 4th sector is a very constant vein in all Odonata, and separates from the "principal sector" between the "nodal" and the pterostigma. M. Selys names it now the "ultranodal sector." M. Charpentier was the first to observe that the 4th sector is broken in *Lestes*, and after him authors have always employed this character. As the Synopsis of *Lestes* and *Podagrion* appeared last year, I note here what there is in it relating to North America.

LESTES ALACER: We have received the ♀.—L. STULTA is very probably *L. forcipata*.—L. VIDUA (and *L. minuscula* Uhler) are *L. congener*.—L. TENUATA: we have the ♀. In the Synopsis of N. A. Neur. dele p. 69, last line, "similar to *L. forficula*."—L. HAMATA (No. 12) is the true *L. forcipata* of Rambur; so M. Selys has named No. 13 (my *L. forcipata*) *L. hamata*.—Finally, we have described two new species, L. DISJUNCTA Me., Ill., Nova Scotia, Red River, Saskatchewan, &c., and L. VIGILAX New Jersey, Uhler, a species received before from the Vienna Museum. I am not yet sure but it is synonymous with *L. inæqualis* Walsh; at all events it must be closely allied, especially the abdominal appendages.—*Lestes Eurina* Say, Walsh, I do not know. [See note 22.]—There are altogether in our Synopsis 50 species of *Lestes*. In the Synopsis of *Podagrion* there is nothing new in reference to North America.

I have read with much interest Mr. Walsh's exposition, p. 381—3. It is a veritable progress, and I entirely approve of his ideas. In general M. Selys and myself have used Rambur's nomenclature, with

the intention of giving a general resumé on all the parts, after we have finished our work. Then it will probably be necessary to make much change, so as to establish a correct, natural, and philosophic nomenclature. [*See note 23.*]

Mr. Walsh's new *Gomphus* and his descriptions are superb. \* \* \* It is the scourge of science, and especially of Entomology, that we have always plenty of dilettantes and but very few with real knowledge, based upon regular and truly philosophical study. [*See note 24.*]

#### SIALINA.

*SIALIS INFUMATA* Newm. Rightly determined by Mr. Walsh. I have it from many places, especially from Saskatchewan. It is very desirable that the anal appendages should be figured and described from the living specimen. The species of this genus are not easy to separate, and I am not sure that *infumata* is not synonymous with *fuliginosa*, a European species; but on the whole they are probably different. [*See note 25.*]

*CHAULIODES SERRICORNIS* and *MACULATUS*. There is a confusion in the Synopsis, as I was only acquainted with the ♀ of *serricornis* and the ♂ of *maculatus*. I now possess ♂ ♀ of both. On comparing Say's description, I find that *C. serricornis* Say, is the true *C. maculatus*, and that *C. serricornis* Hag. Synopsis is a new species. I was partly led into the error in consequence of receiving a ♀ from Mr. Uhler, labelled *C. serricornis* Say. I now view the species as follows:—

*CHAULIODES LUNATUS* Hagen.= *C. serricornis* Hag. Synop. It is the ♀ that is described in the Synopsis, but instead of the words "marked with black," (p. 191, line 1,) read "bordered with black"; and instead of "with white spots," (line 4,) and "veins spotted, white," (line 7,) read "bordered with white." The words "bordered with black" (*nigrocinctis*) in my work are not altogether correct, for the veins are only bordered with a more obscure color. In the more highly colored ♂ ♂ the veins are scarcely bordered, for then the black color is uniform. The ♂ has foliated antennæ, each joint with a large oval plate underneath, a structure which Say could never have described as "deeply serrated." The head and thorax are more slender and highly colored than in ♀; the design of the wings is the same. It may be remarked that the words "a larger anal spot white" in the



Synopsis, should be corrected, for there is "a large rounded *basal* white spot," which is wider than the band of the wings. This spot is easily seen, and is the easiest character by which to distinguish the species. The inferior appendage ♂ is elongate, narrower at tip, and of a pale brown color.—♂ ♀ New York: ♂ Maryland and Illinois (from Mr. Uhler.) ♀ Pennsylvania. Length of front wing ♂ 24—28 mill ♀ 34 mill. [*See note 26.*]

CHAULIODES SERRICORNIS Say = *Ch. maculatus* Hag. Synopsis. The ♂ has serrate antennæ, and the inferior appendage is of a shining black at tip, and less elongated and wider than in the preceding. Both ♂ and ♀ have the base of their wings black.—♂ Savannah (type) Burm.—♂ North America.—♀ New York (June), Connecticut.—A ♂ from Mr. Uhler, labelled Maryland and Illinois, has the band of the front wings a little wider and the apical spots of the hind wings almost united into a large, irregular, oval spot. Two ♂ from Massachusetts (Uhler) and New York (June) are a little smaller and more highly colored. A very highly colored and large ♂ (labelled Maryland and Ill., June 8, Uhler) has the band on the front wings wider. It has foliate antennæ like *C. lunatus* but cemented on with gum and as it seems erroneously.—Length front wing ♂ 21—26 mill. I may add that *Ch. fasciatus* Walker (Australia) seemed to me identical with *Ch. serricornis* Say. Possibly Walker's habitat is erroneous.

CHAULIODES RASTRICORNIS, Ramb. ♂ ♀ received from Mr. Walsh, a superb pair. I had before received a ♀ from Illinois (Uhler); the ♂ I did not previously know. *Ch. pectinicornis* ♀ differs in having pectinate antennæ. I am very curious to see the larva of Chauliodes. [*See note 27.*]

CORYDALIS CORNUTUS, Linn. The larva possesses both branchiæ and spiracles, like that of Sialis. I do not think that the [lateral] filamentous appendages are connected with respiration; the little sponges at the base of the filaments and a little behind them are the true branchiæ. It is a very curious, and up to this day a unique fact, that the larva of an *Odonate* from Ceylon (*Euphæa splendens*) possesses similar filaments. The reason that the larva of Corydalis has both branchiæ and spiracles is, that they live, like Sialis, some weeks out of the water before their transformation. Some extraordinary MS. statements from Mr. Walsh, as to these larvæ "tumbling down chim-

neys," ought to be published in detail. The larva of *Sialis* never travels far from the water. [See note 28.]

#### HEMEROBINA.

MANTISPA BRUNNEA Say. Mr. Uhler's note on this species is probably an error. (Synopsis. p. 208.) The facts stated by him should be verified. It is *contra leges naturæ* that an organ should be abused in that manner. [See note 29.]

#### HERMANN HAGEN.

KÖNIGSBERG, PRUSSIA,  
April 3, 1863.

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#### NOTES BY BENJ. D. WALSH.

N. B.—There is great confusion in the description of the parts of the wing by different authors, arising from the fact that some consider the wing as expanded at right angles to the body, and some as closed. Hence in different authors the terms "anterior" and "posterior" are used in entirely different senses, some, as Dr. Fitch for example, considering the basal portion of the wing as the "anterior" portion, and others, including I think the great majority, considering the costa as the "anterior" portion. In all my published descriptions I have endeavored, as far as possible, to avoid this ambiguity by using the terms "basal," "costal," "terminal," and "interior," instead of "anterior" and "posterior"; but wherever I have, for one reason or other, retained these latter terms, I wish to be understood as speaking of the *expanded* wing.

#### PSOCINA.—PSOCUS.

Note 1, p. 167. *Ps. QUIETUS* Hagen. I failed to identify my species with *quietus*, because the diagnosis in the Synopsis says, "Thorax black, wing-veins *luteous*," whereas *semistriatus* has the thorax black with the sutures conspicuously *whitish*, and the wing-veins *black*, or more properly speaking, perhaps, *fuscous*.

Note 2, p. 167. As this species has never been described, I annex the following description of it, as well as of another species which I have met with since the publication of my Paper on Pseudoneuroptera. Both of them belong to this section of *Psocus*.

**Ps. lichenatus**, n. sp.—Brown. *Head* with the *nasus* often pale yellowish brown; antennæ shorter than the wings, with the basal half of each joint whitish except towards their tip, those of ♂ more robust and with long and dense cinereous hairs, those of ♀ more slender and but slightly hairy. *Thorax* generally paler on the sutures. *Legs* pale yellowish brown, the tibiæ and especially the femora dotted with brown. *Front wings* brown, with a long triangular hyaline spot, its apex next the costa, extending from the disk to the interior margin, another at the costal apex, and a third on the terminal margin, the two last leaving a brown parallelogram between them one-third as wide as the wing. *Veins* the color of the wing, marked on the brown portion, except towards the base, with a row of pale dots placed on one side of them. *Pterostigma* brown, three times as long as wide, its widest part  $\frac{2}{3}$  of the way to its tip, with a dark dot at its basal end, and the angle next the disk regularly rounded. *Hind wings*, as well as their veins, subhyaline. *Length to tip of wings* 3— $3\frac{1}{4}$  millimetres.

Five ♂, seven ♀. Occurred in the autumn, on some precipitous sandstone cliffs, in great numbers.

**Ps. bifasciatus**, n. sp.?

Differs from *quietus* Hagen, (= *semistriatus* Walsh,) in the veins being coarser and blacker, in the pterostigma being cinereous with a large irregular black spot at the interior angle which is rounded, in the vein closing the discoidal cell being white not black or fuscous, in the existence of a faint white spot at the origin of the branch of the 1st sector, (or first discal bifurcation,) and in there being always two distinct narrow nebulous fasciæ on the basal half of the front wing. The size is also one-fourth larger. *Length to tip of wing* 5 mill.; *alar expanse* 9 mill. Three ♀.—In the whiteness of the vein closing the discoidal cell, and in the white spot on the 1st sector, this species agrees with *Ps. novæ-scotiæ*, which however is much larger, and has the interior angle of the pterostigma very acute and the wings spotted on their terminal half. Traces of the white markings of the wing-veins occur in some specimens of *semistriatus*, and I am not certain that this is not a mere variety of that species. The fasciæ are the only strongly marked character that divides them. From confounding a single specimen with *semistriatus*, the dimensions I have assigned to that species are one millimetre too great. *Ps. striatus* Hagen, differs in the pterostigma being “acute,” (by which I understand that the interior, or as it is often called, the “posterior” angle is acute,) and in other respects.

**Ps. PERPLEXUS** Walsh. I have now two additional specimens, taken

in company, in one of which the discal bifurcation of the front wing is peduncled, in the other it is not. The same variation has been described as occurring in *semistriatus* Walsh. Both specimens, in addition to the described fuscous spot at the point where the anal vein strikes the interior margin of the wing, have a very small faint fuscous cloud on and in front of the anal vein  $\frac{2}{3}$  of the distance from its base, and also another between the forks of the discal bifurcation, traces of which last may be seen in my original specimen. The pterostigma is almost black, instead of pale fuscous, or cinereous. These clouds might seem to approximate *perplexus* to *Novæ-Scotiæ*, but in *Novæ-Scotiæ* the veins on the posterior side of the discoidal cellule and at the origin of the branch of the 1st sector are milk-white; in *perplexus* they are fuscous.

PS. POLLUTUS Walsh. A specimen taken at Rock Island has the coloration of the vertex and thorax more obscure. The dimensions are the same.

Note 3, p. 168. PS. GEOLOGUS Walsh. In the autumn of 1862 I beat a specimen of *Ps. amabilis* Walsh, off an oak tree remote from any house, the first specimen having been found dead amongst my insects. If *Ps. geologus* be identical with *Ps. salicis*, and if, as the name indicates, this latter species was found on willows, it is most probable that both *amabilis* and *salicis* are indigenous insects, and that the latter is not identical with the European *Ps. pedicularius* Linn. I commonly, however, find the European *Dermestes lardarius* near Rock Island, under bark, remote from houses, along with its larva, feeding apparently on the dead insects and spiders which accumulate there. I believe that both *amabilis* and *geologus* are, in the imago state, normally apterous but occasionally winged, and that it is these species which infest collections of insects in which camphor is not kept. In a close box good camphor kills them in half a day. They are so peculiarly fond of Ephemera that I find it necessary to dry all my Ephemera in a close box with camphor in it.

Note 4, p. 168. PS. ABRUPTUS and PS. CORRUPTUS Hagen. So far as I can judge by their eyes and antennæ, all my 9 specimens of *abruptus* are ♀, and all my 9 specimens of *corruptus* ♂. The facts indicate that Dr. Hagen was right in supposing the two species to be identical. The hyaline apical spot is very plain in all my specimens of *corruptus*. but varies much in size.

The following species belonging to this section of *Psocus* have been obtained by me near Rock Island since my paper was published :

**Ps. contermimus**, n. sp.—Blackish. *Head* with the nasus obscure greenish or luteous. Sutures of *thoracic* notum but slightly pale. *Legs* dull pale greenish or luteous; tarsi fuscous. *Wings* hyaline, veins moderately fine, fuscous; the submedian vein attaining the 2nd sector within about the space of twice its own breadth, so as almost to close the discoidal cellule, and then turning suddenly back so as to form a posterior marginal cellule nearly in the shape of an equilateral triangle. Pterostigma three times as long as wide, very pale fuscous, sometimes darker at the basal end, the angle next the disk much rounded off. Length to tip of wings  $4\frac{1}{2}$  mill.

One mature ♂, one immature ♀? Very distinct from any described N. A. species. Has the general appearance of *semistriatus* Walsh, which belongs to the preceding Section, but the antennæ ♂ are much more robust and the neuration of course is different.

**Ps. confluens**, n. sp.—Dull luteous. *Head* with the eyes and ocelli brown-black; antennæ, with joints 1 and 2 luteous, 3 fuscous, the rest deficient. Upper surface of *thorax*, except the sutures, brown-black. *Legs* with the knees and the tips of the tarsi obfuscated. *Wings* narrow, brownish subhyaline, veins very coarse and brown; pterostigma colored as the wing, long and narrow, about 4 times as long as wide, the angle next the disk almost entirely rounded off; the submedian vein not nearly attaining the hind margin of the wing before it curves towards the 2nd sector (or 2nd discal bifurcation) and sweeps back to the interior margin to form the posterior marginal cellule, which is consequently open at its basal end, and forms a semicircle. Discal bifurcation acute but peduncled. Length to tip of wings 3 mill. Expanse  $5\frac{1}{2}$  mill.

One specimen, remarkable for the two sectors in the left wing uniting together some distance before they reach the tip, a monstrosity which I have not noticed in any other species. Differs from *Ps. mobilis* Hagen, a Cuban species, in not being hairy.

**Ps. rufus**, n. sp.—Rufous, immaculate. *Head* with the antennæ fuscous, except the three basal joints. *Abdomen* with the sutures a little darker. *Tarsi* obfuscated. *Wings* hyaline; veins slender, black; pterostigma three times as long as wide, with the angle next the disk rounded, slightly obfuscated, with the usual black dot at its basal end; submedian vein attaining the hind margin of the wing before it curves round to form the posterior marginal cellule, which is semicircular. Length to tip of wings  $3\frac{1}{4}$  mill.

One specimen, readily distinguished from the preceding by its neuration, and by the much finer wing-veins, the shorter pterostigma and the wings not narrower than usual.

**Ps. permadidus**, n. sp.—Dull luteous. *Head* with a large black spot on the ocelli and two dark dots placed transversely on the occiput; antennæ pilose, fuscous except the three basal joints, which are pale. Lateral lobe (or scutum)

of the *thorax* black; anterior lobe (or præscutum) dull luteous. *Wings* of a uniform grayish subhyaline color; veins fine, dusky; pterostigma grayish subhyaline, long, three times as long as wide, with the angle next the disk almost entirely rounded off; discoidal bifurcation peduncled; submedian vein stopping when it attains the interior margin of the wing and forming no posterior marginal cellule. Length to tip of wings  $3\frac{1}{4}$  mill.

One specimen ♂?—Near *madidus* Hagen, but differs in the nasus being immaculate, in the antennæ being fuscous except at base, and in the wings being immaculate and their veins fuscous not luteous. May possibly be a variety of that species, but in *Psocus* the coloration of the wings is a very constant character.

*Ps. madescens*, n. sp.

Differs from the above only as follows:—*1st.* The size is  $\frac{1}{6}$  smaller. *2nd.* The dark dots on the occiput are obsolete in two specimens and subobsolete in the other one. *3rd.* The front wings, but not the hind wings, are fumose with about 10 or 12 hyaline spots and streaks always between and not on the veins, each cellule, except the pterostigma, containing one or two of them so as to occupy altogether about  $\frac{1}{2}$  the wing, different specimens varying a little in the distribution of these spots. *4th.* The wing-veins are much coarser.—Length to tip of wing  $2\frac{1}{2}$ — $2\frac{2}{3}$  mill. Three specimens, all ♂? Differs from *madidus* Hagen, in the nasus being immaculate, the antennæ fuscous except at base, the wing-veins fuscous, not luteous, and the hyaline spots and streaks presenting no appearance of two bands. It cannot be a mere sexual variety of the preceding, for the eyes and antennæ are similar.

#### PERLINA.

*Note 5*, p. 168.—*ACRONEURIA ABNORMIS* Newm., Walsh, and ACR. *RUPINSULENSIS* Walsh. I have now before me 7 ♂ 4 ♀ of the former and 2 ♂ 3 ♀ of the latter species, the ♂ of which was previously unknown to me. In *abnormis* the antepenultimate ♀ ventral is scarcely longer than the preceding segment, and its tip is scarcely at all produced or curved, not covering more than  $\frac{1}{3}$  of the penultimate ventral, and there is no vestige on it of any subterminal tubercle. In *rupinsulensis* the antepenultimate ♀ ventral is full half as long again as the preceding segment, and its tip is much produced, somewhat in the form of a rectangle truncate at tip, so as to cover full  $\frac{1}{2}$  of the penultimate ventral, and there is a distinct transverse linear tubercle upon it  $\frac{2}{3}$  of the distance from its base. This seems to be the only

perfectly constant character to separate the two species. In both the shape of the prothorax is variable, and not as sharply contrasted one with the other as in the typical specimens, though there is a separating limit which neither transgresses. In one ♂ and one ♀ *abnormis* the sides of the prothorax are exactly parallel, in the others a little convergent behind, as described. Again, in the same ♂ *abnormis* the dorsal line of the prothorax is as dark as any part of it; in all the others ♂ ♀ it is as pale as any part of it; in all ♂ *rupinsulensis* ♂ ♀ the dorsal line of the prothorax is as dark as any part of it. I can perceive no ♂ character separating the two species, the ♂ ♂ of both having the same glabrous, transversely oval, subterminal tubercle on the eighth or what is apparently the last ventral joint, except that in the anomalous ♂ *abnormis* already twice referred to, this tubercle is smaller. Consequently ♂ *rupinsulensis* can only be distinguished from ♂ *abnormis* by the comparatively greater breadth of the prothorax and its approximating more or less to the cordate form. In *abnormis* the number of subterminal cross-veins in the front wing, exclusive of the "arc," is 2—12, and in *rupinsulensis* 1—11, there being sometimes in the former a difference of 4, and in the latter a difference of 1 cross-vein between the right and left wing. The dimensions, judging from the eye, are the same.

All my specimens of *abnormis* agree pretty closely with the diagnosis in the Synopsis, with the variations noted above. Dr. Hagen does not say in what respect my *abnormis* differs from the specimen received from Illinois and referred by him to *abnormis*, and it is useless therefore to speculate on the subject. Judging from the long list of synonyms in the Synopsis, either several species are there confounded together, or it must be a more polymorphic species even than I have found it to be.

**Chloroperla fumipennis** (= *Perla fumipennis* Walsh.) ♂ Shining brown-black. *Head* bright or obscure luteous, with a large, round, shining, black spot enclosing the ocelli, which are only two in number. *Antennæ* luteous on their basal  $\frac{1}{3}$ . *Thorax* scarcely wider than long, its sides straight and a little convergent behind, its anterior angles rounded and its posterior angles much rounded. *Abdominal seta* luteous on its basal  $\frac{1}{4}$ . *Legs* dull luteous, widely or narrowly vittate above with fuscous on the femora and tibiæ; tarsi fuscous. All four *wings* equally tinged with fuscous, the front wing with a hyaline streak on the discal side of the origin of the accessory subcostal vein, and another between the postmedian and postcostal veins, and with their costa dull luteous; postcostal cross-veins 1—4; veins in all four wings fuscous. Alar expanse  $15\frac{1}{2}$ —17 mill.

Two ♂ taken on Rock River, in addition to the one ♂ which I wrongly described as a *Perla*; ♀ unknown. But for the difference in the number of the ocelli, this species might be taken for a variety of *C. brun-nipennis* Walsh. I do not know whether any other *N. A. Chloroperla* has only two ocelli. *C. bilineata* Say, and *nana* Walsh, I know to have three, and *severa* Hagen, is expressly described as having three. As nothing is said as to their number in the other 5 described species, we may presume that they also have three. It is remarkable that in *Perlina* the number of ocelli, which elsewhere is of high systematic value, becomes scarcely of subgeneric value. Since, however, the species of *Perla* are very numerous, it affords a convenient means of subdividing that difficult, polymorphic and extensive genus.

*NEMOURA ALBIDIPENNIS*, Walker. This species, of which I have taken 5 specimens, may now be added to the list of Illinois *Perlina*. It is easily known from *N. completa* by its wing-veins margined with fuscous, and the absence of the two pale fuscous fasciæ from the front wings. The latter occurs on the Mississippi River, the former in the neighborhood of Rock River.

#### EPHEMERINA.—BÆTIS.

*Note 6*, p. 169.—*BÆTIS FEMORATA* Say, described by Say in the subimago only.—Say describes, in all, ten species of Ephemerina, at least one of which (*B. obesa*), and most probably one or two others, are subimagos. Yet he nowhere drops a word from which it can be inferred that he knew the difference between the imago and subimago states, or that there was such a state as that of subimago.\* It is pos-

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\* All subimagos known to me may be distinguished from their imagos by the wings being ciliate except on the costa. Sometimes this ciliation can scarcely be seen except under the lens, or by holding the wing up to the light. Their abdominal setæ are likewise always more or less pilose, but this character is found also in the imagos of *Bætis* ♀ A (Walsh) and *Palingenia* ♀ B (Walsh), towards the tip of the seta. On the *subimago* or *pseudimago* state see Westw. *Introd.* II, pp. 27—28 and *Note* \*. Westwood here infers analogically that a subimaginal pellicle "is to be found in the bee as well as the beetle." It has been actually observed in the Ant by Huber, (quoted in St. Fargeau *Hymenopt.* I, p. 114,) and I have myself recorded it as found on the antennæ of a Chalcide species, *Glyphe viridescens* Walsh, (*Trans. Ill. State Agr. Soc.* IV, p. 390.) and have since observed the same thing in several other Chalcidians.



sible, therefore, that in describing this species he had specimens of the subimago before him with the setæ, as often happens, badly shrivelled up, and described the ♂ setæ as "hardly twice the length of the body" (20—24 mill.) from recollection of the ♂ imago, which he might have seen but not had before him at the moment, and which has setæ of that exact length. The setæ of the ♂ ♀ subimago, when perfect and not shrivelled up in drying, are, as I have stated, as long as the whole body, (10—14 mill.) and not merely "as long as the abdomen," as Dr. Hagen states from the dried specimen. It is remarkable that in Say's description of *Potamanthus cupidus*, (another species described by him in subimago,) the setæ of the ♂ (called by him by mistake the ♀,) are not only given as less than one-half their natural length, but that they are given as less than one-half of what they are said to be in the body of the description itself, viz: "longer than the body," and less than one-half as long as those of the ♀ (= ♂ apud Say); whereas in *Ephemerina* the exterior ♂ setæ are never shorter than those of ♀. It is possible, however, that the word "four-twentieths," in Say, may here be a clerical or typographical error for "nine-twentieths," which would make his description harmonize both with nature and with itself. Yet the doubtful word is printed at full length and not in figures.—In regard to the *second* objection of Dr. Hagen, four specimens of the subimago, which I have still on hand, all exhibit a very narrow terminal brown annulus, on the extreme tip of the femur, besides the broad postmedian band; in the imago, as stated by Dr. Hagen, this annulus is very distinct, though I carelessly overlooked it in my description. Instead of saying "base of tibiæ brown," I ought to have said "knees brown."—In regard to the *third* objection, viz: the wings not being "snowy white," as stated by Say in his description, it is observable that in the diagnosis prefixed to the description, the wings are said to be "whitish," and this is the color attributed to the wings of *Palingenia bilineata* by Say. ("hyaline, whitish,")—an insect which in the subimago has wings colored exactly like those of *B. femorata* Walsh, subimago, but which in the imago has the wings rather "subhyaline" than "whitish." Similarly in *Bætis alternata* the wings are said by Say to be "whitish," or "hyaline with a whitish reflection," whereas in the imago they are perfectly hyaline and in the subimago of the usual gray, subfumose, or "whitish" tint, as Say would call it. In all these cases Say appears to me to have confounded imago and

subimago together, and endeavored to comprehend both in one description, if I have correctly identified Say's species.

On the whole, if *B. femorata* Walsh, is not identical with *B. femorata* Say, what other known species is identical? Dr. Hagen knows of none, and I know of none. There are some slight discrepancies, it is true, in Say's description, but we are often compelled to overlook these, when no other species can be found to which the original description better applies. For example, in Coleoptera, *Elater sanguinipennis* is described by Say as having the "elytra striate," not "punctate-striate," as they are in the species now referred by common consent to *sanguinipennis*. On the other hand, in *Elater* (corymbites) *hieroglyphicus* the elytra are said by Say to be "striated, the striæ with very distinct punctures and the interstitial spaces punctured;" whereas in the species now generally referred to *hieroglyphicus* Say, the elytra are not strictly speaking punctate-striate, but the striæ are merely irregularly encroached upon by the fine punctures of the interstitial spaces. Nobody but those who have tried it can be aware how difficult a task it is to draw up perfectly faultless descriptions. Say's descriptions are generally admirable, so far as they go, but even Say has committed some errors. It may be added that Say's species is said to have occurred at Cincinnati, Ohio, "not in any considerable numbers," and that my species occurs quite sparsely at Rock Island, Illinois. If the two should eventually prove not to be identical, I would propose for mine the name of *B. interlineata*, in allusion to the remarkable black line on the middle of the costa which occurs also in *Palingenia interpunctata* Say.

In regard to Dr. Hagen's remark, that in the imago of this species abdominal joint I is piceous, and that it is 2—6 which are whitish, not 1—5, as I have described them, I can only state briefly that, in my opinion, what Dr. Hagen considers as the 1st abdominal joint is in reality the metathoracic postscutellum. At all events, besides this disputed joint, there exists in the abdomen of all Ephemera the typical number of 9 joints, all bearing spiracles except the last, which cannot therefore be considered as a mere anal plate, because then the last abdominal joint would bear spiracles, which, so far as I know, is never the case with any insect in any one of its states. Similarly, I believe that in Odonata what Messrs. Selys and Hagen and preceding neuropte-

rists call the 1st abdominal joint is the metathoracic postscutellum, and their abdominal joints 2—10 the true abdominal joints 1—9; although, to prevent confusion, I have adopted the customary phraseology in my descriptions. In *Ephemerina*, on the contrary, the abdomen is usually described as 9-jointed both in larva and imago. (Westw. *Introd.* II, pp. 26 and 31.)

The same mistake has been made by authors in certain entire Orders, e. g., Coleoptera, and in certain families of other Orders, and has been corrected by Westwood in Tenthredinidæ and Tipulidæ. I had originally intended to accompany this Paper by a general Enquiry, illustrated by drawings, into the Homologies of the Segmental Subsegments, for which I had prepared copious materials; but the subject has extended to so much greater length than I had anticipated, that I reserve this Enquiry for a future occasion.

*Note 7, p. 169.* This is an error, for which nobody but myself is to blame. In English "large" refers both to *length* and *breadth*, and it is *length only* which is here spoken of. Singularly enough, in French "large" refers to *breadth only* and in Latin "largus" refers *neither to length nor to breadth*, meaning simply "abundant."

*Note 8, p. 170.* B. ARIDA Say, Walsh. I have noticed this variation in the coloring of the anterior legs in my description. The anterior tibia ♂ ♀ varies from pale greenish, slightly obfuscated at base and tip, to dark fuscous or brown-black, immaculate.

*Note 9, p. 170.* B. SICCA Walsh. A careful examination of 9 ♂ *sicca* satisfies me that the last dorsal joint of the abdomen is, like the rest, piceous, and not ferruginous, as I have erroneously described it. It is the same in color as joints 1—8, in ♀ also.

*Note 10, p. 170.* I have described the first tarsal joint of the anterior leg ♂ ♀ *sicca* as "conspicuously pale, except at the incisures," by which last term I intended to comprehend the incisure between the 1st basal joint and the tibia. The incisures, therefore, as the ground color is said to be "piceous," are of course supposed to be piceous. I have also described the tip of the anterior tibiæ ♂ ♀ as black. It would have been more correct to say that both the tip of the tibia and the base of the 1st tarsal joint are black or fuscous. The tip of joint 1 and the whole of joints 2—5 of the anterior tarsi are, in reality, rather fuscous than piceous, but in a single ♂ specimen joints 2 and 3

are pale on their basal halves. The coloration of the anterior legs in both *arida* and *sicca* is so variable that it is difficult to fix it definitely without being unduly diffuse. To describe the *individual* is always easy; to describe the *species*, "hoc opus, hic labor est."

Note 11, p. 170. The difference between *arida* and *sicca* in the coloration of the setæ prevails only generally, not universally. In many other Ephemera the setæ are sometimes immaculate, sometimes incised with fuscous, the more immature individuals having immaculate setæ like the subimago; e. g., *Palingenia interpunctata* and *P. flavescens* ♀. The more constant differences between *arida* and *sicca* may be thus tabulated from a careful comparison of numerous additional specimens; it is seldom that closely allied species can be so sharply separated.

	BETIS ARIDA <i>Say, Walsh.</i>	BETIS SICCA <i>Walsh.</i>
Dorsum of abdominal joints 1—8.	Piceous ♂, dark ferruginous ♀, with lateral basal pale ferruginous triangles or semicircles both ♂ and ♀.	Piceous ♂, dark ferruginous ♀, immaculate.
Last abdominal dorsal joint ♂ ♀.	Pale ferruginous.	Piceous ♂, dark ferruginous ♀.
Abdominal setæ ♂ ♀.	Pale greenish white, immaculate.	Pale greenish white, with slender fuscous incisures, sometimes obsolete except at base.
Cross-veins of the anterior wing ♂.	Pale greenish hyaline.	Fuscous.
Veins of the anterior wing ♂.	Pale greenish hyaline, sometimes tinged with fuscous towards the costa.	Fuscous.

In both species there is a narrow fissure between the eyes ♂ subimago when recent, which is absent in the imago. I was mistaken in supposing this fissure to be peculiar to *arida*, and I have observed the same character in the subimagos of some other Bætis. My observation on the comparative shortness of the ♂ front legs in *sicca* is only generally, not universally true. Individuals occur with the front legs as long as the body, and I have one now before me with the front legs

only  $\frac{1}{2}$  as long as the body and one leg a trifle longer than the other. (See Dr. Hagen's remarks p. 176 lines 2—6.)

Note 12, p. 171. I have translated Dr. Williamson's description from the original Latin, either of Dr. Williamson or Dr. Hagen, but apparently the latter. The "two eggs" said to be laid by ♀, are no doubt the two long, cylindrical yellow masses, each consisting of numerous minute eggs, which are laid by so many other Ephemerina. Instead of having the vulvar aperture located under the tip of the antepenultimate ventral, as in Perlina and Odonata, Ephemerina have it located under the tip of the præ-antepenultimate, which, so far as I know, does not occur in any other family of Insects, and has not been noticed by authors. This species will, I suspect, prove to be congeneric with my *Cloe ferruginea* for the following reasons:—1st. It is said to have "no ocelli," and in *ferruginea* the eyes overhang and conceal the two posterior ocelli. 2nd. The hind wings are described as "narrower" than the others, as in all true Cloe that have any hind wings, and the wings are said to be "reticulate," which is true of all four wings in *ferruginea*, but not in any other Cloe known to me. 3rd. The subimago of *ferruginea* has the wings partly whitish hyaline, and the wings of *Bætis* (*palingenia*) *alba* Say are described by Dr. Hagen as "whitish with the anterior margin grayish" in the subimago. I doubt whether any Ephemerinous *imago* has opaque whitish wings, though *Palingenia Hecuba* Hagen, imago, is described as having "opaque grayish-rosy wings." Possibly in this case Dr. Hagen was led to believe the specimen to be an imago, because it had "a mass of eggs in the vulvar aperture," but I shall show afterwards that the subimago occasionally oviposits in *Palingenia bilineata*. (See Note 16, line 9.)

#### POTAMANTHUS.

Note 13, p. 172. I failed to identify *odonatus* Walsh with *nebulosus* Walker, because Mr. Walker's description says "anterior wings with a broad LONGITUDINAL fuscous BAND," by which I supposed him to mean a *vitta* extending from the base to the tip of the wing, as many authors, e. g., DeGeer, make no distinction between a *fascia* or band and a *vitta* or longitudinal stripe. It is very satisfactory that I should have referred to the right genus this fragmentary specimen, which had lost both the head and the abdomen, upon which parts and their appendages the ordinary generic characters in Ephemerina are

almost exclusively founded. The extreme tip of the front wing in my specimen is *not* hyaline, as Dr. Hagen supposes. By the words "terminal one-third of the wings dusky, *with a definite* outline," I intended to specify that the dusky part did not shade off gradually into the hyaline part.

As only the ♂ of *nebulosus* is at present known, it may possibly be the case that my specimen, which is deprived of all sexual characters, may be the ♀ of that species; and that the tip of the front wings being hyaline may be a mere sexual distinction of the ♂. Similarly in *Platthemis trimaculata* (Libellulina) the tip of the ♂ front wing is hyaline, and that of the ♀ front wing brown. And if, as both Dr. Hagen and myself think, *Psocus abruptus* and *Ps. corruptus* are the sexes of one species, we here have a subterminal hyaline semi-fascia, accompanied by a large discal hyaline spot, in ♂, and in ♀ merely a subterminal hyaline fascia. But on the above supposition we cannot refer to *nebulosus* the 6 doubtful ♀ ♀ from Saskatchewan, described by Dr. Hagen under *P. cupidus*, which have immaculate wings.

*Note 14*, p. 172. All my seven specimens of *P. cupidus* subimago have the four posterior tarsi brown-black, except two where they are rather dusky than brown-black. My unique specimen of *P. cupidus* ♂ imago was evidently an unusually small one, as becomes manifest from comparing the dimensions which I have given of the ♂ subimago.

*Note 15*, p. 173. As the wings of these six ♀ ♀ are said to be hyaline, it seems contrary to analogy that they should be identical with a ♂ which has the terminal  $\frac{1}{3}$  of its front wing brown. Dr. Hagen does not state whether they agree with the ♀ *P. concinnus* from Washington. The descriptions agree tolerably well, but unfortunately the length of the intermediate seta of *P. concinnus* is not given in the Synopsis. The proportion of the exterior to the intermediate seta (15 to 8) in the six doubtful ♀ ♀ differs greatly from the proportion in my ♀ *cupidus* subimago, (10 to about 8); but it seems to be the general rule in Ephemera, that as a species progresses from larva through pupa and subimago to imago, the proportional length of the middle seta should gradually diminish. For example, in *Ephemera flaveola* Walsh, the middle seta of the imago is to the other setæ as 14 to 20 ♂ and 10 to 12 ♀; while in the subimago the three are almost exactly equal. And it is well known that the genera with only two setæ developed in the imago

have larvæ with three tails nearly of equal length. Unfortunately the middle seta of my unique ♂ *P. cupidus* imago got lost in the handling, and I could only guess at its length. I have no doubt now that the length I formerly gave "about 16 mill," is much too great.

According to Dr. Hagen, the synonymy of the N. A. species of *Potamanthus* will stand thus:—

*P. CUPIDUS* Say, Walsh = *concinus* Walker = *pallipes* Walker = *tessellatus* Walker.

*P. NEBULOSUS* Walker = *odonatus* Walsh.

#### PALINGENIA.

Note 16, p. 174. I now possess ♀ ♀ of the group to which *P. vittigera* belongs and ♂ ♀ subimago. The ♀ differs most remarkably from the ♂ in the middle seta being nearly as long as the others, instead of being only about  $\frac{1}{6}$  as long. In this respect, therefore, Group 5, or my subgenus A, agrees with Dr. Hagen's Group 2, but differs from that Group, 1st. in the anterior legs ♂ being very short and not much longer than those of ♀. 2nd. in the four hind legs being short. 3rd. in the ♀ not remaining in the subimago state. 4th. in the membrane of the wings not being "always folded up in the dead specimens."—As regards the 3rd point, I believe that, in certain species, the ♀ subimagos of which ordinarily moult, they occasionally do not do so; for I possess a ♀ subimago of *P. bilineata* Say, which oviposited in that state. Besides the two ♀ imagos of this 5th Group described below, I have met with two ♀ subimaginal integuments which evidently belong here, so that there can be no doubt that the ♀ subimagos commonly moult.

The discovery of the very curious fact, that the ♀ of this group has the 3 setæ subequal, will necessitate a revision of the Synoptical Table given on p. 368 of my Paper, in which I made an attempt to separate our N. A. genera of Ephemerina, without having recourse to sexual characters. As revised, the commencement of the Table will read as follows:—

	First tarsal &c.....	EPHEMERA.
Setæ 3, subequal.	{ Anterior legs ♂ ♀ nearly as long as the body. Anterior legs ♂ ♀ only $\frac{1}{2}$ as long as the body.	POTAMANTHUS.
		PALINGENIA subgenus A (= <i>Palingenia</i> n. g.) ♀ only.
Setæ 3, the middle one short.....	First tarsal &c.....	PALINGENIA subgenus A (= <i>Pentagonia</i> n. g.) ♂ only.

The 3rd division of the 1st or sexual Synoptical Table (p. 367) must also be slightly amended, and read as follows:—

Eyes ♂ not contiguous, simple; (intermediate setæ, when present, subequal, short, or rudimental.)	}	Legs all short; (intermediate seta short ♂, subequal ♀.)	}	PALINGENIA, subgenus A (=Pentagenia, n. g.)
		Legs &c.		PALINGENIA, subgenus B (=Hexagenia, n. g.)
		Legs &c.		PALINGENIA, subgenus C (=Heptagenia, n. g.)

While on this subject I may add, that in both the sexual and the non-sexual tables, in the 1st primary dichotomous division, instead of "costal cross-veins numerous, robust, regular," we should read "costal cross-veins distinct and plain on the middle of the costa"; and in the 2d dichotomous division, instead of "partially absent" or "entirely absent on some part of the costa," read "entirely absent in the middle of the costa." In *Hept. maculipennis* n. sp., the costal cross-veins are not "regular," but arranged in groups, and in *Bætis subgenus C*. they are entirely deficient, except the oblique vein next to the body, on the basal  $\frac{1}{3}$  of the costa. In *Hept. simplex* again they are deficient, with the same exception, on the basal  $\frac{1}{5}$  of the costa. Thus does Nature, even fruitful and abundant, mock the lagging labors of systematists!

In proposing the above three genera, I have followed Dr. Hagen's example, who has given the same termination to a number of new genera of Libellulina, founded by him, (Celithemis, Plathemis, Lepthemis, Dythemis, Erythemis, Mesothemis, and Perithemis,) which is a great assistance to the memory in determining the position of those genera in a systematic arrangement. The new genera may be thus characterized:—

PENTAGENIA n. g. Wings four, hind wings wide, all with numerous cross-veins; costal cross-veins in the front wing numerous, never absent in the middle of the costa. First tarsal joint distinct in the anterior legs ♂ ♀, indistinct and connate in the four posterior legs ♂ ♀, in all the legs shorter than the 2nd tarsal joint; anterior tibia ♂ much longer than the femur; ant. ♂ legs not much longer than ant. ♀ legs; all six legs ♂ ♀ short, the hind legs not nearly attaining the tip of the abdomen. Intermediate seta short ♂, scarcely half the diameter of the other two; nearly as long as the others in ♀ and only slightly less robust; all the three setæ ♂ ♀ glabrous. Eyes ♂ separated by a



space about as wide as the orbit of the the posterior ocellus.—Species, *vittigera* Walsh, *quadripunctata* n. sp.

**HEXAGENIA** n. g. Wings four, hind wings wide, all with numerous cross-veins; costal cross-veins in the front wing numerous, never absent on the middle of the costa. First tarsal joint distinct in the anterior legs ♂ ♀, indistinct and connate in the four posterior legs ♂ ♀, in all the legs shorter than the 2nd tarsal joint; anterior tibia ♂ much longer than the femur; anterior ♂ legs very long, much longer than anterior ♀ legs; all the other ♂ ♀ legs short, the hind legs not attaining the tip of the abdomen. Two long abdominal setæ, pilose at the tip under the lens, the intermediate seta rudimental. Eyes ♂ separated by a space about twice as wide as the orbit of the posterior ocellus.—Species, *bilineata* Say, *limbata* Pictet.

**HEPTAGENIA** n. g. Wings four, hind wings wide, all with numerous cross-veins; costal cross-veins in the front wing numerous, never absent on the middle of the costa. First tarsal joint distinct and free in all ♂ ♀ legs, never longer than the 2nd tarsal joint; anterior tibia ♂ but slightly longer than the femur; anterior ♂ legs generally very long, and generally much longer than anterior ♀ legs; all the other legs long, the hind legs much more than attaining the tip of the abdomen. Two long, glabrous setæ; no intermediate seta. Eyes ♂ separated by a space at least as wide as the orbit of the posterior ocellus.—Species, *flavescens* Walsh, *interpunctata* Say, *pulchella* Walsh, *terminata* Walsh, *simplex* n. sp., *cruentata* n. sp., *maculipennis* n. sp.

**PENTAGENIA** n. g.

**P. VITTIGERA** Walsh. The ♀ differs in no material respect from the ♂. In the ♂, as well as ♀, the costa of the front wings is tinged with yellow, and instead of saying “abdomen piceous, &c., &c., &c., half-way to its tip,” I should have said, “abdomen piceous on the central  $\frac{1}{2}$  or  $\frac{2}{3}$  of the dorsum, the piceous vitta on each segment having its sides nearly straight, except that they are a little convergent behind, and having also two narrow yellowish divergent basal vittæ extending half-way to its tip.” The eyes ♂ in life are yellow on their upper  $\frac{3}{4}$  and dark ferruginous on their lower  $\frac{1}{4}$ ; and in all ♂ ♀ legs tarsal joints 2—4 regularly and but moderately diminish in length.—Length ♂ 17—18 mill. ♀ 16 mill. Exp. ♂ 30—32 mill. ♀ 36 mill.

Seta ♂ 24 to about 35 mill. ♀ deficient. Ant. leg ♂ 9 mill. ♀ (same size)  $7\frac{1}{2}$  mill. Two ♂, one ♀.

The ♀ subimago has the coloring of the abdominal dorsum dull and opaque, and the yellowish vittæ obliterated, but the shape of the dark vitta still remains discernable. The wings are dull opaque yellowish.—Length ♂ 19 mill. ♀ 18—20 mill. Exp. ♂ 33 mill. ♀ 38—40 mill. Seta ♂ 18 mill. ♀ 13 mill. Interm. seta ♂  $4\frac{1}{2}$  mill. ♀  $10\frac{1}{2}$  mill. One ♂ from which I bred an imago; two ♀.—The only specimen I formerly had of this species was a ♂, found entangled in a cobweb. In disengaging the insect the setæ got broken in pieces, except about  $\frac{1}{3}$  of their length, but I guessed them at “about 40 or 50 mill.” The additional ♂ I now possess was bred from a subimago, the setæ of which measured 18 mill., and those of the subimaginal integument 19 mill. This ♂ died before its setæ became fully developed, but they measure now about 24 mill. As the setæ of the ♂ imago in the allied *P. bilineata* and *P. limbata* are much more than double those of the ♂ subimago, we may safely estimate the seta of ♂ *vittigera*, imago, at about 30 or 35 mill., when fully developed, those of the subimago being 18 or 19 mill. The seta of the female imago of the next species measures  $22\frac{1}{2}$  mill., and that of the ♀ subimago 17 mill.; but it is a very general rule in Ephemera that the ♂ setæ and ♂ front leg are proportionally much more elongated than the ♀ setæ and ♀ front leg, on assuming the imago state.

***P. quadripunctata* n. sp.**

The imago ♀ differs from the preceding species (*P. vittigera*, Walsh) only as follows:—*1st.* There are four distinct fuscous dots, each surrounded by a slight cloud and conspicuous to the naked eye, on the front wings, extending in a slightly curved line from the middle of the costa to the centre of the disk; viz., one on the 2d vein of the costa, and one on the 4th, 6th and 9th veins respectively from the costal edge. In *vittigera*, imago and subimago, no traces whatever can be discovered of any such dots. *2nd.* The piceous vitta of each abdominal segment, instead of having its sides nearly straight, has them sharply angulated, so that the vitta of each segment forms a regular hexagon.—The small yellowish vittæ included in the piceous vitta are here subobsolete, but are very distinct in the ♂ subimago.—Length ♀  $19\frac{1}{2}$  mill. Exp. ♀ 40 mill. Seta ♀  $22\frac{1}{2}$  mill. Interm. seta ♀  $19\frac{1}{2}$  mill. One ♀; ♂ unknown.

The ♂ ♀ subimago differ from *vittigera* in the same two characters as the ♀ imago. In ♂ the coloring is unusually bright, but the setæ are pilose and the wings fringed under the lens. Both ♂ ♀ differ from ♀ subimago of *vittigera* in the wings being whitish-opaque, instead of yellowish-opaque.—Length ♂ 19 mill. ♀ 22 mill. Exp. ♂ 32 mill. ♀ 41 mill. Seta ♂ 15 mill. ♀ 17 mill. Interm. seta ♂ 3 mill. ♀ 14 mill. One ♂, one ♀.

*Note 17, p. 175.* P. BILINEATA Say, and P. LIMBATA Pictet. Nothing is easier than to distinguish living specimens of these insects by the color of the eyes. In the former the upper half of the eyes is cinnamon-brown, in the latter bright greenish yellow; in both the lower half of the eyes is black. The dried specimens, especially those of ♂, are very difficult to distinguish. I incline to believe that both the abnormal ♂ from Rock Island, the 3 ♂ from Chicago, the ♂ from Red River (Uhler), and the ♂ habitat unknown, are all properly referable to *limbata* and not to *bilineata*. In the middle of July, when on the shallow arm of the Mississippi, known as "the Slough" at Rock Island, *bilineata* appears in prodigious swarms, so that the bushes absolutely bend down with their weight, I examined many hundred ♂ ♂, but could not find a single one with the setæ other than dusky-brown to the naked eye, although under the lens there is occasionally a very small whitish annulus, as is noticed in Dr. Hagen's description, at the base of the joints. The ♀ ♀, on the contrary, almost universally had the setæ very pale brown, verging on white towards the tip and darker at base, with conspicuous dark brown incisures, which were scarcely ever absent. In no one instance could I perceive an individual ♂ with the setæ as they are described by Dr. Hagen in the 3 ♂ from Chicago, and as they are in ♂ *P. limbata*, viz., brown with the basal half of the joints pale. Neither could I see a single individual ♂ or ♀ with the tips of the hind wings hyaline, as they are said to be in the abnormal ♂ from Rock Island, and in the ♂ without habitat. Lastly, I am sure that in the thousands of individuals both ♂ and ♀ which blackened the bushes, there was not one with the upper surface of the eyes yellow or yellowish; the only variation I noticed from the normal color was, that one ♂ had the eyes a shade or two paler than the rest on their upper surface. I have now before me in the dried specimen 13 ♂ 18 ♀ of *bilineata*, and 5 ♂ 3 ♀ of *limbata*, and the following Table

expresses such differences between the two species as I find to be pretty constant, all exceptions that occur being carefully noted.

	P. BILINEATA Say. (= <i>limbata</i> Hag. Synops.)	P. LIMBATA Pictet. (= <i>bilineata</i> Hag. Synops.)
Prothorax.	Black in front and laterally, as described in Synopsis.	Black laterally only, as described in Synopsis.
Spots on each side of the joints of abdominal dorsum.	Yellowish white, medial, suboblong or elongate-triangular; lateral tip of each joint brown.	Yellow or fulvous, basal, equilaterally triangular; lateral tip of each joint with a similar fulvous or yellow triangle.
Anterior legs ♂ ♀.	Fuscous immaculate, base of tarsal joints 2—4 paler only in two ♀.	Fuscous, base of tarsal joints 2—4 whitish or yellowish, except in a single ♂.
Four hind legs ♂ ♀.	Femora dull greenish, knees and the rest of leg fuscous.	Bright clear yellow, tips of a few of terminal tarsal joints, and the whole of 5 fuscous.
Seta ♂.	Dark fuscous brown, the joints occasionally with a very narrow basal whitish annulus.	Whitish, terminal $\frac{1}{2}$ of each joint brown; joints sometimes alternately 1 all brown and 1 all white, or 2 all brown and 1 all white.
Seta ♀.	Very pale brown, darker at base, whitish at tip, almost always with fuscous incisures.	Whitish, with brown incisures obsolete at tip, in a very immature ♀ obsolete except at the extreme base. Incisures sometimes irregularly wide & narrow.
Veins at the extreme base of all four wings ♂ ♀.	Dusky.	Hyaline.
Veins in all four wings ♀ except at the extreme base.	Dusky or black.	Yellowish, more or less partially tinged with dusky.
Terminal edge of hind wings.	Fuscous ♂ ♀.	Fuscous or clouded ♂, hyaline or clouded ♀.

In all my ♂ specimens both of *bilineata* and *limbata* the anterior leg is nearly as long as the body, but proportionally a little longer in the former than in the latter; whereas in the abnormal ♂ from Rock Island, described above by Dr. Hagen, the anterior ♂ leg is only  $\frac{1}{2}$  as long as the body. In 9 ♂ *bilineata*, measured while they were alive, the

body was  $15\frac{1}{2}$ — $23\frac{1}{2}$  mill. and the seta 58—74 mill., or more than three times the length of the body. In 3 ♂ *limbata*, measured when dried, the body was  $13\frac{1}{2}$ —19 mill., the expanse 28—40 mill., and the seta 35—52 mill.; the seta being considerably less than three times the length of the body. On the other hand, in Dr. Hagen's abnormal ♂ the seta is not much more than half as long again as the body. As in the ♂ subimago of both these two species the anterior legs and the setæ are short and the setæ brownish immaculate, I should conceive that the abnormal ♂ must have been a specimen which died immediately after moulting, before the anterior legs and setæ had time to expand to their proper proportions, and the setæ to acquire their proper coloring. I noticed above, under *Bætis sicca* Walsh, an abnormal ♂ with the anterior legs proportionally short. It may be added here, that both in *bilineata* and *limbata* in the anterior leg of the ♂ imago the tibia is about  $\frac{1}{2}$  longer than the femur, varying a little in different individuals; while in ♀ imago and in ♂ ♀ subimago the tibia of the anterior leg is but very slightly longer than the femur. Upon the above hypothesis, this fact serves to explain why in Dr. Hagen's abnormal ♂ the femur is 3 mill., and the tibia only  $3\frac{1}{4}$  mill. In 17 ♀ *bilineata*, measured while alive, the length of the body was 17—30 mill., the seta 30—54 mill., and the anterior leg scarcely more than half as long as the body.

*Note 18, p. 177.* I conceive this doubtful ♀ from Rock Island to be a mere variety of *P. limbata* Pictet (*bilineata* Hag. Synop.). As to the six differences pointed out above by Dr. Hagen, 1st. My three ♀ of *limbata* measure, body  $15\frac{1}{2}$ —20 mill., expanse 38—43 mill., seta 26—30 mill., the specimen with the *shortest* body having the *widest* expanse. I have even a ♀ of *bilineata*, selected from among a crowd of others, some but a trifle smaller, the body of which when recent measured 30 mill. and when dry 23 mill., the expanse being 55 mill. or 3 millimetres more than that of the doubtful ♀. Yet the *usual* dimensions of *bilineata* and *limbata* are about the same, except the setæ. 2nd. The prothorax generally contracts longitudinally in drying and its shape is not a reliable character. 3rd. Of 5 ♂ 3 ♀ *limbata* before me scarcely two have the abdomen exactly alike, the dorsum in some having the blood-brown color dominant, and in others the yellow dominant, with all the intermediate grades. 4th. In the four hind legs of the 5 ♂ 3 ♀, some-

times the tip of tarsal joints 1—4 is brown, sometimes only the tip of 3 and 4 or of 4 only. *5th.* In two of my ♀ *limbata* the wings are yellowish; in one they are subhyaline with a slight smoky tinge, as they also are in my 5 ♂. *6th.* The intermediate seta generally shrinks in drying and is not reliable. Sometimes in the dried specimen it can scarcely be distinguished, but in the living insect it is always easily seen by the naked eye.

I believe that in *bilineata* and *limbata* the terminal  $\frac{1}{3}$  of the seta of the ♂ ♀ imago is always pilose under the lens—a thing which I have not noticed in the imago of any other Ephemerinous group but my *Bætis* § A, and there only in the extreme tip. This is also stated by Dr. Hagen as a character of the ♀ of his second group, with a query that the ♀ remains in the subimago state like the first group. In that case the seta would probably be hairy, not merely at the tip but throughout its length. Has the ♂ also of this *second* group a seta hairy at the tip, like the ♂ of *Hexagenia* n. g., the *sixth* group?

On the whole, I am satisfied that at Rock Island we have only two species of this group—*bilineata* and *limbata*—the former of which occurs in prodigious swarms and only on the banks of the Mississippi, in the middle of July; the latter occurs very sparsely and often as much as a mile from the nearest river. I found the former in similar profusion on the Ohio river in South Illinois, in the middle and latter end of July, 1861, so that I suspect it is confined to large rapid rivers. It is possible that some of Dr. Hagen's specimens may belong to a third species, with which I am unacquainted. Foreign entomologists, who can only study *N. A. Ephemerina* in the dried specimen, labor under great disadvantages, not only because the setæ of the specimens which reach them are frequently mutilated, or badly shrivelled, but because one of the best and most constant characters, the color of the eyes, is entirely obliterated in death, to say nothing of the great difficulty of ascertaining from the generally shrivelled eyes of the dried specimen whether these organs are single or double.

*Note 19, p. 177.* Every spring many acres of log-rafts are floated down to the Rock Island saw-mills from the pineries in Wisconsin and Minnesota. Amongst the floating rubbish that accumulates between the logs breed myriads of Ephemerinous pupæ, which may be often noticed crawling out on to the logs to assume the subimago state. As these

rafts come from various rivers which empty into the Mississippi, it happens, as we might *a priori* anticipate, that from time to time new Ephemeropterous species are imported amongst us. This may account for the fact, that although in 1862 I pretty thoroughly explored the neighborhood of our saw-mills, yet in 1863 I have met with several species in considerable abundance which were previously unknown to me. On the other hand, of several species that were abundant in 1862, I have in 1863 met with only one or two specimens, e. g., *Potamanthus cupidus*, *Bætis alternata* and *Bætisca obesa*.—This may, however, be partly explained by the fact that in 1863 the Mississippi has been unusually low and comparatively but few log-rafts have come down.

P. PULCHELLA Walsh, and P. TERMINATA Walsh. I am not sure but these two species are identical. I had supposed that the presence of fuscous dots in *pulchella*, located on the spiracles of the pale segments of the abdominal dorsum, was a constant character ♂ ♀; but out of many dozen individuals examined in 1863, I find a ♂ with these dots subobsolete and another with them obsolete. Although *pulchella* has been abundant in 1863, I have not seen a single *terminata*, so as to determine with precision the color of its eyes. *Pulchella* certainly has them “pearly-whitish,” and from my general recollection that the eyes of *terminata* were yellow, I stated them in my description to be “generally yellowish.” In this, however, I may possibly be mistaken, for I was not in the habit in 1862 of noting the color of the eyes in the field, and these organs often turn black in the interval between capture and death, sometimes both, and sometimes only one. The only *constant* distinguishing character that remains is, that the four hind legs and the abdominal joints 1—6 are pure whitish in *pulchella* and pale yellowish in *terminata*, which, unsupported by a constant and decided difference in the color of the eyes, would not be sufficient to separate such closely allied species. Here, as elsewhere, it is easy to separate two *individuals*, but to separate two *species*, when specimens are greatly multiplied, is a far more difficult undertaking.

As to Dr. Hagen’s remark on the probable identity of *P. pulchella* Walsh, and *Bætis verticis* Say, there is some clerical or typographical error in the figures given in the Synopsis. Say says that *B. verticis* is “over one-fourth of an inch long,” and the setæ “over three-tenths,” which in millimetres would be about 7 and 8; and he says likewise

“setæ hardly longer than the body.” Yet the figures given in the Synopsis under *B. verticis* Say, are 8 and 24 respectively. Now the setæ of *pulchella* are 17—22 mill., and it can scarcely therefore be identical with a species which, according to its describer, has setæ only 8 millimetres long. If *B. verticis* Say, is ever identified, I should conceive, from the ornamentation of the legs and the description of the hind wings, that it will probably prove to be a *Cloe*.

The following belong to the same group (*Heptagenia* n. g.) as *P. pulchella* Walsh.

#### HEPTAGENIA n. g.

**H. simplex**, n. sp.—♂ Golden-yellow ranging to whitish. *Head* with the eyes bright greenish yellow in the living insect above and below; orbits of ocelli blackish. Upper surface of *thorax* flesh-colored. *Abdomen* and *venter* perfectly hyaline and immaculate, except the last two or three joints, which are opaque yellowish or whitish; setæ white, tinged with dusky at the extreme tip; anal appendages white. *Legs* white, the femora yellow or yellowish, and the extreme tips of all the tarsi and in the anterior legs the tips of the tibiæ and sometimes the tarsal incisures, fuscous. *Wings* hyaline, veins and cross-veins fine, subequal, the cross-veins on the terminal  $\frac{1}{2}$  of the costa coarse, on the other  $\frac{2}{3}$  very fine, and entirely absent, except the oblique basal vein, on the basal fifth of the costa; veins and cross-veins in both wings hyaline except on the terminal  $\frac{1}{2}$  or  $\frac{2}{3}$  of the front wing where they are fuscous, all the costal cross-veins being occasionally fuscous.

The ♀ differs from ♂ as follows:—The abdomen and venter are egg-yellow, except where the eggs have been extruded. The setæ are scarcely tinged with dusky at tip. All six legs have only the extreme tip of the tarsus a little tinged with fuscous. All the veins and cross-veins are hyaline, except a few cross-veins towards the costal tip which are dusky, and the costal veins which have a yellowish tinge.—Length ♂ 6—8 mill. ♀ 7—8½ mill. Exp. ♂ 16½—20½ mill. ♀ 21—22½ mill. Seta ♂ 14—18½ mill. ♀ 14—16 mill. Ant. leg ♂ 6½ mill. ♀ (same size) 6 mill.

Ten ♂, nine ♀.

The ♂ ♀ subimago differ only in the usual way from the imago. The wings, as well as their veins and cross-veins, are yellowish, all the veins and cross-veins, except on the costa of one ♀, untinged with fuscous.—Length ♂ 6 mill. ♀ 6½—9 mill. Exp. ♂ 16 mill. ♀ 19—25½ mill. Seta ♂ 10½ mill. ♀ 10—15 mill. One ♂, four ♀.—This species is remarkable for the unusual shortness of the anterior tarsus, which never exceeds  $\frac{3}{4}$  the length of the tibia in ♂, and  $\frac{1}{2}$  the tibia in ♀, whereas in *pulchella* ♂ it is generally from  $\frac{1}{4}$  to  $\frac{1}{2}$  longer than the tibia and in *pulchella* ♀ about as long as the tibia. It differs also from its congeners,



except *pulchella*, *terminata* and *maculipennis* n. sp., in the first tarsal joint in all ♂ ♀ legs being as long as the second, instead of being somewhat shorter, joints 1—4 being subequal, 4 a trifle the shortest. I met with a single ♀ subimago of this species in 1862, and laid it aside as a "nondescript." In 1863 the species was abundant in June, near one of our saw-mills. No less than 5 of the ♂ specimens described have the eyes fully rounded out, which is the surest sign of maturity both in *Ephemerina* and *Odonata*, so that they cannot be considered as immature and colorless individuals of some other species. The colorless specimens of *terminata* described by me have their anterior tarsi as long as fully colored specimens.

**H. cruentata**, n. sp.—♂ Yellowish. *Head* with the eyes in the living insect pale bluish gray, a black line dividing the upper  $\frac{2}{3}$  from the lower  $\frac{1}{3}$ ; ocelli fuscous; vertex sanguineous; seta dusky, whitish at tip. Upper surface of *thorax* sanguineous. Dorsum of *abdomen* sanguineous, the overlapping portion of the segments darker. Anal appendages pale, fuscous at tip: setæ whitish, the incisures fuscous and towards the base alternately wide and narrow. All six legs with the terminal  $\frac{1}{2}$  of the femora, and the basal  $\frac{1}{3}$  and terminal  $\frac{1}{3}$  of the tibiæ, pale sanguineous, the sanguineous part of the femora darker at each extremity, so as to present a narrow medial and terminal dark annulus; all the six tarsi with their claws and incisures dusky. *Wings* hyaline; veins and cross-veins moderate, the veins finer than the cross-veins, all fuscous except at the extreme base of the wing and the basal  $\frac{2}{3}$  of the costa, where the veins are respectively hyaline and yellowish; the costal cross-veins all, including the oblique basal vein, of uniform coarseness, and the costa uniformly tinged with yellow. Half way to the tip of the front wing the 2nd costal vein is thickened and obfuscated for the length of half a millimetre, as in *flavescens* Walsh. and generally in *pulchella* Walsh.

The ♀ is occasionally paler than ♂, and occasionally the venter is sanguineous. In two specimens there is a pair of subobsolete pale dorsal vittæ on each abdominal joint. The hyaline portion of the wing-veins extends a little further than in ♂, particularly in the hind wings.—Length ♂  $7\frac{1}{2}$ —8 mill. ♀ 8—9 mill. Exp. ♂ 19—20 mill. ♀ 22—23 $\frac{1}{2}$  mill. Seta ♂ 25—27 mill. ♀ 17—20 mill. Ant. leg ♂  $9\frac{1}{2}$  mill. ♀ (larger)  $7\frac{1}{2}$  mill.

Two ♂ ; three ♀ .

The ♂ subimago, from which I have bred the imago, differs as usual. The setæ are tinged with dusky, the fuscous incisures less obvious. In 1 specimen the markings of the legs are much paler. In both, the wings, as well as all their veins and cross-veins, are dull opaque yellowish.—Length ♂ 7 mill. Exp. ♂ 20—21 mill. Seta ♂ 12—14 mill. Two ♂ ; ♀ unknown.—Closely allied to *flavescens* Walsh, but much smaller, and the eyes are not bright greenish yellow as in that species. Differs also

in the uniform coloring of the costa, and in the very remarkable ornamentation of the legs and especially the tibiæ. In *flavescens* ♂ the anterior tarsus is a trifle longer than the tibia; in *cruentata* ♂ it is the same length. In *flavescens* ♀ it is a trifle shorter, in *cruentata* ♀  $\frac{1}{4}$  shorter. In both species the first tarsal joint is slightly shorter than the second in ♂ ♀ four hind legs, shorter in ♀ anterior legs, and much shorter in ♂ anterior legs, and corresponding differences are observable, in the other species of this genus, between the different ♂ ♀ legs, except in *H. simplex* where ♂ ♀ anterior tarsi are abnormally short.

**H. maculipennis**, n. sp.—♂ Pale yellowish. *Head* with the vertex ferruginous; orbits of ocelli and antennal seta dusky. *Thorax* ferruginous above. Dorsum of *abdomen* with the terminal  $\frac{2}{3}$  of joint 6, the whole of 7 and 8 and the extreme base of 9, piceous; anal appendages and setæ whitish. *Legs* whitish, the femora yellowish and generally with a short fine fuscous vitta beneath at tip; all six tarsal claws and the extreme tips of the anterior tibiæ, fuscous. *Wings* hyaline; veins fine and dusky, cross-veins coarse and black, except on the inner submargin of the front wing and the entire hind wing, where both veins and cross-veins are all hyaline. On the costa of the front wing the cross-veins are coal-black and arranged as follows, giving the appearance of spots:—at the base about four at the usual distance, the 1st in both rows and the next three in the costal row heavily bordered with black, then an open space, then on the middle of the costa a group of about three cross-veins close together and bordered with black, then a space with fewer cross-veins than usual, then at  $\frac{2}{3}$  the distance to the tip another similar group of four or five similarly bordered, then cross veins at the usual distance as far as the tip.

The ♀ is paler than ♂, and the terminal dorsal joints of the abdomen are whitish-opaque more or less tinged with ferruginous. The tip of the anterior tibiæ is scarcely ever fuscous, and the costal markings are rather paler.—Length ♂  $4\frac{1}{2}$ —6 mill. ♀ 5—6 mill. Exp. ♂ 14—17 mill. ♀ 15—17 mill. Seta ♂ 12—15 mill. ♀ 9—12 mill. Ant. leg ♂ 8 mill. ♀ (same size) 5 mill.

Eight ♂, seven ♀.

The subimago ♂ ♀ differs as usual. The setæ are tinged with dusky at tip; the wings are tinged with dusky, and all the cross-veins are slightly bordered with dusky.—Length ♂ ♀  $4\frac{1}{2}$  mill. Exp. ♂ 14 mill. ♀  $15\frac{1}{2}$  mill. Seta ♂  $7\frac{1}{2}$  mill. ♀ 8 mill. One ♂, one ♀.—A well marked species, remarkable for the arrangement of the costal cross-veins. In the anterior ♂ leg, tarsal joint 1 is about  $\frac{1}{3}$  of 2, in anterior ♀ leg joint 1 is about  $\frac{2}{3}$  of 2; in both ♂ ♀ anterior legs the tarsus is longer than the tibia; in the four hind legs ♂ ♀ joint 1 is the same length as 2, as in *pulchella*, *terminata* and *simplex*.

## EPHEMERA.

Note 20, p. 178. *E. myops* n. sp.

The ♂ of this species differs from *E. flavcola* Walsh, only in the following respects:—The size is much larger, the expanse of the smallest *myops* being 7 millimetres greater than that of the largest *flavcola*, of which 15 specimens have been measured by me; yet the eyes are not only relatively but absolutely smaller, and are separated by a space  $2\frac{1}{2}$  times their own diameter instead of only by one diameter. The lateral abdominal fuscous vitta found in *flavcola* is absent, which however occurs also in two specimens of *flavcola*. In the more mature specimen both venter and abdomen are ferruginous from 1 to 5, 6 and 9 paler, 7 and 8 yellowish; in the other specimen the whole abdomen is yellowish, and I think it was so with both in the living insect.—Length ♂ 12—13 mill. Exp. ♂ 26—27 mill. Seta ♂ 27—29 mill. Interm. seta ♂ 19—21 mill. Ant. leg ♂ 11 mill. Two ♂; ♀ unknown. One ♂ was bred from the subimago, and the subimaginal integument having been preserved shews the three setæ to have been exactly equal and 16 mill. long. But for the eyes, which give this insect the appearance of a ♀ *Bætisca*, I should have supposed it to be a mere variety of *flavcola*.

## CLOE.

Note 21, p. 178. *C. VICINA* Walsh, non Hagen. Say gives the length of *C. posticata* as  $7\frac{1}{2}$  or 8 mill., and the setæ 18 or 19 mill., describing only the ♂ imago. Of 7 ♂ imagos of *C. vicina* Walsh, measured by me—and I had noticed many more in the field which did not appear any larger—the length was 4—5 mill. and the seta  $7\frac{1}{2}$ —10 mill. Is not this rather too great a discrepancy to allow us to consider the two species identical? *Vicina* being preoccupied, I should propose for my species, if it be really new, the name of *propinqua*.

## ODONATA.

N. B. The following drawing of the *hind* wing of *Gomphus*, copied with a few additions from the original of Dr. Hagen, (Mon. Gomph. Pl. 22,) is intended to illustrate the pterological nomenclature of Odonata. With the exception of the anal angle (*z*), and the anal triangle (*Γ*), the same parts with the same names occur slightly modified in the *front* wing of *Gomphus*, and generally in both wings throughout Odonata,



SECTORS (branches springing from areas, veins, cross-veins, or other sectors).—*fff*, principal sector. *g*, nodal sector. *h*, subnodal sector. *k*, median sector. *mm*, short sector. *n*, upper sector of the Triangle, (normally a prolongation of *d*.) *o*, lower sector of the Triangle, (normally a prolongation of *e*.) *o'*, *o''* its branches, (*rameaux*.)\*

CROSS-VEINS.—*p*, nodus. *q*, arc or arculus. *rrr* ---- antecubitals. † *sss* ---- postcubitals.

AREAS and ANGLES.—*t*, THE TRIANGLE, (discoidal.) *u*, internal triangle. *V*, anal triangle. *W*, basal area (or space.) *xx*, median area (or space.) *y*, membranule. *z*, anal angle in ♂, the dotted line *z'* shewing the form of the anal corner of the wing in ♀ *Gomphus*. ‡ *AA* ----, discoidal areolets, (in the figure, two ranges of them commencing with three.) *B*, Pterostigma. *C*, its basal (or internal) side prolonged in the normal manner. *D*, “quadrangle,” “quadrilateral,” or “area above the triangle,” bounded above by *m*, below by *d*, basally by *q*. and terminally by an unnamed cross-vein. *EEE*, Postcostal area (or space.)

Of the above pterological parts, *q* and its sectors, *r*, *s*, *t*, *W*, *y*, *B*, and in Calopterygina and Agrionina “the quadrilateral” (*D*) and “the postcostal area” (*E*) are the most important in Classification. When in Odonata “antecubitals” and “postcubitals” are spoken of, the anterior or costal series of each, in the front wing, is always meant, unless express reference is made to the antecubitals and postcubitals of the hind wing, or to their posterior or subcostal series. The triangles are said to be “free” (*libres*) or “empty” (*vides*), when, as in *Gomphus*, they are not intersected by cross-veins. In *Gomphoides*, *Cordulegaster*, and most other triangle-bearing Odonatous genera they are so intersected. The discoidal Triangle (*t*) is usually called simply “the Triangle.” In all my *Gomphus* (60 or 70 specimens of different species, including *Macrogomphus spiniceps* Walsh) the first and fifth antecubitals are more robust than the others both in the costal and subcostal series, and are

\* The figure gives an *angle* where *o'* bifurcates from *o*. which should have been a flowing curve. Both *n* and *o* should have been engraved as springing from the lower angle of the triangle (*t*).

† The basal antecubital is wrongly engraved as dislocated with that of the 2nd or subcostal series.

‡ The angle *z* ought to have been engraved as much more acute and salient.

never "dislocated" as the other antecubitals are towards the nodus, (*p.*) In the Asiatic type of *Macrogomphus*, however, it is the 1st and the 7th, not the 1st and the 5th antecubitals which are thus thickened. In *Æschna (constricta)* and *Anax (junius)* the medial antecubital which is thus thickened and not dislocated varies in the same species, in the same sex, and sometimes even in the right and left wings of the same individual, from the 6th to the 7th; thus proving that in *Æschnina*, at all events, this character is not even of specific, much less of generic or subgeneric value.

#### HETÆRINA.

The following Table of the sub-groups of the subgenus Hetærina, copied with additions from Selys and Hagen's *Monogr. Calopt.*, will probably be found both useful and interesting. Of this subgenus 31 species, all American, are now described, 9 of which exist in the U. S. and probably many more remain to be discovered.

Pterostigma absent ♂ ♀	Tibiæ black	Tip of ♂ hind wings hyaline	1 species, S. A.
		Tip of ♂ hind wings with a red spot,	8 sp. S. A. and 1 sp. U. S. ( <i>septentrionalis</i> .)
		Tip of all 4 ♂ wings with a red spot,	4 sp. S. A.
	Tibiæ "superiorly" (or exteriorly) pale. (Tip of ♂ wings with no spot.)		2 sp. N.A. and S. A. and 1 U. S. ( <i>californica</i> .)
		Tibiæ "superiorly" (or exteriorly) pale. (Tip of ♂ wings with no spot.)	4 sp. U. S. ( <i>americana</i> , <i>basalis</i> , <i>pseudamericana</i> n. sp. and <i>texana</i> n. sp.)
Pterostigma present ♂ ♀, sometimes rudimentary.	Tibiæ black.	Tip of ♂ wings, especially the hind ones, bordered with brown.	1 sp. S.A. 1 sp. N. A. & 3 sp. U. S. ( <i>tricolor</i> , <i>rupinsulensis</i> Walsh and <i>rupamaensis</i> n. s.)
		Tip of all 4 ♂ wings with a brown spot.	1 sp. S. A. and 1 sp. N. A.
		Tip of ♂ hind wings with a brown spot.	1 sp. N. A.
		Tip of ♂ hind wings with a red spot.	1 sp. S. A.
		Tip of all 4 ♂ wings with a red spot.	1 sp. S. A.

H. AMERICANA? Fabr. A single ♂, which I refer with some hesitation to this species chiefly because the ♂ abdominal appendages agree both with the figure and with the description in the *Monographie*, was

taken by me at the end of August on Rock River, Ill. There is, it is true, a small but distinct tubercle above on the posterior base of the median lamiform tooth of the appendage, which is not specially mentioned in the *Monographie*; but as this tubercle exists in both my other species of this subgroup, it probably exists also in *americana*. The carmine-red basal spot on all the 4 wings extends about  $\frac{3}{4}$  the way to the nodus, or 11—12 cellules beyond the quadrilateral in the front wing and 8—9 cellules beyond the quadrilateral in the hind wing. Now *americana* ♂ is described as having the carmine-red spot reach only  $\frac{1}{2}$  the way, instead of  $\frac{3}{4}$  the way, to the nodus; and in a ♂ specimen sent me by Mr. Uhler, which however as it has lost most of its abdomen cannot be identified with certainty, it reaches in the front wing 5 cellules beyond the quadrilateral and in the hind wing 3. I observe, however, that in *rupamensis* ♂ n. sp. there is a variation of 2 and 5, and in *pseudamericana* ♂ n. sp. a variation of 2 and 4 cellules in the extent of the basal spot in the front and hind wings respectively; and as a character which is variable in one species may generally, I think, be assumed to be more or less variable in closely allied species, we may disregard in this specimen the unusual extent of both basal spots, being about 6—7 cellules of overplus. Again, in *americana* ♂ the basal spot is described as “leaving the costal margin free almost for its whole extent” in the front wing, and “leaving the postcostal margin free from opposite the arc” in the hind wing; (*Monogr.* p. 132,) and such is the case also in the specimen from Mr. Uhler. In my ♂ the spot on the front wing leaves the costal margin at  $\frac{1}{2}$  its own length from the base of the wing; and that on the hind wing leaves the postcostal margin at  $\frac{2}{3}$  its own length from the base of the wing; the other two margins are touched by the spot throughout its entire length. But in these points, too, I find very considerable variation in the above named two species. There are also some other less important and equally variable characters in which our insect differs from the description, viz. 1st. The entire second joint of the antennæ is brown, instead of being “brown at each end;” but it is also uniformly brown in the Uhlerian specimen of *americana*. 2nd. The pterostigma is black, instead of “reddish-brown” in the mature ♂ and “yellow” in the immature ♂. 3rd. The epistoma is brassy-green, and the top of the head and the dark parts of the thorax coppery-red, as is also the

case in the Uhlerian specimen. The *Monographie* describes the epistoma as "bronze-green," the top of the head as "golden-green;" and the thorax as "coppery-green in front" and "bronze-green" on its sides. In Dr. Hagen's Synopsis the general color of ♂ is said to be "coppery." In the above-quoted two species (*rupamnensis* and *pseud-americana*) I find the coloration in these parts to be very variable. As is also the case in the Uhlerian specimen of *americana*, the postocipital tubercles of this specimen are obtuse, which character however is omitted in the *Monographie*.—Antecubitals 25—26; postcubitals 25—27; 9—13 cross-veins to the 4 quadrilaterals; 6—8 cross-veins to the 4 basal areas. Length ♂ 47 mill. Expanse ♂ 58 mill. Abd. ♂ 38 mill. Front wing ♂ 30½ mill. Hind wing ♂ 29 mill. One ♂; ♀ unknown. Very rare near Rock Island, Ill. A search of several weeks for the ♀ of this species, and also for additional ♂ specimens, was finally unsuccessful.

A new species of *Hetærina*, *basalis* Hagen, is briefly described by its differences from *americana* in M. Selys's *Addit. Synops. Calopt.* p. 6. (where however the habitat should be "Pecos River, Texas," instead of "Pecos River, High California,") and also in Hagen's *Synopsis* p. 60. As in that species the basal spot is said to extend  $\frac{4}{5}$  of the way to the nodus instead of only  $\frac{1}{2}$  the way as in *americana*, it might be thought that our insect, whose basal spot extends about  $\frac{3}{4}$  the way to the nodus, should be referred there. But, *1st*, in *basalis* the basal spot is said to be more convex exteriorly than in *americana*, which is not the case here, and *2nd*, the superior ♂ abdominal appendages of *basalis* are said to have the middle tooth "triangular," whereas according to the figure and description in the *Monographie* the middle tooth in *americana* is "rounded" in a regular curve, as in my ♂. Amongst the *débris* of a number of specimens of *Hetærina* sent me by Mr. Uhler, some of which were labelled "*basalis* Hagen, Texas," I find an abdomen with just such a triangular tooth on the ♂ abdominal appendage. In a word, this character of the tooth is structural and therefore as a general rule more important; the characters drawn from the spot are merely colorational, and are not, therefore, as a general rule, either so reliable or so important.

But besides this last distinction it is important to observe, that



throughout Odonata the ♂ abdominal appendages are most remarkably constant; and it is expressly remarked of the genus *Hetærina* in the *Monographic* that “the species resemble one another greatly, so that many of them are distinguishable with difficulty, especially ♀ ♀.” and that in ♂, besides the characters drawn from the wings, “we should pay special attention to the organization of the abdominal appendages, which are fortunately a little different almost in every species.” (p. 87.) I have carefully collated 36 specimens of ♂ *rupamuensis* n. sp. and can find no appreciable variation whatever in the structure of these organs. Hence we may infer, I think, that they are generally constant in other species of the genus, and as the characters in which our insect differs from *americana* are by no means constant, while that of the ♂ abdominal appendages, in which it agrees with *americana* and differs from *basalis*, may be assumed to be constant, we should place more dependance upon a single constant character than upon several inconstant ones.

The principle above referred to, which though not universally is, I think, pretty generally true, may be called the LAW OF EQUABLE VARIABILITY, and may be thus expressed:—If any given character is very variable in one species of a group, it will tend to be variable in allied species; and if any given character is perfectly constant in one species of a group, it will tend to be constant in allied species. For example, almost all the spotted *Coccinellidæ* are, as is well known, more or less variable in the characters drawn from their spots; *Anomala varians* Fabr. is exceedingly variable in its spottings, and so is *A. lucicola* Fabr. and *A. binotata* Schönh.; the European *Donacia Proteus* has the ground-color remarkably variable, and most of our N. A. species vary similarly more or less; *Orsodacna vittata* Say, is most remarkably variable in its vittæ, and so is another vittate species *O. childei* Kirby, from Hudson's Bay; the different species of *Melitæa* and *Argynnus* are notoriously variable in the markings of their wings; the spotted species of *Tettigoniadæ* are more or less variable in their spots and some astonishingly so; and throughout *Perlina* the neuration, which in most families of insects is constant, is more or less inconstant. On the other hand, in the allied family *Odonata* the neuration is wonderfully constant. Finally, in the tribes *Eschnina* and *Libellulina* the coloration is pretty constant; in the tribe *Agrionina* it is as incon-

stant.\* All this is generally expressed by saying that so and so are difficult, variable or polymorphic groups; but I do not know that any one has yet called attention to the fact as a confirmatory proof of the Derivative Origin of species. Mr. Darwin certainly has not done so. The question seems unanswerable:—If species were separately created, not derived one from the other, why should variability have been largely conferred upon some entire groups and almost entirely denied to other entire groups? Why should the spotted Erotylidæ be constant, and the spotted Coccinelladæ inconstant, in their spottings?

Throughout Odonata, as is well known, the ♂ abdominal appendages are used to embrace the neck of the ♀ preparatory to and during copulation, and for that purpose they are in general curiously curved and in many cases, especially the two superiors, armed with teeth thorns or branches. The ♀ abdominal appendages are here, on the contrary, always simple—laminar, elongate-conical or cylindrical—and almost invariably smaller than those of ♂. In most genera of Locustariæ Latr. (=Gryllidæ Leach.) e. g. in Phylloptera, Orchelimum, Xiphidium and Conocephalus, but not in Rhaphidophora† which osculates

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\* In my Paper on *Ill. Pseudoneur.* (p. 381) I stated erroneously that the milky-blue tint (*bleu saupoudré*) often found on the bodies of certain mature ♂ *Libellulina* “seems to be secreted under the external integument, and what is known as *pruinoseness* in *Agrionina* on its surface, whence it may be washed off.” In both tribes the bluish matter is secreted externally, and in both it may be easily washed off. Hence variability arising from this source can scarcely be considered as colorational variability, and so far as regards this character the tribe *Libellulina* are not variable in their coloration.

† The tetramerous Locustarian genus *Rhaphidophora* osculates through the partly trimerous allied genus *Daihinia*, Hald., and the partly tetramerous Gryllide genus *Ecanthus*, with the elsewhere uniformly trimerous Gryllides. Hence it is not surprising that the ♂ ♀ abdominal appendages should here be antenniform as in Gryllides. *Rhaphidophora* and its allies agree also with Gryllides, except *Tridactylus*, and differ from all other Locustariæ known to me, in the ♂ not having any inferior abdominal appendages. In Locustariæ, with the above exception, in Blattadæ, in Mantidæ, and in Acridii, the ♂ but not ♀ has two inferior appendages. In Blattadæ and Mantidæ these appendages are separated from each other, as in the tribe *Agrionina*, and antenniform, and are known as “anal styles.” In the Locustarian genera *Phylloptera*, *Orchelimum*, *Xiphidium* and *Conocephalus* they are laminiform and soldered together more or less at base and antenniform at tip. Finally, in the Locustarian genera *Cyrtophyllus* and *Phaneroptera* and in all Acridii, they are soldered together either

with Gryllides Latr. (= Achetadæ Leach,) in Phasmidæ (*Diapheromera femorata* Say) where however the inferior appendages are wanting, in the Neuropterous family Panorquina, and also in the subfamily Corydalides Westw., of the family Sialina, the ♂ appendages are similarly prehensile and the ♀ appendages similarly simple. Here, however, it is the abdomen and not the neck of ♀ that is grasped by ♂, Odonata being the only known family where the true ♂ reproductive organs are placed at the base, instead of at the tip of the abdomen, and their *coitus* being consequently abnormal. In Forficuladæ the superior

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basally or throughout, as in the Tribes *Æschnina* and *Libellulina*, and laminiform throughout. In the two latter cases the lamina is known to Orthopterists as "the infra-anal plate," (*squama subanalis*, Saussure.) On the other hand, in the Perlinoous genus *Acroneuria* the ♀ has a pair of small, triangular, inferior appendages, and the ♂ has none; while throughout *Ephemerina*, where the superior appendages are similarly antenniform ♂ ♀, the two inferior appendages are multiarticulate and sexually prehensile ♂, but absent ♀.

Typically, the superior abdominal appendages are, I think, three in number. In *Ephemerina* they are all, when present, antenniform, and there is a regular gradation from groups where they are equal in length ♂ ♀ (*Ephemerella*, Walsh,) through groups where they are subequal ♂ ♀ (*Ephemera*), and others where they are subequal ♀ but the middle one short ♂ (*Pentagenia*, Walsh,) and others again where the middle appendage is short or subobsolete ♂ ♀ and either articulate (*Bætis* §§ A & B, Walsh) or exarticulate (*Bætisca*, Walsh,) to groups where the middle appendage is entirely obsolete, (*Bætis* § C. Walsh.) In *Odonata* the middle appendage is obsolete ♂, but is represented ♀ by a laminiform piece known as the superior anal process and most distinctly seen in *Gomphina*, the two inferior anal processes representing the inferior ♂ appendages. In the *Odonatous* pupa, however, they are all three present, in the pupa of *Gomphus* and *Agrion* all three alike, and in that of *Agrion* long and subequal. Throughout *Orthoptera*, except *Forficuladæ* where it is obsolete, the middle appendage is represented by what Orthopterists call the supra-anal plate, and in several *Acridians* the three superior appendages are almost exactly alike, viz., triangularly laminiform. That this supra-anal plate is not the terminal dorsal joint of the abdomen is proved by the fact, that in *Mantidæ* and *Phasmidæ* it exists, though small in size, *in addition* to the nine typical abdominal joints which are all dorsally present in these two families. In most Neuropterous and Pseudoneuropterous families the middle superior appendage is obsolete or subobsolete ♂ ♀. In *Corydalis* e. g. it is represented by an indistinct triangular lamina. The Locustarian genera *Phaneroptera* and *Cyrtophyllus* are remarkable for the intermediate appendage being greatly and narrowly prolonged ♂ and in the former genus bifurcate at tip, and in conjunction with the similarly prolonged "infra-anal plate," which consists of the two inferior appendages soldered together, forming a vertical, prehensile, sexual

appendages are forcipate but nearly alike ♂ ♀ and are used as defensive weapons, the two inferiors being absent. In all the other Neuropterous, Pseudoneuropterous and Orthopterous families, excepting, so far as regards the inferior appendages, the family Ephemera, the abdominal appendages when present are simple, and when present in both sexes are alike ♂ ♀. Occasionally they are laminate (Acridii Latr.=Locustadæ Leach) but usually more or less setiform, the superiors often very long and antenniform and either exarticulate (Gryllides) or multiarticulate, (Blattadæ, Mantidæ, Perlina, Ephemera.) Hence morphologically they must, I think, be considered as caudal antennæ, as they have been actually observed in Gryllides, where however the two inferiors except in Tridactylus are absent, "to be very sensible and to serve probably to give the animal notice of the approach of any annoyance from behind." (Westw. Intr. I. p. 441.) Functionally, however, though not morphologically, these organs are in Odonata and the above enumerated Orthopterous and Neuropterous groups, in ♂ but not in ♀, accessory reproductive organs, just as in Forficuladæ ♂ ♀ they are functionally weapons of defense. The true ♂ reproductive organs are generally in the class Insecta small, retractile and more or less fleshy, so as to be studied with difficulty, especially in the dried specimen, except in Odonata and a few other families, where they are generally large, exerted and horny and consequently not liable to lose their form in drying. Wherever they have been studied, however, they seem to follow the same laws as the ♂ reproductive organs of Odonata, whether true or accessory, which have been so elaborately illustrated by Dr. Hagen, viz., that they are remarkably constant in the same species, and that they differ by small but constant differences in the ♂ ♂, but scarcely

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forceps. Consequently, as this forceps takes the place of the normal horizontal ♂ forceps formed by the two exterior appendages, the latter are here nearly alike in ♂ ♀, except that in Cyrtophyllus they have a long branch ♂ which does not appear ♀.

That the long exarticulate seta in Gryllides is strictly homologous with the short prehensile superior appendage found in ♂ Odonata, &c., is proved by the fact, that the *larva* of Chauliodes, as will be hereafter shown, has two long superior setiform appendages almost exactly like those of Gryllus (= Acheta,) while the *imago* of ♂ Chauliodes has a pair of short prehensile superior appendages closely resembling those of the Odonatous Erpetogomphus. Nobody, I believe, has doubted that the exarticulate seta in Gryllides is homologous with the multiarticulate seta of Ephemera and Perlina.

differ in ♀ ♀, of allied species.‡ On the other hand it is notorious that when in Neuroptera, Pseudoneuroptera and Orthoptera the ♂ abdominal appendages are normal, i. e. antenniform, or degraded so as to be functionally useless, (Acridii,) there is scarcely any difference in their structure between allied species of the same genus or even of the same family.

These facts lead me to suspect that generally in the Class Insecta, when a variation useful to ♂ in his sexual operations does take place in ♂ reproductive organs, it is often seized hold of by Natural Selection to originate a new species, the less favored ♂ ♂ being beaten in the struggle for ♀ ♀; and that species thus formed afterwards, by ordinary variation and by so to speak "breeding in-and-in," modify and gradually exaggerate colorational peculiarities which were originally common to them and the supposed primordial form from which they sprang. In no other way, on the Principles of Natural Selection, can I account for the well-known fact of the colorational design or pattern being so often the same throughout a large group of species, though it generally differs minutely in each of these species in its proportions and details; while in the same group we shall find scarcely any structural differences, which could have been seized hold of by Natural Selection to originate new species, unless it be in the ♂ reproductive organs. In *Heterina*, for example, there are normally *three* dark stripes on the pleura of the thorax, two on what I consider to be the mesothoracic epimerum, and one on the metathoracic episternum. Again, in *Gomphus* there are normally *two* dark stripes on the pleura, one on the mesothoracic epimerum and one on the metathoracic episternum. Thirdly, in *Gomphus* Messrs. Selys and Hagen have shown, that there are normally three dark stripes on each side of the dorsum of the thorax, or what I conceive to be the mesothoracic episternum. Fourthly, in *Agrion* and *Lestes* I have shown that there are normally three dark vittæ on the femur, (*Ill. Pseudoneur.* pp. 282-3,) and

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‡ E. g. in the hymenopterous *Bombus*, as observed by Audouin, quoted *Westw. Intr.* II. 281; in the dipterous *Limnobia*, as observed by Osten Sacken. See Plates and descriptions of Plates appended to his Paper on *Limnobia* in *Proc. Phil. Acad. Sc.*, Aug. 1859. I have myself observed the same thing in *Locustaria* Latr. of the superior ♂ abdominal appendages or accessory reproductive organs.

the "posterior" series of subobsolete dark spots which I have since observed in several species of *Hetærina* seems to indicate that there is normally also a fourth dark vitta there—the posterior one. Yet in all these groups there are scarcely any structural specific characters but those which are drawn from the reproductive organs. Now what possible advantage can it be to a ♂ *Hetærina* or to a ♂ *Gomphus* or to a ♂ *Agrion*, to have the colorational stripes on any part of its body arranged a little differently, or a little wider or narrower, or one or more of them confluent, abbreviated, interrupted, subobsolete or obsolete? On the principles of Sexual Selection, we can readily and naturally account for ♂ ♂ being often more highly colored or more highly ornamented than ♀ ♀, but it is unconceivable to me that such minute differences as those above referred to could be appreciated by ♀ ♀. Neither can I understand how such minute differences as these could be of any use to the whole species, both ♂ ♂ and ♀ ♀, so as to be seized on, not by Sexual Selection, but by Natural Selection. Darwin has felicitously conjectured, with regard more especially to Vertebrates and Plants, that "the most frequent cause of variability may be attributed to ♂ ♀ reproductive elements having been [functionally] affected prior to the act of conception." (*Orig. Spec.* p. 15.) The affections above spoken of are structural, not functional; but it is not improbable that they may similarly give rise to a considerable amount of variation in coloration and perhaps occasionally even in structure. Prof. Owen has observed that "the generative organs, being those which are most remotely related to the habits and food of an animal, have been always regarded by him as affording very clear indications of its true affinities." (Quoted *Or. Spec.* p. 361.) It is remarkable that in Odonata, although the form of the ♂ reproductive organs differs almost in every species, yet that there is a certain family likeness throughout many, perhaps most, of the groups. No Neuropterist, for instance, could possibly mistake the ♂ abdominal appendages of any species of *Agrion* for those of a *Lestes*, or those of a *Lestes* for those of a *Hetærina*. I select the above examples because here the classification is not, as in the subgenera of the genus *Gomphus*, based upon the structure of the ♂ abdominal appendages; and it cannot therefore be contended that I am arguing in a circle and saying that certain species belong to a separate group because their ♂ abdominal appendages have a general resem-

blance, and that the ♂ abdominal appendages have a general resemblance because they belong to that group.

If the above hypothesis, viz. that species often originate from structural variations in their ♂ reproductive systems, be correct, we can gain some glimpses of light upon the extraordinary and anomalous phenomena of hybridism. We can see dimly why species of distinct families never cross; why distinct species of the same family do not commonly cross in a state of nature; why varieties generally but not always cross with facility; why species apparently closely allied should sometimes cross with difficulty or not at all, and others apparently wide apart in a natural system should sometimes cross with facility; why certain genera of plants should be fertilized more readily by the pollen of distinct species than by their own; and why the ♂ of a given species should cross readily with the ♀ of another species, and the ♂ of that other species cross with extreme difficulty or not at all with the ♀ of the first. The fact that, with the imperfect resources at our disposal, we cannot detect in very many cases such structural variations in ♂ reproductive organs, does not prove their non-existence. No chemist has yet succeeded in detecting any peculiar substance in the air of malarial districts;\* yet that there is such a thing as malarial matter in the air, it is almost impossible to disbelieve.

With regard to the question whether *H. basalis* Hagen, be a mere geographical race of *H. americana* Fabr., as hinted by Selys and Hagen, I incline upon the above principles to the opinion that they are distinct species, if it were only on account of the different structure of their ♂ abdominal appendages. It may be assumed, it is true, that intermediate grades between the two structures exist in the country intermediate between the habitats of the two supposed species, as has been shown by Dr. Hagen to be the case in Gomphina with the European *Onychogomphus forcipatus* and *Cordulegaster annulatus*; but until this is proved with regard to some one Calopteryginous species, the assumption is a very unsafe one. A character which is notoriously constant throughout a large group in specimens of any given species from the same locality, cannot, I think, without some collateral proof be reasonably assumed to vary in specimens of another species belonging to the same group from different localities.

\* *Consolations in Travel*, by Sir Humphrey Davy, p. 116.

The only valid practical criterion of specific distinctness is the general non-existence, either actually ascertained or analogically inferred, of intermediate grades in the distinctive characters, whence we may reasonably conclude that the two supposed species are distinct, i. e. that they do not now in general mix sexually together, or if geographically separated that they would not do so supposing them to be placed in juxtaposition. Whether they are descended from common parents which ages and ages ago mixed sexually together, is another and a very different question, which concerns the speculative philosopher not the practical naturalist. They may even now mix sexually together in some few rare instances, as I have recorded to be the case with *Coccinella abdominalis* Say, and *Chilocorus bivulnerus* Muls.; (Proc. Ent. Soc. Phil. I, p. 351,) and yet if they do not commonly and habitually mix together the species will remain distinct. Hence all experiments on artificial hybridization seem to me to prove nothing as to the distinctness of species, unless they are conducted, as they necessarily cannot be, on the same gigantic scale as that upon which Nature works. We may and do mix the horse and the ass and produce a mule or a hinny, but what naturalist believes that if a herd of wild asses were transported to the plains of Mexico they would mix habitually with the mustangs and produce all the intermediate grades? Every field-entomologist is aware of the fact that 5 or 6 very closely allied species, e. g. of *Cicindela*, will often be found on a piece of ground 100 yards square, and yet that every one of them keeps perfectly distinct. A similar case occurs in the genus *Gomphus*, of which 10 perfectly distinct but closely-allied species co-exist in the neighborhood of Rock Island, Ill., three of which, as already recorded, (Ill. Pseudon. p. 396,) I have seen coming out of the water together in the pupa state on one and the same day, and on one and the same spot of ground. Immediately that we assume any other criterion of specific distinctness than the general non-existence in a state of nature of the intermediate grades, either proved by actually examining numerous specimens or inferred from the analogy of allied species, all is chaos and confusion. The formerly received dogma that hybrids are incapable of further propagation, has been proved by Rev. W. Herbert and others to be utterly false in the Vegetable Kingdom, and is probably false in the Animal Kingdom. Hence may be seen the importance of describing species,



whenever practicable, from numerous specimens, and carefully noting all the variations; for to describe the species is often a very different thing from describing the individual. Hence, too, we may see the reason why descriptions are necessary even when the very best colored figures are given; for a single figure necessarily gives only the individual, perhaps an average of the species, perhaps an extreme variety, but a good description gives the variations as well, and consequently the species. In variable genera, such for instance as the coleopterous *Haltica*, *Chrysomela*, *Cryptocephalus*, and their allies, almost any entomologist not familiar with the Order, would suppose individual specimens taken from the two extremes of a specific series to be specifically distinct, and it is only the existence of the intermediate grades which proves them to be identical. In one word, the *amount* of difference between two supposed species is comparatively nothing, the *constancy* of the difference is comparatively everything.

I am not ignorant of the existence in the Vegetable Kingdom of what are called Dimorphous species, where hermaphrodite flowers of two distinct types of structure, without any intermediate grades, occur on separate plants of what is undoubtedly the same species. (See *Silliman's Journal* XXXVI. p. 279.) Something similar to this has been long known in the Animal Kingdom, in the case of the females and so-called neuters of social insects. The queen-bee actually differs from the common working-bee in several important structural characters; and hymenopterists do not hesitate to separate, as specifically or even generically distinct, forms which differ in no greater degree than do these two forms, which undoubtedly belong to the same sex of the same species. It may be said that the differences between the queen-bee and the working-bee arise from differences in food, &c., or what naturalists call "the Conditions of Life." Granted. But who will undertake to assert without a particle of proof that if the food, &c. were of an intermediate character, an intermediate form between the queen and the working-bee would be produced? It would be as reasonable for some chemical dogmatist to assert without a particle of proof, that because certain chemical substances are known to exist in what are called "allotropic states," therefore the intermediate states can be called into being. Again, what is known as "gynandromorphism" in the Coleopterous *Dytiscus* and in Lepidoptera in *Papilio Turnus* and in certain

species of *Colias*, (See *Proc. Ent. Soc. Phil.* I. p. 349-51,) is nothing but a phase of Dimorphism; and the orange-colored ♀ ♀ of *Agrion Ramburii* are perhaps referable to the same class of facts, for I do not remember ever to have seen any intermediate grade between the blue ♀ and the orange-colored ♀. Thirdly, in the coleopterous genus *Siagonium* and its allies, where the ♂ head is armed with horns, we are told by Westwood that "these cornuted individuals appear to be of two distinct kinds," some with large and some with small horns, and that "out of 50 ♂ ♂ of *Siagonium* he was not able to find a single individual intermediate between the two kinds"; (*Introd.* I. p. 172,) which is a clear case of ♂ dimorphism. Fourthly, it has long been known that certain species of Orthoptera, Hymenoptera and especially of Heteroptera and Homoptera sometimes occur in the ♂ ♀ imago state with very short wings and sometimes with long ones, without any intermediate grades, and that other species are in the ♂ imago sometimes fully winged but generally apterous, without any intermediate grades, an instance of which, in the Ichneumonide genus *Pezomachus*, I have recorded in my *Essay on Insects injurious to Vegetation in Illinois* (p. 369.) Fifthly, in Cynipidæ I have some very strong proof, which at some future time I shall offer to the world, that Hartig's agamous species, which exist only in ♀ sex, are mere dimorphous forms of bisexual species.\* In the Vegetable Kingdom it appears that there are even trimorphous species, and similarly in Formicidæ the genus *Atta*, a species of which commonly occurs in Illinois, has one kind of neuters with heads of the ordinary proportions, and another kind with heads as bulky as the remaining part of their bodies, with no intermediate grades whatever, as I have repeatedly observed. A phenomenon apparently of the same kind occurs in *Termes*, but as in *Pseudoneuroptera* the larva and pupa resemble the imago and are active, and as the so-called "nasuti" may *possibly* be larvæ, the case is not so strong a one. It has often been said that there are also two distinct sizes of neuters belonging to the hymenopterous genus *Formica*, but my experience is that here all the intermediate sizes coexist in the same

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\* See on this subject Baron Osten Sacken's *Papers on N. A. Cynipidæ*, *Proc. Ent. Soc. Phil.* I. pp. 49-50 and 248-249. Brullé dismisses this physiologically important and very remarkable subject in a dozen lines. *Suites a Buffon. Hymenopt.* IV. p. 632.

nest. Lastly, it is well known that there are three distinct types of the Lepidopterous *Vanessa interrogationis*, which were "all obtained from the same caterpillars" by Boisduval & Leconte. (Quoted by Mr. Edwards, *Proc. Ent. Soc. Phil. I*, p. 184.)—In the meantime, the general non-existence of intermediate grades between two closely-allied forms may and must be taken as *prima facie* evidence of their specific distinctness. That "the exception proves the rule" is an old and not very philosophical saying; but that there are exceptions to almost all rules in Natural History is undoubtedly true. Monomorphism is the rule; Dimorphism is the exception.

It may be observed here that in many, though by no means in all, Odonatous groups there is a great overplus of ♂♂. In the same way Mr. Edwards has remarked to me that in the genus *Papilio* the ♂♂ are about four times as numerous as ♀♀, and I can confirm the fact from my own observation. I shall afterwards prove that this is also the case in a subgroup of the subgenus *Gomphus*. In the two subgenera of *Hetærina* (*Lais* and *Hetærina*) it appears to be almost the universal rule. Of the 37 described species of these two closely-allied subgenera, although collectors of course always strive to make up pairs of each species, the number of ♂ specimens known to exist is about 366, and the number of ♀ specimens known to exist only about 90, calculating from my own species and from those where the numbers of ♂♀ specimens are given in the *Monographie*; and in no less than 6 species of the 37 the ♂ only is known. Hence we may conclude that generally in the genus *Hetærina* the ♂♂ are at least 4 times as numerous as ♀♀. This great preponderance of ♂♂, wherever it exists, must give much greater latitude to the above-mentioned kind of "natural selection," than if the sexes were equal in number or ♀♀ more numerous than ♂♂.

**H. pseudamericana** n. sp. ♂. Brassy-black. Top of the *head*, including the orbits of the eyes, coppery-red, occasionally greenish-brassy. Epistoma generally greenish-brassy, sometimes coppery-red when the top of the head is also so, always with a lateral whitish spot; rhinarium blackish; labrum very pale dull brown, with a large, shining, basal, black spot in the middle; labium and its lobes brownish white; mandibles whitish on their basal  $\frac{1}{2}$ , shining black on their terminal  $\frac{1}{2}$ . Back of the head blackish; postoccipital tubercles obtuse. Antennæ black, the 2nd joint whitish at base and tip, sometimes entirely whitish except a small medial black spot. *Prothorax* dull coppery-red. Dorsum of *thorax* coppery-red, the dorsal carina black and generally crowned by a faint longitudi-

nal whitish line; immediately in front of the humeral suture a whitish line extending from its middle to the prothorax. Pleura whitish with a short black line above in the humeral suture and in each of the two sutures before and behind the spiracle, and a large black spot below in the segment before the spiracle which is black. The segment before the spiracle with a broad coppery-red stripe covering nearly its whole surface and touching the upper  $\frac{1}{2}$  of the suture before the spiracle; the spiracle-bearing segment with a much narrower stripe, extending from the spiracle, where it is pointed, nearly to the origin of the wings; and the segment behind the spiracle with a still narrower stripe slightly abbreviated above and below. Antealar sinus generally dark-green, sometimes coppery-red. Sternum whitish. *Abdomen* with a narrow, basal, whitish annulus, interrupted above, on joints 3—7, and occasionally with a faint dorsal whitish line on 2—4; its sides indistinctly whitish. On the terminal  $\frac{1}{2}$  of 10 is a carina, tipped with a minute slender thorn. Venter black, pale brown at base and tip. *Superior abdominal appendages* forcipate, about  $1\frac{1}{2}$  times as long as the 10th abdominal joint, regularly curved inwards but not at all downwards on their upper edge, obtuse at tip, and when viewed in profile expanded downwards in a regular curve on their terminal  $\frac{1}{3}$ , blackish towards their tip, rather pale brown at their base, their exterior edge above except at the extreme base and tip with minute teeth directed obliquely backwards. On the middle of their inferior surface is a large laminiform tooth about 1.5th as long as the appendage itself, with its sides nearly parallel and its tip obtusely convex, directed downwards and inwards and a little forwards; and behind that again is a small round tubercle, beneath which a narrow laminiform prolongation of the large laminiform tooth sweeps round and then extends, directed inwards and downwards, to the extreme tip of the appendage. On the upper surface of the appendage is a carina, curved inwards at its base where it terminates in a tubercle, and behind the large laminiform tooth turning inwards and then assuming a narrow laminate form and running with its edge parallel to that of the narrow prolongation of the laminiform tooth to the tip of the appendage, so that the two together form a spoon-shaped cavity. Above, on the posterior base of the large laminiform tooth is a small indistinct tubercle. *Inferior appendages* just attaining the large laminiform tooth of the superiors, pale brown at base, blackish at tip, suddenly tapered near their base, thence cylindrical and terminating obtusely with a very robust short thorn or angle at their extreme tip directed inwards and upwards. *Legs* blackish; coxæ and trochanters whitish; femora "posteriorly" whitish on their basal  $\frac{2}{3}$  with a "posterior" longitudinal row of blackish dots, and "posteriorly" at their extreme tips whitish immaculate, the intervening space blackish; tibiæ "superiorly" whitish except at tip. *Wings* hyaline; front wings with a carmine-red basal spot extending along the post-costal margin beyond the point opposite the tip of the quadrilateral, thence curving round the tip of the quadrilateral with an evanescent outline at a distance of 4—6 cellules from it to the median sector, thence following that sector to the arc, thence following the submedian vein to the base of the wing. Commencing at the base of the wing 1—6 of the first series of antecubitals, and 5—11 of the second series, and also 1—6 of the areolets of the basal area, arc

centrally brown, those next the base of the wing the most so. The basal spot on the hind wings is brown towards the costa, sometimes with a fine purple reflection, carmine-red towards the postcosta with the areolets centrally brown and occasionally entirely brown. It almost attains the postcostal margin to beyond the tip of the quadrilateral, then leaving the postcostal margin at a distance of  $\frac{1}{2}$ —2 areolets curves round the tip of the quadrilateral at the distance of 4—8 areolets, and proceeds to the costa, its general direction perpendicular to the costa, but with a bidentate outline, the second and by far the larger of the two teeth being on the median vein; thence follows the costa to the base of the wing. Veins and cross-veins above black in both wings, except those covered by the spots which are carmine-red and the basal  $\frac{1}{3}$  of the median vein which is rufous. Beneath in both wings the basal  $\frac{1}{3}$  of the median vein is rufous, and the basal  $\frac{1}{3}$ — $\frac{2}{3}$  of the subcostal vein, the lower  $\frac{2}{3}$  of the nodus, the origin of the nodal sector, and very conspicuously the entire length of the principal sector, are all yellowish white; as are also in the hind wing the veins and cross-veins covered by the basal spot, those covered by the basal spot in the front wing being carmine-red as above; the other veins and cross-veins black. The tips of all 4 wings immaculate. Pterostigma yellowish-white,  $1\frac{1}{2}$ — $2\frac{1}{4}$  times as long as wide and surmounting  $1$ — $1\frac{3}{4}$  cellules. Antecubitals 20—24; postcubitals 22—28. Cross-veins of basal area (front wing) 5—8; of quadrilateral (front wing) 7—10.

The ♀ differs as follows:—*1st.* The top of the head and the dark parts of the thoracic dorsum and pleura are bright green, except in a specimen from Mr. Uhler, where the two latter are coppery-red as in ♂. *2nd.* The sides of the epistoma are widely bordered with whitish. *3rd.* The second joint of the antennæ is always whitish, with a medial fuscous dot sometimes subobsolete. *4th.* The prothorax is very dark green, narrowly bordered all round with whitish, and with a small, transversely double, dorsal, whitish spot immediately before its posterior lobe. *5th.* The dorsal carina is scarcely black, but of the same color as the thorax only of a much darker shade, and in one specimen it is crowned by a whitish line as it generally is in ♂. *6th.* The whitish annulus on abdominal joints 3—7 is wider and is not interrupted above except on 7, and there is a distinct whitish dorsal line throughout 1—10, only interrupted by the terminal short, black, annular subsegment of each segment. The sides of 1—10 are distinctly whitish with an irregular fuscous spot towards the tip of 1—7, and the dorsal carina extends the whole length of joint 10. *7th.* The femora are whitish, the anterior ones with a confluent "anterior" and "superior" vitta, and the 4 others with only a "superior" vitta, both black; "posteriorly" all the 6 femora are marked as in ♂, the dots sometimes subobsolete. *8th.* Instead of the basal spots, all 4 wings are pale-yellowish brown on their basal  $\frac{1}{4}$  or  $\frac{1}{2}$  with an evanescent outline, the extreme edge of the postcosta and the two ranks of antecubitals less obviously colored. In one Illinois specimen and also in that from Mr. Uhler, the veins and cross-veins covered by the pale yellowish-brown color are also pale yellowish brown above and below, except in the hind wing below where most of them are yellowish-white in all 3 specimens. Beneath in all 4 wings nearly the entire subcostal, instead of its basal  $\frac{1}{3}$ — $\frac{2}{3}$ , is

yellowish-white, and the lower  $\frac{2}{3}$  of the nodus, the origin of the nodal sector and very conspicuously the entire length of the principal sector are yellowish-white, as in ♂. All the other veins above and below black. Pterostigma yellowish-white, 2—2½ times as long as wide and surmounting 1½—2 cellules. Antecubitals 20—24; postcubitals 19—23. Cross-veins of basal area (front wing) 6—9; of quadrilateral (front wing) 7—11. The abdominal appendages ♀ are 3-5th as long as joint 10, robust, conical, yellowish, with their tips excurved and their extreme tips blackish.

Length ♂ 45—46 mill. ♀ 38½—43 mill. Expanse ♂ 57—58 mill. ♀ 58—64 mill. Abd. ♂ 34½—38 mill. ♀ 30—34 mill. Front wing ♂ 30 mill. ♀ 30—32 mill. Hind wing ♂ 28½—29 mill. ♀ 28½—30 mill.

Three ♂, three ♀; rare. One ♀ was sent me by Mr. Uhler as ♀ of *americana*; the other ♂ ♂ ♀ ♀ occurred on Rock River, Illinois, from the beginning of July to the end of August; one ♂ and one ♀ very mature. Although none were taken *in coitu*, yet the very remarkable and conspicuous whitishness of the principal sector on its inferior but not on its superior surface, no traces of which are met with in ♂ *americana*, sufficiently proves that this ♀ does not belong there; and as only three ♂ forms occurred on Rock River during a careful search of many weeks, viz. *americana*,\* *rupamensis* and *pseudamericana*, and the ♀ of *rupamensis* is known with certainty, this ♀ may be confidently correlated with ♂ *pseudamericana*. Differs from all described *Hetærina* but *texana* n. sp. in the whitishness of the principal sector beneath. In *pseudamericana* the basal spot of the ♂ front wing is particolored; in *americana* and *basalis* it is unicolored. In *pseudamericana* the carmine-red part of the basal spot in the ♂ front wing does not extend so far forwards even as the basal area; in *americana* and *basalis* the carmine-red basal spot of the front wing extends to the costal edge, basally in the former, nearly for its whole length in the latter. This species differs also from *americana* and *basalis* in the pterostigma of both the mature and the immature ♂ being yellowish-white. The superior ♂ appendages scarcely differ from those of *americana* Fabr., Walsh,\* except in the laminiform tooth being much larger and the tubercle behind it smaller, and in the tubercle on the superior base of the laminiform tooth being smaller and more indistinct.

The *Monographie* (p. 97) lays it down as one of the characters of the subgenus *Hetærina*, that in the front wing of ♂ “the postcostal area

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\* For *americana* read *scelerata* n. sp. See Appendix.

is filled with small irregular areolets," while in the front wing ♀ and in the hind wing ♂ ♀ it "has two regular ranks of areolets." Subsequently on p. 281 it is observed that in *H. Brightwelli* it is only the hind wings ♂ ♀ that have the two regular ranks of areolets, the front wing of ♀ having three. In *pseudamericana* ♀ the front wing has 3—5 very irregular ranks; in *texana*? ♀ n. sp. 2—3. Again, I observe that in the hind wing both of my specimen and of the Uhlerian specimen of *americana* ♂ there are 3—4 irregular ranks of areolets, and that there are 2—3 in the hind wing of two out of three *pseudamericana* ♂, as is also the case in *rupinsulensis* ♂ Walsh, and in 4 or 5 specimens out of 36 of *rupamnensis* ♂ n. sp. Hence the characters of the subgenus *Hetærina* must be modified, so as to assert simply that in the front wing ♂ the postcostal area is filled with small irregular areolets, which is sufficient to distinguish that subgenus from the subgenus *Lais*, where "the postcostal space of all 4 wings ♂ ♀ up to opposite the tip of the quadrilateral has two regular ranks of large areolets," (Monogr. p. 87.) in connection with the fact that the wings of ♂ *Lais* have no basal red or brown spot, and those of ♂ *Hetærina* always have such a spot.

**H. texana** n. sp.

♂. Differs from the preceding ♂ only as follows:—*1st.* The back of the head is green not blackish. *2nd.* The large laminiform medial tooth on the superior appendage, instead of being convex at tip, is distinctly emarginate so as to appear bilobate, the anterior lobe the more prominent; and the tubercle on its superior surface is distinct. *3rd.* The median vein in both wings above and below is scarcely rufous on its basal  $\frac{1}{3}$  but rather carmine-red. *4th.* The basal spot on the hind wing is less brown and more carmine-red; it attains the postcostal margin for  $\frac{1}{2}$  its length and nearly attains it the rest of its length, and its outline towards the tip of the wing is almost straight instead of being conspicuously bidentate. *5th.* Only in one wing is there a pterostigma, and there it is no longer than broad and represented only by two thickened cross-veins with the intervening space hyaline; in the other 3 wings it is represented merely by a single thickened cross-vein. Antecubitals 21. Postcubitals 20—21. Cross-veins of 4 basal areas 6—8; of 4 quadrilaterals 7—10. Length ♂ 48 mill. Abd. ♂ 37 mill. Expanse ♂ 62 mill. Front wing ♂ 31 mill. Hind wing ♂ 29 mill. One

♂, the head and some legs lost, received from Mr. Uhler and labelled by him as "*H. basalis* Hagen, Pecos River, Texas." The coloration of the wing-veins and especially the whitishness of the principal sector below, the much smaller extent and different shape of the basal wing-spots, the presence of brown in the basal spot of the front wing, and the shape of the laminiform medial tooth on ♂ abdominal appendages, all prove that it cannot be *basalis* Hagen. But for the remarkable difference in ♂ abdominal appendages, I should suppose it to be a geographical race of *pseudamericana*, although none of my 6 specimens of that species show any disposition towards irregularity in the pterostigma. In *H. occisa* and *majuscula*, which belong respectively to the last but three and last sub-groups of the Table, (p. 210,) there is the same occasional absence of the pterostigma, and when absent it is represented, just as in our insect, by a single thickened cross-vein. It will shortly be seen that in *rupamnensis* n. sp. the pterostigma is occasionally rudimentary as in the two foreign species just referred to, and occasionally has an additional cross-vein, equally robust with its bounding veins, as in certain specimens of the African *Phaon iridipennis* Burm.

♀? Unfortunately there is no full description extant of the ♀ of *americana*. In the *Monographie* Say's brief description is copied, and the words "head with a yellow abbreviated line on the anterior orbits" are translated "tête avec une bande jaune antérieure interrompue," (head with an interrupted anterior yellow-band,) whence the locality of the interrupted band becomes obscure. I have a mutilated ♀ *Heterina* sent me by Mr. Uhler, in which this short yellow line on the anterior part of the orbit of each eye is very distinct, and is about a millimetre long and placed just under the origin of the mandibles. This specimen agrees in most respects with Say's description of ♀ *americana*, but is remarkable for the following peculiarities:—1st. The wings are unusually narrow, the front wing being 30 millimetres long and only 5 millimetres broad at the nodus, while in ♂ *americana* (from Mr. Uhler) the front wing is 29 millimetres long and 5½ millimetres broad at the nodus, and in the ♀ *pseudamericana* which has the narrowest wings the front wing is 29½ millimetres long and 5½ millimetres wide at the nodus. 2nd. The wings are colored as in the normal ♀ *pseudamericana*. 3rd. The pterostigma, which is white, is three times as long as wide, and three out of the four have a distinct cross-vein



equally robust with the bounding veins.—As the color of the wing-veins which lie outside the region of the basal spot is not a sexual character, (*Monogr.* p. 87,) and as in this ♀ the median vein and principal sector are pale beneath outside the basal spot, while in ♂ *americana* and *basalis* they are black, it can scarcely belong to either of these two species. The yellow line on the orbit of the eye, the irregularity of the pterostigma, and especially the narrowness of the wings and the comparatively small number of the ranks of postcostal areolets, forbid its being confounded with ♀ *pseudamericana*. Unless therefore it is referable to *texana*, the pterostigma of which is irregular also, though in a different way, it must be an undescribed species. The abdomen is lost except the first joint which has a yellowish dorsal line, but the legs prove that it belongs to the same subgroup as *americana*. In *texana* ♂ there is no short yellow line on the anterior orbit of the eye, as in our ♀, but this is described as a *sexual* peculiarity of ♀ *americana* by Say. The front wing, however, of ♂ *texana* is 31 millimetres long and 6 millimetres wide at the nodus, and in most described *Hetærina* the ♀ wings are either of the same proportional width as ♂ wings, or, as in *simplex*, *auripennis*, *hebe*, *longipes*, *proxima* and *vulnerata* from  $\frac{1}{5}$  to nearly  $\frac{1}{6}$  wider. But, according to the measurements of the *Monographie*, the ♀ wings are proportionally narrower than the ♂ wings, in *moribunda* by  $\frac{1}{3}$ , in *cruentata* by  $\frac{1}{3}$ , and in *tricolor* by  $\frac{1}{7}$ . Supposing this doubtful ♀ to be identical with *texana*, the ♀ wings would be nearly  $\frac{1}{6}$  narrower in proportion than ♂ wings. The postoccipital tubercles agree with those of *texana* ♂, but, unless my memory fails me, this doubtful ♀ was labelled “Pennsylvania,” not Texas, by Mr. Uhler. It only differs from ♀ *pseudamericana*, besides the points already mentioned, in the epistoma being narrowly bordered in front, as well as widely at the sides, with whitish, in there being no transversely double whitish spot on the prothorax, and in the thorax and legs being more dominantly whitish. Antennæ except the two basal joints, both the anterior legs and abdominal joints 2—10 lost.\* The *Monographie* (pp. 87, 109, 114, &c.) remarks on the great difficulty of correlating ♂ with ♀ in the subgenera *Lais* and *Hetærina*. Hence it is very important that when ♂ ♀ are taken *in coitu* they should be carefully preserved. Antecubitals 18. Postcubitals 21—22. Cross-veins of 4 median areas 4—6; of 4 quadrilaterals 5—6.

\* Respecting this doubtful ♀, see Appendix.

**H. rupamensis** n. sp. ♂ Black with a slight brassy tinge. *Head* with the epistoma, labrum, and the anterior edge of front brown, the labrum with a shining black basal spot in the middle; mandibles and the labium and its lobes pale brown, sometimes brown, all black at tip. Antennæ black, the second joint and the extreme base of the third varying from very pale brown to dark brown. Post-occipital tubercles conspicuous and thorn-like. Dorsum of *thorax* generally more or less tinged with coppery-red, occasionally with greenish-brassy, the dorsal carina always black. The humeral suture with a broad reddish-brown or dark-brown stripe, straddling the suture on its lower  $\frac{2}{3}$  and placed entirely behind it on its upper  $\frac{1}{3}$ . Pleura pale yellowish brown, with a short black line above in each of the two sutures before and behind the spiracle; on the segment before the spiracle a black stripe abbreviated below and above; on the segment bearing the spiracle a narrower black stripe abbreviated above and scarcely attaining the spiracle below; and on the next segment a still narrower black stripe abbreviated both above and below. Occasionally the ground color of the pleura is much darker and the normal design indistinct. Origin of each wing reddish-brown. Sternum pale-brown, generally more or less pruinose. *Abdomen* slender, generally with an obscure, lateral, pale brown vitta on joints 1—2, and generally with traces of a pale basal annulus on four or five of the joints next the base; joint 10 carinate above on its terminal half with a minute acute tooth at the tip of the carina and another on each side of it. *Superior abdominal appendages* black, half as long again as joint 10, obtuse at tip, regularly curved inwards but not downwards, with a broad lamina beneath directed inwards and downwards, which, when viewed obliquely from above, is seen to be semiovally emarginate, to commence with an oblique truncation tipped with a small pencil of hairs at the extreme base of the appendage, and to terminate in a square truncation at  $\frac{2}{3}$  the way to its tip, the tip of the lamina being as wide as any part of it. Behind its terminal truncation this lamina is continued very narrowly to the tip of the appendage and is directed downwards. The superior carina of the appendage commences from its base without any tubercle, and runs on its upper edge  $\frac{2}{3}$  the way to its tip, when it is suddenly deflected inwards and then runs with its edge parallel with that of the narrow prolongation of the inferior lamina to the tip of the appendage, so that the two together form a shallow cavity inside its tip. Opposite the square truncation of the lamina are situated above 5 or 6 minute, acute, slender teeth, directed obliquely backwards. *Inferior appendages* extending to  $\frac{1}{2}$  the length of the superiors, black, slender, cylindrical, with a basal enlargement, regularly curved upwards but not inwards, truncate at tip, and with a robust acute thorn directed upwards at the corner of the truncation. *Legs* black, trochanters and coxæ pale brown, often pruinose; tibiæ “superiorly” brown-black ranging to rather pale brown, but never pale-reddish-brown or fawn-color. *Wings* hyaline; front wings with a carmine-red basal spot generally attaining the postcostal margin for  $\frac{1}{3}$  of its own length, occasionally scarcely attaining it except at its extreme origin, thence leaving the postcostal margin at the distance of  $\frac{1}{2}$ —2 areolets, thence curving round the tip of the quadrilateral at a distance of 0—2 areolets, thence following the median sector above

the quadrilateral to the arc, thence following the submedian vein to the base of the wing. Above this spot the whole basal area and the trapezium beyond the arc formed by the osculation of the principal sector with the median vein, and also one or two of the basal areolets in each series of antecubitals, are all brown. Hind wings with a basal brown spot never extending into the postcosta, but following the postcostal vein from its base to the tip of the median area, so as almost always to cover the whole length of the median area, thence proceeding so as almost always to leave the terminal  $\frac{1}{2}$  of the quadrilateral hyaline, but occasionally covering the whole of that as well as the median area, thence starting from the upper side of the quadrilateral and extending in a more or less prolonged and obscurely defined tongue along the median vein towards the tip of the wing, thence more or less gradually nearing the costal margin and attaining it at or before the origin of the wing. In one wing of a single specimen the spot does not attain the tip either of the median area or of the quadrilateral by 5 areolets. Above in both wings and beneath in the front wing the veins and cross-veins covered by the spots, except those not far from its margin, are the same color as the spot, but in certain lights the cross-veins of the basal area on the under side of the front wing are milk-white. In the hind wing, both above and below, the cross-veins are sometimes lightly bordered with subhyaline. In the hind wing beneath most of the cross-veins and some of the veins covered by the spot are conspicuously milk-white. All the other veins and cross-veins in both wings, both above and below, black. Extreme tip of hind wings always more or less bordered with brown, and occasionally a trace of brown at the tip of the front wing. Pterostigma brown or pale-brown, variable in size, 1—2 times as long as wide, surmounting 1—2 cross-veins. In a single wing of two separate specimens it has a cross-vein as thick as its bounding veins; in a single wing of another it has a longitudinal vein in its middle;\* in a single wing of still another it is hyaline in its middle; and in two wings of a fifth specimen it is rudimental and represented only by one thickened cross-vein. Antecubitals (12 specimens) 19—26; postcubitals (12 sp.) 25—35. Cross-veins of basal area (front wing of 12 sp.) 4—7; of quadrilateral (same) 4—8.

The ♀ differs as follows:—1st. The brown parts of the head are several shades paler, and the upper edge of the occiput is distinctly pale-brown, as well as the basal  $\frac{2}{3}$  of the 3rd joint of the antennæ. 2nd. The prothorax is irregularly bordered with pale brown. 3rd. The dorsum of the thorax is very pale reddish-brown or fawn-color to a little beyond the humeral suture on the upper part of that suture, with the dorsal carina and a short line at the top of the humeral suture, black. On each side of the tip of the dorsal carina a longitudinally oval spot  $\frac{1}{2}$  as long as the carina, and inside the humeral suture a lanceolate spot extending from the antealar sinus half-way to the prothorax, both bright grass-green. Pleura as in ♂ and with the same black lines above, but always

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\* This is analogous to the supernumerary short longitudinal vein, in the place where the pterostigma ought to be, found in three wings of a single specimen of ♀ *H. cruentata* Ramb. (*Monogr. Calopt.* p. 129.)

of a pale yellowish brown color, and with the 3 stripes bright green instead of black, and the anterior stripes much more abbreviated above. Antealar sinus with a small pale brown spot in the anterior angle. 4th. The abdomen is, as usual, shorter and stouter, and it is more tinged with brassy except when obscured by pruinescence; and there is a distinct, narrow, basal, whitish annulus, interrupted above, on joints 3—7. Joints 1—2 are laterally pale-reddish-brown, dorsally grass-green, joint 2 with the sides of the green spot very deeply emarginate in the middle. Joints 3—10 laterally marked with obscure pale brown, 10 carinate for its entire length, the carina tipped with a slender, acute thorn, beneath which is a pale tubercle, and having on each side of its tip a minute acute tooth. 5th. The femora, except towards the tip, are very pale-brown "inferiorly" and "posteriorly," the posterior brown surface with a longitudinal row of dusky dots. 6th. The wings are entirely immaculate, lightly and uniformly subflavescent, but rather more obviously so at the extreme base and occasionally along the costa. Veins and cross-veins all black. Pterostigma white,  $1\frac{1}{2}$ — $2\frac{1}{2}$  times as long as wide and surmounting  $1\frac{1}{4}$ — $1\frac{3}{4}$  cellules. The abdominal appendages are  $\frac{2}{3}$  as long as the last abdominal joint, robust, conical, excurved and tapered to an acute thorn at tip, black at tip and brown towards their base. Antecubitals 17—21. Postcubitals 22—28. Cross-veins of basal area (front wing) 4—5. Of quadrilateral (same) 3—5.

Length ♂  $46\frac{1}{2}$ —51 mill. ♀ 42—44 mill. Abd. ♂  $37\frac{1}{2}$ — $41\frac{1}{2}$  mill. ♀ 33—34 mill. Exp. ♂ 56—59 mill. ♀ 59—62 mill. Front wing ♂ 29— $31\frac{1}{2}$  mill. its width  $6$ — $6\frac{1}{2}$  mill. ♀ 31—32 mill. its width  $6\frac{1}{3}$ — $6\frac{1}{2}$  mill. Hind wing ♂ 28—30 mill. its width  $5\frac{1}{2}$ —6 mill. ♀ 30—31 mill. its width  $6$ — $6\frac{1}{2}$  mill.

Thirty-six ♂, four ♀; three pairs taken *in coitu*. Occurred on Rock River, Ill., whence the trivial name, from the middle of August to the middle of September. Local and not very common. *Rupinsulensis* Walsh, occurred on a small rivulet emptying into the Mississippi River three miles from the nearest point on Rock River. *Rupamnensis* scarcely differs from that species except in the spot on the ♂ front wing being partly carmine-red, in that spot always extending much behind the postcostal vein, in the basal spot on ♂ hind wing being very much darker, and in the coloration of the femora. The ♂ abdominal appendages are undistinguishable, and I should have supposed *rupinsulensis* to be the immature form of *rupamnensis* but for the fact that my unique ♂ specimen of the former is decidedly mature, and that, although many of my 36 ♂ specimens of the latter are immature, yet none of them show any approximation whatever to the other species in the coloration of the basal spot of the front wing. The difference in locality is not so slight as might at first sight be supposed. I have observed that *Heterina* ♀ flirts her eggs into the open river, without attaching them to aquatic plants &c., as do certain other Odonata;

and consequently those eggs are not improbably carried down by the current from the upper waters of the river where they occur. Comes very near indeed to *tricolor* Burm., but differs 1st, in the ♂ antennæ being particolored not uniformly brown; 2nd, in having a distinct lateral green stripe on the dorsum of ♀ thorax, whereas ♀ *tricolor* is described as having none; 3rd, in the stripes of ♀ pleura being bright-green, not "brown"; 4th, in the abdomen ♂ being much slenderer than in *americana*, whereas in *tricolor* it is said to be "a little more robust than in *americana*"; 5th, in ♀ abdominal joints 1—2 being bright-green above, not "black;" 6th, in the inferior lamina of the ♂ abdominal appendages terminating in a square truncation the apex of which is scarcely rounded off, whereas in *tricolor* it is described as terminating in "an obtuse tooth." 7th, in there being no tubercle at the superior base of the ♂ appendage, as figured and described in *tricolor*; 8th, in the ♀ wings being within a minute fraction as broad in proportion as ♂ wings; whereas in *tricolor* the ♀ wings are described as  $\frac{1}{4}$  narrower; and in some other minor points. *Limbata*, which is given provisionally as a variety of *tricolor*, is said to be much slenderer than *tricolor*, but it has the cross-veins of the inferior surface of the basal spots of ♂ wings "not in the least whitish," whereas they are conspicuously so on the hind wings of every one of my 36 ♂ *rupamnensis*. From *moribunda* Hag. (S. A.) it is separated at once by that species having no distinct postoccipital tubercles, and from *titia* Drury (Mexico), by the wings of ♂ *titia* being "blackish-brown" outside the basal carmine-red spots.

The habits of the ♂ ♂ of this species are to traverse the water actively to and fro, and return from time to time to a favorite log or stick of wood lying in or overhanging the river. They are rather shy, but will come back repeatedly to their favorite station after being stricken at, unlike most of the larger Odonata. Their flight is strong and jerky, and resembles a good deal that of the lepidopterous genus *Vanessa*. The ♀ ♀ are comparatively sluggish, sometimes hiding in the weeds, and the ♂ ♂ must certainly be at least four times as numerous as ♀ ♀. *Americana*,\* *pseudamericana* and *rupamnensis* all occurred within two hundred yards of each other.

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\* For *americana* read *scelerata* n. sp. See Appendix.

Note 22, p. 179.—*LESTES EURINA* Say. There is a typical specimen of this species in the Harrisian Cabinet at Boston. My friend Mr. Scudder has kindly furnished me with the following description of it:—

“Greenish blue; mouth yellow; labrum luteous; top of the head and dorsum of thorax bright metallic blue with greenish and subviolaceous reflections, the dorsal and lateral sutures yellowish-brown, so as to show each a yellowish-brown inconspicuous LINE; sides of the thorax metallic blue, the sides of the mesothorax with a biserrate yellow spot occupying its lower posterior third; the side of the metathorax yellow with an oblique triangular fuscous stripe. Base of all the legs and under surface of the femora, especially of the posterior ones, yellow; upper surface of the femora, lower surface of the tibiæ and tarsi brownish green; upper surface of the tibiæ fuscous. Wings subhyaline or slightly flavescent; pterostigma black. Abdomen above with segments 1—5 blue, 6—10 blackish green; beneath pale fuscous, more dusky posteriorly, their apices blackish. Superior appendages forcipated, denticulate in the middle externally, beneath bidentate interiorly; the first tooth at the extremity of the basal fourth, sharply pointed and directed posteriorly, the second one just beyond the middle, flattened, (depressed,) laminate, minutely denticulate, directed towards the corresponding tooth in the other appendage. Inferior appendages removed. Postcubital cross-nervules 13 on one side, 15 on the other. Length to the base of the forceps 1 4-5 inch [46 mill.] Alar expanse 2½ inch [59½ mill.] Pterostigma 1-10 inch [2½ mill.], surmounting 3—3½ cells, variable before and behind in either wing. One ♂.”

On comparing the above with Say's description and with mine, I am fully satisfied of the identity of my insect with *eurina* Say. There is considerable variation in the coloring, but not more than we often meet with in Agrionina. For example, I possess a ♂ specimen of *Agrion Ramburgii*, captured this year amongst a crowd of others, in which the “narrow green lateral vitta” of the dorsum of the thorax is entirely obsolete in the middle and is represented at each end only by a green spot similar to the occipital spots. Again, in a host of species, e. g. in *Agr. civile*, in *Agr. apicale*, as observed by Say himself, and in the unnamed species described by me (*Ill. Pseudoneur*, p. 386) for which I now propose the name of *Agr. Hayeni*, what is sky-blue in the mature, is pale reddish-brown in the immature insect, both in the recent and in the dried specimen. Finally, in *Agr. binotatum* Walsh, the dorsum of the thorax is “pale reddish brown, reddish brown, or in the living mature insect PURPLE fading to reddish brown in death.” I have already stated that my specimen of *eurina* was “somewhat immature,” and I have little doubt that what I described as “fuscous” in the dorsum of the tho-

rax is normally in the mature insect "blue, somewhat varied with greenish and violaceous," as Say describes it, or "bright metallic blue with greenish and subviolaceous reflections," as Scudder describes it. In other words I believe that my specimen is more or less immature and that Say's typical specimens were fully mature. It will be noticed that in my description of the dorsum of the thorax, for convenience sake, I considered the *pale* color as the ground-color, and that both Scudder and Say consider the *dark* color as the ground-color. In one remarkable point Say's description comes much nearer to mine than to Mr. Scudder's. Say speaks of "a yellow *vitta* on the thorax, *behind bifid and divaricated.*" Scudder speaks merely of "a yellowish-brown inconspicuous *line* on the dorsal and lateral sutures." In my insect the dorsal PALE *vitta* is about  $\frac{2}{3}$  millimetre wide and distinctly divaricates on the antearlar sinus, (which I expressed by saying that the sublateral DARK *vitta* was "slightly abbreviated,") while on the other hand the PALE *vitta* on the lateral suture is about  $\frac{1}{2}$  a millimetre wide. The following Table of the principal points of difference in the three descriptions, will, I think, shew that in some other respects my insect comes nearer to Say's description than does the typical Harrisian specimen as described by Scudder:—

<i>L. eurina.</i>	SAY.	SCUDDER.	WALSH.
Labrum.	Yellowish.	Luteous.	Obscure greenish, varied with dusky.
Dark color of dorsum of thorax.	Blue, varied with greenish and violaceous.	Bright metallic blue, with greenish and subviolaceous reflections.	Fuscous.
Pale color of dorsum of thorax.	Yellow.	Yellowish brown.	Rather pale brown.
Femora, beneath.	Whitish.	Yellow.	Yellowish towards the base.
Tibiae.	Black, with an exterior white line.	Lower surface brownish green, upper surface fuscous.	Black, with an "anterior" yellowish <i>vitta</i> .
Pterostigma.	Blackish.	Black.	Brown.

It may here be added that a sketch of the pleura of the Harrisian specimen obligingly furnished to me by Mr. Scudder, agrees exactly with the very remarkable design exhibited in my specimen, nothing

approaching to which has been observed by me in other Agrionina. Mr. Scudder's description of the design of the pleura also agrees exactly with mine, though the coloration differs. The "rather pale brown" vitta on the humeral suture in my specimen would have been more definitely and diffusely described as "rather pale brown along the suture gradually shading into a dark fuscous color towards the yellow part of the pleura."

*Note 23, p. 180.*—I am now satisfied, from the examination of living Odonata, that the "rhinarium" is merely a coriaceous hinge-like joint connecting the true "nasus" or "epistoma" of Messrs. Selys and Hagen (or what I have erroneously supposed to be the lower half of the front) with the labrum. In *Acheta* Fabr. and British authors (= *Gryllus* of the modern Continental school), there is an almost exactly similar connection. Dr. Hagen states generally of the whole Legion Calopteryx, which includes Heterina, that the "rhinarium is almost obsolete, consisting of a folded membrane." (*Mon. Calopt.* p. 10.) In Coleoptera the subfamily Tenebrionidæ is divided by LeConte into two primary groups, one of which has a similar coriaceous connection between the anterior edge of the front, (which must be considered, I think, as a clypeus with the clypeal suture obsolete) and the labrum. (*Lec. Introd. Col.* p. 224.) Latreille says of Cicada, "Cum clypeo non confundendus marginis frontalis superi processus dilatatus. \* \* \* [Clypeus] a labro pariter discernendus. *Voces illæ sæpius ab auctoribus confusè adhibitæ [sunt.]*" (*Gen. Crust. et Ins.* III. p. 152, note.) It is evident from Prof. Westwood's drawing of the head of Libellula that he considered the "rhinarium" as the true epistoma; for he has entirely omitted the clypeal suture, apparently supposing it, as I formerly did, to be a mere ornamental stria and not a true suture connecting two distinct pieces of the head. (See Westw. *Intr.* II. p. 35, fig. 2.)

*Note 24, p. 180.*—The following Odonatous species have occurred since the publication of my Paper in *Proc. Phil. Acad. Sc.*

#### AGRION.

**A. dentiferum** n. sp. ? (= *signatum* Hagen?) Brassy black. *Head* villose. Occiput with a transverse line, dilating into a cuneiform spot towards the eyes, pale-reddish-brown (fawn-color) in the dried specimen, orange-tawney in the living insect as well as all the other pale-reddish-brown parts; all before a



transverse line drawn behind the antennæ pale-reddish-brown immaculate, except the nasus which is brassy-black all but its anterior edge, the rhinarium which is occasionally obfuscated, and the labrum which generally has a small basal triangular black spot; 2nd joint of antennæ with an interior black spot. 3rd joint fuscous, seta black; lower parts of head very pale yellowish brown. *Prothorax* with its anterior lobe and a small spot behind that lobe, its sides and its posterior lobe, and on its disk a lateral spot and sometimes a pair of abbreviated approximated narrow dorsal vittæ, all pale-reddish-brown; the posterior lobe very narrow throughout and scarcely discernible and with a slight dorsal tubercle. Dorsum of *thorax* villose with a broad, lateral, pale-reddish-brown stripe, occupying  $\frac{1}{4}$  of its breadth and not quite attaining the humeral suture above; pleura obscure pale-reddish-brown, except a broad humeral stripe straddling the humeral suture above, a narrow line subobsolete below in the medial suture and a short line under the front wing, all brassy black, and except also the anterior half of the anterior pleural segment which is very pale yellowish brown; sternum whitish. *Abdomen* slender widening on joints 8—10 to nearly twice as wide, with the sides of all the joints pale-reddish-brown: joints 1—7 with a basal pale-reddish-brown annulus occasionally interrupted above, wider, paler and more conspicuous on 4—6: joint 9 entirely pale-reddish-brown; joint 10 dorsally carinate and with a pair of small robust, conical tubercles on the middle of its terminal edge; venter fuscous, often at base and tip pale-reddish-brown. All four *abdominal appendages* pale-reddish-brown, tipped with black and pilose under the lens: the superiors long and robust, the inferiors slender and scarcely half as long as the superiors. Viewed from above the superiors are at base more than  $\frac{1}{4}$  as wide as long, whence they taper slightly for  $\frac{2}{3}$  their length with one deep dorsal stria, and then taper suddenly to what would be an acute point but for a small robust acute tooth on their interior tip which points inwards. Viewed laterally, they are nearly  $\frac{1}{2}$  as wide as long at base, the upper edge straight, the lower edge diverging very slightly to  $\frac{1}{2}$  their length, where there is a small robust blunt tooth or tubercle directed downwards, behind which tooth the lower edge slopes suddenly upwards, the tip of the appendages being obtuse and rounded. The inferior appendages taper slightly and are regularly curved inwards, the tip subtruncate. *Legs* pale-yellowish-brown, often whitish towards their tips, femora with a superior and anterior black vitta, the superior vitta especially in the middle and hind legs being very often degraded into a row of black dots sometimes subobsolete in the hind legs; anterior and sometimes the intermediate tibiæ with a slender basal anterior black vitta; tarsal incisures and tips of claws slenderly fuscous. *Wings* hyaline; veins black; pterostigma rhomboidal, pale-reddish-brown, marginally much paler or even subhyaline; 10—11 postcubitals ♂ ♀.

The ♀ differs in the pale-reddish-brown parts being greenish blue in the recent, and obscure pale green in the dried specimen. The black line in the medial pleural suture is obsolete except next the wings, and the short black line under the front wing is absent. The abdomen is more robust and does not expand at tip; joint 9 has a large, equilaterally-triangular, brassy-black, dorsal spot extending from base to tip, and joint 10 has merely a narrow brassy-black dorsal

vitta, and its apex is triangularly emarginate; the 8th ventral is tipped with a slender acute spine; and the anal appendages are short, conical, and pale-red-dish-brown, scarcely tipped with black.

Length ♂ ♀ 34 mill. Exp. ♂ 37—38 mill. ♀ 42—43 mill. Superior appendages ♂ 1 mill.

Two ♂, two ♀, both pairs taken in coitu in June, not far from a saw-mill. *Agrion binotatum* Walsh, occurred only on and near log-rafts from Wisconsin, at two different points distant over two miles from each other, whence I infer its true habitat to be Wisconsin. *Dentiferum* differs from *signatum* Hagen, in the pale color not being "yellow," in the superior ♂ appendages being scarcely "subdolabrum," in the inferior appendages not being "black," and in the pterostigma not being "fuscous." In some respects this species agrees better with *Agrion pollutum* Hagen. Georgia is the northernmost State in which either *signatum* or *pollutum* has been taken, and the ♀ of *signatum* is as yet undescribed. The medial tooth on the superior ♂ appendage of *dentiferum* strikingly recalls some species of *Gomphus*, (*fraternus*, *adelphus* and *vastus*.) There is no better or more reliable character in Odonata than the shape of the ♂ abdominal appendages. It is singular that in the difficult Orthopterous family of Locustariæ Latr. (= Gryllidæ Leach,) although the shape of the ♂ anal appendages varies almost in every species and is very constant in each, precisely as in Odonata, yet Orthopterists have as yet made no use of so important and definite a character.

#### GOMPHUS.

G. FRATERNUS Say. This species is described in the *Monographie* (p. 125) from two small immature specimens from New York, one ♂ one ♀, the ♂ with its abdominal appendages mostly broken off. Consequently these last have neither been figured nor described. I note the following points in which the description differs from my Illinois specimens, and supply the deficiency in regard to the abdominal appendages. Say's brief description of this species would apply nearly as well to half a dozen others. Nobody but those who, like myself, have examined many scores of specimens of particular species of *Gomphus* from one and the same locality, can form any idea of how constant the size always is and how constant the coloration is except in very immature individuals, and what minute differences of coloration are of specific value. The only very remarkable variable character in this

genus, and that only observable in a few species, is the presence or non-presence of *dorsal* yellow vittæ on the 9th and 10th abdominal joints, which is the more singular as the *lateral* yellow markings of joints 8 and 9 are remarkably constant and afford one of the best specific characters. We may add to this, as variations of a less marked character which also occur in certain species—1st. The confluence or non-confluence, for a short space, near the humerus, of the humeral and ante-humeral (dark) stripes, in species which have the intervening pale stripe very narrow. 2nd. The presence or non-presence of the slender “superior” basal yellow vitta of the tibiæ. 3rd. The presence or non-presence of the narrow black edging of the occiput, noticed in 1862, as to the posterior lateral edging in *vastus*, and observed for the first time in 1863, as to the superior edging of the occiput in that species.

In the European *Onychogomphus forcipatus*, however, the laborious researches of Dr. Hagen (Mon. Gomph. pp. 33—40 and Plate 2) have shewn that there are several remarkable *geographical* variations, with transitions from one to the other, and where we should least expect it, in the ♂ abdominal appendages. The Illinois species seem to have these parts nearly as uniform as a set of castings from the same foundry and the same mould.—Owing to my formerly mistaking ♀ *G. consobrinus* n. sp. (described below) for the other sex of ♂ *G. fraternus*, I have erroneously stated in my Paper (p. 393) that the ♀ of *fraternus* has a long, slender, yellowish thorn at each end of the vesicle of the vertex. In reality *fraternus* ♀ has not even the rudiments of any thorn there, while *consobrinus* ♀ has just such a thorn as I have described. I may notice here a remarkable fact, of the truth of which I am satisfied, having observed it for three successive years, and which was the primary cause of the mistake just referred to. In the group *vulgatissimus*, to which belong *fraternus*, *consobrinus* and *graslinellus*, and also in *vastus* which belongs to the group *dilatatus*, the ♂ ♂ are 4 or 5 times as numerous as the ♀ ♀. On the contrary, in my two closely allied species, *fluvialis* and *amnicola*, the ♀ ♀ are 2 or 3 times as numerous as the ♂ ♂. There is no possibility of mistake in the latter case, as my specimens have been solely obtained from individuals just crawling out of the pupa, and during a long period of time in each year. So far as regards the group *vulgatissimus* the fact is confirmed by what can scarcely be a mere coincidence. In that

group there are four species, and only four species, of which there are in existence nothing but unique specimens, viz.: *melænopis*, *kurilis*, *adelphus* and *quadricolor* n. sp. In all four cases these specimens are ♂ ♂. Supposing no selection to be exercised, and supposing ♂ and ♀ to be equally numerous, the chances are 15 to 1 against such an event happening, whence we may safely infer that the ♀ ♀ in this group are not as numerous as ♂ ♂.

♂ ♀. 1st. The ground color is yellow, almost always tinged with green. 2nd. The labrum is immaculate, except a fuscous dot on its outside basal corner, and it has almost always an impressed median puncture; the central lobe of the labium is obfuscated throughout. 3rd. The large yellow lateral spot at the back of the eyes is always conspicuous, and presents occasionally the appearance of 3, not 2 sub-confluent spots, but the three are almost always entirely confluent. 4th. "The base" [i. e. the posterior prothoracic lobe] "and the POSTERIOR BORDER of the prothorax yellow" (*Monogr. Gomphin.* p. 126) is a manifest clerical or typographical error for "ANTERIOR BORDER"; i. e. anterior prothoracic lobe. The term "base" would include the "posterior border." 5th. It is only occasionally that the humeral fuscous stripe of the thoracic dorsum is confluent with the antehumeral. 6th. It is only in a single ♂ that I can discover any vestige of the "exceedingly slender blackish pleural stripe" in the suture between the meso- and meta-thorax, which M. Selys calls "the second suture," and even in that ♂ it is nothing but an irregular obfuscation.—The anterior dark stripe, which lies midway between the "second suture" and the humeral suture, is interrupted about halfway to the notum, but continued again in a more or less obvious short stripe immediately under the front wing. 7th. In two ♂ only out of seven there is a yellow dorsal vitta on joint 9 of the abdomen, wide in one, narrow in the other; and in the ♂ that has this wide vitta on 9, and likewise in the ♀ which has no vitta on 9, there is also a small median dorsal yellow spot on 10. These markings were described by Say, and traces of them were noticed by Mr. Selys in his ♀. 8th. The large, lateral, basal, yellow spot on abdominal joint 8 varies somewhat in size, and always along its basal  $\frac{1}{2}$  attains the margin and occasionally along its whole length; almost always, in addition to this basal spot, there is a submarginal terminal yellow dot or small spot on 8, with which in one ♂ the large

basal spot is partially confluent. 9th. The superior ♂ abdominal appendages are as I have described them in *vastus* Hagen, but the change in their curvature takes place at  $\frac{2}{3}$  (not  $\frac{3}{4}$ ) of the way to their tips, and instead of the "inferior small spine" at the change of curvature there is an inferior small blunt tooth; the inferior ♂ appendages differ from those of *vastus* in being only  $\frac{2}{3}$  (not  $\frac{3}{4}$ ) as long as the superiors, and in gradually curving inwards and upwards for their whole length, their tip obtuse and with a very small terminal thorn directed upwards. In *vastus*, on the contrary, the tip itself "curves suddenly upwards at  $\frac{3}{4}$  their length," and terminates acutely in a robust cone when viewed in profile, obtusely when viewed from above; whereas I erroneously described these appendages as "obtuse." 10th. There is always a "posterior" yellow vitta, slightly abbreviated at base, on the anterior femur ♂ ♀; and on the posterior femur ♀, but never in ♂, there is an "anterior," unabbreviated, yellow vitta, as in *M. Selys* ♀. The knees are generally spotted with yellow above, and generally on the tibiæ there is a slender "superior" basal vitta, which is sometimes subobsolete, and occasionally obsolete. This last vitta is described by Say. 11th. The wings are not even "slightly yellowish" at base; the costal vein is almost always conspicuously yellow on the outside; the pterostigma varies from bistre-brown to pale-reddish-brown or fawn-color, and surmounts 3—4½ cells. Antecubitals (front wings) 12—14. Postcubitals 9—12; two discoidal areolets, commencing always with 3 in both wings and in one wing of one ♂ with 4. 12th. Instead of the occiput being "more elevated at the sides in ♀ than in ♂," I see no difference. The middle of the ♂ occiput, however, rises much higher above the line of the eyes than the middle of the ♀ occiput, which scarcely rises at all above the line of the eyes. The abdominal appendages in my unique ♀ are yellow, not "black," except at the extreme base and tip.

Length ♂ 53—56 mill. ♀ 54 mill. Expanse ♂ 61—67 mill. ♀ 68 mill. Abd. ♂ 35½—39 mill. ♀ 38 mill. App. sup. ♂ 1½ mill. Hind femur ♂ 9—9½ mill. ♀ 10 mill. Front wing ♂ 31½—33 mill. ♀ 34 mill. Hind wing ♂ 29½—31 mill. ♀ 32½ mill. Pterost. inf. ♂ 3 mill. ♀ 3½ mill. Seven ♂, one ♀. Occurs in June both on the Mississippi and on Rock River. The difference in the coloration of the ♂ ♀ posterior femora is very remarkable and unusual, and re-occurs in *G. grasilinellus* Walsh, (see below.) In the *Synopsis of N. A. Neur.* (p.

105, line 2), instead of "anterior and posterior femora partly yellowish," we should read "anterior ♂ ♀ and posterior ♀ femora partly yellowish."

**G. GRASLINELLUS** Walsh. For the sake of brevity I described this species by its differences from *G. fraternus*. Owing to the confusion already referred to as made by myself between *consobrinus* n. sp., and *fraternus* Say, I unnecessarily stated that in ♀ *graslinellus* there was no lateral thorn on the vertex. From the same cause I omitted to state that in *graslinellus* there are two uninterrupted blackish stripes on the thoracic pleura, viz., one on the suture behind the spiracle, and one half-way between that and the humeral suture, and also that the space between these two stripes, as in *consobrinus* n. sp., is livid not yellow. The hind femora are also shorter than those of *fraternus* in the proportion of  $7\frac{1}{2}$  to 10 i. e. one-fourth shorter. In describing the superior abdominal appendages ♂ *graslinellus*, by a clerical error I stated the large lateral tooth to be "quadrangular," instead of "rectangular." In its European representative, *G. graslini*, the lateral tooth is figured by Dr. Hagen as having its sides at an angle of about  $50^\circ$  or  $60^\circ$  to each other (*Mon. Gomph.* Plate 8, fig. 3.) So far as I recollect, the dorsum of the 9th and 10th abdominal segments varied in its coloration as in *fraternus*, but vice versa, being generally marked above with yellow and only occasionally immaculate. The four specimens, however, which I still have on hand, have each a simple, moderately wide, dorsal, yellow vitta on these two joints. I ought to have added also, that in ♂ *graslinellus* the terminal abdominal joints are as much dilated as in ♂ ♀ *fraternus*, and that in ♀ *graslinellus* they are scarcely dilated at all. As in *fraternus* ♀, so in *graslinellus* ♀ (3 specimens) the posterior femur is "anteriorly" vittate with yellow for  $\frac{1}{2}$ – $\frac{2}{3}$  the way to its tip, whereas in both species the ♂ posterior femur is immaculate, save that the knees are spotted with yellow above, as well as all the knees ♂ ♀. In the allied *G. vastus* (6 ♂, 5 ♀) and in *consobrinus* n. sp. (3 ♂, 2 ♀), I find no trace of this singular sexual character. Another equally singular sexual character is found in the tarsal claws of *consobrinus* and *externus* and is noticed below.

**G. consobrinus** n. sp. ♂ Yellow, very slightly tinged with green. *Head* with the occiput a little rounded above, but with the centre scarcely higher than the line of the eyes, fringed above with black hairs. All between the occiput and

the front black. Vesicle of the vertex loftily cariniform, transverse, a little emarginate in the middle and suddenly rounded off at each end. First joint of antennæ annulate with whitish at tip. Upper surface of front with a narrow basal fascia, varying in color from dark brown to very pale reddish brown and with its central  $\frac{1}{2}$  extending forwards in a very obtuse angle. Labium whitish, the central lobe and the basal half of the lateral lobe generally obfuscated; back of the head blackish, with a lateral row of three yellow confluent spots immediately behind the eyes. *Prothorax* black above, with its anterior and posterior lobes, two confluent spots before the posterior lobe and a large lateral spot, all yellow. Dorsum of *thorax* with the dorsal carina yellow only from its posterior bifurcation half-way to its tip, elsewhere black. Stripes of the dorsum dull black; the median stripes confluent, not attaining the anterior margin by  $\frac{1}{2}$  a millimetre, but attaining the antealar sinus, very slightly wider in front and excurved at the extreme tip. The antehumeral broader than the median, attaining the anterior margin but tapering behind and not quite attaining the antealar sinus. The humeral in front as wide as the median, and behind wider, where it is often confluent with the antehumeral, the intervening yellow stripe being throughout very narrow. Antealar sinus black, the posterior middle and the angle next the front wing yellow. Pleura of the thorax with two unabbreviated blackish stripes, one on the suture behind the spiracle and one half-way between that and the humeral suture, the intervening space dull, pale-purple (lilac) in the living insect and livid in the dried specimen, and the two blackish stripes shading off gradually into the livid color. Spiracle black. Sternum pale-greenish-gray. *Abdomen* black, expanded ♂ ♀ on joints 7—9 as in *fraternus* ♂ ♀, and marked with yellow on the dorsum as follows:—1, with a large quadrangular spot confluent with a small spot or dot in front, both together covering its entire length; 2, with the usual trilobate vitta; 3—7 with the usual trilobate narrow vitta tapering to a sharp point at tip and not quite attaining the tip of each joint; 8 with a shortish triangular basal spot; 9 with a vitta, scarcely abbreviated at tip, sometimes broad, sometimes narrow, and varying much in shape; 10 with a dorsal median rhomboidal spot or dot. Laterally, joints 1, 2, 9 and 10 are yellow, 10 very narrowly so; 3—6 are obscurely clouded, with a less obscure basal triangle, the color of both cloud and spot in the living insect being a dull pale purple, and in the dried specimen a dull gray; 7 with a basal triangle of the same color as 3—6 and a median yellow vitta; 8 with a basal yellow spot, reaching about half-way to the tip and always attaining the margin throughout, and also with a submarginal terminal yellow dot. Earlets yellow, tipped behind with minute black teeth. Venter blackish, generally yellowish at tip and sometimes at base. The *abdominal appendages* are black and hairy; viewed from above the superiors are more than  $\frac{1}{2}$  as long again as the 10th abdominal, wide apart at base, slightly divaricate, tapering rapidly and chiefly on the inner side for  $\frac{1}{3}$  their length, then very slowly for the next  $\frac{1}{3}$ , when they again taper very rapidly and chiefly on the inner side and terminate in a slender thorn. Viewed laterally, their upper edge is perfectly straight, except that it curves very slightly downwards at their extreme base and very slightly upwards at their extreme tip; their lower edge converges with the other edge at an angle of  $45^{\circ}$  for  $\frac{1}{4}$  the length of the

appendage, then suddenly diverges from it, at an angle of about  $100^\circ$  or  $110^\circ$  with its former course, till it attains  $\frac{1}{2}$  the distance to the tip, then suddenly angles off to the tip, which is acute, in a straight line, which, at  $\frac{2}{3}$  of the distance from the last angulation to the tip, has a slight emargination in it followed by a very small tubercle. The inferiors extend  $\frac{2}{3}$  as far as the superiors, and are yellowish at their origin, horizontally flattish, wider apart at base than the superiors, tapered regularly and slowly, almost at right angles to the abdomen for  $\frac{1}{2}$  their length, when they curve inwards and upwards and terminate in an obtuse point with a minute spine at its tip directed upwards. Legs black; femora with short promiscuous spines, hind femora also with a double row of spines, gradually longer towards the tip and longest a little before the tip. Anterior femora with a "posterior" yellow vitta slightly abbreviated at base. In one immature ♂ all the femora are yellowish except "superiorly." Knees spotted with yellow above; tibiæ above with a slender basal yellow vitta. In the immature ♂ the base of the tarsal claws is pale. Wings hyaline, veins black. The costal vein conspicuously yellow in front to the tip of the pterostigma. Pterostigma ranging from dark reddish brown to very pale reddish brown in the immature ♂, and surmounting  $3\frac{1}{2}$ — $4\frac{1}{2}$  cells. Membranule moderate, whitish. Antecubitals ♂ ♀ 12—15; postcubitals ♂ ♀ 10—13; two discoidal areoletts ♂ ♀, always commencing with three both in front and hind wing.

The ♀ differs as follows:—1st. The ocellus is laterally nearly quite straight, but rises suddenly in its middle  $\frac{1}{2}$  in two confluent curves, which however are scarcely elevated above the line of the eyes. 2nd. At each end of the vesicle of the vertex, adjoining the eyes, there is a slender acute yellowish thorn, as long as the second joint of the antennæ. 3rd. The double row of thorns on the hind femur has the longest ones in its middle, where they are twice as long as the longest on the ♂ femur. 4th. The basal  $\frac{1}{2}$  of the tarsal claws, and more conspicuously so in the hind legs, is rufous. 5th. The pterostigma is pale reddish-brown in the mature specimen.—The ♀ abdominal appendages are fuscous, elongate-conical, slightly curved outwards and upwards near the tip, and terminating in a slender thorn; the anal processes are yellow, the superior one half as long as the appendage, the inferior a little longer; the superior one semicircular, the inferior one transversely semi-oval and slit lengthways to its base. The vulvar lamina is yellowish fuscous, full half as long as the 9th ventral, and bifid fully half-way to its base, the tips curving apart horizontally nearly in a rectangle.

Length ♂ 55—59 mill. ♀ 57—60 mill. Expanse ♂ 60—69 mill. ♀ 66—75 mill. Abd. ♂ 39—41 mill. ♀ 41—43 mill. Append. sup. ♂  $1\frac{1}{2}$  mill. Hind femur ♂  $9\frac{1}{2}$ — $10\frac{1}{2}$  mill. ♀  $10\frac{1}{2}$ — $11\frac{1}{2}$  mill. Longest thorns ♀ hind femur 1 mill. Front wing ♂  $32\frac{1}{2}$ — $34\frac{1}{2}$  mill. ♀ 36— $36\frac{1}{2}$  mill.; its width ♂ 7— $7\frac{1}{2}$  mill. ♀  $7\frac{1}{2}$ —8 mill. Hind wing ♂ 31—33 mill. ♀ 34—35 mill.; its width ♂ 9— $9\frac{1}{2}$  mill. ♀  $9\frac{1}{2}$ —10 mill. Pterost. inf. ♂  $3\frac{1}{2}$ —4 mill. ♀ 4 mill. Width of 8th ventral ♂ ♀  $2\frac{1}{2}$  mill.

Three ♂, two ♀.—Differs from *fraternus* as follows:—1st. The average size is fully  $\frac{1}{18}$  larger. 2nd. The ♀ vertical vesicle is laterally thorned. 3rd. The median black stripe of the thoracic dorsum is wider and the adjoining yellow stripe consequently narrower, which



gives the insect a very different appearance. 4th. The anterior blackish stripe of the pleura is never interrupted or abbreviated, there is a distinct posterior blackish stripe on the pleura, and the space between the two is pale dull purple or livid instead of greenish yellow. 5th. The ♂ anal appendages are entirely different. 6th. The hind femur ♀ is not "anteriorly" yellow.—From all other allied species, except *graslinellus* Walsh, and *quadricolor* n. sp. (described below,) *consobrinus* differs in the space between the 1st and 2nd pleural stripes being livid;\* from *graslinellus* the ♂ differs in the abdominal appendages not having a large lateral rectangular tooth and the ♀ in having a lateral thorn to the vertical vesicle. From all allied species, excepting 1st, *externus* Hagen, of which more below, 2nd, *intricatus* Hagen, which is very much smaller and quite different and belongs to a different group, and 3rd, *spoliatus* Hagen, it differs essentially in the shape of the ♂ abdominal appendages. As to *spoliatus*, in size and in ♂ abdominal appendages *consobrinus* closely resembles that species, the ♀ of which is unknown, but it is separated at once, 1st, by the median and antehumeral stripes of the thorax being very wide apart and not connected by a black band above and below, 2nd, by the abdominal appendages ♂ not being yellow at base and middle, and 3rd, by the hind femora being  $\frac{1}{2}$  shorter in proportion and much less formidably spined. From *dilatatus*, *externus*, *vastus* and *ventricosus* n. sp., it differs in the tip of the abdomen not being so widely expanded—which in that group is caused by the terminal VENTRAL segments being much wider than usual. Finally, from *adelphus*, *dilatatus*, *vastus*, *vulgatissimus* (Europe), *melænops* (Japan), *simillimus* (Europe), *Lucasii* (Africa), *pulchellus* (Europe), *Graslini* (Europe), and *flavipes* (Europe), it differs by the face being immaculate.

This species singularly resembles *externus* (Texas) in all its measurements, except that it is at least one-seventeenth larger and the pterostigma one-sixth longer. It resembles it also in the minutest details of its coloration, even down to the ♂ ♀ tarsal claws, except that in that species the carina of the thoracic dorsum is yellow throughout, the

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\* In the exotic subgenus *Cyclogomphus* the 1st and 2nd pleural stripes are described as confluent, and it is stated that this character is not found in any other group. (*Mon. Gomph.* p. 105.)

pleura is not described as livid between the blackish stripes, and its ♀ hind tarsi are said to be "yellow in the middle," no traces of which color are discoverable in the tarsi of ♀ *consobrinus*. But 1st *externus* is said, when compared with *fraternus*, to have "its terminal abdominal segments very much more dilated, so as always to prevent any confusion between the two species," and *consobrinus*, when placed side by side with *fraternus*, exactly resembles that species in the structure of its terminal abdominal segments. 2nd. The ♀ of *externus* is known and described, yet no mention is made of the remarkable and conspicuous yellowish thorns on the ♀ vertex which are found in ♀ *consobrinus*. 3rd. The posterior femora of *externus* ♂ ♀ are said to have, besides the short promiscuous spines, "an *external* series of spines of which a dozen are successively longer," whereas in ♂ ♀ *consobrinus* there is not only an *external*, but a distinct *internal* series also, but slightly shorter than the external ones. 4th. Neither the description (p. 412) nor the figure (Plate 21, fig. 2) of the ♂ abdominal appendages of *externus* precisely agree with those of *consobrinus*; still the differences in their structure are not fundamental. The vulvar lamina agrees exactly, and the ♂ genitals pretty closely, so far as they are figured.

**G. quadricolor** n. sp. ♂ Pale green. *Head* with the occiput ciliated above with black hairs and regularly rounded in a circular arc of 45°, so as to be cut off nearly throughout by a line drawn from the top of one eye to the top of the other. All between the occiput and front black. Vesicle of the vertex loftily cariniform, transverse, scarcely emarginate in the middle, and curving downwards very suddenly at the sides towards the eyes. Upper surface of the front with a basal black band, parallel with its anterior edge except that it is acutely emarginate laterally at  $\frac{1}{4}$  of its entire width. Labium pale livid green, the exterior margin of its lateral lobes yellowish: back of the head blackish, but along the lateral margin of the eyes with a large, ill-defined, elongate, yellow spot. *Prothorax* black, with the anterior lobe and a small double spot on the posterior lobe yellow, and a double discoidal spot and a large lateral one green. Dorsum of *thorax* with the stripes black; the carina green only half-way from its posterior bifurcation to its tip, elsewhere black. The two median stripes confluent, gradually wider in front, squarely truncate in front, not attaining the anterior margin by  $\frac{1}{2}$  a millimetre, but narrowly confluent along the front of the antealar sinus with the antehumeral. The antehumerals wider, their sides parallel in front but converging behind, nearly twice as near to the medians behind as they are in front. The humerals as wide as the medians, and wider behind than in front, separated in front from the antehumerals only by a narrow green line, and confluent with them for a short space at  $\frac{3}{4}$  the distance

from their tips to their base, when they diverge widely so as to leave a triangular green spot which almost attains the antealar sinus. Pleura with an ill-defined pale dusky stripe in the suture behind the spiracle, and a well-defined dusky one half-way from this suture to the humeral one, the intervening space livid. The entire space between this last stripe and the humeral one greenish yellow, yellowish above and below. Spiracle black. Sternum dull greenish gray behind. Antealar sinus black on its anterior  $\frac{1}{2}$ ; origin of wings black; meta- and mesothoracic scutels vivid yellow. *Abdomen* black, with joints 7—9 moderately expanded as in *fraternus*, and 9 a trifle longer than 8. Joint 1 is entirely green except a hairy black stripe extending from the lateral tip of its dorsum nearly to the centre of the dorsum; 2 is laterally pale-green with some irregular yellow freckles, with the usual trilobate dorsal vitta which is pale-green. Along the middle of this vitta, as well as the middle of joint 1, extends a longitudinal very irregular, vivid yellow line, alternately contracting and expanding and throwing off lateral fine yellow lines. The remaining joints are marked dorsally as follows with greenish yellow:—3 has the usual narrow, pointed, trilobate, vitta scarcely attaining the tip, and 4—7 a narrow pointed vitta reaching only  $\frac{1}{2}$  of the way to the tip, with rudiments of a short basal vitta on 8. Laterally 3—7 have an obscure yellow triangular basal spot, 8 and 9 are submarginally yellow except at base and tip; the terminal  $\frac{1}{2}$  of the margin of 8 and the whole of the margin of 9 are also yellow; and 10 has an obscure yellowish cloud along its lateral margin. Earlets green with very minute black teeth; venter blackish. *Abdominal appendages* black and hairy, the superiors  $\frac{1}{2}$  longer than the 10th abdominal joint, wide apart at base and moderately divaricate, the inferiors  $\frac{1}{2}$  shorter than the superiors, still wider apart at base and still more widely divaricate than the superiors. Viewed laterally from above at an angle of  $45^\circ$  to the perpendicular, the superior appendage which is next the eye is regularly tapered, except that it is trumpet shaped and much expanded on its basal  $\frac{1}{2}$  especially on the inside, and has its extreme tip suddenly contracted on the outer side and terminating in a small acute thorn. The appendage furthest from the eye, from the same point of view, has its upper edge sinuate for  $\frac{2}{3}$  its length in two exceedingly gentle curves, the first twice as long as the second, when the appendage turns slightly upwards in the form of a straight, fusiform, robust, acute thorn occupying the other  $\frac{1}{3}$  of its length. From the same point of view, the lower edge of the same appendage for  $\frac{1}{2}$  its length diverges from the upper edge in a very gentle concave curve till it is twice as far from it as it was at base, when it turns suddenly upwards in a direction at right angles to the upper edge till it has travelled full  $\frac{1}{4}$  of the way to it, thereby forming an acutely angular tooth, and then runs in a very gentle curve, whose convexity is downwards, to the base of the terminal fusiform tooth. The inferior appendages are rounded below, flat above, but slightly tapering, and with their upper edge perfectly straight till they attain their utmost limit, when the extreme tip which is obtuse turns upwards in the form of a small robust thorn. *Legs* black, the anterior femora and trochanters with a "posterior" pale green vitta. *Wings* hyaline, slightly flavescent at base; veins black, the costal vein pale green in front as far as the pterostigma; pterostigma dark red-

dish brown, surmounting 3—4 cells; membranules rather small, whitish; angle of hind wings very acute. Antecubitals 13; postcubitals 10—12; two discoidal areolets commencing with 2, in one hind wing with 3.

Length ♂ 45½ mill. Exp. ♂ 55 mill. Abd. ♂ 33 mill. Front wing ♂ 27 mill. Hind wing ♂ 25½ mill. Hind femur ♂ 6½ mill. Pterost. infer. ♂ 2⅓ mill.

One ♂; ♀ unknown. There are four distinct colors in this insect, viz.: black, lilac, green and yellow, whence the specific name. The contrast between the green, which is almost bluish-green, and the bright vivid yellow is very striking, and the details were most of them noted from the living insect. The contrast is just as apparent in the dried specimen. In *vastus* ♂ ♀ there is a somewhat similar contrast, which I did not notice in my description, the meso- and metathoracic scutels being yellow more or less bright and the thoracic notum greenish yellow; and in one specimen there is a bright yellow spot on the greenish-yellow dorsal vitta of the 2nd abdominal. This elegant little species can be confounded with no allied U. S. species but *adelphus* Selys, owing to its minute size; and it differs from *adelphus* 1st, in the face being immaculate. 2nd, In the occiput not being "blackish" behind. 3rd, In the back of the head not being blackish immaculate. 4th, In having no black spot behind the coxæ of the hind legs. 5th, In the sides of abdominal joints 8 and 9 not being black, immaculate. 6th, The superior abdominal appendages of *adelphus* are described as having their tooth spring from the *outside* edge of their inferior surface and point *downwards*, whereas in *quadricolor* it springs from the *inside* edge and points obliquely *inwards* at an angle of 45°. 7th, Although *quadricolor* is  $\frac{1}{7}$  larger than *adelphus*, its posterior femur is  $\frac{1}{4}$  shorter. 8th, The femora of *adelphus* are immaculate, except a yellow point at the knee; those of *quadricolor* are immaculate except that the anterior femora and trochanters are posteriorly yellow.—Of the foreign allied species it is separated at once from *vulgatissimus*, *similimus*, *pulchellus*, *graslini* and *flavipes*, all 5 of Europe, and from *mælænops* (Japan), and *Lucasii* (Africa), by its face being immaculate. From a closely allied species (length .48 mill.) inhabiting the Kurile Islands, south of Kamtschatka, of which only a single specimen in bad condition is known to exist, *G. kurilis*, it differs as follows: 1st, *Kurilis* has the occiput "almost straight," and what is singular "not ciliated." 2nd, The dorsal abdominal vitta of *kurilis* is continuous on joints 4—7, in *quadricolor* it is widely interrupted at the tip in joints

4—7. 3rd, In *kurilis* the legs are "all black." 4th, The ♂ abdominal appendages are entirely different.

**G. ventricosus** n. sp. ♂ Greenish yellow. *Head* with the occiput straight, except laterally, and in the exact line of the eyes, fringed with black hairs. All between the occiput and front black; tip of the first joint of antennæ whitish. Vesicle of vertex straight, transverse, cariniform, suddenly rounded off at the sides. Upper surface of the front with a very narrow basal black fascia. Central lobe of labium blackish. Back part of head blackish, laterally yellow immediately behind the eyes. *Prothorax* black above, with the anterior and posterior lobes, a double spot before the posterior lobe and also a lateral spot, all greenish yellow. Dorsum of *thorax* with its stripes deep black, as in *vastus*; the dorsal carina yellow from its bifurcation almost to its extreme tip, elsewhere black. The median stripes confluent, scarcely wider in front, obliquely truncate at tip so that their extreme tip just attains the tip of the carina, narrowly confluent behind along the antealar sinus with the humeral. The humerals confluent throughout with the antehumerals except in front for  $\frac{1}{4}$  their length, where the separating yellow line is very narrow, and except also that the hind end of the antehumeral separates itself from the two united stripes in the form of a large triangular black tooth which does not attain the antealar sinus by one millimetre. The two united stripes are nearly twice as wide as the united medians and are unabbreviated. Antealar sinus black, yellowish on the middle  $\frac{2}{3}$  of its posterior half; origin of wings blackish; meso- and metathoracic scutels a vivid yellow. Sternum pale dull green, behind dull greenish gray. Pleura with a narrow dusky stripe midway between the humeral suture and that behind the spiracle, which stripe does not ascend towards the wing beyond the spiracle; spiracle blackish. *Abdomen* black, joints 7—9 greatly dilated and widely margined, especially 8, precisely as in *G. vastus*; joint 1 laterally pale dull green and with a large obtrigonal dorsal pale green spot not quite attaining the base and tip; 2 laterally pale dull green and with the usual trilobate dorsal vitta, which is pale green with a central, unabbreviated longitudinal, yellow line. The remaining joints are marked on the dorsum with greenish-yellow as follows:—3—6 with the normal trilobate vitta, a little wider than usual, not very acute at tip, and just attaining the subterminal short spines of each joint; 7 with a lanceolate very acute vitta extending  $\frac{2}{3}$  of the way to the tip, and also with the narrow annulus behind the subterminal spines yellowish. Laterally 3—6 have a basal triangular spot, much larger on 3, and a faint marginal vitta, all obscure greenish yellow; 7 has the same basal triangle, and also confluent with the triangle an irregular median yellow spot, which leaves the terminal  $\frac{1}{2}$  of the expanded margin of the joint black; 8 has a large unabbreviated yellow vitta which leaves the expanded margin black, and 9 has a narrower unabbreviated vitta, which, as well as the margin, is yellow. Earlets anteriorly shining black, posteriorly with small black thorns. Venter blackish. *Abdominal appendages* black and hairy. Viewed from above the superiors are wide apart at base, twice as long as the last abdominal joint, slender, conical, but slightly divaricate, straight, tapering to a long acute point,

the outer side with an attenuated margin (or flange) which is narrow to  $\frac{1}{4}$  their length and then expands slowly and gradually as far as  $\frac{1}{2}$  their length, when it is suddenly contracted to  $\frac{1}{2}$  its width, so as to form an angular tooth, and tapers out at  $\frac{2}{3}$  their length. Viewed laterally the superiors taper rapidly on their basal  $\frac{1}{4}$  and afterwards very slowly; and they curve downwards, their lower edge describing a circular arc of  $45^\circ$  for 4-5ths their entire length, then suddenly become straight and taper to a very fine, long, acute point. At the change in the curvature there is an elongate inferior tubercle, truncate for its whole length in a direction parallel with the straight terminal portion of the appendage, and about 1-7th or 1-8th as long as the appendage itself. The inferiors are  $\frac{2}{3}$  as long as the superiors, as wide apart at base as they are and more divaricate, obliquely but almost vertically flattish, rapidly tapered when viewed flatways, very slowly tapered when viewed edgeways, their inside surface a little excavated, their outer surface a little rounded, straight for  $\frac{2}{3}$  their length, when they curve inwards and upwards in a quadrant and terminate in a robust cone with a very minute thorn at tip directed upwards. *Legs* black; anterior femora with a "posterior" pale green vitta. *Wings* hyaline, scarcely flavescens at base; veins black, the costal vein greenish yellow in front to the pterostigma: pterostigma dark brown, surmounting  $3\frac{1}{2}$ —4 cells; membranules moderate, whitish. Antecubitals 11; postcubitals 10. Two discoidal areolets, commencing with 3 in both wings.

Length ♂ 48 mill. Expanse ♂ 57 mill. Abd. ♂  $34\frac{1}{2}$  mill. Sup. wing ♂  $30\frac{1}{2}$  mill. Inf. wing ♂  $29\frac{1}{2}$  mill. Pterost. inf. ♂ 3 mill. Post. femur ♂ 8 mill. Append. sup. ♂  $1\frac{1}{2}$  mill. Width of 8th ventral ♂  $3\frac{1}{2}$  mill.

One ♂; ♀ unknown. In measuring the width of the 8th ventral in *Gomphus* care should be taken not to include the spiracle-bearing membrane which connects what may be called the "sternum" or central piece of the venter with the attenuated margin or "pleura" of the dorsum. In Odonata the abdominal spiracles are situated in this membrane, generally close to the "sternum," and are generally very small and not easily seen except by inflating the abdomen; which individual *Gomphus* sometimes do of their own free will in the interval between their capture and their death. The subfamily Gomphina, which has the tip of abd. ♂ more or less dilated, is remarkable for the spiracle of the 8th ventral being larger than the others and very conspicuous. Just so *Dytiscus* in Coleoptera, who has a habit of sticking his anus out of the water to draw his breath, has his anal spiracle much larger than the others. In *vastus* and *ventricosus* and probably in the other two species belonging to this group, this spiracle on the 8th ventral is situated rather further from the ventral "sternum" than in other *Gomphus*. *Ventricosus* is readily distinguishable from all allied *Gomphus* but *dilatatus*, *externus* and *vastus* by the terminal abdominal joints being

very widely distended, joint 8 expanding  $6\frac{1}{2}$  mill. in consequence of the unusual width of the terminal ventrals. From *dilatatus* it is at once separated by the much larger size of that species, the total length of which is 72 mill. and that of the superior wing 41 mill., and also by the face of *dilatatus* being fasciate with black.—From *externus* it differs as follows:—1st. The stripes of the thoracic dorsum are deep black, as in *vastus*, not “brown.” 2nd. The humeral and antehumeral are confluent nearly throughout; in *externus* they are not confluent at all. 3rd. The posterior pleural stripe is absent and the anterior one abbreviated above, nearly as in *fraternus*; in *externus* both stripes are present and unabbreviated. 4th. Abdominal joints 8—10 are dorsally immaculate; in *externus* they are distinctly vittate with greenish yellow. 5th. The earlets are widely tipped with black as in *vastus*; in *externus* they are immaculate with fine black teeth. 6th. The posterior femur is only  $\frac{1}{3}$  of the total length of the body; in *externus* it is nearly  $\frac{1}{5}$ .—Finally, although at first sight it would easily be confounded with *vastus*, it differs from that species as follows:—1st. The size is smaller, the smallest specimen of 6 ♂ *vastus* now before me being  $52\frac{1}{2}$  mill. long, sup. wing  $32\frac{1}{2}$  mill. Out of eleven ♂ *vastus* measured by me in 1862, the length only varied from 53—55 mill., and three ♀ the same. 2nd. The face is immaculate; in *vastus* the face (if we include the labrum) is trifasciate with black. 3rd. It has one long yellow spot behind the eye; *vastus* has two small ones which are never confluent. 4th. The median thoracic stripe is rather narrow, its sides are parallel and it is obliquely truncate at tip, the obtuse angle outwards; in *vastus* (11 ♂ ♀ specimens) the median thoracic stripe is wider, distinctly obovate, and obliquely truncate at tip, the acute angle outwards, except in a single ♂ where it is squarely truncate and scarcely obovate. 5th. The humeral and antehumeral are confluent for a long space; in *vastus* never at all. 6th. It has only one pleural stripe, and that abbreviated on its upper half; *vastus* has two, never abbreviated, though the anterior one is sometimes interrupted for a short space. 7th. The dorsal vitta of abdominal joints 3—6 is scarcely abbreviated at tip; in *vastus* it is greatly abbreviated. 8th. In *vastus* there is a small inferior thorn near the tip of the superior abdominal appendage ♂; in *ventricosus* this thorn becomes a long truncate tubercle. In *ventricosus* there is a distinct lateral flange on the outside

of this appendage; in *vastus* there are slight rudiments only of such a flange, which I omitted to mention in my description, for the sake of brevity.

*G. FLUVIALIS* Walsh, and *G. AMNICOLA* Walsh. I ought to have stated as one of the sexual distinctions of these two closely allied species, that the terminal joints of the ♀ abdomen are not nearly as much dilated as in ♂ — in fact scarcely dilated at all. In the ♂ the terminal joints are dilated about  $\frac{3}{4}$  as much as in *G. fraternus*. In this respect these two species differ from the characters of the group *pallidus* (Selys,) which is the only one to which they can with any propriety be referred, and which is stated have the terminal joints (♂ ♀?) “very little dilated.” (Mon. Gomph. p. 118.) They differ also in the ♂ abdominal appendages not being “yellowish,” but brown-black or black. They are likewise unlike “*pallidus* and certain allied species” in the ♂ not having its femora “very hairy,” but on the contrary destitute of any but a few scattering basal hairs which are also found in ♀. Probably they form a distinct group.

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Of the great genus *Gomphus* there are now no less than 86 described species, including the three described above and the six described in my former Paper on Pseudoneuroptera. Of these 86 no less than 36 occur in North America, and at least 26 and perhaps 30 within the limits of the United States. Messrs. Selys and Hagen have divided this Genus into 16 subgenera, six of which are found in America, either North or South, and five within the limits of the United States. The following Synoptical Table expresses as briefly as possible the structural relations of these six American subgenera. In giving more weight to structure and less to coloration I have deviated from the path travelled by M. Selys in his Analytical Table of the whole number of Subgenera. (Mon. Gomph. p. 14.)



G. GOMPHUS AND ITS AMERICAN SUBGENERA.		SUBGENERA.	
Inferior ♂ abdominal appendages not divaricate.	Stripes of the thoracic dorsum more or less obsolete; legs short; occiput ♂ ♀ unarmed.	} ERPETOGOMPHUS.*	
	Stripes of the thoracic dorsum distinct; legs long; occiput ♂ unarmed, occiput ♀ with large horns.		
Inferior ♂ abdominal appendages widely divaricate.	Internal vein of the pterostigma not prolonged; vesicle of the vertex semi-circular.	} MACROGOMPHUS. †	
			Abdominal joint 9 at least $\frac{1}{2}$ as long again as 8; 10 very short, from $\frac{1}{2}$ — $\frac{1}{3}$ of 9. Earlets ♀ subobsolete as usual.
	Internal vein of the pterostigma prolonged as usual; vesicle of the vertex straight or nearly so.	Abdominal joint 9 about equal to 8; 10 about half as long as 9. Earlets of ♀ as large as they commonly are in ♂ Gomphina.	} EPIGOMPHUS. ‡
		Abdominal joint 9 about equal to 8; 10 half as long as 9 or less.	
	Abdomen with joints 8—10 gradually diminishing in length.	} GOMPHUS.	
		} NEOGOMPHUS.	

\*These two subgenera were originally united under Ophiogomphus by M. Selys. I retain them as separate in deference to his high authority, but I can perceive no distinguishing characters that are not rather of specific than of subgeneric value. To consider the characters laid down by Messrs. Selys and Hagen in detail:—1st. *The difference in the thoracic stripes.* If species with the normal thoracic stripes *subobsolete* are to be placed on that account in a separate subgenus from those with the normal thoracic stripes *distinct*, surely those with the normal thoracic stripes *entirely absent* ought also to be placed in a separate subgenus. Now Mr. Selys himself refers to Erpetogomphus a species (*boa*) with the thorax immaculate; (Addit. Synops. Gomph. p. 11,) and I have described another one (*rupinsulensis*), which also has the thorax immaculate. 2nd. *The different length of the legs.* Calculating from M. Selys' own measurements, in *Erp. crotalinus* ♂ the hind wing is 4.28 of the hind femur, while in *Oph. colubrinus* ♂ and *Oph. serpentinus* ♂ the hind wing is respectively 4.21 and 4.20 of the hind femur—the difference in this respect between the two subgenera being as small as it well could be. It is possible, however, that the tibiae in Ophiogomphus may be disproportionately elongated, so that the entire hind leg may be relatively to Erpetogomphus much longer, instead of being subequal as we should infer from the subequality of the hind femora. But even allowing that the legs of all known Erpetogomphus are short, and those of all known Ophiogomphus long, the enormous and yet very gradual difference in the length of the hind femur between the different species of the Subgenus

## CORDULIA.

**C. ? molesta** n. sp. ♀ Pale dull brownish olive, both in the living and in the dried specimen; almost immaculate. *Head* pilose; antennal seta brown; mouth and all beneath paler; behind the tubercle of the eyes some obscure yellow markings. *Thorax* pilose; dorsum of thorax with a much darker broad dorsal stripe, shading off into the ground-color half-way to the humeral suture; dorsal carina yellowish. Pleura with a yellowish stripe on the spiracle, obsolete

Gomphus, seems to indicate that in the entire genus Gomphus the length of the legs is a character not of subgeneric, but merely of specific value. For example, calculating from M. Selys' own measurements, in *G. dorsalis* ♂ the hind wing is 4.60 of the hind femur, in *intricatus* ♂ 4.58, in *simillimus* ♂ 4.51, in *pulchellus* ♂ 4.33, in *lividus* ♂ 4.13, in *graslini* ♂ 4.06, in *pilipes* ♂ 3.94, in *flavipes* ♂ and *militaris* ♂ 3.93, in *occipitalis* ♂ and *Kurilis* ♂ 3.87, in *vulgatissimus* ♂ 3.86, in *spicatus* ♂ 3.85, in *melanops* ♂ 3.80, in *minutus* ♂ 3.73, in *adelphus* ♂ 3.33, in *dilatatus* ♂ 3.20, in *fraternus* ♂ 3.11, in *spinosus* ♂ and *armatus* ♂, which are grouped separately from all the others except *spoliatus* as having "excessively long hind femora," no less than 3.04 or only .07 less than *fraternus* ♂! and finally in *externus* ♂ 3.00 and in *spoliatus* ♂ 2.80, the last species but one being grouped as having "hind femora of the ordinary length," and yet actually having the longest hind femora of any of them, with the single exception of *spoliatus*!—3rd. As to the character drawn from the very remarkable *armature of the ♀ occiput* in Ophiogomphus, (*Mon. Gomph.* Plate V. fig. 2. h), M. Selys himself, in the earlier part of his great work, laid it down as one of the characters of the subgenus Macrogomphus, that the ♀ "had a protuberance on the middle of the occiput," (p. 87,) but he subsequently allowed that "this character was only a specific one." (p. 428.) Are not the horns of the occiput in ♀ Ophiogomphus likewise only of specific value? We see that in the foreign subgenus Onychogomphus one species (*Cerastes*) has horns on the ♀ occiput (*Mon. Gomph.* Plate IV. fig. 2, b.); yet it is not on that account placed by M. Selys in a different subgenus from the other 13 species which have no occipital horns.—4th. Considerable stress is laid, especially by Dr. Hagen, upon the fact that Ophiogomphus has a tooth upon the second joint of the penis, while Erpetogomphus has none. But the most recent researches of Dr. Hagen have shown that some species of the foreign subgenus Onychogomphus have this tooth and some have not. (*Mon. Gomph.* p. 429.) It would seem, therefore, that neither can this character be of subgeneric value in Gomphus.—5th. It is said that the vesicle of the vertex is divided into two tubercles in Erpetogomphus, and is simple and normal in Ophiogomphus. But my *Erpetogomphus rupinsulensis* has the vertical vesicle "scarcely emarginate."—6th. The comparative length of the two terminal abdominal joints is not, in reality, sufficiently different in the two subgenera to be relied on as a distinguishing character. M. Selys stated originally that in Erpetogomphus ♂ ♀ the 10th joint was equal to the 9th. (*Mon. Gomph.*, table, p. 14 and p. 69.) In his latest word on the subject he says that in Erpetogomphus ♂ the 10th joint is equal to the 9th, but that

when it reaches half-way to the notum: under and rather behind the front wing, at the upper hind corner of the anterior pleural segment, a large, ill-defined, roundish, yellowish spot, in the same line with the yellow stripe. *Abdomen* long, robust, inflated at base, gradually contracted to the tip, with the hind edge of joints 2—5 narrowly yellow; venter brown. *Abdominal appendages* tipped with blackish, pilose. Viewed from above they are cylindrical, slightly contracted towards their base, slightly bent outwards at  $\frac{1}{2}$  the way to their tips,

in *Erpetogomphus* ♀ “8—10 diminish successively in length,” how much not being specified. (*Mon. Gomph.* p. 401.) In my *Erp. rupinsulensis* ♂, on the most careful measurement, 8—10 are respectively  $3\frac{1}{2}$ ,  $2\frac{3}{4}$  and 2 millimetres long, thus making joint 9 *three-eighths as long again* as 10 in ♂ *Erpetogomphus*, whereas, according to M. Selys, joint 9 in ♂ *Erpetogomphus* is *equal* to 10. On the other hand, although M. Selys says that in *Ophiogomphus* “10 is half as long as 9,” yet on measuring the ♂ ♂ of the two species of *Ophiogomphus* figured by Dr. Hagen, we find joints 9 and 10 to average respectively  $7\frac{1}{2}$  and  $4\frac{1}{2}$  millimetres. The difference between these proportions and those found in my ♂ *Erpetogomphus* is scarcely sufficient to afford a character of much subgeneric importance. If joint 9 in ♂ *Ophiogomphus* was proportioned to 10 as it is in my ♂ *Erpetogomphus*, it would measure a small fraction over  $5\frac{1}{2}$  instead of  $7\frac{1}{2}$  millimetres: and if joint 9 in my ♂ *Erpetogomphus* was proportioned to 10 as it is in ♂ *Ophiogomphus*, it would measure a small fraction over  $3\frac{1}{2}$  instead of  $2\frac{3}{4}$  millimetres. Such differences are practically worthless, as subgeneric characters.

After the above was in the hands of the printer, I received from Mr. A. S. Packard, jun., of the State of Maine, the following brief description of the ♀ of what is evidently an undescribed species of *Ophiogomphus*. Mr. Uhler had previously informed me that he had received from the same source an undescribed *Ophiogomphus*, which, so far as he recollected, was ♂. It will be noticed that it agrees with *Ophiogomphus* Selys, in the armature of ♀ occiput, and with *Erpetogomphus* Selys, in the thorax being chiefly green and in the vesicle of the vertex being divided into two tubercles. In the “Additions and Corrections” to the *Monographie*, however, M. Selys himself modifies the characters of *Erpetogomphus* by saying that “the six stripes of the front of the thorax may be pretty wide and blackish,” (p. 431.) On the other hand the hind wing in ♀ of this species is 5.71 of the hind femur, according to Mr. Packard, while, according to the *Monographie* in *Ophiogomphus serpentinus* ♀ it is 3.88 of the hind femur. In *Erpetogomphus crotalinus* ♀, according to the measurements of the *Monographie*, it is 4.14, in *E. designatus* ♀ 5.58, and in *E. compositus* ♀ 6.00, or in the average of the three species 5.24, thus making the average hind femur of ♀ *Erpetogomphus* considerable longer, instead of shorter, than it is in this new species of *Ophiogomphus*. These additional facts prove, I think, conclusively that the subgenus *Erpetogomphus* must be suppressed.

***Ophiogomphus mainensis*** Packard, n. sp. “♀ Green varied with brown. Front of the head green, pale and whitish in the neighborhood of the mouth. Vesicle of the vertex divided by a medial impressed line into two low tubercles,

about  $4\frac{1}{2}$  times as long as wide, and at  $\frac{3}{4}$  the way to their tips gradually tapering to a point which at the extreme tip becomes a small slender thorn. Viewed laterally, they are perfectly straight, slightly contracted towards their base and tapering towards their tips as before described. Superior anal process short, semicircular; the inferior larger but not extending further than the superior, triangularly slit to its base lengthways, very pilose and brownish. Vulvar lami-

and above somewhat cariniform. Occiput with two large transversely arranged tubercles behind, the bases of which occupy nearly the whole of its posterior surface, and which terminate each in a single sharp spine inclining a little forwards and surmounting its superior edge by a space equal to about one-fifth of its entire breadth, the two spines converging at an angle of about  $60^\circ$ , so as almost to touch at their extreme tips. *Thorax* mostly green, with brown lines and spots. The *abdomen* is very clavate, with segments 8 and 9 much dilated, 8 as broad as long, 10 one-half as long as 9, and it is of a dark color, with lateral, rather large, yellowish-brown or snuff-colored patches. *Legs* black.

Total length 1.80 inch [46 mill.] Front wing 1.25 inch [32 mill.] Hind wing 1.20 inch [31 mill.] Hind femur .21 inch [ $5\frac{1}{2}$  mill.] Hind tibia .15 inch [ $3\frac{3}{4}$  mill.] Hind tarsus .11 inch [ $2\frac{3}{4}$  mill.] Breadth of head .30 inch [8 mill.] One ♀. Common in the northern part of the State of Maine."

† The existence of the Asiatic subgenus *Macrogomphus* in North America rests solely upon my authority. The insect referred by me to that subgenus (*M. spiniceps* ♀ pp. 389—391) differs from the subgeneric characters laid down in the *Monographie* in a few unimportant points which I have specified, and two of which may now be erased from the list, for the following reasons:—1st. When M. Selys stated that *Macrogomphus* has *two subobsolete pale stripes* on the dorsum of the thorax, I carelessly misunderstood him to mean *two on each side of the dorsum*. My species has the number assigned by him to the subgenus, viz. one on each side of the dorsum or two in all. 2nd. I have already mentioned that the subgeneric character drawn from the protuberance on the middle of the ♀ occiput was subsequently allowed by M. Selys himself to be only of specific value.

I notice on the abdomen of certain specimens of *Mesothemis simplicicollis* Say, and of *Perithemis Domitia* Drury, irregular vein-like dark branches, very similar to those which I have recorded (p. 390) as found on the thorax of my unique *Macrogomphus* ♀. This of course confirms the opinion expressed by me (p. 383) that such markings are not markings of *external* coloration, but connected with the *internal* anatomy of the insect.

‡ The only known species of *Epigomphus* occurs in Brazil. The ♂ is unknown; but as the species agrees with *Macrogomphus* in the two very remarkable structural characters which I have given under the 2nd division in the Table, I have ventured to place it in the same category, though it is possible that its inferior abdominal appendages may not be divaricate. M. Selys seems more inclined to refer it to the same division as *Neogomphus*, though he places it in the body of his book immediately before *Macrogomphus*.

na scarcely 1-9th as long as the 9th ventral, very wide, emarginate at tip in the form of a circular arc  $45^\circ$  long, the emargination almost attaining its base. *Legs* rather paler than the body; tibiae with a superior yellow vitta; tarsal claws obfuscated. All four *wings* hyaline and marked alike, their extreme tips slightly clouded with fuscous, their veins black except the costal vein which is pale-reddish-brown, and the subcostal and median veins which are brown. The pterostigma, a square spot upon each of the second series of antecubitals narrower towards the nodus in the front wing, and a large irregular spot upon the nodus, all pale-reddish-brown. Both membranules white at base, fuscous at their extreme tip. Front wing, antecubitals 7, postcubitals 8; hind wing antecubitals 5, postcubitals 8. Discoidal areoles both before and behind 2—3, commencing always with 3. Total length including appendages 53 mill. Exp. 74 mill. Abd.  $36\frac{1}{2}$  mill. Abd. appendages  $2\frac{1}{2}$  mill. Front wing  $37\frac{1}{2}$  mill. Its breadth 10 mill. Hind wing 38 mill., its breadth 13 mill. Hind femur  $6\frac{1}{2}$  mill. Width of head  $8\frac{1}{2}$  mill.

One mature ♀ only. Easily separated from all described *N. A. Cordulia* by the spots on the second series of antecubitals, which are suddenly darker on their basal and terminal edges so as to appear to be bounded by cross-veins.

It is with some misgivings that, in the absence of the ♂, I refer the above unique ♀ to *Cordulia*, although it agrees in its general appearance with the two species of that genus which I possess, and has the same short yellow pleural stripe enclosing the spiracle as *C. lateralis*, while its antecubitals and postcubitals are respectively 7 and 8, and those of *C. albicincta* 7—8 and 7—8. It seems to be perfectly congeneric with my two species, except that the color is not "brassy-green," but the exact shade of olive found in *Mesothemis corrupta* Hagen, and the vulvar lamina, instead of being very long, cleft nearly to its base, and almost attaining the tip of joint 10, is unusually short as in *Macromia*. It cannot however be referred to *Macromia* nor to *Didymops*, because the tarsal claws are normal and not equally bifid, nor to *Tetragoneuria*, Selys, (a genus which I do not know,) for the reticulation is not more dense than usual, neither are the cellules generally square as the name (*Tetragononeuria*?) seems to imply. Possibly it may belong to *Epitheca*, the ♂ of which genus has in reality a very small and scarcely perceptible obtuse anal angle to the hind wings, apparently overlooked by authors, and a membranule no larger comparatively than in *Cordulia*, so far as I can see, though it is stated to be "large"; but in that genus too the vulvar lamina is long and bifid, extending to the tip of joint 9, and the only described

species is much slenderer than our insect, and has altogether a very different appearance. Does this insect belong to some genus of *Cordulina* not hitherto found in N. A.? or will it, when the ♂ is discovered, constitute a new genus? Of *Cordulia*, besides the five described species, there are no less than nine undescribed N. A. species in M. Selys' collection from Canada, Nova Scotia, &c., two of which *C. Franklini* and *Richardsoni* are said to be the representatives of the European *C. alpestris* and *arctica*. (Mon. Gomph. p. 78.) There can be no doubt that this insect belongs to *Cordulina*, because the posterior edge of the eyes is conspicuously tubercled.

To prevent misconception it may be stated here, that in all my measurements of the Odonatous body and abdomen the abdominal appendages are included, and that the width of the wings is measured, unless otherwise specified, at the widest place.

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The character given on page 141 of the Synopsis to separate the *subfamily* Libellulina from the *subfamily* Cordulina, "beginning of the 2nd series of postcubital spaces with no transverse veins," should be stricken out and appended to the characters of the *Tribe* Libellulina, p. 132, for it is common to both subfamilies, *Cordulina* as well as *Libellulina*. The following Synoptical Table, compiled chiefly from scattered passages in the *Monographie des Gomphines*, *Mon. des Calopt.* and the *Synopsis N. A. Neur.*, briefly expresses the more obvious relations of the six subfamilies of the great Family Odonata. I have retained the systematic nomenclature employed by Dr. Hagen in the *Synopsis* for the sake of uniformity, though I agree with Leach in considering Odonata to form two distinct families, Agrionidæ and Libellulidæ—as it certainly must if we accept Prof. Agassiz's definition of the term "family"—the former including Dr. Hagen's subfamilies Calopterygina and Agrionina, and the latter his remaining four subfamilies. In the *Monographie*, on the other hand, Messrs. Selys and Hagen consider Odonata not as a *family*, but as a *suborder*, and Leach's two families they call tribes, and divide them into the three families Agrionidæ, *Æschnidæ* and Libellulidæ, which are again dichotomously divided into the same six subfamilies defined in the Synopsis by Dr. Hagen, except that instead of the termination *ina* they employ *inæ* to designate the subfamily, as does also Prof. Baird in his work

on N. A. Ornithology. (*Mon. Culopt.* pp. 1, 2, and *Mon. Gomph.* pp. 1, 2.)

Here we may remark that, although the old established divisions of Kingdom, Sub-Kingdom (or Branch as Agassiz calls it,) Class, Order, Family, Genus and Species are employed by all modern Naturalists in same relative subordination, and have been beautifully and ingeniously defined by Agassiz, yet the term "Tribe" is used in very different senses by different modern systematists. For example, Dr. Hagen, as we saw above, considers the "Tribe" as intermediate between the "Family" and the "Subfamily"; the authors of the *Monographic* and Prof. Baird consider it as intermediate between the "Suborder" and the "Family"; and modern Coleopterists consider it as intermediate between the "Subfamily" and the "Genus." (Leconte *Introd. Class. Coleop. passim.*) It is very desirable that the meaning of this and similarly indefinite terms should be settled with precision, and also that some peculiar termination should be adopted universally for every systematic subdivision. Probably this could only be effected by the action of a Scientific Congress. Individual authors, Prof. Baird for example, are already aiming at it, but there is a lack of unanimity amongst them. Without some such technical assistance it is every day becoming more impossible for the human memory to grasp the infinite multiplicity of modern scientific analysis. When Dr. Hagen, for example speaks simply of Agrionina, who is to tell, except by guessing from the context, whether he means the *tribe* Agrionina or the *subfamily* Agrionina? And so in Coleoptera, when Dr. LeConte speaks simply of Carabidæ, who is to tell, with the requisite scientific precision, whether the *family* Carabidæ or the *subfamily* Carabidæ is referred to?

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SYNOPTICAL TABLE OF THE SUBFAMILIES OF THE  
FAMILY ODONATA.

		SUBFAMILIES
1st Tribe. AG- RIONINA. Wings alike, vertically fol- ded in repose. (Eyes remote and pedunc- led.)	Antecubital cross-veins numerous, at least five in number. (Wings almost always not petiolated.)	} 1. CALOPTERYGINA.  } 2. AGRIONINA.
	Antecubital cross-veins two only. (Wings always distinctly petiolated.)	

Hind wings differently shaped from front wings: all 4 wings carried horizontally in repose.	2nd Tribe. <i>ÆSCHNINA</i> . <sup>*</sup> Antecubitals of the 1st & 2nd series not corresponding except at base. Base of the 2nd series of post-cubitals with cross-veins.	Eyes ♂ ♀ remote, or touching at a single point ( <i>Cordulegaster</i> ), the touching part of each forming an acute angle.	} 3. GOMPHINA.
	Base of the 2nd series of post-cubitals with cross-veins.	Eyes ♂ ♀ touching for a considerable space, the touching part straight, or at a single point ( <i>Æschna heros</i> ), the touching part rounded in a regular curve.	
	3rd Tribe. LIBELLULINA. Antecubitals of the 1st & 2nd series corresponding. Base of the second series of post-cubitals with no cross-veins.	Each eye laterally tubercled behind.	} 5. CORDULINA.
	no cross-veins.	Posterior edge of each eye simple.	

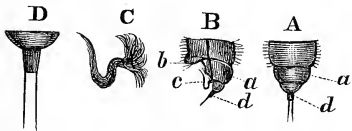
M. Selys says that the character drawn from the arrangement of the eyes "is the only one which effectually separates Gomphina from *Æschnina*;" (*Mon. Gomph.* p. 4) and in separating these two tribes, (p. 2) he defines Gomphina as "having the eyes remote one from the other or touching only in a single point (*par un point seulement*)," though under the genus *Cordulegaster* he adds that the eyes of that genus are "transverse." (*Mon. Gomph.* Table p. 310.) After intimating that in *Æschna* the eyes do also touch, he winds up by suggesting that "we should not consider this character in too critical a manner (*d'une manière trop minutieuse*)." So strongly had the difficulty of separating *Æschnina* from Gomphina been felt, that Bur-

\* M. Selys lays down as a character of the family *Æschnidæ*, that "the discoidal triangles of all four wings are constructed in an analogous manner"; (*Mon. Gomph.* p. 2), and Dr. Hagen states of his 2nd Tribe *Æschnina* (= *Æschnidæ* Selys) that "the triangles of all the wings are of the same form." (*Synops.* p. 98.) There are exceptions to this rule in Gomphina. In the genera *Gomphoides*, *Chlorogomphus*, *Petalura* and *Phenes*, the triangles of the hind wings are quite dissimilar to those of the front wings. (*Mon. Gomph.* Plate 23 &c.) In all *Libellulina* known to me the triangles of the hind wings are either dissimilar, or dissimilarly situated to those of the front wings. (See Hag. *Synops.* p. 132.)



meister and Vander Linden actually annexed the troublesome genus *Cordulegaster* to *Æschnina*, so as to cut the knot instead of untying it, although, as M. Selys well observes, that genus has manifestly the general characters and the coloration of *Gomphina*, and in some of its subgenera the eyes do not quite touch. I have endeavored—I know not with what success—to define with precision wherein the distinction between the eyes of *Gomphina* and *Æschnina* consists. In the *exotic* genus *Petalia*, which belongs to *Gomphina*, the eyes touch, but the touching part is figured as scarcely angulated, especially in the subgenus *Phyllopetalia*. (Mon. Gomph. Plate 18, figs. 7 and 8.) So far as *N. A.* genera are concerned, the distinction laid down in the Table is undoubtedly correct.—In the *Tribe* *Libellulina* there are often one or two supernumerary cross-veins in the 1st or 2nd series of antecubitals, either in the middle or at the tip of the series, which of course cannot “correspond” with any cross-veins in the other series; but the other cross-veins always “correspond,” i. e. are not “dislocated” as Say expressively terms it in *Hymenoptera*. In the tribe *Æschnina* they are all “dislocated” except at the base and a single robust pair not far from the base.

## SIALINA.



*SIALIS INFUMATA* NEWM. From the recent specimen. A terminal abdominal joints ♂, seen from above and slightly magnified; *a* 8th dorsal joint, *d* penis.—B. The same, seen in profile. *a* 8th dorsal joint. *b* anus? *c* genital hooklet

(one only.) *d* penis.—C. Genital hooklet, much magnified, seen from above and straightened out.

*Note* 25, p. 180. The above drawing represents the position assumed by the parts when the middle of the abdomen is slightly compressed. The last ventral, to the tip of which the genital hooklet (*c*) is attached, when viewed from below has on each side of its disk a large round fovea, and underneath the lobed tip (*b*) of the 7th ventral is a very large triangular cavity directed forwards, which is probably the anus. The whole is black, except the hooklet which is piceous but paler at base and tip. I am not certain whether the piece succeeding *a* is to be considered as a ninth dorsal or as the basal joint of the penis, but

I rather think the latter, as the ♀ abdomen is distinctly 8-jointed. It is opaque black, not shining black like the piece behind it.

In ♀ the dorsal and ventral pieces of the 8th or terminal joint of the abdomen are separated by an opening, which, when viewed in profile, is obtrigonal, the dorsal piece being very large and somewhat pyriform, the large end at the tip, and more than twice as long as the ventral, and the ventral being triangular. Viewed from below the 8th ventral is semicircular, and split lengthways to its base.

The species occurs near Rock Island plentifully, but only on the banks of the Mississippi. *Sialis americana*, on the other hand, occurs more sparingly, and exclusively on the banks of Rock River, the two rivers being only 2 or 3 miles apart.

*Note 26, p. 181.* CHAULIODES LUNATUS Hag., and SERRICORNIS Say. The "inferior appendage" spoken of by Dr. Hagen is not, unless I mistake, the homologue of the true inferior appendages but of the lobe attached to the tip of the penultimate ventral joint in ♂ *Sialis*. (See fig. B, b.) It exists just as he describes it in *lunatus*, in a specimen of that species sent to me by Mr. Uhler, the sex of which however is uncertain because it has lost its antennæ, but is manifestly attached to the penultimate ventral. Throughout Neuroptera, Pseudoneuroptera and Orthoptera the true ♂ inferior appendages, whether soldered together as in the Tribes *Æschnina* and *Libellulina*, or free and prehensile as in the tribe *Agrionina*, are always, when they exist at all, placed behind the last ventral. In my ♂ specimen of *C. rastricornis* this appendage has apparently been obliterated by stuffing the abdomen with cotton. If we refer to the closely allied genus *Corydalis*, we shall find that the true inferior ♂ appendages are two in number, wide apart, long, forcipate, and freely moveable as in *Agrionina*, though they are anomalous in being attached not to the sternal piece of the venter but to what may be called the pleura of the last abdominal joint, which is separated from the dorsal piece of that joint by an indistinct suture. It might be thought that this entire piece, both dorsum and pleura, was the homologue of the superior appendages, and the pieces which I consider as the true inferior appendages were mere branches of those appendages, but for the fact that the preceding joint ♂ ♀ bears a distinct spiracle in its lateral membrane and cannot therefore be the last abdominal joint. Both in ♂ ♀ *Chauliodes*, so far as can be seen

in the dried specimen, there appear to me to exist two pair of very short, robust appendages similarly situated to those of *Corydalis*, the superior pair slightly incurved and prehensile in ♂ and simple in ♀, and the inferiors simple ♂ ♀. In *Corydalis* both pairs of appendages are long and strongly forcipate in ♂ and short and simple in ♀.

*Note 27*, p. 181. *CHAULIODES RASTRICORNIS* Ramb. I have bred many specimens of this insect from the larva, which occurs under the loose bark of floating logs, apparently beneath the surface of the water, and retires under logs &c., on the dry land to assume the pupa state, forming a rude cell there as does *Corydalis cornutus* L. Sometimes on floating log-rafts it forms its cell under that portion of the bark which is permanently above water. The pupa is quiescent, but has the power, when disturbed, of crawling along quite fast on its belly. It lies in the pupa state about 3 weeks, and my first imago appeared May 28.

The larva is of a pale dingy brown color, and has the general appearance of that of *Corydalis cornutus*, but is much smaller measuring only 40—45 mill., exclusive of the abdominal appendages. The *Head* is subquadrate, not wider than the prothorax and with no neck such as that of *Corydalis*, piceous, glossy and with a few scattered punctures. The mouth scarcely differs from that of *Corydalis*, except that the epistoma and labrum are larger and the latter proportionally much wider, and except also that the mentum is longer and its emargination is truncate-obtrigonal, instead of describing a circular arc of 90°. Precisely as in *Corydalis*, the maxilla is elongate, depressed, four times as long as wide and with its sides parallel, and as in *Corydalis*, it is remarkable for being furnished at its tip with two palpiform appendages, the outer one a little the longer of the two and nearly as long as the maxilla is wide. The outer one or true palpus, is more robust than the other, 4-jointed, the last joint very minute; the inner one, (the homologue of the Orthopterous galea and of the palpiform outer maxillary lobe in the Coleopterous Adepaga,) is distinctly 2-jointed, the basal joint the stoutest and the two of equal length. Although in *Corydalis* the eyes are lateral, 6 in number, simple of course, and very distinct, yet in *Chauliodes* they are scarcely perceptible and cannot be counted. The antennæ are about 2 mill. long, 5-jointed, the joints each slenderer than the preceding one and proportioned to each other as follows:—1, 3, 1,

1, 1; whereas in *Corydalis* they are 1, 3,  $2\frac{1}{2}$ , 2,  $1\frac{1}{2}$ . The *pronotum* is subquadrate, with the prothoracic spiracle behind its posterior corner, as in *Corydalis*; the meso- and metanotum are each 3 times as wide as long; all three corneous, glossy, piceous mottled with luteous and with a few scattered punctures, whereas in *Corydalis* it is only the pronotum which is glossy and corneous, the other two segments being almost as opaque as the abdomen. The *abdominal* joints are opaque, eight in number only, joint 1 half as long as each of the rest which are subequal. Joints 1—7 have each a lateral, subterminal, exarticulate, fleshy seta nearly at right angles to the body and about as long as the body is wide, immediately above and behind which is the spiracle which is very distinct; joint 8 has the same seta as the rest but no spiracle. In *Sialis*, on the contrary, the lateral setæ are said to be articulate and have been supposed to act as branchiæ. Upon the dorsum of each joint, a little before the middle, is a very distinct transverse suture, and behind it at regular intervals two others less distinct, indicating apparently the normal subsegments. From the tip of the last segment there proceeds a pair of appendages, contiguous, and exactly similar to those of *Corydalis*, viz., a robust fleshy pillar, more than half as long as one of the abdominal joints, at the tip of which is a pair of long, curved, horny, shining claws above, and a fleshy, tapering seta below twice as long as the claws. Above these two appendages is a pair of robust, fleshy, exarticulate setæ, similar to those of *Acheta*, but closely contiguous and tapering much less rapidly,  $\frac{1}{2}$  millimetre in diameter at base and probably at least 10 or 12 millimetres long; the unbroken portion in my specimen measuring 6 millimetres. Legs dark luteous; the tarsi one-jointed and as long as the tibiæ, with no appearance of any sutures and with two terminal claws.

Besides the points above specified this larva differs from that of *Corydalis* in three other respects: *1st*, *Corydalis* has a 9-jointed, not 8-jointed abdomen, 1—8 having the same lateral seta and spiracle as 1—7 in *Chauliodes*, and 9 having neither seta nor spiracles. *2nd*, *Corydalis* has no caudal setæ, nor even any rudiments of them, so that *Chauliodes* forms a connecting link in this respect between that genus and *Sialis*, the larva of which is said to have "one long, slender, setose tail." (Westw. *Intr.* II, p. 50.) *3rd*, the venter of *Chauliodes* is simple, and entirely destitute of the remarkable paddle-like branchiæ found in *Cory-*

dalis on joints 1—7 under and before the lateral setæ, no traces of them being discoverable even in the living larva.

The pupa, or at all events the ♀ pupa, has two robust obtuse abdominal appendages, confluent towards their base and about two mill. long. and an inferior process of two similar ones which are connate throughout. The antennæ are multiarticulate and longer than the head, and the tarsi are 5-jointed. In its general appearance it resembles the pupa of *Sialis*.

*Note 28, p. 182.* CORYDALIS CORNUTUS L. A most respectable man, who keeps the toll-bridge over Rock River where this insect is very abundant, informed me that on several occasions its larvæ had fallen down one of his chimneys. His idea was that they must have bred there; but that of course is out of the question. The statement was confirmed by his wife and I have no doubt of its truth. In 1863 I threw a larva of this insect into the Mississippi to examine into its customary mode of progressing in the water, which, as I found, was by crawling along the bottom not by swimming. As it emerged from the water, it climbed with ease up the stump of a large white elm, which was stripped of its bark and as smooth as any carpenter could have planed it. The stump was three feet high and upright, and when it had reached the top it commenced descending on the opposite side, but after a while lost its foothold and fell into the water again. The pair of 2-clawed appendages at the tail are used with much effect to assist it in climbing. The building which it must have climbed to reach the chimney, down which it is stated to have fallen, was only a low one-story wooden one. I learnt from the same source that these larvæ are nocturnal in their habits, for, though they are never seen travelling by day, they had several times been noticed running about in the dawn of the morning. Some which I bred to the imago state in 1861 never commenced travelling till after nightfall, and when thrown into a basin of water swam with vigor. They are much sought after as fish-bait, having a very tough integument so that one larva suffices to catch several fish, and are popularly known in the neighborhood of Rock Island as "crawlers." The larva, after it has left the water, retires under a stone or log or plank to hide during the day, and finally to change to the pupa state, and forms there an irregular cell in the earth. The pupa of the ♀, or what I take to be that of the ♀,

has two excessively robust superior appendages, incurved so that their extreme tip points backwards, with a rudimental intermediate appendage, and two excessively robust straight inferiors half as long as the superiors, basally confluent with them, and occupying the entire ventral surface. It is several weeks before the imago of *Corydalis* emerges, which is nocturnal in its flight, as is also that of *Chauliodes*, and dull and sluggish in its motions.\* It is greedily devoured by birds and domestic fowls, as is also the larva whenever they can meet with it. The eggs are deposited in patches, as I am told, upon any substance overhanging the water. This insect occurs both on the Mississippi and on Rock River, but most abundantly in those localities where there is a rocky bottom. I have never met with it in the larva state more than a hundred yards from the water.

*Note 29, p. 182. MANTISPA BRUNNEA Say.* I do not possess this species, but I have taken near Rock Island a single pair of the rare *M. interrupta* Say, which is stated by Mr. Uhler to exhibit the same "tarsal lobes" as the other species. On the closest examination I can detect no traces of any lobes on the tarsi, except the two lobes of the large pad or onychium under the tarsal claws of the 4 hind feet, which lobes are alike in both sexes and obvious on every tarsus, exhibiting in several of them both ♂ and ♀ a slight appearance beneath of pale hyaline membrane. The "quadrate fuscous spot" on the wings of *M. interrupta*, spoken of by Mr. Say, is represented in both my specimens by a ferruginous bordering of one of the cross-veins springing from the costa, and the costa in my specimen is bright ferruginous as Say describes it, not "fuscous," as it is described in the Synopsis. Is not Dr. Hagen's insect a distinct species? It disagrees with Say's description in many respects. Mine agrees exactly, except in the color of the "quadrate spot" above referred to.

Since the above was in the hands of the printer, I have learnt from Mr. Uhler that his remarks in the *Synopsis* refer to the *plantule* (*onychia*) not to the appendages described by Dr. Hagen, which, at

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\* Mr. E. T. Cresson informs me that "he collected a large number of ♂ *Chauliodes serricornis*? Say on the wing about 10 or 11 A. M. on a clear, warm day in June." Myrmeleon is generally said to be nocturnal in its flight, but the only two pairs I ever took (*M. salvus* Hag.) occurred on the wing in broad daylight.

the time when his (Mr. Uhler's) remarks were printed, were, as he says, unknown to him. He adds that "these appendages cannot be characteristic of sex as Dr. Hagen supposes, because *most specimens* are not furnished with them." This last proof seems to me no proof at all. To make it conclusive, it ought to be shewn in addition that these appendages occur *both in* ♂ *and* ♀. Of course, Mr. Uhler's statement that these appendages are also found in *M. interrupta* applies to the *onychium*, and it is no wonder that I could not find them in that species either ♂ or ♀.

#### APPENDIX.

*Hetærina scelerata* n. sp. (= *H. americana* Walsh, p. 210.)

After the preceding pages were in press, Mr. Uhler was kind enough to send me at my request a pair ♂ ♀ of *H. americana*. On comparing the ♂ abdominal appendages with those of the ♂ described page 210, and doubtfully referred to *americana*, I am satisfied that this doubtful ♂ is a distinct and undescribed species (*scelerata*) for the following reasons:—*1st.* In *americana* the laminiform medial tooth of the superior ♂ appendage has its sides convergent at an angle of about 45° for about two-thirds of its entire length, the terminal third part being rounded in a flattish or obtuse curve. In *scelerata* the sides of this tooth, instead of converging rapidly, are almost parallel for two-thirds of its entire length, but the terminal third part is rounded as in *americana* except that it is of course much wider. In both species the tooth is directed inwards and downwards and a little forwards, so that its true shape is only seen when viewed laterally in an oblique direction from above or below. Viewed either perpendicularly from above, or horizontally in profile, as in Dr. Hagen's drawings of *americana* (Monogr. Calopt. Plate XII, fig. 3,) its proportions are foreshortened and altered. I find that the stray abdomen mentioned above page 212, and supposed to belong to *basalis*, has the laminiform tooth of the superior appendage identical with that of *americana*, viz. triangular with the apex truncate and obtusely rounded. *2nd.* In *americana*, on the upper surface of the posterior base of this laminiform tooth, there is nothing but a slight intumescence, which on a cursory inspection would scarcely be noticed; in *scelerata*, as already stated page 211, there is a distinct hemispherical tubercle there, which is colored fuscous with the

surrounding space yellowish.—Coupled with the colorational distinctions already noticed in the wing-spots and the pterostigma, (page 211,) these two structural differences are manifestly of specific value. In the second ♂ *americana* received from Mr. Uhler, the carmine-red basal spot extends only 3—4 cellules beyond the quadrilateral in the front wing, and 1—1½ in the hind wing, instead of 5 and 3 as in the first ♂; thus increasing still further the disparity in this character between *americana* and *scelerata*, where it extends 11—12 and 8—9 cellules beyond the quadrilateral. The laminiform tooth of *scelerata* is shaped nearly as in *pseudamericana*, but is much smaller, being only about ⅓ as wide at base as the appendage is long, instead of ⅓.

Mr. Uhler, to whom I had communicated my observations on the whitishness of the principal sector beneath in *pseudamericana* and *texana*, says that he “has captured many pairs of *americana* in copula, and that the teneral [or very immature] ♂ has the underside of the principal sector very conspicuously whitish, just as in the teneral and less adult ♀. In this state the dorsum of the thorax and abdomen is bright emerald green ♂ ♀; in the adult ♂ it is splendid coppery purple and in the adult ♀ olive-greenish. In the semi-adult ♂ and the adult ♂ ♀ the principal sector inferiorly is brown, or at most not whitish. In the teneral ♂ the pterostigma is whitish; in the adult ♂ brown.”\* —In the two ♂ *americana* sent me by Mr. Uhler himself, which are both adult, the principal sector and the other veins described as yellowish white in *pseudamericana*, are not “brown,” but *black* beneath, and they are described as black in the *Monographie* both in the adult ♂ and the semi-adult ♂, (jeune ♂.) In the ♀ *americana* recently received from Mr. Uhler, which is tolerably mature and has the dorsum of the thorax dark green, the principal sector &c., are reddish-brown beneath. In this ♀ there are on the postcosta of the front wing only 2—3 irregular ranks of cellules, instead of 3—5 as in *pseudamericana* ♀; and the front wing is 28 mill. long and 4¾ mill. wide at the nodus, instead of 32½ and 6, (or proportionally half a millimetre wider,) as in *pseudamericana* ♀. Hence the abnormal ♀ referred above doubtfully

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\* The description in *Monogr. Calopt.* (p. 133) says that the pterostigma of the adult ♂ is “reddish brown,” and that of the semi-adult ♂ “yellow.” In the remarks following that description, the ♂ pterostigma is erroneously stated to be “yellow,” without regard to age.



to *texana*, which likewise has only 2—3 ranks of cellules on the postcosta of the front wing, and in which the proportions of the front wing are 30 and 5, may not improbably belong to *americana*. If proportioned exactly as in *americana* ♀ the front wing would be 5.09 mill. wide.

As I still think from the structure of the postcosta of the front wing, and the greater comparative breadth of that wing, that the ♀ formerly sent me by Mr. Uhler as ♀ *Americana* belongs to *pseudamericana*, it is probable that both these two species exist in Mr. Uhler's neighborhood, and that he may have partially confounded the two together in his description of the former. I doubt the fact of the principal sector &c. in ♂ *americana* being "whitish" beneath in the teneral individual, as stated by Mr. Uhler, when I see with my own eyes that it is perfectly black, not brown, in the adult specimen. Still, coloration in Agrionina is so variable, that it is difficult to fix the limit of variation.

It will be observed that, according to Mr. Uhler, it is only the teneral ♂ and the teneral and semiadult ♀ ♀ of *americana* that have the principal sector &c. whitish beneath; whereas in *pseudamericana* ♂ ♀ and *texana* ♂ the adult specimen also has these veins whitish beneath. *Pseudamericana* ♂ differs also both from ♂ *americana*, ♂ *scelerata* and ♂ *texana*, in the tubercle behind the laminiform tooth (not the one on its superior base) being only about  $\frac{1}{4}$  as wide as that tooth, instead of about  $\frac{1}{2}$  as wide as in *americana* and *scelerata*, or  $\frac{1}{3}$  as wide as in *texana*.

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On p. 217 I said that "in Gomphus there are normally two dark stripes on the pleura, one on the mesothoracic epimerum and one on the metathoracic episternum." The *locus* of the latter is, correctly speaking, on the anterior suture of the metathoracic episternum, or, in other words, on the suture dividing the meso- from the meta-thorax.

In many, perhaps all, Agrionina and Calopterygina, (*Agrion*, *Lestes*, *Calopteryx*, *Hetærina*, *Libellago*, &c.) there exists behind the humeral suture a more or less developed supernumerary or false pleural suture dividing the mesothoracic epimerum into two subequal parts, the posterior part bearing the spiracle. Slight traces of this suture are occasionally found in the other four Odonatous Sub-families. The *Mono-*

*graphic* calls this supernumerary suture the *first* pleural suture, that dividing the mesothorax from the metathorax the *second* or median suture, and sometimes "the suture under the wings," and that behind the metathoracic episternum the *third* or sometimes the ventral suture. (*Mon. Calopt.* p. 11.) Considering this false or supernumerary suture as a true one, it is a remarkable fact that in *Gomphus* the *locus* of each dark pleural stripe is always *in or on a suture*, and in *Hetærina* *between two sutures*. But as if to show how Nature never proceeds by sudden leaps, there exists in many *Hetærina*, in addition to the normal dark stripes BETWEEN the sutures, a short black line at the upper part of the pleura IN one or two of the sutures.

Strictly speaking, there are typically *three*, not *two*, dark pleural stripes in *Gomphus*. For example, in several *Onychogomphus* (groups *geometricus* and *grammicus* and certain species of the group *cognatus*,) in *Ceratogomphus*, and in one single species of *Gomphus*, *G. parvulus*, there is said to exist a *third* dark pleural stripe "on the posterior border" of the metathorax or "on the third suture." (*Mon. Gomph.* pp. 16, 18, 19, 66, 77, 158.) In *Gomphus melænopeus*, *G. minutus* and *G. occipitalis* the *Monographie* especially notices the absence of this third pleural stripe, (pp. 129, 156, 166.) Just as in *G. kurilis* the *first* dark pleural stripe is obsolete, and in *G. fraternus* and a few other species the *second* dark pleural stripe is almost always obsolete, so in all 37 *Gomphus*, except *parvulus*, and in many other subgenera of the great genus *Gomphus*, this *third* pleural stripe is obsolete. In *Platygomphus* the pleural dark stripes are all three of them obsolete. In *Erpetogomphus boa* Selys, and *E. rupinsulensis* Walsh, not only are all the three typical dark pleural stripes obsolete, but also the three typical dark stripes on each side of what is called the dorsum of the thorax. In the other species of *Erpetogomphus* these last are only subobsolete. The important point to observe is, that wherever any of these dark thoracic stripes exist, their *locus* is definitely fixed.\* So that if we believe that each species of, e. g., the 37 described species of *Hetærina* and of the 86 described species of *Gomphus* was separately created, and not derived by hereditary descent from some one

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\* Dr. Hagen well observes of the extra-American Legion *Lindenia* (*Gomphina*) that "by fixing the primitive designs [of the thorax], we may always derive from them the special variations." (*Mon. Gomph.* p. 251.)

primordail form, we are compelled to believe that the Great Author of Nature, for some inscrutable purpose, confined himself in ornamenting each species of these two extensive genera to mere modifications of one single design or pattern. A human artist who should so confine himself would be immediately accused of poverty of imagination.

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### ILLINOIS PSEUDONEUROPTERA.

	OLD SPECIES.	N. Sp. 1862. (B. D. W.)	N. Sp. 1863. (B. D. W.)	TOTAL.
TERMITINA, . . . .	1	0	0	1
PSOCINA, . . . .	5*	6	7	18
PERLINA, . . . .	9†	9	0	18
EPHEMERINA, . . . .	10	16	5	31
AGRIONINA, . . . .	12	4	4‡	20
ÆSCHNINA, . . . .	8	6	3	17
LIBELLULINA, . . . .	21	2	1	24
	—	—	—	—
TOTAL, . . . .	66	43	20	129

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### ERRATA.

Page 177, line 12, for "basal" read "tarsal."

" 217, line 6 from bottom, for "metathoracic episternum" read "anterior suture of the metathoracic episternum."

" 238, line 21, for "varies" read "differs."

" 246, line 17, for "agree with those" read "agrees with that."

" 252, line 11, for "stated have" read "stated to have."

" 259, line 6, for "same" read "the same."

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\* Exclusive of *Ps. lichenatus* and *Ps. abruptus* = *corruptus*.

† Including *Nemoura albidipennis* (p. 188).

‡ Exclusive of *Heterina texana* n. sp., from Texas, but including *H. scele-rata* n. sp.

The following Errata and Corrigenda may be noticed as occurring in my Paper in Proc. Acad. Nat. Sciences of Philadelphia:—

- p. 361, line 15, for "(South Illinois)" read "(North and South Illinois)."
- p. 364, line 3, for "length ♂" read "length ♂ abdomen."
- p. 365, dele line 18 "no appearance of any suture."
- p. " dele lines 6—4 from bottom, repeated from lines 15—13 from bottom.
- p. 371, line 27, dele "except the last segment."
- p. 376, line 23, for "Alar exp. ♀" read "Alar exp. ♂."
- p. 381, lines 17 and 21, for "*undata*" read "*fluctuans*."
- p. 383, last line, for "behind" read "before"
- p. 387, line 27, for "triangular brown spot" read "triangular spot. brown."
- p. 393, Table, line 3, for "long, slender, yellowish" read "absent."
- p. " " line 4, for "yellow?" read "yellow, banded with black."
- p. 394, line 20, for "quadrangular" read "rectangular."
- p. 397, Table, last line, for " $3\frac{1}{2}$ " read " $31\frac{1}{2}$ ."
- p. " line 6 from bottom, for "two inside" read "two inside;"
- p. 401, 1st column, line 15 from bottom, for "—13 sp." read  
 "Isopteryx cydippe Newm.  
 Capnia minima Newp.  
 Tæniopteryx fasciata Burm.  
 Nemoura completa Walk.  
 —17 sp."
- p. 401, 2nd column, line 15 from bottom, for "binotatum" read "binotatum  
 n. sp."
- p. 402, 2nd column, line 6 from bottom, for "Perlina - - - 13 - - - 19" read  
 "Perlina - - - 17 - - - 9."
- p. " 2nd column, last line, for "106" read "110."

*Rock Island, Illinois, Sept. 21, 1863.*

Additions to the Catalogue of U. S. LEPIDOPTERA, No. 5.

BY AUG. R. GROTE.

NOCTUINA, H-S.

AGROTIS Ochs.

*A. texanus* nov. sp. (Plate 6, fig. 2, ♀.)

Anterior wings dark yellowish brown shaded irregularly with black. Reniform, orbicular and claviform spots same color as the rest of the wing distinctly margined with black, the former with black center. Median lines black, sinuate, geminate, the transverse anterior the best defined. A faint black median shade line runs from the costa to the internal margin between the reniform and orbicular spots more apparent in the ♀. Subterminal line absent in the ♀, irregularly apparent in the ♂. Terminal space shaded with black along the nervures and with a terminal row of small black lunules merging into a straight line toward the internal angle; fringes light. Posterior wings white, immaculate in the ♂, shaded with brownish along the exterior margin and nervules in the ♀; fringes white. Underside of anterior wings shaded with light brown, darker along the costa and exterior margin, lighter at the base and along the internal margin and showing the median lunule faintly. Underside of posterior wings white, darker shaded along the upper margin. Thorax and head same color as anterior wings; tegulæ with a semicircular dark brown line at base. Abdomen lighter than thorax, of a more greyish shade underneath. Antennæ brownish strongly pectinated to the middle in the ♂, simple in the ♀. Exp. ♂  $1\frac{1}{2}$  inch. ♀  $1\frac{5}{8}$  inch.

*Hab.* Western Texas. Two specimens in fine condition in the collection of the Entomological Society of Philadelphia.

This species seems to be allied to *A. malefida* Guenée Noct. 1, p. 267, a species I am not acquainted with, but it differs from Guenée's description of the latter species in the shape of the ordinary spots, while the expression "Ailes super, d'un gris-testacé un peu rougeâtre." but indifferently applies to the species I have just described.

In the Wiener Entom. Monat., Vol. 6, 1862, Plate 1, fig. 2 to 5, pp. 130—133, Mr. H. B. Möschler has figured and described four species of this genus belonging to our fauna from Labrador, viz. *A. Wöckei*,

*A. comparata*, *A. Staulingeri* and *A. septentrionalis*, of which the latter species as well as the one I have just described belong to Group I Guenée, a group characterized by the strongly pectinated antennæ of the ♂ and a certain similarity of ornamentation of the anterior wings.

**PLUSIA** Ochs.

In the collection of the Entomological Society of Philadelphia is a ♀ specimen belonging to the genus *Plusia* taken at Pike's Peak, which, on a comparison of actual specimens, very closely resembles *P. divergens* Fabr. and *P. devergens* Hüb. from Europe, and although, after a careful examination I am induced to believe our species distinct, still a series of individuals from that locality may render evanescent characters which I now regard as of specific value. I subjoin a description of our species, comparing it with the European, and proposing for it the name of

***P. ignea*** nov. sp.

Anterior wings dark brown with the fringe, terminal and subterminal spaces darker than in *P. divergens*. In the latter species the fringe is of a greyish-lilac hue which spreads towards the internal angle over the terminal space to the subterminal line. In *P. ignea* the terminal space is of an even brown color from costa to internal angle, wanting the brassy shade which spreads over both subterminal and terminal spaces in both the European species and the fringe has not the greyish-lilac color which it shows in *P. divergens*. The median space is tinged with bright reddish near the lower half of the transverse posterior line which is not the case in the specimens of both the European species I have before me. The metallic subcellular spot, though presenting the same general appearance, is broader and more rounded at its lower extremity than in *P. divergens* Fabr. The black band on the posterior wings is broader and not so attenuated at the anal and external angles and the base of the wing is more clouded with black. The coloring of thorax, abdomen and under surface present no noticeable differences. The wings in our species are however relatively broader and the spur at internal angle more acute. *P. ignea* expands  $1\frac{1}{4}$  inch., my specimen of *P. divergens* 1 inch.

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I append a list of the descriptions of our native Lepidoptera which I have published under the title of the present article, having corrected

and arranged the references and retaining the classification of Dr. Herrich-Schäffer.

## SYNTOMOIDEA, H-S.

### CTENUCHA Kirby.

**Cressonana** Grote, Proc. Ent. Soc. Philad. 1863. Vol. II. p. 64.

## DREPANULINA, H-S.

### DRYOPTERIS Grote.

Proc. Acad. Nat. Sci. Phil. 1862, p. 360. Proc. Ent. Soc. Phil. 1863, p. 345.

**rosea** Walker, C. B. M. VIII. Grote, Proc. Ent. Soc. Philad. 1863, Vol. I, p. 345.  
Plate III, fig. 1. *Americana* (Cilix) H-S. Exot. p. 60, fig. 470.

I had described this species in the Proc. Acad. Nat. Scien. Philad. 1862, p. 60, as *Platypteric formula*; subsequently I rectified my error and here withdraw the name altogether.

### PLATYPTERIX Laspeyres.

**fabula** Grote, Proc. Acad. Nat. Sci. Philad. 1862, p. 59. Proc. Ent. Soc. Philad. 1863, Vol. I, p. 346. Plate III, fig. 2.

**genicula** Grote, Proc. Acad. Nat. Sci. Phila. 1862, p. 59. Proc. Ent. Soc. Phila. 1863, Vol. I, p. 346. Plate III, fig. 3.

## ARCTIOIDEA, H-S.

### CROCOTA Hübn.

**opella** Grote, Proc. Ent. Soc. Vol. I, 1863, p. 345; *ibid.* Vol. 2, Plate II, fig. 1.

**quinaria** Grote, Proc. Ent. Soc. Vol. II, 1863, p. 30. Plate II, fig. 2.

## LITHOSINA, H-S.

### HYPOPREPIA Hübn.

**Packardii** Grote, Proc. Ent. Soc. Vol. II, 1863, p. 31. Plate II, fig. 5.

## EUDRYINA.

### CIRIS Grote.

**Wilsonii** Grote, Proc. Ent. Soc. Vol. II, 1863, p. 65. Plate III, fig. 1.

## NOCTUINA, H-S.

### DIPHThERA Ochs.

**Graefii** Grote, Proc. Ent. Soc. Philad. 1863, Vol. II, p. 68. Plate III, fig. 6.

**CHERSOTIS** Boisd.

*pecta* Linn. U. S. and Eur. Guenée Noct. I. p. 326.

**AGROTIS** Ochs.

*texanus* Grote, Proc. Ent. Soc. 1863, Vol. II, p. 273. Plate VI, fig. 2.

**DYPTERYGIA** Steph.

*pinastri* Linn. U. S. and Eur. Grote, Proc. Ent. Soc. Vol. I, p. 218.

**HELIOTHIS** Ochs.

*armigera* Hüb., U. S. and Eur. Guenée Noct. II, p. 181.

I described this species as *Heliothis umbrosus* in Proc. Ent. Soc. Philad. 1862, p. 219, but subsequently rectified the error into which I had been led, by supposing our species distinct from the European, and I here withdraw the name altogether. To the species found in the U. S. as well as in Europe, I merely cite the authority who first published them as so found.

**PLUSIA** Och.

*ignea* Grote, Proc. Ent. Soc. Philad. 1863, Vol. II, p. 274.

**PANOPODA** Guenée.

*Cressonii* Grote, Proc. Ent. Soc. Philad. 1863, Vol. I, p. 346. Plate III, fig. 4.

Very distinct from Guenées' descriptions under this genus, but possibly referable as a variety to *P. rufimargo* Hüb., of which I have seen no specimen corresponding to Hübner's figure.

## GEOMETRINA. H-S.

**AMPHIDASYS** Tr.

*pænulataria* Grote, Proc. Ent. Soc. Philad. 1863, Vol. II, p. 31. Plate II, fig. 3

**ACIDALIA.**

*persimilata* Grote, Proc. Ent. Soc. Philad. 1863, Vol. I, p. 347.

The roughness of the figure I gave of this species makes it useless as a reference for the identification of the species.

**BAPTRIA** Hübn.

*albofasciata* Grote, Proc. Ent. Soc. Philad. 1863, Vol. II, p. 66. Plate III, fig. 2.

*albovittata* Guenée, U. and P. Vol. II, p. 520. Grote, Proc. Ent. Soc. Philad. 1863, Vol. II, p. 67. Plate III, fig. 3.

*infulata* Grote, Proc. Ent. Soc. Philad. 1863, Vol. II, p. 67. Plate III, fig. 4.

*elaborata* Grote, Proc. Ent. Soc. Philad. 1863, Vol. II, p. 67. Plate III, fig. 5.

**EUPETHECIA** Curtis.

*miserulata* Grote, Proc. Ent. Soc. Philad. 1863, Vol. II, p. 32. Plate II, fig. 4.



## S T A T E D M E E T I N G , N O V E M B E R 9 .

President BLAND in the Chair.

## DONATIONS TO CABINET.

69 HYMENOPTERA (*Bombus terricola*, *B. pennsylvanicus*, *B. vagans*, *B. fervidus*, *B. borealis*, *B. virginicus*, *B. separatus*, *B. affinis*, *Apathus elatus*, *A. citrinus*, *A. laboriosus*), 66 LEPIDOPTERA (*Argynnis aphrodite*, *Polyommatus dorcas*, *P. comyntas*, *Lycæna Scudderi*, *Arctia parthenice*, *Olisiocampa americana*), and 31 COLEOPTERA (*Cicindela limbalis*, *Gnorimus maculosus*, *Dicercia tenebrosa*, *Ancylochira fasciata*, *A. Nuttalli*, *Monohammus confusor*, *Clytus ruricola*, *Leptura vibex*, *Encyclops cœruleus*, *Cupes capitata*, *C. cinerea*, *Crymodes discicollis*), from William Saunders, of London, Canada West.

54 COLEOPTERA (*Pterostichus contractus*, *Lophoglossus ater*, *Galerita californica*, *Metrius contractus*, *Platynus maculicollis*, *P. californicus*, *Chlœnius harpalinus*, *Anisodactylus californicus*, *Calathus ruficollis*, *Lucanus elaphus*), from S. S. Rathvon, of Lancaster, Penna.

39 DIPTERA (*Rhipidia domestica*, *Stylogaster stylata*, *Dolichopus scapularis*, *Gymnopternus flavus*, *Xanthochlorus helvinus*, *Eumetopia rufipes*, *Scatophaga furcata*, *Hippolates plebejus*, *Crassiseta costata*, *Oscinis trigramma*, *Oscinis umbrosa*, *Oscinis variabilis*, *Oscinis palipes*, *Oscinis nudiuscula*, *Diplotaxa versicolor*), from Dr. T. B. Wilson.

39 DIPTERA (*Subula pallipes*, *Nemotelus unicolor*, *Sphegina rufiventris*, *Tæniaptera antennæpes*, *Corylura pleuritica*, *Corylura setosa*, *Corylura cincta*, *Corylura bimaculata*, *Scatophaga exotica*, *Dixa terna*, *Meromyia americana*, *Crassiseta nigriceps*, *Chlorops proxima*, *Chlorops trivialis*, *Chlorops sanguinolenta*), from E. T. Cresson.

23 LEPIDOPTERA, from Rev. Wm. P. Breed.

4 DIPTERA (*Tabanus ruficornis*, *Trypeta sparsa*), from Harvey J. Rich, of Brooklyn, N. Y.

3 LEPIDOPTERA (*Chionobas semidea*, *Pterogon inscriptum*, *Leptina dormitans*), from Aug. R. Grote, of New York.

2 DIPTERA (*Bibio albipennis*), from William Evett.

1 DIPTERA (*Tropidia quadrata*), from James Ridings.

1 DIPTERA (*Heteromyia fasciata*), from Charles A. Blake.

1 DIPTERA (*Echinomyia vivida*), from Charles Wilt.

## DONATIONS TO LIBRARY.

*Silliman's American Journal of Sciences and Arts, for September, 1863.* From Dr. T. B. Wilson.

*List of the Coleoptera of North America, and New Species of North American Coleoptera, by John L. Le Conte, M. D.* 2 Pamphlets. 8vo. From the Smithsonian Institution.

The following works were deposited by Dr. T. B. Wilson:—

*Proceedings of the Zoological Society of London, Parts 2 and 3 for 1862, and 1 for 1863.* 8vo.

*Revue et Magasin de Zoologie, 1863, No. 7.* 8vo.

*Wiener Entomologische Monatschrift, Band 7, No. 9.* 8vo.

*The Zoologist for August and September, 1863.* 8vo.

*Specimen of a Catalogue of Lycænidæ in the British Museum, by W. C. Hewitson.* 4to.

*Illustrations of Diurnal Lepidoptera. Part 1, Lycænidæ, by W. C. Hewitson.* 4to.

*Recherches anatomiques et physiologiques sur les Hémiptères, par M. Léon Dufour.* 1 Vol. 4to.

*Recherches anatomiques et physiologiques sur les Orthoptères, les Hyménoptères et les Névroptères, par M. Léon Dufour.* 1 Vol. 4to.

*Insecta Svecica descripta a Leonardo Gyllenhall. Tom. 1, 4 parts. Coleoptera.* 4 Vols. 8vo.

*Species Insectorum. J. C. Fabricii.* 2 Vols. 8vo.

## WRITTEN COMMUNICATIONS.

A letter was read from Mr. S. S. Rathvon, dated Lancaster, Pa., October 21st, 1863, transmitting donations to the Cabinet.

The following papers were presented for publication in the Proceedings:—

“Descriptions of a few supposed new species of North American Coleoptera, No. 2, by Jas. H. B. Bland.”

“Descriptions of several supposed new species of Cynips, with remarks on the formation of certain galls, by H. F. Bassett.”

“Descriptions of North American Lepidoptera, No. 1, by Aug. R. Grote.”

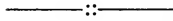
“Notes on Central American Lepidoptera, with descriptions of new species, No. 2, by Tryon Reakirt.”

“Hemipterological Contributions, No. 2, by P. R. Uhler.”

And were referred to Committees.

#### ELECTIONS.

Mr. Augustus R. Grote, of New York, was elected a Resident Member, and H. T. Stainton, Esq., of Lewisham, near London, England, a Corresponding Member of the Society.



#### Description of a supposed new genus and species of SATURNIIDÆ from the Rocky Mountains.

BY C. A. BLAKE.

#### COLORADIA nov. gen.

Body stout. Palpi very short. Antennæ a little longer than the thorax. Legs stout, pilose; tarsi rather long: hind tibiæ with two minute apical spurs. Wings moderately broad and long; each with an indistinct ocellus. Fore wings not falcate, slightly convex along the costa, rounded at the tips, exterior border convex, hind wings not extending beyond the abdomen. Female, antennæ serrate.

**C. Pandora** n. sp. (See Plate 7.)

*Female*.—Brownish-grey. Head not prolonged, palpi extending rather beyond the head. Antennæ bright luteous, biserrate, a little longer than the thorax. Thorax densely villose. Abdomen above fuliginous, sides mixed with griseous, apex tufted, extending a little beyond the hind wings. Wings semi-transparent. Fore wings with two indistinct, oblique, somewhat undulating, fuliginous bands, the exterior one paler than the other, the space between the bands covered somewhat sparsely with distinct white scales, a small black spot on the discal nerve. Hind wings with an indistinct cloudy band, broader at the interior margin, gradually tapering to the exterior. A pale fuliginous spot on the disc. Base of the wings clothed with pale pinkish hairs, ciliæ whitish at the extremity of the veins. Under side brownish-grey, tinged with pink; the discal spots more distinct than on the upper side. Length of the body 15 lines. Expanse of the wings 38 lines.

*Hab.* Pike's Peak, Colorado Territory. One specimen in the Cabinet of the Entomological Society of Philadelphia.

On the North American species of the genus **NOMADA**.

BY E. T. CRESSON.

Gen. **NOMADA**, Fabr.

The characters of this genus are given by Mr. Smith, (*Bees of Great Britain*, p. 116), as follows:—

*Body* destitute of pollinigerous appendages. *Head* transverse, as wide as the thorax. *Antennæ* geniculated, filiform, nearly as long as the thorax. *Labrum* transverse, its anterior margin rounded. *Mandibles* bidentate, in the males simple, and rounded at their apex. *Mentum* slightly narrowed at the base, the labium of the same length as the mentum, broad and narrowed a little before the apex, which is rounded. *Labium* grooved and transversely striated. *Paraglossæ* about one-fourth the length of the labium. *Labial palpi* four-jointed, continuous, a little shorter than the labium, the basal joint longer than the three following, the second about one-fifth of the length of the basal joint, the two following each shorter than the preceding. *Maxillary palpi* six-jointed, nearly as long as the apical lobe; the basal joint minute, the second and third joints of about equal length, the remainder gradually decreasing in length, and each more slender than the preceding. *Superior wings* have one marginal and three submarginal cells, the second submarginal receiving the first, and the third the second recurrent nervure. *Legs* simple in both sexes. *Abdomen*: the apical segment truncate at the apex in the females, acute in the males.

The beautiful bees constituting this genus are parasitic, principally, on those of the genera *Andrena* and *Halictus*. Very little is known of their economy. They are mostly gayly colored, resembling in this respect some of our wasps. Most all the specimens that I have examined, have a longitudinal carina, more or less developed, between the antennæ; the scutellum is mostly subbilobate, only in one specimen bilobate; the "tubercles" mentioned in the descriptions are two hard, round, shining elevations, one on each side of the thorax, before and a little below the base of the wings; the wings are generally clouded especially about their apical margins, with a more or less hyaline, lunular spot near the tip; the stigma is often lighter colored than the rest of the nervures; the shape of the second and third submarginal cells varies very much, even in the same species; I have before me a ♀ specimen from Maine (*N. oblitterata* n. sp.), which has the second transverse cubital nervure in both superior wings entirely obliterated, thereby throwing the second submarginal cell into the first, and making the latter as long as the marginal. In another ♀ specimen from Kansas (*N. luteola* var?) we have the normal neuration on the left

superior wing, while on the right wing the third submarginal cell is petiolated, i. e. the transverse cubital nervure that separates the second and third submarginal is suddenly angulated at its anterior third and becomes confluent with the third transverse cubital nervure before it reaches the radial nervure; an example of this monstrosity is shown in the normal second submarginal cell of *Miscophus*,—a genus of Laridæ. (See St. Farg. *Hymenopt.* pl. 27, fig. 6 bis.) Mr. Walsh of Rock Island, Ill., informs me that he possesses a ♂ *Nomada* “with the *three* normal submarginal cells on the left wing and only *two* on the right wing, the two next the base being confluent; and another ♂ with *two* submarginal cells on the left wing and only *one* on the right wing.” The abdomen is short and ovate, but the segments are generally more or less distended and consequently vary in shape; the base of the first segment above has a more or less deep longitudinal excavation; the apical segment of the male is narrow, its lateral margins somewhat reflexed and the tip mostly bifid, rarely rounded.

As most of the species of this genus are liable to vary more or less in the color and markings, it will be found very difficult to separate the varieties and to tell correctly to what species they belong, without having a large series of specimens; but with a limited collection and with no intermediate grades of variation, it is hardly possible to avoid creating a number of species, which, after a large series of specimens has been accumulated, may prove to be only varieties. This, however, is generally the case with almost every variable genus of insects when first monographed, where synonyms are unavoidably created.

The following have the appearance of being distinct species:—

1. *N. superba* n. sp.

*Male*.—Head large; black; densely, somewhat deeply and confluent punctured, the punctures more sparse and less deep on the face; thinly clothed with whitish hairs; sides of the face, orbits of the eyes beneath, clypeus, labrum, a quadrate spot above the clypeus, mandibles, except tips, lemon-yellow. Antennæ, when extended back, attains the scutellum; fulvous, apical joint paler, scape in front yellow, behind black. Thorax black, densely, somewhat deeply and confluent punctured; collar, tubercles, tegulæ, except a dot on the middle, a triangular spot on the pleura, immediately behind the fore feet, and two spots on the scutellum which is bilobate, lemon-yellow; thinly clothed

with whitish hairs beneath the wings and on the metathorax which is sparsely punctured. Wings hyaline, apical margins faintly stained with fuscous; nervures ferruginous. Legs: coxæ black, spotted with yellow; trochanters more or less fulvous and black; femora fulvous, black at their extreme base and yellow at their tips; tibiæ and tarsi lemon-yellow, stained with fulvous within; claws piceous at tips. Abdomen minutely punctured, slightly pubescent, shining, black; base of the first segment above slightly tinged with ferruginous; about the middle of each segment a more or less broad lemon-yellow transverse band, slightly attenuated in the middle and somewhat indented on the extreme sides of the first and second segments anteriorly; apical segment elongate, rounded at tip; beneath piceous, hairy, with the two first segments stained with ferruginous, the three following segments banded with yellow and the sixth entirely yellow. Length 6 lines.

*Hab.* Pike's Peak. One specimen in the collection of the Entomological Society of Philadelphia.

A most lovely species, entirely distinct from any other species of *Nomada* known to me. The form is much more robust than that of *N. luteola* St. Farg.

2. *N. luteola*, St. Farg.

*Nomada luteola*, St. Farg., Ency. Méth. Ins. viii, p. 365.

*Nomada sulphurata*, Smith, Brit. Mus. Cat. Hym. ii, p. 249. ♀.

*Female*.—Head blackish-brown; sides of the face, clypeus, a spot above it, labrum, mandibles except tips, and a small spot in front of the ocelli, yellow; a blackish-brown line extends half-way down the sides of the clypeus. Antennæ as long as the head and thorax, dark fuscous towards the apex, rufous or dark ferruginous at the base, the scape in front is sometimes yellowish. Thorax densely punctured, blackish-brown; the collar, tubercles except a blackish indentation in front, two longitudinal lines on the disk not reaching either the collar or scutellum, a line over the base of each wing reaching from the collar to the angles of the scutellum, the tegulæ except a blackish spot on the disk, the scutellum which is subbilobate and rather prominent, a transverse line on the postscutellum, a large quadrate patch on each side of the metathorax, a small spot beneath the base of the wings connected with a large quadrate patch beneath, and two spots in front of the intermediate coxæ, yellow. Wings fusco-hyaline, apical margins

clouded, with a pale lunule near the tip; stigma pale ferruginous, nervures ferruginous. Legs yellow varied with ferruginous, especially the femora at base and within. Abdomen blackish-brown, each segment above with a broad yellow fascia, the posterior margin of which is slightly attenuated and more or less waved, the anterior margin of the fascia on the first segment is slightly denticulated; beneath same as above, except that there is a spot, instead of a band, on the first segment, and the fasciæ are rather more attenuated in the middle posteriorly. Length 6 lines.

*Male*.—Head black; clypeus, a spot above it, labrum, mandibles except tips, face on each side of the clypeus, and the orbits of the eyes, yellow; a minute black dot on each side of the clypeus. Antennæ rather long, ferruginous, blackish behind towards the base; scape robust, yellow in front, black behind. Thorax black, clothed with short pale hairs; the tubercles, an oblong spot beneath, the tegulæ except a spot on the disk, two small round spots on the scutellum, and (in one specimen) a small bilobed patch on each side of the metathorax, yellow. Wings hyaline, apical margins faintly clouded. Legs yellow; base of all the femora, the posterior femora and their tibiæ within, and a more or less distinct oblong spot or vitta on the outside of the posterior tibiæ, blackish or fuscous. Abdomen black, with yellow fasciæ similar to those of the female, that on the first segment above, being sometimes interrupted in the middle. Length 5 lines.

*Hab.* Penn., Del., Conn. (Coll. Ent. Soc. Phil., and Mr. E. Norton.)

The longitudinal lines on the thorax are sometimes ferruginous or yellow margined with ferruginous.

I have before me four ♀ specimens which have the face rather shorter, the clypeus, labrum and mandibles, except tips, either entirely ferruginous or yellow stained with ferruginous, and a small black dot on each side of the clypeus; except in one specimen, there is no yellow spot in front of the ocelli; the longitudinal dorsal yellow or ferruginous lines of the thorax and the yellow patch on the pleura are sometimes very indistinct or entirely absent; the sublobes of the scutellum are smaller and more prominent and the yellow transverse line on the postscutellum is reduced to a mere spot; the yellow fascia on the first segment of the abdomen above is deeply indented on the middle anteriorly, and sometimes interrupted with ferruginous. These

four specimens are more slender in form than the three females from which the main description was taken.

I have another ♀ variety from New Jersey, which has the longitudinal lines of the thorax bright ferruginous; the spots on each side of the metathorax are triangular and become confluent on the disk, and the legs are almost entirely ferruginous; this specimen is more robust than the females above described.

Also another ♀ variety, probably of this species, from Pike's Peak, which is ferruginous, with the sides of the face, the collar, tubercles, tegulæ, a quadrate patch on the pleura, a large quadrate spot on the scutellum, a transverse line below it on the postscutellum, a small spot on each side of the metathorax near the insertion of the abdomen, part of the coxæ and the usual fasciæ on the abdomen, yellow; there is no appearance of longitudinal lines on the thorax, and the scutellum is flat, not subbilobate; the legs and antennæ are entirely ferruginous. It may be a distinct species. In this specimen, the right wing has the third submarginal cell petiolated, as mentioned before on page 281.

### 3. *N. vineta* Say.

*Nomada vineta* Say, Bost. Journ. Nat. Hist. i, p. 401. ♂ ♀. (1837.)

*Nomada pulchella* Smith, Brit. Mus. Cat. Hym. ii, p. 247. ♂. (1854.)

*Female.* "Body black: head beneath the antennæ, ferruginous: orbits yellow: antennæ ferruginous, dusky about the middle; terminal joint paler: collar yellow: thorax each side over the wings, with a dull ferruginous margin; before the wings a yellow spot: wing-scale honey-yellow: wings slightly dusky, particularly the terminal margin: nervures honey-yellow: scutel subbilobate, yellow, line on the middle posterior margin ferruginous: metathorax near the scutel with a transverse line and an irregular, longitudinal, quadrate spot on each side behind, yellow: tergum with a yellow band, gradually contracted towards the middle, and obsoletely margined with ferruginous, before the middle of each segment; anterior band a little undulated or denticulated: pectus with a triangular, yellowish spot over the fore-feet: coxæ, black, with a yellow spot: thighs ferruginous, blackish behind: tibiæ and tarsi ferruginous and yellow: venter with two yellowish bands; towards the tip honey-yellow. Length ♀ nine-twentieths of an inch.



*Male.* "Ferruginous; orbits and head before, yellow; antennæ blackish towards the tip; first joint yellow beneath; collar, line over the wings, two obsolete ones in the middle, wing-scale excepting a dot in the middle, yellow; scutel undivided, yellow; metathorax in greater part, yellow; abdomen yellow, posterior margins of the segments black, submargins ferruginous. Rather more slender than the female."

Three ♀ and two ♂ specimens of this beautiful species, from Rock Island, Ill. (Coll. Benj. D. Walsh, Esq.), differs from Say's description above quoted as follows: ♀.—Head beneath the antennæ is yellowish-ferruginous; the labrum and sides of the face being sometimes yellow; the "dull ferruginous margin over the wings" is, in one specimen, indistinct, and in another specimen the thorax above is ferruginous, with a broad black longitudinal dorsal line, and on each side of it, a longitudinal blackish stain; the tegulæ in two specimens are yellow, with a fuscous dot on the disk; the femora behind are sometimes entirely ferruginous and the tips of the tibiæ within are blackish, sometimes indistinctly so. The two yellow bands of the abdomen beneath are on the second and third segments. ♂.—Black, instead of ferruginous; the face beneath the antennæ is yellow, and on each side of the clypeus a minute black dot; the yellow orbits of the eyes do not reach their vertex; the thorax is black, and there is no appearance of a "line over the wings" and "two obsolete ones in the middle;" the tegulæ are honey-yellow; the scutellum has two small yellow spots; each side of the metathorax also with a small yellow spot; the posterior femora within are black; the first segment of the abdomen above has a narrow ferruginous band, which, in one specimen, has on each side of the disk two small yellow spots close together; the yellow band on the second segment is broadly indented on the disk anteriorly and in one specimen the band on the third segment is broadly and squarely indented on the disk anteriorly; the apical segment beneath is yellow. Length 3½ lines.

I rather suspect that Say described a small and slender ♀ of *N. luteola* St. Farg., as the ♂ of his *vincta*, as I have some small and slender females of the former species which answer to Say's description of the latter, and which at a glance have the appearance of males.

The females of *vincta* resemble some of the ♀ varieties of *luteola*, but they may be easily distinguished from the latter by the much finer

punctuation of the head and thorax. The males also very much resemble those of *luteola*, but the yellow abdominal bands of the latter are more regular and not so narrow as those of *vineta*, and the face not altogether yellow beneath the antennæ.

4. *N. modesta* n. sp.

*Female.* Head black, densely punctured; a rather broad longitudinal line on each side of the face, yellow stained with ferruginous. (this line in one specimen is reduced to a spot on each side of the antennæ); clypeus tinged with piceous; labrum and mandibles brown-ferruginous. Antennæ rather short, blackish above and ferruginous beneath towards the base. Thorax black, coarsely and confluent punctured; the collar, tubercles, two spots on the scutellum, which is subbilobate, a transverse line on the postscutellum, a spot on each side of the pleura, and sometimes a minute spot on each side of the pleura anteriorly, yellow; tegulæ honey-yellow. Wings fusco-hyaline, apical margins fuscous with a pale spot near the tip; stigma ferruginous, nervures fuscous. Legs ferruginous; coxæ above black with a yellow spot behind; posterior femora black within, sometimes altogether black except the extreme base and apex; tibiæ tipped with yellow. Abdomen densely and finely punctured, black; first segment above tinged with ferruginous, and having a narrow yellow fascia near the posterior margin, obtusely indented on each side anteriorly; near the posterior margin of the second segment a broad yellow fascia, gradually attenuated in the middle; on each side of the third segment a yellow line, indented posteriorly; on the fourth and fifth segments a narrow yellow fascia, that on the fourth segment indented on each side anteriorly, the indenture sometimes extending through and interrupting the fascia; the fascia on the fifth segment is somewhat interrupted in the middle; apical segments blackish, obscurely tipped with yellowish; beneath black, shining. Length  $4\frac{1}{2}$ —5 lines.

*Variety.* Differs by having the longitudinal line on each side of the face entirely yellow; by the orbits of the eyes behind obscurely, and the anterior portion of the clypeus, the labrum and mandibles being ferruginous; by the eyes having a short yellow line behind near their vertex; by the tegulæ being yellow; by the metathorax having on each side a longitudinal yellow spot; by the pleura having on each side two yellow spots connected with ferruginous; by the legs being

entirely ferruginous; by the yellow fasciæ of the abdomen above being continuous, or very slightly interrupted on the disk, and much attenuated in the middle, the fascia on the first segment is broader, not indented on each side anteriorly, but slightly so in the middle; and by the second segment beneath having a ferruginous stain on the disk, and the apical segments being obscurely margined posteriorly with yellow.

*Male.* Differs from the female as follows:—the sides of the face, the clypeus except a black line on each side, a minute dot above the clypeus, the labrum and mandibles are yellow; the antennæ beneath are ferruginous, and the scape in front yellowish; in one specimen the yellow fascia on the third segment of the abdomen above is continuous and slightly indented on each side posteriorly, in the other two specimens this fascia is widely interrupted in the middle; the fasciæ on the two following segments are also continuous; the sixth segment is blackish-piceous; the apical segment black, bifid at tip. Length  $3\frac{1}{2}$ —5 lines.

*Hab.* Maine 2 ♂ (Coll. Mr. E. Norton); Rock Island, Ill., 4 ♀, 1 ♂. (Coll. Benj. D. Walsh, Esq.)

Allied to *N. electa* n. sp., but distinct from that species by the coarser punctures of the thorax; it also resembles *N. festiva* n. sp. I would not be surprised if this species should eventually turn out to be an extreme variety of *N. fervida* Smith.

5. *N. bella* n. sp.

*Male.* Head black, finely punctured, densely clothed with short whitish hairs, those on the clypeus and labrum silvery; clypeus, labrum, mandibles except tips which are piceous, orbits of the eyes beneath, and the face on each side of the clypeus, yellowish-white. Antennæ as long as the head and thorax, black; flagellum in front rufo-piceous. Thorax entirely black, finely punctured, densely clothed with whitish hairs; tegulæ dark ferruginous; scutellum somewhat subbilobate. Wings hyaline, apical margins slightly clouded. Legs clothed beneath with whitish hairs; coxæ, trochanters and femora except tips blackish; tibiæ ferruginous, stained with blackish; tarsi ferruginous. Abdomen minutely punctured, piceous, apical margin of the segments tinged with ferruginous; first segment above blackish or piceous, obsoletely stained with ferruginous, on each side in the middle a transverse

yellowish-white spot, slightly and obtusely indented posteriorly; at the base of the second segment a broad yellowish-white fascia somewhat attenuated towards the disk and slightly indented on the extreme sides and disk anteriorly; at the base on each side of the four following segments a narrow yellowish-white fascia, slightly attenuated in the middle and more or less squarely indented on each side posteriorly; apical segment dark ferruginous, the tip bifid; beneath dark ferruginous, stained with piceous, sometimes with an oblong, pale-yellowish spot on each side of the third segment, and another on the apical segment. Length  $3\frac{1}{2}$ — $4\frac{1}{2}$  lines.

*Hab.* Mass., Conn. Three specimens. Collection of Mr. E. Norton.

Sometimes the spots on the first segment are reduced to mere dots, and very indistinct; the fascia on the second segment is sometimes obsolete divided by a ferruginous line, and those on the fifth and sixth segments sometimes interrupted and broken into four spots.

6. *N. lepida* n. sp.

*Male.* Head black, densely and finely punctured, thickly clothed with whitish hairs; the clypeus, labrum, mandibles and the orbits of the eyes on each side of the clypeus, yellow. Antennæ as long as the head and thorax; black above, flagellum beneath yellowish-ferruginous, scape in front yellow. Thorax black, densely and finely punctured, thickly clothed with rather long whitish hairs; tubercles yellow, deeply notched anteriorly with black; scutellum rather prominent and slightly subbilobate; tegular honey-yellow. Wings hyaline, slightly iridescent, apical margins clouded, nervures ferruginous. Legs: coxæ except tips, trochanters and the anterior and intermediate femora beneath at base, and the whole of the posterior tibiæ except tips, black, rest of femora ferruginous, tipped with yellowish; tibiæ and tarsi yellow varied with ferruginous. Abdomen minutely punctured, shining, ferruginous; basal half of the first segment above black, and the posterior margins of the segments with a dark stain; on each side of the middle of the first segment an oblong yellow spot having its margins waved, especially in front, on the posterior margin of each spot, a small distinct fuscous dot; at the base of each of the five following segments a transverse yellow band, more or less attenuated within and slightly interrupted in the middle with ferruginous, that on the second segment broad and slightly indented with blackish on the extreme sides ante-

riorly, the bands on the four following segments narrow and more or less squarely indented on each side posteriorly, the band on the sixth segment scarcely interrupted, apical segment ferruginous, bifid at tip; beneath ferruginous, base of the first segment black, posterior margins of the segments with a darker stain; at the base of the second, third and fourth segments a narrow, transverse, yellowish line attenuated in the middle, a spot on the fifth and another on the apical segment, yellow. Length 4 lines.

*Hab.* Pike's Peak, one ♂ (Coll. Ent. Soc. Philad.); Rock Island, Ill., one ♂ (Coll. Benj. D. Walsh, Esq.).

This species resembles the ♂ of *vineta* Say, but differs by having the face densely pilose, and by the clypeus and sides of the face having less yellow, and in other respects. I have before me an obscure specimen, doubtless of the same species, from Maryland (Coll. Mr. Norton), which differs from the Pike's Peak specimen in the colors being less bright,—in the scutellum having two ferruginous spots,—in the spots on the first segment of the abdomen above being rather deeply and obtusely indented anteriorly, and the fuscous dot on the posterior margin of each spot being obsolete,—in the transverse yellow bands of the following segments being more widely interrupted on the disk and having their outline much less distinct, those on the fourth and fifth segments being somewhat deeply indented on the disk anteriorly, and that on the sixth segment obsolete, and in the yellowish markings of the abdomen beneath being either very indistinct or else entirely obsolete.

7. *N. festiva* n. sp.

*Female.* Head black, densely and confluentely punctured, somewhat depressed in front; clypeus prominent; the face on each side of the clypeus, labrum, base of mandibles, and an irregular spot on the clypeus, yellow. Antennæ rather short; rufo-piceous, blackish above towards the apex, scape in front yellow. Thorax rather coarsely and densely punctured, black; collar, tubercles, tegulæ, a transverse line on the scutellum which is subbilobate, a round spot on each side of the metathorax, and two obsolete spots on the pleura, yellow. Wings subhyaline, apical margins clouded; nervures piceous. Legs: coxæ and trochanters black, slightly stained with ferruginous; anterior and intermediate femora ferruginous and black, posterior femora almost en-

tirely black; tibiæ and tarsi yellow varied with ferruginous; posterior tibiæ within and the tarsi obfuscated. Abdomen finely punctured, shining, black; an obsolete ferruginous stain on the middle of the first segment above, a broad yellow fascia attenuated and interrupted in the middle on the second segment; a transverse yellow line on each side of the third segment, and a yellow fascia, slightly interrupted in the middle, on each of the fourth and fifth segments, that on the fourth segment somewhat indented on each side posteriorly; anus piceous; beneath blackish-piceous, a dark ferruginous stain on the first and second segments, a yellow fascia, attenuated in the middle, on the third segment, and an obsolete, yellowish, transverse line on the fourth segment. Length 4 lines.

*Hab.* New Jersey. One ♀ specimen. Collection of Mr. Edward Norton.

This species resembles the ♀ of *N. modesta* n. sp., but I think it is distinct.

8. *N. electa* n. sp.

*Female.* Head black, densely and confluentely punctured; sides of the face, clypeus, labrum, mandibles, orbits of the eyes behind and a minute spot on each side of the ocelli, at the summit of the eyes, ferruginous tinged with yellowish; a black dot on each side of the clypeus. Antennæ when extended back attains the scutellum; black above, beneath ferruginous and yellow at the base and blackish towards the tip. Thorax rather finely granulated; black; two short lines on the collar, tubercles except a minute black dot on the disk and a black indentation in front, two spots on the scutellum which is slightly subbilobate, and a transverse line on the postscutellum, yellow; tegulæ and an interrupted circle on the pleura beneath in front of each intermediate leg, ferruginous; metathorax slightly clothed with whitish pubescence. Wings subhyaline, slightly stained with yellowish-fuscous, with a pale lunule near the tip; stigma ferruginous, nervures fuscous. Legs ferruginous, more or less stained with fuscous, especially the coxæ and the femora within; anterior and intermediate tibiæ yellowish at base and apex; posterior tibiæ above yellow interrupted on the middle by an oblong fuscous spot; tarsi ferruginous. Abdomen minutely punctured, shining, black; each side of the first segment above with a somewhat oblique, narrow, undulating, yellow line, almost meeting on the disk;

on each side of the second segment a large euneiform yellow spot pointed within and almost meeting on the disk; third segment with a narrow yellow fascia interrupted in the middle and slightly indented on each side posteriorly; fourth and fifth segments also with a narrow yellow fascia not interrupted in the middle, but deeply indented anteriorly on each side; anus yellowish, hairy; beneath piceous, immaculate. Length 5 lines.

*Male.* Differs from the female as follows:—Form rather more slender; the sides of the face, the clypeus, labrum, mandibles except tips, orbits of the eyes beneath and the scape of the antennæ in front entirely yellow; the flagellum beneath ferruginous; no spot at the summit of the eyes, a lunular yellow spot on the pleura beneath instead of the ferruginous interrupted circle; legs fulvous, except the posterior femora within which are black, and the tibiæ which are as in the female. Abdomen more elongate, the yellow spots on the first segment above assume the appearance of lunules, being rounded on their anterior margin and obtusely indented on the middle posteriorly and connected on the disk by an indistinct dark ferruginous line, as also are the spots on the second segment, the band on the third segment is scarcely interrupted; the sixth has a broad yellow fascia, interrupted on each side anteriorly, and the anus is black, with the tip bifid; beneath blackish-piceous with a yellowish fascia on each segment, which is distinct on the disk and subobsolete on each side, where it is broadly excavated anteriorly; apical segment with a small yellow spot. Length 5 lines.

*Hab.* Illinois ♀, Connecticut ♂. Two specimens. Coll. Ent. Soc. Phila. and Mr. E. Norton.

For the ♀, the Society is indebted to Benj. D. Walsh, Esq., of Rock Island, Ill.

9. *N. placida* n. sp.

*Female.* Head black, finely and densely punctured; sides of the face and orbits of the eyes obsoletely, yellow; clypeus, except the anterior margin, labrum and the base of the mandibles yellowish-ferruginous. Antennæ black above; beneath piceous, tinged with ferruginous towards the base. Thorax black, densely and finely punctured; two lines on the collar, the tubercles except a black indentation in front, a broad line on the scutellum which is subbilobate, a line on the

postscutellum and an obsolete spot on the pleura immediately behind the fore-feet, yellow; tegulae honey-yellow. Wings subhyaline, apical margins faintly clouded with fuscous; nervures piceous. Legs: coxae black, the posterior pair with a yellow spot at their base; trochanters and femora ferruginous, varied with blackish in front, almost entirely blackish behind; tibiae yellow varied with fuscous and ferruginous, the posterior tibiae having a patch of blackish on the middle of the outer surface but not reaching the upper margin which is entirely yellow; tarsi yellowish-ferruginous. Abdomen finely punctured, shining, black; first segment above black, sometimes with an obsolete ferruginous stain on its disk; on each side of the second segment a large cuneiform macula pointed within and sometimes almost contiguous on the disk; on each side of the third segment a transverse yellow line; the fourth and fifth segments each with a yellow fascia, indented on each side anteriorly, the fascia on the fourth segment very slightly indented on the disk both anteriorly and posteriorly, and that on the fifth segment rather deeply and obtusely indented on the disk posteriorly; beneath blackish-piceous, with obsolete ferruginous stains, the fourth segment has a yellowish fascia the anterior margin of which is scooped out on each side, sometimes there is an obsolete similar fascia on the third segment. Length 3—3½ lines.

*Male.* Like the female, except that the clypeus is sometimes almost entirely yellow, the yellow orbits of the eyes behind, the yellow spot on the pleura and the yellow line on the post-scutellum are sometimes obliterated; the sixth segment of the abdomen above has a yellow fascia, and the anus is somewhat rounded at tip. Length 3½—4 lines.

*Hab.* Pennsylvania. Four ♀ and two ♂ specimens. Coll. Ent. Soc. Philad.

The yellow markings on the ventral segments of the female are sometimes obsolete.

This species resembles *N. electa* n. sp., very much in color and markings, but it is much smaller; the first abdominal segment has no yellow spots or lines, and the yellow line on each side of the 3d segment is not indented either anteriorly or posteriorly.

10. *N. vicina* n. sp.

*Female.* Head black, densely punctured; orbits of the eyes behind, obsolete in front, dark ferruginous; mouth piceous. Antennae black.



beneath ferruginous except towards the tip. Thorax black, densely and confluent punctured; tubercles, tegulæ, a line which passes over them, two very indistinct longitudinal lines on the disk, a spot on the pleura, and the scutellum which is subbilobate and prominent, dark ferruginous; metathorax less deeply punctured and slightly fringed on each side with silvery-white pubescence. Wings subhyaline, stained with fuscous towards the tip, which has a pale lunule; stigma pale ferruginous, nervures piceous. Legs dark ferruginous, the coxæ, except tips, the trochanters and femora beneath blackish. Abdomen minutely punctured, shining, black; the first segment above has a narrow yellow line interrupted in the middle; the second segment has anteriorly on each side a large, cuneiform, yellow macula pointed within, the points almost contiguous on the disk, the anterior margin of the macula laterally, is slightly indented with black; a narrow yellow line on the anterior margin on each side of the third segment; the fourth and fifth segments have each anteriorly a yellow fascia, indented on each side posteriorly, the fourth being slightly attenuated on the disk and divided by an obsolete blackish line, and the fifth being slightly indented on the disk anteriorly; anus piceous; beneath black, a yellow spot on each side of the third segment and a line or two spots on the middle of the fourth segment. Length 4—5½ lines.

*Male.* Head black, finely punctured, clothed with short pale hairs, those on the clypeus and labrum silvery; the clypeus, labrum, mandibles except tips, orbits of the eyes beneath and sides of the face near the base of the mandibles, yellow. Antennæ as long as the head and thorax, blackish above, beneath rufo-piceous, scape in front yellow. Thorax densely and finely punctured, thickly clothed with short pale hairs, those on the sides of the metathorax somewhat silvery; tubercles and tegulæ honey-yellow; a yellow spot on each side of the pleura anteriorly, immediately behind the fore feet. Scutellum subbilobate, prominent, blackish, sometimes with an obsolete yellowish spot on each lobe. Wings hyaline, apical margins clouded; nervures piceous. Legs: coxæ blackish; anterior and intermediate legs in front yellowish-ferruginous, behind blackish-piceous or dark ferruginous; posterior pair blackish-piceous, varied with ferruginous, especially on the femora in front. Abdomen marked as in the female, except that the yellow macula on the second segment is broader and more widely separated

on the disk, and the fascia on the fourth segment is more or less interrupted on the disk and on each side, so that sometimes the fascia is broken into four spots, two on each side; the sixth segment has a transverse yellow spot, and the anus is black and slightly bifid at tip; beneath piceous, with the second and third segments banded with yellow; an obsolete yellowish line on the fourth segment and sometimes a minute yellowish spot on the disk of the fifth segment. Length 4—4½ lines.

*Hab.* Connecticut and New York. Two ♀ and two ♂ specimens. Collection of Mr. Edward Norton.

In this species the yellow fasciæ on the fourth and fifth abdominal segments are indented on each side *posteriorly*, and not *anteriorly*, as in *electa* and *placida*.

11. *N. proxima* n. sp.

*Male.* Head black, thickly clothed with pale hairs; anterior margin of the clypeus, labrum, mandibles, except tips, and the sides of the face near the base of the mandibles, yellow. Antennæ above black, beneath rufo-piceous. Thorax black, thickly clothed with pale hairs; tegulæ and tubercles piceous. Wings hyaline, apical margins fuscous; nervures piceous. Legs piceous; femora blackish above. Abdomen black, tinged with piceous towards the apex; first segment above entirely black; anterior margin of the second segment on each side with a large cuneiform yellow macula pointed within; a narrow, uneven, transverse, yellow line on each side of the third segment anteriorly; an interrupted, transverse, yellow line on the fourth segment, and on the fifth a yellow fascia obsoletely margined posteriorly with ferruginous; anus piceous, tipped with blackish, with the apex subtruncate; beneath blackish-piceous, the second, third and fourth segments obsoletely banded with yellowish. Length 4½ lines.

*Hab.* Maine. One ♂ specimen. Collection of Mr. E. Norton.

Allied to *vicina*, and differs, principally, from that species by the greater expanse of the wings (9 lines) which is one line more than that of the largest female of *vicina*, whose length of body is one line longer than that of *proxima*.

12. *N. fervida* Smith.

*Nomada fervida* Smith, Brit. Mus. Cat. Hym. ii, p. 247, ♀.

“*Female.* Length 4—5 lines.—Black, the sides of the face, the

clypeus, the labrum, mandibles and antennæ ferruginous, the latter slightly fuscous above; the clypeus and flagellum sometimes dark fuscous. Thorax, the disk coarsely rugose, the collar, tubercles, tegulæ, a spot beneath the wings, the scutellum and post-scutellum ferruginous, the two latter sometimes have a yellowish stain; the legs ferruginous, the wings fuscous, their apical margins having a darker stain; the basal segment of the abdomen has a transverse rufo-testaceous band, sometimes bordered with yellow; the second segment has a similar band placed beyond the middle, the band more or less attenuated in the middle; the fourth segment has sometimes a transverse narrow line, and the fifth sometimes an oblique yellow dot

“*Hab.* St. John’s Bluff, East Florida; Georgia.”

A ♀ specimen of this species (Coll. Mr. Norton) from Connecticut, differs from Mr. Smith’s description above quoted, as follows:—The head is black, except the sides of the face above the clypeus, the labrum and base of the mandibles which are yellowish-ferruginous; the antennæ are blackish-piceous, except the basal half beneath which is ferruginous; the collar, tubercles, tegulæ and a spot beneath the wings are yellowish-ferruginous; the scutellum and postscutellum are ferruginous, the former with two yellowish spots, the latter with a transverse yellowish line; the band on the second segment of the abdomen above is tinged with yellow, and very much attenuated in the middle. there is no appearance of a line on the fourth segment, and the oblique dots on the fifth segment are very indistinct.

13. *N. gracilis* n. sp.

*Male.* Head black, finely and densely punctured, rather thickly clothed with erect whitish hairs; clypeus narrowly margined anteriorly with yellow; the labrum, base of the mandibles and orbits of the eyes near the base of the mandibles, yellow; rest of the mandibles piceous. Antennæ slightly longer than the head and thorax, black, flagellum ferruginous beneath. Thorax black, finely and densely punctured, rather thickly clothed with erect whitish hairs; tubercles ferruginous; tegulæ yellowish-ferruginous. Wings hyaline, splendidly iridescent; apical margins faintly clouded, nervures testaceous. Legs black, slightly pubescent, extreme tips of the coxæ, of the trochanters and of the femora, the tibiæ and tarsi ferruginous, sometimes the tibiæ are slightly obfuscated beneath. Abdomen minutely punctured, slightly

hairy towards the apex, shining, black; extreme sides of the first segment tinged with piceous; on each side of the second segment at base a large subangular yellow spot; on each side of the third segment an oblong yellow spot or line; on the fourth segment four yellow spots, the extreme lateral ones minute and indistinct; on the middle of the fifth segment a yellow line, slightly attenuated in the middle; on the sixth segment an oblong yellow spot; apical segment black, bifid at tip; beneath blackish-piceous, with a small more or less distinct yellow spot on each side of the second, third and fourth segments, the fifth segment stained with ferruginous and the apical segment entirely yellowish-ferruginous. Length  $3\frac{1}{2}$  lines.

*Hab.* Massachusetts. One specimen. Coll. of Mr. Edward Norton.

A very slender and gracefully formed species, having the scutellum only slightly prominent and with no appearance of being bilobed.

14. *N. punctata* Fabr.

*Nomada punctata* Fabr. Ent. Syst. ii, p. 346.

"Half the size of *N. scutellaris*. Antennæ ferruginous, base black. Head black, labium silvery, rather shining. Thorax black, with a small tuberculous spot before the wing. Scutellum with a porrect, acute spine and a small white tubercle on each side at the base of the spine. Abdomen smooth, black, with a white transverse spot on each segment, on the posterior segment with the spots connate and forming a band. Legs rufous, femora black.

"*Hab.* Canada."

Unknown to me.

15. *N. imbricata* Smith.

*Nomada imbricata* Smith. Brit. Mus. Cat. Hym. ii, p. 246, ♀.

"*Female.* Length  $4\frac{1}{2}$ —5 lines.—Head ferruginous, a black spot above the insertion of each antenna, also a minute black dot on each side of the clypeus, above which there is sometimes a yellow spot; thorax ferruginous, the collar, tubercles, two spots on the scutellum, an oblique line on each side of the metathorax yellow: a line down the centre of the metathorax and another oblique one on the sides of the thorax behind the wings black, the legs ferruginous; wings slightly fuscous. Abdomen ferruginous, a yellow line or spot on each side of the basal segment, and a broad band of the same color on the basal

margins of the three following segments. each more or less attenuated in the middle, the first usually interrupted, the fifth segment yellow.

“*Hab.* United States.”

Unknown to me.

16. *N. annulata* Smith.

*Nomada annulata* Smith, Brit. Mus. Cat. Hym. ii, p. 248. ♂ ♀.

“*Female.* Length  $3\frac{1}{4}$  lines.—Black, the sides of the face, orbits of the eyes, clypeus, labrum and mandibles yellow; the antennæ and a minute spot above the clypeus ferruginous. Thorax, the collar, tubercles, a spot before and a line below them, the scutellum and a patch on each side of the metathorax yellow; legs ferruginous, variegated with yellow, the wings slightly clouded on their apical margins. Abdomen slightly ferruginous towards the base, each segment having a transverse yellow band; the three basal bands more or less attenuated in the middle, the bands continued beneath the abdomen.

“*Male.* Length  $3\frac{1}{4}$  lines.—This sex has the clypeus, labrum, mandibles, scape of the antennæ in front and the flagellum beneath of a pale yellowish-white, the latter is fuscous above towards the base and again towards the apex, the intervening joints are ferruginous and the apical ones entirely yellowish-white; thorax, the scutellum ferruginous; the tubercles, tegulæ and nervures of the wings reddish-yellow, the wings subhyaline, having a fuscous cloud at their apex. Abdomen black at the extreme base, the rest of the first segment and the whole of the second ferruginous the latter having a large angulated yellow macula on each side, the first only a minute dot; each segment from the fourth to the apical one has a narrow yellow band; beneath entirely ferruginous.

“*Hab.* North America.”

17. *N. articulata* Smith.

*Nomada articulata* Smith, Brit. Mus. Cat. Hym. ii, p. 248. ♂.

“*Male.* Length  $3\frac{1}{2}$  lines.—Black, the clypeus, labrum, mandibles, sides of the face, scape in front and flagellum towards the base yellow, the latter ferruginous towards the apex, above fuscous, the scape black above, joints of the flagellum submoniliform. The tubercles, tegulæ, scutellum and postscutellum ferruginous, the wings hyaline, the nervures ferruginous, the apical margin of the superior wings fuscous; legs ferruginous; the coxæ and posterior femora within fusco-ferrugi-

nous; the two basal segments of the abdomen dark ferruginous, the apical ones black; a minute spot on each side of the first segment, a large ovate one, pointed within, on the second, and a transverse fascia on the four following placed about the middle, yellow; the apex ferruginous.

· *Hab.* North America.”

I have before me five males from Connecticut (Coll. Mr. Norton) and two males from Rock Island, Ill., (Coll. Mr. Walsh), either of this species, or of *N. annulata* Smith, but cannot satisfactorily decide to which species they belong. Two specimens have their abdominal segments distended and showing the yellow markings very distinctly. All the seven specimens have the “sides of the face yellow,” the antennæ “fuscous [or blackish] above towards the base and again towards the apex, the intervening joints are ferruginous,” and the apical joint also ferruginous or yellowish-ferruginous; the “abdomen black at the extreme base” and the segments have the same yellow markings; some have the flagellum beneath pale yellow and others yellowish-ferruginous; two specimens have the “two basal segments of the abdomen dark ferruginous” except the base of the first segment, and “the apical ones black”; one specimen has the base of the second segment black, and the posterior margin of all the segments fuscous; and two specimens have the abdomen, except the base of the first segment and the yellow markings, entirely ferruginous; one of the two specimens first mentioned, and one of the last have the thorax dark ferruginous with a black longitudinal dorsal line, and in the last the orbits of the eyes are obsoletely ferruginous, and a patch on the pleura also ferruginous, the spots on the first abdominal segment being oblong, oblique and much larger than in the other specimens. The yellow markings of the third segment are, in almost all the specimens, a line on each side and not continuous as on the three following segments. I have placed these specimens under this species because all of them have the “*joints of the flagellum* (except the apical joint) *submoniliform*”, that character being specially mentioned in the description, and also, because the construction of the antennæ, in all the five specimens, is remarkable and altogether different from that of any other species of *Nomada* known to me, i. e., the scape is cylindrical and very robust, the fourth joint of the antennæ is almost as long as the

third and fifth joints put together, and the apical joint is attenuated and acute at tip.

Are not the males of *articulata* and *annulata* varieties of one and the same species?

18. *N. pygmæa* n. sp.

*Male.* Head black, densely punctured, face thickly clothed with whitish pubescence; the clypeus, a spot above it, the labrum, mandibles, and face narrowly on each side of the clypeus, yellow; orbits of the eyes ferruginous. Antennæ as long as the head and thorax; ferruginous; base of the flagellum above blackish; scape in front yellowish-ferruginous, behind ferruginous with the apex black. Thorax rather finely and densely punctured; dark ferruginous above with a blackish longitudinal dorsal line; pleura and metathorax blackish, clothed with short whitish pubescence; two lines on the collar, tubercles, a spot on each side of the pleura anteriorly, two spots on the scutellum which is subbilobate, yellow or yellowish-ferruginous; tegulæ ferruginous. Wings hyaline, apical margins faintly clouded; nervures ferruginous. Legs ferruginous; the coxæ, base of the femora and posterior femora except tips, black. Abdomen ferruginous, finely punctured, shining; base of the first segment above black; on each side at the base of the second segment, a large, angular, yellow macula, pointed within and nearly meeting on the disk; on each side at the base of the third and fourth segments a transverse yellow line, more or less squarely indented posteriorly; on the fifth segment, a yellow fascia, obsoletely indented on each side anteriorly, and very slightly interrupted on the disk; sixth segment yellowish-ferruginous; apical segment ferruginous, the tip bifid; beneath ferruginous, stained with blackish on the disk of the segments. Length 3 lines.

*Hab.* Connecticut. One specimen in the collection of Mr. E. Norton.

19. *N. rubicunda* Oliv.

*Nomada rubicunda* Oliv., Ency. Méth. Ins. viii, p. 365.

“ Resembles in form and size *Nomada bifasciata*. The antennæ are ferruginous-brown. The head and the thorax are ferruginous-brown, with a slight gray down. The abdomen is ferruginous, with two black spots on the first segment; the third is deep brown, with a yellow spot on each side; the two following segments are blackish-brown, with a white band in the middle of each one, the second is broader than the

first. The legs are ferruginous. The wings have an obscure tinge, with a transparent spot towards the extremity; the nervures are brown, and the stigma is reddish.

“*Hab.* Carolina.”

Unknown to me.

20. *N. amœna* n. sp.

*Female.* Head finely punctured, ferruginous; lower orbits of the eyes in front yellowish; the throat, a dot on each side of the clypeus, a patch about the insertion of the antennæ obscurely connected with another enclosing the ocelli, black. Antennæ rather short, ferruginous. Thorax finely and densely punctured, ferruginous; a longitudinal dorsal line, an abbreviated line anteriorly on each side of the disk, sides of the metathorax and a line down its middle, black; a black impressed puncture on each side of the pleura immediately beneath the base of the wings; sides of the metathorax densely clothed with silvery-white pubescence. Wings subhyaline, apical margins clouded, with a pale lunule near the tip. Legs ferruginous; base of the femora beneath and the posterior femora and tibiæ within, blackish. Abdomen finely punctured, blackish-brown; on the middle of the first segment above, a transverse ferruginous stain, having on each side of the disk two yellow spots; on each side at the base of the second segment, a large cuneiform yellow macula, obtusely pointed within and almost meeting on the disk; on each side of the third segment a yellow line indented in the middle posteriorly; on the fourth and fifth segments a yellow fascia also indented on each side posteriorly; beneath ferruginous, a minute dot on each side of the second segment, a transverse oblong spot on each side of the third, and a transverse line on the disk of the fourth segment, all yellow. Length 4 lines.

*Hab.* Rock Island, Ill. One specimen in the Collection of Benj. D. Walsh, Esq.

A beautiful species, resembling some of the varieties of *N. maculata* n. sp., but can hardly, I think, be a variety of that species.

21. *N. torrida* Smith.

*Nomada torrida* Smith, Brit. Mus. Cat. Hym. ii, p. 250 ♀.

“*Female.* Length  $4\frac{1}{2}$  lines.—Head red, the basal joint and the flagellum of the antennæ beneath red. Thorax red, the collar obscurely yellow, the scutellum and sides of the metathorax of a paler



red, the sides of the metathorax covered with white pubescence; the legs have a short silvery pile, particularly on the posterior femora. tibiæ and tarsi within; the wings fusco-hyaline, having a pale lunule towards their apex. Abdomen ferruginous, the extreme base black, also two black spots on each side of the basal segment; the third segment has on each side an oblong yellow stripe at its basal margin, the fourth has a narrow yellow fascia at its basal margin, the fifth entirely yellow.

“The yellow markings on this species are in some examples very obscure.

“*Hab.* Georgia.”

An obscure ♀ specimen of this species (Coll. Ent. Soc. Phila.) from Pennsylvania, is of a uniform ferruginous color, the antennæ except the three basal segments in front are blackish, the collar and legs are ferruginous, the posterior margins of the segments of the abdomen are more or less blackish, the markings of the abdomen are obscure yellowish-white instead of yellow, the fifth segment above is also yellowish-white margined anteriorly with black and somewhat indented with black on each side, and the fourth ventral segment has on each side an oblique whitish spot. The abdomen is uniformly and distinctly punctured.

22. *N. obliterata* n. sp.

*Female*.—Head ferruginous; finely and densely punctured; anterior margin of the clypeus, labrum, mandibles and orbits of the eyes on each side of the clypeus tinged with yellowish; a spot enclosing the ocelli and the extreme posterior margin of the head, black. Antennæ, when extended back, attaining the scutellum; entirely ferruginous, except the apical joint which is tipped with yellowish. Thorax ferruginous; finely and densely punctured, slightly hairy, especially on each side of the metathorax; a longitudinal dorsal impressed line extending to the scutellum, sides of the collar, upper margin of the pleura extending from the collar to the metathorax and enclosing a small ferruginous spot immediately beneath the base of the wings, the extreme sides of the scutellum, and the metathorax except a ferruginous patch on each side; black or blackish; the collar above, tubercles, two spots on the scutellum which is subbilobate, and a small spot on the lower part of the ferruginous patch on each side of the metathorax. yellow; tegulæ

ferruginous. Wings fusco-hyaline, nervures ferruginous, stigma paler; Legs ferruginous; coxæ except tips, and a stripe on the posterior femora within, black. Abdomen ferruginous; finely, densely and uniformly punctured; extreme base above slightly blackish, and the posterior margins of the segments above with a darker stain; on each side of the second segment, near the base, an irregular yellowish spot; on the middle of the third segment a transverse yellowish line, deeply excavated on each side anteriorly and somewhat attenuated on the disk posteriorly; on the fourth segment an indistinct, narrow, yellow line, and on the fifth segment an oblong yellow spot with the posterior margin silvery-white in certain lights; beneath ferruginous, with an indistinct yellowish stain on the third segment. Length 4 lines.

*Hab.* District of Columbia. One specimen. Collection of Mr. Edward Norton.

Differs principally from all allied species by the uniform and distinct punctation of the abdomen. The only specimen I have seen of this species has the second submarginal cell obliterated in both superior wings.

23. *N. depressa* n. sp.

*Female*.—Head finely punctured, ferruginous; a short line extending half-way down the sides of the clypeus, a large patch about the insertion of the antennæ, a spot enclosing the ocelli, and the posterior part of the cheeks and throat, black. Antennæ ferruginous. Thorax ferruginous, finely and densely punctured, slightly hairy; a longitudinal dorsal line, sides of the collar and of the scutellum, a wide margin on each side dividing the pleura and metathorax, a line down the centre of the metathorax, and a patch beneath immediately behind each fore leg, black; a rather deep puncture on each side beneath the base of the wings. Wings subhyaline, apical margins clouded, with a pale lunule near the tip. Legs ferruginous; base of the femora beneath blackish. Abdomen ferruginous; very minutely punctured, shining; dorsal surface flattened; basal third of the first segment above black, and the posterior margin of the segments with a darker stain; on each side of the second segment at base a rather large, angular, yellow macula, pointed within; a small, oblong, yellow spot below it on the third segment, and at the base of the fifth segment two small yellowish spots, immediately behind these spots the segment is suddenly

depressed, and truncated, the surface of the depressed part being silvery-white in certain lights and having on each side a rather large, shallow fovea; beneath ferruginous. Length 4 lines.

*Hab.* Maine. One specimen in the Collection of Mr. E. Norton.

Resembles var. *a* of *N. maculata* n. sp., but is at once distinguished by the remarkable depression of the fifth dorsal segment of the abdomen,—a character not observed in any other species of *Nomada* known to me.

24. *N. maculata* n. sp.

*Female.* Head entirely ferruginous, rather finely and densely punctured; slightly hairy. Antennæ about as long as the head and thorax; entirely ferruginous. Thorax entirely ferruginous, rather finely and densely punctured, slightly clothed with short pale hairs; scutellum subbilobate; metathorax less densely and more finely punctured, clothed on each side with dense silvery-white hairs; tegulæ dark honey-yellow. Wings subhyaline, apical margins clouded, with a pale lunule near the tip; stigma ferruginous, nervures piceous. Legs entirely ferruginous. Abdomen minutely punctured, shining, ferruginous; posterior margins of the segments with an indistinct darker stain; extreme base of the first segment black; on each side of the middle of the first segment above a minute yellow spot, which is obsolete in one specimen; at the base of the second segment on each side a more or less large yellow spot; on each side of the third and fourth segments at base a yellow line, those on the fourth segment sometimes almost meeting on the disk; on the fifth segment two yellow spots close together; beneath ferruginous, immaculate. Length  $5\frac{1}{2}$  lines. Two specimens from Connecticut.

Var. *a*.—Head with a more or less distinct transverse spot about the insertion of the antennæ, sometimes another enclosing the ocelli, the throat posteriorly, a longitudinal line on the disk of the thorax, a spot or a longitudinal line on the disk of the metathorax, a patch on the pleura beneath immediately behind the base of the fore feet, the intermediate and posterior coxæ except tips, and the base of the femora beneath, all more or less black; abdomen without yellow spots on the first segment, those on the second segment small, those on the third and fourth either subobsolete or obsolete, and the two yellow spots on the fifth segment distinct. Length 4—5 lines. Five specimens from Maine, Conn., Penn., and Delaware.

Var. *b.*—Differs from the above in having the antennæ a little shorter and sometimes varied above with blackish,—in the thorax being brown or dark ferruginous with an impressed, longitudinal dorsal line,—in the femora having more black at their base beneath and within,—in the yellow spots on the second segment of the abdomen above being large, angular and pointed within,—in the more distinct yellow marks on the third and fourth segments, and in the two spots on the fifth segment being connate and forming a transverse yellow spot, obtusely indented posteriorly. Length 5 lines. Three specimens from Connecticut and Virginia.

Var. *c.*—Differs in having only a small yellow spot on each side of the second segment and a narrow transverse line on each side of the third segment. Length 4—4½ lines. Four specimens from Connecticut and Pennsylvania.

? *Male.* Head black, rather finely and densely punctured, clothed with pale hairs which are longer and more dense in front and beneath; a small yellowish ferruginous spot, sometimes obsolete, at the summit of the eyes; base of the clypeus sometimes tinged with ferruginous; rest of the clypeus, labrum, mandibles except tips, and the orbits of the eyes beneath and on each side of the clypeus, yellow. Antennæ as long as the head and thorax, ferruginous, varied with black above, especially the seven or eight basal joints, apical joints generally ferruginous. Thorax rather finely and densely punctured and thickly clothed with rather long erect pale hairs; black, sometimes with four subobsolete, longitudinal, ferruginous lines above between the wings, two on the disk and one on each side over the base of the wings; collar, scutellum or two spots on it, and a more or less distinct line on the postscutellum, ferruginous; tubercles and tegulæ yellowish-ferruginous; a yellowish or ferruginous spot beneath on the pleura anteriorly on each side of the fore feet, and sometimes a small ferruginous spot on each side beneath the base of the wings. Wings hyaline, iridescent, apical margins faintly clouded. Legs ferruginous, hairy beneath; the coxæ except tips, trochanters and the anterior and intermediate femora at base beneath, and the whole of the posterior femora except tips, black. Abdomen minutely punctured, slightly hairy on the sides and towards the apex; shining, ferruginous; base of the first segment above black; posterior margins of all the segments more or less blackish; on each

side of the first segment a small yellowish spot which is generally wanting; on each side of the second segment at base, a large yellow macula, either rounded or angular, pointed within and sometimes almost meeting on the disk, or forming a broad fascia somewhat attenuated within and slightly interrupted on the disk; on each side of the third segment at base a smaller yellow macula, which varies in shape like those on the second segment, being sometimes a broad fascia, slightly interrupted on the disk, and sometimes reduced to a mere line on each side; the fourth, fifth and sixth segments have on each side an oblong yellow spot or a line, all of which are sometimes subobsolete or wanting; apical segment ferruginous, bifid at tip; beneath ferruginous, with the base of the first and the posterior margins of all the segments more or less black. Length  $3\frac{1}{2}$ — $4\frac{1}{2}$  lines. Eight specimens from Massachusetts and Connecticut.

This is evidently a very variable species and when a large series of specimens have been accumulated, they may possibly prove to be varieties of either *Americana* Kirby, *valida* Smith, *ruficornis* Linn., or *bisignata* Say; but with the limited number of specimens before me, it is impossible to identify the varieties with any described species, and I am therefore obliged to place them, for the present, under a new name.

The males from which I drew out the above description and also some of the varieties of the female may not belong to this species, but as they approximate more or less, I would rather, for the present, include them under one name. In Mr. Norton's collection there is a large male (5 lines long) from Connecticut, which is colored and marked like var. *c* of the female, except that the face is densely clothed with silvery-white pubescence, and the anterior part of the clypeus, labrum, mandibles except tips, and the orbits of the eyes beneath and on each side of the clypeus, are yellow.

25. *N. bisignata* Say.

*Nomada bisignata* Say, Long's 2d Exp. ii, p. 354 ♀; Bost. J. N. H. i, p. 402 ♂.

“*Female*. Head ferruginous, front with a large black spot, confluent with another transverse one on the vertex; occiput and throat black; antennæ blackish, beneath rufous; stethidium black, varied with ferruginous, and like the head rough with dense punctures; thorax ferruginous, with a longitudinal black line; scutel ferruginous;

feet rufous; thighs black at base; wings dusky, particularly on the margin of the terminal half; tergum rufous, the segments on their posterior margins, and the basal segment at base also black; second segment with a large, lateral yellow spot, and a slight appearance of another on each side of the third segment. Length rather more than three-tenths of an inch.

“This species varies in having the thorax black, with four ferruginous lines.

“The male has the head black, with the nasus and mouth yellow; antennæ beneath, rufous; the thorax has hardly any appearance of ferruginous, but the scutel in some specimens is of that color; the thighs, particularly the posterior pair, have more black than those of the female.

“Var. Abdomen rufous, immaculate.”

I have before me 4 ♀ and 3 ♂ specimens (Baltimore, Coll. Ent. Soc. Philad.; Illinois, Coll. Mr. Walsh; Connecticut, Coll. Mr. Norton) which probably belong to this species, as they answer to Says' description, above quoted, very well. All the specimens, except one, have the yellow spot on each side of the third segment of the abdomen above, and two specimens have the four ferruginous lines of the thorax distinct. The males are smaller (3 lines) and more slender than the females, and the yellow spot on each side of the second abdominal segment is very large and almost meeting on the disk. Some ♀ varieties of *N. maculata* n. sp., resemble those of this species, but as their antennæ are longer and more robust, I think they are distinct; a large series of specimens, however, are required before a correct division of these allied varieties can be made. The variety with the “abdomen rufous, immaculate,” mentioned by Say, is probably referable to *N. incerta* n. sp?

26. *N. perplexa* n. sp.

*Female.* Head dark ferruginous; deeply, coarsely and confluent punctured; a large spot in front about the base of the antennæ confluent with a transverse one which encloses the ocelli, the throat, cheeks except orbits of the eyes, and the occiput, black. Antennæ as long as the head and thorax; dark ferruginous varied with blackish behind, apical joint paler, sometimes tinged with yellow; scape black, ferruginous at base. Thorax dark ferruginous, deeply, coarsely and conflu-

ently punctured, somewhat clothed with pale hairs on the pleura and metathorax; a longitudinal dorsal line and another on each side of the disk, and the pleura except a small ferruginous spot on each side under the wings and a large one beneath both of which are sometimes obsolete, black; scutellum subbilobate, prominent; metathorax much more finely punctured, black sometimes slightly stained with ferruginous. Wings subhyaline, apical margins clouded, with a pale lunule near the tip; nervures piceous. Legs slightly clothed with pale pubescence; coxæ black tipped with ferruginous; trochanters and base of femora especially beneath, black, rest of the femora, the tibiæ and tarsi ferruginous, the latter sometimes slightly obfuscated. Abdomen finely punctured, shining, dark ferruginous; base of the first segment above black, the posterior margins of the first four segments generally blackish, on each side of the second segment a rather small round yellow spot; posterior margin of the fifth segment whitish, and the lateral margins of the third, fourth and fifth segments slightly clothed with whitish hairs; beneath ferruginous, with the base of the first segment black, and the posterior margins of the first four or five segments generally blackish and slightly ciliated with whitish hairs. Length  $3\frac{1}{2}$ —4 lines.

? *Male*. Differs from the female as follows:—Head entirely black, except the orbits of the eyes beneath near the mandibles, the anterior margin of the clypeus, the labrum and base of the mandibles which are yellow; face clothed with silvery-white pubescence; the antennæ above are black except the apical joint which is pale ferruginous; the antennæ beneath are ferruginous with the scape in one specimen almost entirely black; the thorax is entirely black, except the tubercles and a faint stain on the scutellum; the legs are rather more stained with blackish, particularly the posterior pair; the abdomen rather darker, the yellowish spot on each side of the second segment above is larger and angular; the third segment has on each side anteriorly and immediately beneath the spot on the second segment a narrow yellowish transverse line or spot, apical segment bifid at tip. Length  $3\frac{1}{2}$  lines.

*Hab.* Mass., Conn., Penn., Del. Collection Ent. Soc. Phila., and Mr. Edward Norton. Four ♀, and two ♂ specimens.

This species differs from those specimens which I have placed under *bisignata* Say, by the darker color, by the coarser punctation of the head and thorax, and by the absence, in the females, of the yellow spot

on each side of the third abdominal segment above. The males from which the above description is taken, may not belong to this species, as they have the yellow spot on each side of the third segment of the abdomen conspicuous; but they are certainly distinct from the males which I have placed under *N. bisignata* Say; excepting, however, the yellow spots on the third abdominal segment, they have every appearance of being the true males of *perplexa*.

All the specimens which I have placed under this species have four more or less distinct longitudinal ferruginous lines on the thorax above.

27. *N. miniata* Smith.

*Nomada miniata*, Smith, Brit. Mus. Cat. Hym. ii, p. 250, ♀.

“*Female*. Length  $4\frac{1}{2}$  lines.—Head and antennæ red, the apex of the mandibles fuscous. The thorax and legs red, the collar, a spot in front of the tegulæ and a large macula on each side of the metathorax yellow, the latter covered with silvery-white pubescence; two lines in the middle of the thorax, another passing over the tegulæ and the scutellum pale red; the wings hyaline, slightly fuscous at their apical margins, the nervures ferruginous. Abdomen entirely red, the second segment having on each side an ovate yellow spot; beneath immaculate.

“The yellow markings on the thorax are sometimes obsolete.

“*Hab.* Georgia.”

Unknown to me.

28. *N. Americana* Kirby.

*Nomada Americana* Kirby, Faun. Bor.-Amer. iv, p. 269, pl. 6, fig. 3.

“Body dark ferruginous. Thorax with a longitudinal, mesal, black line, less distinct on the metathorax; breast with a black spot on each side; wings as in the rest of the genus, embrowned with a white spot near the tip, thighs black at the base on the underside; first segment of the abdomen black at the base, and with the second and third brown at the apex. Length of body  $4\frac{1}{2}$  lines. One specimen, taken at Lat.  $65^{\circ}$ .”

Not identified.

29. *N. valida* Smith.

*Nomada valida* Smith, Brit. Mus. Cat. Hym. ii, p. 246, ♀.

“*Female*. Length 4 lines.—Black, the anterior portion of the clypeus, and sometimes a dot above, the antennæ, labrum, and mandibles and orbits of the eyes ferruginous; the disk of the thorax has on each



side a large oblong ferruginous spot deeply notched anteriorly; the tubercles, a minute spot beneath the wings, sometimes united to a large one beneath, the scutellum and two minute spots beneath on the metathorax, ferruginous; wings subhyaline, a pale spot towards their apical margins which are clouded, their nervures pale ferruginous; the coxæ, trochanters and femora ferruginous towards their apex, the anterior pair of the latter being black merely at their extreme base; the tibiæ and tarsi ferruginous. Abdomen ferruginous, the first segment being black at the base, the apical margins of the segments having an indistinct darker stain.

“*Hab.* Nova Scotia.”

Not identified. *N. incerta* (n. sp?) may possibly be a variety of this species.

30. *N. incerta* n. sp?

*Female.* Head dark ferruginous; rather finely and densely punctured, clothed with short, somewhat silvery-white hairs, especially on the labrum and throat, very sparse on the clypeus; a spot enclosing the ocelli and sometimes almost covering the vertex and extending to the base of the antennæ, a minute dot on each side of the clypeus, the throat, and the cheeks posteriorly, black. Antennæ about as long as the head and thorax; dark ferruginous, more or less varied with blackish especially towards the base behind. Thorax dark ferruginous; deeply and confluent punctured; clothed with short, dense silvery-white pubescence, especially on each side of the metathorax; a longitudinal impressed line on the disk extending from the collar to the scutellum, sides of the collar beneath, sides of the scutellum behind the insertion of the wings and the metathorax, which is sometimes varied with ferruginous, black; the pleura is sometimes slightly stained with blackish; scutellum subbilobate, prominent; tegulæ honey-yellow, often with a minute fuscous spot on its disk. Wings fusco-hyaline, apical margins dark fuscous, with a pale lunule near the tip; stigma ferruginous, nervures piceous. Legs ferruginous; coxæ and trochanters beneath, base of the femora beneath, the posterior femora within, and sometimes with stains on their tibiæ and tarsi, blackish. Abdomen above ferruginous, densely and distinctly punctured, the first segment and posterior margins of the remaining segments less distinctly punctured, smooth, shining and somewhat paler than the rest of

the abdomen ; sometimes there is an indistinct blackish transverse stain on the middle of the segments ; extreme base of the first segment above more or less black ; beneath ferruginous. Length 4—4½ lines.

*Hab.* Conn., N. J., Penn., Md., and Ill. (Coll. Ent. Soc. Phil., and Mr. E. Norton.) Thirteen ♀ specimens. ♂ unknown.

I have failed to identify the species with either *N. Americana* Kirby, or *N. valida* Smith, to both of which it is closely allied. Some of the specimens before me were labelled as *N. valida* Smith, but they do not satisfactorily agree with the description of that species ; they seem more closely allied to *N. Americana* Kirby, but there is no “black spot on each side of the breast,” and the second and third segments of the abdomen are *not* “brown at the apex.” However, allowing a wide latitude for variation, which is sometimes so great in this genus, it may probably prove identical with either of the above-named species, hence I have described it as a doubtful new species.

This species is probably what Say considered as a variety of his *N. bisignata* with immaculate abdomen.

In addition to the species above described, the two following are said to have occurred in North America. I have not been able to identify either species from among the specimens I have examined. I copy Mr. Smith's excellent descriptions of these two species, thinking that they might, perhaps, prove useful to students not having the original descriptions accessible.

31. *N. ruficornis* Linn.

*Nomada ruficornis* Linn. &c. Smith, Bees of Great Britain, p. 118.

“*Female.* Length 3—5 lines.—Head and thorax black, the clypeus and a spot above it, a line encircling the eyes, the labrum, mandibles and antennæ rufous ; the scape has sometimes a black line at the sides. Thorax : the collar, tubercles, and a large patch on the sides beneath the wings, an epaulet over the tegulæ, the scutellum, two minute spots beneath uniting with a larger patch on each side of the metathorax, two broad stripes on the disk, the tegulæ and legs, rufous ; the femora more or less black at the base beneath ; the coxæ and trochanters also sometimes stained ; the wings fusco-hyaline and having a dark narrow fuscous cloud at their apical margins. Abdomen rufous, the base and the apical margins more or less black, the second segment having on each side a large angular yellow macula, the two following a broad

fascia, and the fifth a large quadrate spot, yellow; sometimes obscurely variegated with yellow-testaceous bands or spots beneath.

*Male.* Length 3—4½ lines.—The scape in front, the clypeus, the face on each side, the labrum and mandibles, yellow; the latter ferruginous at their tips; the flagellum ferruginous, four or five of the basal joints above, as well as the scape above, black. Thorax black; the tubercles, two spots on the scutellum, and the legs rufous; the coxæ, except at the apex, black; the trochanters behind, the anterior and intermediate femora beneath at the base, and the posterior pair, except a line above, black; sometimes a black line on the tibiæ behind. Abdomen rufous, the base black, the second and following segments having a broad yellow band; the apical margins of the segments rufo-piceous; beneath, the second and following segments have a transverse broad yellow macula; sometimes entirely rufous beneath, or varied with indistinct fuscous bands and yellow spots; the yellow bands on the abdomen above are frequently much attenuated in the middle, one or two of the apical ones being sometimes interrupted.

“It were vain to attempt to describe all the shades of variety in the markings of this species, particularly those of the males; but the most prominent are pointed out, and the extremes most commonly met with; some of the very small examples of the males have the scape and two or three joints of the flagellum nearly black; the brightness of the rufous coloring also varies considerably, from a deep brick-red to a light red; the dark-colored examples have the wings also of deeper hue; the spots on the metathorax of the female are sometimes obliterated, or partially so; the spots on the scutellum of the male frequently disappear; and a variety is met with, but rarely, in which the rufous spots are replaced by yellow ones.”

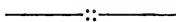
32. *N. armata* Schäffer.

*Nomada armata* Schäff. &c. Smith, Zool. vii, Append. p. xli; Ann. Nat. Hist. 2d ser. iv, p. 438; Bees of Great Britain, p. 130, pl. 1, fig. 5.

“*Female.* Length 5½ lines.—Head and thorax black: the anterior margin of the clypeus, the mandibles and antennæ, and sometimes a minute dot above the eyes, ferruginous; the scape fuscous, the flagellum has the eighth and three following joints fuscous, the apical joint ferruginous; a minute acute tooth in the centre of the labrum. Thorax: a narrow line on the collar, the tubercles, the tegulæ, two spots on the

scutellum, and the postscutellum, ferruginous; a patch beneath the wings and the margin of the metathorax fringed with silvery-white pubescence; the legs ferruginous, the coxæ and trochanters, except their extreme apex, and all the femora towards their base beneath black; the basal joint of the posterior tarsi fuscous on the outside. Abdomen ferruginous, the base black; the second segment has on each side an ovate yellow macula, and the third and fourth segments a short transverse line on each side at their basal margins.

“*Male.* Length  $5\frac{1}{2}$  lines.—Head and thorax black, the flagellum ferruginous, its two apical joints having a black spot above; the mandibles yellow, their tips ferruginous; the labrum armed with a sharp tooth in the middle; the face covered with silvery-white pubescence. Thorax: the pubescence on the disk yellowish, that on the sides and beneath, hoary; the tubercles, tegulæ, tibiæ and tarsi, ferruginous; the femora at their apex above, ferruginous; the wings subhyaline, and having a fuscous cloud at their apical margins. Abdomen ferruginous, its base black; the second segment has on each side a large ovate yellow macula, and the following segments a yellow line at their basal margins; the fifth and sixth have sometimes a transverse band; beneath, the intermediate segments have sometimes a transverse interrupted yellow line, and the three apical ones a central black dot.”



## STATED MEETING, DECEMBER 14.

President BLAND in the Chair.

Seventeen members present.

### REPORTS OF OFFICERS AND COMMITTEES.

The Annual Report of the Recording Secretary was read, as follows:—

**REPORT OF THE RECORDING SECRETARY FOR 1863.**

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The Recording Secretary in presenting his Report, would beg leave to state that it will of necessity be a very brief summary of the transactions of the Society during the past year. The Proceedings that are published from time to time, leaving but little matter wherewith to make out an Annual Report.

It affords me much pleasure in being permitted to speak of the Society, as being in still greater prosperity and advancement than at any time heretofore; a fact that will readily be established by reference to the Reports of the Committees to whose charge the various departments have been entrusted.

The Cabinet has been greatly increased during the past year, by numerous and valuable contributions from friends at home and abroad, tending to show the zeal and interest that is manifested in behalf of this interesting branch of natural science.\*

The Library has been largely increased during the past year, by the addition of many rare and valuable works, furnishing a pretty complete reference for the Student of Entomology.† For this rapid increase, the Society is greatly indebted to our fellow-member Dr. Thos. B. Wilson, who has thus shown his desire to encourage that spirit of investigation and study so necessary to carry out the objects for which this Society was organized.

Not only does the Library bear witness of his noble and disinterested

\* The following extracts made from the Reports of the Committees in charge of the various departments, will exhibit the condition of the Cabinet at the present time:—

	now in the Collection,	3,908 species.	Increase	929 species.
<i>Coleoptera</i>	“	“	“	“
<i>Lepidoptera</i>	“	“	“	“
<i>Hymenoptera</i>	“	“	“	“
<i>Diptera</i>	“	“	“	“
<i>Neuroptera</i>	“	“	“	“
<i>Orthoptera</i>	“	“	“	“
<i>Hemiptera</i>	“	“	“	“
<i>Aptera</i>	}	“	“	“
		342		121

Making a total of 9,025 species, being an increase of 3,833 species during the past year.

† There is now in the Library 890 volumes and pamphlets, being an increase of 417 during the past year.

generosity, but every department of the Cabinet testifies to his zealous efforts for the promotion of Science. Cases have been added from time to time to meet the demands of an increasing collection, and in various ways has the Society been the recipient of his kindness and liberality, thereby securing for him the esteem and gratitude of all connected with this Institution.

I would here state that one great source of increase to the Cabinet of the Society, has been through the agency of the Collecting Fund. Subscriptions to said Fund have been quite liberal, enabling us to secure many rare and valuable specimens, particularly from localities in the vicinity of the Rocky Mountains.\*

The printed Proceedings of the Society still continue to progress in a manner that is very gratifying to all who feel an interest therein. Through its pages much valuable and interesting information has been widely disseminated throughout the scientific world. The energy displayed in this portion of the labors of the Society is deserving of commendation and encouragement.

During the past year there have been presented for Publication 30 Papers, as follows:—

6. By *A. R. Grote*, to wit:—

“Additions to the Catalogue of United States Lepidoptera.” 4 Papers. Nos. 2, 3, 4 & 5.

“A Revision of the species of *Cymatophorina* found in the United States and British America, with descriptions of new species.”

“Descriptions of North American Lepidoptera.” No. 1.

3. By *E. T. Cresson*, to wit:—

“Descriptions of a new species of *Masaris* from the Rocky Mountains.”

“List of the North American species of *Bombus* and *Apathus*.”

“On the North American species of the genus *Nomada*.”

2. By *James H. B. Bland*, to wit:—

“Descriptions of a few supposed new species of North American Coleoptera.” Nos. 1 & 2.

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\* The Committee on Collecting Fund have purchased and presented the Cabinet of the Society with the following number of species and specimens from the Rocky Mountains:—Of *Coleoptera*, 113 species, 319 specimens; of *Lepidoptera*, 35 species, 65 specimens; of *Hymenoptera*, 165 species, 273 specimens,—in all, 313 species, 657 specimens: they further presented from other sources, 23 species, 61 specimens of *Lepidoptera*, making a total of 336 species, 718 specimens. A large number of the species from the Rocky Mountains were very rare,—nearly one-half of the *Hymenoptera* and several of the *Lepidoptera* and *Coleoptera* being new.

2. By *Baron R. Osten Sacken*, to wit:—  
 “Lasioptera reared from a gall on the Golden Rod.”  
 “Contributions to the Natural History of Cynipidæ of the United States, and of their galls.” Article 3d.
2. By *Brackenridge Clemens, M. D.*, to wit:—  
 “American Micro-Lepidoptera.”
2. By *W. H. Edwards*, to wit:—  
 “Descriptions of certain species of Diurnal Lepidoptera found within the limits of the United States and British America.” Nos. 1 & 2.
2. By *William Saunders*, to wit:—  
 “On some hitherto undescribed Lepidopterous Larvæ.”  
 “Descriptions of two new species of Arctiidaæ.”
2. By *Tryon Reakirt*, to wit:—  
 “Notes on Central American Lepidoptera, with descriptions of new species.” Nos. 1 & 2.
2. By *P. R. Uhler*, to wit:—  
 “Hemipterological Contributions.” Nos. 1 & 2.
1. By *Edward Norton*, to wit:—  
 “Catalogue to our known species of Ophion, Anomalon, Paniscus and Campoplex.”
1. By *William Couper*, to wit:—  
 “Importance of Insect Architecture to Entomologists, and Remarks on Tent-Building Ants.”
1. By *H. T. Stainton*, to wit:—  
 “Observations on American Tineina.”
1. By *J. W. Weidemeyer*, to wit:—  
 “Catalogue of North American Butterflies.”
1. By *Benjamin D. Walsh*, to wit:—  
 “Observations on certain North American Neuroptera, by H. Hagen, M. D., of Königsberg, Prussia; translated from the original French MSS., and published by permission of the author, with notes and descriptions of sixteen new North American species of Pseudoneuroptera.”
1. By *Charles A. Blake*, to wit:—  
 “Description of a supposed new species and genus of Saturniidaæ, from the Rocky Mountains.”
1. By *H. F. Bassett*, to wit:—  
 “Descriptions of several supposed new species of Cynips, with remarks on the formation of certain Galls.”

As will be seen by reference to the Reports of the Committees, as well as of the various papers published in the Proceedings, the departments of Coleoptera and Lepidoptera receive by far the greatest attention. But few persons seem inclined as yet to study out the remaining orders, most especially Neuroptera, Hemiptera, Orthoptera, &c., much remains to be done and it is earnestly hoped that ere long a

deeper interest will be taken in said orders, so that they too may show an equally advanced condition.

During the past year it was thought advisable to create an additional department in the Cabinet of the Society, to wit:—"Insect Architecture," a department which, if properly attended to, will do much towards carrying out the objects of this Institution,—in ascertaining the character and habits of Insects.

During the past year, ending November 30th, 1863, there have been elected 6 Resident and 26 Corresponding Members.

The Society now numbers 68 Resident and 74 Corresponding Members.

All of which is respectfully submitted.

J. FRANK KNIGHT,  
Recording Secretary.

The Annual Reports of the Corresponding Secretary, Treasurer, and Standing Committees on Coleoptera, Lepidoptera, Hymenoptera, Diptera, Neuroptera and Orthoptera, Hemiptera and Aptera, Library. Publication, Collecting Fund and Insect Architecture, were read.

#### DONATIONS TO CABINET.

A very fine collection of local LEPIDOPTERA, containing 2160 specimens, some of which are new and very rare; presented by Dr. Samuel Lewis.

29 European COLEOPTERA (*Cicindela trisignata*, *Cicindela nigrita*, *Carabus nitens*, *Carabus splendens*, *Carabus morbillosus*, *Sphodrus Schreibersii*, *Anophthalmus Bilimekii*, *Quæstus arcanus* ♂ ♀, *Adelops Khevenhülleri*, *A. Milleri*, *Silpha granulata*, *Hister major*, *Cetonia oblonga*, *Cetonia funebris*, *Cetonia inhumata*, *Cetonia florentina*, *Cetonia afflicta*, *Cetonia morio*, *Geotrupes geminatus*, *Trichius zonatus*, *Chalchophora mariana*, *Blaps similis*, *Blaps producta*, *Crioccephalus rusticus*, *Cerambyx heros*), from Aug. R. Grote.

4 COLEOPTERA (*Helops gracilis* Bland, Type), from J. H. B. Bland.

2 COLEOPTERA (*Saperda Fayi* Bland ♂ ♀ Types), from H. Ulke.

1 COLEOPTERA (*Acmæops incertus* Bland, Type), from Dr. T. B. Wilson.

1 COLEOPTERA (*Bembidium Wingatei* Bland, Type), from J. D. Wingate.



The following LEPIDOPTERA from the Committee on Collecting Fund, were kindly determined for the Society by Mr. Aug. R. Grote of New York :—

*Omoiala vermiculata* Grote (Type), *Raphia abrupta* Grote, ♂ ♀ (Types), *Dianthæcia capsularis* Guen., *Gortyna rutila* Guen., *Gortyna nitela* Guen., *Achatodes sandix* Guen., *Scolecocampa ligni* Guen., *Agrotis texanus* Grote, ♂ ♀ (Types), *Anthæcia marginata* Haworth, *Anthæcia Spraguei* Grote, ♂ ♀ (Types), *Anthæcia lynx* Guen., *Plusia ignea* Grote, (Type), *Platæa californiaria* H.-S.

#### DONATIONS TO LIBRARY.

*Silliman's American Journal of Science and Arts*, for November, 1863. From Dr. T. B. Wilson.

*Synopsis of Canadian Arctiadæ, including some additional species likely to occur in Canada.* By William Saunders. Pamphlet 8vo. From the Author.

*Prairie Farmer* (Chicago, Ill.). Vol. 12, Nos. 12 to 24.

The following works were deposited by Dr. T. B. Wilson :—

*Insecta Lapponica descripta a J. W. Zetterstedt.* 1 Vol. 4to.

*Fauna Insectorum Lapponica.* Auct. J. W. Zetterstedt. Pars. 1. 1 Vol. 8vo.

*Exotic Butterflies.* By W. C. Hewitson. Part 48. 4to.

*Tijdschrift voor Entomologie.* Deel 6, Stuk. 5. 8vo.

*Wiener Entomologische Monatschrift,* Band 7, No. 10. 8vo.

*Revue et Magasin de Zoologie,* 1863, No. 8. 8vo.

*The Zoologist for October,* 1863. 8vo.

#### NEW BUSINESS.

On motion, the thanks of the Society were tendered to Dr. Samuel Lewis, for the fine collection of Lepidoptera presented by him this evening.

On motion, the thanks of the Society were also tendered to Mr. Chas. Wilt, for the faithful services which he has rendered to the Society as Treasurer thereof.

#### ELECTIONS.

The Society then proceeded to elect Officers and Standing Committees for the ensuing year, with the following result :—

**OFFICERS.****PRESIDENT.**

James H. B. Bland.

**VICE-PRESIDENT.**

Charles F. Parker.

**CORRESPONDING SECRETARY.**

E. T. Cresson.

**RECORDING SECRETARY.**

J. Frank Knight.

**TREASURER.**

James W. McAllister.

**STANDING COMMITTEES.****COLEOPTERA.**

J. H. B. Bland, Samuel Lewis, M. D., Robert Frazer.

**LEPIDOPTERA.**

James Ridings, Charles A. Blake, Aug. R. Grote.

**HYMENOPTERA.**

E. T. Cresson, James Ridings, J. W. McAllister.

**DIPTERA.**

T. B. Wilson, M. D., Charles Wilt, William Wenzel.

**NEUROPTERA AND ORTHOPTERA.**

Chas. F. Parker, James H. Ridings, Thos. B. Neely.

**HEMIPTERA AND APTERA.**

J. Frank Knight, Profr. Jacob Ennis, Robert Nuttall.

**LIBRARY.**

Charles A. Blake, Samuel Lewis, M. D., Rev. W. P. Breed.

**PUBLICATION.**

T. B. Wilson, M. D., E. T. Cresson, John Meichel.

**COLLECTING FUND.**

Samuel Lewis, M. D. Robert Frazer, E. T. Cresson.

**INSECT ARCHITECTURE.**

J. Frank Knight, Charles A. Blake, Jas. H. Ridings.

## Descriptions of a few supposed new species of North American COLEOPTERA.

No. 2.

BY JAMES H. B. BLAND.

## BEMBIDIUM WINGATEI n. sp.

Piceous, tinged with dark rufous; antennæ and legs rufo-fulvous.

*Hab.* Pennsylvania. (Coll. Ent. Soc. Phila.)

Body piceous. Head dark rufous, smooth and shining; palpi yellowish. Antennæ rufo-fulvous, hairy, more than half the length of the body. Thorax subcordate, blackish, very smooth and shining; the anterior and posterior margins dark rufous. A well impressed longitudinal dorsal line; base with a few scattered punctures and having on each side a deep rounded impression; posterior angles rather prominent. Elytra oblong, piceous tinged with rufous at base and apex, shining; disk flattened, with two dorsal punctures on the third stria of each elytron, the anterior puncture situated before the middle and the other at the posterior third; striæ neatly punctured, well impressed at base, becoming obsolete at tip, interstices slightly convex, impunctured. Beneath dark brown, shining; abdominal segments reddish-brown, paler towards the apex. Legs rufo-fulvous. Length  $2\frac{1}{2}$  lines.

Collected near Bellefonte, Pennsylvania, by Dr. J. D. Wingate, and presented by him to the Society.

## HELOPS GRACILIS n. sp.

Elongate, black tinged with cupreous; antennæ with the apical joint as long as the third joint; elytra striated.

*Hab.* New Jersey. (Coll. Ent. Soc. Phila.)

Body elongate, black tinged with cupreous, shining. Head densely punctured, black; front profoundly impressed. Antennæ black, apical joint robust and as long as the third joint. Thorax densely punctured, slightly convex and somewhat narrowed in front, with the sides rounded, a shallow depression on the middle of the lateral margins. Scutellum rounded at tip, black, smooth and shining. Elytra wider than the thorax, elongate, sides parallel, gradually rounded at tip; striæ entire, rather finely impressed, neatly and regularly punctured; interstices smooth and flat. Beneath black, shining, finely punctured. Legs black. Length  $4-4\frac{1}{2}$  lines.

This species was collected by myself in Atlantic County, New Jersey. It is allied to *H. venusta* Say, but the thorax is not quadrate, and the elytral striæ not so deeply impressed; the form of the antennæ is the same.

SAPERDA FAYI n. sp.

Brown, thorax with a lateral, longitudinal white stripe, and the elytra with two basal, a median dorsal, and two subapical white spots; sides of pleura and abdomen white.

*Hab.* Ohio. (Coll. Ent. Soc. Phila.)

*Female*.—Cinnamon-brown; punctured, and having an erect, scattered, black pubescence. Head rather sparsely punctured, with a small white spot on each side of the vertex immediately behind the antennæ; mouth slightly cinereous. Antennæ black, the third and following joints densely clothed with cinereous scale-like pubescence. Thorax with an elevated, longitudinal dorsal line; on each side of the dorsum a rather broad longitudinal white stripe, and on each side, immediately above the anterior legs, an acute-triangular white spot pointing anteriorly. Legs black, densely clothed with cinereous scale-like pubescence; coxæ brown. Elytra more densely and deeply punctured than the rest of the body, and having a slight gloss; at the base of each elytron, a slightly divergent, short, white vitta, sometimes interrupted posteriorly and apparently continuous with the white vitta on each side of the thorax; on the middle of the disk of the elytra a large, elongate, confluent white spot, divided in the centre by the suture; at the posterior fourth of each elytron an ovate white spot close to the suture, but not confluent with it; tip slightly margined with cinereous. Sides of the pleura and abdomen broadly white, beneath cinereous-brown. Length  $6\frac{3}{4}$  lines.

*Male*.—Differs from the female as follows:—Smaller and more slender; general color dark rufous-brown; the antennæ are nearly as long as the body; the thorax and head are rufous; the white markings of the thorax and elytra, although similarly situated, are much less developed and sometimes obsolete. Length 5 lines.

The ♀ of this species differs from the ♀ of *S. cretata* Newman, (a specimen of which is also in the Cabinet of the Society,) by the smaller size,—*cretata* being rather more than 8 lines long,—and the more slen-

der and parallel form, by the presence on the elytra of the basal short white vittæ, and the shape and position of the other white spots, the middle spot of *cretata* being large, broad, and somewhat elongate, emarginate at each end and not confluent with the suture, but forming a distinct spot on each elytron; while *Fayi* has a median, dorsal, elongate spot, confluent with the suture by which it is divided; the posterior white spots on the elytra of the latter species are ovate and close to the suture, while those of *cretata* are large, irregular, contracted within, and situated as far from the suture as the lateral margin; and by the white color on the sides of the abdomen being broader than in *cretata* which has the lower margin of the white sides deeply indented at the anterior part of each segment, giving it a strongly serrate appearance.

The white markings of this species, as well as of *cretata*, are composed of appressed hair-like scales.

I have examined two pairs of this beautiful species (a pair in the collection of Dr. Samuel Lewis), both collected by Mr. H. T. Fay, of Columbus, Ohio, by whom the species was first discovered, and to whom it affords me much pleasure to dedicate it. The Society is indebted to Mr. Henry Ulke, for the fine pair from which the above description is taken.

#### ACMÆOPS INCERTUS n. sp.

Body blackish; anterior margin of the thorax, lateral margins of the elytra and the femora, except tips, reddish.

*Hab.* Virginia. (Coll. Ent. Soc. Phila.)

Head black, densely punctured, slightly sericeous; sockets of the antennæ reddish-yellow; parts of the mouth black. Antennæ three-fourths as long as the body, somewhat flattened, punctured, blackish, brownish towards the tip, rather thickly clothed with pale sericeous pubescence; fourth joint shorter than the third, the fifth broader at tip than the other joints and as long as the second and third put together. Thorax blackish, sparsely and finely punctured, densely clothed with yellowish pubescence; narrowed in front, sides angulated; anterior margin prominent, red; disk rather broadly impressed anteriorly and having on each side a smooth shining space. Scutellum black, punctured and transversely impressed at tip. Elytra twice as wide as

the base of the thorax, black, deeply punctured, the punctures becoming finer and more dense towards the apex, sides parallel, gradually rounded at tip; humeri prominent; lateral margins not extending to the tip of the elytra, reddish-yellow; a slight elevated longitudinal line on the middle of each elytron, not quite reaching either the tip or the humerus. Beneath black, subsericeous. Legs blackish; femora, except tips, reddish; tibiæ and tarsi tinged with reddish. Length  $4\frac{1}{4}$  lines.

This may possibly be an extreme variety of *A. bivittata* Say, but the thorax in front is not so much constricted as in that species. It was collected in Hampshire Co., Virginia, and presented to the Society by Dr. Thomas B. Wilson.

NOTE.—Having submitted several of the insects described by me in the pages of these Proceedings to Dr. John L. LeConte, for examination, he expressed a doubt in regard to the legitimacy of *Desmocerus elongatus* (Vol. 1, p. 269), believing it to be nothing more than a deeply stained specimen of *palliatus*. He recommended the specimen to be well soaked in benzine and ether. This was accordingly done, and upon examination his surmises were found to be correct,—the insect having recovered so much of its color as to place the question beyond a doubt. The Doctor also determined that my *Cyclocephala lurida* is nothing more than a variety of *C. immaculata*. As I have not at my command sufficient material for a satisfactory comparative examination of the insects, I must give up the species, although I do it with much doubt.

I am not at all surprised to see that Dr. LeConte, in his "List" p. 50, lately published by the Smithsonian Institution, has made *Cychrus Ridingsii* Bland, a variety of *Andrewsii*. When I undertook to describe the insect, I was well aware that this was his opinion, as I had been informed that he had compared the insect with his specimen of *Andrewsii*, and had pronounced them one and the same. Having come to a different conclusion, after comparing it with seven specimens of *Andrewsii* (four in the collection of the Society and three from the cabinet of Dr. Lewis), I did not hesitate to describe it as a new species,—and it gives me pleasure to say that the question has been set at rest, very unexpectedly, by my friend Mr. H. Ulke of Washington,—

Mr. Ulke having been so fortunate as to capture *several* specimens (identical with my type) in the neighborhood of Altoona, Penn., this summer;—and what is more to the purpose, I am authorized by that gentleman to say that he considers it a good species, and that he has pointed out to Dr. LeConte wherein it differs from the allied species of the genus.

As this is a matter of some importance to me—a neophyte in the Science of Entomology—is it asking too much of Dr. LeConte to take an early opportunity of giving my bantling its proper place among its brothers and sisters in the beautiful Cychnus-family?

—————::—————

**Descriptions of several supposed new species of CYNIPS, with remarks on the formation of certain Galls.**

BY H. F. BASSETT.

The gall insects described in this paper were, with some other species, reared from galls collected during the past year in the vicinity of Waterbury, Ct.

As I have not had an opportunity to compare mine with the named species in any collection, it is possible some of them may have been described before.

Descriptions of several other species are withheld until another season shall give me opportunity for further observations on their habits.

*QUERCUS RUBRA.* *A smoothish, club-shaped, woody knot, four inches long, and an inch and a half in diameter at the upper and largest end, completely encircling a branch half an inch in diameter.*

This gall was cut from a very young and thrifty oak, April 11th. The flies were then fully grown and began to appear in less than a week. No other galls were noticed at the time, but now (Oct.) there are several of this year's growth,—some larger and others much smaller than the one described. The new galls were fully grown the middle of June, but no larvæ could be detected then. The larvæ are now, however, well developed.

There are hundreds of other oak trees of the same species near this one, but I have not been able to find any similar galls upon them.

**Cynips q. punctata** n. sp.

♀. *Head* and thorax black, face pubescent, palpi light-brown, tips darker; antennæ reddish-brown at the base, gradually deepening to a dull dark brown, 14-jointed. *Thorax* finely and beautifully punctate: three longitudinal grooves, converging towards the scutellum and a short groove on each side of the middle one, reaching half-way from the collare to the scutellum, also a short, shallow groove or depression over the base of the wings. *Scutellum* with coarse, irregular pits or punctures. *Legs* reddish-brown, coxæ and tips of tarsi dark brown or black. Dorsal portion of the *abdomen* black, ventral, reddish-brown, 2nd segment has a few scattered hairs beneath the wings, others (except the first) minutely punctate. *Wings* hyaline: veins brown, rather slender: areolet small, distinct; radial area not closed. Length 0.15.

Among a hundred specimens, I have not been able to find any males.

*Galls found on Quercus Rubra, attached to the underside of the leaves; globular, varying in size from  $\frac{1}{4}$  to  $\frac{3}{4}$  of an inch in diameter, of the color of a white grape; sour, succulent; of the consistence of a green grape, and so TRANSLUCENT that the single cell in the centre can be seen when held up to the sunlight.*

It is singularly distinct from any others I have met with or seen a description of. My specimens were found on the 20th of June, and the flies appeared the 1st week in July.

**Cynips q. sculptus** n. sp.

♀. *Head* black, irregularly and coarsely sculptured, face sparingly pubescent; eyes and ocelli prominent; antennæ black, very long, 13-jointed. 1st and 2nd joints *very short*, 3d *very long*, the others gradually decreasing in length to the 13th, which equals the 11th and 12th. *Thorax* black, *very deeply and irregularly sculptured*, pubescent, the pubescence can be seen without a magnifier. *Abdomen* black, the entire surface microscopically punctate. 2nd segment hairy beneath the wings. *Legs* honey yellow, coxæ black, tarsi brownish. *Wings* smoky brown, somewhat clouded: veins dark red, stopping rather abruptly before reaching the margin, areolet distinct, elongated; radial area narrow, the sides almost parallel. Length 0.20. 2 specimens.

The ♂ has 15 jointed antennæ, the third rather deeply incised; legs dark, reddish-brown, the posterior pair nearly black, all are rather lighter at the joints. *Wings, and even the veins, hyaline.* (The specimens may be immature.) The veins can be traced only in a very favorable light. Length 0.16. 2 specimens.

I have met with the galls but twice, the last time in the month of July. The flies had escaped but the cells in one or two were filled with numerous larvæ of some other insect.

QUERCUS MONTANA. *Club-shaped galls on the petioles of the leaves half an inch in diameter, hard and woody when fully matured.*



Following Willdenow, I have considered this oak a distinct species, and not a variety of *Q. prinus*.

The gall is probably identical with a species described by Baron Osten Sacken as found on *Q. prinus*. His description is as follows: "Swelling of the leaf stalk at the basis of the leaf, or, sometimes, of the midrib near the basis." When on the petiole "subconical or club shaped; rounded when they occur on the midrib." (Proc. Ent. Soc. Philad. i, p. 66.)

His specimens produced only parasites, and as mine have produced, besides many parasites, a few true gall flies, I will describe them under the specific name he has given to the parasite reared from the same gall.

*Cynips q. petiolicola* n. sp.

♀. Vertex of the *head* black, nearly smooth; face brown: pubescent: organs of the mouth light brown; antennæ reddish brown, 13-jointed; terminal joints darker color than the basal. *Thorax* minutely rugose; two longitudinal grooves converging towards the scutellum; within these, two shorter grooves reaching half-way from the collar to the scutellum; also an indistinct groove over the base of the wings. *Scutellum* with a few scattered hairs, wrinkled; basal pits large and deep. *Legs* light brown, posterior pair dark brown: tips of tarsi very dark brown or black. *Abdomen* black, polished; ventral portion dark reddish brown: second segment half the length of the abdomen. *Wings* hyaline; veins distinct but slender: areolet very small: radial area not closed; cubitus disappearing before reaching the 1st transverse. Length 0.10.

♂. Antennæ 15-jointed; third joint incised; abdomen black: 1st segment long: 2d segment three-fourths as long as the remaining ones: otherwise as the female. Length 0.08.

Gall from QUERCUS CHINQUAPIN.

Compared with the last species I can discover no difference in the gall, and little in the insect. The head of the female is a clear brown, verging towards black, and in the antennæ of some specimens there are indications of a 14th joint. The wings are somewhat less distinctly veined. I think it a variety of the last, though a more close examination may show specific characteristics.

I have galls from the petioles of the leaves of the white oak very much like those last described. The insects are not, I think, specifically distinct, though the veins of the wings are less distinct than either of the above; some of them are entirely colorless, and the inner angle of the areolet is scarcely discernible.

Gall on the leaves of QUERCUS RUBRA.

These galls answer to Dr. Fitch's description of the gall that is produced by *C. q. nubilipennis*, so far as this :—They are “globular, growing through the leafy expansion of the red oak ; a third of the sphere projecting from the upper surface of the leaf ; the remainder opposite on the under side.”

My specimens are not, however, as large as a medium sized “grape or hazelnut,” and the gall-fly produced from them differs, materially, from that he described.

They are smooth, thin, varying in diameter from 0.25 to 0.40 of an inch ; each with an oblong cell in the centre, which is held in place by radiating fibres. There is seldom more than one on a leaf, though two and even three are occasionally met with. They reached their full development with the leaf, and the perfect insect came out about the 10th of July. The fly may be named

*Cynips q. singularis* n. sp.

♀. *Head* small, black, rugose ; organs of the mouth dark brown, antennæ 13-jointed, short, pale dusky yellow ; in some specimens a quite distinct indication of a 14th joint. *Thorax* black, sparingly pubescent, coarsely punctate or pitted ; three longitudinal grooves, distinctly, but not deeply, marked. *Wings* dusky throughout, but not clouded, dark reddish brown veins, all disappearing before reaching the margin, areolet rather large, equiangular. *Legs*, the anterior pairs dusky yellow, posterior dusky brown. *Abdomen* red (in alcohol a dull brick red), the 2nd segment with a few scattered hairs beneath the wings ; this segment is a little less than half the length of the entire abdomen ; the remaining segments microscopically punctate. Length 0.15.

♂ ?—The head, thorax, and wings, in color and markings, do not differ from the female save in size, being as usual rather smaller. The antennæ are very long, (equal the length of the body 0.12,) darker than the female ; in 12 specimens examined (all I have in my collection) there were 16 *more or less distinctly marked joints*. After repeated examinations I cannot satisfy myself that the 16th joint is not what it seems, and not the *indication* of a joint so often seen in the antennæ of females of different species. *Legs* dark brown, posterior pair nearly black, all shining. *Abdomen* black, shining, reddish beneath ; 2nd segment very long, into which, in most specimens, the terminal segments are partially withdrawn.

I do not assert that this is the male of the species described above. The galls were all from one species of oak and evidently alike ; the insects appeared at the same time and no other males were found in the box.

Baron Osten Sacken (Proc. Ent. Soc. Phil. ii, pp. 34 and 35) states

that, according to Hartig, the genus *Aulax* has the ♂ antennæ 15 or 16-jointed, and that in some species the radial area is closed, and *in others open*. If this is an *Aulax* it seems to be of a section not hitherto noticed in this country.

The striking resemblance between true gall-flies and many of their parasites is often noticed by Baron Osten Sacken in the papers so often referred to. But it still seems a little singular that the two rather exceptional characteristics of the genus *Aulax*—an open radial area and 16-jointed antennæ should be met with in the same species—and in a case too where the male of the true *Cynips* was not found. Just commencing my entomological studies I do not attempt to decide upon their true character, but shall be glad to furnish specimens to any entomologist who may be specially interested in the matter.

QUERCUS ILICIFOLIA, and Q. COCCINEA.

I have galls from these two species of oak that are probably identical with a species from *Q. coccinea*, described by Baron Osten Sacken (Proc. Ent. Soc. Phil. i, p. 256.) as follows:—

“*Round, somewhat oblong, hollow, pale greenish-yellow gall on the under side of the leaf, slightly projecting on the opposite side; internally an oblong kernel, kept in its position by filaments, radiating towards the shell.*”

His specimens produced only parasites, and the gall-flies I have are all, except two or three, from the galls from *Q. ilicifolia*. Both the gall and fly bear a rather close resemblance to the species last described, though the differences are so marked as to entitle them to the rank of a distinct species. Though measuring nearly as much in length they are much smaller. I take pleasure in giving to this species the name of its discoverer, who has added so much to our knowledge of this interesting genus.

*Cynips q. Osten Sackenii* n. sp.

♀. Black, head and thorax irregularly but not deeply sculptured: face sparingly pubescent; palpi brown; antennæ, short, pale brown 13-jointed. *Thorax* with a few scattered hairs. The longitudinal lines are broken by the sculpturing and only indistinctly traceable; the *mesothorax* along the posterior margin is bounded by a prominent, black, shining ridge. *Legs*: posterior pair very dark shining brown, the others somewhat reddish brown, all lighter at the joints. *Abdomen* black shining; 2nd segment very long with a very few scattered hairs beneath the wings. *Wings* with an extremely faint tinge of brown.

veins brown, distinct but slender, areolet distinct. cubital vein vanishing before reaching the 1st transverse. Length 0.12.

♂. *Antennæ* 15-jointed; dull dark brown, very long. *Legs* darker than in the female. *Abdomen* elongated, 2nd joint nearly two-thirds the length of the entire abdomen. In other respects like the female. Length 0.10.

Several of the species described by Dr. Harris, Dr. Fitch, and Baron Osten Sacken are common here. Among them *Cynips q. seminator* Harris, always found on *Quercus alba*, and what I take to be *Cynips q. operator* Osten Sacken, though the gall is found on two widely different species of oak.—*Q. palustris* and *Q. ilicifolia*. Baron Osten Sacken's specimens were from *Q. nigra*—an oak nearly related to *Q. ilicifolia*. It is very abundant. I think a peck of galls could have been gathered from a single tree this season.

***Cynips q. ficus* Fitch.**

The galls are often met with, but all the flies I have yet examined were parasites.

***Cynips q. cornigera* Osten Sacken.**

Rather rare, found on *Q. ilicifolia* and an undetermined species of oak.

***Cynips q. globulus* Fitch.**

Often met with on the thrifty shoots of *Quercus montana* in recently felled woodlands and occasionally on twigs of *Q. alba*. My galls of this species were collected in March of the present year. In June large numbers of parasitic flies appeared in the boxes. To-day (Oct. 19) I opened the galls that were not pierced and found five living and fully developed, true gall-flies. Two of them are from galls found on the white oak, the others from those found on *Quercus montana*, but I am not able to discover any difference between them. As some of my galls are from a species of oak different from those mentioned by Dr. Fitch or Baron Osten Sacken as producing them, and as the flies produced from them are as large or even larger than the specimen described by Baron Osten Sacken (*Proc. Ent. Soc. Phil.* i, p. 68), I add a very brief description. My specimens are all females.

Black; *head* and *thorax* and also the second segment of the *abdomen*, except the hind margin, quite densely covered with whitish hairs; *antennæ* 14-jointed, black. *Abdomen* very minutely punctate. *Wings* large, veins distinct, areolet small, radial area not closed. Length from 0.19 to 0.23.

The parasitic larvæ, so often found in these galls, were not,—in the

many cells I have examined,—*in* the cell, but in the corklike substance around it, which was much eaten by them.

**Cynips q. palustris** Osten Sacken.\*

I have galls and gall-flies that doubtless belong to this species. The galls are from *Quercus ilicifolia*. The flies differ from the species described by Baron Osten Sacken, but not more than different individual which I have examined. The wing veins are all, except the subcostal and 1st transverse, nearly colorless, and the areolet in most specimens very indistinct. Female antennæ 14-, and the male 15-jointed. In some specimens there are pale brown bands across the abdomen where the segments meet; in others the abdomen is black.

The galls are often found on the aments of this oak, as well as on the leaves. The sterile aments of the oak wither and fall off very soon after flowering, but those which produce the galls remain green long after the others have fallen.

**Cynips q. futilis** Osten Sacken.

I have reared a few flies from the galls which answer the description of the above species. A large proportion of the insects produced from these galls were parasites.

Galls closely resembling the above from *Quercus montana* (*Q. prinus*, var *monticola*, Michaux) are abundant, but from those I have collected only parasites have been produced. Are they the galls of *C. q. papillata* Osten Sacken?

**QUERCUS TINCTORIA.**

Large oak apple galls, an inch and a half in diameter, are common on this species of oak. They were fully grown so early as the middle of June, but no flies appeared till to-day (Oct. 24th). On cutting them I found the flies fully grown and lively. They agree, perfectly, with the description of *C. q. aciculata*. O. S.

**QUERCUS COCCINEA?**

The oak apple gall from this tree and the insects produced from

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\* Is not the gall of this species one of those referred to by Westwood (*Mod. Class.* Vol. 2d, p. 131), as described by Bosc? Bosc, it seems, described eight species of oak galls from Carolina, but was not able to rear any of the inhabitants.

them agree well with the description of *C. q. inanis* Osten Sacken. The flies came out in June.

As I did not gather these galls, I may be mistaken in the species of oak, though from the leaves I judged it to be the species named.

I have, in my collection, a species of gall from *Quercus ilicifolia*, which nearly resembles, if it is not identical with, one described by Baron Osten Sacken (Proc. Ent. Soc. Phil. i, p. 70), and doubtfully referred to *C. q. arbos* Fitch.

My galls were collected during the winter and spring, but I have not yet succeeded in rearing any true gall-flies from them. On the first of June, new galls had reached their full size, but were still tender,—quite like the young shoots of which they formed a part. Examining them on that day, I discovered on them two gall-flies which I succeeded in taking. They were females and the ovipositor of each was inserted into the gall so deeply that they could not readily free themselves, and they were removed by force.

The punctures were, apparently, directly over the cavities where, in this species, the larva is always found.

These flies evidently belong to the section *Inquilinæ*. I add a brief description.

Black. *head* pubescent, face densely pubescent. *Antennæ* 13-jointed, brown, terminal joint black or very dark dull brown, much darker than the others. *Thorax* covered with a fine short pubescence, longitudinal lines very fine. *Legs* yellowish brown, middle of femur and tibia darker. *Wings* hyaline, veins all present but nearly colorless, areolet large, indistinct *radial area* closed. *Abdomen* black, shining. Sheath of the ovipositor turns up abruptly, higher than the back of the abdomen.

Upon an oak bush covered with galls of *C. q. batatus?* I found several parasites like the above, except that the *antennæ* had but 12 joints.

I have deemed this observation of a parasite gall-fly in the act of depositing her eggs, worth recording, as it may throw some light upon the question as to the time and manner in which these flies introduce their eggs into the galls,—a point upon which Baron Osten Sacken, in the paper above referred to, says (l. c. i, p. 49) there have been, as yet, so far as he can learn, no “*direct observations.*” I marked one of the galls and shall endeavor to make sure of whatever it may produce.

During the months of June and July I was in the habit of examin-

ing my boxes of galls almost daily, and of removing all the flies that appeared. I noticed that the flies that first appeared in the box containing galls of *C. q. operator* were nearly all males, while the last that came out were mostly females. This species continued to come out in great numbers for more than two weeks, in the latter part of June, and were followed by a swarm of parasites of several species. The act of copulating at once took place, and several specimens were removed from the box for examination while *in coitu*. May we not safely infer that the last step in the act of procreation—that of ovipositing—would, under favorable circumstances, have soon followed?

The leaf and flower buds for the following year are fully formed at the season when many of the vernal gall-flies make their appearance, and probably many species then deposit their eggs in them.\* The appearance of the oak-apple galls and others upon particular parts of the leaf or on the petiole is difficult to explain. It is possible that these tiny beings are guided by an instinct so delicate and unerring as even to touch the embryo leaf, with the ovipositor, at the proper place. Again, the life force of the tree, that coöperates so mysteriously in the formation of the gall, probably, begins to act in the bud. The egg may, if only placed in contact with the leaf, provoke into activity this force; thus not rendering it necessary that it be deposited in the substance of the leaf.

The theory of leaf development now everywhere admitted to be correct, that the parts of the flower are but modified forms of the leaf, brings into view a principle of adaptation in nature that only needs to be extended slightly to show that the cells of *C. q. seminator* and *operator* are modified leaves, and that the silky fibres covering the cells are only a monstrous development of the pubescence always observable on young leaves; and that such galls as *C. q. batatus* and *tuber* are caused by the depositing of the eggs of the insect while the stem exists, as it certainly does exist, in the bud.

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\* *C. q. punctata*, described in this paper, deposits her eggs in the wood of branches of several years growth, and the gall-flies make their appearance, judging from my specimens, some days before the leaves appear.

I would name *C. q. seminator*, *operator*, *batatus*, and *tuber*, as species that probably oviposit in the young buds. There are probably others also.

I would offer the following facts in support of this theory. The largest gall of *C. q. seminator* and *operator* are always found to cover a cluster of buds, either at or near the tips of twigs, and the large number of cells found in some of these galls probably does not exceed the number of embryo leaves in the several buds. As seldom more than one or two of these buds are developed into leaves in the natural order of growth, the actual number of leaves on a given branch is very far short of the number that existed in embryo.

On carefully dissecting a gall of either *C. q. seminator* or *operator* the cells are found attached, generally, to two or more centres, each of which is the axis of a bud. This axis is often considerably elongated in *C. q. operator*, even passing out through the gall, and, in some cases, bearing a few dwarfed leaves. (I here speak of the galls of *C. q. operator*, as I have found them on *Q. ilicifolia* and *Q. palustris*.)

The axis of the galls of *C. q. seminator* are, so far as my observations extend, less developed, though, of course, much larger than in the embryo state. When the axis is short the cells are often so crowded that many of them, especially the terminal ones, are raised on a pedicel. The long axis of the other species giving ample room, the cells are all sessile.

Around each fascicle-like cluster of cells, but separated from the axis, are found the *bud-scales* of the original bud. These preserve all their characteristics as regards form, size and color, even to the hairs always present on the outside and edges.

The woolly fibres on the galls of *C. q. seminator* are attached to a lengthened beak of the cell,—quite above the place where the larva is found,—but in *C. q. operator* the beak is nearly or quite obsolete, and the whole cell is covered with the fibres.

The long, hairy beak and polished base of the cell of *C. q. seminator* lead me to think that the larval egg is deposited in the *petiole* of the leaf, or at least the larva is developed there; while the larva of *C. q. operator* is developed in the blade of the leaf and the cell, is, therefore, covered with the pubescence of the leaf.

I have not fully investigated the *cell structure* of the larval cell, but in a rather hasty examination, under the microscope, of the outer and inner surface of the cell I thought I could detect something of that difference of cell arrangement always existing between the upper and



lower surface of the leaves of deciduous trees. But this would prove nothing unless it could be shown that the peculiar arrangement is found in the embryonic leaf as well as in the developed form.

The galls of *C. q. seminator* and *operator* have not yielded flies of any sort since the first of August, and, I think not, for some time previous; yet there still remain in many of the cells small, perfect, living larvæ. I expect that when the gall season again arrives they will produce flies differing from any they have hitherto produced.

Having found, as before stated, two gall flies of the section *Inquilinæ* in the act of oviposition, I am satisfied that at least one species deposit their eggs *after* the galls are more or less developed.

The parasitic flies mentioned in the same connection, as being found on a white oak bush covered with what I take to be *C. q. batatus*, did not come from the recent galls but from those of the previous year, many of which were still on the bush.

This is sufficiently proved by the fact that from the galls brought home no parasites of the same species have yet appeared. There are, however, in these dried and shrunken galls a few living larvæ. Further, a large number of galls of apparently the same species, but larger, smoother and more woody were collected last winter and spring, and of the great number of flies produced from them, most, if not all, have the radial area closed, showing that they belong to the *Inquilinæ*.

In regard to the time when those parasites oviposit, that appear at the same time, or nearly the same time with the true gall-flies,—whether belonging to the *Chalcididæ*; the *Ichneumonidæ* or the *Inquilinæ*. I offer this conjecture:—That the female parasite closely follows the true *Cynips*, depositing her egg in the opening prepared for her by the ovipositor of the other, possibly because she may not be fitted by nature for this work, not having power to penetrate the bud; probably, however, because her sting lacks the mysterious gall-producing power of the true gall-fly.

Descriptions of North American LEPIDOPTERA.—No. 1.

BY AUG. R. GROTE.

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SYNTOMOIDEA H-S.

Genus **OMOIALA** m.

*Omoiala vermiculata*\* m. Plate 6. Fig. 1.

*Habitat.* Pike's Peak. Coll. Ent. Soc. Philad.

Gen. **CTENUCHA** Kirby.

On page 174, Vol. 2, Proc. Ent. Soc. Phil., I described, under the present family, a new and beautiful species belonging to the genus *Ctenucha* Kirby, *C. Cressonana* m. (Plate 8, fig. 5), and in presenting the differences between it and other described species belonging to this genus, I referred to *C. Latreillana* Kirby, which latter species, though generally known under the name which Kirby gave it, has been recognisably figured and named by Charpentier in his edition of Esper's Exotic Butterflies.

This species will be found figured on one of two supplementary Plates, not given by Esper in the original work, and I find no allusion to them in the accompanying text. (Vide Hagen Bib. Ent. Vol. 1, p. 216.) I therefore offer the following as the correct synonymy of this species, and one which has apparently been heretofore overlooked.

**Ctenucha virginica** Charpentier.

*Sphinx?* *virginica* Charp. Edit. Esp. Exot. Schm. Sping. Exot. Plate 2, fig. 3 ♂, 4 ♀, 1830.

*Ctenucha Latreillana* Kirby, Fauna Bor. Am. IV, p. 305, 1. (428) 1837.

*Glaucopis Latreillana* Harris, Descr. Cat. N. Am. Sping 39.5.

*Ctenucha Latreilliana* Gosse, Can. Nat. p. 249.

*Ctenucha Latreillana* Walker, C. B. M. Het. p. 282.

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\* Ornamenta alarum hujus speciei *Stalachtis heliconides* Bd. memorabile similia sunt.

Spero, nomen, quod pro illo elegi, non diagnosis certe positum genus, nulla tam non necessita et incerta dicta accepturum esse, ut nomen Eumetopona in Vol. 1, p. 296, hujus scripturæ accepit.

(I substitute *Omoiala* for *Lamprosoma*, having discovered, unfortunately too late to make the correction on the Plate, that the latter name was preoccupied by Kirby in Coleoptera.)

*Otenucha virginica* is found most frequently in Canada, while I have taken it in damp woods in the vicinity of Buffalo, N. Y., as well as along the Canada shore of the Niagara River. It has also been reported to me as having been taken in different parts of the Eastern and Middle States. The caterpillar hibernates, forming a slight cocoon in May and June, the imago appearing in July and August.

## ARCTIOIDEA H.S.

### ARCTIA Schk.

*Arctia anna* nov. sp. Plate 8. Fig. 1.

Anterior wings deep velvety black striped with pale yellow. Costa black with a small pale yellow streak at base; subcostal vein to apical third, median vein and its two middle branches and submedian vein narrowly striped with pale yellow. A broader pale yellow band traverses the wing longitudinally from base to external margin becoming slightly forked at internal angle and upon which, in the terminal half of the wing, rests a series of pale yellow stripes in the shape of the letter K, with the straight stroke turned towards the base of the wing and the upper limb reflexed, at the apex, towards the costa. Fringes brownish black; internal margin rather broadly striped with pale yellow. Posterior wings brownish black, immaculate; fringes of a more brownish shade. Under surface of wings dark brown and showing, on the anterior pair, traces of the broader yellow bands of the upper surface. Disk of the thorax and each tegula black bordered with pale yellow; collar yellowish with two black spots; base of the thorax showing a few reddish colored hairs; head between the eyes pale yellow, without spot. Upper and under surface of abdomen immaculate and with under surface of thorax, legs and antennæ, deep brownish black; palpi black. ♀. Exp.  $1\frac{1}{4}$  inch.

*Hab.* Pennsylvania.

The blackish, immaculate abdomen and posterior wings separate it from any species of North American *Arctia* known to me; in the disposition of the stripes on the anterior wings it presents most resemblance perhaps to *Arctia virgo* L.

For a ♀ specimen in fine preservation the Cabinet of this Society is indebted to Dr. Samuel Lewis of Philadelphia.

## NOTODONTINA H-S.

**HETEROCAMPA** Doubleday.**Heterocampa subalbicans** nov. sp. Plate 8, fig. 2.

Anterior wings whitish grey, darker shaded along the transverse posterior line and on internal margin. Basal and transverse anterior lines blackish, nearly straight, geminate, irregularly dentate. Median space showing a bilobed distinct black discal lunule and a brownish shade band running obliquely from the internal margin, outside of the costal spot, to the discal space where it is bent and runs inversely to costa. Transverse posterior line oblique, distinct, blackish, geminate, regularly dentate. Terminal space lighter than median, blackish at internal angle, with an indistinct subterminal shade line and a terminal series of distinct black spots between the veins. Fringes grey interrupted with black at the extremities of the veins. Posterior wings brownish grey, darker along the external margin, immaculate; fringes greyish interrupted with black. Under surface of wings brownish grey with a faint lighter median shade band on the posterior pair. Head and thorax whitish grey, latter blackish posteriorly; tegulae bordered with black. Abdomen same shade as the posterior wings; antennae simple, whitish at the base. ♀. Exp. 2 inches.

*Hab.* Penn. Coll. Ent. Soc. Philad.

I am not able to recognise in this species any of Mr. Walker's descriptions in the present genus, and believe it to be hitherto undescribed.

**RAPHIA** H-V. H-S.**R. abrupta** nov. sp. Plate 8, fig. 3, ♀.

♀. Exp.  $1\frac{2}{3}$  inch. Anterior wings dark grey; median lines blackish. The transverse anterior line, inclining outwards, runs straightly till below the discal space, there forming a single, deep indentation towards the base of the wing; the transverse posterior line forms a wide outward curve, projected superiorly, from the costa till below the discal space, thence sinuate to internal margin. Terminal and subterminal spaces clear grey; subterminal line obsolete. Median space grey, whitish on the costa and between the ordinary spots. Orbicular spot rounded, moderately large and distinct, whitish, ringed with black; reniform spot distinct, of the normal shape, with a greyish centre, obscured superiorly by a blackish shade which extends to the costa;

fringes whitish, interrupted with grey. Posterior wings obscure whitish, with a distinct median line and traces of others indistinct; anal angle darker shaded; fringes as on anterior wings.

Under surface of anterior wings showing a discal dot and blackish transverse band and half-band. Under surface of posterior wings showing a discal dot and an irregular darker shaded median line. Antennæ moderately short and stout with a basal tuft. Collar blackish; thorax and tegulæ greyish. Abdomen stout, exceeding the posterior wings, without apical tuft, crested on all the segments, grey, lighter shaded underneath.

♂, Exp.  $1\frac{1}{5}$  inch. Resembles ♀; antennæ finely pectinated; anterior wings showing a faint whitish subterminal line, orbicular spot much reduced. Three specimens ♂ ♂ ♀. Coll. Ent. Soc. Philad.

Resembles *Raphia hybris* Hübner (H-S. Neue Schm., fig. 62 ♀) in size and appearance, but I think differs specifically by the ornamentation of anterior and coloration of posterior wings.

The genus *Raphia*, of which *R. abrupta* is the only North American species known to me, shows some affinity to the genus *Diphthera*; its position under the present family is in accordance with the classification of Dr. Herrich-Schæffer. *R. abrupta* is generically distinct from the species included under *Raphia* Walk.; and as I regard it as congeneric with *R. hybris* Hüb. H-S., which I do not find in C. B. M., I describe it under the present generic name which has been apparently misapplied by Mr. Walker.

#### CYMATOPHORINA H-S.

*Lacinia expultrix* Grote, Proc. Ent. Soc. Philad., Vol. II, p. 58. Plate 2, fig. 6 ♀.

Since naming this species as a variety of *L. cymatophoroides* Guen., I have had occasion to examine very many ♂ ♀ individuals of it in private collections, and my observations, as well as those on the larva (Proc. Ent. Soc. Philad., Vol. II, p. 134), induce me to regard this as a distinct and valid species, although confounded with *L. cymatophoroides*, by Messrs. Guenée and Walker, and as such it will retain the name I have given it as above.

The genus *Lacinia*,\* though not very strongly distinct from *Thyaty-*

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\* Genus Molluscorum. I refer to M. Guenée's opinion on the generic name *Colocasia* Ochs. Noct. 1, p. 39, and think it unnecessary to change the name I at first adopted.

*ra*, is composed of two generically inseparable species (*L. cymatophoroides* and *L. expultrix*) differing from the rest of the family by the ornamentation and proportionate length of the ♂ abdomen and these characters, as well as those I have elsewhere indicated, will, in my opinion, prevent its being united with *Thyatyra*, from which it also differs in the minor character of wing ornamentation, forming, in its present position, a natural transition between *Leptina* and *Gonophora*.

The following is a list of the described North American species of Cymatophorina; the synonyms are in *italics*, and the references purposely omitted. The species marked with a \* are represented in the Cabinet of this Society.

**CYMATOPHORA** Treits.  
*caniplaga* Walker.

**LEPTINA** Guen.

- \* *dormitans* Guenée.
- \* *ophthalmica* Guenée.
- \* *latebricola* Grote.
- Doubledayi* Guenée.

**LACINIA** Grote.

- \* *cymatophoroides* Guenée.

\* *expultrix* Grote.

♀ *cymatophoroides* Guenée.

var β. *cymatophoroides* Walker.

**GONOPHORA** Bruand.

*scripta* Gosse.

*abrasa* Guenée.

**THYATYRA** Ochs.

- \* *pudens* Guenée.

## NOCTUINA H-S.

### **PHILOCHRYSA** nov. gen.

Antennæ short, stout, simple; head depressed; eyes large; proboscis short, slender; palpi depressed, short, not exceeding the head, well clothed with hair, terminal joint well defined, pointed; thorax convex, stout; abdomen stout, hardly exceeding the posterior wings; not crested nor tufted on the sides, anal segment moderately tufted in the ♂. Anterior wings straight along the costa; apex prolonged, rounded; exterior margin rounded, very oblique; median nervure throwing off 1st, 2nd, 3rd and 4th inferior nervules, 1st and 2nd springing from almost the same place; costal and subcostal nervures in the posterior wings diverging from a common stem near the base of the wing.

This generic description is drawn from two ♂ individuals, one of which, in good condition, was taken in Pennsylvania and is now in the Collection of this Society; the other, in indifferent preservation, was kindly lent me by Dr. Morris of Baltimore, and reported to him as having been taken in the vicinity of Washington, D. C. The single

species on which this genus is founded has been apparently overlooked by former describers although its extremely showy colors make it easy of description and a desirable subject to figure.

This genus presents many affinities to the Cymatophorina, but the nervulation of the posterior wings clearly excludes it from that family. I am inclined to regard it as forming the connecting link between the Cymatophorina and Noctuina, and as such it should head the present family, but I need more material for further dissections to assure me that the position here assumed is the correct one.

**P. regnatrix** nov. sp. Plate 8, fig. 4.

Anterior wings bright pink; median space black superiorly, showing the ordinary spots large, well defined, with black centres and broadly margined with orange. Median lines black, apparent only on the inferior half of the wing; the transverse posterior succeeded by an undulating series of black spots which traverses the wing from costal to internal margins and runs parallel to the subterminal line which consists of a similar series of larger black spots. Base of the wing pink, showing the median nervure black, bordered inferiorly by an orange stripe which extends across the median space to the transverse posterior line; costa tinged with orange and black. Terminal space black, interrupted with pink and with a terminal row of squarish orange colored marks which extends from apical to internal angles. Posterior wings, as well as under surface of both pair, blackish, immaculate. Thorax and head blackish sprinkled with whitish; abdomen black; antennæ light colored on the inside, blackish outwardly. ♂ expands  $1\frac{1}{8}$  inch.

The markings are distinct and well defined, and the colors remarkably vivid.

Genus **ANTHECIA** Boisduval.

1. **Anthecia marginata** Haworth.\*

*Crambus marginatus* Haworth, 374.

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\* The synonymy of this species here adopted is indicated by Guenée (Deltoïdes et Pyralites p. 128). The original description (vide Stephens) leaves little doubt that this is the species intended and is as follows: "Alis fusciscentibus, fasciis duabus fuscis albo marginatis, antica basi, postica marginali." Small specimens of this species, especially when rubbed, have much the appearance of the family under which it was originally described. During my investigation of the present synonymy I was much indebted for kind assist-

*Pyralis marginatus* † Stephens. Cat. II, 160. No. 6777; Haust. Vol. IV, p. 26; Wood, In. Ent. pl. 54, fig. 68; West. and Humph. Vol. II, p. 91—92.  
*Anthœcia rivulosa* Guenée, Noct. II, p. 184. Pl. 9, fig. 12; Walker, C. B. M. Noct. p. 694.

Anterior wings dark olivaceous grey, having the powdery appearance of *Gortyna nitela*. Basal and subterminal spaces blackish tinged with olivaceous, median and terminal spaces dark grey. Median lines pure white, distinct, continued from costal to internal margins, the transverse anterior forming a single curve, the transverse posterior sinuate, both lines approaching below the discal space; subterminal line faint, whitish, nearly straight. Reniform spot black, rounded, vague, often indistinct. Posterior wings dark greyish without markings. Under surface of anterior wings dark grey showing indistinctly a discal spot and subterminal line; under side of posterior wings lighter shaded than anterior, with a discal lunule and a darker band along the external margin; thorax and abdomen greyish; the sexes alike. Expanse  $\frac{1}{5}$ — $1\frac{2}{3}$  inch.

*Habitat.* Occurs throughout the Middle and Eastern States. I have seen also specimens from Maryland, Canada and New Brunswick. Coll. Ent. Soc. Phila. and various private collections.

Among the numerous ♂ and ♀ individuals that I have examined there are no marked varieties. In a single ♂ specimen (Coll. Ent. Soc. Philad.) the white median lines approach so closely, towards the centre of the wing, as almost to become confused.

2. *Anthœcia arcifera* ‡ Guenée, Plate 6, fig. 3.

*Anthœcia arcigera* Guenée, Noct. II, p. 184.

*Anthœcia arcigera* Walker, C. B. M., Noct. p. 694.

Anterior wings dark olivaceous-brown, silky, the basal and subterminal spaces ferruginous, the median space showing a blackish posterior

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ance to Mr. Stephen Calverley, Brooklyn, L. I., in whose collection this species is numbered 937.

† This name has been referred doubtfully, and I must think erroneously, as a synonym to *Asopia rubidalis* S. V., by Lederer in his "Beitrag zur Kenntniss der Pyraliden." Wien. Ent. Monat. 1863, p. 342.

‡ "Guenée, Rectification des doubles noms, Errata Noct. Vol. III, p. 399." I cannot follow M. Guenée in his alterations of the specific names of other authors in the present group; in this instance, however, the change is made in his own species and should be followed. This correction was accidentally omitted on the accompanying Plate.



shade. Median lines distinct, narrow, whitish tinged with the adjoining colors, the transverse anterior forming a single curve, the transverse posterior slightly sinuate. There is a terminal row of black dots; fringes long. Posterior wings black, immaculate; fringes whitish. Under side of both pair of wings black tinged with reddish along the costal and external margins. Head and thorax brown; abdomen dark brown, terminal segment yellow.—Exp. 1 inch, ♂ ♀.

*Hab.* I have seen only specimens from N. Y. State. Coll. Ent. Soc. Phil., Messrs. F. & J. Tepper and E. L. Graef, Brooklyn, L. I.

M. Guenée does not notice the different coloration of the anal segment and merely says in his description, "Corps brun." In other respects his description perfectly accords with my specimens, and I have no doubt that this is the species intended.

3. *Anthœcia Spraguei* nov. sp. Plate 6, fig. 4 ♂, 5 ♀.

*Alæ* anteriores mixtæ e rubro et cinereo colore; regiones subterminales et basales obscuriores, rubræ-brunneæ, priores cum olivacea tinctura, præsertim femina. *Lineæ* mediales distinctæ; transversale anterior egalem di-orbem formans; transversale posterius pæne perpendiculare tantum inferior pars anteriori transversali se advertens. *Alæ* posteriores claræ flavæ cum nigra lunula et terminali lato lino. Abdomen flavum.

Anterior wings reddish olivaceous-grey, silky. Basal and subterminal spaces rich reddish brown, latter tinged with olivaceous especially in the ♀. Median space reddish gray with a darker posterior shade obscuring, in some specimens, the reniform spot; terminal space darker than median. Median lines distinct, whitish, tinged with the adjoining shades, the transverse anterior forming a single even curve, the transverse posterior almost straight with a slight inclination towards the transverse anterior below the discal space. Subterminal line merely indicated by the difference between the coloring of the terminal and subterminal spaces; there is a terminal row of black marks; fringes long, dark olivaceous. Posterior wings light yellow with a broad black terminal band narrowest at anal angle and a blackish discal lunule; fringes light. Under surface of anterior wings blackish, tinged with red along the external margin, yellowish at base and along internal margin and showing a black discal spot and band. Under surface of posterior wings yellowish, with a well defined median blackish band, tinged with

red along the upper and external margins, blackish towards the anal angle. Antennæ brown on their upper surface, lighter underneath. Upper and under surface of thorax, tegulæ and head rich reddish brown; palpi brown, terminal joint the darkest; tongue blackish, lighter at the base, as long as the thorax. Abdomen entirely yellow, not banded, shaded with reddish underneath. Expanse  $\frac{3}{4}$ — $1\frac{1}{5}$  inches.

*Hab.* Mass., New York, Pennsylvania. Coll. Buffalo Soc. Nat. Sci., Ent. Soc. Philad., and of Messrs. Harvey J. Rich and F. and J. Tepper, Brooklyn, L. I.

In single specimens (Coll. Ent. Soc. Philad.) the transverse posterior line is more arcuated superiorly than in the specimens I have figured and the discal lunule on the posterior wings is almost obliterated.

This very distinct species unites, in the ornamentation of anterior and posterior wings, the 1st and 2nd groups of the three into which M. Guenée resolves the present genus. As these groups are artificial and founded apparently on no affinities of structure, I have not felt justified in retaining them.

I have dedicated this species to my friend and brother Entomologist Henry S. Sprague, of the Buffalo Society of Natural Sciences.

4. *Anthœcia jaguarina* Guenée.

*Anthœcia jaguarina* Guenée, Noct. II, p. 184. Pl. 9, fig. 11.

*Anthœcia jaguarina* Walker, C. B. M. Noct. p. 694.

“Anterior wings reddish with the two median lines well defined, of a lighter color and broadly shaded exteriorly with olivaceous; the transverse anterior line strongly curved; the transverse posterior angulated opposite the discal space, curved below it. Median shade olivaceous, narrow, zigzag, crossing the reniform spot which is of the same color. Subterminal line hardly perceptible, preceded by a dark costal mark [in M. Guenée’s figure two blackish rounded superposed spots]. Posterior wings dark yellow showing a large black discal spot and basal streak and a terminal black band vaguely spotted with yellow about the centre. Under surface dark yellow; anterior pair showing a basal mark, a discal spot and band all black; posterior pair with the discal spot and band nearly obliterated; ♀ and ♂ alike.

“*Hab.* North America.”

Unknown to me. M. Guenée’s figure should render this species readily recognisable.

5. *Anthœcia lynx* Guenée, Plate 6, fig. 6.*Anthœcia lynx* Guenée, Noct. II, p. 185.*Anthœcia lynx* Walker, C. B. M., Noct. p. 694.

Anterior wings ochraceous grey; subterminal, basal and part of the median space brownish olivaceous. The median lines indistinct; the subterminal wanting, being merely indicated by the difference in coloring between the terminal and subterminal spaces. Reniform spot large, vague, indistinct. Posterior wings bright yellow, showing a large discal lunule and a well defined terminal band, black. Under side yellow, the costa and external angle touched with ferruginous; the anterior pair showing a black subterminal band and two large discal spots; the posterior pair showing the markings of the upper surface, anterior half of the band yellowish. Abdomen yellowish; thorax and head ochraceous. Exp.  $\frac{3}{4}$  inch.

*Hab.* I have seen specimens from Mass., New York and Pennsylvania. Coll. Ent. Soc. Philad., Messrs. E. L. Graef and Harvey J. Rich, Brooklyn, L. I.

6. *Anthœcia tuberculum* Hübner.*Melicoleptria tuberculum* Hübner, Zutr. No. 259, fig. 517, 518.*Anthœcia tuberculum* Guenée, Noct. II, p. 185.*Anthœcia tuberculum* Walker, C. B. M., Noct. p. 695.

“Anterior wings light ochraceous shaded with reddish olivaceous at the base, in the median space and especially behind the transverse posterior line where it forms a band taking up all the subterminal space. Reniform spot more or less distinct, darker shaded. Posterior wings black with the base yellow showing a discal spot which is confounded inferiorly in the black color of the rest of the wing. Under side of anterior wings with the discal space black showing a black band enlarged inferiorly; posterior wings with a basal streak, a discal lunule and internal half band, black. Abdomen distinctly banded with yellow and black. ♀ darker, the markings on the anterior wings indistinct and the posterior wings of a more intense black than in the ♂. The half-band on the underside of the posterior wings joined to the costal margin by an indistinct series of blackish atoms.”

“*Hab.* Pennsylvania. Hüb.”

Unknown to me except by Hübner's figure.

7. *Anthœcia bina* Guenée.*Anthœcia bina* Guenée. Noct. II, 186,*Anthœcia bina* Walker. C. B. M., Noct. p. 695.

“Anterior wings reddish brown varied with olivaceous yellow, the latter shade obtaining principally in the median space, the former at the base. Two white costal spots, more apparent in the ♀, indicate the commencement of the median lines which are very indistinct. Posterior wings black, costal margin slightly tinged with yellowish and two spots of the latter shade on the discal space; fringes yellow. Under side varied with black, light yellow and brownish red; posterior wings showing the subterminal band distinct, half black, half red. Abdomen distinctly banded; palpi perceptibly longer than in the preceding species. ♀ darker, more reddish than the ♂.”

“*Hab.* North America.”

Unknown to me. Said to resemble *Anthœcia tuberculum* and to have in common with that species, a resemblance to certain *Pyrausta* belonging to the genus *Pyrausta*.

## GEOMETRINA H-S.

*Platœa californiaria* H-S. Exot. p. 43 and 61, fig. 537.

Alæ anteriores cinereæ-brunneæ, discali lunula alba, margine costali depresso, apice prolongato. Lineæ mediales dentatæ, obscuriores, albæ latæ marginatæ, confluentes in margine inferiore. Linea subterminalis lata, alba, duo-flexa. Alæ inferiores sordide-albæ; antennæ bipectinatæ; thorax et abdomen sordide-album; tegulæ albæ. ♀.

A specimen in the Coll. Ent. Soc. Philad., from Pike's Peak, differs from H-S. figure by the ground color of the anterior wings being of a uniform brownish grey showing also a white lunulated discal spot instead of the black dot with which H-S. represents it. It differs also by both median lines being largely bordered with white and by the presence of several white streaks in the median space. The median lines also do not approach so closely, nor is the posterior line so acutely toothed as in H-S. figure. These differences are perhaps sexual—H-S. figure is evidently ♂, while the specimen I have before me, though its condition does not admit of absolute certainty, I judge to be ♀. The description of *Gorytodes uncanaria* Guen. U. & P. Vol. II, p. 180 (1857) refers undoubtedly to this species (Vide Morris' Cat.) but according to H-S. Exot. p. 61, the name I have retained above has priority, having been published in 1855.

Notes on Central American LEPIDOPTERA, with descriptions of new species.  
No. II.

BY TRYON REAKIRT.

PIERIDÆ.

**EUTERPE** Swainson.

1. **E. Bithys**, Hübn.

*Delius Bithys*, Hübn. Zut. f. 467, 468. (1818.)

*E. Bithys*, Boisd. Sp. Gén. I, p. 410, n. 7. (1836.)

Cat. Brit. Mus. VIII, p. 22. (1844.)

Doubled. and Hewits. I, p. 34, n. 4. (1847.)

Nicaragua.

An unusual visitant in that section, inhabiting chiefly the valley of the Amazon.

2. **E. Nimbee**. Boisd.

Boisd. Sp. Gén. I, p. 409, n. 6. (1836.)

Cat. Brit. Mus. VIII, p. 22. (1844.)

Doubled. and Hewits. I, p. 34, n. 7, t. 5, f. 1. (1847.)

Morris' Cat. p. 3. (1860.)

Chiapas.

3. **E. Eudoica**, nov. sp.

Head, antennæ and palpi, black; thorax, abdomen and legs, dark brown.

Upper surface, brownish black; a macular band, orange, divided by black nerves and nervules, traverses the middle of the wings, consisting, on the primaries, of five spots, the first being in the lower part of the cell, the last on the middle of the interior margin; on the secondaries of eight; the third, in the upper angle of the post-apical, and the fifth in the lower angle of the medio-central interspace, are very small; the seventh and eighth, on the abdominal margin, are yellow. Two detached oval spots on the apical area of the primaries, just above the origin of the third sub-costal nervule; a marginal row of small indistinct yellow crescents. Fringe, alternating brown and white. Expanse 2.68 inches.

Under side, primaries, brown; costa, white near the base of the wing; the transverse band and spots are the same as above. In the apical area, near the anterior margin, a white mark, dashed with orange, and divided by a black nervule; on each side of the post-apical nervule, a sagittal bar pointing inwardly, the head, white and orange, the

shaft, arising from the margin and nearly approaching the head, orange; short orange lines arise from the middle of each area, on the posterior margin.

Secondaries, brownish black, nervules, margined with light brown; a white dot at the base; a white line, orange at the upper part, curved and projecting interiorly, extends down the costa; an orange spot below the curve; the macular band as above, but the spots are smaller and margined with white, and the orange of the fourth is prolonged interiorly; above this band, and below the sub-median nervure, four small orange lines; two orange dashes in the inferior portion of the discoidal cellule; the lower part of the interspaces occupied by elongated crescents, orange in the middle, and white at the extremities; yellow cones, arising from the margin, extend into the spaces contained within the wings of these crescents.

Honduras.

4. **E. Swainsonii**, Gray.

G. R. Gray, in Griffith's An. Kingdom, t. 38, f. 2, 3. (1832.)

Cat. Brit. Mus. VIII, p. 22. (1844.)

Doubled. and Hewits. I, p. 34, n. 16. (1847.)

Chiapas.

**LEPTALIS**, Dalman.

1. **L. Nehemia**, Boisd.

Boisd. Sp. Gén. I, p. 528, n. 132. (1836.)

Doubled. and Hewits. I, p. 37, n. 27. (1847.)

*Lept. Cydno*, E. Doubleday. Gray's Zool. Misc. p. 75. (1842.)

Cat. Brit. Mus. VIII, p. 23. (1844.)

Morris' Cat. p. p. 3. (1860.)

Chiapas.

2. **L. Jethys**, Boisd.

Boisd. Sp. Gén. I, p. 423, n. 13. (1836.)

Cat. Brit. Mus. VIII, p. 23. (1844.)

Doubled. and Hewits. I, p. 37, n. 18. (1847.)

Morris' Cat. p. 3. (1860.)

Chiapas.

**PIERIS**, Schrank.

1. **P. Monuste**, Linné.

*Pap. Mon.* Linn. Mus. Lud. Ulric. p. 237, n. 56. (1764.)

Linn. Syst. Nat. II, p. 760, n. 80. (1867.)

Fab. Syst. Ent. p. 470, n. 117. (1775.)

Cram. II, p. 71, t. 141, f. F. (1776.)

Goeze, Ent. Beiträge, III, p. 139, 80. (1779.)

- Fab. Sp. Ins. II, p. 41, n. 163. (1781.)  
 Fab. Mant. Ins. II, p. 19, n. 191. (1787.)  
 Fab. Ent. Syst. III, i, p. 189, n. 585. (1793.)  
*Mylothris Mon.* Hübn. Verz. bek. Schmiett. p. 91. (1816.)  
*Pieris Mon.* Godt. Enc. M. IX, p. 141, n. 79. (1819.)  
 Boisd. Sp. Gén. I, p. 495, n. 88. (1836.)  
 Cat. Brit. Mus. VIII, p. 29. (1844.)  
 Doubled. and Hewits. I, p. 49, n. 106. (1847.)  
 Morris' Synopsis, p. 16, n. 1. (1862.)  
 var. *Pi. Cleomes*, Boisd. et Lec. p. 43, t. 16, f. 1—5. (1833.)  
 var. ♀ *Pi. Suasa*, Boisd. Sp. Gén. I, p. 549, n. 160. (1836.)  
*Pap. Alcyone*, Cram. I, p. 89, t. 58, f. A. B. (mas.), f. C (fem.). (1775.)  
 Goeze. Ent. Beiträge, III, p. 173, n. 40. (1779.)  
*Pontia Feronia*, Steph. Illus. Haust. I, p. 149. (1827.)  
*Pi. Orseis*, Godt. IX, p. 141, n. 78. (1819.)

## Honduras.

2. **P. Demophile**, Linné.

- ♀ *Pap. Dem.* Linn. Amœn. Acad. VI, p. 406, n. 66. (1764.)  
 Linn. Syst. Nat. II, p. 761, n. 82. (1767.)  
 Fab. Syst. Ent. p. 472, n. 124. (1775.)  
 Goeze, Ent. Beiträge III, p. 141, n. 82. (1779.)  
 Fab. Mant. Ins. II, p. 19, n. 200. (1787.)  
 Fab. Ent. Syst. III, i, p. 192, n. 596. (1793.)  
 Clerck. Icon. t. 28, f. 4. (1764.)  
 ♂. ♀. *Myl. Dem.* Hübn. Verz. bek. Schmiett. p. 91. (1816.)  
 ♂. ♀. *Pi. Dem.* Cat. Brit. Mus. VIII, p. 24. (1844.)  
 Doubled. and Hewits. I, p. 49, n. 120. (1847.)  
 ♀. *Pap. Molphea.* Cram. II, p. 20, t. III, f. C. (1776.)  
 Goeze, Ent. Beiträge III, p. 179, n. 64. (1779.)  
 ♂. *Pap. Amathonte.* Cram. II, p. 29, t. 116, f. A. B. (1776.)  
 Goeze, Ent. Beiträge, III, p. 179, n. 63. (1779.)  
 Fab. Sp. Ins. II, p. 51, n. 170. (1781.)  
 Fab. Mant. Ins. II, p. 19, n. 193. (1787.)  
 ♂. ♀. *Pi. Amath.* Godt, Enc. M. IX, p. 157, n. 132. (1819.)  
 Boisd. Sp. Gén. I, p. 438, n. 1. (1836.)

## Honduras.

I believe this to be the only authenticated instance in which this species has been found so far north. All the authorities I have consulted give it a more southern locality.

3. **P. Pyrrha**, Cram.

- Pap. Pyr.* Cram. I, p. 97, t. 63, f. A. B. (1775.)  
 Fab. Sp. Ins. II, p. 46, n. 200. (1781.)  
 Fab. Mant. Ins. II, p. 42, n. 416. (1787.)

- Pi. Pyr.* Godt. Enc. M. IX, p. 155, n. 128. (1819.)  
 Lucas. Pap. Exot. p. 63, t. 32, f. 3. (1835.)  
 Boisd. Sp. Gén. I, p. 440, n. 4. (1736.)  
 Cat. Brit. Mus. VIII, p. 24. (1844.)  
 Doubled. and Hewits. I, p. 49, n. 125. (1847.)  
 ♀ *Pap. Pamela*, Cram. VI, p. 61, t. 319, f. A. (1782.)  
 ♀ var. *Pap. Iphigenia*, Fab. Mant. Ins. II, p. 21, n. 220. (1787.)  
 Fab. Ent. Syst. III, i. p. 109, n. 621. (1793.)  
 ? Goeze, Ent. Beiträge III, p. 170, n. 29. (1779.)  
*Perrhybris Eueidias*, Hübn. Verz. bek. Schmett. p. 91. (1816.)  
 Nicaragua.

The remarks made upon *Pi. Demophile* will also apply to this species. It is rather singular that Goeze should have referred to Fabricius' Mantissa, when the latter work was not issued until eight years after the date of Goeze's publication.

4. **P. Aripa**, Boisd.

- Boisd. Sp. Gén. I, p. 528, n. 131. (1836.)  
 Doubled. and Hewits, I, p. 50, n. 130. (1847.)  
 Cat. Brit. Mus. VIII. App. p. 8. (1848.)

Chiapas.

5. **P. Elodia**, Boisd.

- Boisd. Sp. Gén. I, p. 529, n. 134. (1836.)  
 Doubled. and Hewits, I, p. 50, n. 132. (1847.)  
 Morris' Cat. p. 3. (1860.)

Chiapas.

These two closely resemble each other.

6. **P. Drusilla**, Cram.

- ♀ *Pap. Drus.* Cram. II, p. 21, t. 110, f. C. (1776.)  
 Goeze. Ent. Beiträge III, p. 178, n. 59. (1779.)  
*Pi. Drus.* Godt. Enc. M. IX, p. 146, n. 98. (1819.)  
 Boisd. Sp. Gén. I, p. 492, n. 81. (1836.)  
*Myl. Margarita*, Hübn. Samml. Exot. Schmett. (1806—27.)  
*Pi. Marg.* Cat. Brit. Mus. VIII, p. 33. (1844.)  
 Doubled. and Hewits. I, p. 51, n. 157. (1848.)  
*Myl. Molpadia* Hübn. Zut. f. 259, 260. (1823.)  
*Pi. Ilaire*, Hübn. Verz. bek. Schmett. p. 91. (1816.)  
 Godt. Enc. M. IX, p. 142, n. 83. (1819.)  
 Boisd. Sp. Gén. p. 491, n. 80. (1836.)  
 ♀ *Pi. Mysia*. Godt. Enc. M. IX, p. 143, n. 87. (1819.)

Chiapas.

I can see no reason why the priority of Cramer's name should not



entitle it to preference over the two now used by different authorities, *Pi. Ilaire* and *Pi. Margarita*.

7. **P. Flippantha**, Fab.

*Pap. Fl.* Fab. Ent. Syst. III, i. p. 202, n. 631. (1793.)

*Pi. Fl.* Cat. Brit. Mus. VIII, p. 29. (1844.)

Doubled. and Hewits. I, p. 51, n. 163. (1847.)

*Pi. Limmoria*, Godt, Enc. M. IX, p. 143, n. 93. (1819.)

Swains. Zool. III. 2nd Series, t. 19. (1832.)

Lucas Pap. Exot. p. 51, t. 26, f. 2. (1835.)

Boisd. Sp. Gén. I, p. 488, n. 75. (1836.)

Nicaragua.

8. **P. Pandosia**, Hewits.

Hewits. Exot. But. I, Pieris. f. 14. (1853.)

Hewits. Exot. But. II, Pieris. f. 39. (1861.)

Honduras.

9. **P. Kigaha**, nov. sp.

Head and antennæ, black: first and second articles of the palpi, clothed with white hairs, third, black; thorax and abdomen black, shading into gray below.

Upper surface, primaries, white, costa broadly black at the base, narrowing towards the summit; a very wide black border on the outer margin, diminishing towards the interior angle and deflecting slightly on the inner margin; a projecting tooth, black, occupies half of the medio-superior interspace.

Secondaries, white, a wide black border, bifurcating at the anterior angle. Fringe dark brown. Expanse 1.69 inches.

Under side, primaries, same as above, with a marginal row of five triangular white spots; a black line above the cell, curved downwards at its extremity.

Secondaries, white, sulphureous at the base; a broad brown band, along the outer margin, and extending across the wing from the anterior angle to a point just below the base of the wing, containing, on the margin, an inner line, rufous; a separate spot of the same color, with an inferior white line at the outer angle.

Honduras.

This species is closely allied to *P. Marana*, E. Doubleday, and *P. Pandosia*, Hewits., but the black costal margin in *Kigaha* is broadest at the base, in *Pandosia*, of equal size to the end of the cell; the pro-

jecting tooth in *Kicaha*, is square instead of angular, and the border on the posterior wings is much narrower than in *Pandosia*: below, it differs from *Pandosia*, in the presence of a transverse band on the posterior wings; from *Marana*, by the absence of a transverse band on the anterior wings. It is also smaller than either of the others.

10. **P. Philete.** Fab.

*Pap. Phil.* Fab. Syst. Ent. p. 471, n. 119. (1775.)

Goeze. Ent. Beiträge III, p. 161, n. 4. (1779.)

Fab. Sp. Ins. II, p. 41, n. 171. (1781.)

Fab. Mant. Ins. II, p. 19, n. 194. (1787.)

Fab. Ent. Syst. III, i. p. 190, n. 590. (1793.)

*Pi. Phil.* Boisd. Sp. Gén. I, p. 550, n. 161. (1836.)

Doubled. and Hewits. I, p. 51, n. 178. (1847.)

Chiapas.

**NATHALIS**, Boisd.

1. **N. Iole**, Boisd.

Boisd. Sp. Gén. I, p. 589, n. 1. (1836.)

Cat. Brit. Mus. VIII, p. 36. (1842.)

Doubled. and Hewits. I, p. 54, n. 1. (1847.)

Morris' Synopsis, p. 22, n. 1. (1862.)

var. *Irene*, Fitch, 3rd Report, Suppl. p. 167, n. 212. (1859.)

Morris' Synopsis, p. 22, n. 2. (1862.)

Honduras.

My specimens correspond with Fitch's *Irene*, which, if it be a variety, possesses at least the merit of being constant in its aberration.

2. **N. luteolus**, nov. sp.

*Female.* Antennæ shorter than in *N. Iole*, black annulated with white, club, ferruginous; palpi, yellowish; head and thorax, brown; abdomen, yellow, with a dorsal brown band; legs, yellow. Wings, narrower and much more elongated than in *N. Iole*. Expanse 1.21 inches.

Upper surface, primaries, orange-yellow; a black discal line; base of the wing powdered with black atoms; a large, black, triangular patch occupies the anterior angles, prolonged along the outer margin into a black border; a black band occupies the inferior part of the wing, below the median nervure and is separated from the black border by three yellow lunules; a large, black dot, in the angle formed by the triangular patch with this band, separates a fourth crescent from the ground color. Fringe, brown alternating with yellow.

Secondaries, deep orange; a broad black line on the costal margin; the lower half of the disc, is dark brown, containing four orange spots, divided by black nervules; three, very large, occupy the medio-posterior, sub-median, and anal areas; the fourth is small, and in the medio-central interspace. Fringe, yellow.

Under side. Primaries, orange at the base; summit, fulvous; a small, discoidal, black point; three black spots on the disc, the lower one prolonged into a black band, reaching to the base of the wing. Secondaries, yellow, strongly powdered with brown atoms, particularly at the base; a broad transverse band across the disc, formed by the aggregation of these atoms.

Honduras.

This would seem to be a very dark variety of the female of *N. Iole*, but the difference in the length of their antennæ, and the shape of their wings, is so great that I am forced to believe them distinct.

#### CALLIDRYAS, Boisd.

##### 1. *C. Eubule*, Linne.

♀. *Pap. Eubule*. Linn. Syst. Nat. II, p. 764, n. 102. (1767.)

Fab. Syst. Ent. p. 477, n. 151. (1775.)

Cram. II, p. 36, t. 120, f. E. F. (1776.)

Goeze, Ent. Beiträge III, p. 153, n. 102. (1779.)

Fab. Sp. Ins. II, p. 50, n. 215. (1781.)

Herbst. Pap. t. 103, f. 1, 3. (1785.)

Fab. Mant. Ins. II, p. 24, n. 248. (1787.)

Fab. Ent. Syst. III, i. p. 209, n. 655. (1793.)

♂. ♀. Sm. Abb. Ins. of Georgia I, p. 10, t. 5. (1797.)

♀ *Phœbis Eubule*, Hübn. Verz. bek. Schmett. p. 98. (1816.)

*Col. Eubule*, Ménétries. Mem. de la Soc. Imp. des Nat. de Moscou. III, p. 118, n. 5. (1834.)

♂. ♀. *Call. Eubule*, Boisd. et Lec. p. 74, t. 24. (1833.)

Boisd. Sp. Gén. I, p. 613, n. 8. (1836.)

Cat. Brit. Mus. VIII, p. 38. (1844.)

Doubled. and Hewits. I, p. 67, n. 7. (1847.)

Morris' Synopsis, p. 25, n. 1. (1862.)

*Pap. Sennæ*. Linn. Syst. Nat. II, p. 764, n. 103. (1767.)

Fab. Syst. Ent. p. 477, n. 150. (1775.)

Goeze, Ent. Beiträge III, p. 154, n. 103. (1779.)

Fab. Sp. Ins. II, p. 49, n. 213. (1781.)

Fab. Mant. Ins. II, p. 24, n. 246. (1787.)

Merian Ins. Surinam, p. 58, t. 58. (1719.)

Seba. Mus. IV, ♂. t. 10, f. 13, 14.—17, 18?—(1765.)

♀. t. 23, f. 13, 14. (1765.)

♂ ♀. *Call. Marcellina*, Boisd. Sp. Gén. I, p. 615, n. 9. (1836.)  
Honduras.

2. **C. Marcellina**, Cram.

♂. *Pap. Marcellina*, Cram. II, p. 103, t. 163, f. A—C. (1776.)

Goeze. Ent. Beiträge III, p. 181, n. 72. (1779.)

Fab. Sp. Ins. II, p. 49, n. 214. (1781.)

Fab. Mant. Ins. II, p. 24, n. 247. (1787.)

Fab. Ent. Syst. III, i. p. 209, n. 654. (1793.)

*Col. Mar.* Godt. Enc. M. IX, p. 92, n. 9. (1819.)

♂. ♀. *Call. Mar.* Boisd. Sp. Gén. I, p. 615, n. 9. (1836.)

Cat. Brit. Mus. VIII, p. 38. (1844.)

Doubled. and Hewits. I, p. 68, n. 8. (1847.)

Morris' Synopsis, p. 26, n. 2. (1862.)

*Call. Eubule*, Boisd. Sp. Gén. I, p. 613, n. 8. (1836.)

Honduras.

3. **C. Yamana**, nov. sp.

Antennæ and club, ferruginous; palpi, white; head, brown; thorax, black, clothed with white hairs; abdomen, white; legs yellowish.

Upper surface, anterior wings, white; costa, black, widening towards the summit; black indentations on the posterior margin; a black discal dot. Fringe, brownish. Posterior wings, white; a light yellow spot in the medio-superior interspace. Fringe fulvous. Expanse 2.75 inches.

Under side, the posteriors, and the superior part of the fore wings, are yellow, finely reticulated with brown lines; the inferior portion, white, immaculate; a brown discal ocellus on each wing, those on the primaries, having an ash-gray, on the secondaries a snow-white pupil; a roseate spot at the base of the secondaries.

Honduras.

This is closely allied to *C. Pyranthe* Linn, but differs in the number and form of the ocelli on the under surface. Their geographical distribution is also so widely distinct as almost to preclude the possibility of their being varieties of the same species, even if the difference in ornamentation were not sufficient.

4 **C. Drya**. Fab.

*Pap. Drya*. Fab. Syst. Ent. p. 478, n. 153? (1775.)

Goeze. Ent. Beiträge III, p. 167, n. 22. (1779.)

Fab. Sp. Ins. IV, p. 50, n. 218. (1781.)

Fab. Mant. Ins. II, p. 24, n. 251. (1787.)

*Col. Drya*. Godt. Enc. M. IX, p. 92, n. 10. (1819.)

Ménétriés, Mem. Soc. Imp. Nat. de Moscou III, p. 118, n. 4. (1834.)

*Call. Drya*. Boisd. Sp. Gén. I, p. 616, n. 10. (1836.)

Doubled. and Hewits. I, p. 68, n. 9. (1847.)

Morris' Cat. p. 4. (1860.)

♀ *Phæbis Eubule*. Hübn. Samml. Exot. Schmett. (1806—27.)

Honduras.

5. **C. Philea**. Linné.

♂. *Pap. Philea*. Linn. Amœn. Acad. VI, p. 404, n. 59. (1764.)

Linn. Syst. Nat. II, p. 764, n. 104. (1767.)

Fab. Syst. Ent. p. 478, n. 156. (1775.)

Cram. II, p. 117, t. 173, f. E. F. (1776.)

Goeze. Ent. Beiträge III, p. 155, n. 104. (1779.)

Fab. Sp. Ins. II, p. 51, n. 221. (1781.)

Fab. Mant. Ins. II, p. 24, n. 254. (1787.)

Fab. Ent. Syst. III, i. p. 212, n. 662. (1793.)

♂ *Col. Philea*. Godt. Enc. M. IX, p. 91, n. 8. (1819.)

Ménétriés. Mem. Soc. Imp. Nat. de Moscou III, p. 118, n. 6, (1834.)

♂ ♀ *Call. Philea*. Lucas. Pap. Exot. p. 82, t. 41, f. 2. (1835.)

Boisd. Sp. Gén. I, p. 619, n. 13. (1836.)

Cat. Brit. Mus. VIII, p. 39. (1844.)

Doubled. and Hewits. I, p. 68, n. 11. (1847.)

Morris' Cat. p. 4, 350. (1860.)

♀ *Pap. Aricia*. Cram. I, p. 147, t. 94, f. A. B. (1775.)

♀ *Pap. Melanippe*. Cram. IV, p. 139, t. 361, f. E. F. (1782.)

♀ *Pap. Larra*. Fab. Ent. Syst. Suppl. V, p. 428, n. 653, 654. (1793.)

♂ *Col. Corday*. Hübn. Verz. bek. Schmett. p. 99. (1816.)

♀ *Col. Lolia*. Godt. Enc. M. IX, p. 94, n. 15. (1819.)

*Col. Larra*. Ménétriés. Mem. de la Soc. Imp. &c. III, p. 118, n. 7. (1834.)

♂ *Mancipium fugax Argante*. ♀. Hübn. Samml. Exot. Schmett. (1806—27.)

Honduras.

6. **C. Thalestris**, Hübn.

*Col. Thal*. Hübn. Samml. Exot. Schmett. (1806—27.)

*Call. Thal*. Boisd. Sp. Gén. I, p. 621, n. 14. (1836.)

Doubled. and Hewits. I, p. 68, n. 12. (1847.)

Cat. Brit. Mus. VIII, App. p. 10. (1848.)

Morris' Cat. p. 4. (1860.)

Honduras.

7. **C. Argante**, Fab.

♂ *Pap. Argante*, Fab. Syst. Ent. p. 470, n. 106. (1775.)

Goeze, Ent. Beiträge III, p. 160, n. 2. (1779.)

♂ *Col. Arg*. Godt. Enc. M. IX, p. 92, n. 11. (1819.)

♂ *Mancip. fugax Arg*. ♂. Hübn. Samml. Exot. Schmett. (1806—27.)

♂ ♀ *Call. Arg*. Lucas. Pap. Exot. p. 81, t. 40, f. 3. (1835.)

Boisd. Sp. Gén. I, p. 662, n. 15. (1836.)

Cat. Brit. Mus. VIII, p. 39. (1844.)

Doubled. and Hewits. I, p. 68, n. 13. (1847.)

Morris' Synopsis, p. 350. (1862.)

- ♀ *Pap. Cypris*. Cram. II, p. 5, t. 99, f. E. F. (1775.)  
 ♂ *Pap. Hersilia*. Cram. II, p. 117, t. 173, f. C. D. (1776.)  
 ♀ *Col. Cnidia*. Godt. Enc. M. IX, p. 93, n. 14. (1819)  
 Var. *Call. Agarithe*. Boisd. Sp. Gén. I, p. 623, n. 16. (1836.)  
 Honduras.

#### GONEPTERYX, Leach.

##### 1. *G. Clorinde*, Godt.

- Col. Clorinde*, Godt. Enc. M. IX, Suppl. p. 813, n. 1, 2. (1823.)  
*Call. Clor.* Lucas. Pap. Exot. p. 83, t. 42, f. 2. (1835.)  
*Rhod. Clor.* Boisd. Sp. Gén. I, p. 599, n. 2. (1836.)  
 Cat. Brit. Mus. VIII, p. 37. (1844.)  
 Morris' Synopsis, p. 350. (1862.)  
*Gonep. Clor.* Doubled. and Hewits. I, p. 71, n. 2. (1847.)  
*Amynthia Swainsoniana*, Swainson, Zool. Ill. 2d Series, t. 65. (1832.)  
*Col. Godarti*. Perty. Del. An. Art. t. 29, f. 4, 4a. (1833.)  
 Honduras.

##### 2. *G. Ecclipsis*, Linné.

- Pap. Ecclipsis*, Linn. Amœn. Acad. VI, p. 406, n. 67. (1764.)  
 Linn. Syst. Nat. II, p. 765, n. 107. (1767.)  
 Fab. Syst. Ent. p. 478, n. 154. (1775.)  
 Cram. II, p. 47, t. 129, f. A. B. (1776.)  
 Goeze, Ent. Beiträge III, p. 159, n. 107. (1779.)  
 Fab. Sp. Ins. II, p. 50, n. 219. (1781.)  
 Herbst. Pap. t. 103, f. 5, 6. (1785.)  
 Fab. Mant. Ins. II, p. 24, n. 252. (1787.)  
 Petiv. Gazoph. VI, t. 10, f. 6. (1767.)  
*Pap. Mærula*. Fab. Syst. Ent. p. 479, n. 157. (1775.)  
 Goeze, Ent. Beiträge III, p. 167, n. 23. (1779.)  
 Fab. Sp. Ins. II, p. 51, n. 222. (1781.)  
 Fab. Mant. Ins. II, p. 24, n. 255. (1787.)  
 Fab. Ent. Syst. III, i. p. 212, n. 664. (1793.)  
 Don. Ins. India. t. 27, f. 1. (1800.)  
*Anteos Mær.* Hübn. Verz. bek. Schmett. p. 99. (1816.)  
*Col. Mær.* Godt. Enc. M. IX, p. 89, n. 1. (1819.)  
*Rhod. Mær.* Boisd. et Lec. p. 71, t. 23, f. 1. (1833.)  
 Boisd. Sp. Gén. I, p. 600, n. 4. (1836.)  
 Cat. Brit. Mus. VIII, p. 37. (1844.)  
 Morris' Synopsis, p. 23, n. 1. (1862.)  
*Gonep. Mær.* Doubled. and Hewits. I, p. 71, n. 4. (1847.)  
 Honduras.

Boisduval had better have restricted the genus *Rhodocera* to our American species, all of which (excepting *G. lyside* and *G. Leachiana*) might be advantageously separated from their eastern congeners. They are generally larger and more robust insects; their antennæ are trun-

cate, whilst *Rhamni*, and its group, have them slightly rounded; their neururation is also distinct. The two exceptions mentioned I have erected into a new genus *Kricogonia*, the diagnosis of which follows.

**KRICOGONIA**, nov. gen.

**HEAD**, broad, clothed with erect hairs.

*Eyes*, round, projecting.

*Labial palpi*, longer than the head, clothed with short scales; the first joint, curved, compressed internally; the second, oval, sub-cylindric, of about the same length as the first, compressed internally; third joint, elongate, minute.

*Antennæ*, short, rather slender, grooved below, enlarging from the lower third towards the apex, more abruptly clavate than in the American species of *Gonepteryx*.

**THORAX**, stout, covered with fine long hairs.

**WINGS**, destitute of prominent angles, and more or less rounded.

*Anteriors*, sub-triangular; costa slightly curved at the base; costal nervure, very stout; sub-costal, four branched; its first nervule thrown off near the middle of the cell; the second, just above the end of the cell; the third midway between the end of the cell and the apex of the wing; the first discoidal nervule confluent with the sub-costal, for some distance beyond the cell; middle disco-cellular, one-half or more the length of the lower. Sub-median nervure curved downwards near the base. Internal nervure, short, running into the sub-median.

*Posterior wings*, obovate, shoulder very prominent. First sub-costal nervule curved outwardly; discoidal nervule does not appear to be a third sub-costal nervure, as in *Gonepteryx*; upper disco-cellular nervule more than half the length of the lower; abdominal channel very distinct and ample.

**ABDOMEN**, rather stout, not so long as the abdominal margin of the posterior wings.

**LEGS**, short; claws moderately bifid; paronychialia about as long as the claws.

I have taken *G. lyside* as the type of a new genus, differing from *Gonepteryx* in many particulars. Its nervular arrangement is widely distinct, requiring the greatest allowance to make it correspond with the diagnosis of *Gonepteryx*; excepting *G. leachiana*, it was the only

member of the genus whose wings were not angular, and to include such species in a group, the name of which indicates angularity as one of its prominent characteristics, would be preposterous.

*G. Leachiana*, I have never seen, but from its nervular structure as shown in the Genera of Diurnal Lepidoptera, I should include it under the same type.

1. **K. lyside**, Godt.

*Col. Lyside*. Godt. Enc. M. IX, p. 98, n. 30. (1819.)

Ménétriés. Mem. de la Soc. Imp., &c. III, p. 119, n. 8. (1834.)

*Rhod. Lys.* Boisd. Sp. Gén. I, p. 603, n. 7. (1836.)

Cat. Brit. Mus. VIII, p. 37. (1844.)

Morris' Synopsis, p. 24, n. 2. (1862.)

*Gonep. Lys.* Doubled. and Hewits. I, p. 71, n. 6. (1847.)

Costa Rica.

**MEGONOSTOMA**, nov. gen.

HEAD, moderately broad, clothed with rather long hairs.

*Eyes*, oval, projecting.

*Labial palpi*, longer than the head, clothed with short scales; first joint, curved; second, cylindric, oval, as long as the first; third, minute.

*Antennæ*, short, rather stout; thickening from the lower third to the Apex, which is truncate; arcuated.

THORAX, stout; clothed, in front densely, with fine hair.

ANTERIOR WINGS, sub-triangular, apex, acuminate or almost falcate; the apical nervule terminating exactly in the summit; costa, curved; costal nervure, very stout; sub-costal, four-branched; its first nervule thrown off about the middle of the cell; the second at the end of the cell; the third much nearer to the apex than to the end of the cell; first discoidal nervure, united to the sub-costal, one-third or one-fourth its length beyond the cell; lower disco-cellular nervule about four times the length of the middle disco-cellular.

POSTERIOR WINGS, sub-triangular, angles rounded, shoulder very prominent. Discoidal nervure appearing as a third sub-costal nervule; lower disco-cellular nervule, twice the length of the upper.

ABDOMEN, rather stout, not so long as the inner margin of the posterior wings.

LEGS, rather stout, tarsi, very long and spiny; females furnished



with eupronychia. Claws but little curved, deeply bifid, and without paronychchia or pulvilli.

I have separated three species,

*C. Cæsonia*, Stoll.

*C. eurydice*, Boisd.

*C. Philippa*? Fab.

together with one about to be described, from the genus *Colias*, with which they have been heretofore associated, but from which they are widely distinct, with the purpose of forming a new group, corresponding with the above diagnosis. They differ in the shape of the wings and in their nervular system, but chiefly in the possession of peculiar appendages, found on the middle and posterior legs of the female, and to which I have given the name, eupronychia.

They are to be found on the under side of the tarsi respectively at two-thirds, and three-fourths of their length, as two small membranous appendages, each being tri-jointed. The first joint is at the point of insertion into the tarsus; at the second, some distance below, both become bifid, when each branch, after being again jointed, curves abruptly upward, dilating into a semi-transparent, oblong, irregular, pyriform disk, becoming lateral to the tarsus, and extending in the upper and longest pair, beyond the insertion of the lower, which in their turn, are carried beyond the unguis.

These can be referred neither to paronychchia, which are placed above the claws, nor to pulvilli, between them. The measurements of the different sections are given below, and may prove interesting to the investigator; they are expressed both in inches and millimetres:

First pair or upper eupronychia—

A.	Length from the insertion or 1st joint to the 2nd.....	01199 in.....	03020 mill.
B.	“ of the branches from the 2d to the 3d joint...01411 in.....	03558 “	
C.	“ of the pyriform disks.....	03746 in.....	09515 “
	Total length.....	06356 in.....	16093 “

Second pair or lower eupronychia—

A.	Length from the insertion of 1st joint to the 2nd.....	00796 in.....	02019 mill.
B.	“ of the branches from the 2d to the 3d joint...01965 in.....	02705 “	
C.	“ of the pyriform disks.....	04167 in.....	10584 “
	Total length.....	06027 in.....	15308 “

A. and B. are semi-opaque, the opacity gradually diminishing towards C., brown and roughened on the surface.

C. is membranous, translucent, yellow, veined and blotched irregularly with brown; margin thick, purple, sinuate.

It must be observed that I have only seen eupronychia in fresh specimens of the female, thus forming an apparent sexual distinction. As, however, these appendages are so very delicate, that the slightest friction is sufficient to rupture them, I am not prepared to say that such is the case, until I have had an opportunity of examining some recently captured males.

1. *M. Cæsonia*, Stoll.

*Pap. Cæs.* Stoll. t. 41, f. 2, 2 B. (1791.)

*Zerene Cæs.* Hübn. Samml. Exot. Schmet. II, f. 1—4. (1806.)

Hübn. Verz. bek. Schmett. p. 97, n. 1027. (1816.)

*Col. Cæs.* Godt. Enc. M. IX, p. 98, n. 31. (1819.)

Boisd. et Lec. p. 67, t. 22, f. 1—5. (1833.)

Lucas. *Pap. Exot.* p. 79, t. 39, f. 5. (1835.)

Boisd. *Sp. Gén.* I, p. 635, n. 1. (1826.)

*Cat. Brit. Mus.* VIII, p. 40. (1844.)

Doubled. and Hewits. I, p. 74, n. 2. (1847.)

Morris' *Synopsis*, p. 27, n. 1. (1862.)

*Pap. Caroliniana*, Petiv. *Gazoph.* p. 2, t. 7, f. 10. (1767.)

Chiapas.

2. *M. Helena*, nov. sp.

*Male.* Antennæ, pink, club, ferruginous; first article of the palpi, yellow; second and third pink; head, fulvous; thorax covered with greenish white hairs; abdomen, greenish-yellow, a faint brown dorsal band; femora and tibiæ, ochraceous, above pink, tarsi, dull brown.

Upper surface; wings, sulphureous, inclining to orange yellow at the base of the secondaries; costa, brown, a large brown discoidal spot on the primaries; fringe, yellow, expanse, 2.47 inches.

Below, primaries, pale yellow, deepening at the apex and base; discal spot, becomes a pale brown ocellus, with a white pupil. Secondaries, orange yellow, costa heavily margined with pink; two pink lines, issuing from the base, the upper being preceded by a light yellow line; a pink ocellus, white pupil and a submarginal row of pink spots.

? Chiapas.

I am doubtful of the locality of this species, but as it was found

among a number of specimens from that vicinity, I presumed that it came thence.

**TERIAS**, Swainson.

1. **T. Nicippe**, Cram.

- Pap. Nic.* Cram. III, p. 31 t. 210, f. C. D. (1780.)  
 Herbst. t. 107, f. 2, 4, p. 176. (1787.)  
 Fab. Ent. Syst. III, i. p. 208, n. 651. (1793.)  
*Abœis Nic.* Hübn. Verz. bek. Schmett. p. 97. (1816.)  
*Col. Nic.* Godt. Enc. M. IX, p. 103, n. 43. (1819.)  
*Pt. Nic.* Say, Amer. Entom. II, p. 70, t. 30. (1825.)  
*Terias Nic.* Boisd. Sp. Gén. I, p. 653, n. 1. (1836.)  
 Cat. Brit. Mus. VIII, p. 42. (1844.)  
 Doubled. and Hewits. I, p. 78, n. 1. (1847.)  
 Morris' Synopsis, p. 33, n. 1. (1862.)  
*Ter. Nic.* Lucas, Pap. Exot. p. 76, t. 38, f. 1. (1835.)  
*Xanthidia Nic.* Boisd. et Lec. p. 55, t. 20, f. 1—5. (1833.)  
 Chiapas.

2. **T. Proterpia**, Fab.

- Pap. Prot.* Fab. Syst. Ent. p. 478, n. 152. (1775.)  
 Goeze, Ent. Beiträge III, p. 166, n. 21. (1779.)  
 Fab. Sp. Inst. II, p. 50, n. 216. (1781.)  
 Fab. Mant. Ins. II, p. 24, n. 249. (1787.)  
*Col. Prot.* Godt. Enc. M. IX, p. 91, n. 5. (1819.)  
 Hübn. Zuträge. f. 803. (1823.)  
 Lucas. Pap. Exot. p. 74, t. 38, f. 2. (1835.)  
*Terias Prot.* Boisd. Sp. Gén. I, p. 654, n. 2. (1836.)  
 Cat. Brit. Mus. VIII, p. 42. (1844.)  
 Doubled. and Hewits. I, p. 78, n. 2. (1847.)  
 Morris' Synopsis, p. 35, n. 5. (1862.)

Honduras.

3. **T. Gratiiosa**, Boisd.

Boisd. MSS. Doubled. and Hewits. I, p. 78, n. 4, t. 9, f. 5. (1847.)

Head, brown: antennæ black, annulated with white at their base; palpi yellow. Thorax, black; abdomen yellow, a dorsal black band; legs yellowish-white.

Upper surface; superior wings, lemon yellow, base suffused with orange; costa, black; a broad black border, on the outer margin, very much curved and irregular interiorly, bearing some resemblance to the outer portion of the "dog's head" so well marked in *M. Cæsonia*. It arises from the lower third of the costal margin, traverses the apex transversely to the first discoidal nervule, thence it is nearly parallel with the outer margin as far as the medio-superior nervule, at which

point it becomes narrower and parallel with the margin as far as the medio-posterior nervule, where it again widens. A short distance above the posterior angle, on the inner margin, it is suddenly contracted to a diminishing line, terminating about the middle of the inner margin.

Posterior wings, pale yellow, an orange patch at the outer angle, whence a black border arises, widening very broadly at the discoidal nervule, from which it gradually diminishes to the outer margin, just beyond the medio-posterior nervule. Expanse 1.69 inches.

Under surface, yellow, with a few scattering black atoms. A curved orange line, almost imperceptible, on the superior portion of the disc of the posterior wings.

Honduras.

4. **T. Elathea**, Cram.

- Pap. El.* Cram. II, p. 5, t. 99, f. C. D. (1776.)  
 Goeze, Ent. Beiträge III, p. 177, n. 55. (1789.)  
 Fab. Sp. Inst. II, p. 44, n. 185. (1781.)  
 Fab. Mant. II, p. 30, n. 209. (1787.)  
 Herbst. Pap. t. 117. (1788.)  
 Fab. Ent. Syst. III, i. p. 196, n. 610. (1793.)  
*Pieris El.* Godt. Enc. M. IX, p. 136, n. 58. (1819.)  
*Col. El.* Lucas. Pap. Exot. p. 76, t. 39, f. 1. (1835.)  
*Ter. El.* Boisd. Sp. Gen. I, p. 664, n. 19. (1836.)  
 Cat. Brit. Mus. VIII, p. 44. (1844.)  
 Doubled. and Hewits. I, p. 79 n. 21. (1847.)  
 Morris' Cat. p. 5. (1860.)

Honduras.

5. **T. Sinoë**, Godt.

- Pieris Sin.* Goat. Enc. M. IX, p. 138, n. 66. (1819.)  
*Ter. Sin.* Boisd. Sp. Gén. I, p. 683, n. 51. (1836.)  
 Doubled. and Hewits. I, p. 80, n. 50. (1847.)  
 Morris' Catalogue p. 5. (1860.)

Honduras.

6. **T. Lisa**, Boisd.

- Xanthidia Lisa.* Boisd. et. Lec. p. 53, t. 19, f. 4, 5. (1833.)  
*Ter. Lisa.* Boisd. Sp. Gén. I, p. 661, n. 16, t. 2, A. f. 5. (1836.)  
 Cat. Brit. Mus. VIII, p. 43. (1844.)  
 Doubled. and Hewits. I, p. 79, n. 18. (1847.)  
 Morris' Synopsis, p. 34, n. 2. (1862.)  
*Pieris Smilax.* Godt. Enc. M. IX, p. 136, n. 56. (1819.)

Honduras.

## HEMIPTEROLOGICAL CONTRIBUTIONS.—No. 2.

BY P. R. UHLER.

**PACHYCORIS**, Burm.**P. complicatus**, n. sp.

Dull clay-yellow, the upper surface with rather coarse, deep, scattered punctures, arranged in an irregularly reticulated manner, and connected together by the same carbon-black color as that which covers them. Head with irregular, scarred, black punctures, arranged in a row immediately each side of the tylus; the surface rather regularly convex, the apex pale clay-yellow, the base greenish-black, lateral margins sinuated, smooth, yellow, the under side strongly punctured with greenish-black, somewhat in rows, with the margins of the bucculæ and a few small spots yellow, bucculæ very narrow, long; antennæ slender, black, the basal joint and origin of the second yellow, the second joint a little longer, slenderer and smoother than the third; rostrum reaching between the posterior coxæ. Thorax very convex, the lateral margins smooth, yellow, sinuated, the posterior margin truncated, the anterior surface obscured with blackish, the punctures coarser than upon the head and arranged somewhat transversely, the humeri rounded, but not prominent. Corium black upon the posterior portion, the exterior apical and interior edges yellow, smooth; membrane with a slight tinge of brown. Scutellum a little flattened before the tip, the tip hardly truncated, the lateral margins anterior to it almost sinuated, the edge smooth, yellow, upon the middle a faint, slender, yellowish, longitudinal line. Beneath yellow, with deep, black punctures, which are grouped together in spots, particularly at sides, disk of the venter impunctured, bearing two subtriangular fuscous spots each side upon the silky areas, lateral margins of the segments yellow, impunctured. Femora yellow, with groups of blackish punctures, tibiæ rufous, with fuscous tips, tarsi almost entirely blackish.

Length 11 millims. Humeral breadth  $6\frac{2}{3}$  millims.

*Hab.* Mexico, (Lieut. Couch)

**SYMPHYLUS**, Dallas.**S. infamatus**, n. sp.

Reddish-brown, opaque, becoming darker posteriorly. Head triangular, a very little sinuated before the eyes, with rather coarse, deep, oc-

asionally confluent punctures of a metallic green color, a few smooth spots between the punctures, the apex and the infra-marginal smooth line, the anterior inferior surface, rostrum and antennæ yellow, the latter a little dusky at tip, the first joint about two-thirds the length of the second, the second and third subequal, but the third stouter, fourth almost as long as the first and second together; third and fourth joints of the rostrum subequal, the second longest. Thorax very convex on the disk, near the sides longitudinally impressed, and with a shallow, round impression behind each eye, the surface rust-brown, with numerous scattered, yellow, smooth spots, and with confluent, deep, fuscous punctures, behind the head tinged with metallic green; the lateral margins abruptly elevated, and together with a smooth inferior surface bounding them, yellow, the posterior margin truncated, the humeri a little roundly elevated. Hemelytra yellow, with numerous smaller green punctures, membrane slightly tinged with brown. Scutellum becoming fuscous posteriorly, on the middle, posteriorly, is a vestige of a longitudinal darker line, each side of base the surface is yellowish, numerous whitish spots are scattered over the disk and posteriorly, punctures smaller than upon the thorax, becoming finer and denser posteriorly, each side, medially; near the margin is a rounded blackish spot, and the apex, which is subtruncated posteriorly, is covered with a sublunate yellow spot, bearing two or three fuscous points. Beneath yellow, shining, punctured with green underneath the head and upon the pectus, the venter more finely and densely punctured with brown. Legs yellow, with numerous brown points.

Length 10 millim. Humeral breadth 6 millim.

*Hab.* Mexico. Cabinet of the Entomological Society of Philada.

In form it resembles *S. irroratus* Fab.

#### OPLOMUS, Spin.

##### *O. annotatus*, n. sp.

Deep metallic blue, rather narrow, robust. Head subquadrate and flat before the eyes, the lateral lobes dull, blackish-blue, the tylus as long as the lateral lobes, but almost surrounded by them at tip, having a few large, deep punctures, the lateral margins narrowly elevated, the cranium elevatedly convex, polished, with groups of small, deep punctures, the middle of the occiput with a minute orange spot; ocelli amber yellow; antennæ slender, black, with yellowish pubescence, the

first joint reaching the tip of the head, the second equal to the first and third together, third shorter than the fourth, fourth and fifth equal; rostrum reaching the posterior coxæ, blue black, the labrum brown on the middle. Thorax moderately convex, deep blue, polished, the anterior surface with fine, deep, remote punctures, just before the middle is a transverse, smooth space, which is bounded posteriorly by an impressed, interrupted, punctured line, the surface posterior to this is coarsely, deeply punctured, lateral margins carinated, sinuated, humeral angles subacute; anterior margin with two small, reniform, orange-yellow spots, and each side before the humerus with a larger spot, which is produced upon the inferior surface. Scutellum with a large, smooth, orange-yellow spot at each basal angle and a larger one at the apex; deeply, remotely punctured at base, and with finer, closer punctures posteriorly. Corium dull, with a tinge of purple, finely, shallowly, remotely punctured, the punctures becoming obsolete posteriorly; the exterior margin and apex polished, coarsely, deeply punctured, near the base is a small spot, and the apical margin yellow; membrane brown, projecting beyond the abdomen. Beneath bright, deep blue, polished, coarsely, deeply, remotely punctured, postpectus each side with a carbon-black area, upon which a transverse short groove runs outwards from the stigmata. Ventral spine, transverse spot behind it, a large spot at the side of the 2nd segment, a streak at the side of the 4th and a spot at the side of the 5th yellow; punctures fine and dense at the sides, more remote and coarse nearer the middle, a silky spot each side of antepenultimate segment. Legs purplish-blue, the anterior tibiæ a very little dilated.

Length 8 millims. Humeral breadth 5 millims.

*Hab.* Cuba, Prof. Poey.

#### HALYDIDÆ.

##### PRIONOSOMA, Uhler.

Head long, narrow, with the lateral lobes prominent, advanced in front of the tylus, but not meeting before it, the sides sinuated above the antennæ, the tylus forming a prominent middle ridge, basal joint of the antennæ just reaching the tip of the head, contracted at its origin, much stouter than the following joints, the second and fourth subequal, all the joints with numerous stiff hairs; eyes hemispherical prominent, ocelli widely separated, placed near the eyes and base of

the head, bucculæ carried a short distance upon the pectus, narrow, enlarging a little towards the base of the head and subtruncated; rostrum very slender in the middle, the second joint as long as the third and fourth together, the third much broader than the rest, depressed, a little longer than the fourth, the fourth about two-thirds the length of the third, and not quite so robust. Thorax eight-sided, broader than long, the anterior division very abruptly narrowed each side and emarginated, the humeri projecting, with a subacute process at the outer extremity, posterior margin truncated. Scutellum broad, a little longer than the corium, not abruptly sinuated at sides, bluntly rounded at tip. Corium of almost equal breadth throughout, the interior apical margin obliquely rounded, middle of the apex emarginated, membrane with about 7 longitudinal undulating nervures. Sides of the abdominal segments with projecting, thorn-like, blunt processes. Venter obesely convex. Sternum with a groove to receive the rostrum. Anterior tibiæ prismatic, having a spine upon the inside face.

**P. podopioides** n. sp.

Pale testaceous, obscured with fuscous markings, covered with hoary pile. Head fuscous, with the cranium, tylus and anterior and basal margins yellow, surface with a few deep, coarse punctures, and with several irregular, longitudinal ridges; antennæ blackish, with long, stiff white hairs; rostrum piceous, reaching the middle coxæ, underside of the head and bucculæ yellow, punctured with fuscous. Thorax closely, finely punctured with fuscous, surface very much broken, with the smooth lateral margins and small scattered intervals between the punctures yellow, anterior margin deeply emarginated, with a blunt denticulus at each anterior angle, humeral projections a little curved backwards, smooth, bearing a tooth-like process at the extremity, behind this emarginated, from the emargination to the basal margin the sides are regularly rounded, the basal margin subtruncated, smooth. Scutellum irregularly, erodedly, closely punctured with fuscous, the surface uneven, bearing a Y-shaped elevation, the stem of which runs towards the apex, a short, smooth line at the basal middle and a few smooth areas yellow. Corium with the punctures finer and more regular, fuscous, base, nervures and a corneous, lenticular spot beyond the middle yellowish; membrane pale brown, the nervures bounded with whitish. Tergum blackish, densely punctured, posterior exterior an-



gle of the segments and the processes yellow, remainder of the connexivum blackish. Beneath testaceous, very hairy, closely punctured with fuscous, grouped in patches near the legs, and arranged into two indistinct longitudinal lines each side of the venter, middle line of the venter yellow; stemmata dark brown. Legs very pubescent, yellow, closely punctured with brown, the anterior femora, knees, and base and apex of the tibiæ fuscous; tarsi almost entirely brown.

Length 9 millims. Humeral breadth 5 millims.

*Hab.* California. Cabinet of the Entomological Society.

#### MICTIDÆ.

##### CHELINIDEA, Uhler.

Form similar to *Anasa*, but broader, oval. Head two-thirds the length of the thorax, subconico-cylindrical, the upper surface gently curving towards the apex; the tylus defined almost to the base of the head, its apical carina perpendicular in front; juga produced beyond the tylus each side in a conical point; antennæ prismatic, granulose, each of the three sides carinated upon the edge, the basal joint curved, thick, narrowed at base, the second and third joints subequal, the latter with a minute tooth at the apex exteriorly, between it and the fourth is a minute, inserted joint, 4th joint fusiform. Eyes globose, situated a little nearer to the base of the head than to the scapus; genæ emarginated beneath at the middle of the bucculæ; bucculæ rather more than one-third the length of the basal joint of the rostrum, broad, obliquely truncated in front, rounded and acute behind; rostrum reaching upon the abdomen, basal joint very thick, cylindrical, a little longer than the head, the remaining joints flattened, the second a little the longest, the third scarcely half the length of the fourth, the fourth about two-thirds the length of the second; labrum almost as long as the basal joint. Thorax subhexagonal, the latero-posterior sides but bluntly defined, forming a very obtuse angle with the posterior margin; all the margins, excepting the anterior one, carinately elevated, the lateral margins broadly elevated, anterior angles with a small tooth each side of the head, the anterior margin produced over the head so as to form a collar-like sheath which fits the head neatly; humeral angles not prominent, broadly rounded, and surrounded by the marginal carina. Pectus with a broad sulcus to receive the rostrum. Nerves of the corium very conspicuous, prominent, the middle one forked

at the end, forming an acutely triangular cell; costal margin acutely elevated; nervures of the membrane numerous, forked, ramose. Connexivum broadly dilated. Penultimate ventral segment of the female lunately incised at base, and then split into two rounded lamellæ; genital segment triangularly emarginate, the pieces each side subacute at tip. Posterior femora thickened, cylindrical, hardly curved, bearing two rows of slender teeth beneath, anterior and middle femora denticulated at tip beneath, tibiæ prismatic, the superior edges carinated, posterior tibiæ granulated inside.

**C. vittiger** n. sp.

Bright ochre-yellow, polished. Head black, densely granulose, upon the tylus and reaching the base of the head is an ochre-yellow vitta, a shorter vitta interrupted by the eyes and a less distinct spot at base each side beneath indistinctly yellow, bucculæ and basal joint of the rostrum also yellow. Antennæ black, minutely granulated; eyes and ocelli rufous; rostrum, excepting the basal joint, black. Thorax yellow, densely, roughly punctured, its collar and a small area behind it, upon the depressed space, omitting the middle line, blackish, a transverse vitta placed just before the posterior margin, but not reaching the humeri, also black; the transverse diameter is almost double the longitudinal, and the breadth at the collum does not exceed that of the head between the eyes, interior to each humerus is a slight prominence, a little beyond this the surface is roundedly impressed. Scutellum densely punctured with black, the immediate edge smooth, yellow. Corium densely, finely punctured with black, excepting at the base exteriorly, which gives it a fuscous appearance, lateral elevated edge, posterior and interior margins and the elevated veins smooth, yellow; membrane black. Connexivum densely punctured with black, the exterior margin broadly yellow. Pectus yellow, coarsely punctured, the collar punctured with black. Venter yellow, finely, densely punctured. Legs deep black, the anterior and middle femora with about three fine teeth at tip beneath, posterior femora much thicker, with two rows of longer spines beneath.

Length 13 to 15 millim. Humeral breadth 5 to 5½ millim.

*Hab.* Utah, Fort Benton, Virginia, and Louisiana.

Widely distinct from any of the other genera of this family in the shape and proportions of the head, &c.

PROCEEDINGS  
OF THE  
ENTOMOLOGICAL SOCIETY  
OF PHILADELPHIA.

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VOL. 2. JANUARY, FEBRUARY & MARCH, 1864. No. 4.

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STATED MEETING, JANUARY 11.

President BLAND in the Chair.

DONATIONS TO LIBRARY.

The following works were deposited by Dr. T. B. Wilson :—

*Catalogues of the British Museum*:—*Coleoptera*, Parts 1-4. 6-9, and *Cucujidæ*;—*Lepidoptera*, Parts 1 (1844), 2 (1847), *Appendix* (1848), and *Papilionidæ* (1856);—*Neuroptera*, Parts 1-4, and *Termitina* (1858);—*Myriapoda*, *List* (1844), and *Part 1. Chilopoda* (1856). 20 Parts. 12mo.

*Catalogue of Orthopterous Insects in the Collection of the British Museum*, Part 1. *Phasmidæ*. By J. O. Westwood. 1 Vol. 4to.

WRITTEN COMMUNICATIONS.

The following papers were presented for publication in the Proceedings :—

“Contributions towards a Monograph of the genus *Crocota*, by Tryon Reakirt.”

“On the North American species of several genera of Apidæ, by E. T. Cresson.”

And were referred to Committees

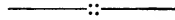
ELECTIONS.

The following persons were elected Corresponding Members of the Society:—

Charles N. Riotte, of Costa Rica.

Profr. Felipe Poey, of Cuba.

Dr. Juan Gundlach, of Cuba.



STATED MEETING, FEBRUARY 8.

President BLAND in the Chair.

DONATIONS TO CABINET.

53 Mexican COLEOPTERA (*Cicindela Vasseletii*, *C. humeralis*, *C. cyaniventris*, *C. Sommeri*, *C. Mellyi*, *Silpha analis*, *Phanæus nimrod*, *P. cuprinus*, *Strigoderma tomentosa*, *S. sulcipennis*, *Anomala discoidalis*, *Anomala nigripennis*, *Macroductylus nigrocyanus*, *Cyclocephala gravis*, *C. stictica*, *C. maffafa*, *Euphoria pulchella*, *Xyloryctes Telephus*, *Pelidnota punctulata*, *Antichira splendens*, *Cotinix subviolacea*, *Aegithus 4-notatus*, *Omphoita ornata*, *Temnochila polita*, *Nosoderma milliformis*, *Spheniscus marginicollis*, *Epicauta funesta*, *Ischnocerus infuscatus*, *Naupactus perardus*, *Heilipus guttatus*, *Zygops vitticollis*, *Cryptorhynchura bicaulata*, *Macromerus succinctus*, *Copturus leptopus*, *Piazurus plagiatu*, *Sphenophorus sanguinicollis*, *Agrilus furciliatus*, *Parandra laciniator*, *Ptychodes politus*, *Acanthoderus leucocephalus*, *Dendrobium 4-maculatus*, *Chalcophana Klugii*, *Calligrapha fulvipes*, *Aulacoscelis melanocera*, *Oedionychis Klugii*, *Diphaulara haerens*, *Anomoia mulatibilis*, *Diabrotica porracea*, *D. patruelis*, *Coptocycla ventricosa*, *Pselaphacus puncticollis*, *Hippodamia convergens*.) from George D. Smith, of Boston, Massachusetts.

The following LEPIDOPTERA from the Committee on Collecting Fund, were kindly determined for the Society, by Mr. Aug. R. Grote

of New York :—*Heterocampa semiplaga* Walk., *H. biundata* Walk., *H. subalbicans* Grote (Type), *Arctia anna* Grote (Type), *Limacodes spinuloides* H-S., *L. laticlava* Clem., (= *L. fasciola* H-S.?) *Phlogophora anodonta* Guen., *P. iris* Guen., and *Anthæcia arcigera* Guen.

## DONATIONS TO LIBRARY.

*Remarks on some characteristics of the Insect fauna of the White Mountains, New Hampshire.* By Samuel H. Scudder. Pamp. 8vo. From the Author.

The following works were presented by Dr. T. B. Wilson :—

*Hymenopterologische Studien, von Arnold Foerster.* Heft. 1, *Formicariæ.* Heft. 2, *Chalcidiniæ und Proctotrupii.* 2 Vols. 4to.

*Tables générales alphabétiques de l'Encyclopédie d'Histoire Naturelle, du Dr. Chenu.* Lépidoptères. 4to.

*Journal of Proceedings of the Linnean Society.* Zoology. No. 27.

*Proceedings of the Zoological Society of London.* March to June, 1863. 8vo.

*Revue et Magasin de Zoologie.* 1863. No. 9. 8vo.

*Wiener Entomologische Monatschrift.* Bd. 7, Nr. 11. 8vo.

*The Zoologist for November, 1863.* 8vo.

*Stettiner Entomologische Zeitung.* Jahr. 24. No. 10—12. 8vo.

*Linnæa Entomologica.* Zeitschrift herausgegeben von dem Entomologischen Vereine in Stettin. Fünfzehnter Band. 8vo.

*Aranææ Svecicæ descriptæ a Nicolao Westring.* 1 Vol. 8vo.

*Fauna Austriaca.* Die Käfer. Von Ludwig Redtenbacher. 1 Vol.

*Catalogue des Larves des Coléoptères.* Par Chapuis et Candèze. 1 Vol. 8vo.

*Genera quædam Insectorum.* Iconibus illustravit et descripsit H. Burmeister. Vol. 1. 8vo.

*Smithsonian Report for 1858.* 1 Vol. 8vo.

The following were presented by J. C. Brevoort, of Brooklyn, New York :—

*Monographia Apum Angliæ, by Wm. Kirby.* 2 Vols. 8vo.

*Monographia Tenthredinetarum, synonymia extricata, auctore Am. le Peletier de Saint-Fargeau.* 1 Vol. 8vo.

*Entomologie Française.* Rhynchotes. Méthode Mononymique. Par C. J. B. Amyot. 1 Vol. 8vo.

## WRITTEN COMMUNICATIONS.

Letters were read from the Secretary of the Entomological Society of London, and of the Smithsonian Institution at Washington, D. C., severally acknowledging the receipt of recent numbers of the Proceedings of the Society.

The following papers were presented for publication in the Proceedings :—

“North American Micro-Lepidoptera, by Brackenridge Clemens. M. D.”

“Description of a new species of North American Gortyna, by Aug. R. Grote.”

“Descriptions of North American Lepidoptera, No. 2, by Aug. R. Grote.”

“Description of a new species of North American Papilio, by Aug. R. Grote.”

“On Dimorphism in the Hymenopterous genus Cynips; with an Appendix, containing hints for a new Classification of Cynipidæ and a list of Cynipidæ, including descriptions of several new species, inhabiting the Oak-galls of Illinois, by Benj. D. Walsh, M. A.”

“Description of certain species of Diurnal Lepidoptera found within the limits of the United States and British America, by Wm. H. Edwards.”

“Description of certain new species of Catocalidæ, found within the United States, by Wm. H. Edwards.”

“Catalogue of North American Butterflies, by J. W. Weidemeyer.”

“Orthopterological Contributions, by P. R. Uhler.”

And were referred to Committees.

## NEW BUSINESS.

The thanks of the Society were voted to J. C. Brevoort, Esq., of Brooklyn, N. Y., for certain books presented by him this evening.

## ELECTIONS.

Joseph Leidy, M. D., of Philadelphia, was unanimously elected a Resident Member of the Society.

Contributions towards a Monograph of the genus *CROCOTA*.

BY TRYON REAKIRT.

1. *C. choriona*, nov. sp.

Antennæ, long, fulvous; head and thorax, fulvous; abdomen, pale ferruginous, with an obsolete row of dorsal black dots; legs, fulvous.

Anterior wings, dark brown, shading into a luteous fawn color along the costa and outer margin; a black discal ocellus, with a white pupil; an indistinct sub-marginal, transverse, macular brown line, darkest at its extremities; two irregular yellowish white spots on the disc, the inner and largest in the upper centre of the medio-posterior interspace, the outer, midway between it and the outer margin.

Posterior wings, rose color; a large black discal dot, and broad black margin, terminating just before the outer angle; fringes, rosy.

Under surface, rose color, black discal spots on both wings, with a broad brown marginal band on the posteriors. Length of body,  $3\frac{3}{4}$  lines; of the wings  $11\frac{1}{4}$  lines.

Philadelphia.

Although the number of true species contained in this genus is comparatively limited, and their varieties very numerous, yet the ornamentation of the above species is so entirely different, from those with which we are already acquainted, that I can have no hesitation in regarding it as new. In common with *C. quinaria* Grote, it possesses irregular whitish marks on the anterior wings, but with this difference, that *quinaria* carries five, whilst *choriona* has but two.

2. *C. nigricans*, nov. sp.

*Male*. Antennæ, short, black; head, thorax and abdomen, tawny; the latter with a row of black dorsal dots; legs, fawn colored.

Above, superior wings, fawn color, an indistinct discal spot, and sub-marginal line, as in *choriona*. Inferior wings, blackish brown, showing faintly a large black discal dot; costa, roseate; ciliæ on the superior wings fawn-color; on the inferiors, fulvous.

Under surface, superior wings marked as above but more distinctly; rosy, becoming yellowish on the inner margin. Inferior wings, rosy; a narrow fulvous line on the anal and outer margins, inside of which, a very broad brown sub-marginal band; a large black discal dot. Length of body 3 lines; of the wings 9 lines.

The *female* resembles the male in markings, but is much darker. The head, thorax, abdomen and anterior wings, fulvous; the abdomen having one row of dorsal, and two, of lateral black dots: the posterior wings, very black, the costa of which, also fulvous. Below, brick red, in ornamentation the same as the male. Legs, reddish-brown. Length of body  $3\frac{3}{4}$  lines; of the wings  $11\frac{1}{4}$  lines.

Philadelphia.

My specimens were obtained near this city by the kindness of Mr. Geo. W. Tryon, Jr. It approaches some varieties of *rubicundaria* in its ornamentation, but the terminal band on the posterior wings of that species, is here developed, until it covers the whole surface, excepting a small portion of the costal edge.

3. *C. immaculata*, nov. sp.

Antennæ, long, fulvous; head, thorax and abdomen, pale ferruginous, a row of obsolete black dorsal dots on the last. Wings, fawn color, covered with a rosy blush, sub-hyaline, immaculate, above and below. Costa of anterior wings, on the under side, rather more roseate than any other part of either surface. Legs, pale ferruginous. Length of body  $3\frac{3}{4}$  lines; of the wings 12 lines.

Philadelphia.

This species has some resemblance to *C. cupraria* Walker, but on comparison, it will be readily seen, that the differences between them are too great to be reconciled and united under that name.

I have several specimens, which, although they do not correspond with any described species or varieties, might perhaps be considered as a variation of *rubicundaria* or even *ferruginosa*, if, indeed the latter be not simply a form of the first; yet in regard to their ornamentation, they would appear to approach more nearly the second group of the genus, that containing *cupraria* and *læta*. The vexed question of what are properly true species of this genus and which, their abnormal conditions, can only be satisfactorily determined, when due attention has been paid to their larval state, to their identification and transformations.

In coloration, my specimens correspond in the main with *C. immaculata*; no discal dots on either wings; a transverse obsolete, sub-marginal brown line on the primaries, beyond which the ground color becomes lighter; apex of primaries, tipped with black. Three large



black spots on the outer margin of the secondaries; two, connected, at one-third the length of the margin from the anal angle, the other, midway between them and the outer angle. Abdomen without spots. Below, immaculate, costa of primaries rosy. Length of body  $3\frac{3}{4}$  lines; of the wings  $10\frac{1}{2}$  lines.

Philadelphia.

Should these prove to be new, I would propose for them the name of *tri-maculosa*.

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On the North American species of several genera of APIDÆ.

BY E. T. CRESSON.

Gen. ANTHIDIUM, Fabr.

The characters of this genus are laid down by Mr. Smith (*Bees of Great Britain*, p. 184) as follows:\*

“The *body* usually adorned with yellow spots or stripes. *Head* nearly as wide as the thorax; the *ocelli* placed in a triangle forward on the vertex; the *antennæ* filiform, the basal joint of the flagellum obconical. The *mentum* linear, elongate and pointed at its apex; the *labium* elongate, blunt at its apex and channeled down the middle, one-third longer than the palpi; the latter four-jointed, the first and second joints elongate, gradually narrowed from the base to the apex; the two apical joints minute, placed at the side and near the apex of the second joint. The *maxillary palpi* consisting of one joint, placed on a cup-shaped basal tubercle (or joint?): the apical lobe of the *maxillæ* sickle-shaped. The *superior wings* having one marginal and two submarginal cells, the second submarginal cell receiving the first recurrent nervure a little within at the base, the second recurrent nervure uniting with the second transverse nervure. *Abdomen* incurved, furnished with a dense pollen-brush beneath in the females; the males having the apex armed with spines.”

Our species of this beautiful genus are apparently quite rare and may be classed as follows:—

*Sect. 1*, containing those species which are large, broad and subparallel, having somewhat the form of a *Megachile*, the body more or less hairy and subopaque, the wings hyaline, the second recurrent nervure uniting with the second transverse nervure, the abdominal seg-

\* In giving the characters of the genera of Apidæ, I copy the excellent descriptions of Mr. Frederick Smith, as given in his Catalogues of Hymenoptera in the British Museum, and think it unnecessary to draw up other descriptions when those of Mr. Smith are full and explicit. These descriptions are here given as an assistance to those not having the original ones convenient

ments transversely depressed at base, and the apical segments of the males armed with spines.

*Sect. 2*, containing those species which are short and very robust, the body not hairy, the wings mostly fuscous, the second recurrent nervure passing a little beyond the apex of the second submarginal cell, the abdomen short, glossy, and very convex above. the segments not depressed at base, and the apical segments of the males not armed with spines.

#### *Section 1.*

##### 1. *A. emarginatum*, Say.

*Megachile emarginata*, Say, Long's 2nd Exped. ii, p. 352, ♀ (1824).

*Female*.—Head black, densely punctured, thickly clothed with rather long pale hairs, which are sparse on the clypeus; a small ferruginous-yellow spot on each side of the vertex over the eyes. Antennæ black. Thorax black, opaque, densely and finely punctured, thickly clothed with pale hairs; the tubercles, anterior part of the tegulæ, and four spots on the posterior margin of the scutellum.—the extreme basal ones being the smallest, yellowish-white. Wings hyaline, nervures fuscous. Legs black, clothed with pale hairs, especially on the tibiæ and tarsi; a yellowish-white vitta on the exterior edge of each tibia; tarsi clothed within with rufo-fuscous pubescence. Abdomen convex, finely punctured, black, somewhat shining; a yellowish-white fascia near the apical margin of each segment, very slightly interrupted on the disk except that on the basal segment, and more or less emarginate on each side anteriorly, the fascia on the basal segment is deeply indented posteriorly; ventral scopa yellowish-white. Length  $4\frac{1}{2}$  lines.

*Male*.—Resembles the female, but differs as follows:—the clypeus, the face on each side of the clypeus and the mandibles are yellowish-white; the posterior margin of the scutellum has only a narrow yellowish-white line on each side of the middle; the vittæ on the exterior edge of the tibiæ are interrupted on the anterior and intermediate pairs, and reduced to a short line at the base of the posterior pair; the wings are faintly tinged with fuscous; the fasciæ on the abdominal segments are broadly, deeply and somewhat squarely indented anteriorly, the indenture on each side of the basal segment extending entirely through and dividing the fascia into four spots, a small one each side of the disk and a large one at each extreme side; the fasciæ on the fourth and fifth segments are scarcely interrupted on the disk;

on the middle of the sixth segment a yellowish-white mark, slightly interrupted in the middle and deeply and acutely indented on its outer margins, giving it somewhat the appearance of the letter X dilated, with its lower angles prolonged on each side; on the extreme sides of the posterior margin of this segment there is a stout acute tooth; the apical segment black, deeply emarginate posteriorly, with a rather slender acute tooth in the middle, and with the lateral angles much produced and obtuse; apical segment beneath with an acute tooth on each side.

*Hab.*—Kansas. ♂ and ♀. Coll. Ent. Soc. Phila.

Closely allied to *A. maculifrons* Smith, but differs principally in the form and position of the markings.

2. *A. maculifrons*, Smith.

*Anthidium maculifrons*, Smith, Brit. Mus. Cat. ii, p. 214, ♂. (1854.)

“*Female.* Length 4 lines.—Black, the face has four ovate yellow maculae, two on the clypeus, and one on each side of it; a stripe on the inferior margin of the mandibles, and a minute spot on the vertex above the eyes, yellow. Thorax, a short stripe over the tegulae, and four on the margin of the scutellum, a spot on the tegulae anteriorly, and the tibiae at their base above, more or less yellow; the thorax, particularly beneath, the face, cheeks and legs have a cinereous pubescence, on the tarsi beneath it is rufo-fuscous; the claws ferruginous. The basal segment of the abdomen has on each side an angular macula and another minute one a little within; the four following segments have on each side, a little within their apical margins, an oblong stripe, pointed within, and deeply emarginate anteriorly, almost dividing the stripes; the apical segment has two central ovate spots, its margin crenulated, and laterally subemarginate, terminating in a short tooth; the ventral scopa yellowish-white.

“*Hab.*—United States.”

I have before me three ♀ specimens (2 from Texas, Coll. Ent. Soc. Phila., and 1 from Utah, Coll. Mr. Norton) which answer in every particular to Mr. Smith's description quoted above; in addition to the characters mentioned therein, these specimens are all 5 lines long, and have a small spot on each side of the anterior margin of the thorax; the four spots on the scutellum vary in size and are sometimes nearly confluent; the wings are hyaline with their apical margins slightly

clouded, the nervures are black; the anterior tibiæ have on their outer edge a vitta, nearly reaching the tip, and the intermediate and posterior tibiæ have an abbreviated vitta on their outer margin at base. All the markings are yellowish-white. I have not seen the ♂ of this species.

3. *A. maculatum*, Smith.

*Anthidium maculatum*, Smith, Brit. Mus. Cat. ii, p. 216, ♂. (1854.)

“*Male*. Length 5 lines.—Black, the entire insect thinly covered with cinereous pubescence; the clypeus, the face on each side, and the mandibles exteriorly of a yellowish-white; also a minute spot on the vertex above the eyes. Thorax, the scutellum has a narrow line on each side of its posterior margin, a spot on the tegulæ in front, and a minute one at the base of the anterior tibiæ above yellow; all the tarsi have a dense white pubescence, and the basal joint of the anterior and posterior pairs is pale yellow. Abdomen, the first to the fifth segment have each four subtriangular yellow spots, the sixth has only two oblique spots, the lateral margins having a curved spine, the seventh is armed with three spines on its apical margin, the central one being the shortest.

“*Hab.*—Mexico.”

Unknown to me.

*Section 2.*

4. *A. notatum*, Latr.

*Anthidium notatum*, Latr., Ann. Mus. Hist. Nat. 13, p. 48 and 231; St. Farg. Hym. ii, p. 370, ♂.

*Female*.—Head large, wider than the thorax, black, shining, rather densely and profoundly punctured; the face on each side, and an uninterrupted transverse line on the posterior margin of the vertex, yellow; lateral margins of the clypeus broadly yellowish-ferruginous. Antennæ black. Thorax black, densely and profoundly punctured, subopaque; anterior margin with an oblong oblique spot on each side, the tubercles, two rather large ovate spots on the posterior margin of the scutellum and a smaller spot on each side above, all yellow tinged with ferruginous. Wings fuliginous, with a few subhyaline spots towards the tip. Legs yellowish-ferruginous, somewhat obfuscated exteriorly and clothed with short pale pubescence. Abdomen short, very convex above, shining, black, regularly and deeply punctured, the punctures smaller towards the tip; a rounded spot on the extreme side of the

first segment, a narrow transverse band slightly interrupted in the middle and a little curved on each side of the second segment, yellow; the third, fourth and fifth segments have each a yellow spot on each side of the disk, those on the third segment the largest, quadrate and very slightly emarginate exteriorly, those on the fifth segment are small and round; remaining segment black; ventral scopa yellowish. Length 3 lines.

*Male*.—Resembles the female, but differs as follows:—The clypeus, a transverse line immediately above the clypeus, and the mandibles except tips, are yellow; the flagellum of the antennæ is sometimes tinged with rufous in front; the femora and the tibiæ exteriorly are sometimes vittate with blackish; the small spot on each side of the scutellum is sometimes wanting; the extreme sides of the third, fourth and fifth segments of the abdomen each with a very small yellowish spot, the outer margin of the dorsal spots on these three segments are slightly emarginate; the sixth segment is notched in the middle, with its apical margin narrowly yellow; apical segment sinuate or broadly emarginate posteriorly, with its apical margin yellow; ventral segments sometimes stained with ferruginous.

*Hab*.—Mass., N. J., Penn., Del. One ♀ and three ♂ specimens. Coll. Ent. Soc. Phila., and Mr. E. Norton.

5. *A. perplexum*, Smith.

*Anthidium perplexum*, Smith, Brit. Mus. Cat. Hym. ii, p. 214, ♂ ♀, (1854.)

“*Female*. Length 4 lines.—Black, the face on each side of the clypeus and a little above the insertion of the antennæ yellow; an un-interrupted line along the margin of the vertex, an ovate spot a little below the insertion of the antennæ, the scape and four or five basal joints of the flagellum ferruginous. Thorax, the margin ferruginous, interrupted only on the collar and on the posterior margin of the scutellum; the nervures towards the base of the wings, the tubercles and legs ferruginous; the wings dark fuscous. The basal segment of the abdomen ferruginous, having an ovate yellow macula laterally, its posterior margin narrowly black; the second segment has on each side a curved stripe nearly uniting in the middle, the stripes are tinged with ferruginous, the two following segments have on each side a subquadrate macula similarly colored, the two apical segments black; the ventral scopa yellowish-white.

“*Male*.—This sex closely resembles the female, but differs in having the clypeus yellow as well as a spot above and the mandibles also yellow exteriorly. The abdomen has two additional spots on the fifth segment, and all the spots are emarginate at their outer margins. The sixth segment is sub-bituberculate on its apical margin, the seventh is somewhat produced and rounded, and has a slight central carina. its apical margin as well as the extreme lateral margins of all the segments yellow.

“*Hab*.—Georgia.”

A single ♀ specimen of this species from Florida, in the collection of Mr. Edward Norton, agrees exactly with Mr. Smith's description above quoted. It closely resembles *A. notatum* Fabr., but is much larger and more robust. I have not seen the ♂.

6. *A. curvatum*, Smith.

*Anthidium curvatum*, Smith, Brit. Mus. Cat. ii, p. 215. ♀ (1854).

“*Female*. Length 4 lines.—Black, the clypeus yellow, having a broad black stripe down the middle, the inner orbits of the eyes nearly to their vertex broadly yellow, a minute yellow spot before the anterior stemma and a transverse yellow line on the vertex continued nearly half-way down the outer margins of the eyes. The collar, tubercles and posterior margin of the scutellum yellow, the former slightly interrupted; the tubercles and legs yellow, the latter varied with ferruginous, the femora being fusco-ferruginous towards their base; the wings smoky, darkest towards their anterior margin. The basal segment of the abdomen has a transverse band, deeply emarginate laterally, the three following segments have on each side an oblong stripe curved downwards and pointed at their extremity within; the curved form being given by a deep notch in the middle of each stripe beneath; the fifth segment has two central oblique stripes, the sixth immaculate.

“*Hab*.—Georgia.”

Not identified.

7. *A. simile*, n. sp.

*Female*.—Head black, densely punctured, clothed with short pale hairs; sides of the face nearly to the summit of the eyes, broader on each side of the clypeus, an ovate spot on each side of the clypeus, and a short stripe behind the eyes near their vertex, yellow. Antennæ black. Thorax black, densely punctured; a rather small spot on each

side of the middle of the anterior margin, the anterior half of the tubercles, the posterior margin of the scutellum, slightly interrupted in the middle, and a small spot on the extreme sides of the scutellum at base, yellow; sides of the metathorax clothed with long pale hairs; tegulæ ferruginous. Wings fuliginous, the marginal cell almost black; nervures black. Legs black; tips of femora yellowish-ferruginous; tibiæ and tarsi yellowish, with an oblong black spot on their exterior surface; tarsi clothed beneath with golden-yellow hairs. Abdomen very convex, shining, black, rather densely, deeply and uniformly punctured, the apical margin of the segments smooth, impunctured; first segment with a short transverse median basal yellow line, and at the extreme sides a basal subquadrate yellow spot, very slightly emarginate within; an oblong yellow spot or stripe obtusely pointed within and rather deeply indented posteriorly, on each side of the second, third and fourth segments; a large yellow spot, slightly emarginate exteriorly, on each side of the fifth segment; the extreme lateral edge of the yellow spots on each side of the second, third and fourth segments are slightly emarginate; apical segment black; ventral scopa golden-yellow. Length 4 lines.

*Male*.—Resembles the female, but differs as follows:—size rather larger; the clypeus, mandibles and sometimes a small spot immediately above the clypeus, yellow or yellowish-ferruginous; the posterior margin of the scutellum sometimes very narrow, with the lateral basal spot wanting; posterior coxæ each with a stout yellow spine; the middle spot at the base of the first segment of the abdomen is smaller and quadrate; the oblong spot on each side of the fifth segment resembles those on the three preceding segments, the sixth segment entirely black; the apical segment yellow, black at base, dilated and rounded on each side, with the apex produced in the middle into an obtuse tooth; ventral segments stained with rufous.

*Hab*.—Mass., Conn. Coll. Ent. Soc. Phila., and Mr. E. Norton.

The ♀ of this species differs from the description of the ♀ of *A. curvatum* Smith, as follows:—There is no “minute yellow spot before the anterior stemma”; the collar is black, not “yellow”; there is a yellow spot on each side of the thorax anteriorly; the legs are black, vittate with yellow, and not “yellow varied with ferruginous”; the basal segment of the abdomen has three spots, and the fifth segment

has two large spots, emarginate outwardly, instead of "two central oblique stripes." I see no variation in the markings of the three specimens before me.

8. *A. interruptum*, Say.

*Megachile interrupta* Say, Long's 2nd Expedition, ii, p. 351. ♂ ♀ (1824).

"*Male*.—Body punctured, above glabrous; head black; antennæ, first joint at base and third and fourth joints dull rufous; hypostoma, broad frontal orbits, and mandibles at base, yellow; vertex with a ferruginous band, interrupted in the middle and extending down the cheeks; labrum rufous, a small black spot at base; thorax black, surrounded by a ferruginous margin, which is interrupted before, and passes upon the posterior margin of the scutel; wings fuliginous; pleura with cinereous hair beneath the wings; feet rufous, tarsi with yellow hair; tergum convex, black, with dilated, obscure, rufous, scarcely definite bands, five in number, on each side of which, excepting the basal one, is another yellow band emarginate each side behind, and the three posterior ones are interrupted in the middle; anus trilobated; lobes yellow, intermediate one small; posterior coxæ each with a robust yellow spine; venter with transverse bands of long, dense, yellow hair. Length nearly two-fifths of an inch.

"*Female*.—The black color of the front extends down upon the middle of the hypostoma nearly to its tip; the rufous color on the basal joints of the antennæ is obsolete; labrum black on the disk; mandibles black, excepting a small, rufous spot at base; the three last bands of the tergum are destitute of any rufous color about them; venter densely covered with hair: mandibles as in the male, three-toothed; posterior coxæ unarmed. Length about the same as the male, but more robust.

"*Hab*.—Missouri."

This and the two following species are unknown to me, and may not belong to this section, but from their description I should judge that they did.

9. *A. jugatorium*, Say.

*Megachile jugatoria*, Say, Long's 2nd Exped. ii, p. 352, ♀ (1824.)

"*Female*.—Body punctured, above nearly glabrous; head with a yellow line on the superior part of the cheeks; hypostoma with a dilated, yellow line, which extends upon the anterior orbits nearly to



their summit; thorax with a widely interrupted line before, extending round above the wings, and two oblique lines upon the scutel, yellow; wings fuliginous; feet blackish, with dull rufous joints, and tarsal hair; anterior feet before dull rufous; tergum, bands yellow, not at all emarginated each side, the basal band widely interrupted, second band less widely interrupted, the penultimate one hardly interrupted, the ultimate one entire. Length about seven-twentieths of an inch.

“*Hab.*—Missouri.”

10. **A. dorsale**, St. Farg.

*Anthidium dorsale*, St. Farg. Hym. ii, p. 384, ♂ (1841.)

“*Male.*—Head black; its hairs rufous: clypeus, cheeks, face, upper part of the mandibles, of a ferruginous-yellow, as well as a spot behind the eyes. Antennæ black with the first joint in front yellow. Thorax black; its hairs whitish, except those of the back which are rufous; a ferruginous line upon each shoulder, prolonged at its two ends; the upper emitting at a right angle a line of the same color, which descends as far as the middle of the back, and the lateral giving rise to another ferruginous line which margins the back along the base of the wings as far as the scutellum. Scale of the wings black, its anterior part ferruginous-yellow. Scutellum ferruginous, except the base of the middle lobe, which is black. Abdomen black, its first segment ferruginous with the base black: the second, third, fourth and fifth having a ferruginous-yellow band, which is dilated upon the sides: the sixth and the anus ferruginous, prolonged in the middle. Legs ferruginous. Wings tolerably transparent, but a little smoky towards the tips. Length 5 lines.

“*Hab.*—Georgia.”

Gen. **CHELOSTOMA**, Latr.

“*Head* quadrate, usually wider than the thorax; the *antennæ* not longer than the head in the *female*, the flagellum clavate; half as long as the thorax, slender and filiform in the *male*. The *labrum* elongate, narrowed anteriorly, and truncate at the apex; the *mandibles* bidentate at their apex and densely ciliated with hairs on their inner margin; the *ocelli* placed in a triangle, the posterior pair in a line with the vertex of the eyes. The *labial palpi* four-jointed, the basal joint about one-third the length of the second, the second joint somewhat attenuated at the apex, the third placed in a line with it, short, the fourth joint clavate-truncate, attached to its side near the apex. The *maxillary palpi* three-jointed. The *anterior wings* have one marginal and two submarginal cells; the second submarginal receiving the two recurrent nervures. *Abdomen*

sublinear, slightly narrowed towards the base; furnished in the *female* with a dense scopa of pubescence. In the *male*, the abdomen is incurved and dentate at the apex."—Smith, *Bees of Great Britain*, p. 187.

Two North American species of this genus have been recorded, the descriptions of which follow. I have not been able to identify either of them.

1. *C. rugifrons*, Smith.

*Chelostoma rugifrons*, Smith, Brit. Mus. Cat. ii, p. 220, ♀. (1854.)

"*Female*. Length 5 lines.—Black, the head strongly punctured; the face has some white pubescence on each side at the insertion of the antennæ; the mandibles very stout, having a tooth near their base within, their apex tridentate, the middle tooth minute, longitudinally grooved above. Thorax strongly punctured; its pubescence, as well as that of the legs, white, the claw-joints rufo-testaceous, the tarsi beneath fulvous, the wings subhyaline, the nervures black. Abdomen cylindric, shining and strongly punctured; the basal and apical margins depressed; the first and three following segments have very narrow fasciæ of white pubescence, which is rather wider at the lateral margins; the fasciæ cross the segments about one-third within, curving backwards to the lateral apical margins, the sixth segment covered with white pubescence at the base; beneath densely clothed with white pubescence.

"*Hab.*—Georgia."

2. *C. albifrons*, Kirby.

*Chelostoma albifrons*, Kirby, Faun. Bor.-Amer. iv, p. 270, ♂, (1837).

"Body black, thickly punctured. Mouth bearded with white; mandibles carinated above, armed with two strong terminal teeth; nose square, flat, clothed with decumbent silver pile; antennæ filiform; scape black; the other joints are rufo-piceous underneath; trunk very hirsute with white or subcinereous hairs; wings a little embrowned, with black veins and base-covers; legs hairy; abdomen subcylindrical, hirsute with black hairs, incurved with the apex of the four intermediate segments fringed with white hairs; anal joint with a concavity above, obtuse; last ventral segment forcipate, rufo-piceous. Length of the body  $4\frac{1}{2}$  lines."

*Hab.*—North America ("Lat. 65°").

*Monumetha obsoleta*, described below, agrees tolerably well with

the description above quoted, but I have separated it on account of its 5-jointed maxillary palpi, which excludes it from *Chelostoma*.

Gen. **HERIADES**, Latr.

“The *labial palpi* four-jointed, the basal joint not quite half the length of the second, the third and fourth joints minute, placed at the side and near the apex of the second joint. The *maxillary palpi* three jointed, the two basal joints stout, the apical joint cylindric, slender and pointed at the apex. The *wings* as in the genus *Chelostoma*.

“This genus only differs from *Chelostoma* in having two minute apical joints to the labial palpi, which are placed near the apex of the second joint at its side. *Chelostoma* has only one minute apical joint, the third being attached to the apex of the second, and in a line with it; in other respects they coincide.”—Smith, *Bees of Great Britain*, p. 191.

The two following species appear to have but three joints to their maxillary palpi, and probably belong to this genus.

1. *H. carinatum*, n. sp.

*Female*.—Head subquadrate, rather large, black, deeply, roughly and densely punctured; clypeus prominent on the disk; mandibles stout and obtusely bifid at tip; antennæ short and black. Thorax convex above, rounded in front, black, shining, deeply and roughly punctured, with scattered pale pubescence; metathorax longitudinally impressed on the disk. Wings subhyaline, the apical half clouded, nervures black. Legs short, black, sparsely clothed with pale pubescence, tarsi clothed with yellowish pubescence. Abdomen elongate, subcylindric, convex above, slightly narrowed at base, black, shining, deeply and uniformly punctured, the punctures smaller and more dense towards the tip; apical margin of the segments transversely impressed and narrowly fringed with white pubescence; the anterior face of the basal segment deeply concave and bounded above by a rounded carina; apical segment rounded; ventral scopa pale yellowish-white. Length 3 lines.

*Male*.—Resembles the female, but the head is smaller, transverse and clothed in front and beneath with whitish hairs; the antennæ are almost as long as the thorax; the abdomen is incurved at the apex, and the first ventral segment has on its disk a rather large, obtuse tubercle; the tarsal claws are bifid and rufo-testaceous.

*Hab*.—Conn., Penn. Nine specimens. Coll. Ent. Soc. Phila., and Mr. E. Norton.

2. *H. simplex*, n. sp.

*Female*.—Head subquadrate, black, finely and densely punctured, sparsely clothed with pale hairs; antennæ short, black. Thorax black, finely and densely punctured, shining; metathorax longitudinally impressed on the disk; tegulæ tinged with rufous. Wings subhyaline, apical half clouded; nervures fuscous. Legs black, with scattering pale pubescence, that on the tarsi beneath dense and yellowish. Abdomen subovate, convex above, black, shining, minutely punctured; basal segment rounded in front; some of the segments have an obsolete marginal fringe of pale pubescence; ventral scopa yellowish-white. Length about 3 lines.

*Hab*.—Connecticut. One specimen. Coll. Mr. E. Norton.

Resembles the preceding species, but is distinguished at once by the much finer punctation, and by the rounded front of the basal segment of the abdomen.

**ANDRONICUS**, nov. gen.

*Head* transverse, as wide as the thorax; *ocelli* placed in a curve on the vertex; *antennæ* (♂) half as long as the thorax, scape rather long and robust, most slender at base, flagellum unequal, joints 2—5 dilated, joint 6 suddenly narrower and the following joints gradually attenuated to the tip which is pointed; *mandibles* rather acutely bidentate at their apex. *Labial palpi* four-jointed, the two basal joints elongate, of equal breadth from the base of the first joint to almost the tip of the second joint which is acute, basal joint about half the length of the second, the two apical joints minute, of about equal length and placed at the side and near the apex of the second joint. *Maxillary palpi* four-jointed, the three basal joints rather long and about equal in length, apical joint slender, cylindric, pointed at its apex and about half the length of the third joint; lobe of the maxilla long, slender and moderately curved. *Superior wings* with one marginal and two submarginal cells, the first recurrent nervure uniting with the first transverse nervure, and the second recurrent nervure received by the second submarginal cell a little within its apex. *Abdomen* elongate, sub-linear, slightly narrowed towards the base; apex (♂) incurved.

The specimen upon which I have founded this genus resembles in general form that of *Chelostoma*, but the maxillary palpi are four-jointed. The structure of the antennæ is very singular, having somewhat the appearance of the figure of an antennæ given by St. Fargeau, Hymen. Pl. 26, fig. 6 bis. I have not been able to identify this and the two following genera with any that has been already established.

**A. cylindricus**, n. sp.

*Male*.—Head black, minutely punctured; face below the antennæ

and the cheeks clothed with long, rather dense yellowish-white hairs; vertex sparsely clothed with short pale hairs. Antennæ black. Thorax convex above, rounded in front, black, densely and finely punctured, somewhat shining, clothed with long whitish hairs which are sparse on the upper surface; metathorax more finely punctured, with a deep longitudinal impressed line on its disk. Wings subhyaline, faintly clouded on their apical margins; nervures fuscous. Legs rather long, black, punctured, shining, clothed with rather short pale hairs; femora and tibiæ robust, subclavate, the latter short, especially the intermediate pair; tarsi nearly as long as the femora and tibiæ put together, clothed beneath with dense short yellowish pubescence; claws bifid. Abdomen elongate, cylindric, finely and densely punctured, black, shining, very sparsely clothed with short whitish pubescence, which is more dense toward the tip; apex very much incurved, apical margin rather broadly compressed and somewhat produced; anterior and posterior margins of the segments above compressed, the basal segment rounded and convex in front; ventral segments flat, the basal plate margined posteriorly by a semicircular, well defined carina, on the disk of this plate a small bifid tubercle; on the third or fourth ventral segments there are two oblique tubercles, one on each side of the disk; margins of the segments ciliated with pale yellowish hairs; last ventral segment forcipate, piceous, and fringed with long yellowish hairs. Length  $5\frac{1}{2}$  lines.

*Female*.—Unknown.

*Hab*.—Connecticut. One specimen. Coll. Mr. E. Norton.

#### ALCIDAMEA, nov. gen.

*Head* transverse, as wide as the thorax, *ocelli* placed in a curve on the vertex; *antennæ* ( $\text{♂}$ ) half as long as the thorax, scape rather long and very robust, slender at base, joints of the flagellum compressed, submoniliform, of nearly equal length, slightly attenuated towards the tip, apical joint suddenly constricted into a slender curved spine, rather acute at tip. *Labial palpi* four-jointed, the two basal joints elongate, slender, the second joint about one-third longer than the basal, the two apical joints minute, placed at the apex of the second joint. *Maxillary palpi* four-jointed, the first two joints robust, the basal joint short, about half the length of the second, the third and fourth joints more slender, cylindric, the third about twice the length of the apical joint; lobe of the maxilla very long, slender and much curved. *Superior wings* with one marginal and two submarginal cells, the second submarginal cell receiving the two recurrent nervures. *Abdomen* subovate, convex above; slightly incurved in the males, and the second ventral segment more or less produced on the disk.

This genus is also allied to *Chelostoma* and *Heriades*, but differs by the four-jointed maxillary palpi. It approaches *Andronicus*, but differs in the shape of the labial and maxillary palpi, and also in the structure of the ♂ antennæ, which is again remarkable in this genus; the abdomen is neither elongate or cylindrical. Two species, both males, are at present known to me.

1. *A. pilosifrons*, n. sp.

*Male*.—Head black, minutely punctured, clothed with long yellowish-white pubescence, which is very dense on the face; scape of the antennæ black, the flagellum rufo-testaceous beneath, rufo-piceous above. Thorax convex above, densely and finely punctured, black, shining, densely and uniformly clothed above and beneath with rather long yellowish-white pubescence; tegulæ rufo-piceous, shining. Wings hyaline; nervures blackish. Legs simple, black, shining, sparsely clothed with pale hairs; tibial spurs testaceous; apical joints of the tarsi ferruginous, claws bifid, tipped with black. Abdomen subovate, black, shining, finely punctured, convex above, rather flat beneath, apex incurved and pointed; each segment having an apical marginal fringe of short white pubescence, sides of the segments clothed with pale hairs; on each extreme side of the sixth segment posteriorly a stout acute tooth; apical segment narrow, pointed, carinated above; beneath, the second ventral segment has on its disk a rather large, transverse, obtuse projection; the last segment forcipate, rufo-testaceous. Length 4 lines.

*Female*.—Unknown.

*Hab*.—Connecticut. One specimen. Coll. Mr. E. Norton.

2. *A. producta*, n. sp.

*Male*.—Head black, finely and densely punctured; face on each side, the cheeks and the vertex sparsely clothed with rather short whitish pubescence; antennæ black, the flagellum tinged with rufo-testaceous in front and towards their tips. Thorax black, finely and densely punctured, subopaque, clothed with whitish pubescence which is short on the disk above and long on the pleura, scutellum and sides of the metathorax; tegulæ black, shining. Wings subhyaline; nervures fuscous. Legs black, sparsely clothed with short pale hairs; tarsal claws bifid. Abdomen subovate, convex above, black, shining, finely punctured, apex incurved and pointed, each segment with a narrow apical

marginal fringe of short white pubescence, interrupted on the middle of the segments; on each extreme side of the sixth segment posteriorly, a short stout rather obtuse tooth; apical segment narrow, pointed, and carinated on each side above; beneath, the second ventral segment has its disk produced into a large somewhat acute tubercle; posterior margins of the third, fourth and fifth ventral segments carinated, the carina interrupted in the middle. Length  $3\frac{1}{2}$  lines.

*Female*.—Unknown.

*Hab*.—Virginia. One specimen. Coll. Ent. Soc. Phila.

Allied to *A. pilosifrons* n. sp., but not so hairy, the apical segment of the abdomen not so narrow, the projection of the second ventral segment much larger and more acute. The structure of the antennæ is exactly the same in the two species.

#### MONUMETHA, nov. gen.

*Head* ♂ transverse, as wide as the thorax, ♀ subquadrate, rather wider than the thorax; *ocelli* placed in a curve on the vertex; *antennæ* filiform, rather short; *mandibles* stout, deeply bifid at tip. *Labial palpi* four-jointed, two basal joints elongate, first joint rather more than half the length of the second; the two apical joints minute, about equal in length, slender at base, thickened and truncate at tip, placed at the side and near the apex of the second joint. *Maxillary palpi* five-jointed, the two basal joints robust, first joint very short and about half the length of the second; third and fourth joints about equal in length and longer than the second joint; apical joint slender, cylindric, pointed at tip. *Superior wings* with one marginal and two submarginal cells, the second submarginal cell receiving the two recurrent nervures. *Abdomen* ♂ sublinear, convex above, apex incurved, claws bifid; ♀ subovate, rather short, furnished beneath with a short dense pollen-brush; claws simple.

Also allied to *Chelostoma* and *Heriades*, but distinct by the five-jointed maxillary palpi.

##### 1. *M. argentifrons*, n. sp.

*Male*.—Head black, finely punctured, clothed about the base of the antennæ and on the vertex with long yellowish hairs; clypeus flat, clothed with short silvery-white decumbent pile, anterior margin truncate, and slightly emarginate in the middle; antennæ black, rather short. Thorax black, clothed with rather long dense yellowish-white hairs. Wings hyaline, apical margins clouded, nervures black. Legs black, shining; anterior femora clothed beneath with long whitish hairs; tarsi clothed within with fuscous pubescence. Abdomen elou-

gate, cylindric, convex above, finely and densely punctured, shining, black; apical segments very much incurved; the five basal segments with an apical fringe of whitish pubescence, more dense on the two first segments and narrow on the others; apical segment obtuse, abruptly depressed above into a large deep fovea; ventral segments flattened, with several small obtuse projections; apical segment forcipate. Length  $5\frac{1}{2}$  lines.

*Hab.*—Pike's Peak, Colorado Territory. Two specimens. Coll. Ent. Soc. Phila.

2. *M. obsoleta*, n. sp.

*Male.*—Head black, finely and densely punctured, sparsely clothed with pale hairs, which are more dense about the insertion of the antennæ; clypeus flat, clothed with short decumbent silvery-white pile, its apical margin truncate; antennæ black, the flagellum tinged with rufo-piceous towards the tip. Thorax black, finely and densely punctured, rather sparsely clothed with whitish hairs which are short in front and beneath, and long on the scutellum and metathorax, the latter longitudinally impressed on the disk. Wings subhyaline, stained with fuscous towards the tip; nervures dark fuscous. Legs black, sparsely clothed with short pale hairs, which are long and white on the anterior femora beneath. Abdomen elongate, cylindric, convex above, finely punctured, shining, black; apical segments very much incurved; the apical margins of the second and three following segments with an obsolete fringe of pale pubescence; apical segment depressed as in *M. argentifrons*; ventral segments flattened, and having on each side a short obtuse projection, apical segment forcipate, tinged with rufo-piceous. Length  $5\frac{1}{2}$  lines.

*Hab.*—Pike's Peak (Coll. Ent. Soc. Phila.), Hudson's Bay Territory (Coll. Mr. E. Norton).

Closely resembles the preceding species in size and form, but is evidently distinct; the wings are differently colored and the clypeus is not emarginate in front. The specimens are apparently somewhat rubbed. It answers tolerably well to the description of *Chelostoma albifrons* Kirby, but it cannot belong to that genus as it has the maxillary palpi five-jointed instead of three.

3. *M. borealis*, n. sp.

*Female.*—Head rather large, black, finely and densely punctured,



face about the antennæ thickly clothed with yellowish hairs, the clypeus, vertex and cheeks clothed with black hairs; mandibles very stout, carinated above, tip broad, with two or three stout teeth, the outer one acute, the others blunt; antennæ short, black. Thorax convex above, finely and closely punctured, densely clothed above with yellowish-white hairs, beneath with black hairs. Wings subhyaline, slightly tinged with fuscous, especially the marginal cell, at the apex of the second submarginal cell a faint hyaline spot; nervures black. Legs black, clothed with black hairs, the tarsi with fuscous hairs. Abdomen convex above, short, subovate, minutely punctured, black and shining; on the apical lateral margins of the first and second segments above a tuft of whitish pubescence (the surface being apparently rubbed, all the segments, in well-preserved specimens, may have their entire apical margins fringed with whitish pubescence); ventral scopa short and black. Length  $6\frac{1}{2}$  lines.

*Hab.*—Great Slave Lake, British America. One specimen. Coll. Smithsonian Institution.

This may eventually prove to be the female of *M. argentifrons*, as it bears some resemblance to that species.

#### Gen. CERATINA, Latr.

“*Head* transverse, the *ocelli* placed in a triangle on the vertex; the *labrum* subquadrate; the *mandibles* short and stout, tridentate at their apex. The *labial palpi* four-jointed, the two basal joints elongate, the third and fourth minute, placed at the side and near the apex of the second joint. The *maxillary palpi* six-jointed, the three basal joints of about equal length; subclavate, the apical joints minute. The *superior wings* with one marginal and three submarginal cells; the second submarginal cell receiving the first recurrent nervure a little beyond the middle, the third submarginal receiving the second recurrent nervure also beyond the middle. *Abdomen* clavate.”—Smith, *Bees of Great Britain*, p. 193.

Two species of these little bees are known to me, one of which (*C. dupla*, Say,) is rather abundant, and is said to excavate the pith of our common Mullein (*Verbascum Thapsus*). Four species have been described from Panama. I have not seen any of them.

##### 1. *C. dupla*, Say.

*Ceratina dupla*, Say, Bost. Jour. Nat. Hist. i, p. 399. (1837.)

*Female.*—Body dark green, sometimes varying to deep blue, shining, densely punctured. Head rather large, the face on each side

above the clypeus depressed, the antennæ inserted in the depressions; clypeus sparsely punctured with a longitudinal obconic yellowish-white spot on the disk, which is sometimes obsolete or wanting; labrum clothed with short suberect pale hairs; antennæ short, black, slightly tinged with green or blue. Thorax with the punctures more or less sparse on the disk which has five slightly impressed longitudinal lines, the two lateral ones abbreviated in front; posterior half of the tubercles white, anterior half black; tegulæ piceous, smooth and shining. Wings subhyaline; nervures blackish. Legs black, tinged with green or blue, shining, sparsely hairy; extreme base of the tibiæ exteriorly with a small whitish spot which is sometimes obsolete; apical joints of the tarsi rufo-testaceous. Abdomen rather short, ovate, when the segments are distended it is more or less clavate; convex above, sparsely punctured on the disk of the three basal segments and more dense on the apical segments; extreme tip of the apical segment acute; ventral segments flat, densely and rather deeply punctured and clothed with pale hairs especially toward the tip. Length 2—4 lines.

*Male*.—Resembles the female, but the head is smaller, the clypeus has on its disk a yellowish-white mark which is suddenly and broadly dilated on each side along the anterior margin, somewhat resembling a trefoil; the labrum has a yellowish-white spot in the middle, and the sixth segment of the abdomen above has on its disk a small more or less obtuse tubercle which is, as well as the apical margin of the segment, densely clothed with whitish pubescence.

*Hab*.—Mass., Conn., N. Y., N. J., Penn., Del., Va., Ill. Numerous specimens. Coll. Ent. Soc. Phila., and Mr. E. Norton.

This pretty little bee is rather common, and varies considerably both in size and color.

2. *C. Tejonensis*, n. sp.

*Male*.—Body dark bluish-green, shining. Head deeply but not densely punctured, the punctures very sparse on the clypeus which has a whitish subtrefoil mark, similar to that on the ♂ of *dupla*; the labrum sparsely punctured with short pale pubescence, and having on its disk a quadrate whitish spot; the antennæ rather short, inserted in a depression on each side of the face above the clypeus, tinged with rufo-testaceous towards the tip. Thorax sparsely punctured, with five slightly impressed longitudinal lines as in *dupla*, the punctures on

the pleura, the scutellum and post-scutellum are dense; tegulæ dark rufo-piceous, smooth and shining; tubercles entirely green-black. Wings subhyaline; nervures black. Legs bluish-black, shining, tarsi clothed with yellowish pubescence, apical joints rufo-testaceous; posterior femora produced beneath into a broad obtuse tooth; tibial spurs testaceous. Abdomen ovate, finely and densely punctured, shining bluish-green, apical segment clothed with short pale pubescence; near the posterior margin of the sixth segment above there is an obtuse projection which is densely clothed with pale pubescence; apex of the seventh segment fringed with rather long pale hairs; ventral segments densely and finely punctured, the apical margin of the segments ciliated with pale pubescence. Length  $4\frac{1}{2}$  lines.

*Hab.*—Fort Tejon, California. One specimen. Coll. Mr. E. Norton.

Resembles *C. dupla* Say, but distinguished at once by the finer punctuation of the abdomen, and the shape of the posterior femora. The tubercles and tip of the tibiæ are without the whitish spots which are conspicuous in *dupla*.

### 3. *C. eximia*, Smith.

*Ceratina eximia*, Smith, Trans. Ent. Soc. Lond. 3d ser. i, p. 40. (1862.)

“*Female*. Length  $4\frac{1}{2}$  lines.—Head and thorax of a bright metallic green, and strongly and closely punctured; the flagellum obscurely rufo-piceous beneath; an oblong spot on the clypeus and a minute triangular one on each side, cream-colored; the mesothorax with three longitudinal impressed lines in the middle, and an abbreviated one outside opposite the tegulæ; the wings subhyaline, the nervures and tegulæ ferruginous; the legs pale ferruginous, and thinly covered with cinereous pubescence; a minute spot at the apex of the anterior femora above, and a line on the tibiæ; also a minute spot at the extreme base of the posterior tibiæ, white. Abdomen bright purple, finely punctured, the three apical segments rugose.”

*Hab.*—Panama.

### 4. *C. placida*, Smith.

*Ceratina placida*, Smith, Trans. Ent. Soc. Lond., 3d ser. i, p. 41. (1862.)

“*Female*. Length  $3\frac{1}{2}$ —4 lines.—Dark bronze color, with tints of bright green on the head and thorax; a triangular spot on the clypeus anteriorly, and a similar spot on each side of it touching the eyes, the latter sometimes continued up the inner orbit of the eyes, yellowish

white; a narrow line behind the eyes; the head strongly and closely punctured; the flagellum piceous beneath. Thorax strongly punctured, with a smooth shining space in the middle of the disk; the mesothorax with three central smooth impressed lines, and an abbreviated one outside of them opposite the tegulæ; the wings subhyaline, the nervures blackish; the legs nigro-piceous; a process in front of the anterior femora at their base, which is produced into an acute spine on each side. The abdomen strongly punctured, the three apical segments rugose; beneath bright green."

*Hab.*—Panama.

The two following species of this genus, described from Cayenne, are also recorded as having been collected at Panama:

5. *C. punctulata*, Spin.

*Ceratina punctulata*, Spin., Ann. Soc. Ent. Fr. x, p. 139 (1841); Smith, Trans. Ent. Soc. Lond. 3d ser. i, p. 40.

"The specimens from Cayenne, described by Spinola, only differ from those from Panama in having a white spot on the labrum: I have little doubt of their identity."

6. *C. læta*, Spin.

*Ceratina læta*, Spin., Ann. Soc. Ent. Fr. x, p. 138; Smith, Trans. Ent. Soc. Lond. 3d ser. i, p. 40.

Gen. **EPEOLUS**, Latr.

"*Head* transverse, the *ocelli* placed in a curve on the vertex; the *labrum* transverse-ovate, the anterior margin sub-emarginate, with a minute tooth in the centre of the emargination, the angles produced; in the middle, two minute teeth placed in a line with the angles of the emargination. The *labial palpi* four-jointed, about one-fifth shorter than the labium; the two basal joints elongate, the first joint one-third longer than the second, the two apical joints minute, placed at the apex of the second joint; the *paraglossæ* short and lanceolate. The *maxillary palpi* one-jointed, the joint ovate and minute. The *superior wings* having one marginal and three submarginal cells, the marginal cell elongate-ovate, slightly narrowed towards the apex; the first submarginal cell nearly as long as the two following, the second much narrowed towards the marginal, and receiving the first recurrent nervure a little beyond the middle; the second submarginal also much narrowed towards the marginal cell, and receiving the second recurrent nervure a little beyond the middle. The *legs* have the calcaria and claws simple. *Abdomen* oblong-cordate."—Smith, *Bees of Great Britain*, p. 143.

These pretty bees are easily recognized by the yellowish-white or cinereous bands of the abdomen. The abdomen is acute in the males.

and obtuse-truncate in the females; the fifth segment in the latter sex has on its disk above, a subtriangular depressed space, somewhat rugose, and clothed with short decumbent hairs which sometimes have a silvery reflection in certain lights. Only four species of this genus are at present known to me; three of these are very abundant in August, on flowers in the neighborhood of Philadelphia. They are easily captured, being very sluggish in their habits.

1. *E. remigatus*, Fabr.

*Melecta remigata*, Fabr. Syst. Piez. p. 387 (1804).

*Female*.—Head black, shining, finely punctured, interspersed with larger punctures on the clypeus, clothed with a few yellowish hairs above the antennæ and on the vertex; a small impressed puncture on each side of the clypeus. Antennæ black. Thorax black, opaque, finely punctured, above yellowish-white, with a large cordate black mark occupying nearly the whole disk; anteriorly, the middle black lobe is prolonged to the collar, the lateral lobes short; the collar, an angulated mark on each side of the pleura almost covering the tubercles and extending half-way down the sides of the pleura and then suddenly angulated posteriorly, yellowish-white. Scutellum black, with the posterior margin and two small spots close together on the middle of the anterior margin, and the post-scutellum yellowish-white; a tuft of long pale hairs on each side behind the base of the wings. Wings fusco-hyaline. Legs black or brown-black, sparsely clothed with short pale glittering pubescence. Abdomen black, opaque, minutely punctured; basal segment yellowish-white, interrupted on the disk by a longitudinal black line which is dilated on its middle; the second segment has a yellowish-white band, slightly interrupted on the disk and very much dilated on each side; the third and fourth segments have on their apical margins a narrow uninterrupted yellowish-white band; the fifth segment has on each side a small cinereous spot; beneath brown-black, shining. Length 6 lines.

*Male*.—Like the female, except that the fifth and sixth segments of the abdomen above have fasciæ like those on the third and fourth segments.

*Hab*.—Pennsylvania and New Jersey. Coll. Ent. Soc. Phila., and Mr. E. Norton.

Easily distinguished by the large cordate black spot on the disk of the thorax, and by the whitish band of the second segment of the abdomen above being broadly dilated on each side.

2. *E. lunatus*, Say.

*Epeolus lunatus*, Say, Long's 2nd Exped. ii, p. 354, ♂ ♀ (1824).

*Female*.—Head black, densely punctured, those on the clypeus and labrum very fine, close and interspersed with larger punctures; labrum and a spot on the mandibles rufous; a patch of yellowish sericeous pubescence around the base of each antenna; occiput fringed with pale hairs. Antennæ black, three basal joints rufous, especially in front. Thorax black, densely, finely and confluent punctured; the disk with a longitudinal impressed line; a line over the collar almost encircling the tegulæ and extending backwards, sometimes obliquely, on each side of the pleura, a line over the insertion of the wings, sometimes bordering the posterior margin of the mesothorax, two short abbreviated lines on the disk of the metathorax anteriorly, the posterior margin of the scutellum, the post-scutellum, and an angulated patch, pointed within, on each side of the metathorax, all pale yellowish; scutellum black, subbilobate on the disk and having on each side a slightly divergent, stout, rather acute tooth; on each side of the post-scutellum a tuft of long yellowish-white hairs; tegulæ rufous. Wings fuscohyaline, apical margins darker. Legs rufous, clothed with very short silvery-white pile, especially the posterior legs and trochanters; the coxæ, trochanters and femora more or less stained with blackish. Abdomen opaque velvety-black, minutely punctured; basal segment pale yellowish, interrupted anteriorly and posteriorly, and on the disk by a rather large transverse triangular black spot; apical margin of the second, third and fourth segments pale yellowish; the fifth segment has on each side a triangular cinereous patch; beneath black, the segments sometimes obsoletely margined with cinereous. Length 5—6½ lines.

*Male*.—Differs from the female in having the labrum, mandibles, three basal joints of the antennæ, the tegulæ and legs mostly black, sometimes obsoletely tinged with rufous; the fourth, fifth and sixth segments of the abdomen above have their posterior margins cinereous; the apical segment is narrow and rounded at tip, and silvery in certain lights.

*Hab.*—Conn., Penn., Del., Va., Ill. Collection Ent. Soc. Phila., and Mr. Edward Norton.

The yellowish markings of this, as well as of the other species, are composed of appressed scale-like pubescence, and the color sometimes varies to a very pale yellowish-white or cinereous.

I cannot agree with Mr. Smith (Brit. Mus. Cat. ii, p. 256), that this species is identical with *E. remigatus* Fabr., for I have examined numerous specimens of both species and find that the characters which separate them are constant and with no intermediate grades of variation. In *lunatus* the face about the insertion of the antennæ is always yellowish, in *remigatus* it is black in all the specimens I have examined; in the ♀ *lunatus* the labrum, the three basal joints of the antennæ, the tegulæ and the legs are always rufous, in *remigatus* they are always black; the yellowish band on the second abdominal segment of *lunatus* is narrow and not dilated laterally as is always the case in *remigatus*, and the dorsum of the mesothorax in *lunatus* has only two short longitudinal lines, whereas *remigatus* has the mesothorax above yellowish-cinereous, with a large cordate black spot on the disk, or as Fabricius describes it, "*macula magna, dorsali antice triloba nigra.*"

### 3. *E. mercatus*, Fabr.

*Epeolus mercatus*, Fabr. Syst. Piez., p. 389 (1804).

"Small. Head black, clypeus shining, with silvery pubescence. Thorax black, with a yellowish line on the anterior and posterior margins. Abdomen black, with five cinereous bands. Feet rufous.

"*Hab.*—Carolina."

I have not seen this species. It seems intermediate between *E. lunatus* Say, and *E. donatus* Smith. Say thought it distinct from his *lunatus*, and Mr. Smith indicates it as being in the Collection of the British Museum.

### 4. *E. 4-fasciatus*, Say.

*Epeolus 4-fasciatus*, Say, Western Quarterly Reporter, p. 81 (1823).

"Body deep opaque black; three basal joints of the antennæ, clypeus and labrum, rufous; front around the base of the antennæ, yellow; thorax with an anterior and posterior yellow line, the latter so arquated as nearly to attain the former; a broader line beneath the wings; beneath the scutel a whitish band and two oblique lanceolate spots; tergum, 4-banded with yellow, first band very broad, interrupted

by a line which is very slightly dilated in the middle; remaining bands narrower, submarginal, entire; terminal segment with an oblique yellow lateral spot; feet rufous. Length three-fifths of an inch.

“*Hab.*—Arkansa. On flowers near the Rocky Mountains. It is much larger than *E. mercatus* F.”

I have not seen any specimens which answer exactly to the above description, but with the exception of the rufous clypeus, and the absence of the two short medial lines of the thorax, it agrees with *E. lunatus* Say, and may possibly be a bright colored variety of that species.

5. *E. donatus*, Smith.

*Epeolus donatus*, Smith, Brit. Mus. Cat. ii, p. 256, ♂ ♀ (1854).

*Female.*—Head black, densely and finely punctured, interspersed with larger punctures on the clypeus, a patch of silvery pubescence on each side of the face above the clypeus. Antennæ black. Thorax black, densely, finely and confluent punctured, somewhat shining; a line on the collar, an irregular mark behind the tubercles which it margins posteriorly, two short lines on the disk anteriorly which are usually obsolete, the posterior margin of the thorax and scutellum, sometimes a line over the wings, the post-scutellum, and a curved line on each side of the metathorax, cinereous; a tuft of cinereous hairs on each side behind the base of the wings. Wings fusco-hyaline. Legs black, having a thin glittering pubescence. Abdomen black, minutely punctured, somewhat shining; basal segment margined with cinereous, the basal and apical margins interrupted on the disk, the apical margins of the second, third and fourth segments cinereous, sometimes slightly interrupted on the disk; on each side of the second segment there is sometimes a cinereous spot or line proceeding from the apical band; the fifth segment with a triangular cinereous patch on each side; beneath black, shining. Length 6 lines.

*Male.*—Like the female, except that the fifth and sixth segments of the abdomen above have each an apical cinereous band like those on the two preceding segments; tibiæ and tarsi and the apical margins of the ventral segments have a cinereous pubescence. The wings are sometimes hyaline.

*Hab.*—Conn., N. J., Penn., Del. Coll. Ent. Soc. Phila., and Mr. E. Norton.



Differs from *E. lunatus* Say, by the markings being always cinereous, by the face having a silvery-white pubescence, by the labrum, antennæ, tegulæ and legs being always black and clothed with a very fine, short, silvery-cinereous pubescence, by the more hyaline wings, and by the basal segment of the abdomen above being only narrowly margined with cinereous. Among the many specimens of this species that I have examined, I find no intermediate grades of variations between this and *E. lunatus* Say.

6. *E. scutellaris*, Say.

*Epeolus scutellaris*, Say, Long's 2nd Expedition, ii, p. 355, ♀. (1824.)

"*Female*.—Body deep black, densely punctured; front with a white spot surrounding the base of each antenna; antennæ black-brown, three basal joints and mandibles rufous; thorax with the collar, obsolete line over the wings, dilated posterior teeth and scutel, ferruginous; wings dusky on their terminal margin; feet rufous; tergum black-brown; two distant bands on the first segment, of which the first is obsolete, and the other is interrupted in the middle, second and third segments each with a band on their posterior margins, pale yellow; remaining bands indistinct. Length from three-tenths to nearly seven-twentieths of an inch.

"*Hab*.—Middle States.

"Much smaller than the preceding, and about equal in size to *E. mercatus* Fabr., from which it differs by various characters, and particularly by the much more dilated form of the posterior thoracic teeth."

Not seen.

7. *E. zonatus*, Smith.

*Epeolus zonatus*, Smith, Brit. Mus. Cat. ii, p. 257. ♀. (1854.)

"*Female*. Length 4 lines.—Head and thorax black, the antennæ, labrum and mandibles ferruginous, the face has a little silvery pubescence. Thorax encircled with ferruginous; the collar, sides of prothorax, tegulæ and scutellum being red, the scutellum armed on each side with a short stout acute tooth; legs ferruginous, the wings fusco-ferruginous, the nervures ferruginous. Abdomen, the two basal segments ferruginous, the apical ones black; the apical margins of the segments have fasciæ of short white pubescence, usually much interrupted; the extreme base of the abdomen black.

“*Male*.—This sex differs in having the apex of the clypeus ferruginous, and only the basal segment of the abdomen of that color.

“*Hab*.—United States; St. John’s Bluff, East Florida.”

Unknown to me.

8. *E. fumipennis*, Say.

*Epeolus fumipennis*, Say, Bost. Journ. Nat. Hist. i, p. 403. (1837.)

“Body densely punctured, black; head carinate between the antennæ: antennæ honey-yellow at base, beneath: labrum with an obsolete, minute, ferruginous dot each side: mandibles honey-yellow at base: thorax with two slender whitish abbreviated lines and whitish lateral edge: collar with a ferruginous disk, contracted in the middle; a ferruginous dot before the wings: wing-scale and scutel ferruginous: wings fuliginous: tergum, first and second segments with a yellow band, the first broader and widely interrupted; remaining segments with a whitish band, the last segment with the addition of an obscure rufous terminal margin: tibiæ and tarsi honey-yellow. Length three-tenths of an inch.

“*Hab*.—Mexico.

“The *lunatus* nob. also has a bilineated thorax, but it is a larger species, has a whitish spot around the base of the antennæ; lunated spot at base each side of the tergum, &c. Smaller than *mercatus* F. and *scutellaris* nob.”

Unknown to me.

9. *E. pusillus*, n. sp.

*Female*.—Head black, finely and densely punctured, the face about the base of the antennæ silvery-white; labrum tinged with rufous on each side; mandibles rufous; antennæ black, as long as the thorax, the three basal joints rufous in front. Thorax finely and densely punctured, black, opaque; a line over the collar passing down on each side behind the tubercles, another line in front of the scutellum extending forward, rather obsoletely, over the base of the wings, two short longitudinal lines on the disk in front, the posterior margin of the scutellum, the post-scutellum, and a patch on each side of the metathorax, all pale cinereous; the tubercles, tegulæ and legs rufous, the latter somewhat clothed with short glittering pile. Wings hyaline, with their apical margins fuscous. Abdomen rather short, opaque velvety black, finely and densely punctured; base of the first segment and the apical mar-

gins of four basal segments, cinereous, that on the second segment slightly interrupted in the middle; fifth segment cinereous, with the depressed space small and silvery in certain lights; beneath brown-black, disk of second segment stained with rufous, and the apical margins of the segments obsoletely fringed with cinereous. Length 3 lines.

*Hab.*—Massachusetts. One specimen. Coll. Mr. F. G. Sanborn.

Rather smaller than *E. variegatus* of Europe, and marked somewhat like *E. donatus* Smith, but distinct from any described species.

#### Gen. **CÆLIOXYS**, Latr.

“*Head* as wide as the thorax; the *ocelli* placed in a triangle on the vertex; the *eyes* lateral, elongate, and covered with pubescence. The *labial palpi* four-jointed, the basal joints elongate, the second rather longer than the first, the third and fourth minute, placed at the side and near the apex of the second joint. The *maxillary palpi* three-jointed, the basal joint very short, thick and subglobose; the second joint not so thick, but of about the same length; the apical joint of equal length, but slender and cylindric. The *labrum* elongate, transverse at the base and produced at the lateral angles. *Thorax* globose, the *scutellum* armed with a tooth on each side; the *superior wings* with one marginal and two submarginal cells; the marginal cell narrow, elongate, and rounded at the apex; the second submarginal cell receiving the two recurrent nervures, the first near its base, and the second near its apex. *Abdomen* conical, acute at the apex in the females; in the males the apex is dentate. The *claws* simple in the females; in the males bifid at their apex. The males have their anterior coxæ toothed.”—Smith, *Bees of Great Britain*, p. 144.

These bees are parasitic on the genus *Megachile*. They are easily known by their conical abdomen, which is acute at tip in the females and armed with spines in the males. They are generally black, strongly punctured and having the abdominal segments fringed with white pubescence; the scutellum is produced, posteriorly and armed on each side with a short or long, stout tooth, and the segments of the abdomen, in most species, have a more or less deep transverse impressed line on their middle.

In separating our species, I have used Dr. Nylander's excellent specific characters, i. e., the form of the anal plates of the ♀ abdomen; the upper and lower plates differ in shape and are constant in each species; the inferior plate is more or less longer than the superior, being in some species only slightly longer, and in others nearly half as long again. The males are very difficult to determine, and their habits will have to be studied well before they can be correctly separated.

1. *C. rufitarsus*, Smith.

*Celiorys rufitarsus*, Smith, Brit. Mus. Cat. ii, p. 271, ♂ (1854.)

“*Male*. Length  $5\frac{1}{4}$  lines.—Black, the head and thorax coarsely punctured, the face covered with white pubescence, the cheeks and the thorax beneath have a long white pubescence as well as the sides of the metathorax, the tegulæ testaceous in the middle, the wings subhyaline, their nervures ferruginous, all the tarsi bright ferruginous; the apical margins of all the segments have a white marginal fascia; the fifth segment has on its apical margin laterally a short blunt tooth, the sixth has a more acute one on each side in the middle, the apex having four teeth, placed two above and two beneath, the latter being the longest and most acute.

“*Hab.*—United States.”

Not seen. *C. dubitata* Smith, is most probably the female of this species.

2. *C. dubitata*, Smith.

*Celiorys dubitata*, Smith, Brit. Mus. Cat. ii, p. 272, ♀. (1854.)

*Female*.—Head black, clothed with yellowish-white pubescence, which is longer about the insertion of the antennæ and on the apex of the clypeus; vertex deeply and roughly punctured. Antennæ black. Thorax black, deeply, roughly and rather densely punctured; an obsolete line on the anterior margin, interrupted in the middle, a line over the tegulæ and a spot behind them, two spots in front of the scutellum and an obsolete line behind it, a double line on each side of the pleura continued uninterrupted beneath, of short white pubescence; sides of the metathorax densely clothed with white pubescence; tegulæ black; scutellum with a stout, bent tooth on each side behind. Wings subhyaline, dusky towards the tip; nervures fuscous. Legs black, tip of the femora and the tarsi rufous; the femora and tibiæ clothed with short white pubescence. Abdomen conical, black, shining, distinctly and sparsely punctured; the five basal segments with an apical white marginal fringe; the superior plate of the apical segment finely and densely punctured and having a slight longitudinal carina towards the tip; on each side of the segment the margin is suddenly narrowed at half its length, forming on each side a sharp angle, from which it gradually narrows to the tip which is obtuse and rounded; the inferior plate is lanceolate, longer than the superior and very slightly notched on each side near the tip; ventral segments densely and deeply punc-

tured, and each having an apical white marginal fringe, which is sometimes interrupted in the middle. Length 6 lines.

*Hab.*—Conn., Penn., Del. Four specimens. Coll. Ent. Soc. Phila., and Mr. E. Norton.

Most probably the female of *C. rufitarsus* Smith. It is larger than *C. 8-dentata* Say, from which it differs principally by the more sudden angulation of the lateral margin of the last abdominal segment above, and by the inferior plate having the slight notch on each side removed further from the tip, which is consequently more elongate beyond the notches.

3. *C. 8-dentata*, Say.

*Cæliozygæ 8-dentata*, Say, Long's 2nd Exped. ii, p. 353, ♂; Bost. Journ. Nat. Hist. i, p. 400, ♀.

*Female.*—Head black, deeply and roughly punctured on the vertex, finely punctured on the face which is clothed as well as the cheeks with short whitish pubescence; about the base of each antenna there is a tuft of long yellowish hairs; clypeus fringed with yellowish hairs; antennæ black. Thorax black, deeply, roughly and somewhat densely punctured; a line on the anterior margin which continues down on the sides of the pleura and behind the fore-legs, interrupted on the disk above, a line over the tegulæ and a spot behind them, a short line or two spots before the scutellum as well as its posterior margin, all of short white pubescence; sides of the metathorax densely clothed with white pubescence, the pleura and thorax beneath sparsely so; the posterior margin of the scutellum broadly rounded and armed on each side with a stout, rather acute, slightly divergent tooth; tegulæ ferruginous. Wings subhyaline, apical margins fuliginous; nervures fuscous. Legs ferruginous, the coxæ and sometimes the femora and tibiæ more or less blackish; the femora beneath clothed with short whitish and the tarsi with short yellowish pubescence. Abdomen conical, black, shining, rather deeply but not densely punctured; the posterior margins of the five basal segments above fringed with short white pubescence; the superior plate of the apical segment finely and densely punctured, apex lanceolate, with a slight longitudinal carina; on each side of the segment the margin is rather suddenly narrowed at half its length, forming on each side a subacute angle, from which it narrows to the apex which is rounded and obtuse; the lower plate is lanceolate,

longer than the upper and very slightly notched on each side near the tip which is obtusely pointed; ventral segments black, sometimes stained with rufous and having a posterior white marginal fringe, sometimes slightly interrupted in the middle. Length 5 lines.

*Male*.—Like the female, except that the face is densely clothed with yellowish-white pubescence; the extreme lateral apical margin of the sixth segment produced into a short blunt tooth, the apical segment is produced into two bifurcate processes, the upper teeth short and obtuse, the lower teeth longer, more slender and acute, also a tooth on each side of the segment, broad at base and rather suddenly narrowed towards the tip which is acute.

*Hab.*—N. Y., Penn., Del., Va. Ten specimens. Coll. Ent. Soc. Phila., and Mr. E. Norton.

The legs sometimes varies from ferruginous to almost entirely black. and the white markings of the body sometimes obsolete; the apical segment of the ♀ abdomen of this species has the lateral margins of the superior plate much less suddenly narrowed in the middle than in *C. dubitata* Smith, and the inferior plate is rather shorter and broader. and has the slight notch on each side nearer the tip.

4. *C. brevis*, n. sp.

*Female*.—Head black, the face and cheeks densely clothed with short whitish pubescence, which is more sparse on the elypeus; antennæ black. Thorax black, densely and roughly punctured; a line on the anterior margin interrupted on the disk, a spot behind the tegulæ, a transverse line or two spots before the scutellum, a double transverse line on each side of the pleura and the sides of the metathorax, of short white pubescence; posterior margin of the scutellum rounded and having on each side a stout slightly bent tooth; tegulæ ferruginous. Wings subhyaline, their apical margins clouded. Legs ferruginous, the coxæ and base of the femora black. Abdomen conical, black, shining, rather densely punctured; the five basal segments each with an apical white marginal fringe; apical segment short, densely punctured, and having a longitudinal carina above towards the tip which is obtusely rounded, sides rather abruptly narrowed about the middle; the lower plate longer than the upper, broad and gradually narrowed to the tip, before which on each side is a slight notch; ventral segments black, densely and strongly punctured, the basal seg-

ment has a large spot of white pubescence on its disk and the four following segments have an apical, white, marginal fringe. Length  $4\frac{1}{2}$  lines.

*Male*.—Resembles the female, from which it differs as follows:—The head is larger and has the face densely clothed with rather long yellowish-white pubescence; the abdomen is short, conical, the apex obtuse, the extreme lateral apical margin of the sixth segment is produced on each side into a short blunt tooth; the apical segment produced into two bifurcate processes, the upper teeth short and blunt, the lower teeth a little longer and more acute; on each side of this segment there is a stout acute tooth. Length 4 lines.

*Hab*.—Conn., N. J., Penn., Md. Five specimens. Coll. Ent. Soc. Philad., and Mr. E. Norton.

Resembles the preceding species, but the superior anal plate of the ♀ abdomen is shorter and the sides not so suddenly narrowed as in that species. The males are rather small, short, and robust.

5. *C. mæsta*, n. sp.

*Female*.—Head black, densely punctured, sparsely clothed in front and on the cheeks with short pale pubescence; antennæ black. Thorax black, densely and strongly punctured, the pleura and metathorax especially the sides, clothed with rather long whitish hairs; the scutellum rounded posteriorly and having on each side a short blunt tooth; tegulæ black, smooth and shining. Wings subhyaline, their apical half dusky. Legs black, shining, the tarsi clothed beneath with short yellowish pubescence. Abdomen conical, black, shining, rather sparsely punctured, the four basal segments having a narrow apical white marginal fringe, that on the third and fourth segments subobsolete; apical segment densely punctured, subopaque, depressed towards the tip, which is slender, pointed and having on its disk a slight longitudinal carina; the lower plate slender, much longer than the upper, and having a slight notch on each side near the tip; ventral segment densely and strongly punctured, subopaque. Length 5 lines.

*Hab*.—Connecticut. One specimen. Coll. Mr. E. Norton.

Resembles the two preceding species, but differs in the shape of the apical plates of the abdomen, being longer, narrower and more acute than in those species.

6. *C. modesta*, Smith.

*Cœlixys modesta*, Smith, Brit. Mus. Cat. ii, p. 271, ♀. (1854.)

“*Female*. Length  $4\frac{1}{2}$  lines.—Black, head and thorax covered with large distinct punctures, the face covered with white pubescence. Thorax, a line on the collar, a spot behind the tegulæ, and a line at the base of the scutellum of white pubescence; the sides of the metathorax have some long white hairs, and the legs above are covered with very short white pubescence, the legs rufo-testaceous, as well as the tegulæ and nervures of the wings, the latter fusco-hyaline, darkest towards their apical margins; the scutellum rounded behind and armed on each side with a short bent tooth. Abdomen shining, the punctures scattered, all the segments have fasciæ of white pubescence, frequently interrupted; the apical segment has the lower plate broad, rounded at the apex, and having a minute point in the middle, the margins of the plate fringed with fuscous pubescence.

“*Hab.*—United States.”

I have before me a single ♀ specimen from Pennsylvania (Coll. Ent. Soc. Phila.), which agrees with the above description, except that the tegulæ and legs are rufo-piceous instead of “rufo-testaceous.” The superior plate of the apical segment of the abdomen is a little shorter than the inferior, the posterior half of the plate is depressed, gradually narrowed to the tip which is acute and bent upwards; the lower plate agrees with the description given by Mr. Smith. I have very little doubt of their identity.

7. *C. funeraria*, Smith.

*Cœlixys funeraria*, Smith, Brit. Mus. Cat. ii, p. 272, ♂ (1854).

“*Male*. Length 5 lines.—Black, head and thorax strongly and very closely punctured, the face covered with snow-white pubescence; the thorax has some long white pubescence on the collar, metathorax beneath, and on the sides; wings subhyaline, the nervures ferruginous, the tarsi ferruginous; the scutellum rounded at its posterior margin and armed on each side with a short bent tooth. Abdomen shining, closely and rather strongly punctured; all the segments have a snow-white band on their apical margins, which is narrow in the middle and gradually widened towards the lateral margins and continued uninterrupted on the ventral segments; the apex armed with six teeth,



placed one on each side, and four at the apex placed two above and two below, the lower pair longest and acute.

“*Hab.*—Canada.

“This species closely resembles the *C. vectis* [of Europe], but differs in having snow-white pubescence on the face, continuous bands on the abdomen, and also in wanting the transverse depressions on each segment; the fifth segment also is not produced at its apical lateral margins.”

Unknown to me.

8. *C. lateralis*, n. sp.

*Male.*—Head black, densely and roughly punctured; the face densely clothed with rather long yellow pubescence; antennæ black. Thorax black, densely and roughly punctured, clothed with rather dense, short, yellowish-fuscous pubescence, the sides of the metathorax and the pleura clothed with dense whitish pubescence; scutellum rounded behind, and having a short, blunt, diverging tooth on each side; tegulæ blackish. Wings subhyaline, dusky at tip. Legs black, the coxæ and femora clothed with whitish pubescence. Abdomen subconical, very slightly narrowed towards the tip, the base being narrower than the thorax; black, shining, covered with dense, deep punctures which are more sparse on the disk above; base of the first segment clothed with fuscous pubescence; on each side of the four basal segments the apical margins are fringed with white pubescence, narrowed to a point inwardly, that on the side of the basal segment large and angular; the extreme lateral margin of the sixth segment is produced on each side into a very short blunt tooth; the apical segment is produced into two bifurcate processes, the upper teeth short and obtuse, the lower teeth a little longer, more slender and acute; on each side of this segment there is a straight well developed acute tooth; ventral segments densely and strongly punctured, each having an apical, white, marginal fringe. Length  $5\frac{1}{2}$  lines.

*Hab.*—Pennsylvania. One specimen. Coll. Ent. Soc. Phila.

This is a very neat and distinct species; the sides of the abdomen are almost parallel and unlike any other species known to me. I have not seen the female.

9. *C. alternata*, Say.

*Cælixys alternata*, Say, Bost. Journ. Nat. Hist. p. 401, ♂ ♀. (1837.)

*Female*.—Head black, finely punctured, clothed with short appressed white pubescence, which is rather sparse on the clypeus and vertex; anterior margin of the clypeus rounded and fringed with white pubescence; a slight longitudinal carina between the antennæ; a well impressed puncture on each side of the upper margin of the clypeus; antennæ black. Thorax black, somewhat shining, rather densely and deeply punctured, a transverse impression in front of the scutellum, which is rounded behind, with a stout blunt tooth on each side; a line on the anterior margin of the thorax, curving around to the base of the wings, and a short line in front of the scutellum, white; the pleura, posterior margin of the scutellum, and each side of the metathorax clothed with rather long whitish pubescence; tegulæ piceous, smooth and shining. Wings hyaline, their apical margins slightly clouded; nervures fuscous. Legs black, sparsely clothed with cinereous pubescence; tarsi beneath with dense yellowish pubescence. Abdomen elongate, black, shining, distinctly and rather sparsely punctured, especially on the disk; on each side before the middle of the second and three following segments above, a transverse impressed line, slightly curved downwards and not reaching the disk of the segments, these impressed lines as well as the sides and anterior margin of the first segment and the posterior margin of the first five segments clothed with short white pubescence; sides of the abdomen crenulated, which is caused by the contraction of the segments at their posterior lateral margins; apical segment with its superior plate elongate, lanceolate, sparsely punctured, with a slight longitudinal carina near the tip which is pointed and rather acute; inferior plate a little longer than the superior, rather broad and rounded at the tip which is fringed with fuscous pubescence; beneath densely and deeply punctured, the segments having an obsolete whitish marginal fringe which is interrupted in the middle. Length 6 lines.

*Male*.—"Body black, punctured; the punctures not much crowded; head with short, white hair almost naked on the vertex: front with long, white, dense hair: antennæ, tip of the basal joint obscurely piceous: thorax, an interrupted, arcuated, white line before, curving over the wings; a line before the scutel, and another at its tip, white:

wing-scale dull honey-yellow : wings yellow fuliginous, more dusky at tip: tergum polished, punctures more sparse than on the thorax ; segments, particularly the basal ones, white on their posterior margins ; and each segment excepting the ultimate and basal ones, with a white interrupted band before the middle ; tail concave above, with about ten spines : feet black, more or less piceous : venter banded with white. Length over two-fifths of an inch."

*Hab.*—Indiana (Say) ; Pike's Peak, 2 ♀ specimens. Coll. Ent. Soc. Phila. ♂ not seen.

A very distinct species. The apical abdominal segment of the female is long, and slender at tip ; the inferior plate only slightly longer than the superior.

10. *C. rufipes*, Guér.

*Cœlixys rufipes*, Guér. Icon. Règ. Anim. Ins. p. 452 ; tab. 73, fig. 9.

*Female.*—Head black, sparsely punctured on the vertex, clothed with short decumbent whitish pubescence, which is very dense on each side of the face, on the cheeks and on the apical margin of the clypeus ; antennæ black. Thorax black, sparsely and deeply punctured ; an arcuated line on the anterior margin, interrupted on the disk, a line over the tegulæ ending in a large spot behind, a transverse line in front of the scutellum, a double line on each side of the pleura, the disk of the thorax beneath and the metathorax in greater part, snow-white ; scutellum obtusely angulated behind with a very short blunt tooth in the middle and a rather long, obtuse, slightly divergent tooth on each side ; tegulæ black, smooth and shining. Wings fusco-hyaline, fuliginous at tip ; nervures black. Legs rufous, the coxæ, the femora beneath and the tibiæ outside covered with very short white scale-like pubescence. Abdomen elongate, conical, black above, very glossy, with fine scattering punctures ; the segments having the transverse impressions very faint and the apical margins of the five basal segments fringed with dense snow-white pubescence ; apical segment short, densely and finely punctured, with a well defined longitudinal dorsal carina near the tip which is rounded, and clothed above with rather short erect, blackish hairs ; lower plate longer than the upper, broad towards the base and suddenly constricted towards the tip into a long slender acute spine, densely fringed with long fuscous hairs ; ven-

tral segments dark rufous, sparsely punctured, shining, on the disk of the basal segment a large spot of snow-white pubescence, and the apical margins of the five basal segments rather broadly fringed with snow-white pubescence. Length 8 lines.

*Male*.—"Black, head, except the vertex, covered with very dense yellowish-white silky pubescence. Thorax with two small transverse lines in front, a small longitudinal line on each side near the insertion of the wings, and a fine margin at the base of the scutellum, white; sides of the thorax and the posterior part of the metathorax clothed with white hairs. Abdomen black, shining, with the base of the first segment beneath yellow; each segment margined with white above and beneath; superior anal plate armed with six teeth as in *C. conica*. Wings hyaline, with the extremities slightly smoky. Legs yellow, with a line of white pubescence on the exterior surface of the femora and tibiæ. Length 10 mill."

*Hab.*—Cuba. One specimen. Coll. Ent. Soc. Phila.

A very beautiful and distinct species. The Society is indebted to Mr. P. R. Uhler, for the ♀ specimen from which the above description is taken. The ♂ is unknown to me. Guérin says, "We possess a female which in truth belongs to this species, but we have received it from Mexico. The superior anal plate terminates in a point and is carinated above; the inferior plate is longer, nearly straight, and a little hollowed out on each side towards the extremity." The shape of the anal plates given here does not accord with that of the ♀ specimen from which I drew up the description given above, and therefore either Guérin's ♀ from Mexico, or mine from Cuba belongs to another species.

11. *C. abdominalis*, Guér.

*Cœlioxys abdominalis*, Guér. Icon. Règ. Anim. Ins. p. 453; La Sagra, Hist. Cuba, tab. 19, f. 11.

"Black, with the abdomen and feet yellow. Face covered with somewhat golden-yellow silky pubescence. Anterior margin of the thorax, a small spot over the wings, two spots at the base of the scutellum, of a silky yellow; the hairs behind the eyes, at the extremity of the metathorax and the thorax beneath, white. Margin of the segments of the abdomen and the exterior part of the legs fringed with fine white pubescence. Wings transparent, with the extremity brown; their tegulæ yellow. Superior anal plate armed with six acute spines

in the male. These parts in the female resemble those of the preceding species [*C. rufipes*]. Length 12 to 14 mill.

“*Hab.*—Island of St. Thomas.”

Unknown to me.

In addition to the above, the following European species is said to have occurred in North America. I have not seen any specimens of it taken in this country.

12. *C. quadridentata*, Linn., &c.

*Cœliozeus quadridentata*, Smith, Bees of Great Britain, p. 146.

“*Female.* Length 5 lines.—Black; head and thorax roughly punctured, the face with a yellowish-white pubescence, the anterior margin of the clypeus having a dense pale fulvous fringe; the eyes pubescent. Thorax: the posterior margin of the scutellum obtusely angulate and armed on each side with a short tooth; the wings fusco-hyaline, their margins clouded. Abdomen shining, having scattered deep punctures; the apical segment very closely and finely punctured, subopaque, and having a slight longitudinal carina, the apex of the segment lanceolate; the ventral plate lanceolate, elongate, produced beyond the superior plate, and having a lanceolate appendage at the apex.

“*Male.* Length  $4\frac{1}{2}$  lines.—Black, punctured as in the other sex, the face having a dense silvery-white pubescence; the thorax as in the other sex; the apical segment of the abdomen produced into two stout bifurcate appendages, having on each side at their base a stout straight acute tooth.

“*Hab.*—(Europe;) United States; Trenton Falls,” (Smith).

Gen. **STELIS**, Panz.

“*Head* transverse, the *stemmata* placed in a triangle on the vertex; *antennæ* filiform in both sexes. The *labial palpi* four-jointed, the two basal joints elongate, the basal joint about two-thirds of the length of the second joint, the two apical joints minute. The *maxillary palpi* two-jointed, the joints minute. The *superior wings* with one marginal and two submarginal cells, the marginal cell as long as the two submarginals, its apex rounded; the submarginal cells of about equal length, the second receiving the first recurrent nervure a little beyond the apex of the second submarginal cell, and unites with the abbreviated cubital nervure; the *legs* having the calcaria simple and the claws bifid.”—Smith, *Bees of Great Britain*, p. 151.

1. *S. obesa*, Say.

*Stelis obesa*, Say, Bost. Journ. Nat. Hist. ii, p. 398. (1837.)

“Body robust, convex, punctured, black: nasus, mandibles at base,

orbits anteriorly and abbreviated line behind, yellow: thorax with a yellow, arcuated line each side extending on the anterior margin: scutel somewhat indented towards the tip, margined behind with yellow, which is slightly interrupted in the middle: wings fuliginous; nervures fuscous: tergum, six yellow bands, the anterior one widely interrupted, the others gradually less so to the penultimate one which is confluent; the ultimate one broadest, entire: venter yellowish at base: feet yellowish; thighs and posterior face of the tibiæ partly black. Length over one-fourth of an inch.

“*Hab.*—Indiana.”

“In the abdominal markings it resembles some species of *Anthidium*, but the maxillary palpi have two joints.”

Unknown to me.

2. *S. fœderalis*, Smith.

*Stelis fœderalis*, Smith, Brit. Mus. Cat. ii, 275. ♂ ♀ (1854.)

“*Female.* Length  $2\frac{1}{2}$  lines.—Black, the face covered with griseous pubescence, the flagellum rufo-piceous; the thorax as well as the head strongly punctured, the former has a scattered griseous pubescence, the wings fusco-hyaline, the apical margins of the wings faintly clouded, the apical joints of the tarsi dark ferruginous. Abdomen ovate, shining and closely punctured, the basal segment having on each side a somewhat pear-shaped yellowish-white macula; the four following segments have across the middle a slightly interrupted narrow fascia, the sixth immaculate, its margin entire, rounded.

“*Male.*—Closely resembling the female, the face being more densely pubescent; the five basal segments of the abdomen having a subinterrupted fascia of the same color as in the female, the fasciæ on each side are sinuated on their inferior margins; the apical segment rounded.

“*Hab.*—United States.”

Unknown to me.

3. *S. lateralis*, n. sp.

*Female.*—Head black, densely and rather deeply punctured, sparsely clothed with whitish pubescence; antennæ black. Thorax black, densely punctured, sparsely clothed with whitish pubescence; tegulæ black, shining, punctured. Wings subhyaline, apical margin faintly clouded; nervures fuscous; the second recurrent nervure uniting with the second transverse nervure. Legs black, sparsely clothed with pale pubescence.

Abdomen subovate, convex above, black, finely and densely punctured, sparsely clothed with short pale pubescence; apex incurved; on each extreme side of the three basal segments of the abdomen a rather small ovate yellowish-white spot; on each side of the fourth segment a transverse yellowish-white stripe rather deeply indented posteriorly; on each side of the disk of the fifth segment a transverse yellowish-white spot; apical segment black, rotundate. Length  $2\frac{1}{2}$  lines.

*Hab.*—Pennsylvania. One specimen. Coll. Ent. Soc. Phila.

4. *S. elegans*, n. sp.

*Female.*—Head dark blue, with green reflections, shining, closely punctured; face and cheeks densely clothed with long white pubescence, that above the insertion of the antennæ and on the vertex mixed with fuscous; antennæ black. Thorax same color as the head, shining, closely punctured; rather densely clothed with whitish pubescence; tegulæ greenish-blue, shining, punctured. Wings subhyaline, apical margins faintly clouded, nervures black; the second recurrent nervure received by the second submarginal cell a little within its apex. Legs dark blue, punctured, slightly hairy. Abdomen subovate, convex above, dark blue, shining, finely and closely punctured; apex incurved, clothed with rather short, erect blackish pubescence; on the middle of each of the five basal segments a narrow whitish fascia, interrupted on the disk, and having their posterior margins slightly waved; that on the fifth segment interrupted on the disk and again on each side, making four spots, the extreme lateral ones minute; apical segment immaculate, rotundate. Length 3 lines.

*Hab.*—Pike's Peak, Colorado Territory. One specimen. Coll. Ent. Soc. Phila.

An elegant little species. The termination of the second recurrent nervure in the wings of this and the preceding species does not accord with that mentioned in the generic description given above, and therefore they may not belong to this genus.

## STATED MEETING, MARCH 14.

President BLAND in the Chair.

Seventeen members present.

## DONATIONS TO CABINET.

A fine collection of galls and gall-flies, containing the following species:—*Cynips q. inanis* O. S. ♀; *C. q. petiolicola* Bassett ♀, with galls; *C. q. aciculata* O. S., ♀, with galls; *C. q. operator* O. S. ♂ ♀, with galls; *C. q. sculptus* Bassett, ♂ ♀; *C. q. singularis* Bassett, ♂ ♀, with galls; *C. q. Osten Sackenii* Bassett, ♂ ♀, with galls; *C. q. punctata* Bassett, ♀, with galls, and *Rhodites rosæ* Linn., ♀, with galls, from Homer F. Bassett of Waterbury, Connecticut.

44 DIPTERA (*Helomyza 5-punctata*, *Drosophila adusta*, *Palloptera superba*, *Pachycerina verticalis*, *Sapromyza philadelphica*, *S. compe-dita*, *S. bispina*, *S. quadrilineata*, *Lauxania obscura*, *Tanytus annu-latus*, *T. choreus*, *Ceratopogon setulosus*, *Ctenophora topazina*, *Systro-pus macer*), from E. T. Cresson.

27 LEPIDOPTERA (*Papilio zolicaon*, *Limnitis Lorquini*, *L. eulalia*, *Pieris oleracea*, *Vanessa carye*, *Melitæa chalcedon*, *M. pratensis* ♂ ♀, *M. campestris*, *M. mylitta* ♂, *Cænonympha californica*, *Polyommatus xanthoides*, *P. arota*, *P. helloides*, *P. heteronea* ♂ ♀, *P. sœpiolus* ♂ ♀, *P. pheres* ♀, *P. acmon*, *Pamphila oileus*), from Wm. H. Edwards.

26 DIPTERA (*Psilopus tener*, *Liopè sociabilis*, *Blepharoptera pubes-cens*, *Helomyza plumata*, *Drosophila amœna*, *D. funebris*, *D. quadri-maculata*, *D. tripunctata*, *Lauxania lupulina*, *Corethra punctipennis*, *Ceratopogon bimaculatus*), 1 COLEOPTERA (*Amblychila cylindrifor-mis*), from Dr. Thos. B. Wilson.

9 LEPIDOPTERA (*Smerinthus myops*, *Raphia frater*, Grote (Type), *Catocala relictæ*, *C. concumbens*, *C. nuptula*, *Microcelia vinnula* Grote (Type), *Acronycta noctivaga* Grote (Type), *Ellopiæ ribearia*, *Hypena scabra*), from Aug. R. Grote.



9 DIPTERA (*Gnophomyia luctuosa*, *Tipula fuliginosa*, *Myennis* var. *Ortalis marginata*), from Charles Wilt.

4 DIPTERA (*Ctenophora fumipennis*), from James Ridings.

2 DIPTERA (*Ctenophora rubecula*), from Benj. D. Walsh.

2 DIPTERA (*Ceratopogon rufus*, *Tipula abdominalis*), from Wm. Evett.

#### DONATIONS TO LIBRARY.

*Index alphabeticum-synonymicum Insectorum Hemipterorum Heteropterorum, auctore Dr. Herrich-Schäffer.* 1 Vol. 8vo. From Aug. R. Grote.

The following works were presented by Dr. T. B. Wilson:—

*Histoire Naturelle des Lépidoptères d'Europe, par H. Lucas.* 1 Vol. 8vo.

*Histoire Naturelle des Lépidoptères Exotiques, par H. Lucas.* 1 Vol. 8vo.

*Monographia Anoplurorum Britannicæ. By Henry Denny.* 1 Vol. 8vo.

*Die Käfer der Mark Brandenburg, beschrieben von W. F. Erichson. Erster Band.* 1 Vol. 8vo.

*Chilonidarum et Crambidarum genera et species. Scripsit P. C. Zeller.* 4to.

*Journal of the Academy of Natural Sciences of Philadelphia. New Series.* Vol. 5. Part 4. 4to.

*Proceedings of the Academy of Natural Sciences of Philadelphia,* 1863. Nos. 4, 5 & 6. 8vo.

*Silliman's American Journal of Science and Arts, for January,* 1864. 8vo.

*Revue et Magasin de Zoologie.* 1863. Nos. 10 & 11. 8vo.

*Tijdschrift voor Entomologie. Deel 6, Stuk. 6.* 8vo.

*Naturgeschichte der Insecten Deutschlands, von Dr. W. F. Erichson. Coleoptera. Band 4, Lief. 4.* 8vo.

*Observations on the Natural History of two species of Wasps. By Rev. Edward Bigge, M. A.* 8vo.

*Glanures Entomologiques, par M. Jacquelin Du Val. Cahier 1 & 2.* 12mo.

*British Museum Catalogues. British Lepidoptera, Parts 5, 10 and 12; Part 13, Nomenclature of Hymenoptera; Part 15, Nomenclature of Neuroptera; Part 17, Nomenclator of Anoplura, Euplexoptera and Orthoptera; Part 11, Anoplura, or Parasitic Insects; List of British Curculionidæ, with synonyma, by John Walton. 9 Parts. 12mo.*

#### WRITTEN COMMUNICATIONS.

The following papers were presented for publication in the Proceedings:—

“Description of a new genus and species of North American Noctuidæ, by Aug. R. Grote.”

“Notes on Tenthredinidæ, with descriptions of new species, in the Collection of the Entomological Society, by Edward Norton.”

“On the North American species of the genus *Osmia*, by E. T. Cresson.”

And were referred to Committees.

#### VERBAL COMMUNICATIONS.

Dr. Leidy exhibited twigs of the Sour Gum, *Nyssa multiflora*, on which were specimens of a *Coccus*. This was demi-oval, about  $1\frac{1}{2}$  lines long and 1 broad, mahogany-colored, smooth and shining. Some of the specimens were infested by a fungus parasite, the mycelium of which pervaded the interior of the body converting it into a dense white mass. From the surface there projected nine or ten recurved, pointed stipes from a line to a line and three-fourths long. The specimens were obtained last summer. Since they were collected a hymenopterous parasite had escaped from several of them, one of which was also preserved.

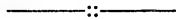
Mr. James Ridings stated that he had noticed many years since upon an Apricot tree, growing in his garden, an insect of a nature somewhat similar he thought to that just spoken of. In appearance it seemed so far as he remembered, like that exhibited by Dr. Leidy, and doubtless was an insect of the same genus, but could not at present undertake to describe it exactly. It was always to be found on the under side of the branches upon which it seemed to feed by some mode of suction. The best idea he could impart to the members of the effect of these

insects on trees was in likening it to that caused by the one best known as the "Mealy Bug," which infested to so great an extent at the present time, the Maple trees of Philadelphia. If persons would only take a little trouble to clean the branches of our trees it would, he believed, be very beneficial to them. The coccus he thought, but would not at present assert the fact, consisted of two broods per annum.

Dr. Leidy remarked that he had noticed the same thing on the Peach, and other fruit trees as that just stated. In his garden he had frequently seen an insect of the same character on the branches of the Rose trees. The only efficacious plan he had yet found was to give the bushes, quite frequently, a good sweeping with a broom. By so doing the covering of the insect is removed, and the insect exposed to the action of the weather, which in most cases is fatal to it.

#### ELECTION.

On ballot, J. C. Brevoort, Esq., of Brooklyn, New York, was elected a *Corresponding Member* of the Society.



### NORTH AMERICAN MICRO-LEPIDOPTERA.

BY BRACKENRIDGE CLEMENS, M. D.

#### LABRADORIAN TINEINA.

##### TINEA.

1. *Tinea biflavimaculella*. Proc. Acad. Nat. Sci. Sept. 1859, p. 257.

A single much mutilated specimen collected in Labrador by Mr. A. S. Packard, Jr., and numbered 1631.

Mr. Stainton remarks in his Observations on American Tineina: This insect is closely allied, if not identical with *Tinea Spilotella* (see Linn. Ent. vi, p. 108, *Rusticella* var. b). *Spilotella* appears confined to the North of Europe, occurring in Finlands and Scotland.

##### ORNIX.

2. *Ornix Boreasella*, n. s.—Fore wings dark fuscous, with two white costal spots, one exterior to the middle of the costa, and the other midway between the first and the apex of the wing: and with two white dorsal spots, one a little interior to the first costal spot, and the other, with some scattered white scales, opposite the second costal spot. Cilia dark fuscous, with a white patch behind

the second dorsal spot, and apparently, a few white scales on the costa behind the tip. The apical spot is not distinct if present, the apex being nearly denuded of cilia and scales.

The single specimen before me is much mutilated and without a head, therefore I was obliged to rely exclusively on the neuration of the wings to determine the genus to which it belonged. Compared with other members of the genus the venation of the wings varies slightly. In the fore wings there are four subcosto-marginal nervules, and the apical nervule, which arises from the middle of the posterior end of the cell, is furcate at its extremity. The median vein is 3-branched. In the hind wings the venation is the same as in other members of the genus, except that the inosculation of the bifid subcostal vein with the tip of the costal, and of the lower branch of the former with the furcate discal nervule, is almost obsolete and very indistinct. The insect appears to resemble *Ornix guttea* of Europe, but cannot be identical, as the spots in *Boreasella* are nearly round instead of triangular as in *guttea*, and the former has but two costal spots while the latter has three.

The specimen was collected in Labrador by Mr. A. S. Packard, Jr., and was numbered 1621.

#### INCURVARIA.

3. *Incurvaria Labradorella*, n. s.—Fore wings fuscous with a brassy hue, with a white band at the basal third of the wing and an opposite dorsal and costal spot of the same hue, at the apical third of the wing, and which nearly meet in the middle of the wing. Cilia concolorous with fore wings. Hind wings fuscous, somewhat iridescent. Head and antennæ dark fuscous.

In the fore wings the apical vein is simple and enters the costa behind the tip. In the hind wings the median vein is 3-branched; subcostal, simple; discal nervules, two. In ornamentation the insect bears strong resemblance to the Elachistæ.

I have before me a single specimen collected by Mr. A. S. Packard, Jr., in Labrador.

#### GELECHIA, Zeller.

Proc. Ent. Soc. Phila. March, 1863, p. 10.

4. *Gelechia brumella*, n. s.—*Second joint of labial palpi, with loose scales beneath, scarcely resembling a brush.* Fore wings ochreous, clouded with dark fuscous at the base of the wing, narrowly along the costa and in the middle of the apical portion of the wing from about the termination of the disc to the tip.

leaving a very irregularly formed, transverse, ochreous stripe, a little exterior to the apical third of the wing. Cilia ochreous. Hind wings dark ochreous.

Head yellowish ochreous? Antennæ dark fuscous. Labial palpi ochreous, middle joint with a fuscous spot at base and one about the middle; terminal joint fuscous at the base, with a slight fuscous ring about the middle.

A single somewhat denuded specimen collected in Labrador by A. S. Packard, Jr., and numbered 1641.

5. *Gelechia Labradoriella*. Proc. Ent. Soc. March, 1863, p. 12.

#### LABRADORIAN TORTICIDÆ.

6. *Anchylopera plagosana*, n. s.—Fore wings ochreous or grayish fuscous, with a dark brown oblique stripe from the middle of the costa to the inner margin beyond the middle, and a shorter parallel one behind the tip of the wing of the same hue, with the extreme apex dark brown. The costa is geminated with white and black from the base to the tip of the wing; exterior to the median stripe, the white costal spots are produced into lines, the pair adjoining it forming an exterior border; between the next stripe and the tip of the wing are two more pairs and beneath the tip, in the cilia, is a pair of white spots; beneath these the cilia are white, tipped with black.

The dark markings in some specimens are brown or ochreous brown and in one the second stripe is cut up by the produced white lines from the costa.

Hind wing fuscous, cilia the same.

Head and labial palpi grayish fuscous. Antennæ blackish-brown.

Three specimens are before me, collected by A. S. Packard, Jr., in Labrador, and one of them is numbered 3009.

7. *Halonota Packardiana*, n. s.—Fore wings dark gray, with two bands of rather dispersed brown scales from the middle of the costa, one of which is rather broad and inclined toward the base of the inner margin, and the other towards the inner angle; between the middle of the costa and the tip of the wing are four geminated white spots, the lines from which alternate with brown stripes. The two bands of scales which diverge from the costa leave on the middle of the inner margin a spot of the general hue. Cilia grayish fuscous. Hind wings fuscous.

I have before me two rather imperfect specimens, collected in Labrador by A. S. Packard, Jr., and numbered respectively 3004 and 3006.

8. *Lozopera? fuscostrigana*, n. s.—Fore wings pale yellowish, costa dark brown geminated with yellowish white, with an ochreous-brown band in the middle of the wing, parallel to the hinder margin. Beyond the median band the wing is dusted or clouded with ochreous-brown.

Head whitish. Antennæ and labial palpi fuscous.

A single specimen not in good condition, collected in Labrador by A. S. Packard, Jr., and without a number.

9. *Antithesia bipartitana*. Proc. Acad. Nat. Sci., Aug. 1860, p. 346.

The Labradorian species show slight modifications in ornamentation. In one specimen the central and basal band is not distinctly separated by a white but a grayish space and the bands themselves are grayish-brown. The dark brown spot in the middle of the wing on the exterior margin of the central band is very distinct in all the specimens. The exterior margin of the central fascia is not straight as in New England specimens, and the apical, white portion of the wing, is more or less varied with dark brown. The hind wings vary from ochreous-brown to dark brown.

I have before me four specimens collected in Labrador by A. S. Packard, Jr.

#### CRAMBITES.

*Crambus albellus*. Proc. Acad. Nat. Sci., June 1860, p. 204.

A single specimen considerably denuded, collected by Mr. A. S. Packard, Jr., and numbered 1642. Labrador.

*Crambus inornatellus*, n. s.—The fore wings are white, immaculate. Hind wings dull ochreous. Head white; labial palpi white, somewhat fuscous exteriorly. Antennæ dark fuscous, white above. Under surface of the fore legs is fuscous.

I have before me a single specimen in good condition, collected by Mr. A. S. Packard, Jr., and numbered 1635. Labrador.

I have a few specimens of Labradorian moths that I will not venture to describe in consequence of their denudation and mutilated condition. Doubtless some of the specimens I have named and described in this paper may belong to the fauna of Northern Europe, a fact which the want of good descriptive works has made it impossible for me to determine.

#### TINEINA OF THE UNITED STATES.

##### WALSHIA, new gen.

This genus is apparently related to the genera *Laverna* and *Chysoclista* and partakes of the characters of each of them.

Hind wings with long cilia, rather long, narrow and lanceolate. The costa is somewhat dilated near the basal third and slightly excised about the middle. Inner margin rounded from the base of the wing to the tip. *The submedian and internal veins are obsolete*, the former

is replaced by a submedian fold. The costal vein is simple. Subcostal vein attenuated towards the base; it appears to be simple, but is really bifid, the point of bifurcation being invisible except by transmitted light under a lens; the lower branch is continued through the disc as a false nervule. The disc is closed, becoming narrower behind or exteriorly. The median vein is very distinct and 4-branched, the three posterior branches being equidistant.

*Fore wings with large thick tufts of scales*, the tips of the wings are bent or turned under, when closed, lanceolate and pointed. The disc is narrow. The subcostal vein has three marginal branches, the first arising from the middle of the disc; the apical branch is furcate and enters the costa before the tip of the wing. Beneath the apical branch are 5 nervules to the inner margin.

Head without ocelli, smooth with appressed scales. Antennæ as long as the body, slightly serrated beneath towards the tip; basal joint rather long, smooth, slender. Labial palpi smooth, moderately long, recurved, not ascending higher than the vertex; second joint slightly compressed, slightly broader than the terminal joint, which is cylindrical, about as long as the middle joint, of uniform diameter and scarcely acute. Maxillary palpi short, distinct. Tongue rather longer than the anterior femora, clothed with scales to the tip, densely at the base.

**W. Amorphella.**—Fore wings yellowish fuscous, with a rather large blackish brown patch at the base of the wing somewhat varied with spots of the general hue, and a blackish-brown tuft, having the scales directed toward the tip of the wing, on the basal third of the fold, and a smaller one above it near the costa. Near the end of the fold is another small tuft of the general hue, having the ends of the scales tipped with dark brown and in the middle of the wing nearly adjoining the latter is a large tuft of the general hue. Above the end of the fold is a small blackish brown tuft, the scales of which are not so much erected as in the other tufts; between this and the central tufts is a blackish brown patch which sends a streak of the same hue into the fold. The apical portion of the wing is somewhat discolored with brown and along the inner margin, at the base of the cilia are five or six black dots. Cilia dull testaceous.

Antennæ fuscous. Head and thorax blackish-brown. Labial palpi yellowish fuscous.

Mr. B. D. Walsh, to whose kindness I am indebted for three specimens of this moth, informs me that the larva burrows in a gall formed on the stem of *Amorpha fructifosa* and undergoes its transformation within it.

**GELECHIA**, Zeller.

Proc. Ent. Soc. Phila., March 1863, p. 10.

**Gelechia? ornatifimbriella**, n. s.—Fore wings dark brownish varied slightly with ochreous. Cilia shining, pale ochreous, dotted with dark brown scales. Hind wings brownish ochreous?

Head dark brown, with ochreous reflections. Antennæ dark brownish. Labial palpi dark brown.

An inconspicuous-looking insect, most probably an aberrant form of the genus, partaking of its characters and those of the group *Depressaria*. In size and general characters it resembles most strongly the Gelechiæ; its neuration is that of this generic group. In the hind wings the subcostal vein is bifid, with an intercostal cell at the base of the wing, between the costal and subcostal veins. The median vein is 3-branched, the disc closed with a central nervule. The form of the wing is trapezoidal, tip slightly produced, and the hinder margin beneath the tip, slightly excised. In the fore wings the venation is as usual in the Gelechiæ.

It differs from the *Gelechiæ*, however, in the structure of the labial palpi, the second joint of which is almost brush-like beneath and the abdomen is somewhat flattened above.

I have two specimens from Illinois, neither of which are in very good condition, received from Mr. B. D. Walsh. They were captured by him in the winter, under the loose bark of trees.

**Gelechia gallægenitella**, n. s.—Fore wings white, but so freely dusted with black as almost to obscure the ground color, especially between the bands. There are three oblique, black bands not distinctly marked, the first within the basal third of the wing, the second near the middle, the third, which is less distinct than the others placed about the apical third of the wing. Along the base of the costal and apical cilia is a line of black dots and the cilia are discolored with blackish; cilia of the inner margin dark gray. Hind wings pale gray; cilia grayish-ochreous.

Antennæ blackish, annulated with whitish. Thorax white dusted with blackish. Head white with the ends of the scales touched with blackish. Labial palpi blackish; middle joint with a central and apical white ring; terminal joint with a basal white ring, and one of the same hue, near the apex, which is blackish.

I have before me a single specimen in good condition, received from Mr. B. D. Walsh of Rock Island, Illinois. He says respecting it: "It is a species of which I have bred two, from the oak-apple galls of *Cynips quercus-spongifica* O. S. There is also a large Tortrix? larva



that eats up the "sponge" of these galls leaving the central cell, the imago of which I do not know, but I suspect its normal food is oak-leaves, because I have found a very large Notodontade larva, which I know usually eats oak leaves, engaged in the same operation. I know nothing of the larva of this species, but am *certain* both imagos came out of these oak-apples."

#### GRACILARIA, Zell.

Proc. Acad. Nat. Sci., Jan. 1860, p. 6. Proc. Ent. Soc. Phil., March 1863, p. 9.

**Gracilaria coroniella**, n. s.—Fore wings dark yellowish, overlaid with purple. Near the middle of the costa is a large triangular, pale yellow patch, the angle of which terminates at the fold of the wing and containing on the costa three or four purplish dots. A little posterior to the triangular patch is a small costal pale yellow spot. The apical portion of the wing is yellowish; cilia is yellowish tipped with black. Hind wings shining gray, cilia dull dark gray.

Head dark yellowish. Antennæ dark fuscous, very slightly annulated with yellowish. Labial palpi yellowish, terminal joint dark brownish exteriorly.

This is a very handsome insect. I have a single specimen from Illinois for which I am indebted to Mr. B. D. Walsh. His specimens were taken in the winter, under the loose bark of trees and consequently the imago hibernates.

#### DEPRSSARIA, Haw.

Proc. Ent. Soc. Phila., Aug. 1863, p. 124.

**Depressaria pulvipennella**, n. s.—Fore wings dark, slightly reddish-ochreous, freely dusted and spotted with blackish-brown. The costa at the base is pale-ochreous and is marked with blackish-brown, short striæ from near the base to the tip. On or near the disc is a blackish shade, or nearly square spot containing a white dot in a short streak thrown from it exteriorly. There is another blackish patch at the base of the fold. The hinder margin is indistinctly dotted with blackish; *cilia with a reddish hue*.

Thorax pale ochreous, dusted with dark brownish. *Face whitish; head touched above with reddish brown*. Antennæ dark brown. Labial palpi dark brownish; middle joint dusted with whitish and the scales beneath touched with reddish; terminal joint blackish with the extreme tip and a central ring reddish-ochreous.

A single specimen from Mr. B. D. Walsh, and a specimen in the collection of the Entomological Society of Philadelphia from the State of Virginia.

Besides the foregoing I am indebted to Mr. Walsh for some specimens of the smaller Tineina. Unfortunately they were set on strips

of card, with the wings unexpanded and have been too much denuded in the process of setting to enable me to determine precisely to what genus and species they belong. One of these which was taken in the winter time, hibernating under the loose bark of trees, is a *Lithocolletis*, either *Robiniella* or *Cratægella*, but possibly a new species. There were likewise new specimens of *Phyllocnistis*, so much denuded and worn that I cannot determine the species.

***Depressaria cinereocostella*, n. s.**—Fore wings reddish-brown, grayish along the costa, marked with numerous, short, black longitudinal dashes. Hind wings grayish fuscous.

Head and thorax grayish. Labial palpi whitish: middle joint with two dark brown patches and the ends of the scales beneath, touched with dark brownish; terminal joint dark brownish, with two grayish rings, one in the middle, the other at the extreme tip.

Virginia. Coll. Entomological Society of Philadelphia.

#### HAMADRYAS, n. gen.

This imago, which I have placed in a new genus, appears to me to be congeneric with a portion of the genus *Gelechia*.

The hind wings are lanceolate. The submedian and internal veins distinct. Subcostal simple, attenuated towards the base. The disc is closed and two nervules are given off from it. The median vein is 3-branched.

The fore wings are lanceolate, with the inner margin dilated near the base of the wing. The subcostal vein has four branches, the first arising near the middle of the wing and the apical nervule furcate. The disc is closed, with two nervules given off from it. Median vein, 3-branched, the posterior branch arising midway between the space opposite the origins of the first and second subcosto-marginal nervules. Submedian furcate at the base.

Head smooth, face and forehead broad. Ocelli very small. Antennæ rather thick, about one-half as long as the fore wings, denticulated beneath. Labial palpi moderately long, curved, rather slender, smooth, pointed; the middle joint slightly compressed, rather thicker and longer than the terminal joint, which is cylindrical. Maxillary palpi, extremely short. Tongue clothed with scales at the base and about as long as the anterior coxæ.

**H. Bassettella.**—Fore wings bright reddish-orange, sometimes tinted with yellowish-orange, with a black spot at the base above the fold of the wing, and a broad black stripe, showing bluish or greenish reflections, along the inner margin, extending from the middle of the fold to the tip of the wing and occupying nearly one-half of the breadth of it. Along the costa, about the middle of it, is a shining black stripe, which becomes narrower as it approaches the apical third of the wing. Cilia blackish. Hind wings shining, dark greenish-black.

Head and thorax black. Antennæ black. Labial palpi, yellowish-orange.

I am indebted to the kindness of Mr. H. F. Bassett of Waterbury, Conn., for a number of specimens of this interesting gall miner. Mr. B. says the species is rather common in his neighborhood and the larva feeds in a gall found on "a species of oak which I call *Q. Tinctoria*."

The galls are formed on the smaller branches, three or four being aggregated, are globular, yellowish-brown, shining and hard.

The species is dedicated to the discoverer, who will doubtless work out its larval history.

#### CYCLOPLASIS, n. gen.

This new generic type is an extremely novel and interesting one, not only on account of larval history, but the structure of the perfect insect. It is a type that is probably peculiar to our own continent.

The hind wings are so extremely narrow as to be hair-like, or spine-like, dilated near the base, so as to resemble a paddle; they are adorned with very long cilia. The median vein is very short and placed near the basal angle and is branchless. The subcostal vein is attenuated towards its base, is adjacent to the costa, distinct in the basal third of the wing and runs through the middle of the setiform portion, and is likewise branchless.

The fore wings are narrowly lanceolate. The subcostal vein is attenuated towards the base, is placed near the costa and without branches. The median vein is distinct and placed in the middle of the wing; it is delivered to the acute tip of the wing, near which it is probably furcate sending a very short, indistinct branch to the costa, which however can scarcely be seen under a  $\frac{1}{10}$  inch lens. The submedian vein is obsolete.

Head smooth, with appressed scales. Face and forehead broad. Antennæ setaceous, short, slightly more than one-half so long as the body. Labial palpi, short, separated; in the living imago, ascending but

scarcely reaching to the middle of the face, slightly curved, slender, smooth and pointed; in dead specimen the palpi are depressed and much divergent laterally; the terminal joint is very short and indistinct. No maxillary palpi. Tongue naked, short, rather longer than the face.

When at rest the imago holds the posterior pair of legs elevated at the sides above the wings, and in walking—its motions are very active—uses them by making very rapid vibrations, during which they touch the surface for only an instant. The femora and tibia of the posterior legs are not hairy but quite densely clothed with spines, and the feet of this pair appear to be without hooks. The antennæ are porrected.

The mine of the larva is like that of an *Elachista*, beginning as a long threadlike line and towards the latter part of larval life is enlarged into a blotch. When it has reached maturity, it cuts a perfectly circular disk from the upper cuticle of the leaf, folds it along its diameter and unites the edges of the circumference, so as to make a semicircle. When completed the larva enclosed in its semi-circular cocoon, lets itself fall to the ground, where it attaches the cocoon to some adjacent object.

**C. Panicifoliella.**—Fore wings dark brown, with a violet hue; from the middle to the tip, bright silvery, with a bright silvery band about the basal third. Cilia violet-brown. Hind wings violet-brown, cilia fuscous.

Head and thorax silvery. Antennæ brown, touched with a silvery hue towards the base.

The larva mines of the leaf of *Panicum clandestinum* early in July. My specimens were taken July 9th, and at that time many mines were tenantless and appeared to be old and are characterised by the circular piece cut out of the upper cuticle. The mine begins near the base of the leaf as a minute, threadlike line and runs to the tip, thence returns along the side to the middle of it, when it is irregularly enlarged by the larva.

On July 12th, five specimens taken on the 9th began their preparations for pupation, and on the 25th of July two imagos made their appearance and continued to appear for several days subsequent.

Easton, Pennsylvania.

**ELACHISTA.**

*Cosmiotes.* Proc. Acad. Nat. Sci., Jan. 1860, p. 9. Ib. May, 1860, p. 172.

**Elachista Brachyelytrifoliella.**—Fore wings dark grayish brown from the base to the middle of the wing and thence to the tip, blackish brown between the markings. The costa at the base is white and connected with the white costa, about the basal third of the wing, is a short, oblique silvery white costal streak. Near the apical third of the wing, is another conspicuous, silvery-white oblique costal streak, nearly meeting in the middle of the wing a dorsal streak of the same hue. In the costal cilia, just above the tip, are two minute silvery white streaks, black margined internally. Beneath the tip, the wing is slightly varied with pale grayish. Hind wings grayish brown, cilia the same.

Antennæ grayish-brown. Head in front, and labial palpi silvery white.

The larva mines the leaf of *Brachyelytrum aristatum* early in July. The mine at this period is a blotch, taking up most of the leaf, but the beginning is a threadlike line. My specimens were taken on the 9th of July, at which time the most of the mines I found were tenantless, and two of the larvæ were young. On the 12th of July one of the larvæ left its mine to prepare for pupation; this it did by weaving a slight web in which the larva attached its anal prolegs, with the head downward. The larva that spun up on the 12th, appeared as an imago on the 25th of July.

Easton, Pennsylvania.

**ADELA, Lat.**

Hind wings oblong-ovate, with moderate cilia. The subcostal vein is simple, attenuated towards the base. The discoidal cell is closed by a doubly angulated vein which throws from the upper angle a discal branch, furcate near the extremity and anastomoses with a false nervule in the middle of the disc. The median vein is 3-branched, the upper branch being medio-discal and closes the lower portion of the disc. Submedian and internal veins distinct.

Fore wings oblong. The subcostal vein gives origin to four marginal branches, the first arising near the base of the wing and forms a secondary cell. (In the species described below, *Ridingsella*, the third marginal branch is furcate.) Two discal branches are delivered to the hinder margin from the discal vein. The median vein is 3-branched. The submedian furcate at its base.

Head rough, with hairlike scales; face beneath rather smooth. Ocelli none. *Eyes remote in both sexes.* Antennæ twice as long as the fore

wings in the ♂, slender, slightly thickened towards the base; in the ♀, shorter and at the base downy. Labial palpi cylindric, slender, projected, nearly naked on the sides exteriorly, with long hair-like scales, especially beneath. No maxillary palpi. Tongue of moderate length.

**A. Ridingsella**, n. s.—Fore wings coppery-brown, with a pale grayish-brown patch, dusted with black, in the middle of the wing, on the nervules. At the anal angle of the wing is a patch of four or five black spots, those placed along the margin each containing an embossed silvery-violet spot, and that nearest the base of the wing, containing two silvery-violet spots. Across the middle of the wing is a silvery band, and towards the tip, an oblique, silvery costal streak which nearly reaches the most interior of the black patches above the anal angle. At the extreme tip of the wing is a silvery spot, and just interior to it is a short silvery band; between this and the oblique costal streak is a silvery costal spot, and one of the same hue on the inner margin nearly opposite to it, placed between the apical band and the last of the black patches. Hind wings fuscous, with a reddish-purple hue.

Head, face and labial palpi fuscous, intermixed with dark ochreous. Antennæ annulated with white and dark fuscous.

Virginia. Coll. Ent. Soc. Philadelphia; taken by Mr. Jas. Ridings of Philadelphia.

#### COLEOPHORA. Zell.

Proc. Ent. Soc. Phila., March 1863, p. 6.

**Coleophora Rosæfoliella**, n. s.—*Basal joint of antennæ tufted*. Fore wings pale grayish towards the base, clouded with dark brownish from the middle to the tip, where the color is most decided. Cilia grayish brown. Hind wings blackish-brown, cilia grayish-brown.

Head and thorax white. Antennæ basal joint white, annulated with black and white. Labial palpi white, dark brownish externally.

Case silken, covered with granulations. It is cylindrical, slightly compressed, the mouth slightly deflexed and the opposite end turned down slightly, hook-like. Color brown, varied with gray and reddish-brown granulations.

I took the larva of this species on the 19th of April, feeding on the opening buds of the common, hundred-leaved garden-rose. During the winter the case was attached to a thorn on one of the principal stems. The imago appeared on the 25th of May.

Easton, Pennsylvania.

**Coleophora Rosacella**, n. s.—*Basal joint of antennæ, slightly thickened with scales*. Fore wings blackish brown, with the costa from the base to the begin-

ning of the costal cilia, narrowly touched with white. Cilia concolorous with fore wings. Hind wings blackish, cilia concolorous.

Antennæ basal joint dark grayish-brown. Head and thorax, dark grayish-brown. Labial palpi grayish, grayish-brown externally.

The case is made of the cuticle of the rose-leaf on which the larva feeds. It is a compressed cylinder, dilated slightly on the middle of the under edge and *serrated above*. Color dark ochreous.

I took the larvæ on the 19th of April, feeding on the opening buds of the sweet briar, the leaf of which is strongly serrated, and I found the same species on the common, hundred-leafed rose at the same time. The case of the latter differs from that of the larva of the sweet briar; it is smaller, but of the same form, not serrated along the upper edge, and with a slight projection on the middle of the under edge; its color is grayish-brown. The cases of both are attached to the thorns of the bush during the winter, or to one of the principal stems amongst the thorns, and it is not easy to distinguish them from the spines of the rose-bush.

*Variety.* Two specimens were obtained from the cases of the sweet-briar feeders which varied in color from the others, although the cases were not distinguishable. The imagos have the fore-wings dark ochreous and the hind wings dark brown.

The imagos appear during the latter part of May and early in June.

There is a strong resemblance between the variety of *C. Rosacella* and the European *C. Limosipennella* the larva of which feeds on the elm-leaf.

Easton, Pennsylvania.

#### DASYCERA, Haw.

Hind wings ovate. The subcostal vein is simple. The discal vein, which closes the discoidal cell, gives rise to two discal branches. The median is 3-branched, the two upper branches arising on a common stalk. The submedian and internal veins are distinct.

Fore wings elongate, lanceolate. The subcostal vein subdivides into four marginal branches, the apical furcate, both branches reach the costa behind the tip. The discal vein sends two branches to the hinder margin beneath the tip and the median vein is 3-branched. The fold is thickened at its tip and the submedian furcate at its base.

Head smooth. Ocelli none. Antennæ towards the base thickened, with hairy scales on the back of the base, with the apex comparatively naked, slightly ciliated. Labial palpi reflexed, ascending above the vertex, the end of the middle joint equal with the forehead; the second joint compressed, with appressed scales; the terminal joint slender, pointed, nearly as long as the second joint. Maxillary palpi short. Tongue somewhat longer than the anterior coxæ, clothed with scales.

**D. Newmanella.**—Fore wings purple, with an orange-colored stripe in the disk and a shorter one at the base of the wing in the fold and nearly joining the former. Hind wings dark fuscous.

Antennæ dark purple, tip silvery. Head and face of a brassy hue. Labial palpi and tongue, orange yellow.

Virginia. Coll. Entomological Society of Philadelphia.

#### WILSONIA, n. gen.

Hind wings very narrow and acutely pointed, with very long cilia. The costa is dilated near the middle. The submedian vein is nearly obsolete. The costal vein enters the costa just beyond the dilation. The subcostal is simple, attenuated and obsolete from the middle of the wing to the base. The discoidal cell is closed by an extremely attenuated discal vein, which gives rise to two nervules, the upper of which appears to be a lower branch of the subcostal, but is unconnected with it and is continued through the discoidal cell to the base of the wing as a false nervule. The median vein runs near the inner margin and subdivides into three equidistant branches.

Fore wings lanceolate. The discoidal cell is long and narrow, and appears to be unclosed. The subcostal vein subdivides into five branches, the apical branch bifid, both its nervulets are delivered to the costa behind the tip. The median is 4-branched. The submedian furcate at its base.

Head smooth, with appressed scales. Without ocelli. Eyes small. Antennæ simple, about one-half as long as the fore wings; basal joint slightly thickened with scales. Labial palpi recurved, tips equal, at least, to the vertex, rather slender, especially towards the base, with a spreading, limited tuft of scales over the articulation of the middle and terminal joints and thence to the base smooth and slender; terminal joint, about as long as the middle, roughed with scales from its base to the tip, cylindric, pointed and thicker than the basal portion of the



middle joint and about as long. No maxillary palpi. Tongue clothed with scales, extremely short.

The genus is dedicated to Dr. Thomas B. Wilson of Philadelphia, in recognition of the eminent encouragement he has given to Entomological studies in the United States.

**W. brevivittella.**—Fore wings fuscous intermixed with grayish, with three black longitudinal streaks or dashes, one at the base of the fold, another in the middle of the wing, and the last in the middle of the wing near the tip. On the inner margin are three small, black spots, placed respectively beneath the dashes. Hind wings fuscous, cilia the same.

Antennæ dark fuscous, basal joint yellowish. Head pale yellow. Labial palpi dark fuscous, the tuft and two rings on the terminal joint, pale yellowish.

Virginia. Coll. Entomological Society of Philadelphia.

**YPSOLOPHUS**, Haw., Zell.

Proc. Ent. Soc. Phil., Aug. 1863, p. 122.

**Ypsolophus flavivittellus**, n. s.—Fore wings dark brown, yellowish along the costa from the base to near the tip of the wing. The yellowish streak is limited by the subcostal vein and is slightly dotted with dark brown. Hind wings fuscous.

Antennæ, head and labial palpi, fuscous.

Virginia. Coll. Entomological Society of Philadelphia.

**ANESYCHIA**, Steph.

Hind wings rather broadly oblong with short cilia. The subcostal vein is simple. The discoidal cell is closed by a transverse discal vein which gives rise to two branches. The median vein is 3-branched, the two upper branches, arising from a short, common stalk. The submedian and internal veins distinct.

Fore wings elongate ovate. The subcostal vein subdivides into four branches; the first is given off near the middle of the wing and the apical branch furcate. The discal vein has two branches and the median is 3-branched, all the branches being aggregated at its posterior end. The submedian furcate at the base.

Head smooth. Ocelli none. Antennæ of the males with the joints rather dentate and pubescent-ciliated. Labial palpi smooth, cylindric, moderately long, exceeding the vertex somewhat, *reflexed with the third joint pointed*; middle joint longer than the terminal joint. No maxillary palpi. Tongue of moderate length, clothed with scales towards the base.

According to Mr. H. T. Stainton the larvæ of this genus seem exclusively attached to plants of the Borage family, on which they feed.

**Anesychia sparsiciliella.**—Fore wings white with deep black markings. At the extreme base of the costa is a small black spot and one on the inner margin at the base, of the same hue. On the middle of the costa, is a rather large black spot, nearly square, but with a slight incision on its inner side and doubly curved on its exterior side. Near the middle of the fold is a black dot, and one obliquely above it in the disk. The apical portion of the wing is slightly dusted with dispersed, black atoms, and near the hinder margin on the ends of the nervules are a few black dots. Cilia white slightly dusted with blackish. Hind wings dark gray, cilia the same.

Antennæ blackish, white at base. Head white. Labial palpi whitish, with a black stripe along the base of the middle joint.

Virginia. Coll. Entomological Society of Philadelphia.

#### ELACHISTA ?

Hind wings with very long cilia, cimeter-like, extremely narrow. The submedian and internal veins are obsolete. Subcostal vein, parallel and contiguous to the costa and furcate at the extreme tip of the wing. The discal vein is extremely attenuated and short, and gives off a furcate branch very near to the stalk of the subcostal vein.

Fore wings narrowly lanceolate. The discoidal cell is very narrow. The subcostal vein sends off three branches to the costa; *the apical vein gives off a branch from its middle and is trifid at its tip.* Beneath the apical vein, are three branches to the margin beneath the tip, two of which are branches of the median vein, the posterior being only faintly indicated. The submedian is furcate at its base.

Head smooth. Forehead rounded. Face rather broad. Basal joint of antennæ slightly thickened (*stalk wanting*). Labial palpi slightly curved, depressed, cylindrical, slender, pointed.

**Elachista? orichalcella.**—The entire insect is of a beautiful, metallic cupereous color. The hind wings and cilia, are rather pale ochreous.

I have before me a single specimen, badly set but otherwise in good condition.

Virginia. Coll. Entomological Society of Philadelphia.

Description of a new species of North American *GORTYNA*.

BY AUG. R. GROTE.

Curator of Entomology, Buffalo Society Natural Sciences.

*NOCTUINA* H-S.*GORTYNA* Ochs.*Gortyna cerussata*, nov. sp. (Plate 9, fig. 1.)

Anterior wings entire purplish brown, sparsely sprinkled with whitish scales; median space large, uniformly tinged with reddish; terminal and subterminal spaces showing a silky purple shade. There is a white basal spot, beyond which, and separated by the median vein, are two slightly yellowish spots, the lower the largest, which precede the basal half-line, the latter wavy and tinged with yellowish. Beyond and immediately following this line is a very small yellowish spot on the median vein. Transverse anterior line nearly straight, darker shaded, indistinct, undulating, preceded by a faint yellowish costal mark.

The three superposed spots, which in this genus usually take the place of the orbicular and claviform, are white, obliquely inclined and contiguous to the transverse anterior line. The upper spot is pure white, very greatly larger than the inferior ones, broadest at its base and excavated along its exterior border; the middle spot is soiled by the transverse anterior line. Transverse posterior line geminate, darker shaded, regularly dentate between the veins, projected superiorly. Reniform spot preceded by a distinct yellowish costal mark, slightly oblique and consisting of a yellow bent central streak surmounted by three small nearly confluent linear spots, the largest perpendicular and the two smaller ones horizontal giving the appearance of a single bi-toothed spot; this central streak is bordered exteriorly by three nearly equal sized white spots, the upper one bean shaped, the lower nearly spherical, opposed to a single one on the side towards the base of the wing. Subterminal line undulating, distinct, becoming interrupted towards the internal angle, reddish brown and surmounted by a yellowish ill-defined sub-apical spot; fringes long. Posterior wings brownish, darker shaded along the veins and external margin, lighter towards the base. Under surface of both pair brownish; posterior wings lighter shaded, both pair with a darker median shade band. Thorax and tegulæ purplish brown, latter narrowly bordered

with whitish. Palpi brown, terminal joint with a few whitish scales. Antennæ with a whitish basal tuft; abdomen stout, exceeding the posterior wings, brown above and below. Legs brown, lighter shaded at the extremities of the tibial spurs and at the base of the tarsi. ♂ Exp. 2 inches.

*Hab.* Pennsylvania. Coll. Ent. Soc. Philad.

This species presents some points of resemblance to the description of *G. limpida* Guen., but differs decidedly by the number and relative size and position of the white spots on the anterior wings.

The list of North American species of *Gortyna*, as given by Dr. Morris, is susceptible of some alterations. *Zee* Harris, known to me only by the figure and description, does not appear to me to belong here. *Leucostigma* Harris, of which *rutila* Guenée is a synonym, is our most common species and represents in our fauna the European *flavago* W. V. The name proposed by Harris for this species is open to the objection of being already used in the present family, but I cannot believe that this constitutes any sufficient reason for its rejection. *Marginidens* Guenée, and *limpida* Guenée, are as yet unidentified by me in nature. Guenée refers to them as possible varieties of his *rutila*, but the descriptions seem to indicate distinct species.

Mr. Walker, who evidently had the species before him, appears to have regarded *marginidens* as a doubtful variety of *leucostigma*.

*Nebris* Guenée, and *nitela* Guenée, I have seen specimens of from the Eastern and Middle States; they are closely allied brown inconspicuous species, the latter apparently merely differing from the former by the absence of the white ordinary spots which are replaced by a blackish shade, observable when the specimen is held to the light. I have seen an individual the ornamentation of which appeared to me to unite these species, but have had no opportunity as yet of verifying the structural differences described by M. Guenée as separating them. The following is perhaps a more correct list of our species:

? *zee* Harris.

*leucostigma* Harris.

*rutila* Guenée.

*marginidens* Guenée.

var? *leucostigma*.

*limpida* Guenée.

*cerussata* Grote.

*nebris* Guenée.

*nitela* Guenée.

Descriptions of North American LEPIDOPTERA.—No. 2.

BY AUG. R. GROTE,

BOMBYCINA H.S.

Genus **GASTROPACHA**, Ochs.

In the Cabinet of the Entomological Society is a ♂ specimen which, in the absence of further corresponding material, I am disposed to consider as an aberration or variety of *Gastropacha vellea* Stoll, and describe it as follows, comparing it with the ordinary male of the species.

*Gastropacha vellea* Stoll, *var. minuta*, n.

Anterior wings entirely bluish black, the median bands nearly obsolete but discernible and apparently occupying the same relative positions as they do in the ordinary ♂. Veins at the base touched with white, the subterminal white band broadly indented at the middle as in the ordinary ♂. Terminal line very narrow, whitish; fringes short, entirely bluish black—in the ordinary ♂ they are moderately long, white, interrupted with black between the veins. Posterior wings and fringes entirely bluish black, immaculate, differing greatly from those of the ordinary ♂ which are brownish, have a white band along the external margin and the fringe as on the anterior wings. Under surface resembling the upper with the veins along the external margin touched with whitish. Upper surface of thorax, tegulæ and abdomen, latter also on the sides, entirely bluish black, differing from the ordinary ♂ in which the tegulæ and sides of the abdomen are white. Head and collar at base, white, and these, as well as palpi, legs and under surface of abdomen, present no great differences from the ordinary ♂ in coloring except that the abdomen is somewhat darker shaded. Finally the wings only expand 1 inch, extreme length from head to tip of abdomen  $\frac{5}{8}$  inch. Similar measurements of the ordinary ♂ give expanse  $1\frac{6}{10}$  inch, extreme length  $\frac{9}{10}$  inch.

The specimen is in good preservation, appears well developed and exhibits a perfect relative proportion in its different parts.

Taken by Mr. Ridings during the summer of 1863, in Massachusetts.

ARCTIOIDEA H.S.

Genus **ARCTIA**, Schk.

*Arctia Persephone* nov. sp.

Anterior wings deep velvety black; all the veins narrowly and en-

tirely striped with pale yellow. A very broad pale yellow central band runs from the base of the wing, below the median and third inferior veins, to the internal angle, enclosing, near the external margin, a small black spot which indicates the obsolete furcation. On this median band, in the terminal half of the wing, rests a series of similarly colored stripes resembling the letter K, with the straight stroke turned towards the base of the wing and the upper limb, attaining the external margin, reflexed to costa near the apex. A very broad straight pale yellow stripe extends from the costa to median vein, crossing the discal space, and a second, nearer the base of the wing, merely attains the sub-costal vein. Costa striped with pale yellow, fringes pale yellow, internal margin showing a broad stripe of the same color narrowed towards internal angle. Posterior wings darker yellow with a broad semi-lunate discal spot and a very wide irregular black terminal band, narrowed at about the middle, not attaining the anal angle, joined to the base of the wing by a rather broad black straight streak; fringes pale yellow.

Under surface of anterior wings blackish, showing the broad yellow bands of the upper surface; the veins in the terminal space striped with yellowish. Under surface of posterior wings resembling the upper surface. Disc of the thorax and tegulae deep black, bordered with pale yellow. Collar, and head between the eyes, pale yellow, immaculate; palpi black; eyes margined with black; antennae brownish, shortly bi-pectinate; legs dark brownish, anterior femora yellowish on the inside. Abdomen, black, with two broad lateral yellow stripes which do not touch the anal segment. ♂ Exp. 2 inches.

*Hab.* Pennsylvania. Coll. Ent. Soc. Phila.

Allied to *Arctia virginicula* Kirby, which it exceeds in size; the markings of the posterior wings are probably inconstant.

For the single specimen, in good preservation, the Collection of this Society is indebted to the kind liberality of Dr. Samuel Lewis of Philadelphia.

#### NOTODONTINA H-S.

Genus **RAPHIA**, H-V., H-S.

Vein 5 of the posterior wings equally strong with, and equidistant from, veins 4 and 6, but originating nearer 4 at its base. Legs moderately slight and short, sparsely clothed with long hair, posterior

tibiæ with four very short spurs. Antennæ of the ♂, finely bi-pectinated, of the ♀, simple, with minute scales; eyes naked; tongue short; palpi short, hardly exceeding the front, 3rd article small, depressed. Thorax without posterior tuft; abdomen stout, exceeding the posterior wings, crested on each segment, without anal tuft.

**Raphia frater** nov. sp. (Plate 9, fig. 7. ♀.)

Anterior wings bright steel grey, median lines black, distinct. Transverse anterior line black, slightly bent, running in an oblique direction from costa towards the base of the wing till near internal margin where it forms a deep sinuate abrupt rounded outward reflexion. Median space grey, showing a black zigzag median shade line and black costal mark. Reniform and orbicular spots distinct, ringed with black, greyish, the former with a dark central stréak, the latter, contiguous to transverse anterior line, with a clear greyish centre, and beneath it the claviform spot margined with black. Transverse posterior line black, narrow, angulated, much projected and arcuated superiorly, followed by a greyish coincident shade. Subterminal space with a slightly brownish tinge; subterminal line dark grey bordered outwardly by a lighter shade; veins marked with blackish; terminal line black; fringes blackish, narrowly interrupted with grey at the extremities of the veins. Posterior wings whitish, clouded with greyish at anal angles, with a distinct black terminal line and a very faint median greyish line; fringes grey, darker shaded between the veins. Under surface of anterior wings grey, showing a black discal lunule and a macular subterminal band; costa with some small blackish spots. Under surface of posterior wings, lighter than anterior, showing a blackish discal lunule and a similar macular undulating band. Thorax, greyish; tegulæ, narrowly bordered with black; abdomen crested on all the segments, greyish, exceeding the posterior wings. ♂, resembles ♀; antennæ shortly and finely bi-pectinate. ♂ Exp.  $1\frac{2}{10}$  inch. ♀, Exp.  $1\frac{5}{10}$  inch.

*Hab.* Middle States. ♀ Coll. Ent. Soc. Phila. ♂ ♀. Coll. Mr. E. L. Graef, Brooklyn, L. I.

Mr. Graef informs me that the larva feeds on the silver-leaf poplar, and described it to me in general terms as light green with sub-dorsal reddish stripes.

I am disposed to regard this species, as well as *R. abrupta* m., as congeneric with *R. hybrida* Hüb., which latter it much resembles, and

as generically distinct from the species included under the present name by Mr. Walker.

### NOCTUINA H.S.

Genus **MICROCÆLIA**, Guen.

**Microcælia vinnula** nov. sp. (Plate 9, fig. 2.)

Anterior wings olivaceous grey, terminal space whitish. In the basal space, below the submedian vein, is a black streak extending from the base of the wing to the transverse anterior line, which latter is composed of two dark olivaceous distinct undulate and rather widely separated bands. Median space large, olivaceous grey, crossed by the median shade which is wavy, distinct, dark olivaceous and, traversing the reniform spot, becomes blackish at the costa. Ordinary spots of the normal shape, the orbicular with a clear whitish center; the reniform obscured with olivaceous. Transverse posterior line white, arcuated till below the discal space, bordered externally by a narrow black line, which latter becomes more distinct towards internal margin. Subterminal space dark olivaceous and showing, just above the internal angle, a narrow black streak which extends from the transverse posterior line to external margin. Subterminal line indicated by the difference of coloring between the subterminal and terminal spaces; terminal space whitish, and showing some darker shade spots near the apex. There is a terminal row of black dots; fringes whitish, slightly interrupted with greyish between the extremities of the veins. There is a series of black costal marks extending from the median shade to apex. Posterior wings blackish, with a terminal black line; fringes whitish. Under surface of anterior wings blackish in the center, whitish along all the margins and crossed by two parallel blackish bands. Under surface of posterior wings greyish, with a discal spot and dentated median band. Head, thorax and tegulæ olivaceous grey, without markings. Palpi extending a little beyond the head, first and third articles greyish, second article black. Abdomen blackish grey above, lighter below; legs greyish streaked with black; tarsi marked with black at base. ♀ Exp.  $1\frac{2}{10}$  inches.

*Hab.* New Jersey. Coll. Ent. Soc. Philadelphia.

I have seen four individuals of this apparently rare species, which presents some resemblances of ornamentation to the genus *Acronycta*, and was doubtfully of opinion that M. Guenée's *M. fragilis* had been



described from a possibly faded individual referable here. Having however forwarded a specimen to Mr. Walker of the British Museum, that distinguished Entomologist gives it as his opinion that the present species had not been hitherto described, in which opinion I now concur. Although the markings present many coincidences with *M. Guenée's* description, yet the peculiar greenish or olivaceous coloring of the anterior, and darker posterior, wings, together with the absence of the thoracic markings of *M. fragilis*, form good specific distinctions which will not allow of the two species being confounded.

Genus **ACRONYCTA**, Ochs.

**Acronycta noctivaga** nov. sp. (Plate 9, fig. 3.)

Anterior wings dark grey varied with black; ordinary lines white. Basal space black, greyish on the costa; basal half line white, bordered externally by a black line. Transverse anterior line white, widely lunulated, distinct, bordered externally by a black line which commences from a broader black costal mark. Median space large, dark grey; median shade band blackish, traversing the reniform spot. Ordinary spots of the normal shape, distinct; reniform attenuated, black, with a hardly perceptibly lighter center; orbicular round, black, with an ill-defined greyish inner ring. Between the ordinary spots in the lower middle of the wing is a squarish black spot bordered externally by the median shade. Transverse posterior line white, acutely dentated, arcuated superiorly, preceded near the costa by a whitish mark and bordered on either side by a black line. Subterminal line broad, white, irregular, interrupted just before the internal angle. Terminal space black, narrow, reduced by the subterminal line which, at about the middle, nearly attains the external margin. Fringes white interrupted with black between the veins; costa with some black and white marks. Posterior wings uniformly dark brownish, immaculate; fringes lighter. Under surface of both pair light brownish, with faint discal dots and bands. Thorax grey, varied with blackish on each tegula and collar. Head whitish grey, with two longitudinal parallel black marks between the antennæ, latter blackish, powdered with whitish at base. Palpi with the second joint black tipped with whitish, legs greyish; tarsi black, white at extremities; abdomen blackish grey, crested on first segment. ♂ Exp.  $1\frac{3}{10}$  inches.

*Hab.* Penn., New York. Rare. Coll. Ent. Soc. Philadelphia.

*Acronycta afflicta* nov. sp. (Plate 9, fig. 4.)

Anterior wings dark grey, shaded with black. The basal and transverse anterior lines are black, geminate, undulate. The median space is dark grey, lighter on the costa and along internal margin and traversed by the median shade line which is black, dentate, crosses the reniform spot, and is composed of three distinct black bands which are obscured in the center of the wing, and only apparent on the costa and internal margin. The discal space is occupied by a deep blackish shade, showing a somewhat greenish reflection, and which occupies all the subterminal space. The ordinary spots are of the normal shape; the orbicular distinct, whitish with black center; the reniform broad, but slightly excavated externally, obscured by the greenish discal shade, ringed with black, and with a central streak. Transverse posterior line intensely black, geminate, minutely dentate. Subterminal and terminal lines white, interrupted, dentate between the veins; fringes whitish, broadly interrupted with black at the extremities of the veins; costa with some whitish marks. Posterior wings grey, darker along the veins, slightly silky; fringes as on anterior wings. Disc of thorax whitish grey, with two central blackish spots. Tegulae and collar blackish, latter with a black line and greyish superiorly. Head black; 2nd joint of palpi blackish sprinkled with whitish inferiorly; neck, at base of palpi, white; proboscis blackish. Under surface of anterior wings greyish, darker shaded on the disc, crossed by a blackish subterminal band preceded and followed by a blackish costal mark, and with a small ochraceous tuft at base. Under surface of posterior wings greyish, blackish along the veins and showing a blackish discal lunule and median dentated band. ♂ Exp.  $1\frac{6}{10}$  inch.

*Hab.* Texas. Coll Ent. Soc. Philadelphia.

The orbicular spot and disc of the thorax in this species are prominent, owing to the contrast of coloring they present to the blackish wings and tegulae.

Besides the two just described species of North American *Acronycta*, I have before me specimens belonging to four distinct, and I believe hitherto undescribed, species, but as I cannot as yet with certainty separate them from some unidentified descriptions under this genus by Messrs. Guenée and Walker, I defer their publication for the present. I am indebted to Mr. A. S. Packard, Jr., for specimens of *Acronyctæ* taken in Maine and Massachusetts.

**DICHAGRAMMA**, nov. gen.

Anterior wings elongate, straight along costal and internal margins, external margin moderately rounded; apex acute. Head applied closely to the thorax, compressed laterally, tufted between the antennæ. Palpi not exceeding the head, densely clothed with hair, third article short. Abdomen somewhat squarish and flattened, not exceeding posterior wings. Antennæ long, minutely bi-pectinate in the ♂, simple in the ♀. Legs well clothed with hair, hind tibiæ with four short spurs, the inner pair the longest. Posterior wings broad, having vein 5 (H-S) somewhat weaker than 4 or 6, more remote from 6 than from 4.

The two hitherto undescribed species of *Noctuina* composing the present genus, coincide exactly in their ornamentation and structure, and, though they may ultimately be referable to an already established genus, in the absence of any approximating material I describe them under a new one. The anterior wings very gradually increase in width to the external margin, and are as long as the entire body, including thorax and head. The median lines are narrow, straight (especially the transverse anterior), and divide the wing into three nearly equal sized spaces. The orbicular spot is wanting, the reniform distinct, differing in form in the two species; the subterminal line is broad, bordered on either side by a lighter shade; the terminal line very clearly defined, semi-lunulate, continued. The species appear to me to approach most nearly the genus *Mythimna*, and especially to our species *Mythimna pseulargyria* Guenée, with which they coincide in the shape of the external margin of the anterior, and approximately share in the pterostic characters of the posterior, wings.

The different palpal structure and abdominal proportionate length and shape, together with the differing ornamentation and spur structure of the hind tibiæ, have induced me to erect a new genus for these two species, a proceeding which their perfect coincidence in the above mentioned characters seems to justify.

**Dichagramma Walkerii** nov. sp. (Plate 9, fig. 5.)

Anterior wings dull ochraceous, mixed with brownish, lighter shaded in terminal and subterminal spaces. Transverse anterior line distinct, darker shaded, straight, composed of two narrow lines with a central light shade. Orbicular spot absent; reniform, light ochraceous, vague. Median shade line distinct, running straightly from internal margin to

reniform spot, which it borders on the inside and obliquely from the latter to the costal margin, which it joins near the transverse anterior line. Transverse posterior line slightly projected superiorly, wavy. Subterminal line broader than median lines, distinct, bordered on either side by a lighter shade. Terminal line darker than the others, very distinct, regularly undulate and continued without interruption from apex to internal angle. Posterior wings blackish, silky, immaculate, with a terminal darker line; fringes ochraceous. Under surface of both pair, greyish ochraceous, showing a subterminal band and discal lunule. Antennæ testaceous, white at base. Upper and under surface of the thorax, legs and head, same color as anterior wings. Abdomen sparsely clothed with hair, base of the segments blackish, terminal segment with a dark ochraceous sub-tuft. ♀ Exp.  $1\frac{5}{10}$  inches.

*Hab.* Canada; Middle States. Rare. Coll. Ent. Soc. Philadelphia.

I dedicate this species to Francis Walker, Esq., of London, England.

**Dichagramma vinulenta** nov. sp. (Plate 9, fig. 6.)

Anterior wings rich dull red, terminal space shaded with purplish along the veins. Basal half-line oblique, indistinct. Transverse anterior line straight, distinct, darker shaded, preceded by a faint, somewhat purplish, line and lighter shade. Median space darker shaded from the transverse anterior to median shade line, which latter is ill-defined, slightly wavy, borders the reniform spot externally, and runs straightly from costal to internal margins. Orbicular spot absent; reniform, white, distinct, composed of a central lunule with a small detached white spot at each extremity. Transverse posterior line purplish, slightly projected superiorly and undulate. Subterminal line broader than the others, dark reddish, bordered on either side by a lighter shade, undulate. Terminal space shaded with purplish along the veins; terminal line distinct, continued; fringes same shade as the rest of the wing. Posterior wings blackish, silky; fringes pale reddish, long. Under surface of anterior wings reddish along the costal and external margins, blackish on the disk, and showing a faint discal spot and two darker shaded, approximate transverse bands, the outer one indistinct. Under surface of posterior wings pale reddish, whitish along internal margin and showing a darker shaded narrow band and discal spot. Head, thorax and tegulæ same color as anterior wings;

abdomen paler; antennæ testaceous, yellowish white at base. ♂ Exp.  $1\frac{5}{10}$  inch.

*Hab.* Texas. Coll. Ent. Soc. Philadelphia.

This species is represented by a single individual, in perfect preservation, in the Coll. Ent. Soc. Philadelphia, and was collected by Mr. Ezra T. Cresson in Western Texas.

***Philochrysa regnatrix* m.**

This name I believe correctly to refer to *Euthisanotia timais* Cramer, a species which may be regarded as a native of South America and the West Indies, but which occurs at different localities along our coast. The occurrence of tropical Lepidoptera Heterocera on our coast is not unusual: I took a specimen of *Erycata* Cramer, in the summer of 1860, near the Castle Garden, New York city, and the specimen is now in the collection of Mr. Edward L. Graef of Brooklyn, L. I. I the more readily fell into the error of re-describing this species, in that I was disposed to assign it a somewhat different position, in a systematic arrangement, from that accorded to it by Messrs. Guenée and Walker, and which latter position, in due deference to these authorities, I must consider the more correct one. I have no alterations to suggest either to my description or figure, the generic diagnosis, however, as given by Mr. Walker, based on more numerous material, is more correct and complete than my own. The locality for this species given by Cramer, "Coast of Coromandel," if correct, supposes for it a very wide geographical distribution.

**Description of a New Species of North American PAPILIO.**

BY AUG. R. GROTE.

***Papilio Calverleyi* nov. sp.** (Plate 10. ♂.\*)

♂. Anterior wings black; the interspaces, in the terminal half of the wing, are occupied by a series of bright yellow patches which, distinctly separated by the black veins, extend from costa to internal angle, become obtusely pointed towards the discal cell, and are broadest at the black marginal space where they partly absorb a series of yellow oblong marginal spots situate in the center of the interspaces; emarginations yellowish.

Posterior wings black at base; terminal interspaces bright yellow,

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\* The detached wings on the right of the figure represent the under surface.

which color encroaches on the inferior part of the discal cell, shaded with fulvous between the veins above the marginal lunules, and distinctly divided by the black veins. There is a marginal row of elongate yellow lunules in the black marginal space; anal angle showing a large orange ill-defined ocellus transversed by a narrow faint blackish arcuated line; tail moderate, straight, black sprinkled with yellowish in the center; emarginations yellowish.

Under surface of anterior wings resembling upper surface, the yellow patches in the interspaces are of a lighter shade superiorly, becoming suffused with orange towards the internal angle; at the outer extremity of the discal cell is a faint whitish streak along the vein.

Under surface of the posterior wings resembling upper surface, the marginal lunules and terminal interspaces orange.

Abdomen black, with a double row of lateral yellow spots, one on each segment; thorax and head black, latter with two small yellowish spots behind the eyes, and two larger lateral yellow spots on the collar; legs black; femora slightly streaked with yellowish. Exp.  $3\frac{1}{10}$  inches.

*Hab.* New York State.

Resembles *Papilio asterias* Fab., in size, the shape of the wings and the markings of the body; the present species has but two rows of abdominal spots. It is however unnecessary to insist here upon the numerous differences which separate the present from each of our heretofore described species belonging to the present genus. From the circumstance of there having been but a single individual as yet taken in the locality, together with the prominence of the species which would render it unlikely to have been so long neglected, it might be supposed foreign and its introduction accidental; if so, it is still probably undescribed, for, after as rigid an examination as was possible for me to make among the many figures and diagnoses under the present genus, I was unable satisfactorily to refer it to any heretofore acknowledged species.

The male individual from which the above description and accurate accompanying figure was taken, is in the collection of Mr. Stephen Calverley, Brooklyn, L. I., to whom I dedicate the species, and was captured during the month of August, 1863, by Mr. Louis Fischer in the immediate neighborhood of the village of New Lots, Queen's County, Long Island.

**On Dimorphism in the Hymenopterous genus CYNIPS; with an Appendix, containing hints for a new Classification of Cynipidæ and a list of Cynipidæ, including descriptions of several new species, inhabiting the Oak-galls of Illinois.**

BY BENJ. D. WALSH, M. A.

More than two years ago Baron Osten Sacken directed the attention of American Entomologists to the remarkable fact, that Hartig had "collected about 28,000 galls of *Cynips divisa* and reared 9 to 10 thousand *Cynips* from them, all ♀ ♀"; and that "of *Cynips folii* likewise he had thousands of specimens of the ♀ sex without a single ♂"; whence he concluded "that these insects were agamous, or in other words that the ♂ ♂ did not exist at all."—(*Proc. Ent. Soc. Phil.* I, p. 49.)

I have myself examined in all, at various times, some in the closet and some in the field, about a thousand specimens bred from or taken out of the gall of *Cynips quercus aciculata*—a species described by Osten Sacken from two specimens furnished by myself—and they were all beyond a doubt ♀ ♀. There can be no mistake here, because in this genus the ♂ is distinguishable at a glance by its differently shaped and very much smaller abdomen; but to prevent the possibility of error, in most cases I ascertained the presence of the ovipositor.

In the spring of 1863 I determined, if possible, to solve this mystery; and as the subject is of high physiological importance, it will be advisable, before stating the conclusions arrived at, to specify in some considerable detail, as extracted from my journal, the facts upon which those conclusions are based.

The trees from which I obtained the galls, or "oak-apples" as they are commonly called, on which I experimented, were an isolated and scattering group of 50 or 60 black oaks (*quercus tinctoria*), situated on a blue-grass prairie and without any other kind of forest-trees intermixed with them. The distance from this group to the nearest timberland is about 150 yards. For many years I have procured from this source just as many *Cynips q. aciculata* as I wanted, the galls occurring in prodigious exuberance there; and I had noticed three years ago that upon 6 or 7 of the largest black oaks in this group, on which the *Cynips* had hitherto been almost exclusively found, being cut down for fuel,

the insect shifted its quarters to some other large trees which stood at the other end of the group, passing over a number of much smaller and younger trees lying in the intermediate space. One of these last large trees in particular was so badly infested by *Cynips* in 1863, that it must have borne from 400 to 500 galls. I have, however, occasionally found these galls elsewhere on quite young trees and even on saplings.

These same galls occur on the black oak in two or three other localities near Rock Island, Illinois, but by no means so abundantly. They are, however, exceedingly local, and if all the black oaks within two miles of Rock Island were divided into groups of the same size as the one above described, I am confident that for one such group where these galls exist, certainly fifty and perhaps one hundred will be entirely destitute of them. I speak the more confidently on this point, because one of my favorite modes of collecting is by "beating," and because it is scarcely possible to "beat" an oak, where these large and conspicuous galls or "oak-apples" exist, without becoming aware of their presence. Another fact leads to the same conclusion. Every spring in the locality above referred to dozens and dozens of oak-apples of last year's growth may still be seen hanging on the trees, being almost invariably those from which the *Cynips* or its parasites have made their exit. In the winter of 1863-4 I have carefully looked for such oak-apples in many black oak patches where I had failed to find them in the summer, and could not discover a single one. Yet the trees being mostly leafless a single specimen would have been easily seen. On the same prairie mentioned above there is another group of black oaks, similar and similarly situated to the one that swarms with oak-apples, and distant from it about  $\frac{1}{4}$  mile. Yet a careful search in the winter failed to discover a single oak-apple hanging on the boughs. On the other hand I had no difficulty in finding on the same occasion many of these galls still hanging on the trees in the two or three localities where I commonly find them in small numbers in the summer; nor in finding numerous galls of *Cynips quercus inanis* O. S. on the red oak still hanging on the tree. Yet that gall is not one-twentieth part so abundant as the one which produces *aciculata*.

There are found near Rock Island the following species of oak, named in the order of their relative abundance, and on none of them,



except the black oak, have I ever found the kind of gall which produces *aciculata*:—*Quercus tinctoria*, (black oak, by far the most abundant of any,) *alba* (white oak), *rubra* (red oak), *macrocarpa* (burr oak), *imbricaria* (laurel oak), and *prinus* variety *discolor* (swamp white oak.) *Q. coccinea* (the scarlet oak) is believed by my friend Dr. Fred. Brendel, to be a mere variety of *Q. tinctoria*, (*Trees and Shrubs of Illinois*, by Dr. Brendel, *Trans. Ill. State Agr. Soc.* III, p. 596,) but it does not, so far as I am aware, occur in this vicinity. The identity of *Q. tinctoria* and *Q. coccinea* is an important fact, because Osten Sacken allows that his *Cynips quercus coccineæ*, bred by him from *Q. coccinea*, is scarcely distinguishable from *C. q. spongifica*, bred by him from *Q. tinctoria*, and only separates them on account of the supposed distinctness of the galls from which the two insects were bred, and the supposed distinctness of these two so-called species of oak. (*Proc. Ent. Soc. Philad.* I, p. 247—8.)\*

On May 17th, 1863, I visited the above described group of black oaks, and although their leaves were only about  $\frac{3}{4}$  grown, I noticed, in addition to several of last year's dry and brown oak-apples, a very great number of green and freshly formed ones, many of which had attained their full size. On cutting a few of them open, I found the larva of the *Cynips* about  $\frac{1}{2}$  grown. Some of these galls had the terminal nipple attributed to the gall of *spongifica* by Osten Sacken, some were smoothly spherical as the gall of *aciculata* is described by the same author, many had several nipples scattered irregularly over their surface, and 2 or 3 had as many as 12 or 14. The few I cut into had a rind or skin as thick as that of the normal gall of *aciculata*. I noticed a single specimen which was irregularly lobed like a common tomato.

On May 24th some of these galls contained full-grown larvæ, and on May 25th I found in several of them ♀ pupæ. On June 4th I opened several galls gathered May 24—5, and found in them some larvæ and pupæ, and one ♂ and two ♀ imagos of *C. q. spongifica* O. S. Shortly afterwards I collected about 100 galls, as they were beginning to get

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\*Of the four other species of oak known to occur in Illinois—*q. obtusiloba* (post-oak), *q. nigra* (black jack or barren oak), *q. castanea* (yellow chestnut oak) and *q. palustris* (pin oak)—the two first are confined to Central and Southern Illinois, so far as is hitherto known.

ripe, and bred from them in all during the month of June, 6 ♂♂ and about 20 ♀♀ of *spongifica*, besides a great number of the Cynipidous inquiline or guest gall-fly, *Synophrus læviventris* O. S., and of two distinct species of parasitic Chalcididæ belonging apparently to Callimome and Deatoma, and a single Bracon very near *mellitor* Say. Up to June 14 all the galls that produced *spongifica* flies were thin-shelled and of the type of the gall *q. coccineæ*. Such galls were then brown and ripe, whereas the more hard-shelled and thick-shelled ones were then more or less green and succulent. On June 14th, however, I bred a ♂ *spongifica* from one of the latter description of galls, and many ♀♀ afterwards from such galls; and I found that all the intermediate grades between the two types occurred in the galls that produced *spongifica*, some having a shell no thicker than writing-paper which wrinkled and collapsed and shrivelled up in drying, and some a shell as thick as ordinary cardboard, so as to retain their plump, apple-like appearance under the roughest usage; some again having a terminal nipple, some many nipples, and some none at all or next to none. The last *spongifica* (a ♂) came out June 18, and after that date no more made their appearance, nor after the last day of June any more inquilines or parasites except a single ♀ Callimome (?) on July 23d. Of the whole number of galls somewhere about  $\frac{1}{2}$  remained on hand imperforated by any insect, those that were perforated having been from day to day picked out and thrown away. About the last of June, the thicker shelled galls having now become partially ripe and dry, I gathered 2 or 3 hundred more from the same locality, selecting of course those which had not been perforated by any insect.

During the month of June I had endeavored to experiment on the mode in which these galls are generated, by enclosing the boughs of of different species of oak with gauze-bags and placing therein freshly-hatched specimens of ♂♀ *spongifica*. Owing to the mischievous propensities of certain unknown persons, the only fact I was enabled to arrive at was, that this insect when fed on white sugar, which it appears to eat freely, lives only 6 or 8 days.

On July 16th I examined the group of black oaks, from the accessible boughs of which I had sometime before stripped all the galls. There were no new galls formed there, neither were there any subsequently formed there during the summer. Out of about 16 or 18 galls

left on a particular tree, three or four which I opened contained each a lively cynipidous larva in the central nucleus, and full one-half of the whole number were not perforated.

On September 6th I opened two of the oak-apples gathered early in June, and found a black ♀ pupa, apparently *aciculata*, in each. On Sept. 17th and 18th I found in the same lot of oak-apples 7 ♀ *aciculata* in the imago state, and during the month of October and the early part of November I bred very numerous imagos of the same, say from 50 to 60, all ♀. On October 25th I obtained three specimens from galls with a thinnish shell, and one from a gall with a shell as thin as paper and a distinct nipple at the tip. Of three others bred the same day from thick-shelled galls, one came from a gall with a terminal nipple, and the other two from spherical galls. On October 27, out of 11 or 12 ♀ *aciculata* that came out, several came from galls with a terminal nipple and from galls covered with nipples all over, the rest from spherical galls. Other specimens continued to come out till November 16, and a single one after that date. Not a single parasite had made its appearance since July 23rd. On January 20, 1864, I cut into 30 or 40 of the remaining galls and found in them 9 *aciculata* ♀ fresh and limber but dead, and 2 specimens dead and dried up, besides some dead and dried up parasites.

Besides the locality above referred to, I reared in 1862 a ♂ *spongifica* and several ♀ *aciculata* from a different locality, the gall of the former gathered in the spring and that of the latter in the autumn and both found on *q. tinctoria*.

From the above facts I draw the following conclusions:—

1st. *Cynips q. spongifica* O. S. is identical with *C. q. coccinæ* O. S., as there are confessedly no distinctive specific characters of any importance, and the galls occur on the same species of oak (*q. tinctoria*) and are connected by all the intermediate grades. The spongy matter of the gall of *q. coccinæ* is said to be "whiter" than that of *q. spongifica*, but I noticed several galls of *aciculata*, the spongy matter of which was in January, 1864, almost pure white.

2nd. *C. q. spongifica* O. S. occurs ♂ ♀ exclusively on *q. tinctoria*, and emerges not later than June from galls that commenced their growth in the preceding month of May.

3rd. *C. q. aciculata* O. S. is a dimorphous form of *C. q. spongifica*

O. S., occurs exclusively in the ♀ sex and exclusively on *q. tinctoria*, and emerges from the last of September to the middle of November, and many of them not till the following spring, from galls that commenced their growth in the preceding May, which are undistinguishable from those which produce *C. q. spongifica*, the same kinds of gall from the same lot of trees, gathered at the same time, producing *spongifica* ♂ ♀ in June and *aciculata* ♀ in October and November, and nothing whatever but a solitary parasite in the intervening period.

Suppose, for argument's sake, that *aciculata* and *spongifica* are distinct species. Then we are met immediately by the following difficulties:—1st. Is it likely that two distinct species of *Cynips* should produce, on the same species of oak, galls which are undistinguishable? I know of no such case in the whole Class Insecta. 2nd. Is it likely that when *spongifica*, as above shown, is so local that it is only found in one station out of fifty near Rock Island, *aciculata* should select that particular station instead of some other one of the remaining 49? 3rd. If *aciculata* is a distinct species, then we are compelled to believe with Hartig in the existence of agamous species, i. e. of species that propagate from year to year *ad infinitum* without sexual intercourse with a distinct individual. I cannot believe that any species in the whole Animal Kingdom is uniformly agamous, for the simple reason that we should then have almost as many races, and finally species, as individuals. Monstrosities and remarkable variations, which with bisexual species are mostly eliminated by intercrossing with normal individuals, would then by the laws of inheritance be always intensified and exaggerated from generation to generation, and what was originally one homogeneous species would split up into an almost infinite number of distinct and sharply defined types.\*

That it may not be supposed that I approached this subject biased in favor of the conclusions above announced, it is proper to state that my original guess was, that there were two broods of this *Cynips* every year, the first a spring brood ♂ ♀ of the type *spongifica*, the second an autumnal brood, ♀ only, of the type *aciculata*, generated in the ordinary course by the first brood, and in its turn generating by

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\* Mr. Darwin has avowed a similar belief in the case of hermaphrodite species, but for a different reason, viz., that close interbreeding tends to produce sterility. (*Origin of Species*, p. 235, Amer. edition.)

parthenogenesis the spring brood of *spongifica* in the following year. It is scarcely necessary to add, that the facts utterly overthrow this hypothesis. On the subject of Dimorphism, see my Paper on Pseudoneuroptera. (*Proc. Ent. Soc. Philad.* II, p. 221—2.)

The differences between these two dimorphous forms are so striking, that at the very first glance every entomologist who saw them for the first time would pronounce them to be distinct species, and there are no intermediate grades of any consequence. I have now before me 6 ♂, 5 ♀ of *spongifica*, and 30 ♀ of *aciculata*, and the following differences are observable:—

1st. The fovea at the base of the scutel is twice or thrice as deep in *spongifica*, and the longitudinal carina which bisects it is twice or thrice as lofty.

2nd. In *spongifica* there are three deep and wide, transversely corrugated, longitudinal striæ or sutures in front of the scutel, one central one extending nearly to the collare, but becoming narrower as it approaches it, and two divergent lateral ones fading out as they approach the humerus. In *aciculata* it is only in particular lights that traces of these striæ are discoverable, and they do not extend nearly so far forwards.

3rd. In *aciculata* on each side of the notum, beginning at the collare and terminating suddenly about half-way to the scutel, is an almost invariably conspicuous, obtuse, glabrous carina, each parallel with the other and distant from the other about as far as the two posterior ocelli are. In *spongifica* it is only in two or three specimens and in certain lights, that faint traces of these two carinæ are discoverable.

4th. In *aciculata* the mesonotum is very finely aciculate, or covered with fine regularly parallel rugæ before the scutel, except in two or three specimens where it is somewhat irregularly but very finely rugose. In *spongifica* it is very coarsely rugose. There is some little variation in both these two forms, but comparing the most coarsely sculptured *aciculata* with the most finely sculptured *spongifica*, the rugosities are at least twice as coarse in the latter, i. e. each rugosity is twice as wide.

5th. The sculpture of the rest of the thorax and also of the head is about twice as coarse in *spongifica* as in *aciculata*.

6th. The body of *aciculata* is uniformly black except that the abdo-

men is sometimes piceous below. In two ♀ *spongifica* the thorax is almost rust-red, (as observed in a single ♀ *C. q. coccineæ* by Osten Sacken. *Proc. Ent. Soc. Phila.* I, p. 244,) and the abdomen piceous red; in another ♀ the thorax is tinged with rust-red and the abdomen is piceous; and in the fourth ♀ the thorax is black and the abdomen is piceous red, the remaining ♀ specimen being uniformly black as are also both ♂ ♂. In the closely allied or identical species *q. inanis*, however, one of my two ♂ ♂ has a piceous red abdomen and all my 9 ♀ ♀ have a black thorax and a piceous red abdomen.

7th. Viewed laterally, the upper edge of the second abdominal joint (counting the peduncle as the first joint) describes a circular arc of about  $60^\circ$  in both forms. Taking the chord of this arc as a definite and permanent basis of measurement, in *spongifica* ♀ the lower or ventral edge proceeds straight downwards exactly at right angles with this chord for a distance equal to  $\frac{1}{2}$  or  $\frac{1}{3}$  the length of the chord, before it curves gradually backwards to form the ventral arch. In *aciculata* ♀ on the contrary, instead of being at right angles ( $90^\circ$ ) with the chord, it forms with it an angle of about  $110^\circ$ , so as to exhibit a most extraordinary bulge in front, and it curves much further downwards from the peduncle and in a more compressed and knife-edged form, so that the abdomen is vertically at least as wide as long and almost always much wider, whereas in *spongifica* ♀ it is always longer than wide and generally much longer. The above variation in each form is caused by the terminal abdominal joints being more or less telescopically drawn out in different specimens, so that in each form the second abdominal joint sometimes occupies dorsally  $\frac{1}{2}$  the entire length of the abdomen exclusive of the peduncle, and sometimes almost  $\frac{2}{3}$ . St. Fargeau has observed the same thing of the genus *Megachile*, (*Hymenopt.* II, p. 338,) and I only notice it here because Osten Sacken, having only a few specimens of each form on hand, supposes the relative length of the 2nd abdominal joint with regard to the terminal joints to be a permanent character of each. (*Proc. Ent. Soc. Phil.* I, p. 246.)

8th. In consequence of the above bulge on the anterior abdomen in *aciculata*, (See *Appendix*, Fig. I,) the distance from the "ventral valve" (Fig. I, v,)\* to the "dorsal valve" (Fig. I, 7)\* is proportion-

\*These terms are explained in the Appendix.

ally twice as long as in *spongifica*, and consequently the sheaths of the ovipositor (Fig. I, *ss*) are also proportionally twice as long, though their proportional breadth in both forms is nearly the same.

9th. With the exception of a single specimen, my 30 ♀ *aciculata* are  $\frac{1}{4}$  broader and longer than my 5 ♀ *spongifica* and my 9 ♀ *inanis*, all 14 of which are remarkably uniform in size, save a single ♀ *inanis* which is a little smaller than the rest.

These nine differences are sufficiently remarkable, and but for the evidence of dimorphism would undoubtedly be viewed by every entomologist as of specific value. Three other differences stated by Osten Sacken I do not find to be strictly correct.

1st. In both forms the antennæ are of a uniform, opaque, dark reddish brown, and not "pitch black" in *aciculata* and "brown or reddish brown especially towards the tip" in *spongifica*. (*Proc. Ent. Soc. Phila.* I, pp. 56 and 242.) The two basal joints, however, are blacker and a little inclined in some specimens to be polished.

2nd. In both forms the areolet is, on the average of specimens, equally distinct and not "more distinct" in *aciculata*. (*Ibid.* p. 57.) Of course, on account of the larger size of the insect, it is absolutely but not relatively larger in *aciculata*.

3rd. In both forms the antennæ ♀ are 13-jointed, the last joint nearly as long as the two preceding ones put together and with *one* more or less distinct transverse impression slightly behind its middle; or, to state the same thing in other terms, the antennæ ♀ are 14-jointed, the two last joints connate and almost confluent. Osten Sacken erroneously says that in *spongifica* ♀ the antennæ are 13-jointed, the last joint "with *two* indistinct transverse sutures foreshadowing the 14th and 15th joints of the ♂;" and that in *aciculata* ♀ the antennæ are "14-jointed, the last joint being separated from the penultimate one by a suture as distinct as that of all the other joints." (*Proc. Ent. Soc. Phila.* I, p. 246.) In some specimens of *aciculata*, and it was probably such that Baron Osten Sacken received from me, the connate suture or transverse impression of the 13th joint is much more distinct than in others, but even in such specimens it disappears when viewed in certain lights, the other or true sutures remaining visible. In no specimens is it a true or free suture, as I ascertained by examining and re-examining dozens of specimens both in life and in death. Neither

could I find more than *one* transverse impression on the 13th antennal joint of any ♀ *spongifica* or ♀ *inanis*, though I carefully examined all my specimens while they were alive for that express purpose, and have verified the fact in the dried specimen. Both here and in the case of *C. q. palustris* (*Proc. Ent. Soc. Phila.* I, pp. 63 & 251) Baron Osten Sacken seems to have been led into error by supposing that in the *typical* Cynipide the antennæ ♀ ought to have as many joints as the antennæ ♂.

Two problems still remain to be solved, one of which I will myself endeavor to investigate in the coming season, and to the other I earnestly invite the attention of European entomologists.

1st. What, if any, is the generative function of *aciculata*?

2nd. Are Hartig's agamous species dimorphous forms, like *aciculata*, of some known or unknown bisexual species?

In regard to the first question I have shown above that *spongifica* ♂ ♀, which come out in June, only live 6 or 8 days, and it is therefore utterly improbable that ♂ *spongifica* should survive till October, so as to copulate with ♀ *aciculata* that appear in that month, and still more improbable that it should survive till the following spring, so as to copulate with the *aciculata* that pass the winter inside of the gall. What place in Nature, then, does *aciculata* fill, or does it fill no place at all? I can only guess, on the analogy of *Apis*, *Bombus*, &c., that *aciculata* ♀ generates galls which produce by parthenogenesis ♂ *spongifica* exclusively, and that ♀ ♀ *spongifica* coupling in June with these ♂ ♂ oviposit in the same month in the young buds of the oak, the eggs lying dormant till the following spring, when some of the eggs produce ♀ *spongifica* in June and some ♀ *aciculata* in the autumn or early in the following spring, which last in their turn, as before mentioned, generate ♂ *spongifica* to appear in the following June. It may also be the case that some few ♂ *spongifica* are generated by ♀ *spongifica*. By this arrangement the life of *aciculata* from egg to imago would be 16—22 months, and of *spongifica* ♂ generally 8—2 months, while that of ♀ *spongifica*, and perhaps occasionally of ♂ *spongifica*, would be 12 months. We know that the small ♀ of *Bombus* generates by parthenogenesis an autumnal crop of ♂ *Bombus*, for the assertion of that most inaccurate writer St. Fargeau, that there is a summer brood of small ♂ *Bombus*, which copulates with small ♀ *Bombus*, is contrary to the authority of



all other writers on the subject and contrary to my experience with regard to North American species, ♂ *Bombus* appearing exclusively in the autumn.\* We know also, on the authority of Huber, that the working honey-bee occasionally lays ♂ eggs, although that writer states that these eggs are invariably destroyed by the other working-bees three days after they are sealed up in their cells. (Quoted by St. Fargé, *Hymenopt.* I, p. 359.) Bevan, however, (quoted by Westw. *Intr.* II,

\* See Westw. *Intr.* II, p. 279, note \* and p. 281: St. Fargé, *Hymenopt.* I, pp. 449 and 452, who quotes Dahlbom and Huber as being of the opinion contrary to his own. Some conspicuous proofs of St. Fargeau's inaccuracy may here be mentioned. 1st. He asserts (*Hymenopt.* I, p. 46) that there are no apterous species in Hymenoptera, although Gravenhorst had long before established the apterous Ichneumonide genus *Pezomachus*, to say nothing of the Chalcidide genus *Choreius* and the Cynipide genus *Biorhiza*. 2nd. In Vol. II, pp. 212-214, two species of bees are described under the genus *Melitta*, and in pp. 145-7 of the same volume a new genus, Kirbya, is established to contain these same two species of bees, of which slightly different descriptions are given, and all this without a word of comment or explanation. 3rd. In Vol. II, p. 261, "lagopus" (hare-footed) is translated "pied de loup" or wolf-footed. 4th. In Vol. III, p. 509, he finds fault with a certain Italian Committee of Naturalists, who had issued a most interesting Report on the well-demonstrated fact that *Scolia*, unlike other Fossores, does not make a nest and carry its prey thereto, but attaches its eggs to the larvæ of Oryctes, like an Ophion or a Tachina. "One would suppose," says he, "that the gentlemen of the Committee were not aware that three years before they wrote their Report I had divided Hymenoptera into two Suborders, Ovitithers (egg-placers) and Oviscaptors (egg-diggers) which last lay their eggs inside the body which serves to nourish them." As if the Ichneumonide Ophion was not, according to his own arrangement, an "Oviscaptor"! or as if that genus had not been proved, not only three years but many years before he wrote, to attach its eggs *externally* to the body of its victim just like the "Ovitither" *Scolia*! Even if his division had been natural and correct, such half-Latin and half-Greek terms, as "ovitithers" and "oviscaptors," might well have grated harshly upon the ears of a Committee, composed of descendants of the ancient Romans. 5th. The "Vallonia" in which the above-mentioned Oryctes larva occurred is not, as St. Fargeau erroneously supposes, "tannée" (tan-bark), but a kind of acorn so called and extensively employed in tanning. (See Macculloch, *Diction. Commerce*, "Vallonia.") Hence St. Fargeau's remark that "he cannot conceive why M. Passerini stops to combat the opinion that the larva of *Scolia* may possibly be *frugivorous*, seeing that there were no *fruits* either whole or chopped up near it," and that such a supposition is "neither sustained nor sustainable," is based upon a misapprehension of the meaning of the common word "Vallonia." For Vallonia acorns are certainly *fruits*, in the botanical sense of the term, though "tan-bark" is not. (*Ibid.* p. 506, note 1, and p. 507.)

p. 279, note\*) distinctly states that some working-bees "differing in shape from the rest, are occasionally fertile, depositing eggs but which only produce males." And according to Kirby and Spence (*Introd.* Letter 19), "Riem of Lauten of the *Palatinate Apiarian Society*, and Wilhelmi of the *Lusatian* affirm that the queen lays the eggs which produce the queens and workers and the workers those that produce the drones or males"; which is valuable as the testimony of practical bee-masters to the fact of the workers occasionally, at all events, producing male offspring. Again, we know from Huber, that if the coitus of the queen-bee is delayed till the 21st day after her birth, which may be considered as an ineffectual coitus or no coitus at all, she ever thereafter gives birth to nothing but ♂ eggs; (St. Farg. *Hymenopt.* I, p. 324) and it is well known that every queen-bee normally impregnated produces ♀, or which is the same thing, ♀ eggs for 10 or 11 months, and finally, when the effect of the impregnation may be supposed to have died out, ♂ eggs. (St. Fargeau *Hymen.* I, p. 324.) Furthermore, we learn through Huber, on the authority of M. Perrot, that in the wasps there are "small ♀ ♀ *not bigger than the workers* which lay only ♂ eggs." (Quoted Kirby and Spence, *Introd.* Letter 18, p. 108=p. 348.) And Kirby and Spence state generally that "*like those of the wasps and hive-bees the minor queens [of Bombus] produce only male eggs, which come out in time to fertilize the young females that found the vernal colonies*" (*ibid.* p. 353); i. e. come out in the autumn, when those "young females" are well known to make their first appearance, and when only, as I know by long observation, the ♂ ♂ either of *Polistes*, *Vespa* or *Bombus* are to be met with. Whether in the case of the wasps and the humble bees we choose to call these individuals that lay only ♂ eggs "minor queens" or "small females" or "workers," is a matter of taste; for there is in these two groups no external character but size, or occasionally trifling differences in coloration, to distinguish them from the large ♀ ♀ that found the colonies in the spring. But in the case of the hive-bee, where there are marked structural characters that separate the worker from the female or queen-bee, it was most satisfactorily demonstrated by Huber, that the individuals that laid the ♂ eggs had ALL the structural characters of workers; (quoted St. Farg. *Hymen.* I, p. 356—8;) and here therefore it would be manifestly incorrect to call these individuals "small queens." The

truth of the matter seems to be, that authors have been misled by the erroneous term "neuters"; and when they found a so-called neuter wasp or neuter humble-bee laying ♂ eggs, have thought it necessary to call the insect by some other name, as if knowledge consisted in words and not in things. So far as my own limited experience goes, I believe that there are only three distinct types either in *Apis*, *Bombus* or *Vespa*, viz. 1st. the large copulative ♀ queen or founder of the nest generating both ♂ ♂ and ♀ ♀, 2nd. the small agamous ♀ or so-called neuter generating ♂ ♂ only, which in *Apis* is not only smaller than but structurally distinct from the first type, and 3rd. the ♂ or drone. In a nest of *Bombus virginicus* examined October 7, by Mr. Cresson, 30 ♀ ♀ were "all of the largest size," i. e. about 12 lines, and 38 workers or small ♀ ♀ "5—8 lines." (*Proc. Ent. Soc. Phil.* II, p. 165.) And this coincides exactly with what I found to be the case in the only nest of *Bombus* that I ever examined myself. I believe further, though the fact still remains to be proved, that the first of these three types is homologous with ♀ *spongifica*, the second with the agamous ♀ *aciculata*, and the third with ♂ *spongifica*. And if this be correct, the old opinion that the working bee is not a distinct dimorphous form but nothing but a mere stunted ♀, is manifestly untenable; for ♀ *aciculata* lives in exactly the same kind of gall as ♀ *spongifica*, and one can be no more stunted than the other. Finally it is recorded that three generations of a moth (*Hypogymna dispar*) have been obtained without impregnation, "the last of which consisted entirely of males," (Westw. *Intr.* II, p. 384,) and it is notorious that in *Aphis* generation after generation of ♀ ♀ are produced by parthenogenesis, until the original impregnation may be supposed to have died out, when a generation of ♂ ♂ comes into the world. All these facts seem to indicate, that when the fecundating ♂ principle is absent, or rather when it has more or less partially died out, whatever is born is of the ♂ sex. It is possible, of course, that *aciculata* ♀ may perform no generative function whatever, but both here and in the case of *Apis* and other social insects it seems difficult to understand, how any dimorphous type can subsist for an indefinite time without at least occasionally exercising some generative function. Like produces like, either in the next or in some succeeding generation, and if the type *aciculata* was uniformly sterile, it would surely in an indefinite number of ages tend to be elimi-

nated and gradually cease to make its appearance. As an apparent confirmation of the hypothesis that *aciculata* produces ♂ exclusively, Baron Osten Sacken has called my attention to the fact, that "he found three galls in the spring *on the same branch*, and on cutting them open found ♂ *spongifica* in two and the third was probably also a ♂." (See *Proc. Ent. Soc. Phila.* I, p. 244.) May it not be possible that the working-bee generates ♂ bees more frequently than has been supposed, so as to admit of a queen bee being occasionally fertilized by one of them? On this hypothesis a difficulty which has much exercised Mr. Darwin would be thoroughly cleared up, viz., how instincts acquired by "neuter" insects come to be inherited. (*Origin of Species*, chap. 7.) The small ♀ of *Bombus* are normally fertile; analogy would lead us to suppose that the ♀ of *Apis* should be at least occasionally fertile. May not the well known fact that in certain insects one or the other sex greatly preponderates in numbers, and the further fact, so familiar to all breeders of insects, that with a given species one brood will be almost exclusively ♂ and another brood almost exclusively ♀, be also accounted for on the above theory?

In regard to the second problem, it may be asked why, if Hartig's agamous species are mere dimorphous forms of bisexual species, did he fail to discover the bisexual forms? I can only say in reply, that I once argued in print, that it was impossible that the army-worm moth (*Leucania unipuncta* Haw.) should exist in the Eastern States, for if it did it *must* have been found there either by Dr. Harris or Dr. Fitch; and that scarcely had the argument been published, when it was proved by indubitable evidence that it did so exist. Negative evidence is at the best always more or less unreliable. I recollect distinctly that the common English "oak-apples" which are, I believe, formed by *Cynips quercus terminalis*, attain their full size like the North American oak-apples of *spongifica*, by the end of May, because 30 years ago it was the custom to cover them with gold-leaf and employ them in the celebration of King Charles's day, May 29th. Will not some English entomologist collect a hundred or so of them and see if they do not produce a dimorphous ♀ form in the autumn?

To those who are desirous either of verifying the dimorphism of *spongifica* and *aciculata*, or of investigating the probable dimorphism of European species, it may be suggested that a very cheap, convenient

and successful way of breeding from "oak-apples," is to pin up several dozen in a newspaper. Placed in a glass jar, especially if very green, they are far more apt to mould and spoil, and the moisture that is continually exhaling from them settles on the jar, even when dry sand is placed at the bottom, and wets the wings of the imagos as they appear. Moreover, when breeding on a large scale, the expense of providing a sufficient number of jars would be quite considerable.

There is still another most interesting question connected with the Natural History of *Cynips q. spongifica*. Baron Osten Sacken bred a form allowed by him to be undistinguishable from it (*C. q. inanis*) in June, from entirely different galls found either on *quercus coccinea* or on *q. rubra*, but which species is uncertain; but he succeeded in obtaining two ♀ specimens only. In June, 1863, I obtained 2 ♂ 9 ♀ and some parasites from about 50 such galls, and I am certain that these galls occur near Rock Island exclusively on the red-oak (*q. rubra*), and as stated by Osten Sacken, on young trees and occasionally on mere saplings. The gall-fly described by Dr. Fitch as *Callaspidia confluenta* Harris (*N. Y. Rep.* II, § 317) and said to occur on the red-oak, is manifestly from the description of its gall identical with *inanis* O. S.; but neither did Dr. Fitch succeed in obtaining the ♂ sex. The insect however is evidently not a *Callaspidia*, for that genus has the ♂ antennæ 14-jointed, not 15-jointed like *inanis* ♂, and the scutel "clathrate" or covered with raised network, and truncate behind, not rounded behind as in *inanis*. (Brullé *Hymenopt.* IV, p. 635.) I can bear witness to the fact that both sexes of *inanis* are undistinguishable, except in the few unimportant particulars mentioned above, from ♂ ♀ *spongifica*. Having about 30 of the galls remaining on hand imperforated by any insect till the autumn, I had fully expected to obtain *aciculata* or some other dimorphous ♀ type from them; but to my great mortification, on cutting them open in January, 1864, I discovered that 15 or 16 of them had been attacked by a small parasitic Chalcidide, 8 or 9 of the larvæ of which were found clinging together in a round ball inside of the central cell, some of the others contained what was probably a dead larva of *inanis*, one a dead imago of *inanis* all mouldy, and the rest irrerecognizable matter. Six I reserved untouched, for the chance of breeding the Chalcididous imago. The failure to breed any dimorphous autumnal form from these galls may very pro-

bably have been caused by their having been put in a glass jar instead of in paper; for they were quite green when gathered and moulded considerably in spite of all my care. Thus the question still remains to be settled, whether *inanis*, as well as *spongifica*, has an autumnal dimorphous form. I strongly suspect that it has. It is possible, however, that it has not, and it is possible that it may have an autumnal dimorphous form entirely distinct from *aciculata*. Similarly the ♂ ♂ and ♀ ♀ of *Formica aphidicola* Walsh, and *F. latipes* Walsh, are scarcely or not at all distinguishable, while the ♀ ♀ are as different as two species of the same genus can well be. In either of the above two cases it will be necessary to consider *C. q. inanis* as a distinct species, and I therefore consider it provisionally as distinct; though I am inclined to believe that it is merely a distinct race of *C. q. spongifica*, which has acquired a permanent habit of attacking the red-oak exclusively instead of the black-oak, just as I have shown that there is a distinct race of *Clytus pictus* Drury, which has acquired a permanent habit of attacking the locust exclusively instead of the hickory. (See my Paper *Proc. Bost. Soc. Nat. Hist.*, Feb. 1864.)

I infer that the form *inanis* does not sometimes attack the red-oak producing *inanis* galls, and sometimes the black-oak producing *spongifica* galls, from the following fact:—The red-oak near Rock Island grows exclusively upon high bluff land, where it is intermixed promiscuously with black-oak. But although the gall of *C. q. inanis* is tolerably abundant there on the red-oak, I never saw but a single gall of *spongifica* (which it will be remembered attacks the black-oak) on the bluffs, nor any anywhere within half a mile of the spot where my *inanis* galls were all gathered, nor within half a mile of any spot where I ever found the gall *inanis*. On the other hand on the flat sandy bottom land, where the galls of *spongifica* occur in profusion, there are no red-oaks, so that the converse of the above question, viz., whether the form *spongifica* sometimes attacks the black-oak producing *spongifica* galls and sometimes the red-oak producing *inanis* galls, cannot be tested.

The galls of *inanis* and *spongifica*, although at first sight essentially distinct, are constructed upon the same fundamental principle, viz., a central nucleus, in which the larva lies, connected with a more or less thin and irregularly spherical shell by radiating filaments. The only differences are, that the gall of *inanis* ranges from  $\frac{3}{4}$  to  $1\frac{1}{8}$  inch, and

that of *spongifica* from  $\frac{3}{4}$  to  $1\frac{3}{4}$  inch in diameter, and that in *inanis* the space between the filaments is empty, and in *spongifica* is filled by a dense spongy substance. May not this last difference, as suggested by Osten Sacken, be caused by the different re-action of the two different species of oak against the sting of the same *Cynips*? I must confess analogy is generally opposed to the supposition; for the very remarkable and peculiar galls of *Cynips q. palustris* were found by Osten Sacken on *quercus tinctoria*, *coccinea* and *falcata*, and I have found them on trees of *quercus tinctoria* and *imbricaria* growing by the side of each other with their limbs interlaced, while Mr. Bassett has found a similar gall producing a slightly different insect on *q. ilicifolia*. (*Proc. Ent. Soc. Phila.* II, 329.)\* An observation of Mr. Ratzeburgh's to the same effect has been quoted by Osten Sacken (*Proc. Ent. Soc. Phila.* I, 248.) On the other hand an instance is quoted by the same writer where somewhat different galls on different oaks produce apparently the same species of *Cynips* (*Ibid.* p. 51.) There is considerable variation in the shape of the gall of *inanis*, as in that of *spongifica*, some specimens occurring that are not smooth and spherical but covered with excrescences. I noticed two that grew, not out of the leaf, but out of the stem close to the origin of the leaf.

So far as the identity of the parasites infesting *spongifica* and *inanis* might be supposed to prove the identity of the two species themselves, the evidence is indecisive. I have obtained from both in June a beautiful green *Callimome* (?), and the chalcidide larva mentioned above as found in January in the galls of *inanis*, occurs also in the same month in those of *spongifica*; on the other hand I have bred from *spongifica* alone a large *Dorcatoma* (?) with spotted wings and a single specimen of a *Bracon*, and from *inanis* alone a small Pteromalide, all in June. The inquiline or guest gall-fly *Synophrus? læviventris* O. S., also occurs in June exclusively on *spongifica*.

Baron Osten Sacken, by the way, remarks that "respecting the true relation of the Inquilinæ to the Psenides \* \* not a single direct observation seems to be extant, and that the fact of their parasitism is therefore merely inferred from the circumstance of their having been reared

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\* Specimens ♂ ♀ obligingly sent me by Mr. Bassett are identical with specimens bred by myself from *q. tinctoria*.—March 14, 1864.

from the same galls." (*Proc. Ent. Soc. Phila.* I, p. 49.) I have repeatedly observed that the little cells of the above-named inquiline are placed in great numbers—sometimes 20 or 30 of them—immediately under the outer skin or rind of the gall of *spongifica*, whence the imago emerges through orifices like pin-holes; and on two occasions I have found in the central cell of *spongifica* galls, that were full of such little cells under the rind, not the *spongifica* fly itself indeed, but what comes to the same thing, its parasitic destroyer the large green Callimome (?) above referred to. Hence three results follow:—1st. That it is not the *Synophrus* that makes these galls, for it only occurs in some few of them. 2nd. That the eggs of the *Synophrus* must have been deposited after the gall had attained some considerable growth; for if the eggs that produce the *Synophrus* had been laid in the bud of the oak along with that of *spongifica*, it seems difficult to understand how they could get invariably to the rind of the gall, or why they should do so. 3rd. That the *Synophrus* does not interfere with the health and prosperity of the original proprietor or builder of the gall, and is consequently not what is generally called a parasite but a true inquiline or guest gall-fly.—Some important observations to the same effect have been recently published by Mr. Bassett. (*Proc. Ent. Soc. Phila.* II, p. 329–331.)

It is proper to add, in conclusion, that Baron Osten Sacken writes me word that "according to Dr. Rheinhardt *spongifica*, *inanis*, &c., belong to a new genus" distinct of course from *Cynips*. Both Latreille and Westwood state that *Cynips* (= *Diplolepis* Latr.) has ♂ antennæ 15-jointed and ♀ antennæ 14-jointed (Latr. *Gen. Cr. et Ins.* IV, p. 18 and West. *Intr.* II, Synops. p. 56.) Yet on examining a ♀ specimen of *C. gallæ tinctoriæ*, a species obtained from the "nut-galls" of commerce and which Westwood expressly refers to *Cynips*, I find that the ♀ antennæ are distinctly 13-jointed, (not 14-jointed,) the last joint full as long as the two preceding ones put together and divided into two by a rather obvious connate suture, which however disappears in certain lights when the adjoining ones do not, and is entirely invisible on holding the antennæ up to the light, while the others are very plain. Our ♂ *spongifica* and ♂ *inanis* have both of them 15-jointed antennæ, but the ♀ ♀, as above shown, including *aciculata*, have all the 13th and 14th joints of their antennæ connate and almost confluent, and their antennæ are therefore, in the usual sense of the term, 13-jointed.



like those of *C. gallæ tinctoriæ*. Again, Westwood says that in *Cynips* the three sides of the areolet are of equal thickness. (*Ibid.*) Yet in the above specimen of *C. gallæ tinctoriæ*, as well as in all N. A. Cynipidæ known to me, I find the terminal vein thicker than the others, and Dr. Fitch observes the same thing of all N. A. Cynipidæ known to him. (*N. Y. Rep.* II, §309, p. 28.) In all other respects but these, *spongifica*, *inanis*, &c., agree well with the characters of *Cynips*, and unless they are referred to that genus, there seems to be no other described genus to which they can with propriety be referred. Hartig, it appears, does not consider the number of the antennal joints as of generic value, for the species of *Aulax* Hartig, and of some others of his genera, vary in this character. (*Proc. Ent. Soc. Phila.* II, p. 34, &c.) It is remarkable that all our N. A. Cynipidæ, as has been observed by Dr. Fitch, have the abdomen highly polished and nearly glabrous, while *C. gallæ tinctoriæ* (Asia) has the abdomen opaque and strongly and coarsely pubescent. And it is still more remarkable that the ♂ of *C. nubilipennis* Harris, actually has *sixteen-jointed* antennæ. (*See the Appendix.*)

Few things are more striking in the history of the different families of gall-producing insects, than the manner in which certain genera are almost exclusively confined to certain genera of plants. Authors long ago noticed the innumerable species of *Cynips* and its allies that infest the different species of oak. We learn from Osten Sacken that the Cynipide genus *Diastrophus* affects the bramble both in America and Europe, and that the Cynipide genus *Rhodites* (10 species) is found on the rose and only on the rose both in America and Europe. Three species of gall-producing Psylladæ (Homoptera) have been noticed by him, as he has kindly informed me, to inhabit the hackberry, (*Celtis occidentalis*,) all forming very different galls. One only of these, *Psylla* (?) *venusta* O. S. M.S., was bred by him to the imago; a second one I have myself bred in great numbers, and I can testify to its specific distinctness from *venusta*, as I have been favored with specimens of the latter; the third species is still unknown in the imago.\* Again, there are three

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\* My insect as well as *venusta* evidently belongs to a genus distinct from *Psylla*. The antennæ are 8-jointed (not 10-jointed) with the 8th joint long and clavate, and the 3rd joint the longest; and there are no spurs to the hind legs, whereas *Psylla* has two strong spurs there. No Psylladæ known to me form

species of *Phylloxera* (Aphidæ) which form very distinct galls on the black or shag-barked hickory, *Ph. caryæfoliæ* Fitch, *Ph. caryæglobuli* Walsh, and *Ph. (pemphigus) caryæcaulis* Fitch, which last was only known to Dr. Fitch in the gall and was referred by him to *Pemphigus*, but both Baron Osten Sacken and myself have obtained from it the perfect insect which is scarcely distinguishable from *caryæglobuli*. Finally, there are certainly 3 and probably 6 species of *Byrsocrypta* (Aphidæ) forming distinct galls on the cottonwood (*Populus angulata*) and other poplars, viz., *B. (pemphigus) populicaulis* Fitch, *B. pseudo-byrsa* Walsh, and *B. vagabunda* Walsh, which last, since the description was published, I have ascertained to inhabit smooth, hollow, green galls at the tips of the young shoots of the cottonwood, shaped much like the garden flower known as "cockscomb," and about 1—1½ inch in diameter. I have recently seen similar galls similarly situated on the Balm of Gilead (*P. balsamifera*.)

The same propensity to inhabit certain genera of plants has been observed in many other genera of Insects that do not produce galls. For instance, *Dryocampa* affects the oaks, *Vanessa* and allied genera the nettles, *Hipparchia* the grasses, and *Argynnis* the violets. These facts have a clear significance on the theory of the Derivative Origin of Species; on the Creative Theory they are inexplicable.

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true galls, but *Ps. buxi* and also *Livia juncorum* produce deformities upon leaves; and there is no Psyllade genus, so far as I am aware, to which these insects can be referred. For the benefit of those who, more fortunate than myself, have access to good Entomological Libraries, it may be added here that Baron Osten Sacken writes me word, that there is a Paper on the generic arrangement of Psylladæ by Foerster, in *Rheinländische Verhandlungen*, and another by Flor, in *Bulletin des Natur. de Moscou*, 1861, Art. 2.

## APPENDIX.

The very curious subject of the Guest gall-flies or Inquilines has already been referred to. For our knowledge on this subject, and for an explanation of the distinction between the True Gall-flies (*Psenides*) that make the galls and the Guest gall-flies (*Inquillinæ*) that inhabit the galls made by the others, without however necessarily starving or destroying them, we backwoods entomologists are indebted to Baron Osten Sacken. (*Proc. Ent. Soc. Phila.* I, pp. 48--9.) That writer has clearly shown that Dr. Fitch was not aware of the existence of Guest gall-flies, because, having bred a Guest gall-fly (*oneratus* Harris) from a gall made by a true Gall-fly (*q. globulus* Fitch) he supposed that the two insects must have come from two different kinds of gall. (*Ibid.* pp. 67--8.) Having myself bred this Guest gall-fly from the gall of *q. globulus*, I can confirm the fact of its not being produced from a distinct kind of gall.

I have also reared a very great number of gall-flies from the Oak-fig gall (*q. ficus* Fitch) which correspond accurately with Dr. Fitch's description of his *Cynips q. ficus*, and which are not true gall-flies but inquilines, and identical with the species that I know, as before stated, to be an inquiline in the oak-apple of *spongifica*—*Synophrus læviventris* O. S. It is therefore not improbable that Dr. Fitch's *Cynips q. ficus* is an inquiline and a mere synonym of the above-named species, with which, as will be shown below, it agrees in the number of its antennal joints, 15 ♂, 13 ♀. Mr. Bassett also bred nothing but "parasites" from this gall, by which term he, as well as Baron Osten Sacken, denotes not only the true parasites (*Ichneumonidæ*, *Chalcididæ*, &c.) but also the Guest gall-flies. Further than this, I have bred another inquiline (*Synophrus albipes* n. sp.) from a gall (*q. flocci*) apparently identical with *q. lana* Fitch; and as Dr Fitch's description of his *Cynips q. lana* (♀ with 15-jointed antennæ and ♀ only known to him) agrees very well with that of ♂ *Synophrus læviventris* O. S., which has 15-jointed antennæ and which may readily be mistaken for ♀ on account of the large size of the ♂ abdomen in this genus, I incline to believe that in this case also he has described by mistake the Guest gall-fly for the True Gall-fly, and that the latter in both of these two cases still remains to be described. In the case of the gall *q. flocci* (= *q. lana*)

I can supply the deficiency, having bred an undoubted True Gall-fly from it, which will be found described below as *Cynips q. flocci* n. sp., quite distinct from Dr. Fitch's species. In the case of the gall *q. ficus*, the deficiency can be supplied with probability but not with certainty, as the *Cynips* (*C. forticornis* n. sp.) which I have obtained from that gall in addition to the Guest gall-fly is subapterous, and consequently the chief character which distinguishes the *Psenides* from the *Inquillinæ* is absent.\* Thirdly, from the gall *q. pisum* Fitch, Baron Osten Sacken has bred another subapterous species, specifically distinct from the one obtained by me from the gall *q. ficus*, but like that species apparently a true gall-fly; and it is very probable, therefore, that *Cynips q. pisum* Fitch is a Guest gall-fly, and *C. pezomachoides* O. S. the true maker of the gall *q. pisum*. Indeed Dr. Fitch's description of his *C. q. pisum* agrees very well with the guest gall-fly *Synophrus læviventris* O. S., (which I have found to inhabit several distinct kinds of galls,) even down to the antennal joints ♂ 15, ♀ 13.

Judging from Dr. Fitch's observation that "the second veinlet of the fore wings is curved like a bow" in all the species which he refers to the genus *Callaspidia*, but not in "the species of the genus *Cynips*," and that this "appears to be a generic character of much value" (*N. Y. Rep.* II, §318), and knowing that all the three species which he refers to *Callaspidia* are true *Cynips*, it would seem to follow that he habitually refers *Cynips* to *Callaspidia* and the *Inquillinæ* or Guest gall-flies to *Cynips*. If this reasoning be correct, all the eight species catalogued and described by him under the genus *Cynips* are probably Guest gall-flies. The only fact at variance with this hypothesis is, that he refers *seminator* Harris, which is a true Gall-fly, to *Cynips* and not to *Callaspidia*. But Baron Osten Sacken notices several differences between the true *Cynips* obtained by him from the gall *seminator* and those described by Dr. Fitch; and as the true Gall-flies and the Guest gall-

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\* Mr. Bassett has bred both *C. q. forticornis* in November and December and *Synophrus læviventris* in the following summer from *q. ficus* galls, and has kindly sent me specimens of both species. I had given him my views on the subject, and he writes me word that "he is quite confident that *forticornis* is the true Gall-fly of Fitch's *q. ficus*, having found more than once the remains of a perfect fly in the central cells of that gall about the 20th of November."—March 14, 1864.

flies obtained from the same gall often resemble each other very closely, except generically, I rather infer that *C. seminator* Fitch, is a Guest gall-fly, differing from the true *C. seminator* obtained by Harris and Osten Sacken in having the thorax ♀ "cinnamon red" (40 specimens, Fitch) not "black" (Harris and 44 specimens O. S.), and in the ♂ antennæ being "bright tawney yellow" (Fitch) instead of "yellow at their base but decidedly brownish on their latter half" (O. S.—Compare *N. Y. Rep.* II, §315 and *Proc. Ent. Soc. Phila.* I, p. 69.)\* Harris in describing the thorax of *C. seminator* as "black" says nothing about the sexes; and there seems to be no foundation for Dr. Fitch's assertion that "it is the ♂ only which is described by Harris." It might easily be ascertained from the Harrisian Collection at Boston, whether the Harrisian specimens are really all ♂ ♂.

One reason why such a mistake should have been made as describing the same Guest gall-fly two or three times over as the maker of two or three distinct galls is, that several species—including the one specially referred to—are remarkably variable both in their size and in their coloration, and specimens taken from the two extremes of a specific series might well pass for distinct species. Dr. Fitch himself remarks that "several species of true gall-flies differ from each other only very slightly, \* \* being known with more certainty from the different galls from which they come than from the characters which the flies themselves present." (*N. Y. Rep.* II, §309.) Since, as will be shown below, the same species of Guest gall-fly inhabits several different kinds of galls, and from the same galls two different species of Guest gall-flies have been bred by me, (*Symerges mendax* n. sp. and *S. rhoditiformis* n. sp.) this latter criterion in their case is worth little or nothing.

The classification of *Cynipidæ* is at present in a state of chaos. According to the latest authorities, Hartig and Rheinhardt, *Cynipidæ*

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\* Mr. Bassett writes me word that on a hurried examination "among several hundred *C. seminator* he finds a very few individuals that answer to Dr. Fitch's description of the ♀ as regards the cinnamon-red color of the thorax; that they are much smaller than the ♀ ♀ that have a black thorax and abdomen, of which last there are a great number, and that he has always looked upon the first as parasites." Several dozen ♀ ♀ that he sent me were true *Psenides*, and all had a black thorax.—March 14, 1864.

(genuini) are separated as a distinct family from *Figitidæ*, with which preceding authors had united them, by the following characters:— (See *Proc. Ent. Soc. Phila.* I, p. 48.)

**Cynipidæ.** Second\* abdominal segment longer than [any one of?] the others (Hartig) or longer than half the length of the abdomen. (Rheinhardt.)

**Figitidæ.** Third\* abdominal segment longer than [any one of?] the others (Hartig) or second segment shorter than half the length of the abdomen. (Rheinhardt.)

The objections to this arrangement are manifold:—

1st. As has been stated before, (p. 450.) in *Cynipidæ* the terminal abdominal joints are telescopically drawn out in a manner which varies greatly in different specimens of the same species, so that in one specimen the second joint shall occupy only  $\frac{1}{3}$ , in another full  $\frac{1}{2}$  of the whole abdomen, and thus one specimen shall appear, according to Rheinhardt, to belong to *Figitidæ* and another to *Cynipidæ*. Moreover where is the length to be measured? Dorsally or laterally? In most species it makes a very great difference which way the measurement is taken. For example, in *C. gallæ tinctoriæ* (Asia) joint 2 occupies about  $\frac{1}{2}$  of the dorsal length, but scarcely occupies  $\frac{1}{3}$  of the whole lateral surface.

2nd. In one genus, *Aulax*, according to Dr. Rheinhardt himself, as quoted by Osten Sacken, (*Proc. Ent. Soc. Phila.* II, pp. 35, 37, 43.) the ♂ has the abdominal joints 2 and 3 subequal, the other joints being short, whereas in the ♀ joint 2 almost entirely covers the succeeding ones; so that here the ♂, according to Rheinhardt, belongs to *Figitidæ* and the ♀ to *Cynipidæ*! Again, in *Amblynotus ensiger* n. sp.?, in the ♂ joint 2 is dorsally nearly as long as 3, while in the ♀ joint 2 is dorsally scarce  $\frac{1}{2}$  as long as 3; showing a great sexual variation in what is assumed to be a family character. Observe that *Aulax*, as well as *Amblynotus*, are inquilinous in their habits, at least in certain species, if not in all.

3rd. In the genus *Diastrophus*, according to Osten Sacken, the 2nd and 3rd abdominal joints are subequal, and *Diastrophus* must therefore, according to Dr. Rheinhardt's definition, belong to *Figitidæ*. (*Proc. Ent. Soc. Phila.* II, pp. 38-9.) Observe that this genus is a gall-making one.

4th. *Figites* and *Allotria* have been long known to be true internal

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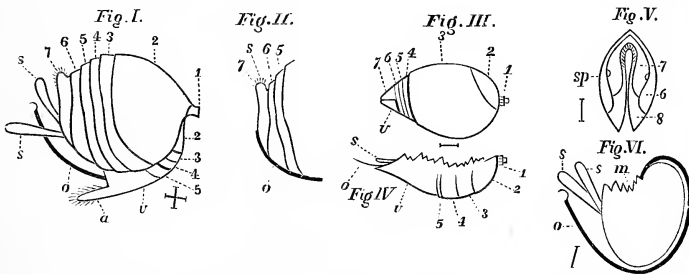
\* Counting the peduncle as the first segment.

parasites in their habits.\* Consequently to the same natural family *Figitidæ* there will appertain, according to the above classification, a gall-producing fly (*Diastrophus*), Guest gall-flies (*Aulax* ♂ and *Amblynotus* ♂ ♀) and internal parasites, (*Figites* and *Allotria*.) This is possible, but exceedingly improbable.

5th. In *Figitidæ* (as defined above) the suture connecting the 2nd and 3rd abdominal joints is a connate one and only indicated by a very faint stria, perceptible in some specimens of a given species and scarcely perceptible in others. I assert this after a careful examination of numerous specimens of several distinct species. Practically, therefore, such a classification as that above quoted is unreliable.

6th. By the above arrangement such genera as *Amblynotus*, which have a general family likeness to *Cynipidæ*, and agree in their habits with the Inquilinous group of that family, are separated therefrom and classed with *Figites*, a parasitic genus to which they have scarcely any family likeness.

Let us compare *Cynips* and *Figites*, and see if other distinctive characters cannot be pointed out, which shall be somewhat more definite



and more easily recognizable. Figure I represents the abdomen of *Cynips quercus aciculata* ♀ O. S. with the organs of oviposition exerted, Fig. II the tip of the same with the organs as in repose, Fig. III the abdomen of *Figites (diplolepis) 5-lineatus* ♀ Say, and Fig. IV the venter of the same, which, except its extreme tip, is completely enclosed and hidden by the dorsal joints as an oyster is enclosed and

\* "Some *Figites*," says Latreille, "are delighted with human excrement." (*Gen. Cr. et Ins.* IV, p. 19.) Doubtless they oviposit in the soft dung-feeding larvæ that abound there. I found a beautiful undescribed Braconide swarming in South Illinois, in a similar situation.

hidden by its two shells, the lower edges of the dorsal joints closing together so tightly as to appear united. In all four figures *o* is the ovipositor, *ss* the two sheaths of the ovipositor, *v* what is apparently the terminal ventral joint, and 5—1 the others. In Fig. I, *a* is an appendage to *v* which only exists in certain species, e. g. *q. spongifica* O. S., *q. inanis* O. S., and *gallæ tinctoriæ* (Asia.) As the ovipositor in certain specimens of several species often reposes in the piece *v*, projecting more or less from its tip, it is liable to be confounded with this appendage, but may always be distinguished by its not being hairy and by its non-presence there in other individuals of the same species.

From the above comparison and from a careful examination of many dozen species in my Cabinet, besides those catalogued below as infesting the oaks of Illinois, and also from repeated dissections, I propose to separate the two families as follows:—

**Cynipidæ.** Venter visible nearly throughout its entire length ♂ ♀, more conspicuously so in ♀, or if retracted within the abdomen leaving a gaping suture below. The joint which is apparently the last ventral, and which for convenience I call in ♀ the “ventral valve”\* (Fig. I, *v*) very long, and forming in ♀ a sheath-like receptacle, convex below, concave above, which is occupied by the ovipositor, (Fig. I, *o*.) Sheaths (Fig. I, *ss*) of the ovipositor, erected in repose, either vertically, or obliquely backwards and upwards, and strongly

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\* The presence of this “ventral valve” in ♀ is a very useful character to distinguish the sexes in *Cynipidæ*, when, as often happens, the joints of the antennæ are difficult to count, and the 3rd joint ♂ antennæ is scarcely curved or excised below. Generally the “ventral valve” is small, weak, thin and inconspicuous: in the genus *Synergus* it is better developed; but in the genus *Rhodites* ♀, in *Tribalia* n. g. *batatorum* ♀ n. sp., and in *Synergus rhoditiformis* ♀ n. sp., it is abnormally enlarged and thickened, and forms a very conspicuous, thorn-like feature in the profile view of the abdomen. (See Harris *Inj. Ins.* Plate viii, figs. 6 & 7, *Rhodites dichlocerus*.) Baron Osten Sacken mentions this as a characteristic of the genus *Rhodites*, but has inadvertently omitted to say that it is peculiar to the ♀ sex as he kindly informs me. (*Proc. Ent. Soc. Phila.* II, p. 44, and compare pp. 46 & 48.) In *Rhodites* ♀ (which belongs to *Cynipidæ*) there is ordinarily an angle of 45°—80° between the tip of the dorsum of the abdomen and the “ventral valve”: but occasionally these two parts close together, the acutely pointed “ventral valve” projecting beyond the tip of the abdomen. In *Figitidæ* these same parts are incapable of divaricating at an angle of more than 5° or 6°, and usually are closely appressed to each other as in Fig. III, and one does not project beyond the other because *the two united* form a boring apparatus; whereas in *Rhodites* it is the “ventral valve” *alone* that forms the boring apparatus.



divaricate with the "ventral valve." Dorsal joints of the abdomen free, except in certain genera the suture between the 2nd and 3rd dorsal and probably in *Ibalia* the suture between the 6th and 7th dorsal, which are connate. Tip of the ♀ abdomen bluntly and widely rounded or truncate. Tip of the ♂ abdomen angular or subangularly rounded, and only when the terminal segments are retracted, truncate, joints 4—7 being each vertically narrower than the preceding one.

*Habits*, so far as known, gallivorous.

**Figitidæ.** Venter retracted within the abdomen with the suture below barely perceptible, entirely internal and invisible ♂ except a minute portion of its tip, entirely so in ♀ except the tip of the terminal joint (Fig. III, v), which tip is horny, vertically flattened, and acutely angular, and in close conjunction with the similarly shaped terminal dorsal joint forms an angular horny borer. Concealed between the dorsal and ventral pieces of this borer lie the ovipositor (Fig. IV, o) and its sheaths (Fig. IV, s). Sheaths of the ovipositor horizontally porrect. Dorsal joints of the abdomen free except the suture between joints 2 and 3, which is connate. Tip of ♂ abdomen truncate, joints 4—7 being each vertically nearly as wide as the preceding one, except that joint 7 is often excised below and shows underneath it a small portion of the tip of the last ventral.

*Habits*, so far as known, insectivorous.

Cynipidæ and Figitidæ differ from all other families of insects known to me in the imago having but a single pair of abdominal spiracles, which are placed laterally close to the base of the 7th or what is apparently the last dorsal segment (Fig. V, *sp.*) There are many dipterous larvæ (e. g. *Midas*) which have only a single pair of abdominal spiracles which are placed on the penultimate joint; but the imagos and pupæ of these very larvæ have the usual number of abdominal spiracles, i. e. one pair on each joint except the last. Authors do not appear to have hitherto noticed this anomaly. It will be shown below that there exists an 8th dorsal joint in ♀ Cynips, and there is an 8th dorsal joint, cylindrical and armed on each side with a horizontal bristle, in ♂ Cynips also, which is occasionally exerted but generally retracted within the abdomen. In Figitidæ ♂ ♀ the 8th dorsal joint is entirely concealed by the 7th, which, as in Cynipidæ ♂ ♀, bears a basal, lateral spiracle. As there are the same number of dorsal joints in the Tenthredinidous, Uroceridous and Cynipidous abdomen, viz. eight, and as in the two former families the venter is 7-jointed, besides the terminal piece which bears the organs of oviposition, while in Cynipidæ the venter has only 6 joints, (Fig. I,) besides the terminal piece (Fig. VI) which is here

internal, it is probable that here the long 6th ventral joint (Fig. I v) is typically composed of two confluent joints.

By the above arrangement the Inquilinous genera *Aulax*, *Amblynotus*, *Sarothrus*, &c., and the gall-making genus *Diastrophus* will be grouped with *Cynipidæ*, where their habits and their general appearance indicate that they belong. What could be more apparently unnatural, than to refer *Diastrophus*, which makes galls on the bramble, to *Figitidæ*. and *Rhodites*, which makes galls on the rose, to *Cynipidæ*? The genus *Ibalia*, which I do not know, will also appertain to *Cynipidæ*, and from its pterological characters appears to belong to the true Gall-flies. (Latr. *Gen. Cr. et Ins.* IV, p. 17.) Dr. Rheinhardt forms this genus into a distinct family, Ibaliidæ (Blanch.), because "the segments of the abdomen are of equal length exclusive of course of the peduncle or 1st joint." (*Proc. Ent. Soc. Phila.* I, p. 48.) It is remarkable that Westwood figures *Ibalia* with an abdomen which, including the peduncle or first joint, is dorsally 6-jointed, the last joint full twice as long as any of the preceding. (*Intr.* II, p. 121, fig. 22.) From the fact that the dorsum of the normal Cynipidous abdomen is apparently 7-, not 6-jointed, though in reality it is 8-jointed, as will be shown below, I infer that this large terminal joint in Professor Westwood's figure is in the actual living insect divided by a suture, perhaps a connate one, into two, and thus, as Rheinhardt asserts, the six principal dorsal joints of the abdomen (2-7) will become equal in length.

I have a remarkable ♀ Cynipide, forming apparently a genus intermediate between *Cynips* and *Ibalia*, and thus confirming the fact that *Ibaliidæ* are not a distinct family, as Dr. Rheinhardt thinks. I obtained it, dead and with the wings undeveloped, from an irregular mass of several dozen egg-shaped cells with a very smooth internal surface, connected by fleshy potato-like matter, and each about .17 or .18 inch long, the whole, as I learned from a reliable source, attached, apparently by a woody peduncle, to a common potato, many other such galls having been found on other potatoes. Numerous dead larvæ, evidently Cynipidous, were found in the other cells, one only in each. Generically this insect may be thus characterized:—

TRIBALIA, n. g. Abdomen with its dorsum apparently 7-jointed, much compressed and knife-edged below; peduncle or 1st joint small; all the sutures between 2 and 7 free. The second dorsal joint only

occupies about  $\frac{1}{4}$  of the lateral or  $\frac{1}{3}$  of the dorsal surface; 3—5 subequal, 6 and 7 somewhat shorter. Venter unusually large and apparently 5-jointed, the last joint very long. Last ventral joint (or "ventral valve") robust and horny ♀ and presenting laterally the appearance of a highly polished, glabrous, tapering, acute spine  $2\frac{1}{2}$  times as long as its basal width, projecting horizontally and very slightly turned upwards at the extreme tip. Last dorsal joint ♀ squarely truncate and bearing on its posterior surface a distinct "caudal groove,"\* without however any "dorsal valve,"\* in which groove the sheaths of the ovipositor, which are normal, are entirely hidden. On the side of dorsal joints 2—6 there is a large, medial, impressed, shallow puncture, simulating a spiracle, and at the lateral base of 7 there is the spiracle usually seen in other Cynipidæ but sometimes overlapped by joint 6.† Between the "ventral valve" and the last dorsal ♀ there is a large angular opening, which, as the dorsal joints open out above, becomes more contracted. Antennæ ♀ 14-jointed, 1 and 2 short and subequal, 3 half as long again as 1 and 2 put together, 4—6 gradually shorter, 6—13 short, and 14 a little longer than 13. Wings——. Differs from *Ibalia* in the ♀ antennæ not being 13-jointed with the last joint no longer than the penultimate, in the scutel being unarmed, in the 1st dorsal joint of the abdomen being considerably larger than any of the following ones, and in the hind legs, especially the basal joint of the hind tarsi, not being abnormally long. From *Rhodites* it is separated by its much more compressed abdomen and the comparatively small size of the 2nd dorsal joint, and also by the comparative shortness of the 3rd joint of the antennæ, and by having no vestige of any "dorsal valve" (see below) whereas *Rhodites* ♀ has a very distinct one.

***Tribalia batatorum*** n. sp. ♀ Black. *Head* with the vertex opaque and glabrous; front very finely rugose, almost aciculate transversely; antennæ robust and  $\frac{2}{3}$  as long as the body. *Thorax* moderately polished, obsoletely rugose, the three usual mesonotal striæ very distinct, except as they approach the collare, and widely and deeply impressed, the two outer ones converging but slightly behind; on each side of the tip of the central one a very short longitudinal stria not quite attaining the collare, and another rather longer one above the

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\* These terms will be explained below.

† There is one small dorsal joint succeeding 7 in Cynipidæ, as will be shown below, and therefore Cynipidæ form no exception to the general rule, that the last abdominal joint is not spiraculiferous.

origin of the front wings. Scutellum with a deep basal transverse suture but no foveæ, longitudinally semioval, opaque, not very finely rugose and with a sub-obsolete longitudinal slightly polished line. *Abdomen*, when viewed laterally,  $\frac{1}{3}$  longer than wide, the dorsal edge in a quadrant and after relaxing the specimen almost in a semicircle from the joints opening out dorsally: joint 2 moderately polished, horny and glabrous, the following joints of a somewhat softer consistence and opaque, except where their polished basal portion has been exposed by the relaxation, but scarcely rugose under the lens. *Legs* reddish brown, hind tibiae and the tips of the intermediate ones and all the six tarsi brown-black. *Wings* not expanded, but evidently not abortive. Length ♀ .16 inch; ♂ unknown. One ♀.

With regard to the subdivision of *Cynipidæ* into true Gall-flies (*Psenides*) and Guest gall-flies (*Inquilinæ*), so far as my limited experience goes, all the species belonging to A. I., "Radial area narrow, areolet opposite its base," are gall-makers, and all belonging to A. II., "Radial area broad, short; areolet opposite its middle," are Guest gall-flies. (See *Proc. Ent. Soc. Phila.* I, p. 48.) According to Hartig, some species belonging to A. I. are Guest gall-flies and some belonging to A. II. are gall-makers. (*Ibid.* p. 49.) It may be so; but it is possible that Hartig may have been deceived, as he was in all probability deceived about his agamous species. Until some good observer succeeds in obtaining two distinct species belonging to A. I. from the same gall, we may well hesitate to believe that any species of that group is inquilinous in its habits. May it not be possible that Hartig obtained two dimorphous forms of some true gall-fly from the same gall, and supposing them to be distinct species concluded that one of them must be an Inquiline? Again, because a particular observer has hitherto bred nothing but species belonging to A. II. from a particular gall, it does not follow that no future observer will succeed in breeding from the same gall a species belonging to A. I. which may be the true maker of the gall. From over a hundred galls of *C. q. palustris* I bred one year nothing but great numbers of *Chalcididæ*, and it was not till the next year that, under a slightly different mode of treatment, I succeeded in obtaining the real maker of the gall in abundance. Some authors would have jumped to the conclusion at once, that the *Chalcididæ* made the galls.

I observe in *C. q. aciculata* ♀, *C. q. spongifica* ♀, *C. q. inanis* ♀, *C. nubilipennis* ♀, and with two apparent exceptions in all the other species known to me, nearly twenty in number, which belong to A. I..

and also in the sub-apterous *C. forticornis* n. sp., a peculiar arrangement for poisoning the tip of the ovipositor, which does not appear to have been noticed by authors.\* Hitherto it has only been inferred analogically that *Cynips* ♀ has an apparatus for poisoning its ovipositor, when it lays an egg in the bark or the bud. The following facts go to explain the physical means by which this very curious process is accomplished.

Take a recent or a relaxed specimen of some gall-making ♀ *Cynipide*, e. g. *C. q. aciculata* ♀, and it will be noticed that almost invariably in repose, instead of the sheaths of the ovipositor being exerted, as they are in the *Inquilines*, nothing is seen resembling a sheath but a small, hairy, tuberculiform projection, which I shall call the "dorsal valve," at the top of the 7th abdominal joint. (See Fig. II, 7.) † Now take a pin and push this "dorsal valve" backwards, and the sheaths will start out and assume the position shown in Fig. I. *ss*, disengaging from between them the tip of the ovipositor (Fig. I. *o*), which is curiously curved so as to lie conveniently between them when they are in their usual position (Fig. II. *o*.) A further examination and a dissection of the parts will show that this "dorsal valve" (Fig. II. 7) composes the upper part of a narrow vertical groove, visible only from behind, sufficiently deep to receive the whole breadth of both sheaths, and formed by the sides of the 8th dorsal joint, which is united by a free suture with the 7th, but with the exception of the "dorsal valve" can only be seen when viewed from behind. (Fig. V, 8.) This groove I shall call the "caudal groove." Concealed in the abdomen, with its edge occasionally slightly projecting towards the "ventral valve" (Fig. I. *v*) there lies a singular, horny, circular, vertically compressed, black, polished piece (Fig. VI.) from which the sheaths (*ss*) behind and the ovipositor (*o*) in front take their origin, and which is strongly connected by a muscular attachment (*m*) to the upper part of the dorsal joints 6 and 7. This piece is figured by Westwood (*Introd.* II, p. 121, fig. 19 *b*), and is evidently from the organs attached to it the homologue of the ter-

\* I observe the same thing in six other species belonging to A. I. recently received from Baron Osten Sacken and Mr. Bassett.—March 14, 1864.

† There ought to be a suture between the 7th dorsal and the "dorsal valve," but through a blunder of my own it is not shown either in Fig. I or Fig. II though it appears in Fig. VI.

minal ventral piece in Tenthredinidæ and Uroceridæ. (*Ibid.* p. 94, figs. 12*b* and 15*b* and p. 115, fig. 13*b*.) In all species known to me belonging to A. I. the sheaths are capable of being concealed for their whole breadth in this "caudal groove"; and it is only in one undescribed N. A. species belonging to A. I. (a unique specimen)\* and also in *C. gallex tinctoriæ* (Asia, another unique specimen) that I have found the sheaths projecting a little beyond the tip of the "dorsal valve." In all the rest which are known to me they do not, when reposing in the "caudal groove," project at all from the "dorsal valve." Each sheath is elongate-spoon-shaped, the convex side outwards, so that when they are compressed together in the "caudal groove," they form a hollow cylinder, rounded and closed at tip. In *aciculata* (12—15 specimens) they are curiously channelled on the inside, as if an impression in wax had been taken of the curved ovipositor with its fine hair-like tip (Fig. I. *a*); and there is a strong appearance, in many freshly relaxed specimens, of a membranous tubercle lying at the interior tip of the sheath in the curve corresponding to the hair-like tip of the ovipositor. In fact in the recently relaxed sheath its whole interior surface seems occupied by membrane, so as to present a plane surface with a groove sculptured in it of the exact shape of the ovipositor, while the very same sheath when dried will be concave inside with the groove indicated only by a shining stripe on an opaque surface. This tubercle may be, and perhaps is, the poison-secreting gland. On three or four occasions, on disengaging the ovipositor of *aciculata* from its sheaths, in the manner described above, I have found its recurved tip covered with a mass of whitish gummy matter soluble in water, and in two specimens, which happened to die with the ovipositor disengaged, I notice the very same thing.\* Hence, and from the peculiar structure of the parts, so different from what we find in any other Spiculifera, I infer that the use of the "caudal groove" is to compress the sheaths of the ovipositor, so as to enable them to form a suitable gum-tight receptacle for the gummy matter, and that this gummy matter is the gall-producing poison, and probably secreted from the tip of the sheath itself.

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\* This species turns out to be *C. q. operator* O. S., as I have ascertained from specimens of that species sent me by Mr. Bassett.—March 14, 1864.

On the other hand, in all the species belonging to A. II. which are known to me, the sheaths of the ovipositor project considerably beyond the "dorsal valve" and often very considerably. *Synergus rhoditiformis* n. sp. forms an apparent exception, but on relaxing a specimen it is found that that species has the "dorsal valve" unusually small, and that what seems the "dorsal valve" is in reality the projecting tip of the sheaths. Not only is it the case that in all species belonging to A. II. the sheaths project beyond the "dorsal valve," but it is also very generally found here that the tip of the ovipositor in many individuals of each species projects from between the tips of the sheaths. For instance, out of 28 ♀ *rhoditiformis* 19 individuals have the tip of the ovipositor thus projecting. On the contrary, out of nearly two hundred ♀ specimens of various species belonging to A. I. now before me, the only two I can find with the ovipositor thus projecting are the very two which, as before stated, have the sheaths themselves projecting from the "dorsal valve," viz. *C. gallæ tinctoriæ* and the unique specimen before referred to.\* The reason is obvious. If the spoon-shaped tips of the sheaths are compressed in the "caudal groove," as in the group A. I. with the exception of the above mentioned two species, they allow no exit to the ovipositor, and at the same time prevent the gummy matter, which I suppose to be the gall-producing poison, from oozing out. If on the other hand, as in all the species known to me belonging to A. II., the spoon-shaped tips of the sheaths project beyond the "dorsal valve," the result will be that the ovipositor, as we find to be

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\* Out of 34 ♀ specimens sent me by Mr. Bassett of *C. q. operator* O. S., the anomalous Psenide above referred to, 20 have the ovipositor detached from the sheaths and reposing in the "ventral valve", and 14 have it projecting from the tip of the sheaths.—March 21, 1864.

(~~The~~ The following note refers to p. 474 line 28, and was accidentally omitted.)

\* The hair-like recurved tip of the ovipositor, which makes its appearance in all the specimens, over 20 in number, which I have examined, is shown by a good lens to be composed of the two normal bristles thrust forwards from the tip of a more robust and apparently channelled seta, in which they travel backwards and forwards. Probably, after the tips of the two bristles have absorbed the gall-producing poison, they are retracted into the robust seta, before the whole apparatus is thrust into the leaf, bud or bark, whence the future gall will arise. Thus the poison will be sure of being conveyed, undiminished in volume, to the appropriate spot.

actually the case, has a free exit from the tips of the sheaths, and that even if Nature secreted any poisonous fluid into the sheaths it would be apt to leak out from their tips, especially if the sheaths, as in most Inquilines, projected considerably from the "dorsal valve." It would seem as if the Guest gall-flies were compelled to sponge upon the true Gall-flies for food and lodging for their young larvæ, because Nature has denied them the peculiar poison adapted to cause the growth of the various kinds of galls, or at all events has denied them a suitable apparatus for making use of that poison. Similarly, the cuckoo-bees, (*Nomada*, *Epeolus*, *Cœlioxyx*, &c.) lay their eggs in nests constructed and provisioned with pollen by pollen-collecting species, because Nature has denied to them the appropriate polliniferous organs. But just as certain Fossorial Wasps are strictly fossorial in their habits, though their legs approximate in their armature to the Vespidae type,\* so the two exceptional Cynipidæ mentioned above, or one of them at all events as we know, are strictly Psenidous in their habits, though the structure of the organs of oviposition in both approximates to a certain extent to the Inquilinous type. The whole subject is a curious one, and well deserves further and fuller investigation.

It is observable that in the Guest gall-fly *Aulax sylvestris* O. S., contrary to the general rule in the group A. II., the radial area is open, i. e. is not closed by a marginal vein. (*Proc. Ent. Soc. Phila.* II, p. 37.)† In all my Cynipidæ belonging to A. II. (Guest gall-flies) the radial area is distinctly closed, and, as I consider it, by a true vein which is a prolongation of the costal vein, and not a mere "thickening of the margin of the wing," as hinted by Osten Sacken. (*Ibid.* p. 36.) I draw this inference and the further inference that the closing of the radial area, though useful as a subsidiary character, is not a character of any high systematic value, at all events in true *Figitidæ*, from the following facts:—I have six species of *Figitæ*, differing in size and in the sculpture and armature of the scutel and the sculpture of the head

\* E. g. *Miscophus*, which is said by Westwood (*Intr.* II, p. 187) to be "destitute of spines on the fore-legs," but on p. 189 is said to be "very sparingly armed with short simple spines," as it is figured p. 188 fig. 6, t 1.

† I observe in specimens of this species obligingly sent me by Baron Osten Sacken, that in certain lights the radial area seems to be closed by a brownish vein which is not seen on the other part of the costal edge.—March 21, 1864.



and thorax. In one (*F. impatiens* Say, 8 ♂, 6 ♀) and another much smaller species (1 ♀ n. sp.?), the radial area is completely closed by a stout brownish vein, evidently a prolongation of the costal. In another (1 ♀ n. sp.?) the radial area is closed, the closing vein brownish and tapering to nothing at tip. In a fourth (1 ♂, n. sp.?) and a fifth (1 ♀ n. sp.?) the brownish closing vein tapers to nothing half-way to the tip of the radial area; and in a sixth, *Figites* (*Diplolepis*) *5-lineatus* Say, (1 ♂, 3 ♀) the radial area is entirely open, the costal vein tapering to nothing before it attains the costal margin. Again, in *Diplolepis armatus* Say, (3 ♂, 2 ♀,) a true Figitide which I take to be an *Ægilips*, the radial area is open, and in another congeneric species (1 ♂, n. sp.?) it is distinctly closed.\*

The results thus far obtained may be conveniently tabulated as follows:—

**Cynipidæ**, subfamily **Psenides**, (True Gall-flies.) Wings with the second transverse vein so bent or incurved towards their base, that the areolet is opposite the base of the radial area. Radial area scarcely ever closed by a prolongation of the costal vein.† Sheaths of the ovipositor scarcely ever projecting beyond the tip of the “dorsal valve.”‡ Ovipositor scarcely ever projecting from between the tips of the sheaths.

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\* If I am right in referring these two last insects to *Ægilips* Haliday, that genus must appertain to true *Figitidæ* Walsh, and in that case *Ægilips* (?) *obtusilobæ* O. S. (*Proc. Ent. Soc. Phila.* I, p. 63), which is a guest gall-fly, must be incorrectly referred to *Ægilips*. Very likely, however, I may be wrong, and the genus *Ægilips* may belong to the true Inquilinous Cynipidæ.

† Osten Sacken states that it is closed in *Rhodites ignota* O. S. (*Proc. Ent. Soc. Philad.* II, p. 49), and I observe that it is so in *Rh. rosæ* Linn. It will be noticed that almost all the distinctive characters laid down above admit of certain rare exceptions, and yet, taken as a whole, they are perhaps more naturally distinctive than a single dichotomous character which of course could admit of no exception. *Fossores* are sufficiently distinct from *Diplopteryga*, and yet there is not one single character that distinguishes them but what admits of occasional exceptions.

‡ In certain species individuals occur with the sheaths withdrawn from the caudal groove, (as in Fig. I, ss), but it is easy to see that if the sheaths were replaced there they would not project beyond the “dorsal valve.” I notice the above peculiarity only in 11 out of 13 ♀ ♀ of *C. q. forticornis* n. sp., which were all dug out of the gall dead and therefore perhaps not in their normal condition, and in 1 out of 5 ♀ ♀ *C. q. flocci* n. sp. All my other ♀ *Psenides*, nearly 200 in number, have the sheaths entirely hidden in the caudal groove excepting of course the two species mentioned above, in which the tips of the sheaths project from the tip of the “dorsal valve.”

**Cynipidæ**, subfamily **Inquilinæ**, (Guest gall-flies.) Wings with the second transverse vein so straight, that the areolet is nearly opposite the middle of the radial area. Radial area almost always more or less closed by a prolongation of the costal vein. Sheaths of the ovipositor always projecting more or less beyond the "dorsal valve," generally projecting greatly. Ovipositor in almost all the species often projecting from between the tips of the sheaths.

It might be thought that in assuming a Cynipide to be a Guest gall-fly, merely because it is bred from a gall known to be produced by a true Gall-fly, we are jumping too fast to a conclusion. May it not, it will be said, be a true Parasite, like the various Chalcididæ and Ichneumonidæ bred so often from galls, or like *Figites* and *Allotria*? The answer is simple. 1st. It is known with certainty that one genus (*Synophrus*) is, in the full sense of the term, a mere Guest in the gall of the true gall-producing *Cynips* (see p. 460), and 2nd. *Ichneumonidæ*, *Chalcididæ*, &c. are reared from all kinds of larvæ, belonging to all the different Orders of Insects, but nobody ever reared a Guest gall-fly except from a gall. Hence it seems a legitimate inference that they prey on the gall itself, and not on the gall-producing insect; for if they are larvivorous, why do they not devour other kinds of larvæ besides those of Cynipidæ? It is probable from certain facts which it would be tedious to particularize, that in some cases they starve out the original maker of the gall, or that Nature has given to certain of them the instinct to destroy the original maker of the gall in its early larva state, as I believe to be the practice of the cockoo-bees (*Cæliorys* &c.) towards the true polliniferous bees, (*Megachile* &c.); but this is a very different thing from the action of the true Parasites properly so called (*Ichneumonidæ*, *Chalcididæ* &c.), which feed upon the living body of their victims, and upon that body exclusively.

As regards the generic determination of Cynipidæ, the subject is full of difficulties. Hartig, the original discoverer of the Natural History of the Guest gall-flies, has, it appears, founded a number of imperfectly characterized genera, which even Baron Osten Sacken finds himself mostly unable to recognize. One of the chief characters employed by him for this purpose is said to be the number of joints in the palpi, which in these minute insects can scarcely be ascertained satisfactorily without dissection under the microscope. Practically, it would be about as convenient to found new genera of Cynipidæ upon the number of convolutions in the intestinal canal. Even the number of joints in the

antennæ is, in the smaller species of these insects, sometimes exceedingly difficult to count. It would be easy to mention a dozen cases where authors have erred in counting them, and subsequently corrected their own errors; and frequently two different authors disagree as to the number of antennal joints in the same species. Dahlbom, for example, says that *Ibalia cultellator* Latr., has the ♂ antennæ 14-jointed, and Westwood says that they are 15-jointed and figures them as 15-jointed! (See Brullé *Hymenopt.* IV, p. 636, Westw. *Intr.* II, p. 121, fig. 17 and p. 126.) I have myself frequent occasion in this Paper to differ from other writers on this subject, and can only say that if I err in so doing it has not been for the want of pains-taking. As in many species there is a long terminal joint in the ♀ antenna, with or without a medial connate joint or obsolete suture, and as this false suture has sometimes been inadvertently taken for a true one, I have stated in each description the proportional length of the last joint, and whether it has a false suture or not. In reality a 13-jointed ♀ antenna with a long 13th joint, with or without a medial connate suture, is evidently the equivalent of a 14-jointed ♀ antennæ with the two last joints short.

On the whole, in the present state of science, generic determinations of Cynipidæ must necessarily be provisional, and I have therefore in each case merely attempted to approximate to accuracy, and to supply the deficiency by careful statements of such characters as appear to be of generic value. Taking *Synophrus* (?) *læviventris* O. S., *Amblynotus* (?) *petiolicola* O. S., and *Synerges* (?) *oneratus* Harris, as types of three inquilinous genera called provisionally *Synophrus*, *Amblynotus* and *Synerges*, I find the following generic distinctions to be common to the different species which I have arranged under those generic names.

**Synophrus.** Antennæ ♂ 15-jointed, ♀ 14-jointed, or 13-jointed with the last joint long. Thorax glabrous under the lens before the scut<sup>el</sup>; scut<sup>el</sup> rugose. Pleura of thorax with a large spot under the wings, which is glabrous and as highly polished as the abdomen. Abdominal peduncle rather indistinct, simple and truncate-conical, the *large* end of the cone towards the 2nd abdominal joint. Second abdominal joint occupying nearly or quite the entire abdomen, exclusive of the peduncle.

**Amblynotus.** Antennæ ♂ 15-jointed, ♀ 12-jointed, the last joint full twice as long as the penultimate. The other characters the same as *Synophrus*, except that what appears at first sight to be the second abdominal joint is divided by a very faint connate suture into two joints, which are dorsally subequal ♂, but

the first of which in ♀ is dorsally scarce half as long as the second. This suture, however, in some specimens is scarcely distinguishable and in none can be seen without difficulty.

**Synerges.** Antennæ ♂ 15-jointed, ♀ 14-jointed, or 13-jointed with the last joint long. Thorax transversely rugose under the lens before the scutel; scutel rugose. Pleura of thorax scarcely glabrous or polished. Abdominal peduncle apparently constricted strongly in the middle, but in reality composed of two parts, the first a short cylinder, the second much larger and in the form of a truncate cone, the *small* end of the cone towards the second abdominal joint. Second abdominal joint occupying nearly or quite the whole abdomen, exclusive of the peduncle.

Hitherto *Synerges* has occurred exclusively in hard, woody galls, and the other two genera in the more soft and fleshy ones. The inquilinous genus *Aulax*, which is peculiar in having the 2nd and 3rd joints ♂ abdomen subequal, while in ♀ the 2nd joint covers the succeeding ones, I have not yet met with.\*

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\* According to the arrangement proposed above, the genera *Cynips* Linnaeus (= *Diptolepis* Geoffroi and Latreille, = *Callaspidia* Fitch non Dahlbom), *Biorhiza* Westwood, *Philonix* Fitch, *Diastrophus* Hartig, *Rhodites* Hartig, *Ibalia* Latreille and *Tribalia* Walsh, will all of them belong to Cynipidæ Psenides: *Synophrus* Hart. and O. S., *Synerges* Hart. O. S., *Amblynotus* Hart. O. S., *Sarothrus* Rheinh. O. S. and *Aulax* Hart. O. S. to Cynipidæ Inquilinæ; and *Figitis* Latr., *Onychia* (?) Haliday, *Callaspidia* (?) Dahlbom non Fitch, *Allotria* (?) Westw., *Kleidotoma* (?) Westw., *Eucoila* (?) Westw. and *Ægilips* (?) Haliday to Figitidæ. *Onychia* is said to have the scutel "canaliculate," which seems to be peculiar to true Figitidæ, and *Callaspidia*, according to Dahlbom, is closely allied to *Onychia*. (See Brullé *Hymenopt.* IV, p. 635.) *Allotria* is parasitic in Aphis. If I have rightly identified *Kleidotoma* and *Eucoila*, both are true Figitidæ, and both have the wings fringed like a *Mymar* (Proctotrupidæ), and the former has them emarginate at tip with the radial area in my species distinctly open, and the latter simple at tip with the radial area in my species marginally closed by a coarse brown vein. A species of *Eucoila* was supposed by Westwood to infest the turnip, but several species are asserted by Walker to be parasitical, (Westw. *Introd.* II, p. 132,) and in that case Westwood's species was probably parasitical upon some other insect that infested the turnip. For "it seems hardly probable," as Baron Osten Sacken well observes, "that species of the same genus should sometimes be true gall-producers and sometimes parasites." (*Proc. Ent. Soc. Phila.* I, p. 49.) Respecting the genus *Ægilips* see the note on page 477.

I notice that in *Aulax sylvestris* O. S. and probably in other *Aulax*, the ♂ abdomen is proportionally as much smaller than the ♀ abdomen as it is in the genus *Cynips*. This is not the case in the above-mentioned three inquilinous genera.—March 21, 1864.

## LIST OF ILLINOIS OAK-INHABITING CYNIPIDÆ AND THEIR GALLS.

†† *Galls upon Leaves.*

1. BLACK OAK (q. tinctoria.) Gall *q. spongifica* O. S. or "Oak-apple" (vernal). See above, pp. 458—9.

GALL-FLY, *Cynips q. spongifica* O. S., and its dimorphous ♀ autumnal form *C. q. aciculata* O. S. = *C. confluens* Harris, 1862 = *C. confluentus* Harris, 1841. See above, pp. 443—452.

GUEST GALL-FLY, *Synophrus læviventris* O. S. See p. 460 and below.

2. RED OAK (q. rubra.) Gall *q. inanis* O. S. (vernal). See above, pp. 458—9.

GALL-FLY, *C. q. inanis* O. S. = *Callaspidia confluenta* Fitch non Harris. See above, pp. 457—8

GUEST GALL-FLY, probably none. Galls like this and that of *C. nubilipennis* Harris, and *C. q. palustris* O. S., which consist scarcely of anything else but a central cell and a thin rind, without any spongy or woody matter intervening, seem to produce no Guest gall-flies.

3. BLACK OAK. Gall *q. pilulæ* n. sp., (autumnal.) A dark blood-red, spherical, but somewhat depressed gall .06—.20 inch in diameter, its upper surface roughish and opaque and often divided by deep striæ into 12—20 four- five- or six-sided compartments like the back of a tortoise, growing on the upper side of the leaves, but partly projecting also on the under side in a flattened disk with a central nipple, both of them the color of the leaf. Never placed on the principal veins and containing only a single very large cell. Frequently two or more galls are confluent, and they then assume an ellipsoidal or irregular form and contain two or more cells divided by thin partitions. Preserves its shape and color well when dry. Its general appearance is like that of *q. pisum* Fitch, figured and described *N. Y. Rep.* II, §319, but that gall occurs on the white oak, and is said to grow on the under side of the leaves only and on their principal veins and to contain usually two cells. *Pilulæ*, however, in a few cases—say 1 out of 500—does grow on the under side of the leaf. Very abundant but local near Rock Island, Illinois.

GALL-FLY unknown. On May 18th I found at the bottom of the jar, in which a number of these galls had been placed in the preceding autumn, 10 or 12 orange-colored Cynipidous larvæ dead and dry. Pro-

bably these may belong to the true Gall-fly, and it may go underground to assume the pupa state. A gall that I then cut into had a living, or at all events a succulent whitish larva in it, and one cut into in February had three such larvæ all in one ordinary sized cell. The former was probably the larva of the Guest gall-fly; the latter might have been Chalcididous, though I bred no Chalcididæ from these galls, as I have done from almost all the other kinds which have afforded me Cynipidæ. Eight of these galls cut open April 1st. contained each a single dead and dried up orange-colored larva, apparently Cynipidous, and probably identical with those found at the bottom of the jar. There was no earth in the jar for the larvæ when they came out of the galls to burrow into. Four-fifths of the galls are found in the winter to be burst open at the top and vacated by their tenants, which most likely had gone underground in the preceding autumn. Frequently at that period the whole top of the gall is abraded, so as to leave nothing but a flat ring on the leaf.

GUEST GALL-FLY, *Amblynotus inermis* n. sp. Came out May 18th from last year's galls. See below.

4. WHITE OAK? Gall *q. flocci*, in all probability identical with *q. luna* Fitch, which occurs on the white oak and is figured and described *N. Y. Rep.* II, §316. That gall is said to be "the size of a hazelnut or walnut," and the cells contained in it to be "about the size of grains of wheat," the length of the ♀ fly being given as .09 inch. The gall *q. flocci* varies from .20 to .40 inch in diameter, and is sometimes irregularly elongated in the direction of the midrib of the leaf. The cells contained in it are much smaller than grains of wheat and more in proportion to the size of the fly produced from them. Rare.

GALL-FLY, *C. q. flocci* n. sp. ♀. Black. *Head* with the vertex glabrous and a little polished, and the face brownish and apparently pubescent; palpi brown; antennæ  $\frac{2}{3}$  as long as the body, 13-jointed, the last joint more than  $\frac{1}{2}$  as long again as the penultimate, their basal  $\frac{1}{2}$  rufous and their terminal  $\frac{1}{2}$  dark brown. *Thorax* glabrous, somewhat polished, with two acute longitudinal striae converging on the scutel, and in one or two specimens with a faint medial stria also, obsolete before. Pleura sometimes entirely opaque subpubescent, sometimes with a moderately polished spot under the wings. Scutel finely rugose, not polished, its basal foveæ large but shallow. *Abdomen* polished, viewed laterally as wide as long, the 2nd joint occupying about  $\frac{1}{2}$  its surface, and the dorsal edge of the 2nd joint forming a circular arc of about 25°. The front edge of the abdomen forms with the chord of this arc an angle of 100°, as

in *C. q. palustris*. "Ventral valve" small, subhyaline, its tip rectangular; the ovipositor stouter than usual and projecting, more or less far, from the "ventral valve." *Legs* all uniformly honey-yellow verging on rufous, except that the tarsal tips are obfuscated. *Wings* hyaline, the principal veins and the cross-veins brown but rather fine. Areolet large and distinct. Radial area open and 3—3½ times as long as wide. Length ♀ .08—.10 inch.

Five ♀; ♂ unknown. Came out in June from last year's galls. Very near *C. q. palustris* O. S., but may be distinguished by its shorter and slenderer antennæ, its opaque and sculptured scutel, and its much finer wing-veins. I omitted to label these galls, and cannot therefore be certain that they grew on the white oak, but I think they did. Quite recently I have found precisely similar galls on the white oak.

GUEST GALL-FLY, *Synophrus albipes* n. sp. Bred the first week in August from last year's galls, four or five of the insects coming out of a single gall. See below.

5. WHITE OAK. Gall *q. erinacei* n. sp.? (= *q. pisum*? Fitch = *pezomachoides*? O. S.) Attached by a single point to the leaf and growing on one of the principal veins, occasionally on the under side of the leaf but twice as often on the upper side, a spherical gall .12—.45 inch in diameter, or occasionally egg-shaped and .35—.60 inch long and .25—.40 inch wide. In a single specimen two spherical galls are placed side by side, but in eleven others there is but a single gall on a leaf. The surface of this gall is "finely netted with fissures or cracks and intervening elevated points like the surface of a strawberry," as *q. pisum* is described by Dr. Fitch, but, in addition, in 11 out of 13 specimens the "elevated points" are prolonged in the form of slender prickles, which are occasionally tinged with pink on one side of the gall, and are .02—.05 inch long, so as to present a beautiful burr-like appearance or something like that of the European hedge-hog, whence the specific name. The general color, when dry, is nearly that of the dry leaf, but is sometimes browner, sometimes yellower. Rather rare.

The above were found in February on young white oaks and saplings that had not shed their leaves. The gall *q. pisum* is said by Dr. Fitch to be "not rare" and "to grow on the under side of the leaf" exclusively, and the same thing is observed by Osten Sacken of the leaf that produced his three *C. pezomachoides*. Almost all of my galls when found were perforated by 1—3 holes, each .02—.03 inch in diameter, and always located on the surface next the leaf so as to

be seen with difficulty. On cutting into one of them in the field that I had noticed to be bored, I discovered that besides the central cells, which were empty, there were other cells near the exterior surface tenanted by living larvæ apparently cynipidous. Hence I conclude that these last are the larvæ of guest gall-flies, and that the true maker of the gall, which I have little doubt is *pezomachoides* O. S., had come out in the preceding autumn or winter. Baron Osten Sacken's species came out January 7 or later, in the latitude of Washington and Philadelphia, and the nearly allied *forticornis* n. sp., the presumed architect of the gall *q. ficus* Fitch, comes out in November and December in the latitude of Connecticut, as we know from the observations of Mr. Bassett already recorded. As I find that nearly all the galls of *q. tuber* Fitch, are bored in the winter, and as I have recently noticed many of them which, although bored, contained living larvæ, apparently Cynipidous, in February, I infer that the maker of that gall also comes out in the autumn and the guest gall-fly in the following spring; and the same is probably the case with the maker of the gall *q. pilulæ* Walsh, except that that species appears to come out in the autumn in the larva state and go underground for the winter, instead of coming out at once in the imago state.

GALL-FLY, *C. pezomachoides*? O. S.

GUEST GALL-FLY, *C. q. pisum*? Fitch = *Synophrus læviventris*? O. S. See above, p 463.

6. RED OAK? Gall *q. sculpta*, Bassett. I have several times met with this very remarkable, grape-like gall, and can testify that it is pleasantly subacid, crisp and eatable. I have always considered that it must be these galls, and not those of *q. inanis* (= *confluenta* Fitch) which the school-teacher informed Dr. Fitch were eaten almost incessantly by the pupils at a certain school in Michigan. (*N. Y. Rep.* II, § 317.)

GALL-FLY, *C. q. sculpta* Bassett. I could never succeed in breeding it.

7. RED OAK. Gall *nubilipennis* Harris, (unknown to Osten Sacken.) This is well described by Dr. Fitch (*N. Y. Rep.* II, § 318), who, however, had not bred the insect from it and only inferred it to belong to the *C. nubilipennis* of Harris, from the "brief indefinite notice" of that writer. Sometimes these galls, "which have a third of the sphere



projecting from the upper surface of the leaf and the remainder opposite on its under side" (Fitch), grow near the margin of the leaf without however quite touching that margin, sometimes one-half of them projects outside from the margin. The galls mentioned by Dr. Fitch, as "perfectly the same, except that they show no vestiges of any attachment to the leaf, being smooth and even on every side," are most probably small specimens of *q. inanis* O. S. (= *confluenta* Fitch.) The galls *nubilipennis*, like *q. inanis*, vary much in size, my largest specimen being .60 inch in diameter, and others only .30 inch; and the central cell is nearly twice as long as wide, whereas that of *q. inanis* is scarcely  $\frac{1}{4}$  as long again as wide. They were gathered in June from a tree full of the galls *q. inanis*, which however are at once distinguished by being attached to the leaf only by a single point.

GALL-FLY, *C. nubilipennis* Harris (= *C. q. singularis* Bassett.) The ♂ of this species, as noticed by Mr. Bassett who was the first to discover it, is very remarkable for having 16-jointed antennæ, 14—16 equal in length, and the suture between 15 and 16 beyond all doubt free, as correctly stated by that writer from 12 specimens. The ♀ antennæ, as stated both by Fitch and Bassett, are 13-jointed, the last joint robust and nearly as long as the two preceding and occasionally with indications of a medial connate suture; the terminal joints gradually thicker. The ♂ antennæ are full as long as the body, the ♀ antennæ scarcely more than  $\frac{1}{2}$  as long. The sculpture of the head and thorax is proportionally nearly as coarse as in *spongifica*, and there is a distinct short stria on each side of the abbreviated tip of the middle mesonotal stria. In all three of my ♀ ♀ and one ♂ the abdomen is piceous, in the other ♂ black. The hind femora and tibiæ are almost always dark reddish brown, and occasionally in a lesser degree the intermediate ones. The wings are uniformly, but slightly, tinged with dusky, without any dark spot on the second cross-vein as in *spongifica*, *aciculata* and *inanis*; the veins all dusky or brownish, and both cross-veins robust and shining brown-black. The dorsum of abdominal joint 2 describes a circular arc of 45°, and the tip of the "ventral valve" is in a right angle, with a hairy filiform appendage. The "dorsal valve" is hairy and very large. Length ♂ .12—.14 inch. ♀ .14—.16 inch. Two ♂, three ♀, none of which were able to perforate the outer rind of the gall, though several had perforated the central cell. Con-

sequently, as they lay in the gall unobserved till the following winter, I can say nothing as to the natural time for their appearance. But we learn from Mr. Bassett that his specimens came out "about the 10th of July," and Dr. Harris gives June as the month when the transformations of this insect are completed.

There can be no possible mistake as to the correlation of the ♂ with the ♀, as my galls were all gathered off the same tree and the insects were all taken out of the gall itself. Mr. Bassett who has favored me with specimens of his *C. q. singularis* ♂ and ♀, thought it possible that the ♂ might belong to the inquiline genus *Aulax*; but the ♂ neuration is not inquiline and is exactly identical with that of *spongifica* and *inanis* and also with that of the ♀. Dr. Fitch's ♀, which he refers to *nubilipennis* Harris, is much larger, (.20 inch instead of .14—.16 inch Walsh, and .15 inch Bassett). It also has the abdomen "black" instead of "piceous red" Walsh, or "red or dull brick-red" Bassett. Finally, it was found "among fallen oak-leaves early in April," instead of occurring in June (Harris) or early in July (Bassett). In all these three characters it differs from Mr. Bassett's and my ♀ ♀, precisely as the dimorphous form *aciculata*, which appears in October and the following April, differs from *spongifica*, which appears in June. It is therefore not improbable that we have here another species with dimorphous ♀ ♀, and a species too which many authors, on account of the extraordinary 16-jointed antennæ of the ♂, would be inclined to make the type of a new genus. No other described species of *Psenides*, so far as known to me, has 16-jointed ♂ antennæ. It would be interesting to know whether the abdomen of Dr. Fitch's April ♀ differs in its shape from that of the June and July ♀, as that of *aciculata* differs from that of *spongifica*. My ♀ ♀ *nubilipennis* have the abdomen shaped nearly as in *spongifica* ♀, except that the terminal segments happen to be more retracted. Both sexes of this species are readily distinguishable from *C. q. globulus* by the number of the antennal joints—in the former ♂ 16, ♀ 13, in the latter ♂ 15, ♀ 14.

It may well admit of a question, whether the very short and indefinite notice of *nubilipennis* by Dr. Harris, though perhaps sufficient to identify the insect, ought to give his name priority over that of Mr. Bassett, who has described both sexes fully and accurately. The law of priority has its conveniences, but it has also its injustices.

8. SWAMP WHITE OAK (q. prinus, var. discolor.) Gall *q. petiolicola* (vernal). It is well described by Osten Sacken, but the author of the gall was unknown to him. (*Proc. Ent. Soc. Phil.* I, pp. 66-7.) Some of these galls, when occupying the base of the leaves, reach .60 inch in diameter, and produce each 9 or 10 flies, judging from the holes through which they have made their escape.

GALL-FLY, *C. q. petiolicola* Bassett. My specimens differ from Mr. Bassett's description as follows, with a few additional characters:—  
*1st.* The face in the living specimen is sometimes rufescent, but in the dried specimen it is black and not even "brown;" under a good lens it is very finely aciculate, with a flat glabrous carina from the origin of the antennæ to the mouth. *2nd.* The antennæ are uniformly pale reddish brown or dull rufous, scarcely darker at tip, 13-jointed, the last joint nearly as long as the two preceding ones put together, and in two or three specimens showing indications of the normal division into two joints, as in some of Mr. Bassett's specimens. The ♂ antennæ are 15-jointed, 13—15 subequal. *3rd.* Besides the two lateral striæ (or parapsidal grooves) of the mesonotum, there is in five or six ♀ ♀ a distinct central stria reaching halfway from the scutel to the collare, and a shorter stria in the other ♀ ♀ and in my ♂. *4th.* It is only the femora and tibiæ of the hind legs that are generally dark brown, the tarsi of the hind legs as well as the whole of the other four legs being pale reddish brown, the tips of all six tarsi brown as described. *5th.* The 2nd abdominal joint ♀ generally occupies dorsally  $\frac{2}{3}$  but laterally only  $\frac{1}{2}$  of the length of the abdomen, exclusive of the peduncle; and its dorsal edge describes a circular arc of about 45°. The "ventral valve" is subhyaline, its tip in an angle of 80° or 90°, and with a setiform appendage as long as itself; and the "dorsal valve" projects slightly above the dorsal line. The radial area is  $2\frac{1}{2}$ —3 times as long as wide. Length ♂ .09 inch, ♀ .10—.11 inch.

One ♂, nineteen ♀. Bred the end of June and forepart of July from galls produced the same year. Mr. Bassett's remark as to the somewhat greater comparative length of the abdominal peduncle in ♂ is perfectly correct.

GUEST GALL-FLY, *Amblynotus ensiger* n. sp.? See below. One ♂, four ♀ at the same time with the above, and from July 31 to August 14 five ♂, eight ♀. Greatly resembles the gall-fly, but, besides the

generic distinctions, differs as follows:—The antennæ are a trifle slenderer, the legs are honey-yellow instead of dull rufous, the hind femora and tibiæ are never obfuscated, the areolet is twice as large, and the sheaths of the ovipositor project like a sting about .03 inch above the line of the back.

9. BLACK OAK and LAUREL OAK (*q. imbricaria*.) Early vernal gall *q. palustris* O. S. The galls from the Laurel oak produced nothing but true Parasites (*Chalcididæ*), but as the parasites were specifically identical with those produced from the galls on the Black oak, and as the two species of oak grew side by side, each full of these galls, and the galls themselves were indistinguishable, I have no doubt that *C. q. palustris* inhabits the Laurel oak.

GALL-FLY. *C. q. palustris* O. S.

†† *Galls on Limbs, Twigs, &c.*

10. WHITE OAK. Gall *q. globulus* Fitch, (autumnal.) Well described and figured by Dr. Fitch, *N. Y. Rep.* II, § 312.

GALL-FLY, *Cynips (callaspulia) q. globulus* Fitch. I have not reared this, but have received ♀ ♀ from Mr. Bassett.

GUEST GALL-FLY, *Synerges (cynips) oeratus* Harris and Fitch. See below.

11. WHITE OAK. Gall *Seminator* Harris, (autumnal.) Well described and figured by Dr. Fitch, *N. Y. Rep.* II, § 315, except that, as noticed by Osten Sacken, (*Proc. Ent. Soc. Philad.* I, p. 69) the figure does not show the numerous "angular projections" which exist in nature. Rather rare near Rock Island, Ill.

GALL-FLY, *Cynips seminator* Harris and O. S. I have not reared this but have received numerous specimens ♂ ♀ from Mr. Bassett.

GUEST GALL-FLY? *Cynips seminator* Fitch non Harris. See above, pp. 464—5. Mr. Bassett says that "the galls *seminator* and *q. operator* have not yielded flies of any sort from the first of August to October; yet there still in October remain in many of the cells small, perfect, living larvæ." (*Proc. Ent. Soc. Philad.* II, p. 333.) Are these the larvæ of a guest gall-fly, or of a dimorphous ♀ form of *C. seminator*, destined in either case, as suggested by Mr. Bassett, (*ibid.*)

to appear "when the gall season again arrives"? The question is an interesting one.\*

12. WHITE OAK. Gall *q. ficus* Fitch, (autumnal.) Well figured and described, *N. Y. Rep.* II, § 314. Some of the central cells in these galls contain in February living larvæ about .05 inch long and occasionally a blackish pupa about .08 inch long, evidently from the structure of its antennæ Chalcididous. About one-fourth of these galls in the winter exhibit external perforations, and their central cells are then invariably perforated, indicating that the maker of the gall had already vacated his cell. With such as are not perforated, the central cell generally contains in February and March the above-mentioned chalcididous larva or pupa, which is no doubt identical with a Chalcidide that I have bred abundantly in May from these galls. The cells in which the guest gall-fly most probably lives are attached to the external rind of some few galls only, in addition to the central cell which is found in every gall and in which, according to all analogy, the maker of the gall must reside. I have found larvæ in March in some of these external cells; and in the same gall in which one of the external cells was tenanted by a larva, the central cell was also tenanted by a chalcididous larva; thus furnishing confirmatory evidence, that in certain cases the guest gall-fly does not destroy the gall-fly, or, which is the same thing, its chalcididous parasite. The twigs on which the galls are placed, unless very large, always perish the next season, and where recent galls are found, a great quantity of old, last year's, dry galls on dry and half-rotten twigs may always be observed. This circumstance seems to have led Dr. Fitch to imagine that there were two crops of these galls every year. He makes the same supposition with regard to the galls *seminator* Harris, and *q. inanis* O. S. (= *confluenta* Fitch), but in the latter case I know from close and continued observation that the supposition is incorrect. I doubt the fact of any oak-inhabiting Psenide

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\* Mr. Bassett has subsequently discovered that he was mistaken in supposing the few ♀ gall-flies with a red thorax, which he had observed to be mixed up with numerous *C. seminator*, to be parasites or inquilines. (See above, page 465, note.) They proved to be specimens of *C. q. operator* O. S., the gall of which, though it occurs on different oaks, closely resembles that of *seminator*, and small pieces of which must have been accidentally mixed up by him with the *seminator* galls.—March 31, 1864.

being double-brooded. The gall *q. ficus* occurs near Rock Island, Ill. chiefly on unthrifty sprouts 2 or 3 feet high growing round the stumps of young white oaks, and never on trees of any size. Dr. Fitch found them "on the long slender shoots of young and thriftily growing white oaks." I have seen them only once or twice in such a situation and then not 7 feet from the ground. The fact of their not occurring on large trees is explained by the gall-producing insect being, as I believe, subapterous.

GALL-FLY? *Cynips q. forticornis* n. sp. ♀. Rufo-sanguineous. *Head* transverse, nearly twice as wide as long and twice as wide as the thorax, glabrous, scarcely polished. Eyes, ocelli and antennæ brown-black, the antennæ opaque, nearly as long as the body, very robust so that all the joints but 1, 3, 4 and 14 are as broad as long, 14-jointed, the joints very distinct, the last joint  $\frac{1}{2}$  as long again as the penultimate, and 1 and 3 tapering to almost nothing at base. *Thorax* narrow, glabrous, a little polished, with only two rather coarse mesonotal striæ converging but slightly at the scutel. Scutel small, opaque, longitudinally semioval, much elevated, the suture before it deeply impressed but without any foveæ. *Abdomen* black, highly polished, the 2nd joint occupying about  $\frac{1}{2}$  of its dorsal or  $\frac{1}{2}$  of its lateral length, the 1st joint or peduncle very small. Viewed laterally it is a little longer than wide, and the dorsal edge of 2 describes a circular arc of about 25°. "Ventral valve" very hairy, yellowish subhyaline, its tip in an angle of about 80°. "Dorsal valve" large, hairy, prominent and distinct. Sheaths of the ovipositor generally exerted and directed upwards and backwards, but in two specimens distinctly lying in the "caudal groove," their tips just attaining the tip of the "dorsal valve." Ovipositor generally reposing in the "ventral valve" with its tip exerted. *Legs* dull rufous or reddish brown, the hind femora and tibiæ and all the tarsal tips generally browner. *Wings* subobsolete, reduced to an elongate-triangular gray scale upon each side, only extending  $\frac{1}{2}$  of the way along the 2nd abdominal joint. Length ♀ .07—.10 inch.

Thirteen ♀; ♂ unknown. Dug on May 17 fourteen ♀ ♀, dead but not decayed, out of the galls of *q. ficus* gathered the preceding autumn. Mr. Bassett, as already stated, bred this insect in November and December. Comes very near to another subapterous species, *C. pezomachoides* O. S., reared from the galls of *C. q. pisum* and probably the true Gall-fly of that gall, but differs in the head and thorax having no brown markings, in the tip of the scutel not being "recurved upwards," in the last tarsal joint not being "a little larger than usual," and in there being no "yellowish spot" on each side of abdominal joint 1. Nothing is said, either, as to the antennæ of that species being much stouter than usual. Probably the "short double projection with a fan-

shaped pencil of yellowish hairs", described in *pezomachoides* as attached to the tip of the abdomen, is the hairy "dorsal valve" with the two sheaths lying in it. Dr. Fitch has founded a new genus, *Philonix*, (which according to the Greek etymology that he himself favors us with should be *Philonips*;) to receive two subapterous species found on the snow in the winter, which however are specifically distinct from *forticornis*. As many species of insects sometimes occur with long wings, and sometimes with mere rudimental ones, it seems unnatural to place an insect in a separate genus merely and simply on account of the wings being rudimental. *Biorhiza* Westwood, which Dr. Fitch has most unnecessarily and inelegantly changed into *Biarhiza*, (*N. Y. Rep.* II, 5th Rep. p. 1.) has no wings at all. It is singular that all these apterous and subapterous Cynipidæ, (in all, six European and N. A. species,) have hitherto occurred only in the ♀ sex.

GUEST GALL-FLY, *Synophrus læviventris* O. S. (= *C. q. ficus*? Fitch. See above, p. 463.) Bred at various times before and after May 17, (from the same lot of galls as *forticornis*;) 31 ♂, 5 ♀.

13. BLACK OAK. Gall *q. podagræ* n. sp.? (autumnal.) Rough, hard, woody, gnarled and scaly swellings on such twigs and limbs as run from  $\frac{1}{4}$  to  $1\frac{1}{2}$  inch in diameter, never at their tips but often 4 or 5 feet from their tips. Occasionally these swellings are placed at the side of a limb, but more generally they encircle it, enlarging it in an irregular, longitudinally ellipsoidal or egg-like form, so as to double or treble its natural diameter. Frequently several of these swellings run one into the other, so as to form a very elongate tumor with a sinuate outline, thus presenting a fanciful resemblance to a gouty or dropsical limb, whence the specific name. Sometimes when a small twig is affected the swelling has 7 or 8 times the diameter of the twig, which then ceases to grow beyond the gall and projects from its tip like a tail. Each gall is polythalamous, i. e. contains numerous cells, connected by woody matter. I have observed three trees in different localities affected by these galls, one so badly that it was almost killed and was probably on that account cut down. As illustrating the local nature of *Cynips* galls, it may be added that of two exactly similar, isolated, black oaks, growing so close together that their boughs almost touched, one had one-tenth part of its boughs covered by these galls, and the other had

not a single gall on it so far as I could discover when it was bare of leaves. The affected limbs and twigs perish before the next season.

GALL-FLY, *Cynips q. podagræ* n. sp.? (= *C. q. punctata* Bassett?) ♀ Black. *Head* with the face and vertex very finely rugose, the face almost aciculate and in certain lights with whitish pubescence. Palpi rufous, tips often darker. Antennæ dull rufous at base, gradually deepening to a dull, dark brown at tip, 14-jointed, the last joint  $\frac{1}{2}$  longer than the preceding. *Thorax* opaque before the scutel, occasionally a little polished, with no perceptible general sculpture under the lens except a few very fine rugosities in front close to the collare. Three acute longitudinal dorsal striæ, the outer ones converging on the scutel and often with an almost microscopic row of punctures adjoining their inner edge, the middle one with a short stria on each side of its tip; another short longitudinal stria above the origin of the wings. Collare rather finely rugose. Scutel rather finely rugose or almost confluent punctate, with two deep, hemispherical, basal pits. *Abdomen* highly polished, black in the dried specimen, in the living immature insect shining piceous, the 2nd joint occupying about  $\frac{1}{2}$  its lateral surface with the upper edge describing a circular arc of about 30°. "Ventral valve" thin, yellowish-subhyaline or piceous, unarmed, its tip in an angle of about 60°. "Dorsal valve" large, prominent and hairy. Ovipositor occasionally reposing in the "ventral valve." *Legs* dull rufous or pale reddish brown, the hind femora almost invariably dark brown, and all 6 tarsal tips brown. *Wings* hyaline, veins moderately coarse, tinged more or less with brown. Areolet distinct and large. Radial area open and 3—3 $\frac{1}{2}$  times as long as wide. Length ♀ .10—.15 inch.

Twenty-three ♀; ♂ unknown. April 18—20, I had 51 ♀ ♀ come out from last year's galls and many more in the few succeeding weeks, without a single ♂ amongst them. It is remarkable that Mr. Bassett also reared 100 ♀ ♀ of his *punctata* without a single ♂. Very near indeed to that species, which was reared from somewhat similar galls on the Red oak instead of the Black oak, but differs by the vertex being rugose and the face rugose and pubescent, not simply "pubescent," and on the other hand by the thorax before the scutel not having its general surface "finely and beautifully punctate," even under an excellent double lens. It is possible, however, that Mr. Bassett may refer to microscopic punctation, though he says nothing to that effect, and says nothing either of the obvious sculpture of the head.\* I

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\*I have since received eight specimens of *punctata* from Mr. Bassett. The only perfectly constant character that separates *punctata* from *podagræ* is that the lower part of the abdomen in the former is decidedly "reddish brown" as described, instead of "black" as in all the dried specimens of the latter. Individuals of both forms have the peculiar "stump of a vein" on the second trans-



am familiar with the gall *q. tuber* Fitch, and it is quite different from *q. podagræ*, besides that it grows exclusively on the White oak. The gall *q. arbos* Fitch, is described as growing exclusively on the tips of the limbs of aged White oaks. The gall *q. batatus* Fitch, also occurs on the White oak and somewhat resembles *q. podagræ*, but the fly is described as having its legs "dull pale yellow" and all its thighs "black," and besides its antennæ are 13-jointed ♀, not 14-jointed. Most probably, as shown above, pp. 464-5, the flies of all these three last galls described by Dr. Fitch, are guest gall-flies and not true gall-flies.

GUEST GALL-FLIES, *Synergus rhoditiformis* n. sp. and *S. mendax* n. sp. See below. Both species came out between May 10 and 15, 3 or 4 weeks after the first *C. q. podagræ* and from the same galls.

14. WHITE OAK. Gall *q. tuber* Fitch. Described and figured *N. Y. Rep.* II, §309. Dr Fitch says that "a single gall always suffices to kill the limb at and above the point where it is situated," and observes that there are two distinct varieties, one "growing upon the ends of the limbs" and another "lower down upon their sides." Near Rock Island the recent galls always grow upon the tips, never at the side, of twigs, and frequently the twig is not killed by it and growing out of the tip of the old gall closes over the perforation made by the Cynips, and presents the appearance of having a recent gall upon its side instead of at its tip. The knife speedily dispels the illusion.

GALL-FLY, unknown? I have never bred from these galls.

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verse vein which Osten Sacken notices as a constant character in *Rhodites bicolor* Harris; others again are without it. I suspect that, like *spongifica* and *inanis*, *podagræ* and *punctata* are distinct races of the same species, which have acquired a habit of exclusively attacking the Black oak or the Red oak; in other words, that they are what Mr. Darwin would call "incipient species." Probably in the course of a few thousand years other distinctive characters, besides the coloration of the abdomen, will by the laws of Variation and Inheritance be gradually produced, and they will then become distinct species.

It is possible, however, since only the ♀♀ of these two forms are at present known, and since those ♀♀—judging from the great numbers reared both by Mr. Bassett and myself without a single ♂ among them—are perhaps the secondary dimorphous ♀ forms corresponding to *aciculata*, that either the primary dimorphous ♀ forms corresponding to *spongifica*, or the ♂♂, or both of them, may differ so much from each other that *podagræ* and *punctata* must be considered as distinct species. Hence it will be advisable for the present to treat them as provisionally distinct.—March 21, 1864.

GUEST GALL-FLY, *Cynips q. tuber?* Fitch. Dr. Fitch notices the very great similarity between this fly and his *C. q. ficus* which is in all probability a Guest gall-fly. (*N. Y. Rep.* II, §314.) See above pp. 464—5 and p. 484.

15. BLACK-JACK OAK? (*q. nigra.*) Gall *q. operator* O. S.

GALL-FLY, *C. q. operator* O. S. Captured at large by myself, but whether in North or South Illinois I cannot be certain. If captured in North Illinois, it must inhabit a different species of oak from any on which it has hitherto been found. Baron Osten Sacken reared it from the black-jack oak (*q. nigra*) and Mr. Bassett from *q. palustris* and *q. ilicifolia*, the last of which is not found in Illinois, and the other two do not occur near Rock Island, Illinois. (See p. 445.) As already stated, my specimen is identical with specimens received by me from Mr. Bassett.

#### INQUILINES OR GUEST GALL-FLIES.

16. SYNOPHRUS LÆVIVENTRIS O. S. (= *C. q. ficus?* Fitch = *C. q. pisum?* Fitch.) ♂ ♂ bred in June from the gall of *C. q. spongifica* differ as follows from Baron Osten Sacken's description of a single ♀ (?) bred from the same gall, but which I believe to have been in reality a ♂:—The *head* varies from pale yellowish to dark reddish brown, the pale individuals having generally a round black spot enclosing the ocelli, but sometimes only a small black transverse line connecting them, and the darkest individuals having the space behind the eyes and the entire vertex brown-black as far as the insertion of the antennæ, and an obscure dusky line descending downwards nearly to the mouth from the origin of each antenna. The antennæ are 15-jointed, joints 13—15 equal in length, and they vary from yellowish immaculate through yellowish tipped with reddish brown to rufous tipped with brown. The *abdomen* varies from black immaculate to brown-black above on its anterior  $\frac{2}{3}$  and pale transparent yellowish on its posterior  $\frac{1}{3}$  above and on the entire lower surface. The 2nd joint very generally, but not always, completely covers the terminal joints. The *legs* vary from pale yellowish to rufous, the tarsal tips always brown, all the 6 femora sometimes vittate above with brown-black. The veins of the wings are generally hyaline, but sometimes, even in but moderately dark specimens, they are brownish. Length ♂ .06—.10 inch. Twenty-three ♂.

The ♂ has an abdomen as long as the ♀ and but for the absence of the "ventral valve" and of the sheaths of the ovipositor might be easily mistaken for ♀. In all the above variations intermediate grades occur.

On comparing 33 ♂♂ bred in May from the gall *q. ficus* with the above 23 ♂♂, their size varies within exactly the same limits, but the range of the coloration of the former is not so extreme. None have the femora, so far as can be seen, vittate above with brown-black, but several have the hind tibiæ thus vittate, which does not occur in those bred from *spongifica*. It is observable that Dr. Fitch describes *C. q. ficus* as having its "hind shanks dusky." The wing-veins are almost always brownish. Evidently the two broods of insects are identical, as the markings of the legs are in Cynipidæ quite an inconstant character.

On comparing 5 ♀♀, bred in May from the gall *q. ficus*, with the description of the ♀ (?) by Osten Sacken, they differ as follows:—The antennæ are 13-jointed, the last joint  $\frac{1}{2}$  as long again as the preceding, (not "14-jointed.") The scutel is not even "slightly reddish" at tip, and it was only occasionally so in the ♂♂ bred from *spongifica* galls. The abdomen is black, immaculate, and joint 2 never occupies more than  $\frac{4}{5}$  of its lateral length exclusive of the peduncle. The hind femora are scarcely "infuscated," but the hind tibiæ are vittate above with brown-black. The wing-veins are rather fine, but almost always brownish. Length ♀ .09—.10 inch.—It may be added that the 2nd abdominal joint in all the specimens ♂♀ describes dorsally a circular arc of  $45^\circ$ , that the tip of the "ventral valve" is unarmed and in an angle of  $30^\circ$ , and that the sheaths project at least .02 inch above the line of the back. As these very conspicuous sheaths are not mentioned in the description, and as it is expressly stated that the 2nd abdominal joint conceals all the following ones, which is a peculiarity of the ♂ sex, I infer that Baron Osten Sacken, having only a single specimen to guide him, mistook ♂ for ♀. In any case he has, as it seems, unless I have incorrectly identified my species with his, miscounted the antennal joints, which are ♂ 15, ♀ 13, whereas he gives them as ♀ 14. They are peculiarly difficult to count in this species.

Judging from the brief description of *C. q. pisum* Fitch, that fly also, as well as *C. q. ficus* Fitch, appears to be identical with the Guest gall-fly, *læviventris* O. S. It has already been stated that Osten Sacken obtained what is apparently a true Gall-fly from the gall *q. pisum* Fitch,

(pp. 464 & 483.) Thus we have certainly one and perhaps two autumnal galls inhabited by this Guest gall-fly, *q. ficus* and *q. pisum*, and one vernal gall, *q. spongifica*; whence it follows that the insect is double-brooded. It was shown that the gall *spongifica* must be punctured by the *Synophrus* after that gall has acquired some considerable size, say towards the middle of May, and not at the time when the egg that produces it is inserted in the bud, viz., in the June of the preceding year, (p. 460.) We can understand now what becomes of the *Synophrus* between the June of one year, when it emerges from the *spongifica* gall, and the May of the following year, when it is necessary for it to be on hand to puncture the young and tender *spongifica* gall. The intermediate time is evidently passed in the larva and pupa state in such autumnal galls as *q. ficus*.

17. *Synophrus albipes* n. sp. ♂ ♀.

Differs from *S. læviventris* O. S., only as follows:—1st. The entire body, including the head with the exception of the palpi which are whitish or pale yellowish, is always black. 2nd. The antennæ ♀ are 14-jointed, (not 13-jointed,) the last joint  $\frac{1}{2}$  longer than the preceding one. 3rd. The 2nd abdominal joint always covers the terminal joints both in ♂ and ♀. 4th. The legs are whitish, scarcely tinged with yellow, with the tarsal tips brown, but otherwise immaculate except in a single ♂, where the hind femora and tibiæ and in a less degree the intermediate ones, are brown. 5th. The sheaths of the ovipositor do not project beyond the line of the back, or scarcely and in a single ♀ only, though the ovipositor often projects from between them, which is not seen in any of my five *læviventris* ♀.—Length ♂ .04—.07 inch, ♀ .07—.09 inch. Twelve ♂, eight ♀, bred from the gall *q. flocci* (= *q. lana*? Fitch), on the 4th of August, when I obtained 41 ♂, 9 ♀, and other specimens August 1st and after August 4th, all from galls of the preceding year's growth. Hence it would seem that this species is not double-brooded like *læviventris*.

18. *Amblynotus ensiger* n. sp.? (= *A. petiolicola*? O. S.) ♂ ♀ Black. Head with the face opaque with the appearance of short whitish pubescence, and a glabrous slightly elevated black stripe descending to the mouth from between the origin of the antennæ; palpi honey-yellow; vertex glabrous, slightly polished. Antennæ ♂ ♀ with joint 3 shorter than usual, ♂ 15-jointed with 13—15 subequal, ♀ 12-jointed with 12 fully equal to 10 and 11 put together, and occasionally with indications of a connate medial suture on 12, ♂ ♀ honey-yellow

immaculate or rufous with the two basal joints and a few terminal ones brownish. *Thorax* glabrous opaque, with the appearance of fine appressed pubescence; two acute longitudinal striæ, subobsolete in front, converging on the scutellum, and a central one extending from the scutellum halfway or less to the collar. A large, highly polished spot under the wings. Scutellum finely rugose, the basal foveæ obsolete or subobsolete. *Abdomen* glabrous, joint 1 short and truncate conical, 2 and 3 connate and together covering from  $\frac{3}{4}$  to  $\frac{2}{3}$  of its whole lateral surface except joint 1, the dorsal edge of these two joints describing a circular arc of  $25^\circ$ ; 2 basally with appressed pubescence, and dorsally in  $\delta$  nearly equal in length to 3, but in  $\varphi$  only half as long. "Ventral valve"  $\varphi$  yellowish and thin, moderately large, its tip unarmed and in an angle of  $60^\circ$ . Sheaths polished and projecting about .03 inch above the dorsal line, often with the ovipositor protruding from their tips. *Legs* honey-yellow, tarsal tips brown, and the tip of the hind tibiæ often brownish  $\delta$ . *Wings* hyaline, veins moderately fine, yellowish-subhyaline, the principal ones sometimes lightly tinged with brown. Areolet large, but with its basal side often subobsolete. Radial area distinctly closed, scarcely twice as long as wide, the areolet placed about  $\frac{1}{3}$  of the way from its base to its tip. Length  $\delta$  .06—.07 inch,  $\varphi$  .07—10 inch.

Six  $\delta$ , twelve  $\varphi$ , bred from the gall *q. petiolicola* O. S. and Bassett. Differs from *A. petiolicola* O. S., bred from the same gall and described from a single  $\varphi$  specimen, in the antennæ  $\varphi$  being properly 12-jointed not 13-jointed, in the abdomen being black and not "dark brown," in the legs being honey-yellow except sometimes the tip of the  $\delta$  hind tibia, not "infuscated except at the joints," and in the areolet being only  $\frac{1}{3}$  of the way from the base of the radial area, instead of "corresponding to its middle." Notwithstanding all the above differences, Baron Osten Sacken's insect is very probably identical with mine, as he says his *petiolicola* is closely allied in all respects to another species reared by him from *q. tuber* and stated to have "12-jointed antennæ, if the last very elongated joint is counted for one." (*Proc. Ent. Soc. Phil.* I, p. 72.) *Amblynotus* Rheinhardt, it appears, ought to have  $\delta$  14,  $\varphi$  13-jointed antennæ, instead of  $\delta$  15,  $\varphi$  12 as in our insect. Baron Osten Sacken also doubts the fact of his *petiolicola* belonging to *Amblynotus* because "the 2nd segment of the abdomen is much shorter than the 3rd. (*Ibid.* p. 67.) In the  $\delta$ , but not  $\varphi$  *ensiger*, these two segments, as above stated, are dorsally equal in length. I should not have described my species but for my happening to possess numerous specimens of both sexes all from the same brood. *Ensiger*  $\varphi$  might be easily mistaken at first sight for the large-sized and dark-colored specimens of *Synophrus læviventris* O. S., but is distinguish-

able, not only generically, but by the tip of the "ventral valve" being in an angle of  $60^\circ$  instead of  $30^\circ$ , and by the sheaths of the ovipositor being proportionally longer.

19. *Amblynotus inermis* n. sp. ♂ ♀.

Differs from the above only as follows:—The 2nd and 3rd abdominal joints ♂ ♀ nearly conceal the succeeding ones; the "ventral valve" is longer and slenderer—its tip in an angle of  $45^\circ$ —and also more horny; the sheaths of the ovipositor do not nearly attain the line of the back, instead of projecting about .03 inch above it; the legs are yellowish-white not honey-yellow; and the basal  $\frac{1}{3}$ — $\frac{2}{3}$  of all 6 femora ♂ ♀ is deep black, the black color extending further in each successive pair. Length ♂ ♀ .07 inch. One ♂, one ♀, bred from the gall *q. pilulæ* n. sp., early in August.

20. *SYNERGES ONERATUS* Harris. Baron Osten Sacken, noticing a discrepancy in the size between his specimen (.21 inch) and the size given by Dr. Fitch (.15 inch) doubts whether it is the same species. (*Proc. Ent. Soc. Phila.* I, p. 68.) But Dr. Fitch says also that its size is similar to that of *nubilipennis* and *confluenta*, which are given by him as respectively ♀ .20 inch and ♀ .25 inch. Mr. Bassett's specimens were "as large or even larger" than Osten Sacken's. (*Ibid.* II, p. 328.) It has been shown above that there is a great variation in size, in other inquiline species also, in the same brood reared from the same galls. (E. g. *Synophrus læviventris*, and see below *Synerges rhoditiformis*.) From the gall *q. globulus*.

21. *Synerges mendax* n. sp. ♀. Black. *Head* with the space behind the eyes (but not the occiput) and also the face below the origin of the antennæ and the mouth, dull yellowish brown varying from dark to pale, the vertex glabrous and moderately polished, the rest of the head opaque and the face finely pubescent. Antennæ nearly as long as the body, 14-jointed with the last joint scarcely longer than the penultimate, yellowish-brown with the two basal joints blackish. *Thorax* with the collare very finely rugose, the mesonotum before the scutel with coarser transverse waving striæ or rugosities, and with two acute longitudinal striæ converging on the scutel, between the base of which striæ is a shallow but widely impressed fovea. Scutel rugose, with the two basal foveæ subobsolete. Under the wings a small but highly polished round spot. *Abdomen* highly polished; the joints succeeding the 2nd concealed by it; the 2nd joint dorsally describing a circular arc of  $30^\circ$ . "Ventral valve" moderate, thin, brownish subhyaline, its tip unarmed and in an angle of  $45^\circ$ . Sheaths extending a little below or a little above the line of the back, with the ovipositor generally protruding from between them. *Legs* dull pale brown or brown-

black, the trochanters, the knees and the tarsi except their tips, honey-yellow or dull rufous, each successive pair of legs a little darker than the preceding. *Wings* hyaline; veins rather fine, the principal ones lightly tinged with brown, the cubitus hyaline and indistinct. Areolet moderate, its two basal sides hyaline. Radial area about  $2\frac{1}{2}$  times as long as wide, distinctly closed by a brownish vein, the areolet placed scarcely more than  $\frac{1}{4}$  of the way from its basal end. Length ♀ .08—.10 inch; ♂ unknown.

Eight ♀, bred at the same time with the following species and from the same galls, (*q. podagræ* n. sp.) May be easily confounded with the dark varieties of that species, but differs in being slenderer, in the antennæ being longer and slenderer and having one more joint ♀, in the "ventral valve" being unarmed and much shorter, and subhyaline and thin not thick and black, and in the radial area being proportionally longer and in a more acute angle at tip ( $30^\circ$  instead of  $45^\circ$ .) From the true gall-fly that produces the gall *q. podagræ* it is at once distinguished by its radial area being closed and proportionally shorter, and having the areolet placed further from its base.

22. **Synergus rhoditiformis** n. sp. ♂ ♀. Rather robust, honey-yellow or rufous, ranging both in the living and the dried ♀, but not in ♂, to very dark reddish brown, or almost brown-black. *Head* glabrous opaque, with a black spot enclosing the ocelli and sometimes extending laterally nearly to the eyes and in front to the origin of the antennæ; extreme tips of mandibles black. Eyes black. Antennæ honey-yellow or rufous ♂ ♀, in the dark ♀ reddish-brown,  $\frac{2}{3}$  as long as the body in ♂, a little over  $\frac{1}{2}$  as long in ♀, 15-jointed in ♂ joint 3 much excised below and 13—15 subequal, 13-jointed ♀ the last joint  $\frac{1}{2}$  as long again as the penultimate and occasionally in certain lights with a slight transverse medial impression. *Collare* glabrous opaque or almost microscopically rugose, always with an equilaterally obtrigonal black spot covering its whole dorsal length. *Thorax* laterally a little polished, dorsally opaque and with fine transverse rugæ; two acute striæ converging on the scutellum and an intermediate one, all three often indistinct throughout or obsolete in front. Scutellum finely rugose. The entire meso- and meta-notum black, the black color ceasing suddenly on the suture dividing the mesonotum from the collare. *Abdomen* black, highly polished, often in the paler specimens laterally and beneath piceous or rufous, joint 2 dorsally describing a circular arc of  $30^\circ$ . "Ventral valve" ♀ horny and thick, very large, extending beyond the tip of the dorsum, its color a highly polished black, its tip, when viewed laterally, in an angle of  $45^\circ$  terminating in a short, obtuse, slender, setiform, hairy appendage, channelled above for the reception of the ovipositor. Sheaths of the ovipositor projecting but slightly from the "dorsal valve," their tips just about attaining the dorsal line, with the ovipositor often exerted from between them. *Legs* varying from yellowish white to honey-yellow ♂, the tarsal tips brown; honey-yellow to dull rufous ♀, in the dark ♀ ♀ all the femora and tibiæ often obfus-

cated and the hind tibiæ brown. *Wings* hyaline, veins rather fine, the principal veins generally brownish, sometimes even in the darkest specimens yellowish hyaline. Areolet large, distinct. Radial area closed, about twice as long as wide, with the areolet placed  $\frac{1}{3}$  of the way from its base.—Length ♂ .07—.10 inch. ♀ .07—.14 inch.

Thirteen ♂, thirty-one ♀. Came out from the gall *q. podagræ* n. sp. May 10—15, and very numerous specimens subsequently. I ascertained by keeping the pale ♀ ♀ four days alive and exposed to the light, that the pale color did not become darker, and I noticed very dark ♀ ♀ that must have hatched out within 24 hours. Similar variations occur also in *C. q. spongifica*, whence we may infer that the rust-red color there is not due to immaturity. Comes very near to *S. lignicola* O. S., which was bred from a woody gall on *q. palustris*, but differs as follows:—1st. That species, described from “numerous specimens,” has its ground color always “yellow.” 2nd. The last joint ♀ antennæ in *rhoditiformis* never shows “two slight sub-divisions” and not often even one. 3rd. The collare in *rhoditiformis* always has a large dorsal black spot, instead of being immaculate as is specially mentioned of *lignicola*. 4th. Nothing is said under *lignicola* of the very remarkable “ventral valve” found in *rhoditiformis*.—This insect is of a much more robust habit than either *S. oneratus* or *S. mendax*, and as the ♀ antennæ have one joint less than in those two species, and the ventral valve is so remarkably developed, it might perhaps form a separate genus. Since, however, in Cynipidæ there are already far too many imperfectly characterized genera, I prefer to refer it provisionally to *Synerges*.

Rock Island, Illinois, Feb. 15, 1864.

#### ERRATUM.

Page 459, line 8 from bottom, for “Dorcatoma” read “Decatoma.”



Description of certain species of **DIURNAL LEPIDOPTERA** found within the limits of the United States and British North America. No. 3.

BY WM. H. EDWARDS, NEWBURGH, NEW YORK.

- |   |  |
|---|--|
| 1. <i>Pieris Nasturtii</i> , Boisduval, in lit. | 6. <i>Melitæa pallida</i> , nov. sp.   |
| 2. <i>Pieris vernalis</i> , nov. sp.            | 7. " <i>Phaon</i> , nov. sp.           |
| 3. <i>Eresia cincta</i> , nov. sp.              | 8. <i>Lycæna Echo</i> , nov. sp.       |
| 4. <i>Argynnis Hesperis</i> , nov. sp.          | 9. <i>Lycæna Lycea</i> , nov. sp.      |
| 5. " <i>Epithore</i> , Boisduval, in lit.       | 10. <i>Hesperia nemoris</i> , nov. sp. |

**PIERIS NASTURTII**, Boisduval, in lit.

*Male*. Expands  $1\frac{7}{10}$  inch. Upper side white; primaries as in *Protodice*; a rhomboidal black spot upon the arc; three sub-marginal spots in line, and several acute spots on the apical half of the hind margin.

Secondaries have a few black scales near outer angle and at the extremities of the nervules; owing to the transparency of the wing the grey tint of the nervules and lines of under surface are distinctly visible.

Under side of primaries like the upper, the spots less distinct; apex greyish.

Secondaries have a broad, serrate, sub-marginal band of grey scales, the points extended to the margin; all the nervures about the base and cell heavily bordered by grey scales.

*Female*. Expands  $2\frac{1}{10}$  inch. Wings more delicate, the white less pure, a violaceous tinge at the base; the spots as in female *Protodice*, but of a faint coppery hue.

Under side of primaries with spots as above, but less distinct; the apex yellowish.

Secondaries yellowish; the nervures all bordered by ochrey scales; the sub-marginal band almost obsolete.

San Francisco; from Dr. Behr, who informs me that it is common in some localities in the vicinity of that city. *P. Protodice* seems also not uncommon.

**PIERIS VERNALIS**, nov. sp.

*Male*. Expands  $1\frac{7}{10}$  inch. Upper side white, less pure than in *Protodice*; primaries have the costa and apical nervules edged with blackish brown; the sub-marginal band is obsolete, or indicated by a few dark scales only; upon the arc a rhomboidal bar.

Secondaries more delicate, showing distinctly the dark markings of the under side.

Under side of primaries with the markings repeated, the sub-marginal band more distinct, the bar reaching the costa and there dilated.

Secondaries have all the nervures broadly edged with greenish scales, so that none of the white surface appears except in narrow stripes in the interspaces; near the hind margin the green edges are connected together by scales of a darker shade, making a sub-marginal band much as in the female of *Protodice*.

*Female*. Nearly same size with similar markings but more conspicuous; the under side scarcely differing from the male.

This species appears to have been hitherto overlooked. In the collection of Mr. Geo. Newman and Mr. Wilt are several specimens, taken, as I am informed, at Red Bank, New Jersey, in the month of May, in company with *A. Genutia*. It differs decidedly from *Protodice*, the only eastern species to which it is allied. There is also in the Society's collection a pair from the Rocky Mountains, that appear to be identical with it.

#### ERESIA CINCTA, nov. sp.

*Male*. Expands  $1\frac{6}{10}$  inch. Upper side fuscous, with a broad belt of white across the middle of both wings, interrupted on primaries so as to leave an oval spot placed obliquely on the costa; primaries have four or five sub-apical white points, and one in the cell; both wings bordered by obscure brown lunules; fringes white, fuscous at tip of the nervules.

Under side of primaries with same spots and band; in secondaries the band is crossed longitudinally by a faint, irregular, brown line, which is darker on the costa and dilated; base of primaries cream-color; apex greyish; the two middle marginal lunules white; base of secondaries grey white with wavy brown lines; the lunules distinct, edged with white; above these, a row of rounded black spots; the submarginal space clouded with white.

Texas. Florida.

"This species resembles *E. leucodesma* of Felder, a Venezuelan species, but is distinct from it." Mr. H. W. Bates in lit.

#### ARGYNNIS HESPERIS, nov. sp.

*Male*. Expands  $2\frac{3}{10}$  inch. Upper side deep fulvous; base of wings

brown; primaries have a broad, black hind margin, enclosing a series of fulvous lunulés, sharply serrate upon its inner edge; otherwise marked as in the allied species.

Secondaries have the margin bordered by two parallel lines which enclose a fulvous space; the median line zigzag and continuous, as in *Atlantis*.

Under side of primaries fulvous; the apex, upper marginal serrations and the sub-apical patch deep ferruginous of the same hue as secondaries; the marginal lunules and apical interspaces buff.

Secondaries deep ferruginous, except the space between the outer rows of spots, which is buff, and not encroached upon by the basal color, except at the extremities, where there are a few ferruginous scales; the marginal lunules buff, serrated, with serrated ferruginous borders; the second row consists of eight spots, the eighth being incomplete on the abdominal margin; the first six long oval, the seventh lunular, all edged above with black, and below projecting a shadow of deeper ferruginous; beyond these is a row of four spots, the first being on the costa and lunular, the second semi-oval, in the cell; the third and fourth almost wanting, but all four heavily edged with black above; in the cell two round spots circled with black, one of them minute; an oval buff spot at the base of median nervure; a slight patch at base of costal nervure; the edges of costa at base and of abdominal margin lightly marked with buff; all the spots, except the marginal, somewhat sprinkled with silvery scales, but which are scarcely perceptible without a glass.

From the Rocky Mountains.

In a paper read by Dr. Behr, 21st April, 1862, before the Academy of Natural Science of San Francisco, on the Argynnides of California, he enumerates nine large and well marked species, none of which are known on the Atlantic slope. This does not include *A. Nokomis* Edw., from the Rocky Mountains, the largest and finest of all the Western species, or *Hesperis*, above described.

Dr. Behr adds.—“The only representative of the Arctic form of Argynnis as now known in California is *A. Epithore*, Boisduval.”

This species, as I am informed by Dr. Behr, is undescribed and only named in letters of Dr. Boisduval. From a male sent me from California I have described it as follows.

ARGYNNIS EPITHORE, Boisduval in lit.

*Male.* Expands  $1\frac{5}{10}$  inch. Primaries rounded as in *Myrina*, not angular at apex and excavated on the margin, as in *Bellona*, to which last it is most closely allied.

Upper side pale fulvous at the base; hind margins bordered by a slight, interrupted line, with small lunules; otherwise the usual markings.

Under side of primaries fulvous, yellowish at apex, with a ferruginous sub-apical patch.

Secondaries have an angular sub-mesial band of irregular spots, as in *Bellona*, each whitish, sprinkled in the centre with ferruginous; in the cell a round black spot; beyond the band to the margin a slight violet tinge, with a submarginal series of round spots and marginal lunules.

Dr. Behr states that he has never known of *A. Aglaia* being captured in California. In the Society's collection are two specimens of *Aglaia* taken by Mr. Wood in the Rocky Mountains, so that the existence of this species upon this Continent is no longer doubtful.

MELITÆA MYLITTA, Edwards, in Proc. Acad. Nat. Sci., Phila. 1861.

This species is described by Dr. Behr, in a second very valuable paper, read before the Academy, 1863, as *M. Collina*. At the time of writing my description I was inclined to consider certain dark colored specimens of *Melitæa* from California, as varieties of *Mylitta*. Dr. Behr has had opportunities for careful and long-continued observation on the spot, and has clearly determined two additional species, *M. campestris* and *M. pratensis*, both of which he, as well as myself, "at first considered local varieties" of the other. I am satisfied upon reading his descriptions and remarks, and examining a very full series of each species kindly sent me by him, that a fourth species, allied to *Mylitta*, and which I also supposed to be a variety, is distinct. I have described it below as *M. pallida*.

Boisduval in Ann. Soc. Ent. X, in his list of Californian Lepidoptera, enumerates *Melitæa Pulchella*, without giving its description, referring to Drury's *Tharos* for it, which he regarded as identical with the Californian species, and differing from the *Tharos* of Cramer. Drury's specimens came from New York, as stated in the text, and his figures

appear to me to agree well with *Tharos* of the Eastern States. Doubtless Boisduval had in view one of the two dark-colored species above mentioned, but it would be difficult to say which, and in this uncertainty Dr. Behr's names will have the preference.

*MELITÆA PALLIDA*, nov. sp.

Expands  $1\frac{5}{10}$  inch. Upper side fulvous, the markings disposed in spots and bands which nearly cover the whole surface, the black shade being mostly confined to the costal edge, hind margin and narrow spaces between the transverse bands; the marginal lunules distinct, pale, the middle one largest; the sub-marginal row of fulvous spots with pale centres; the third row of larger, elongated spots of same shade of color as the marginal; beyond to base a few small patches of black.

Secondaries have a similar series of marginal lunules, towards the outer angle blending with the sub-marginal band; this is broad, deep fulvous, with a rounded black spot in each interspace; a black line dilated on both margins separates the sub-marginal from the median band; beyond to base reticulated with black lines; abdominal margin at base black.

Under side of primaries fulvous, the black markings of upper side repeated in brown, and the three fulvous bands in pale yellow; the apical lunules white.

Secondaries pale yellow; a brown shade on hind margin, enclosing a large metallic white lunule; two or three lunules of similar color at the outer angle and one at the anal angle; submarginal spots brown; a brown sub-apical patch on costa; an irregular, whitish, median band; about the base several whitish spots; thorax and abdomen white; palpi soiled white.

Texas. Kansas.

*MELITÆA PHAON*, nov. sp.

*Male.* Expands  $1\frac{2}{10}$  inch. Upper side black, with fulvous and yellowish markings; a single fulvous lunule on the middle of the hind margin; two transverse bands of spots, the outer fulvous, not reaching the costa, the inner yellowish, terminating in the costa; a cluster of fulvous spots at base.

Secondaries have a marginal series of obsolete lunules, a sub-marginal row of rounded black spots within fulvous spots; a fulvous median band and spots at the base.

Under side: the hind margin of primaries broad, blackish brown; the middle lunule and two apical lunules yellowish white; on costa a sub-apical black patch; the outer band fulvous, the inner nearly white; the black patches on middle of costa and of inner margin as heavy as on the upper side; edge of costa to the base black; these black patches with the marginal border occupy nearly half the wing.

Secondaries yellow white; a black cloud on hind margin, enclosing a large whitish lunule; the apical lunules whitish; a row of black spots corresponding to those of the upper side; a black patch on costa near the outer angle; an irregular whitish median, beyond which to the base the surface is reticulated with black lines; palpi whitish; club fulvous.

*Female*, a little larger, with similar markings.

From St. Simons Island, Georgia; Northern Georgia.

This species may be distinguished at a glance from *Tharos*, by the extent of black surface on under side of primaries. I received several specimens of it from St. Simons some years ago, and supposed them to be an insular variety of *Tharos*. I afterwards received the specimens from Northern Georgia, showing the same marked characteristics, and do not doubt its distinctness as a species.

LYCÆNA ECHO, nov. sp.

*Male*. Expands one inch. Upper side delicate light blue, silvery on costa of primaries; both wings bordered by a fine black line; fringe of secondaries white, brown at tips of nervules; of primaries, brown towards the apex and at tips of the nervules.

Under side white; both wings have a marginal series of indistinct lunules; primaries have a transverse series of brown streaks, of which the second, third, fourth and fifth are in a line parallel to the margin, each turned obliquely towards it; the first is forward of the line on the costa; the spots next inner angle obsolete; discal streak long.

Secondaries have a transverse series of smaller streaks and spots, two being on the costa, followed, after a wide space, by four parallel to the margin; the sixth is below the line and lunular, the seventh upon the margin, also lunular; towards the base are three small spots, one on costa, the second in the cell, the third on abdominal margin.

*Female*. Expands  $1\frac{4}{10}$  inch. Primaries have a broad fuscous costal border hind margin and discal streak; the disk blue.

Secondaries fuscous, slightly sprinkled with blue upon the disk ; a marginal series of rounded fuscous spots in grey circlelets.

California, from Dr. Behr.

This is the Western representative of *Pseudargiolus*. It is much smaller than that species, but otherwise very like it.

LYCÆNA LYCEA, nov. sp.

*Male*. Expands  $1\frac{2}{10}$  inch. Upper side purplish blue, color of *Antiacis* Boisd., with broad fuscous hind margins ; fringes white.

Under side grey white ; both wings have a row of brown points representing the lunules of obsolete marginal spots ; a second row of eight black spots, each circled with white ; the first on costa minute, the second round, the third oval, the fourth, fifth and sixth cordate, the others round ; all, except the first, conspicuous ; discal spot reniform.

Secondaries have a second row of small spots nearly parallel with the margin ; the second and third separated by a wide space ; near the base three points in a line, one upon the costa, the second in the cell, the third upon the abdominal margin ; all the spots circled with white ; discal streak faint.

Rocky Mountains.

HESPERIA NEMORIS, nov. sp.

*Male*. Expands one inch. Upper side glossy brown ; secondaries covered with greenish hairs except a narrow space along the costal and inner margins ; primaries have three yellow dots in line, on the costa, and two small spots on the disk ; fringes long, whitish, dark brown at tips of nervules on primaries only.

Under side greenish grey, except on inner margin of primaries, which is brown ; same spots as above on primaries, but enlarged ; on secondaries a sub-marginal band of small spots, not reaching the inner margin ; two minute spots on the costa and a third on the disk, scarcely paler than the ground color.

Taken at Portsmouth, Ohio, by Mr. John Bolton.

Descriptions of certain species of *CATOCALA*, found within the United States.

BY WM. H. EDWARDS.

- |                                     |                                  |
|-------------------------------------|----------------------------------|
| 1. <i>C. Briseis</i> , nov. sp.     | 6. <i>C. Serena</i> , nov. sp.   |
| 2. <i>C. marmorata</i> , nov. sp.   | 7. <i>C. tristis</i> , nov. sp.  |
| 3. <i>C. Californica</i> , nov. sp. | 8. <i>C. gracilis</i> , nov. sp. |
| 4. <i>C. Walshii</i> , nov. sp.     | 9. <i>C. similis</i> , nov. sp.  |
| 5. <i>C. nebulosa</i> , nov. sp.    | 10. <i>C. minuta</i> , nov. sp.  |
|                                     | 11. <i>C. parvula</i> , nov. sp. |

*CATOCALA BRISEIS*, nov. sp.

Expands  $2\frac{8}{10}$  inch. Thorax grey black; abdomen ashy brown; primaries grey black; the transverse lines indistinct, the elbowed disposed as in *unijuga*, Walker; bordering on this, without, a conspicuous band, grey clouded with buff near the costa and on inner margin, and buff in the disk, edged both without and within by a whitish line. that on the costa without is dilated, sharply serrated and pure white; sub-marginal points white surmounted by black crescents; fringe grey black; reniform with an indistinct light border; sub-reniform lighter and conspicuous; sometimes a whitish patch adjoins the inner side of these spots.

Secondaries dark red-orange, nearly the shade of *ultronia*; median band broad, a little excavated on the outer side, diminishing gradually towards the abdominal margin which it does not quite reach; border regular, with the exception of a triangular indentation near the anal angle; apical spot yellowish; fringe black and white.

On the under side of secondaries the red shade covers rather more than the inner  $\frac{1}{2}$  of the wing and the whole space above the median band.

I have seen but two individuals of this species, one of which was taken by me in the Catskills in July, 1861; the other is in the fine collection of Mrs. Bridgham, taken in Rhode Island.

*CATOCALA MARMORATA*, nov. sp.

Expands nearly four inches. Primaries light bluish grey, with patches and bands of pale brown and white; transverse lines distinct; the basal dentated, the elbowed with two prominent teeth, followed by a third much smaller and a fourth nearly equal to the first; on the lower side of this last, a black line runs back to the sub-reniform, but there is no sinus as in many of the large species; beyond the elbowed line a broad brown band bordered by a narrow band of bluish white that is dentated except near the costa, where it is serrated and of a pure



white; sub-marginal spots blackish; reniform dark brown, with a white patch adjoining its inner side; sub-reniform pale brown; a curved blackish stripe extends from the costa, at one-third the distance from the base, to the hind margin a little below the apex; fringe light-grey.

Secondaries rosy-red; median band of moderate width, much contracted at the middle, abruptly narrowing to the width of a line near the abdominal margin, which it does not quite reach; border broad, sinuous towards the anal angle; apical spot white tinged with red at the edge of the border; fringe white.

On the under side of secondaries, the red shade occupies about two-thirds the wing from the abdominal margin.

From Yreka, California.

CATOCALA CALIFORNICA, nov. sp.

Expands  $2\frac{3}{10}$  inches. Primaries dark brown with a grey tinge; the transverse lines rather indistinct; the elbowed line with two teeth equally prominent, and otherwise resembling *marmorata*; beyond this a brown band bordered by a faint, serrated, greyish line, which is edged without by black; reniform black; sub-reniform brown.

Secondaries rosy-red, nearly the same shade as in *marmorata*; median band narrow, almost straight, contracted in the middle and terminating abruptly two lines before the margin; border somewhat sinuous towards the anal angle; apical spot white tinged with reddish; fringe long and white.

On the under side of secondaries the red shade occupies  $\frac{2}{3}$  the wing.

From Yreka, California.

CATOCALA WALSHII, nov. sp.

*Male.* Expands three inches. Primaries yellowish brown, clouded between the transverse lines with grey; markings indistinct, but similar to *Unijuga*, Walker; reniform ferruginous in a paler circle.

Secondaries dull red; median narrow, almost straight, twice excavated slightly on the outer side, bending at a right angle and terminating squarely just after the bend; border narrow, deeply excavated, almost to the margin between the fourth inferior and sub-median nervure, and again after the sub-median; apical spot luteous, as are also the emarginations. Under side as in *Unijuga*.

Taken by Mr. B. D. Walsh in Southern Illinois.

This species resembles remarkably *Elocata* of Europe, in color, in-

distinctness of markings, shape of median band and apical spot, in all which respects it differs from *Unijuga*.

CATOCALA NEBULOSA, nov. sp.

Expands  $3\frac{4}{10}$  inches. Thorax dark brown. Primaries ferruginous, pale in the disk and along the nervules to the hind margin, almost black at the base up to the basal line, except on the inner margin; basal line slightly waved, but at the inner margin throwing out a prominent tooth that nearly reaches the elbowed line; this is well defined black, much like that of *Neogama*, the two prominent teeth being very long and acute, the lower one half the length of the upper; beyond the elbowed line a paler band edged without by a greyish serrated line; sub-marginal spots black; reniform pale brown in a greyish circlet; sub-reniform pyriform, clear brown with a black edge.

Secondaries almost wholly black, the median band and the border both being very broad, leaving between them but a narrow, sinuous space of dark luteous; the whole base above the median band covered with dark brown hairs, leaving nothing of the surface of the wing visible; when these are removed the luteous color re-appears; the apical spot large and luteous; emarginations luteous, conspicuously cut with black at the tips of the nervules.

Under side of both wings paler luteous; the apices violaceous; median band of secondaries narrow and sinuous, not contracted in the middle.

Philadelphia; Washington.

CATOCALA SERENA, nov. sp.

Expands  $2\frac{4}{10}$  inches. Primaries ashen-grey; transverse lines fine, but distinct; the basal in three equal waves, of which the costal projects a small tooth; the elbowed line without any prominent tooth, rather ragged than serrated; on the median nervure a broad sinus extending back to and including the sub-reniform; a sub-marginal grey serrated band; points black; reniform brown; sub-reniform con-colored.

Secondaries pale-yellow; band much curved, slightly excavated without at the middle; after the bend sinuous, diminishing rapidly and terminating in a line within the hairs of the margin; border broad, bent in the middle, without any excavation; on the under side the base of both wings is fuscous and the bands and borders are broad and black, leaving between them but narrow spaces of yellow.

From Mr. Wilt's collection, Philadelphia.

## CATOCALA TRISTIS, nov. sp.

*Male.* Expands  $1\frac{7}{10}$  inch. Primaries light grey, blackish along inner margin; the transverse lines indistinct; the basal line lost in an oblique stripe reaching from the costa to the inner margin; the exterior line without prominent teeth; reniform blackish.

Secondaries black; fringe black, except at outer angle, where it is white.

From Mr. Newman's Collection, taken at Philadelphia; also Mr. Jung's Collection, at Hoboken, New Jersey.

## CATOCALA GRACILIS, nov. sp.

*Male.* Expands  $1\frac{5}{10}$  inch. Primaries grey, more or less clouded with blackish on the hind and inner margins; transverse lines indistinct; beyond the exterior line a broad brown space with the outer edge deeply serrated; from this to the margin clear grey; in some cases the basal line is conspicuous, rather heavily edged with black, but often the only trace of it is a black patch on the costa; reniform brown in a grey ring.

Secondaries deep yellow; band narrow, curved, terminating abruptly at some distance from the inner margin; border broad, interrupted, with an oval spot near the angle; apical spot and fringe yellow.

Mrs. Bridgham's Collection.

## CATOCALA SIMILIS, nov. sp.

*Male.* Expands  $1\frac{6}{10}$  inch. Primaries grey, clouded with brown and black; the markings distinct; the demi-line bent at a right angle; the basal very slightly waved, but presenting the general form of a single arch, and edged with brown on the inner side; the exterior line without prominent teeth, concave to the elbow, after which it is perpendicular, very slightly waved; beyond is a ferruginous band followed by a grey line which is dilated on the costa so as to make a triangular apical spot; sub-marginal spots black; reniform brown in a broad grey circle, incomplete in the direction of the apex; sub-reniform small, oval, brown in a black ring.

Secondaries bright yellow; band broad, twice bent, and diminishing to a line on the inner margin; border broad, excavated in the middle, interrupted, leaving a large spot at the angle; apical spot yellow; fringe at the apex and at the interruption white, along the rest of the border black, with the outer edge white; the hairs of the base slightly

brown, and a short blackish ray runs from the base in the direction of the second angle of the band.

Mrs. Bridgham's Collection.

CATOCALA MINUTA, nov. sp.

*Male.* Expands  $1\frac{4}{10}$  inch. Primaries dark glossy brown; transverse lines black, distinct; the demi-line arched; the basal wavy, except near the costa, where it projects in a sharp tooth; the exterior with two prominent unequal teeth, and a broad sinus to the sub-reniform; midway between the exterior line and the margin a serrated pure white line dilated on the costa.

Secondaries pale yellow; the band contracted in the middle, then bent at right angles to the margin, near which it connects with a faint black shade from the base; border interrupted, making a spot at the angle; apical spot yellow; fringe yellow, with black hairs at the ends of the nervules.

Mrs. Bridgham's Collection. New York.

*Variety.*—Primaries of a deeper shade of brown, obscuring the basal line; the exterior line with two equally prominent teeth, and much more dentated, without a sinus; the white line conspicuous.

New York.

CATOCALA PARVULA, nov. sp.

*Male.* Expands  $1\frac{5}{10}$  inch. Primaries light grey with a yellowish tinge; the inner margin having a broad arched border of blackish brown, sometimes extending to the base and sending a branch to the costa on the inside of the basal line; sometimes rounding to a point on the margin near the base; the basal line only visible on the costa; the exterior line distinct until it is lost in the inner border, and having two prominent teeth; beyond is a greyish band with serrated outer edge; the hind margins more or less obscured by blackish brown.

Secondaries pale yellow with a narrow band, twice bent, terminating squarely before the margin; border interrupted, leaving a large spot in the angle; in some cases this interruption is not complete; apical spot yellow; fringe yellow, blackish at tips of nervules.

Under side of secondaries marked as above, and also with a small spot in the cell.

New York.

## CATALOGUE OF NORTH AMERICAN BUTTERFLIES.

BY J. WM. WEIDEMEYER.

## 3d family AGERONIA.

Genus 1. **AGERONIA.** (*Peridromia.*)

**arethusa** (*laodamia* is ♀), Cramer, t. 77, ♂, t. 130, ♀; Herbst, t. 140, ♂, t. 141, ♀; Drury, III, t. 8, ♂; Duncan, t. 18; Bdvl. Sp. Gen. t. 23, ♀. Mexico, Central America.

**arete**, Doubleday & W. t. 10. Central America, Mexico.

**chloe**, Stoll, t. 5; Hubner, Exot. f. Central America.

**fornax**, Chenu, f. 152, ♂; Doubleday & W. t. 10. Mexico.

**feronia**, Chenu, f. 151; Drury, I. t. 10; Cramer, t. 192; Herbst, t. 225. Mexico, Central America.

## 4th family DANAIS.

Genus 1. **EUPLOEA.**

Unrepresented.

Genus 2. **DANAIS.**

**archippus** (*plexippus, erippus*), Bdvl. & Lec. t. 40, ♀; Abbot & S. t. 6; Herbst, t. 156, ♂ ♀; Cramer, t. 206, ♂, t. 3, ♀. United States, Canada, W. Indies, Mexico, Central America.

**berenice** (*erippus, gilippus*), Bdvl. & Lec. t. 39, ♂; Abbot & S. t. 7, ♂ ♀, Herbst, t. 157, ♂; Cramer, t. 205, ♀. United States, West Indies, Mexico, Central America.

**cleothera**, Doubleday & W. t. 12; Godart, E. M. IX. West Ind., Cent. America.

**cleophile**, Doubleday & W. t. 12; Godart, E. M. IX. West Indies.

Genus 3. **HESTIA.** (*Idea.*)

Unrepresented.

## 5th family HELICONIA.

Genus 1. **TITHOREA.**

**irene**, Drury, III. t. 38; Godart, E. M. IX. West Indies, Cent. America.

**megara**, Chenu, f. 500; Doubleday & W. t. 14. West Indies.

Genus 2. **HELICONIA.**

**anderida**, Hewitson, t. 7. Central America.

**charitonia**, Bdvl. & Lec. t. 41; Lucas, P. E. t. 50; Herbst, t. 76; Cramer, t. 191. United States, West Indies, Mexico, Cent. America.

**demophoon**, Menetries, Cat. St. P. t. 2. Central America.

**diaphanus**, Hewitson, t. 1. West Indies.

**derasa**, Hewitson, t. 1. Mexico.

**ethilla**, ? West Indies.

**encrate** (*narcæa*), Lucas, P. E. t. 50, ♀; Chenu, p. 158, ♂; Doubleday & W. t. West Indies.

**euclea**, ? West Indies.

**fornarina**, Hewitson, t. 8. Central America.

*morgana*, Hewitson, t. 1. Mexico.  
*Petiverana*, Boisduval—? Mexico, Central America.  
*sappho*, Drury, III, t. 38; Herbst, t. 75. West Indies.  
*toloso*, Hewitson, t. 1. Mexico.  
*virginia*, Hewitson, t. 1. Mexico.  
*zuleika*, Hewitson, t. 8. Central America.

Genus 3. **LYCOREA.**

*atergatis*, Chenu, f. 160; Doubleday & W. t. 16. Central America.  
*cleoraea*, Godart, E. M. IX. West Indies.  
*ceres* (*pasinuntia*), Cramer, t. 90, ♂, t. 316, ♀; Herbst, t. 96, ♂; Lucas, P. E. t. 51, ♀. West Indies.

Genus 4. **OLYRAS.**

Unrepresented.

Genus 5. **ATHESIS.**

Unrepresented.

Genus 6. **EUTRESIS.**

Unrepresented.

Genus 7. **ITUNA.**

Unrepresented.

Genus 8. **METHONA.**

Unrepresented.

Genus 9. **THYRIDIA.**

Unrepresented.

Genus 10. **DIRCENNA.**

*Klugii*, Hübner-Geyer, f. 801; Doubleday & W. t. . Mexico.

Genus 11. **ITHOMIA.** 1

*aretta*, ? Mexico.  
*acte*, ? Central America.  
*astrea*, Herbst, t. 79; Cramer, t. 22. West Indies.  
*artena*, Hewitson, t. 17. Mexico.  
*atilla*, ? Mexico.  
*cubana*, Herr.-S. C. B. Z. M. V. 1862 ♀. West Indies.  
*clusia*, ? Mexico.  
*colyto*, ? Mexico.  
*diaphana* (*unzerina*), Drury, II, t. 7; Duncan, t. 12; Herbst, t. 83; Cramer, t. 231. United States, West Indies.  
*derasa*, Hewitson, t. 20. Central America.  
*leila*, Hewitson, t. 11. Mexico.  
*laranda*, ? Mexico.  
*melphis*, Hbr.-Geyer, f. 687; Godart, E. M. IX. West Indies.  
*melissa*, ? Central America.  
*morgane*. Hewitson, t. 19; Hbr.-Geyer, f. 869. Mexico.

**nero**, Hewitson, t. 16. Mexico.  
**oto**, Hewitson, t. 16. Central America.  
**polydora**. ? Mexico.  
**patilla**, Hewitson, t. 11. Mexico.  
**phono** (*diaphanax*), Herbst, t. 77; Cramer, t. 315. West Indies, Cent. America.  
**tolosa** <sup>2</sup>, Hewitson, t. 21. Mexico.  
**telesto**, Hewitson, t. 19. Mexico.  
**virginiana** <sup>3</sup>, Hewitson, t. 18. Mexico.  
**zea**, Hewitson, t. 16. Mexico.

Genus 12. **MECHANITIS.**

**balea**, ? Central America.  
**hezia**, Hewitson, t. 13. Central America.  
**zillah**, ? Central America.

Genus 13. **SAIS.**

Unrepresented.

Genus 14. **HAMADRYAS.**

Unrepresented.

Genus uncertain.

**annette**, Guerin, p. 470. Mexico.  
**cotytto**, Guerin, p. 471. Mexico.  
**hortense**, Guerin, p. 469. Mexico.

## REMARKS ON FAMILY "HELICONIA."

1. It is not improbable that some of the new insects of this genus, as figured by Hewitson, may prove sexes or varieties of well-known species. 2. This hitherto confused species has been properly defined by Hewitson. 3. The specific names of this insect and that of *tolosa*, are quite near *toloso* and *virginia* in "Tithorea"; careless general entomologists would easily confound these four species.

## 6th family ACRAEA.

Genus 1. **ACRAEA.**

Unrepresented.

## 7th family NYMPHALIS.

Genus 1. **EUEIDES.**

**anaxa**, Boisduval—? Central America.  
**aliphera**, Hübner, Exot. f. ; Bdl. Sp. Gen. t. 11. Mexico, Cent. America.  
**cleobæa**, Hübner. Mexico.  
**isabella**, Cramer, t. 350; Herbst. t. 69; Chenu, f. 180. West Indies.

Genus 2. **COLAENIS**.

- delila* (*cillene*), Herbst, t. 67; Cramer, t. 215. West Indies, Cent. America.  
*dido*, Chenu, f. 183; Cramer, t. 196; Duncan, t. 13; Lucas, P. E. t. 54.C. Amer.  
*julia* <sup>1</sup> (*alcionea*), Herbst, t. 67 ♂ ♀; Cramer, t. 215 ♂ ♀; Lucas, t. 53 ♂. West Indies, Central America.  
*phærusa* (*phatusus!*), Herbst, t. 136; Cramer, t. 130; Chenu, f. 181. Cen. Amer.

Genus 3. **CETHOSIA**.

Unrepresented.

Genus 4. **AGRAULIS**.

- juno*, Cramer, t. 215 ♀; Herbst, t. 68 ♀; Lucas, t. 53 ♂. Cent. America.  
*moneta*, Doubleday & W. t. 22; Bdvl. Sp. Gen. t. 10; Chenu, f. 185; Encyclop. Brittan. Mexico.  
*vanillae* (*passiflorae*), Cramer, t. 212 ♂; Herbst, t. 254 ♂; Bdvl. & Lec. t. 42; Abbot & S. t. 12 ♂ ♀. U. States, W. Indies, Mexico, Cent. America.

Genus 5. **CLOTHILDA**.

- enryale*, Chenu, f. 186; Doubleday & W. t. 21; Klug, t. 2 ♂. W. Ind., Mexico.  
*Jaegerii*, Menetries, Mosc. III, t. 10. West Indies.  
*pantherata* (*numidia, briarea*), Martyn, t. 12, 14; Hubner, —; Godart, E. M. IX. West Indies, Mexico.

Genus 6. **CIRROCHROA**.

Unrepresented.

Genus 7. **TERINOS**.

Unrepresented.

Genus 8. **LACHNOPTERA**.

Unprecedented.

Genus 9. **MESSARAS**.

Unrepresented.

Genus 10. **ATELLA**.

Unrepresented.

Genus 11. **EUPTOIETA**.

- claudia* <sup>2</sup> (*hegesia, thais, columbina*.) Bdvl. and Lec. t. 44 ♀; Herbst, t. 259 ♂, t. 257 ♀; Cramer, t. 209 ♀, t. 69 ♂; Chenu, f. 192. U. States, Mexico, West Indies, Central America.

Genus 12. **ARGYNNIS**.

- astarte* (*pygmaea*), Edwards, P. E. S. Pa. 1862, ♂ ♀; Doubleday & W. t. 23; Bdvl. A. S. E. F. 1852. United States, West Indies.  
*aglaia*, Morris, Syn. p. 46 ♂ ♀; Esper, Eur. t. 17; Herbst, t. 264 ♂ ♀; Wood, t. 1. United States.  
*atlantis*, Edwards, P. E. S. Pa. 1862, ♂ ♀. United States, British N. A.  
*adraste* (*adiaste!*), Boisduval—? United States.  
*aphrodite* (*cybele*), Morris, Syn. p. 43; Harris, f. 111; Bdvl. & Lec. t. 45 ♀. U. States, Canada, Hudson's Bay.  
*arctica*, ? Greenland.



- bellona**, Harris, p. 287; Bdvl. & Lec. t. 45; Morris, Syn. p. 45. United States. West Indies, British N. A.
- Boisduvalii**,<sup>3</sup> Bdvl. Icones, t. 20. United States, British N. A.
- cybele**<sup>4</sup> (*aphrodite, daphnis*), Herbst, t. 255 ♂; Cramer, t. 57 ♂. U. S., W. Ind.
- chariclea**, Bdvl. & Lec. p. 161 ♂ ♀; Herbst, t. 272, Bdvl. Sp. Gen. t. 11; Morris, p. 49 ♂ ♀. British N. A., Greenland.
- calippe**, Bdvl. A. S. E. F. 1852 ♂ ♀; Morris, Syn. p. 46 ♂ ♀. United States.
- diana**, Herbst, t. 253; Cramer, t. 98; Say, t. 17. United States.
- epithne**, Bdvl. MSS. United States.
- egleis**, Bdvl. MSS. United States.
- euryale**, Doubleday & W. t. 23. United States.
- frigga**, Herbst, t. 273; Hübner, Eur. f. 49; Duponchel, t. 19. British N. A., Arctic America.
- freya** (*dia-lapponica*), Herbst, t. 272 ♂ ♀; Esper. Eur. t. 109 ♀; Morris, Syn. p. 46. British N. A., Arctic America.
- idalia**<sup>5</sup> (*ashtaroth* is var.), Cramer, t. 44 ♂ ♀; Bdvl. & Lec. t. 43 ♀; Drury, I. t. 13 ♂ ♀; Lucas, P. E. t. 56 ♂; Herbst, t. 252 ♂, t. 253 ♀. U. S., W. Ind.
- leta**, Behr. Proc. Cal. N. H. Soc. United States.
- mirmonia**, Bdvl. MSS. United States.
- myrina**,<sup>6</sup> Herbst, t. 255; Bdvl. & Lec. t. 45; Cramer, t. 189, Say; t. 46. U. States, British N. A., West Indies.
- montinus**, Scudder, Proc. Essex Inst. 1863 ♂ ♀; Scudder, Proc. Boston N. H. S. 1863, t. 14. United States.
- nokomis**, Edwards, Proc. A. N. S. Pa., 1862 ♂. United States.
- ossianus** (*aphirape, fingsal, tricularis*), Bdvl. Icones, t. 19; Herbst, t. 270 ♂; Bdvl. & Lec. p. 157 ♂ ♀; Morris, Syn. p. 48 ♂ ♀. British N. A.
- polaris**, Morris, Syn. p. 48 ♂ ♀; Bdvl. & Lec. p. 159 ♂ ♀; Bdvl. Sp. Gen. t. 11; Duponchel, t. 20; Bdvl. Icones, t. 20. British N. A.
- thais**, Herbst, IX. p. 183; Godart, E. M. IX. United States.
- zerene**, Bdvl. A. S. E. F. 1852 ♂ ♀; Morris, Syn. p. 53 ♂ ♀. United States.

Genus 13. **MELITÆA**.<sup>7</sup>

- anicia**, Doubleday & W. t. 23; Edwards, P. E. S. Pa. 1862 ♂ ♀. United States.
- aegon** ? West Indies.
- chalcedona** (*chalcedon!*), Doubleday & W. t. 23 ♀; Bdvl. A. S. E. F. 1862; Edwards, P. E. S. Pa. 1862 ♂ ♀. United States, West Indies.
- cocyta**<sup>8</sup> (*morpheis, tharos* ♂), Herbst, t. 260 ♂ ♀, Cramer, t. 101 ♂ ♀. U. States.
- editha**,<sup>9</sup> Bdvl. A. S. E. F. 1852 ♂ ♀; Morris, Syn. p. 51 ♂ ♀. United States.
- frisia**, Poey, Cent. L. ♂ ♀. West Indies.
- Harrisii** (*ismeria*), Scudder Pr. Essex I. 1863. United States.
- ismeria**, Bdvl. & Lec. t. 46; Morris, Syn. p. 50; Harris, p. 288? United States.
- mylitta**, Morris, Syn. p. 324 ♂ ♀; Edwards, Pr. A. N. S. 1861 ♂ ♀. U. States.
- minuta**, Morris, Syn. p. 325 ♂; Edwards, Pr. A. N. S. 1861 ♂. United States.
- nycteis** (*euclea*), Edwards, Pr. E. S. Pa. 1861 ♂ ♀; Morris, Syn. p. 325, ♂ ♀; Herbst, t. 274 ♂; Doubleday & W. t. 23; Chenu, f. 200 ♀. U. States.
- œnone**, Scudder, Pr. Essex I. 1863 ♂ ♀. United States.

- phæton**, Morris, Syn. p. 50; Cramer, t. 193 ♀; Drury, I. t. 21 ♀; Bdvl. Sp. Gen. t. 11; Bdvl. & Lec. t. 47 ♂; Herbst, t. 142 ♀. U. States, Brit. N. A.
- pelops**, Drury I. t. 19; Godart E. M. IX. West Indies.
- pulchella**,<sup>10</sup> Bdvl. A. S. E. F. 1852; Drury, I. t. 21 ♀. United States.
- tharos** (*cocyta*, *sclenis*, *pharos*!), Morris, Syn. p. 51; Bdvl. & Lec. t. 47 ♂ ♀; Herbst, t. 260 ♀; Cramer, t. 169 ♀. U. States, Brit. N. A., Arctic A.
- theone**, Menetries Cat. St. P. t. 2. Central America.
- tarquinius**, Ross, 2d A. V. descr. Arctic America.
- texana**, Edwards, Pr. E. S. Pa. 1863 ♂. United States.

Genus 14. **ERESIA.**

- clio**, ? Central America.
- cincta**, Edwards in litt. United States.
- ezorias**, Hewitson, t. 24. Mexico.
- hera**, Herbst, t. 239; Cramer, t. 253. Central America.
- nauplia** (*phalcrat*), Cramer, t. 316 ♂ ♀, Herbst, t. 78 ♂ ♀. Central America.
- phyllira**, Hewitson, t. 39. Mexico.

Genus 15. **SYNCHLÆ.**

- hippodrome**, Hübner-Geyer, f. 843. Mexico.
- janias**, Godart, E. M. IX: Drury, III, t. 17. Mexico, Central America.
- lacinia**, Hübner-Geyer, f. 899. Mexico.
- marina**, Hübner-Geyer, f. 877. Mexico.
- prezi**, Herr-S., C. B. Z. M. V. 1862 ♂ ♀. West Indies.
- Saundersii**, Doubleday & W. t. 24; Chenu, f. 202. U. States, Mexico, C. Amer.

Genus 16. **ARASCHNIA.**

Unrepresented.

Genus 17. **LAOGONA.**

Unrepresented.

Genus 18. **EUREMA.**

- Kepfersteinii**, Doubleday & W. t. 24; Chenu, f. 205. West Indies.
- lethe** (*zabulina*, *daemonica*), Godart, E. M. IX. Hübner, Exot. f. ♀; Donovan India, t. 23. United States, Mexico, Central America.
- tectesia** (*paullus*), Hübner, Exot. f. ; Godart, E. M. IX. Mexico, W. Ind.

Genus 19. **GRAPTA.**

- comma**, Harris, t. 4; Morris, Syn. p. 54; Edwards, Pr. E. S. Pa. 1862 ♂ ♀. U. States, British N. A.
- faunus**<sup>11</sup> (*comma*, *C-album*), Edwards, Pr. E. S. Pa. 1862; Edwards, Pr. A. N. S. 1862 ♂ ♀. United States, British N. A.
- G-argenteum**, Doubleday & W. t. ; Chenu, f. 207. Mexico.
- Hartwegii**, ? United States.
- interrogationis**<sup>12</sup> (*C-aureum*), Harris, f. 124 ♀; Cramer, t. 19 ♂; Edwards, Pr. E. S. Pa. 1862; Bdvl. & Lec. t. 51; Herbst, t. 162 ♂; Abbot & S. t. 11 ♀. United States, British N. A.
- progne**<sup>13</sup> (*C-argenteum*), Herbst, t. 163; Cramer, t. 5; Kirby, t. 3; Bdvl. & Lec. t. 50; Harris, p. 301. United States, British N. A., West Indies.

Genus 20. **VANESSA.**

- antiopa* (*Lintnerii* is var.), Harris, f. 121; Herbst, t. 167; Esper. Eur. t. 12: Wood, t. 1; Chenu, f. 211. United States, British N. A., Mexico.  
*californica*, Bdvl. A. S. E. F. 1852; Morris, Syn. p. 58. United States.  
*cyanomelas*, Doubleday & W. t. 26. Mexico.  
*J-album*, Harris, p. 298; Bdvl. & Lec. t. 50; Morris, Syn. p. 56. U. S., Canada.  
*Milbertii* (*furcillata*), Bdvl. & Lec. t. 51; Say, t. 27; Doubleday & W. t. 26; Harris, f. 125. United States, British N. A.

Genus 21. **PYRAMEIS.**

- atalanta*, Chenu, f. 212; Harris, f. 120; Herbst, t. 180; Wood, t. 1; Esper Eur. t. 14. United States, British N. A., Mexico, West Indies.  
*cardui*, Harris, p. 291; Esper Eur. t. 10 ♀; Chenu, f. 213 ♂; Wood, t. 1. United States, British N. A., Mexico, West Indies, Central America.  
*carye*, Hübner, Exot. f. . United States.  
*huntera* (*iote*, *cardui-virginiensis*), Cramer, t. 12 ♂; Abbot & S. t. 9 ♀; Wood, t. 53; Herbst, t. 178 ♂ 179 ♀; Drury, I. t. 5 ♀; Bdvl. & Lec. t. 48 ♀. U. States, Mexico, British N. A.

Genus 22. **JUNONIA.**

- cœnia*<sup>14</sup> (*larinia*, *genoveva*, *evarete*, *orythia*), Bdvl. & Lec. t. 49; Abbot & S. t. 8; Herbst, t. 225 ♂ t. 226 ♀; Cramer, t. 290 ♂ t. 203 ♀; Lucas, t. 61 var. United States, Mexico, West Indies.  
*epaphus*, Humboldt & B. t. 35. Central America.

Genus 23. **CYNTHIA.**

Unrepresented.

Genus 24. **ANARTIA.**

- amalthea* (*amathea*!), Doubleday & W. t. 24; Lucas, P. E. t. 58; Duncan, t. 15; Cramer, t. 209; Chenu, f. 215. Mexico, Central America.  
*fatima*, Hübner-Geyer, f. 813; Donovan, India, t. 31. Central America.  
*jatrophæ*, Herbst, t. 172; Cramer, t. 202; Morris, Syn. p. 62. United States, W. Indies, Central America.  
*lytraea* (*chrysopepia*), Hübner-Geyer, f. 547; Godart, E. M. IX. West Indies.

Genus 25. **CYBDELIS.**

- hyperipte*, Hubner, Exot. f. . United States, West Indies.  
*orphisus* (*monima*?) Herbst, t. 222; Cramer, t. 42. West Indies, Cent. America.  
*pandama*, Chenu, f. 217; Doubleday & W. t. 27. Mexico.

Genus 26. **MYSCELIA.**<sup>15</sup>

- antholia*, Godart, E. M. IX. West Indies.  
*chromis*, Chenu, f. 219; Doubleday & W. t. 27. Central America.  
*Cuvierii*, Lucas, P. E. t. 61; Chenu, f. 220. West Indies.  
*cyanaris*, Doubleday & W. t. 27; Chenu, f. 218. Central America.  
*chione* (*medea*), Herbst, t. 183; Cramer, t. 90. Central America.  
*ethusa*, Cuvier, R. A. t. 138. Mexico.  
*micalia*<sup>16</sup>, Cramer, t. 108; Herbst, t. 166. West Indies.

**orsis** (*blandina* is ♀), Donovan, India, t. ♀; Drury, III. t. 16; Herbst, t. 169.  
West Indies, Central America.

Genus 27. **EPITHELE.**

**ariadne** (*merione*), Herbst, t. 171; Cramer, t. 180; Chenu, f. 490? Cent. America.

Genus 28. **ECTIMA.**

Unrepresented.

Genus 29. **PELIA.**

Unrepresented.

Genus 30. **HEMATERA.**

**egris**, ? United States, Mexico.

Genus 31. **EUBAGIS.**

**postverta** (*mylitta* is ♀), Cramer, t. 254 ♂, t. 253 ♀; Herbst, t. 223 ♂, t. 217 ♀.  
West Indies, Central America.

**serina** (*dyonis* is var.; *egaea* is ♀), Godart, E. M. IX.; Hübner-Geyer, f. 871:  
Fabricius, S. E. ♂ ♀; Herbst, VIII. p. 230 ♀. Mexico, W. Indies.

**zetes**, Menetries, Bull, S. N. Mosc. IX. t. 11. West Indies.

Genus 32. **CALLICORE.**

**anna**, Guerin, Iconographie, p. 480. Mexico.

**astala**, Guerin, Iconographie, p. 479. Mexico.

**clymena** (*dryalus*), Lucas, P. E. t. 72; Cramer, t. 24, Hübner-Geyer, f. 583. U.  
States, Central America.

**cornelia**, Herr-S., Ausser, E. f. 21. Mexico.

Genus 33. **PERISAMA.**

Unrepresented.

Genus 34. **CATAGRAMMA.**

**lyca** Chenu, f. 227; Doubleday & W. t. 28. Mexico.

**patelina**, Hewitson, t. 35. Central America.

**pitheas**, Humboldt & B. t. 37; Godart, E. M. IX. Central America.

Genus 35. **CALLIZONA.**

Unrepresented.

Genus 36. **GYNECIA.**

**dirce**, Herbst, t. 253; Cramer, t. 212; Chenu, f. 230. West Indies, C. America.

Genus 37. **CALLIANIRA.**

**alcmena**, Chenu, f. 231; Doubleday & W. t. . Mexico.

Genus 38. **PYRRHOGYRA.**

**meria**, Bdl. MSS. Central America.

**otolais**, ?

**tiphus** (*tiphia*?), Cramer, t. 8; Herbst, t. 237. Central America.

Genus 39. **LUCINIA** (*Nica*.)

**cadma**, Chenu, f. 233, Drury, II. t. 18; Godart, E. M. IX. West Indies.

**sida**<sup>17</sup> (*torrebia*), Hübner, Exot. f. , Menetries Moscow, IX. t. 11. W. Indies.

Genus 40. **ETEONA.**

Unrepresented.

Genus 41. **MORPHEIS.****Ehrenbergii**, Chenu, f. 235; Doubleday & W. 43; Hübner, Exot. f. . Mexico.Genus 42. **EPICALIA.****ancaea** (*obrinus*), Cramer, t. 338 ♂, t. 49 ♀; Herbst, t. 138 ♂, t. 139 ♀. Mexico.**cerambus**, ? Mexico.**nyctimus**, ? Mexico.Genus 43. **CALLITHEA.**

Unrepresented.

Genus 44. **AMNOSIA.**

Unrepresented.

Genus 45. **CYRESTIS.**

Unrepresented.

Genus 46. **TIMETES** (*Megalura*.)**chiron** (*marius*), Herbst, t. 52; Esper, Ausl. t. 52; Cramer, t. 200. Mexico, W. Indies.**coresia** (*zerynthia*), Hübner, Exot. f. ; Edwards, Proc. Ent. Soc. Pa. 1862. United States, Mexico.**corita**, ? Mexico.**eleucha**, Doubleday & W. t. 33; Hübner, Exot. f. 197. West Indies.**harmonia**, Klug, t. 2 ♂. Mexico, Central America.**iole** (*fucula*), Drury, III. t. 38; Stoll, t. 29; Godart, E. M. IX. West Indies.**petreus** (*thetys*), Herbst, t. 67; Duncan, t. 19; Esper, Ausl. t. 58; Cramer, t. 87. Mexico, Central America.**Poey**, Herr-S. C. B. Z. M. V. 1862. West Indies.Genus 47. **VICTORINA.****stenales** (*stheneles*!) Chenu, f. 241; Herbst, t. 47; Cramer, t. 79; Lucas, P. E. t. 67. Mexico, West Indies, Central America.Genus 48. **MINETRA.**

Unrepresented.

Genus 49. **PROTHOE.**

Unrepresented.

Genus 50. **MYNES.**

Unrepresented.

Genus 51. **IAERA.**

Unrepresented.

Genus 52. **NEPTIS.**

Unrepresented.

Genus 53. **ATHYMA.**

Unrepresented.

Genus 54. **LIMENITIS.**

- arthemis.** Harris, t. 1 ♂; Drury, II. t. 10 ♂; Say, t. 23; Bdvl. & Lec. t. 54 ♂ ♀.  
United States, British N. A.
- dissippus** (*misippus! archippus*), Harris, p. 282; Herbst, t. 158 ♂; Cramer, t. 16 ♂; Bdvl. & Lec. t. 55. United States, West Indies.
- eulalia.** Edwards, Proc. A. N. S. Pa. 1862 ♂ ♀; Doubleday & W. t. 36; Bdvl. A. S. E. F. 1852. United States.
- Lorquini.** Morris, Syn. p. 66; Bdvl. A. S. E. F. 1852. United States.
- ursula** (*ephestion*), Harris, p. 283; Abbot & S. t. 10 ♂ ♀; Stoll, t. 25; Bdvl. & Lec. t. 53 ♀. United States.
- Weidemeyerii.** Morris, Syn. p. 327 ♂; Edwards, Proc. A. N. S. Pa. 1861. U. S.

Genus 55. **HETEROCHROA.**

- aryale.** Ann. Nat. Hist. XX. t. 20. West Indies.
- Bredowii** (*eulalia*), Hübner-Geyer, f. 825; Doubleday & W. t. 36. Mexico.
- dionysa.** Ann. Nat. Hist. XX. t. 20. Mexico.
- fessonina.** Menetries, Cat. St. P. p. 119; Ann. Nat. H. XX. t. 20. Cent. America.
- gelania.** Lucas. P. E. t. 68. Mexico, West Indies, Central America.
- serpa** (*basilea, iphicla; cythera* is ♀), Lucas, t. 68 ♀; Cramer, t. 188 ♂. t. 376 ♀; Bdvl. Sp. Gen. t. 8; Herbst, t. 148 ♂ ♀. W. Indies, Cent. America.

Genus 56. **DIADEMA.**

- bolina**<sup>19</sup>, Drury, I. t. 14 ♀; Herbst, t. 244 ♂; Cramer, t. 65 ♂. West Indies?

Genus 57. **GODARTIA.**

Unrepresented.

Genus 58. **ROMALÆOSOMA.**

Unrepresented.

Genus 59. **EURYPHENE.**

Unrepresented.

Genus 60. **ATERICA.**

Unrepresented.

Genus 61. **HARMA.**

Unrepresented.

Genus 62. **ADOLIAS.**

Unrepresented.

Genus 63. **ENISPE.**

Unrepresented.

Genus 64. **EURIPUS.**

Unrepresented.

Genus 65. **HERONA.**

Unrepresented.

Genus 66. **SYMPHÆDRA.**

Unrepresented.

Genus 67. **MENERIS.**

Unrepresented.

Genus 68. **SMYRNA.**

**Blomfieldia** (*bella, proserpine*), Hübner, Exot. f. ; Herbst, VIII. p. 286; Godart, E. M. IX. Mexico, Central America.

**Karwinskii**, Chenu, f. 501; Hübner-Geyer, f. . Doubleday & W. t. .  
United States, Mexico.

Genus 69. **AGRIAS.**

**aedon**, Chenu, t. 35; Hewitson, t. . Central America.

**claudia**, Herbst, t. 226. Central America.

Genus 70. **PREPONA.**

**demophon**<sup>20</sup> (*pheridamas, amphimachus, sisyphus*), Cramer, t. 158; Lucas, P. E. t. 73; Hubner, Exot. f. ; Herbst, t. 27, 28; Chenu, f. 262; Esper Ausl. t. 53. West Indies.

Genus 71. **PANDORA.**

Unrepresented.

Genus 72. **AGANISTHOS.**

**orion** (*danae*) Cramer, t. 84; Herbst, t. 35; Lucas, P. E. t. 66; Chenu, f. 264; Bdvl. Sp. Gen. t. 8; Bdvl. & Lec. t. 52. United States, Mexico, W. Indies, Central America.

Genus 73. **APATURA.**

**callianira**, Menetries, Cat. St. P. t. 2 ♂. Central America.

**celtis**, Bdvl. & Lec. t. 57; Morris, Syn. p. 68. United States.

**clyton**, Bdvl. & Lec. t. 56; Morris, Syn. p. 68. United States.

**laure**, Drury, II. t. 17; Herbst, t. 167. West Indies, Central America.

**pavonii** (*theodora*), Herr.-Sch. Exoten, f. 101, Humb. & B. t. 18. West Indies.

Genus 74. **PYCINA.**

Unrepresented.

Genus 75. (*Nymphalis*.) **CHARAXES.**

Unrepresented.

Genus 76. **PHILOGNOMA.**

Unrepresented.

Genus 77. **MEGISTANIS.**

**cadmus** (*pherecides, sulalia*), Herbst, t. 57 ♂ ♀; Cramer, t. 330 ♂, t. 22 ♀; Doubleday & W. t. 36. United States, Mexico, W. Indies, Cent. America.

Genus 78. **PROTOGONIUS.**

**fabius** (*hippona, cecrops*), Chenu, f. 271 ♂; Esper, Ausl. t. 54 ♂; Drury, III. t. 16 ♀; Herbst, t. 67 ♂; Duncan, t. 19 ♂; Cramer, t. 90 ♂; Donovan, India, t. 35 ♂. Central America.

Genus 79. **HYPNA.**

**clytemnestra**<sup>21</sup>, Cramer, t. 137 ♂, t. 364 ♀; Herbst, t. 59 ♂ ♀; Chenu, f. 272; Lucas, P. E. t. 64 ♀. West Indies.

Genus 80. **CYMATOGRAMMA.**

**echemus**, Chenu, f. 273; Doubleday & W. t. 49. Central America.

Genus 81. **PAPHIA.** <sup>2 2</sup>

**astyanax** (*portia, troglodyta*), Herbst, t. 57 ♂; Cramer, t. 337 ♂. United States, Mexico, West Indies.

**didea**, ? Central America.

**electra**, Hewitson, t. 46. Mexico.

**glycerium**, Chenu, f. 499; Doubleday & W. t. 50; Morris, Syn. p. 67 ♂ ♀. U. States, Mexico, West Indies.

**portia**, Godart, E. M. IX. West Indies.

**pleione**, ? West Indies.

**verticordia**, Hübner, Exot. f. 559. West Indies.

Genus 82. **SIDERONE.**

**ellops**, Menetries, Cat. St. P. t. 3 ♂, p. 88 ♂ ♀. Central America.

**ide**, Bdvl. Sp. Gen. t. 8. West Indies.

**isidora**, Cramer, t. 235 ♂ ♀; Herbst, t. 150 ♂ ♀; Donovan, India, t. 33 ♂. Mexico, Central America.

**marpesia** (*marthesius*!), Cramer, t. 191; Herbst, t. 132. Mexico.

**Rogerii** <sup>2 3</sup> (*ide*), Lucas, P. E. t. 67. West Indies.

**syntyche**, Hewitson, t. 55. Mexico.

Genus 83. **BIA.**

Unrepresented.

Genus 84. **HETEROPSIS.**

Unrepresented.

Genus 85. **KALLIMA.**

Unrepresented.

Genus 86. **AMATHUSIA.**

Unrepresented.

Genus 87. **ZEUXIDIA.**

Unrepresented.

Genus 88. **DISCOPHORA.**

Unrepresented.

Genus—undetermined.

**aidea**, Guerin, p. 478. Central America.

**idya**, Hubner-Geyer, f. . West Indies.

## REMARKS ON FAMILY "NYMPHALIS."

1. May prove to be a variety of *C. delila*. 2. Herbsts' and Cramer's figures are unsatisfactory. By some authors *E. claudia* and *E. hegesia* are supposed to be distinct. 3. A supposed variety of *A. chariclea*. 4. Herbsts' and Cramer's figures are coarse, and tawdry in coloring.



Until lately this species has been confounded with *A. aphrodite*—which latter is larger and more tawny and more dusky in coloring. 5. *A. ashtaroth* is a suffused variation of *A. idalia*. 6. The inferior surface distinguishes it readily from *A. bellona*. 7. According to Felder (*Neues Lepidopteron*) *M. nycteis*, *ismeria*, *tharos*, and others, in consequence of having hairy palpi, belong to the genus *Eresia*. 8. There is uncertainty about this species; the figures given much resemble *M. tharos* ♂. 9. May prove a variety of *M. anicia*. 10. Supposed to be a climatical development of *M. tharos*. 11. Mistaken by most authors for the European *G. C-album*. 12. There are two varieties: BdvI. and Lec. represent one with light colored hind wings, whilst others figure the dark variety. 13. Cramer's figure is badly colored. 14. *T. genoveva* and *I. larina* are probably climatical developements of the same insect. 15. This genus is in bad repute: the individuals hitherto classed in it will probably partly be placed under *Cybdelis* and partly undergo a new generic distribution. 16. Said to be the ♀ of *Epicalia numilia*. 17. A supposed variety of *L. cadma*. 18. Herbst's and Cramer's representations are too dark in coloring; Lucas' representation is too faintly colored. 19. The nativity of this species is not well determined. 20. Both outlines and coloring of Lucas' figure differ much from Herbst's and Cramer's; the former seems done with greater care, and will probably prove most reliable. 21. Subject to much variation. 22. Some confusion among several species. *Didea*, *glycerium*, *portia* and *pleione* are somewhat uncertain, and may be partly synonymous. 23. By some authors supposed to be a variety of one of the sexes of *S. ide*.

#### 8th family MORPHO.

##### Genus 1. CLEROME.

Unrepresented.

##### Genus 2. DRUSILLA.

Unrepresented.

##### Genus 3. THAUMANTIS.

Unrepresented.

##### Genus 4. MORPHO.

*polyphemus*, Chenu, t. 34; Doubleday & W. t. 55. Mexico.

##### Genus 5. CALIGO.

*aesacus*, Herr.-Sch. Ausl. f. 3. Mexico.

*uranus* (*telemachus*), Herr.-Sch. Ausser, f. 1. Mexico.

Genus 6. **DASYOPHTHALMA.**

*rusina* (*lycaon*), Lucas, P. E. t. 78; Chenu, f. 280; Doubleday & W. t. 55. Mexico.

Genus 7. **OPSIPHANES.**

*Boisduvalii*, Chenu, f. 281; Doubleday & W. t. 57. Mexico.

Genus 8. **DYNASTOR.**

*Napoleon*, Chenu, t. 33 ♀; Doubleday & W. t. 58 ♀; Herr.-S. Ausser, f. 79 ♂. Central America.

Genus 9. **PENETES.**

Unrepresented.

Genus 10. **NAROPE.**

Unrepresented.

9th family **BRASSOLIS.**Genus 1. **BRASSOLIS.**

Unrepresented.

10th family **SATYRUS.**Genus 1. **DICTYS.**

Unrepresented.

Genus 2. **CORADES.**

Unrepresented.

Genus 3. **TAYGETIS.**

*andromeda* (*thamyra*, *laches*), Herbst, t. 192, t. 194; Cramer, t. 96 ♂, t. 242 ♀. Central America.

*mermeria*, Herbst, t. 192 ♂ ♀; Cramer, t. 96 ♂, t. 289 ♀. Central America.

*virgilia* (*rebecca*), Herbst, t. 193; Cramer, t. 96. Central America.

Genus 4. **PRONOPHILA.**

*patrobas*, T. E. S. London, 1862, t. 6 ♂ ♀. Mexico.

Genus 5. **DEBIS.**

*portlandia* (*andromacha*), Morris, Syn. p. 79; Bdvl. & Lec. t. 58 ♂ ♀, Gosse, p. 246 ♀; Say, t. 36 ♂. United States, Canada.

Genus 6. **CYLLO.**

Unrepresented.

Genus 7. **ZOPHCESSA.**

Unrepresented.

Genus 8. **GNOPHODES.**

Unrepresented.

Genus 9. **HAETERA.**

*andromeda* (*menander*; *philis* is var.: *pireta*), Drury, III. t. 38; Herbst, t. 84; Cramer, t. 15, t. 387 var. West Indies, Central America.

*diaphana*, Boisduval—? West Indies.

*luna*, Hewitson, t. 33; Godart, E. M. IX. Central America.

Genus 10. **CAEROIS.**

Unrepresented.

Genus 11. **COELITES.**

Unrepresented.

Genus 12. **ORINOMA.**

Unrepresented.

Genus 13. **NEORINA.**

Unrepresented.

Genus 14. **TISIPHONE.***hercyna*, Chenu, f. 303; Doubleday & W. t. 63. Mexico.Genus 15. **ORESSINOMA.**

Unrepresented.

Genus 16. **EUPTYCHIA.** (*Cissia.*)*archebates*, Menetries, Bull. Mosc. III. West Indies.*crantor*, Donovan, India, t. 37; Godart, Ency. M. IX.: Herbst, VIII. p. 291.  
Central America.*mollina*, Hubner-Geyer, f. 105. Central America.*ocirrhœ* (*cissia*), Herbst, t. 184; Cramer, t. 194. Central America.Genus 17. **NEONYMPHA.***aerolatus* (*arcolatus?*), Bdl. & Lec. t. 63; Abbot & S. t. 13 ♂ ♀. United States.*acmenis*, Hubner-Geyer, f. 233. United States.*Boisduvalii* (*canthus*), Bdl. & Lec. t. 60 ♂ ♀; Morris, Syn. p. 74; Harris, f. 128.  
United States.*cantheus*,<sup>1</sup> Godart, E. M. IX.; Morris, Syn. p. 75; Fabr. S. E. United States.*californica*, Doubleday & W. t. 66, Bdl. A. S. E. F. 1852. United States.*eurythris* (*curytris!* *cymela*), Harris, f. 129; Cramer, t. 132 ♂; Herbst, t. 196 ♂;  
Bdl. & Lec. t. 61 ♂ ♀. United States, West Indies.*gemma*, Bdl. & Lec. t. 62 ♂ ♀. Morris, Syn. p. 73. United States.*halyma*, Fabricius, S. E. West Indies.*polixenes?* Fabricius, S. E. United States.*sosybius* (*camertus*), Bdl. & Lec. t. 63; Cramer, t. 293; Herbst, t. 195. United  
States, West Indies, Mexico.Genus 18. **EREBIA.***discoidalis*, Morris, Syn. p. 75; Kirby, IV. t. 3. British N. A.*mancinus*, Doubleday & W. t. 64. United States.*nephele*, Morris, Syn. p. 76; Kirby, IV. United States, British N. A.*Rossii*, Ross, App. 2d Voy. f. ♂ ♀. Arctic America.*subhyalina*, Ross, App. 2d Voy. *descr.* ♂. Arctic America.*vesagus*, Doubleday & W. t. 64. United States.Genus 19. **ARGYROPHENGA.**

Unrepresented.

Genus 20. **CHIONOBAS.**<sup>2</sup>

- bore**<sup>3</sup> (*taygete*), Meigen, t. 30; Herr-S. Europ. f. 119 *only*; Wiener, E. M. 1863.  
♂ ♀. Arctic America.
- chryxus**. Edwards, Pr. E. S. Pa. 1863 ♂ ♀; Doubleday & W. t. 64; Hübner?  
United States.
- crambis**. Freyer, t. 440. Arctic America.
- jutta**<sup>4</sup> (*balder*), Hübner, Europ. f. 614, 615; Herr-S. Eur. f. 116 a 118, 384 a 388;  
Guerin, Icones, t. 80; Wiener, E. M. 1863 ♂ ♀; Hübner-Geyer, f.  
982, 983, Ency. Britannica, f. . British N. A., Arctic America.
- oeno**, Herr-S. Europ. f. 381 ♂, 123 & 124 ♀; Bdvl. Icones, t. 39; Wiener, E. M.  
1863 ♂ ♀. British N. A.
- semidea**<sup>5</sup> (*also, fortunata*), Wiener, E. M. 1863 ♂ ♀; Herr-S. Eur. f. 112 a 115;  
Say, t. 59; Harris, f. 126, Morris, Syn. p. 80. United States.
- taygete** (*bootes*), Hübner, Eur. f. 1,025 a 1,028; Bdvl. Icones, t. 37; Wiener, E.  
M. 1863 ♂ ♀; Herr-S. Europ. f. 391, 392. Brit. N. A., Arctic Am.

Genus 21. **ARGE.**

Unrepresented.

Genus 22. **LASIOMMATA.**

Unrepresented.

Genus 23. **SATYRUS.**

- alope** (*nephele* is var.), Morris, Syn. p. 76; Harris, f. 127; Bdvl. & Lec. t. 59 ♀.  
United States.
- ariane**, Morris, Syn. p. 77; Bdvl. A. S. E. F. 1852 ♂ ♀. United States.
- lysius**, Menetries, Bull. Mosc. III. West Indies.
- pegala**. Morris, Syn. p. 77; Fabricius, Syst. E. United States.
- polixenes**, Fabricius, Syst. Ent. III. United States.
- sylvestris**, Morris, Syn. p. 327 ♂ ♀; Edwards, Pr. A. N. S. Pa. 1861 ♂ ♀. U. States.
- sthenele**. Morris, Syn. p. 77; Bdvl. A. S. E. F. 1852 ♂ ♀. United States.

Genus 24. **MYCALESIS.**

- ostrea** (*otrea!*), Hübner-Geyer, t. 79. United States.

Genus 25. **YPHIMA.**

- philomela**. Hübner, f. 83. United States.

Genus 26. **JOENONYMPHA.**

- californica**. Bdvl. A. S. E. F. 1852; Doubleday & W. t. 66. United States.
- galactina**, Morris, Syn. p. 80; Bdvl. A. S. E. F. 1852 ♂ ♀. United States.
- inornata**, Morris, Syn. p. 328 ♂ ♀; Edwards, Pr. A. N. S. Pa. 1861 ♂ ♀. United  
States, British N. A.
- ochracea**. Morris, Syn. p. 328 ♂ ♀; Edwards, Pr. A. N. S. Pa. 1861 ♂ ♀. United  
States, British N. A.

Genus 27. **CALISTO.**

- hysius**. Godart, E. M. IX. West Indies.
- herophile**, Hübner-Geyer, f. 269. West Indies, Central America.
- zangis** (*agnes*), Herbst, f. 203 ♀; Cramer, t. 325 ♀; Doubleday & W. t. ♂.  
United States, West Indies.

Genus 28. **STEROMA.**

Unrepresented.

Genus 29. **LYMANOPODA.**

Unrepresented.

Genus—uncertain.

*alerophila*, Hübner, Exot. f. . West Indies.

## REMARKS ON FAMILY "SATYRUS."

1. A doubtful species. 2. The synonyms of most species are somewhat confused, and much uncertainty has prevailed in the distinction of kinds from varieties. An excellent and useful monograph on this genus, by Möschler, may be found in the *Wiener Entomologische Monatschrift* for 1863. 3. Said to be a local variety of *C. taygete*. 4. The best figures given by various authors are here indicated. 5. Our *C. semidea* by some is supposed to be synonymous with *C. also*.

11th family EURYTELA.<sup>1</sup> (*Biblis*.)Genus 1. **MELANITIS.***ceryx*<sup>2</sup>, Bdl. Sp. Gen. t. 8. Mexico.Genus 2. **DIDONIS.***aganissa*, Bdl. Sp. Gen. t. 9. Mexico.*biblis* (*hyporia*, *thadana*), Cramer, t. 236; Chenu, f. 490; Lucas, P. E. t. 61. W. Indies.*pasira*, Doubleday & W. t. 31. Central America.Genus 3. **CYSTINEURA.***amymone*, Menetries, Cat. St. P. t. 9 p. 123. U. States, Mexico, Cent. America.*mardania* (*hersilia*), Doubleday & W. t. 31; Cramer, t. 213; Bdl. Sp. Gen. t. 9? West Indies.Genus 4. **OLINA.** (*Olima*!)

Unrepresented.

Genus 5. **EURYTELA.***teleboas*, Menetries, Bull. Mosc. III. t. 10. West Indies.Genus 6. **ERGOLIS.**

Unrepresented.

Genus 7. **HYPANIS.**

Unrepresented.

## REMARKS ON FAMILY "EURYTELA."

1. By most entomologists the entire arrangement and generic distribution of this family is deemed unsatisfactory.

## 12th family LIBYTHEA.

*motya* (*Bachmanii* is var.), Bdl. & Lec. t. 64; Morris, Syn. p. 63. U. S. W. Ind.  
*terena*, ? West Indies.

## 13th family ERYCINA.

Genus 1. **EURYBIA.**

*halimede*, Hübner, Exot. f. . Central America.  
*lycisca*, Doubleday & W. t. 69. Central America.

Genus 2. **ALESA.**

Unrepresented.

Genus 3. **ZEMEROS.**

Unrepresented.

Genus 4. **NEMEOBIUS.**

Unrepresented.

Genus 5. **TAXILA.**

Unrepresented.

Genus 6. **METHONE.**

Unrepresented.

Genus 7. **HELICOPIS.**

*dematria*, Doubleday & W. t. 71. Central America.

Genus 8. **BARBICORNIS.**

Unrepresented.

Genus 9. **SYRMATIA.**

*dorilas* (*nyx*), Cramer, t. 48; Herbst, t. 60. West Indies.

Genus 10. **ANTEROS.**

*aegon*<sup>1</sup>, Herbst, XI. p. 392; Godart, E. M. IX. West Indies.  
*carausius*, Doubleday & W. p. 428. Mexico, Central America.  
*margaretta*, ? Central America.

Genus 11. **ERYCINA.**

*inca*, Trans. E. S. 1859, t. 21 ♂. Mexico.  
*Iurgensenii*, Trans. E. S. 1859, t. 20 ♀. Mexico.  
*lysippus* (*tedea*), Esper, Ausl. t. 56 ♀; Cramer, t. 380 ♀; Lucas, P. E. t. 43 ♂:  
 Drury, I. t. 2 ♂; Herbst, t. 284 ♂, t. 59, *bad.* W. Ind.. C. America.  
*montezuma*, Trans. E. S. 1859, t. 21 ♂. Mexico.  
*thia*, Ann. S. E. F. VI. t. 14 ♂. Mexico, Central America.

Genus 12. **ZEONIA.**

*octavius* (*chorinaeus*), Esper, Ausl. t. 48; Herbst, t. 60; Cramer, t. 59; Duncan,  
 t. 24. West Indies.

Genus 13. **NECYRIA.**

*Hewitsonii*, Trans. E. S. 1859, t. 10 ♂. Central America.

**manco**, Trans. E. S. 1859, t. 11 ♀. Central America.

**tapaja**, Trans. E. S. 1859, t. 11 ♂ ♀. Central America.

Genus 14. **LYROPTERYX.**

**cephise**, Menetries, Cat. St. P. t. 3. Central America.

**terpsichore**, Menetries, Cat. St. P. t. 3; Doubleday & W. p. 433. C. America.

Genus 15. **CYRENIA.**

Unrepresented.

Genus 16. **HADES.**

Unrepresented.

Genus 17. **CALYDNA.**

**outhria**, Doubleday & W. t. 70. Central America.

Genus 18. **EURYGONA.**

**gemellus**, Donovan, N. R. t. 93; Godart, E. M. IX. Central America.

**thucydides** (*nycha*, *aribas*), Donovan, India, t. 43; Herbst, XI. p. 388; Hübner-Geyer, f. 279. West Indies.

Genus 19. **THEOPE.**

**ipsia**, ? Central America.

**oceia**, ? Central America.

Genus 20. **PANDEMOS.**

**arcas**, Cramer, t. 179; Herbst, t. 327. Central America.

Genus 21. **MESENE.**

**lampedo**, ? Central America.

**lycoris**, ? Central America.

**telephus** (*alpheia*), Herbst, t. 313 ♂; Cramer, t. 66 ♂; Bdvl. Sp. Gen. t. 20? W. In.

Genus 22. **PANARA.**

**iarbas** (*perditas*), Drury, III. t. 8; Herbst, t. 325. Central America.

**phereclus**, Cramer, t. 178; Herbst, t. 321. Central America.

Genus 23. **AMARYNTHIS.**

Unrepresented.

Genus 24. **SYMMACHIA.**

**domitianus**, Godart, E. M. IX.; Herbst, XI. p. 368. Central America.

Genus 25. **EMESIS.**

**cratida**, ? Central America.

**clearista**, ? Central America.

**lycortas**, ? Central America.

**maeonis**, ? Central America.

**ovidius** (*fatima*), Donovan, India, t. 46 ♂; Cramer, t. 271 ♂ ♀; Herbst, t. 259 ♂ ♀; Doubleday & W. t. 72. West Indies, Central America.

Genus 26. **NYMPHIDIUM.**

**acte**, ? Central America.

**admata**, ? Central America.

**lamis**, Herbst, t. 319; Cramer, t. 335. Central America.

**lycorias**, Hewitson, t. 57 ♂ ♀. Central America.

Genus 27. **ARICORIS**.

Unrepresented.

Genus 28. **BAEOTIS**.

**hisbon**, Herbst, t. 321; Cramer, t. 83. West Indies.

**meno**. ? Central America.

Genus 29. **CHARIS**.

**avius** (*anius*!) Herbst, t. 317; Cramer, t. 92. West Indies.

**cereus** (*pumila, virginiensis*), Bdvl. & Lec. t. 37; Guerin, Icones, t. 81; Morris, Syn. p. 104. Encycl. Britannica. U. States, Mexico, C. America.

**ismena**. Bdvl. MSS. Central America.

Genus 30. **MESOSEMIA**.

**eumenus**, Cramer, t. 92; Herbst, t. 231. West Indies.

**hypheus**, Cramer, t. 92; Herbst, t. 231. West Indies.

**lasus**. ? Central America.

**lamachus**, Hewitson, t. . Central America.

**tenera**, Bdvl. MSS. Central America.

**telegone**. Bdvl. Sp. Gen. t. 21. Central America.

Genus 31. **CREMNA**.

**clinias**. ? Central America.

Genus 32. **LEMONIAS**.

**crispus** (*lucianus*), Herbst, t. 322 ♂ ♀; Cramer, t. 118 ♂ ♀. C. Amer., W. Indies.

**eupolemia**, Godart, E. M. IX. Central America.

**mormo**, Morris, Syn. p. 104; Felder, W. F. M. 1859. United States.

**mella**. ? Mexico.

**sudias**, Hewitson, t. 25 ♂ ♀. Central America.

Genus 33. **LIMNAS**.

**helius**, Cramer, t. 198. West Indies.

**melantho**, Menetries, Cat. St. P. t. 3 ♂, p. 93 ♂ ♀. Central America.

**melander** (*electron*), Herbst, t. 323 ♂ ♀; Menetries, Cat. St. P. t. 4 ♀; Cramer, t. 336; Chenu, f. 361. Central America.

**pixe**, Bdvl. Sp. Gen. t. 20. Mexico, Central America.

Genus 34. **THEMONE**.

Unrepresented.

Genus 35. **SISEME**.

Unrepresented.

Genus 36. **EUNOGYRA**.

Unrepresented.

Genus 37. **PARNES**.

Unrepresented.



Genus 38. **ISAPIS.**

Unrepresented.

Genus 39. **STALACTIS.**

Unrepresented.

Genus—uncertain.

**damis**, Herbst, t. 321; Cramer, t. 70; Chenu, f. 365. West Indies.**eumedes** (*zeurippe*). 3 ? Central America.**margaretta**, White, Z. p. 28. Central America.**zeurippe**, Bdv1. Sp. Gen. t. 20. Mexico, Central America.

## REMARKS ON FAMILY "ERYCINA."

1. Genus uncertain. 2. Genus uncertain. 3. By some supposed to be the ♀ of *Zeurippe*,

14th family LYCÆNA.<sup>1</sup>Genus 1. **EUMÆUS.** (*Eumenia*.)**atala** (*minyas*, *toxa*), Poey, Cent. L. ♂ ♀; Doubleday & W. t. 74 ♂; Guerin, Icones, t. 80 ♂; Encycl. Britt. ♂. United States, West Indies.**deborā** (*Childrenæ* is var.), Hubner-Geyer, f. ; Griffith, t. 112. Mexico.**minyas** (*toxa*), Bdv1. Sp. Gen. t. 21 ♀; Chenu, f. 370; Lucas, t. 79 ♂. West Indies, Mexico, Central America.Genus 2. **EPITOLA.**

Unrepresented.

Genus 3. **PHYTALA.**

Unrepresented.

Genus 4. **OGYRIS.**

Unrepresented.

Genus 5. **ANOPS.**

Unrepresented.

Genus 6. **LOXURA.**

Unrepresented.

Genus 7. **MYRINA.**

Unrepresented.

Genus 8. **AMBLYPODIA.**

Unrepresented.

Genus 9. **DIPSAS.** (*Dispas*!)

Unrepresented.

Genus 10. **IOLAUS.**

Unrepresented.

Genus 11. **THECLA.**

- acis** (*mars, ixion*). Drury, I. t. 1; Herbst, t. 289; Cramer, t. 175. United States, West Indies.
- agrippa**, Herbst, VI. p. 160; Godart, E. M. IX. Central America.
- arsace**, Bdbl. & Lec. t. 32 ♂ ♀; Morris, Syn. p. 97 ♂ ♀. United States.
- amelia**, Herbst, t. 300. West Indies.
- augustus**, Morris, Syn. p. 103; Kirby, t. 3, Harris, f. 108. U. States, Brit. N. A.
- aetolus**, Hübner, Exot. f. . Central America
- acmenis**, Hübner, Exot. f. 223. North America!
- arogeus**, Cramer, t. 333?; Herbst, t. 292?; Hübner-Geyer, f. 727. West Indies.
- auburniana** <sup>2</sup>, Morris, Syn. p. 101; Harris, p. 277 ♂ ♀. United States.
- acadica**, Edwards, Pr. A. N. S. 1862 ♂. British N. A.
- affinis**, Edwards, Pr. A. N. S. 1862. United States.
- aeon**, Lefebure—? t. 16; Herr-S. C. B. Z. M. V. 1862. West Indies.
- auretorum**, Bdbl. A. S. E. F. 1852; Morris, Syn. p. 99. United States.
- battus** (*bathis*!), Herbst, t. 291; Cramer, t. 51. Mexico, Central America.
- beon**, Herbst, t. 290; Cramer, t. 319. West Indies, Central America.
- balliston** <sup>3</sup>, Hübner, Exot. f. 229. North America!
- californica**, Edwards, Pr. A. N. S. Pa. 1862 ♂ ♀. United States.
- celida**, Bdbl.—?; Herr-S. C. B. Z. M. V. 1862. West Indies.
- clothilde**, Edwards, Pr. E. S. Pa. 1863 ♂. United States.
- calanus** (*falacer*), Harris, Syn. p. 276 ♂ ♀; Bdbl. & Lec. t. 29 ♂ ♀; Hübner, Exot. f. ; Morris, Syn. p. 95. United States.
- coelebs**, Herr-S. C. B. Z. M. V. 1862 ♂. West Indies.
- crolus**, Herbst, t. 290; Cramer, t. 333. Central America.
- damon** (*damastus*), Herbst, t. 299; Cramer, t. 390; Morris, Syn. p. 100. U. States.
- dumetorum**, Morris, Syn. p. 100; Bdbl. A. S. E. F. 1852. United States.
- eryphon**, Morris, Syn. p. 100; Bdbl. A. S. E. F. 1852. United States.
- endymion** (*regalis*), Herbst, t. 298; Cramer, t. 72; Duncan, t. 26. Mexico.
- echion**, Godart, E. M. IX.; Esper, Europ. t. 20, Herbst, t. 305. Cent. America.
- genius**, Hübner-Geyer, f. 727. West Indies.
- ganymedes**, Herbst, t. 298; Cramer, t. 40. West Indies.
- grunus**, Morris, Syn. p. 100 ♀; Bdbl. A. S. E. F. 1852. United States.
- hyacinthus**, Herbst, t. 299; Cramer, t. 36. West Indies.
- hugo**, Doubleday & W. t. 74; Herr-S. C. B. Z. M. V. 1862. West Indies.
- halesus** (*dolichos*), Morris, Syn. p. 91 ♂ ♀; Herbst, t. 295 ♂; Cramer, t. 98 ♂; Bdbl. & Lec. t. 25 ♂ ♀. United States.
- hyperici** <sup>4</sup>, Bdbl. & Lec. t. 28 ♂ ♀; Morris, Syn. p. 96. United States.
- irus**, Bdbl. & Lec. t. 31 ♂ ♀; Morris, Syn. p. 97 ♂ ♀. United States.
- inachus** (*tnarchus*!), Herbst, t. 299; Cramer, t. 36. West Indies.
- iroides**, Morris, Syn. p. 100; Bdbl. A. S. E. F. 1852 ♂ ♀. United States.
- janias**, Herbst, t. 302; Cramer, t. 213. Central America.
- liparops**, Morris, Syn. p. 96; Bdbl. & Lec. t. 31. United States.
- laeta**, Edwards, Pr. A. N. S. 1862. British N. A.
- lygdamus**, Doubleday, Entomologist, M. British N. A.
- marsyas** <sup>5</sup>, Lucas, P. E. t. 44 ♀; Duncan, t. 26 ♂; Herbst, t. 296 ♂; Cramer, t. 332 ♂. Mexico, Central America.

**mopsus**, Morris, Syn. p. 102 ♂ ♀; Bdvl. & Lec. t. 34 ♂ ♀; Hubner-Geyer, f. 135. United States.

**M-album** (*psyche* is var.), Bdvl. & Lec. t. 26, 27 ♂ ♀; Morris, Syn. p. 92 ♂ ♀. United States.

**melinus** (*favonius*), Bdvl. & Lec. t. 30 ♂ ♀; Abbot & S. t. 14 ♂ ♀; Morris, Syn. p. 95; Hübner-Geyer, f. 121. United States.

**marius**, Bdvl.—?; Herr-S. C. B. Z. M. V. 1862. West Indies.

**nipha**, Hübner, Exot. 203. United States.

**niphon**, Bdvl. & Lec. t. 33; Morris, Syn. p. 98; Harris, f. 107; Godart, E. M. IX. United States.

**paseo**, Lefebure—?; Herr-S. C. B. Z. M. V. 1862. West Indies.

**pan**, Drury, II. t. 23; Herbst, t. 288. West Indies.

**poeas** (*beon*), Morris, Syn. p. 103; Bdvl. & Lec. t. 35 ♂ ♀; Hübner, Exot. f. United States, Mexico, Central America.

**Richardsonii**, Bdv. A. S. E. F. British N. A.

**syncellus**, Herbst, t. 287; Cramer, t. 334. Central America.

**smilacis**, Morris, Syn. p. 98; Bdvl. & Lec. t. 33. United States.

**silenus** <sup>6</sup>, (*favonius*, *humuli*), Bdvl. & Lec. t. 30; Hübner-Geyer, f. 111; Harris, t. 4, p. 276 ♂ ♀. United States.

**simaethis**, Drury, I. t. 1; Herbst, t. 289; Hübner-Geyer, f. 423. U. S., W. Indies.

**sito**, Bdvl. Sp. Gen. t. 22. Mexico, Central America.

**strigosa**, Morris, Syn. p. 100; Harris, p. 276. United States.

**selenissa** (*silenus*, *agis*, *phaleros*), Drury, III. t. 26 ♂; Cramer, t. 282; Herbst, t. 292. Central America.

**sylvinus**, Bdvl. A. S. E. F. 1852 ♂ ♀; Morris, Syn. p. 99. United States.

**saepium**, Bdvl. A. S. E. F. 1852; Morris, Syn. p. 99. United States.

**tollus**, Bdvl.—?; Herr-S. C. B. Z. M. V. 1862. West Indies.

**viridis**, Edwards, Pr. A. N. S. 1862. United States.

#### Genus 12. **LYCÆNA.**

**ammon**, Lefebure—?; Herr-S. C. B. Z. M. V. 1862. West Indies.

**astenides**, Bdvl.—?; Herr-S. C. B. Z. M. V. 1862. West Indies.

**amica**, Edwards, P. E. S. Pa. 1863 ♂. British N. A.

**acmon** (*antaegon*), Doubleday & W. t. 76; Bdvl. A. S. E. F. 1852 ♀. U. States.

**anna**, Morris, Syn. p. 329 ♂ ♀; Edwards, Pr. A. N. S. 1861 ♂ ♀. U. States.

**aquila** (*Franklinii*), Ross, II. P. E. f. ; Bdvl. Icones, t. 12. British N. A., Arctic America.

**Behrii**, Edwards, Pr. A. N. S. 1862 ♂ ♀. United States.

**comyntas**, Harris, p. 275 ♂ ♀; Bdvl. & Lec. t. 36; Morris, Syn. p. 83 ♂ ♀. U. S.

**cassius**, Herbst, t. 320 ♀; Cramer, t. 23 ♀; Swainson, t. 133 ♂ ♀. West Indies, Central America.

**fuliginosa**, Morris, Syn. p. 330 ♂ ♀; Edwards, Pr. A. N. S. 1861 ♂ ♀. U. States.

**hanno** <sup>7</sup> (*ubaldus*, *flenus*, *pseudoptiles*), Bdvl. & Lec. t. 35 ♂ ♀; Poey, C. L. ♂ ♀; Herbst, t. 312 ♂; Cramer, t. 390. United States, Mexico, W. Indies, Central America.

**hamo**, Herr-S. C. B. Z. M. V. 1862. West Indies.

**heteronea**, Bdvl. A. S. E. F. 1852. United States.

- isophthalma**, Herr-S. C. B. Z. M. V. 1862 ♂. West Indies.  
**lygdamus**, Doubleday, Entomologist, M. British N. A.  
**lucia**, Harris, p. 275 ♂ ♀; Morris, Syn. p. 90; Kirby, IV. t. 3 ♂. U. S., Brit. N. A.  
**neglecta** (*pseudargiolus*), Bdvl. & Lec. t. 36 ♂ ♀; Edwards, Pr. A. N. S. Pa. 1862  
 ♂ ♀. United States, British N. A.  
**pembina**, Edwards, P. A. N. S. 1862 ♂ ♀. British N. A.  
**pseudargiolus** (*argiolus*), Abbot & S. t. 15 ♂ ♀. United States.  
**pheres**, Bdvl. A. S. E. F. 1852. United States.  
**Scudderii**, Edwards, Pr. A. N. S. Pa. 1862 ♂ ♀; Morris, p. 329 ♂ ♀. Brit. N. A.  
**shasta**, Edwards, Pr. A. N. S. Pa. 1862 ♂ ♀. United States.  
**theonus**, Lefebure?, t. 16; Herr-S. C. B. Z. M. V. 1862. West Indies.

Genus 13. **DAMIS.**

Unrepresented.

Genus 14. **CHRYSOPHANES.**

- americanus** (*phlaeas*), Harris, p. 273; Morris, Syn. p. 91; Bdvl. & Lec. p. 123.  
 United States, British N. A.  
**dorcas**, Morris, Syn. p. 90; Kirby, IV. t. 2: Doubleday & W. t. . U. States.  
 British N. A.  
**epixanthe**, Bdvl. & Lec. t. 38, p. 127 ♂ ♀; Morris, Syn. p. 85. United States.  
**thæ**, Encycl. Britt. f. ♂ ♀; Guerin, Icones, t. 81 ♂ ♀; Bdvl. & Lec. t. 38 ♂  
 ♀; Morris, Syn. p. 89 ♂ ♀. United States, Canada.  
**tarquinius** (*crataegi*), Donovan, I. India, t. 44 ♂; Doubleday & W. t. 77; Bdvl.  
 & Lec. t. 37 ♂; Morris, Syn. p. 85 ♂ ♀; Scudder, P. Essex. I. 1863 ♀.  
 United States, British N. A.

Genus 15. **ZERITIS.**

Unrepresented.

Genus 16. **LUCIA.**

Unrepresented.

Genus 17. **MILETUS.**

Unrepresented.

Genus 18. **PENTILA.**

Unrepresented.

Genus 19? **POLYOMMATUS** (*Argus*).

- amyntula**, Morris, Syn. p. 87 ♂ ♀; Bdvl. A. S. E. F. 1852 ♂ ♀. United States.  
**anthelle**, Bdvl. MSS. British N. A.  
**amicetus**, Bdvl. MSS. British N. A.  
**arota**, Morris, Syn. p. 86 ♂ ♀; Bdvl. A. S. E. F. 1852 ♂ ♀. United States.  
**antiacis**, Morris, Syn. p. 90 ♂ ♀; Bdvl. A. S. E. F. 1852 ♂ ♀. United States.  
**antægon** 9, Morris, Syn. p. 87; Doubleday & W. t. 76; Bdvl. A. S. E. F. 1852  
 ♂ ♀. United States.  
**antibubastes**, Hubner, Exot. f. 99. United States.  
**Donzelli**, ? North America!  
**edna**, Doubleday & W. t. 76. United States.  
**euptyulus**, Hubner, Exot. f. West Indies.

**exilis**, Bdbl. A. S. E. F. 1852 ♂; Morris, Syn. p. 87. United States.  
**enoptes**, Bdbl. A. S. E. F. 1852 ♂; Morris, p. 87 ♂. United States.  
**gorgon**, Morris, Syn. p. 86; Bdbl. A. S. E. F. 1852 ♂ ♀. United States.  
**hypophlæas**, Morris, Syn. p. 84; Bdbl. A. S. E. F. 1852. United States.  
**heloïdes**, Morris, Syn. p. 86; Bdbl. A. S. E. F. 1852 ♂. United States.  
**heteronea**, Morris, Syn. p. 89 ♂ ♀; Bdbl. A. S. E. F. 1852 ♂ ♀. United States.  
**icarioides**, Morris, Syn. p. 87; Bdbl. A. S. E. F. 1852 ♂ ♀. United States.  
**porsenna** ♂, Doubleday & W. t. ; Scudder, Pr. Essex I. 1863 ♂. U. S., Brit. N. A.  
**pheres**, Morris, Syn. p. 89; Bdbl. A. S. E. F. 1852 ♂ ♀. United States.  
**piasus**, Morris, Syn. p. 89 ♂ ♀; Bdbl. A. S. E. F. 1852 ♂ ♀. United States.  
**sæpiolus**, Morris, Syn. p. 88 ♂ ♀; Bdbl. A. S. E. F. 1852 ♂ ♀. United States.  
**xerces**, Morris, Syn. p. 88 ♂ ♀; Bdbl. A. S. E. F. 1852 ♂ ♀. United States.  
**xanthoides**, Morris, Syn. p. 86; Bdbl. A. S. E. F. 1852. United States.

#### REMARKS ON FAMILY "LYCÆNA."

1. The genera *Thecla*, *Lycæna*, *Polyommatus*, *Argus*, *Chrysophanes*, &c., are partly confused, the species under these headings irregularly classified, and their specific characters faintly defined. Hence the arrangement and grouping of species is unreliable. 2. *T. auburniana* is probably identical with *T. smilacis*. 3. *T. balliston* is supposed to be identical with *T. falacer*. 4. *T. hyperion* is supposed to be a variety of *T. favonius*. 5. The coloring of Lucas' figure differs much from that of Cramer and Herbst: the reflexion of light probably displays variable colors in this insect. 6. Boisduval and Leconte's figures are unreliable. 7. The figures of cited authors do not quite agree in form nor in coloring; Herbst's and Cramer's cannot be depended on; the ♀ in Bdbl. & Lec. is incorrectly marked, and too dark and too brown in coloring. 8. Supposed to be the ♂ of *C. tarquinius*. 9. Probably identical with *Lycæna acmon*.

#### 15th family "HESPERIA." 1

##### Genus 1. PYRRHOPYGA.

**jonas**, Felder, W. E. M. 1859 ♀. Mexico.  
**phidias** (*iphis*, *acastus*), Cramer, t. 41 ♂, 199 ♀; Godart, E. M. IX. C. America.  
**scylla**, Menetries, Cat. St. P. t. 4 ♂. Central America.  
**socrates**, Menetries, Cat. St. P. t. 4 ♂. Central America.

##### Genus 2. ERYCIDES.

**mancinus**, Herr.-S. C. B. Z. M. V. 1862. West Indies.  
**vulcanus**, Cramer, t. 245. West Indies.

##### Genus 3. GONIURIS (*Eudamus*).

**brachius** (*doryssus*), Hubner-Geyer, f. 609; Swainson, t. 48 ♀. Central America.  
**cariosa** (*santiago*), Herr.-S. C. B. Z. M. V. 1862. West Indies.

**catillus**, Cramer, t. 260; Godart, E. M. IX. U. States, Mexico, Cent. America.  
**decussata**, Menetries, Cat. St. P. t. 5 ♂. West Indies.  
**eudoxus**, Cramer, t. 366; Godart, E. M. IX. Central America.  
**eurycles**, Hübner, Exot. f. ; Godart, E. M. IX. Central America.  
**habana**, Herr.-S. C. B. Z. M. V. 1863. West Indies.  
**lycidas**, Morris, Syn. p. 106; Bdvl. & Lec. t. 71; Abbot & S. t. 20 ♀. U. States.  
**metophis**, Bdvl. Sp. Gen. t. 13; Godart, Ency. M. IX. Central America.  
**proteus**, Cramer, t. 260; Bdvl. & Lec. t. 69; Abbot & Sm. t. 18 ♂; Chenu. f. 374.  
 United States, Mexico, West Indies, Central America.  
**tarchon**, Hübner, Exot. f. . West Indies, Central America.

Genus 4. **GONILOBA** (*Eudamus*).

**antoninus**, Morris, Syn. p. 113; Godart, E. M. IX. United States, British N. A.  
**anaphus**, Cramer, t. 178; Godart, E. M. IX. Central America.  
**arcalaus**, Cramer, t. 391. Central America.  
**bathyllus**, Harris, p. 312; Morris, Syn. p. 113; Bdvl. & Lec. t. 74 ♂ ♀; Abbot &  
 S. t. 22 ♂ ♀. United States.  
**cellus**, Bdvl. & Lec. t. 73; Morris, Syn. p. 105. United States.  
**corydon**, Fabricius,—? West Indies.  
**celænus**, Cramer, t. 393. Central America.  
**dubius**, Cramer, t. 354; Godart, E. M. IX. West Indies.  
**egens** (*maysi*), Herr.-S. C. B. Z. M. V. 1862; Lefebure,—? West Indies.  
**exadeus** (*socus*), Cramer, t. 260; Doubleday & W. t. 80. Mexico, Central Amer.  
**fulgurator** (*mercatus*), Cramer, t. 284; Godart, E. M. IX. Central America.  
**idas** (*mercurius*), Cramer, t. 260, Godart, E. M. IX. West Indies, Cent. Amer.  
**lucæ**, ? West Indies.  
**Lesuerii**, ? United States.  
**malefida** (*xague*), Herr.-S. C. B. Z. M. V. 1862. West Indies.  
**olyntus**, Bdvl. & Lec. t. 75; Morris, Syn. p. 113. United States.  
**phocion**, Godart, E. M. IX. West Indies, Central America.  
**sumadue**<sup>2</sup>, Herr.-S. C. B. Z. M. V. 1863. West Indies.  
**talus** (*ausonius*), Cramer, t. 176; Godart, E. M. IX. West Indies.  
**tityrus** (*clarus*), Cramer, t. 41 ♂; Harris, 5 ♂; Bdvl. & Lec. t. 72; Abbot & S.  
 t. 19 ♀. United States.  
**yuccæ**<sup>3</sup>, Morris, Syn. p. 113 ♂ ♀; Bdvl. & Lec. t. 70 ♂ ♀. United States.

Genus 5. **ISMENE**.

Unrepresented.

Genus 6. **PHAREAS**.

**aecæ** (*arcas*), Cramer, t. 343. Central America.  
**loxus**, Doubleday & W. t. 80. Central America.

Genus 7. **PYRGUS**.

**arsalte** (*niveus*), Cramer, t. 22; Hübner, Exot. f. Central America.  
**cerialis** (*orcus*), Cramer, t. 392. Central America.  
**orcus** (*oilæus*, *syrichtus*!), Westw. & H. t. 38; Morris, Syn. p. 121; Cramer, t. 334.  
 United States, West Indies, Mexico, Central America.

**textor**, Hübner-Geyer, f. 515. United States.

**tryxus**, Cramer, t. 334; Hübner, Exot. f. . Central America.

Genus 8. **NISONIADES** (*Thanaos*).

**arcas** (*flyas, philemon*), Drury, I. t. 19; Cramer, t. 328. West Indies.

**brizo**, Harris, p. 309; Morris, Syn. p. 114 ♂ ♀; Bdl. & Lec. t. 66 ♂ ♀. United States, Canada.

**catullus** 4, Abbot & S. t. 24 ♂ ♀; Donovan, India, t. 50. United States, W. Indies.

**cervantes**, Feyer, Beitr. t. 417. United States.

**Herminierii**, Morris, Syn. p. 115; Godart, E. M. IX. United States.

**juvenalis**, Harris, p. 309; Abbot & S. t. 21 ♂ ♀; Bdl. & Lec. t. 65 ♂ ♀. U. States.

**otreus**, Cramer, t. 328. West Indies.

**otrillo**, Herr-S. C. B. Z. M. V. 1863 ♂ ♀. West Indies.

**persius** (*juvenalis*), Scudder, Pr. Essex I. 1863 ♂ ♀. United States.

**philemon**, Doubleday & W. t. 19. West Indies.

**tristis**, Morris, Syn. p. 115; Bdl. A. S. E. F. 1852. United States.

**zarucco**, Herr-S. C. B. Z. M. V. 1863 ♂. West Indies.

Genus 9. **CYCLOPIDES**.

Unrepresented.

Genus 10. **PAMPHILA** 5 (*Hesperia*).

Genus 11. **ACHYLIODES**.

**erosus**, Hübner, Exot. f. . Central America.

Genus 12. **EUSCHEMON**.

Unrepresented.

Genus 13. **HESPERIA** (*Pamphila*).

**amphion**, Hübner, Exot. f. . West Indies.

**agricola**, Morris, Syn. p. 108; Bdl. A. S. E. F. 1852 ♂. United States.

**athenion**, Hübner, Exot. f. . Central America.

**accius** (*origenes?*), Abbot & Sm. t. 23 ♂ ♀. United States.

**arpa**, Morris, Syn. p. 117; Bdl. & Lec. t. 68 ♂ ♀. United States.

**brettus**, Morris, Syn. p. 118; Bdl. & Lec. t. 75 ♂ ♀. U. States, Mexico, C. Am.

**buleuta**, Bdl. & Lec. t. 67 ♂ ♀; Morris, Syn. p. 117 ♂ ♀. United States.

**campestris**, Morris, Syn. p. 108; Bdl. A. S. E. F. 1852. United States.

**clonius**, Cramer, t. 80; Godart, E. M. IX. Central America.

**cernes**, Morris, Syn. p. 117 ♂; Bdl. & Lec. t. 76 ♂; Harris, p. 316 ♂. United States, Canada.

**comma**, Wood, t. 3; Esper, Eur. t. 23. United States.

**conspicua**, Edwards, Pr. E. S. Pa. 1863, t. 5 ♀. United States.

**delaware**, Edwards, Pr. E. S. Pa. 1863, t. 5 ♂ ♀. United States.

**egeremet** (*otho*), Bdl. & Lec. t. 77 ♂ ♀; Scudder, Pr. Essex, I. 1863 ♂ ♀. U. S.

**huron**, Edwards, Pr. E. S. Pa. 1863, t. 1 ♂ ♀. United States.

**hiarbas** (*celsus*), Cramer, t. 18; Donovan, India, t. 52. West Indies.

**hobomok**, Morris, Syn. p. 110 ♂ ♀; Harris, f. 137, p. 314 ♂ ♀. United States.

**logan**, Edwards, Pr. E. S. Pa. 1863, t. 1 ♂. United States.

- Leonardus**, Morris, Syn. p. 110 ♂ ♀; Harris, f. 138, p. 314 ♂ ♀. United States.  
**mystic**, Scudder, Pr. Essex, I. 1863 ♂ ♀; Edwards, Pr. E. S. Pa. 1863, t. 1 ♂ ♀.  
 United States.  
**mandan**, Edwards, Pr. E. S. Pa. 1863, t. 5 ♂ ♀. United States.  
**mesogramma**, Poey, Cent. L. ♂ ♀; Godart, E. M. IX. West Indies.  
**numitor** <sup>6</sup> (*puer. marginatus*), Donovan, India, t. 44; Hübner-Geyer, f. 275; Morris, Syn. p. 120; Harris, f. 131. United States.  
**memorum**, Bdvl. A. S. E. F. 1852 ♂; Morris, Syn. p. 107 ♂. United States.  
**nero**, Godart, E. M. IX. West Indies.  
**ocola**, Edwards, Pr. E. S. Pa. 1863 ♂ ♀. United States.  
**omaha**, Edwards, Pr. E. S. Pa. 1863 ♂. United States.  
**pontiac**, Edwards, Pr. E. S. Pa. 1863 ♂ ♀. United States.  
**papinianus**, Poey, Cent. L. ♂. West Indies.  
**pratincola**, Morris, Syn. p. 108 ♂ ♀; Bdvl. A. S. E. F. 1852 ♂ ♀. United States.  
**pustula**, Hubner-Geyer, f. 625. United States.  
**Peckius**, Morris, Syn. p. 120; Kirby, t. 4. Harris, p. 315 ♂ ♀. U. S., Brit. N. A.  
**phylæus**, Morris, Syn. p. 118 ♂ ♀; Bdvl. & Lec. t. 78 ♂ ♀. U. States. W. Ind.  
**rurea**, Edwards, P. A. N. S. Pa. 1860 ♂ ♀. United States.  
**ruvicola**, Morris, Syn. p. 108; Bdvl. A. S. E. F. 1852 ♂. United States.  
**sylvanoides**, Morris, Syn. p. 107 ♂ ♀; Bdvl. A. S. E. F. 1852 ♂ ♀. U. States.  
**sabuleti**, Morris, Syn. p. 109 ♂ ♀; Bdvl. A. S. E. F. 1852 ♂ ♀. United States.  
**sylvanus**, Wood, t. 3; Esper, Europ. t. 36. United States.  
**thaumas** <sup>7</sup> (*origenes*), Morris, Syn. p. 619 ♂ ♀; Donovan, India, t. 48; Esper, Eur. t. 36, 98. United States.  
**uncas**, Edwards, Pr. E. S. Pa. 1863, t. 5 ♂ ♀. United States.  
**verna**, Edwards, Pr. E. S. Pa. 1862 ♂ ♀. United States.  
**vibex**, Hübner, Exot. f. 685. West Indies.  
**vitellius** <sup>8</sup> (*Druryi, phocion, bucephalus*), Bdvl. & Lec. t. 75 ♂ ♀; Abbot & Sm. t. 17 ♂ ♀. United States, Mexico, Central America.  
**vestris**, Morris, Syn. p. 109; Bdvl. A. S. E. F. 1852. United States  
**vialis**, Edwards, Pr. A. N. S. 1862. United States.  
**wyandot**, Edwards, Pr. E. S. Pa. 1863, t. 5 ♂ ♀. United States.  
**zarox**, Hübner, Exot. f. 133. Mexico.  
**zabulon**, Bdvl. & Lec. t. 76; Morris, Syn. p. 116. United States.  
**zephodes**, Fabricius,—? Hübner, Exot. f. . West Indies.

## Genus—uncertain.

- ahaton** (*cernes*), Morris, Syn. p. 111 ♂ ♀; Harris, f. 140 ♂ ♀; Scudder, Essex. 1863 ♂ ♀. United States.  
**cassander**, Fabricius—? West Indies.  
**cornelius**, Latreille—? West Indies.  
**cæspitatis**, Morris, Syn. p. 121; Bdvl. A. S. E. F. 1852. United States.  
**centaureæ**, Herr. S. Europ. f. 1a3. Labrador.  
**ethlius**, Cramer, t. 392. West Indies.  
**ericetorum**, Morris, Syn. p. 122 ♂ ♀; Bdvl. A. S. E. F. 1852 ♂ ♀. U. S., Mexico.  
**exadeus**, Cramer, t. 260. Central America.  
**hegon**, Scudder, Essex. 1863 ♀. United States.



- Lesueur**, Morris, Syn. p. 118; Godart, E. M. IX. United States, West Indies.  
**livida** (*Savigny*), Hübner, Exot. f. ; Latreille—? West Indies.  
**metae**, Scudder, Pr. Essex I. 1863. United States.  
**massasoit**, Scudder, Pr. Essex I. 1863. United States.  
**metazomet**, Morris, Syn. p. 111; Harris, p. 317 ♂ ♀. United States.  
**monoco**, Scudder, Pr. Essex I. 1863 ♂ ♀. United States.  
**manataaqua** (*cernea*), Scudder, Pr. Essex I. 1863 ♂ ♀; Harris, p. 316 ♂. U. States.  
**napa**, Edwards,—? United States.  
**nero**, Godart, E. M. IX. West Indies.  
**origenes** 9, Donovan, India, t. 48. United States?  
**oneko**, Scudder, Pr. Essex I. 1863. United States.  
**otho**, Abbot & S. t. 16 ♂ ♀. United States.  
**pocahontas**, Scudder, Pr. Essex I. 1863. United States.  
**paniscus**, Esper, Eur. t. 28; Wood, t. 3. British North America.  
**panoquin**, Scudder, Pr. Essex I. 1863. United States.  
**ruralis**, Morris, Syn. p. 121; Bdv1. A. S. E. F. 1852. United States.  
**samoset**, Scudder, Pr. Essex I. 1863. United States.  
**scriptura**, Morris, Syn. p. 121, Bdv1. A. S. E. F. 1852. United States.  
**sanguinea**, Hubner-Geyer, f. 613. United States.  
**sassacus** (*rurea*), Morris, Syn. p. 110 ♀; Harris, p. 315 ♀; Scudder, Pr. Essex I. 1863 ♂ ♀; Edwards, Pr. A. N. S. Pa. 1862. United States.  
**verna**, Edwards, Pr. A. N. S. Pa. 1862 ♂ ♀. United States.  
**vialis**, Edwards, Pr. A. N. S. Pa. 1862. United States.  
**wamsutta** (*Pechius*), Morris, Syn. p. 111 ♂; Harris, f. 141. United States.  
**wingina**, Scudde-, Pr. Essex I. 1863. United States.  
**yrika**, Edwards,—? United States.  
**zephodes**, Fabricius,—?; Hübner, Exot. f. . West Indies.

#### REMARKS ON FAMILY "HESPERIA."

1. No reliable systemization of this family has been attempted by the compiler of this catalogue. A searching monograph on the "Hesperians," by some capable hand would be very desirable. Doubleday left this portion of his work unfinished, and Westwood does not seem to have attended to it with necessary care and patient investigation. 2. May prove a variety of *G. talus*. 3. Walker (in British Museum Catalogue) supposes this species too closely allied with the "Castinadæ" to be continued among the "Hesperians." 4. Subject to variation. Many of the "skippers" are so similar in form and coloring that their sexes can only be determined with much difficulty; numerous varieties will probably for a long time continue catalogued as distinct species. 5. This genus is so unsettled and mixed up with that of *Hesperia* proper, that it has seemed best for the present to refer the individuals that occasionally stand under this generic head to

the genus *Hesperia*. 6. Donovan's figure is not quite reliable. 7. Confused and uncertain. 8. Confusion here; the figures of Boisduval and Leconte and those of Abbot and Smith indicate different species. 9. Of doubtful "habitat."

## ADDENDA.

## IN INDEX TO AUTHORITIES.

Encyclopædia Britannica, edition 1855; article and plates on "Entomology."

*Guerin*.—"Iconographie du Regne Animal"; part on Insects.

*Meigen*.—"Systematische Beschreibung der Europäischen Schmetterlinge."

*Scudder*.—In "Proceedings of Essex Institute," Salem; 1863.

*Stoll*.—Supplement to Cramer's "Papillon Exotiques."

"Wiener Entomologische Monatschrift."

*Westwood & Humphrey*.—"British Butterflies."

## ADDITIONAL SPECIES, &amp;C.

**Papilio machaon**. Descr. by European authorities. British North America.

**Euterpe bithys**, Hübner-Geyer, f. 467. Central America.

**Swainsonii**, Griffith, t. 38. Central America.

**Pieris amathonte**, Cramer, t. 116 ♂, 3 ♀. Central America.

**aripa**, Bdv. Sp. Gen. p. 528. Central America.

**demophile** (*molphea*), Clerck, t. 28. Central America.

**pyrrha** (*pamela*), Cramer, t. 63 ♂, 319 ♀; Lucas, t. 32. Central America.

**philete**, Bdv. Sp. Gen. p. 550; Fabr. Syst. E. III. Central America.

**pandosia**, Hewitson, t. 14, 39. Central America.

**Colias nastes** (*phicomene* is synonymn). British N. A.

## CORRIGENDA.

## IN INDEX TO AUTHORITIES.

*Martyn*.—"Psyche—figures of nondescript Lepidopterous Insects." London.

In 1st family, genus 2, for "Orthoptera" read "Ornithoptera."

To *Gonepteryx rhamni*, add "Doubtful as American; *G. Lorquini*, a very similar insect, has probably been mistaken for this species.

## ORTHOPTEROLOGICAL CONTRIBUTIONS.

BY P. R. UHLER.

## GRYLLODEA.

## GRYLLOTALPA, Lat.

*G. cultriger*.

Cinnamon-brown, rather less elongated than *G. longipennis* Scudder. The head fuscous above; ocelli very large, oblong-oval, placed obliquely, diverging posteriorly; palpi, antennæ and cheeks pale cinnamon-yellow. Thorax of the ordinary form. Tegmina broad, long, covering the dorsum of the four basal segments of the abdomen, the anterior flap with no transverse nervures between the obliquely longitudinal ones; wings reaching the tip of the cerci, which are long and very slender. The anterior portion of the intermediate coxæ and the fossorial dactyls almost to their bases, and a few prominences upon the anterior coxæ, black; the dactyls shorter, broader and blunter than in *G. longipennis*. The process of the anterior coxæ is rather long, broad, acute at tip, cultrate; the posterior tibiæ with a row of stout spines, beginning at the middle and becoming gradually longer to the tip.

Lengths 27 millims. Length of thorax 8 millims. Posterior tibia  $6\frac{1}{2}$  millims.

*Hab.* El Paso.

The unique specimen, a male, was kindly presented to me by Henry Ulke, Esq.

## PHYLLOPALPUS, nov. gen.

Head depressed, broader than the thorax, front a little convex between the antennæ; eyes large, prominent, subglobose; ocelli not apparent; antennæ at least twice the length of the body, almost capillary, situated upon the inferior line of the eyes, a little between them, the basal joint cylindrical, longer than broad; maxillary palpi large, the joints hairy, the apical one much longer than the others, very broad, lamelliform, oval, the preceding joint subtriangular, much broader than the middle one, remaining joints subcylindrical, the basal ones glabrous: thorax subcylindrical, narrower anteriorly, the anterior and posterior margin truncate, the lateral margin broadly recurved; scutellum inconspicuous; tegmina as long or longer than the body, wings nearly

or quite the same length as the tegmina : ovipositor-sheath compressed, curved upwards ; abdomen small, nearly or quite concealed by the tegmina ; cerci slender, legs rather slender, anterior tibiæ compressed at base and furnished with a tympanum, basal joints of all the tarsi very stout, cylindrical, longer than the two others together, the middle joint very short, hairy, posterior tibiæ with a row of very long stout spurs each side behind, the basal tarsal joint of the hind legs armed with a long, stout, curved spur on the under side.

***P. pulchellus.***

Shining blackish brown ; head minutely punctured and together with the thorax bright crimson red ; antennæ yellow, hairy, blackish at base, palpi blue-black, eyes brown ; thorax glabrous, rather more coarsely punctured than the head, especially at the base. the lateral recurved margin pale yellow, the middle impressed line abbreviated ; tegmina chestnut brown, the sides darker, with paler nervures ; abdomen blackish, cerci, ovipositor, coxæ, trochanters and legs pale yellow, tarsal joints and nails tipped with blackish.

Length to tip of tegmina 7 millims. Ovipositor  $3\frac{1}{2}$ . Post. femur 5 millims.

It inhabits Prince George County, Maryland ; commencing to be fully winged about the middle of August. It is found quite abundantly amongst the grass and low bushes near ditches, and jumps about with great rapidity ; the great length of the tarsal spurs no doubt greatly assisting it in so doing. I have also a female in my collection which was taken near the city of New York.

**OROCHARIS, nov. gen.**

Head narrower than the base of the thorax ; cranium more or less excavated ; face very oblique ; front depressed between the eyes, produced at the upper line of the antennæ and convex between the antennæ ; ocelli approximate, placed triangularly upon the depression of the front ; eyes large, oval, prominent ; antennæ situated within the lower line of the eyes, and a little between them, setaceous, almost capillary, more than thrice the length of the body ; maxillary palpi having the basal joints short, the third joint longest, cylindrical, the fourth shorter than the fifth, slightly thickened at tip, apical joint somewhat dolabriform, obliquely truncated. Thorax narrower than the tegmina, truncated anteriorly, middle line impressed. Tegmina much

longer than the abdomen, very regularly reticulated, tapering posteriorly, wings (when fully developed) much longer than the tegmina. Anterior tibiæ thickened, femora short, robust. Tarsi of the two pairs of anterior feet with the basal joints dilated, the middle joint about two-thirds the length of the basal one, the apical joint very slender, nearly as long as the two preceding ones together. Spurs at the apex of the basal joint acutely recurved, longer than the middle joint. Ovipositor curved, of the normal form; cerci rather long, and slender.

**O. saltator.**

Pale clay-yellow, lustrous; head with a fuscous line behind the eyes, the upper side of which is margined with a pale streak, face and cheeks pale, almost white, dotted with fuscous, front and vertex more or less clouded with fuscous, antennæ and palpi annulated and the eyes obliquely striated with fuscous, upper surface of the head covered with short pile. Thorax pilous, with a more or less depressed, irregular, longitudinal fuscous line upon the middle and a broad one each side below which touches the latero-dorsal margins, corresponding to and continuous with that upon the head, the inferior marginal surface pale, sides flat, smooth, subquadrate, the angles moderately rounded. Tegmina tapering towards the tip, the apex triangularly rounded and reaching almost to the tip of the cerci, the base more or less tinged with fuscous and the nervures with fuscous interruptions, dorso-lateral nervure pale yellowish, the lateral flaps broader than the depth of the abdomen and almost enveloping it, with the nervures of this part fuscous at base. Tergum polished, darker than the other parts of the body, ovipositor pitchy at back and tip, cerci very hairy, sprinkled with fuscous, tarsal joints more or less fuscous at base and tip, spines of the posterior tibiæ long, slender, tipped with fuscous, nine large ones each side and a number of shorter ones, basal joint of the posterior tarsi with a row of gradually increasing spines each side above, three in number and two long spurs at the apex, which project beyond the tip of the second joint and are curved upward at tip.

Length to tip of abdomen 14 millims. Tegmina  $14\frac{1}{2}$  millims. Ovipositor 11 millims. Posterior femur 9 millims ♀. Length to tip of abdomen 12 millims. Tegmina  $11\frac{1}{2}$  millims. Posterior femur 7 millims ♂.

This species is found in great abundance upon hedges of *Cratægus*,

near the city of Baltimore, during the months of September and October. The male is rather smaller than the female, his posterior legs are shorter and the veins of the dorsal area of the tegmina being very few, the fuscous interruptions are also much less numerous. Specimens have also occasionally been taken upon the Oak.

**HAPITHUS**, nov. gen.

Form short and robust, the males a little more elongated. Head almost globose, narrower than the base of the thorax, hairy above, face very oblique, cranium very convex, front with a broad longitudinal ridge; eyes globose, deeply seated, ocelli small, placed as in *Nemobius*, Serv. Antennæ thrice the length of the body to tip of abdomen, setaceous, becoming capillary at the tip, situated within the lower line of the eyes, a little between them, the basal joint very much thicker than the succeeding ones, cylindrical. Maxillary palpi stout, longer than the face, the apical joint as long as the 2d and 3d together, subdolariform at tip, moderately obliquely truncated, the third and fourth cylindrical, the former about one-third longer than the fourth. Thorax clothed with long hairs above, with no carina at the superior boundary of the sides, the inferior margins of the sides strongly rounded, and the sides a little depressed anteriorly and posteriorly interior to the edge, the dorsal surface somewhat rounded, its anterior margin truncated. Tegmina not covering the apex of the abdomen, the reticulation of the discoidal field very ramose ♂, and the apical portion likewise in the ♀, the latero-dorsal nervure very carinately elevated, the longitudinal nervures beneath it also very prominent, wings rudimental. Cerci very long, slender, clothed with very long hairs; the ovipositor of the normal shape, slender, curved upwards. Legs very hairy, the posterior femora robust, compressed, the anterior femora very slightly compressed below the knee, with the tympanal cavity small and inconspicuous, posterior tibiæ with long slender spines which are curved at the tip, and between them each side is a continuous row of short denticles; spurs of the basal joint of the posterior tarsi at least 6 in number, the apical one each side reaching the tip of the second joint, the last joint slender.

**H. agitator.**

Pale dull fulvous, face yellowish-white, dotted and sprinkled with fuscous points, cranium fulvous, densely clothed with yellowish pubes-

cence; eyes pale brown; ocelli white, the basal joints of the antennæ dotted with brown; palpi spotted with brown, the apex of the terminal joint fuscous. Thorax densely covered with brownish-yellow hair, the lateral, anterior and posterior margins pale, the edge of the two latter sometimes pointed with brown. Tegmina barely reaching the tip of the antepenultimate segment, having the apex triangular upon the exterior flap and rounded upon the interior one, the nervures with a tinge of ferruginous-yellow, occasionally marked with brown, the longitudinal nervure of the anterior margin ♀ very stout, parallel, with very few cross-nervures, those of the disk very irregular, and not very prominent, the lateral bounding nervure white, the lateral flaps broad, embracing the abdomen in its whole depth at base. Tergum closely sprinkled with reddish-brown, and spotted with fuscous at sides and towards the apex; venter yellow, sometimes spotted with brown; ovipositor with a narrow brown line extending along its length, the tip piceous. Legs hairy, dotted with brown, the apices of the tarsal joints fuscous, spines of the posterior tibiæ about 10 in number, shining yellow, and fuscous at tip, the apex of the posterior femora dusky.

Length to tip of abdomen 10 millims. Ovipositor 8 millims. Posterior femur 8 millims. Posterior tibia  $8\frac{1}{2}$  millims.

It inhabits Grape vines and dense shrubbery near Baltimore, and is found fully developed about the middle of September. The description is taken from specimens of several months standing; the living insect is brighter and lighter in its coloring. The male is very scarce, only a single specimen has occurred to me in several years collecting.

#### GRYLLUS, Linn.

##### *G. personatus.*

Pale yellow, form of *G. neglectus*, Scudder. Head minutely shagreened above, yellow, with some vestiges about the antennæ and a short transverse band between the eyes, black, the cranial surface is covered by a large black spot, which is incised anteriorly, each side of the middle, and above each eye, immediately below the middle ocellus the surface is indented, forming a short transverse impression; eyes black, surrounded with a narrow yellow edge; cheeks prominent; tips of the mandibles piceous; basal joints of the antennæ more or less brownish. Thorax black upon the dorsal surface, the sides yellow, with a blackish spot above the middle, the very narrow elevated sub-

margins piceous; the middle dorsal line strongly indented. Tegmina dusky-fuscescent, whitish yellow at base and sides, reaching to the penultimate segment, the nervures deep brown, excepting upon the sides, where they are yellow; wings of about the same length as the tegmina. Tergum black, the edges of the segments and a few broader stripes at the lateral edges of the three last segments, and the cerci yellow. Venter yellow, with a row of black dots each side. Ovipositor about the same as in *G. neglectus*, Scudd. Legs yellow, the posterior femora exteriorly having the oblique ridges of the posterior portion and a spot just before and one upon the patella brown, the interior surface superiorly is closely spotted with fuscous; posterior tibiæ beneath, and the tips of the spines piceous.

Length from front to end of abdomen 15 millims. Ovipositor 13½ millims. Posterior femur 10 millims.

*Hab.* Kansas.

The only specimen which I have seen is a female, and was kindly given to me by Mr. Henry Ulke. The vertex has a deep indentation upon it, but as it shows slight evidences of a crack at that point, it may have been occasioned by being crushed. The antennæ and cerci are for the most part broken off of this specimen.

## LOCUSTINA.

### **CAMPTONOTUS**, nov. gen.

Form similar to *Ceuthophilus*, Scudd. Head large, oval, much broader than the prothorax and not deeply sunken into it. Eyes ovate, vertical, situated on the sides but little behind the basal joint of the antennæ, and exceeding it a little in length. Face, vertex and cheeks convex. Maxillary palpi long, the last joint as long as the preceding one, a very little inflated at the tip. Antennæ at least five times the length of the body without the ovipositor. Pronotum trapezoidal, the sides not carried downwards as far as the lower line of the eyes, the lateral margins somewhat broadly recurved; meso- and meta-notum very small, confined to the dorsum and not prolonged downwards upon the sides, their transverse diameter thus being but little more than half that of the pronotum, their sides also recurved. Females essentially apterous. Dorsal segments of the abdomen about equal in length, the two posterior ones shorter than the rest; cerci very short, slender, hairy.



Ovipositor ensiform, curved upwards, compressed, acute. Legs very short, moderately stout; the anterior and middle tibiæ slightly incurved near the base, having a row of four long spines each side beneath; posterior femora with a few short teeth underneath, near the tip; posterior tibiæ with distant very short spines each side behind. Tarsi stout, 4-jointed, with split cushions beneath, the first joint equal in length to the two following ones conjoined.

**C. Scudderi.**

Ochraceo-testaceous, yellowish-white beneath. Face pale yellow, tips of the mandibles and eyes black; the head anteriorly very moderately convex, produced downwards and narrow at tip, epistoma trapezoidal, transverse, much shorter than the labrum, labrum cordate, emarginate at tip, longer and narrower than the epistoma, palpi long and slender, with a minute rounded joint at the tip. Dorsum of the abdomen deeper in color than the other surface, becoming paler inferiorly, the posterior edges of the segments more or less dusky, the three last segments with a common blackish spot; beneath, pale. Cerci very short, slender, hairy. Ovipositor long, very much curved upwards, the valves flat, acute at tip. The legs moderately stout, anterior and middle femora stouter, shorter and more curved than in *Ceuthophilus*; the tarsi are also stouter and shorter.

Length from vertex to tip of abdomen  $11\frac{1}{2}$ –13 millims. Posterior femur 6–7 millims. Posterior tibia  $7\frac{1}{2}$ –8 millims.

This insect is found near Baltimore upon Oak trees. It appears in the larva state as early as the first of August and can be met with fully developed, from the latter part of September until some time in October. I have also seen a specimen from Delaware, in the cabinet of the Entomological Society of Philadelphia.

It seems to form a connecting link between the Rhabdiphoroid forms of the family and the true green Locustina. Possessing much of the structure of head and tarsi, and form and position of the antennæ and eyes as in some species of the genus *Phylloptera*. The eyes are not directly in front, approaching, as in some *Ceuthophili*, they are much longer than broad and placed, not above, but outside of the antennæ, the first joint of which is almost of the same breadth; the third joint of the maxillary palpi is as long as the fourth, and the fourth is but very little enlarged at tip. The reduced size of the meso- and

meta-notum, and the short cerci recall to mind the atrophied condition of the former, and the form of the latter in *Stenopelmatus*, but the group of heavy spurs at the ends of the tibiæ, and other characters of that genus, widely separate this from it. The male is unknown to me, but from a male of a species of this same genus, in my possession, from the Island of St. Thomas, it may prove to have rudimentary tegmina. There is no exhibition of a tympanum or auditory apparatus upon any of the legs.

**ANABRUS**, Hald.

**A. purpurascens.**

Brown with a tinge of purple, mottled with yellow, form similar to *A. simplex*, Hald. Face greenish or carneous-yellow, broad, somewhat flattened; eyes brownish-glaucous; the transverse suture below the front black at the exterior corners of the epistoma; tips of the mandibles piceous-black; antennæ slender, as long as the body omitting the head, yellow at base, and becoming lurid, and at the tip blackish; joints of the maxillary palpi more or less glaucous; cranium glaucous or lurid brown, in some specimens (usually females) with the vertex and four longitudinal stripes carneous-yellow. Thorax rather short, flattened above, posteriorly, with a transverse moderately impressed line behind the middle, and two short oblique anteriorly divergent impressions before the middle; the surface smooth, lurid glaucous, with an anteriorly dilating purplish-brown line at sides below the dorsal edge, the lateral margins broadly, and the anterior margin, less distinctly yellow; anterior angles rounded, the posterior margin truncated. Tegmina covered by the prothorax, yellow, with lurid purplish nervures; in the female the nervures are fine and longitudinal, very ramose; in the male the branching nervures are confined to the margins, the middle field being surrounded by very stout nervures, and on the middle of this field is a stout nervure the ends of which run divergently backwards. Abdomen and surface beneath the prothorax purplish-brown, closely mottled with yellow. Ventral surface of the fully colored males dull in color, the mottling being pale and not distinct and the pectoral surface including the coxæ yellow, the last ventral segment deeply emarginated at tip, and furnished each side with an articulated cylindrical appendage; in the female the inferior surface is yellow with a more or less glaucous or lurid tinge. Ovipositor

moderately curved, lurid yellow, piceous at tip; cerci of the female hardly longer than the segment beneath which they are placed; no cerci present in the males, but their place is supplied by short, stout cylindrical appendages which are bifurcated at tip, the branches acute and curved inwardly, the inferior branch being much longer and tapering more to the tip than the superior one. Legs, in the fully colored specimens, deep purplish-brown, mottled with yellow upon the anterior femora, and reticulated with yellow on the exterior side of the posterior femora; posterior legs comparatively short, the spines tipped with black; the denticuloid process above the anterior coxæ triangular at base, acute at tip, about as long as the coxa; the legs in pale specimens are largely pervaded with yellow.

Length to tip of last segment ♂. 32—33½ millims. Length of prothorax 11 millims., breadth at apex 7 millims. Posterior femur 18½ millims. ♀ Length to tip of last segment 34—36 millims. Posterior femur 18—19 millims. Ovipositor 20—21 millims.

*Hab.* Minnesota (Kennicott); Washington Territory (Dr. Suckley); Texas (Dr. Horn).

This species was found by Mr. Robert Kennicott in considerable numbers near the Red River in Northern Minnesota; for the specimens examined and here described I am indebted to his generosity. From all the species previously described it differs in many particulars from the characters given by the describers. It seems to approach the most nearly to *A. simplex*, Hald., in the shape of the limbs, &c., but the markings are widely distinct.

For the distinctness of this genus from *Thyreonotus*, Serv., I can by no means vouch; a sufficient examination of all the species hereafter may render it necessary to unite them into one genus. The measurements given are the result of an examination of twenty specimens of both sexes.

#### CYPHODERRIS, nov. gen.

Form short, robust. Head globose superiorly, deeply inserted into the prothorax, very wide and flat between the antennæ; eyes subglobose, placed rather before the sides, immediately exterior to the sockets of the antennæ; antennæ longer than the body, scarcely attenuated at tip, being almost of equal thickness throughout, basal joint long, stout, cylindrical, the second scarcely more than half as thick, and less

than half as long, the third longer than the second; space between the antennæ not elevated into a ridge; epistoma very short and broad, the labrum longer, much narrower, rounded on the lower margin, on the middle of which there is a slight, triangular production; mandibles very stout; apical joint of the maxillary palpi about one-fourth longer than the preceding one, obliquely truncated at tip, the penultimate joint equal to the antepenultimate; cheeks broad, but not prominently dilated. Anterior part of the prothorax amplified, so as to cover the base of the head like a hood, its anterior margin subtruncated, the lateral margins becoming gradually obliquely narrowed posteriorly, not sinuated, the extreme edge carinately elevated, dorsal surface transversely, deeply depressed before the middle, behind the middle much broadened, flat. Tegmina broad, ample, but not reaching the apex of the abdomen, covered with well developed, closely reticulated nervures, excepting only a small area of the discal base, the costal flap extending low down upon the sides. Legs short, stout, the anterior tibiæ dilated upon the middle, and bearing a very long and broad tympanal cavity, the exterior face with a moderate spine just below the middle, the interior face bearing two similar spines each, nearer the tip, the tip with a coronet of four spines surrounding it: exterior face of the intermediate tibiæ with three spines on one side and two on the other, upon the interior face and apex they are the same in number and position as upon the anterior tibiæ; laminate carina of the inferior part of the posterior femora continued to the tip, patellæ very small; posterior tibiæ curved inwards, dilated from the base to the tip, prismatic, with the edges rounded, the posterior face with six remote, stout spines on one side and four on the other, exclusive of the apical coronet; tarsi long, compressed, basal joint about two-thirds the length of the apical one, the second one about half the length of the basal, and more than twice the length of the third, plantulæ small, rounded, not dilated nor cleft. ♂.

### **C. monstrosus.**

Pale dull yellow; cranium black, with five pale lines upon it, the intermediate ones converging anteriorly; face yellow, with black sutures, tips and sides of the maxillary palpi, and uncovered portion of mandibles blackish; antennæ piceous, more or less yellow at base, the first joint yellow upon the middle; eyes dark brown, but little longer

than broad, covering a large part of the base of the tegmina, and of a very thin, scale-like consistence; color dull clay-yellow, the anterior lobe brassy-black (omitting the anterior margin and the anterior portion of the sides, which are whitish-yellow) and this color extends in a broad continuation each side, obliquely backwards; an elongate oval impression upon the disk before the middle is also black; the posterior lobe flat above, and densely longitudinally wrinkled; anterior angles sub-rect, the posterior margin broadly rounded. Tegmina pale brown above, yellow at sides, becoming almost white upon the costal margin, the neuration reddish-brown, very dense and ramose. Abdomen more or less invaded with black above and upon the sides and behind, the two rows of lateral stigmata black; venter rufous, with a row of black points each side; anal and genital appendages very complex, the cerci compressed, reflexed at tips, between these is a large triangular, bilobate prominence, with an acuminate process on each lobe, each side below this is a spatulate appendage, curved inwardly, beneath these on the middle is a pointed keel-like elevation, projected backwards upon the segment, grooved and emarginated at tip; the elevated segment upon which the two lower appendages are placed is emarginated in the middle and has a small lobe each side of the emargination. Pectus black, spots above the coxæ, and the coxæ and trochanters in part yellow. Legs yellow, polished, striped and marked with black within and without; the two anterior pairs of femora faintly sulcated on both faces, the posterior femora sulcated on the exterior face, the underside with a carina upon edges, the intermediate tibiæ faintly and the posterior pair within and without distinctly grooved.

Length to tip of abdomen 16, and 22 millims. Breadth of thorax posteriorly 7, and 9 millims. Posterior femur  $8\frac{2}{3}$  and 12 millims. ♂.

*Hab.* Oregon Territory (Dr. Suckley.)

The specimens examined were two males kindly presented to me by Mr. Henry Ulke. The anterior legs are proportionately more developed, in comparison with the posterior ones, than is the case in any of the allied forms yet described from this country.

#### ACRIDIODEA.

##### **STENOBOTHRUS**, Fischer.

##### **s. admirabilis.**

Bright grass-green; labrum green, carneous at sides and white in

front, the apex broadly, triangularly emarginated; face coarsely, remotely punctured, the vertical ridge broad, not channelled, each side of the front near the eyes is a vertical, slightly elevated carina; base of the mandibles and an oblique streak behind the eyes, and the lower and posterior edge of the cheeks carneous; eyes brown, elongate-oval, the upper end conically subacute; antennæ and palpi carneous-reddish, the base of the former and the sutures of the latter white, tips of the antennæ dusky; cranium with a broad carneous stripe, which reaches from the base to the apex, at which point it conforms to the shape of the vertex, it is also bounded each side by a faintly impressed line; the foveolæ upon the upper extremity of the vertex long and broad, the edge just exterior to them elevated and bright green; the middle of the disk somewhat scabrescent. Prothorax bright green, narrow, the dorsal middle with a broad carneous stripe continuous with that of the head, entire, each side of this is a black line dilating posteriorly, the lateral dorsal boundaries elevated into blunt carinæ, just below these is a slender black streak; sides with a very broad carneous or brownish stripe, the posterior lobe of the prothorax both above and at sides tinged with pale green, and reticulately scabrous, carinate line of the dorsal middle distinct. Tegmina smoky-blackish, with a broad green stripe running upon and each side of the strong nervure bounding the discoidal field anteriorly, the posterior margin of this stripe is invaded by series of oblong black spots; the anal field is covered by a second green stripe, which conforms to its shape and becomes obsolete at tip; wings smoky, especially at tip, the base posteriorly greenish-yellow. Abdomen carneous, obscured at base above. Pectus and anterior pairs of legs carneous or lurid-greenish; upon the pleura, beneath each wing, is a quadrate, oblique, green spot. Posterior femora green, the upper lateral carina whitish, and beneath it a purplish-black streak, the inferior lateral carina white and bounded above by a white streak, the under surface pale carneous or greenish-white, the two inferior carinæ bearing each a row of black specks; patellæ and apical two-thirds of the posterior face of the tibiæ dusky-blackish, spines white with their tips black; tarsi carneous, more or less blackish towards the tip.

Length to end of abdomen 36 millims. Alar expanse 54 millims. Posterior femur 24 millims. ♀.

*Hab.* Baltimore. Late in August, among the grass.

This species has not yet been met with in any abundance here. The wing-covers are comparatively narrow, the costal margin a little dilated near the base; the surface against the thick nervure bounding the discoidal field posteriorly is sometimes tinged with a streak of rosy almost throughout its entire length. The colors are taken for the most part from a fresh specimen not immersed in alcohol.

**PEZOTETTIX**, Burm.

**P. Scudderi.**

Ferrugineo-fuscous, form and general appearance of *Caloptenus femur-rubrum*, De Geer. The cranium is, however, less prominent, the thorax slightly broader, and in the ♀ the black spot on the sides, just below the dorsal surface, is much narrower, sometimes entirely obsolete, the whitish spots upon the middle of the sides are indistinct and sometimes entirely obsolete; the wing-covers do not reach much beyond the apex of the second segment of the abdomen, the under side of the posterior femur is yellow, and the tibiæ have a black dot upon the knee and a black ring just below it; the apical tip of the last segment ♂ is more narrowed, acute, and conically produced than in *C. femur-rubrum*. In its other characters it agrees with that species.

Length ♂ 16—17, ♀ 22—23 millims.

*Hab.* Baltimore; upon the sides of high hills. Rock Island, Ill., (Walsh.)

It is found in great profusion during the latter part of October. It is a completely developed insect, for I have taken many pairs in coitu.

# INDEX.

The names of new genera and of new species are followed by the name of the Author.

	Page		Page
<i>Acmæops incertus</i> , <i>Bland</i> .....	321	<i>Apathus contiguus</i> , <i>Cresson</i> .....	112
<i>Acronycta afflicta</i> , <i>Grote</i> .....	438	<i>elatus</i> .....	114
<i>noctivaga</i> , <i>Grote</i> .....	437	<i>fraternus</i> .....	111
<i>Adela Ridingsella</i> , <i>Clemens</i> .....	426	<i>insularis</i> .....	113
<i>Agrion dentiferum</i> , <i>Walsh</i> .....	236	<i>intrudens</i> .....	111
<i>Agrotis texanus</i> , <i>Grote</i> .....	273	<i>laboriosus</i> .....	111
<i>Alcidamea</i> , <i>Cresson</i> .....	385	Apidæ, on the North American species of several genera of, by E. T. Cresson.....	373
<i>pilosifrons</i> , <i>Cresson</i> .....	386	Appeal to Entomologists, by Baron R. Osten Sacken.....	52
<i>producta</i> , <i>Cresson</i> .....	386	<i>Arctia Americana</i> (larva).....	28
<i>Amphidasys pænulataria</i> , <i>Grote</i> ....	31	<i>anna</i> , <i>Grote</i> .....	335
<i>Amblynotus ensiger</i> , <i>Walsh</i> .....	496	<i>celia</i> , <i>Saunders</i> .....	59
<i>inermis</i> , <i>Walsh</i> .....	498	<i>decorata</i> , <i>Saunders</i> .....	60
<i>Anabrus purpurascens</i> , <i>Uhler</i> .....	553	<i>parthenice</i> (larva).....	28
<i>Anchylopera plagosana</i> , <i>Clemens</i> ...	417	<i>Persephone</i> , <i>Grote</i> .....	433
<i>Andronicus</i> , <i>Cresson</i> .....	384	Arctiidæ, two new species of, by William Saunders.....	59
<i>cylindricus</i> , <i>Cresson</i> ....	384	<i>Argynnis Epithore</i> .....	504
<i>Anesychia sparsiciliella</i> , <i>Clemens</i> ...	430	<i>Hesperis</i> , <i>Edwards</i> .....	502
<i>Anthidium curvatum</i> .....	378	<i>Augocoris Poeyi</i> , <i>Uhler</i> .....	158
<i>dorsale</i> .....	381	<i>Aulax pirata</i> , <i>O. S.</i> .....	42
<i>emarginatum</i> .....	374	<i>sylvestris</i> , <i>O. S.</i> .....	37
<i>interruptum</i> .....	380	<i>Baptria albofasciata</i> , <i>Grote</i> .....	66
<i>jugatorium</i> .....	380	<i>albovittata</i> .....	67
<i>maculatum</i> .....	376	<i>elaborata</i> , <i>Grote</i> .....	67
<i>maculifrons</i> .....	375	<i>infulata</i> , <i>Grote</i> .....	67
<i>notatum</i> .....	376	<i>Bembidium Wingatei</i> , <i>Bland</i> .....	319
<i>perplexum</i> .....	377	Bombus and <i>Apathus</i> , List of the N. A. species of, by E. T. Cresson	83
<i>simile</i> , <i>Cresson</i> .....	378	<i>Bombus affinis</i> , <i>Cresson</i> .....	103
<i>Anthocaris Ausonoides</i> .....	81	<i>Antiguensis</i> .....	107
<i>Anthœcia arcifera</i> .....	340	<i>Arcticus</i> .....	95
<i>bina</i> .....	344	<i>bimaculatus</i> , <i>Cresson</i> .....	92
<i>jaguarina</i> .....	342	<i>borealis</i> .....	93
<i>lynx</i> .....	343	<i>Californicus</i> .....	97
<i>marginata</i> .....	339		
<i>Spraguei</i> , <i>Grote</i> .....	341		
<i>tuberculum</i> .....	343		
<i>Antithesia bipartitana</i> .....	418		
<i>Apathus citrinus</i> .....	112		



	Page		Page
Bombus Carolinus.....	108	Brenthia inflatella, <i>Clemens</i> .....	5
diligens.....	110	Callidryas Yamana, <i>Reakirt</i> .....	352
dubius, <i>Cresson</i> .....	97	Camptonotus, <i>Uhler</i> .....	548
ephippiatus.....	107	<i>Scudderi, Uhler</i> .....	549
fervidus.....	93	Catocala of the U. S. Descriptions	
flavifrons, <i>Cresson</i> .....	105	of certain species of, by Wm.	
frigidus.....	100	H. Edwards.....	508
Grœnlandicus.....	97	Catocala Briseis, <i>Edwards</i> .....	508
Howardii, <i>Cresson</i> .....	99	<i>Californica, Edwards</i> .....	509
Hudsonicus, <i>Cresson</i> .....	92	<i>concumbens (larva)</i> .....	29
impatiens.....	90	<i>gracilis, Edwards</i> .....	511
Kirbiellus.....	101	<i>marmorata, Edwards</i> .....	508
laboriosus.....	109	<i>minuta, Edwards</i> .....	512
lacustris, <i>Cresson</i> .....	103	<i>nebulosa, Edwards</i> .....	510
Marylandicus.....	90	<i>parvula, Edwards</i> .....	512
medius, <i>Cresson</i> .....	97	<i>Serena, Edwards</i> .....	510
melanopyge.....	103	<i>similis, Edwards</i> .....	511
moderatus, <i>Cresson</i> .....	109	<i>tristis, Edwards</i> .....	511
modestus, <i>Cresson</i> .....	99	<i>Walshii, Edwards</i> .....	509
".....	109	Ceratina dupla.....	389
nidulans.....	107	<i>eximia</i> .....	391
occidentalis.....	98	<i>læta</i> .....	392
ornatus.....	104	<i>placida</i> .....	391
pallidus, <i>Cresson</i> .....	92	<i>punctulata</i> .....	392
Pennsylvanicus.....	164, 94	<i>Tejonensis, Cresson</i> .....	390
perplexus, <i>Cresson</i> .....	91	Chauliodes lunatus, <i>Hagen</i> .....	262, 180
pleuralis.....	96	<i>rastricornis</i> .....	263
polaris.....	101	Chauliodes? <i>canicinctella, Clemens</i> ,	129
praticola.....	106	Chelinidea, <i>Uhler</i> .....	365
proximus, <i>Cresson</i> .....	98	<i>vittiger, Uhler</i> .....	366
pulcher, <i>Cresson</i> .....	108	Chelostoma albifrons.....	382
rufo-cinctus, <i>Cresson</i> .....	106	<i>rugifrons</i> .....	382
scutellaris, <i>Cresson</i> .....	96	Chionobas Chryxus.....	82
separatus, <i>Cresson</i> .....	165	Chloroperla fumipennis.....	187
Sitkensis.....	102	Ciris, <i>Grote</i> .....	65
sonorus.....	95	<i>Wilsonii, Grote</i> .....	65
strenuus, <i>Cresson</i> .....	102	Clastoptera stolidus, <i>Uhler</i> .....	161
sylvicola.....	106	<i>undulata, Uhler</i> .....	160
ternarius.....	104	Cœlioxys abdominalis.....	408
terricola.....	99	<i>alternata</i> .....	406
vagans.....	91	<i>brevis, Cresson</i> .....	402
violaceus.....	108	<i>dubitata</i> .....	400
Virginicus.....	166, 165, 87	<i>funeraria</i> .....	404
Brachiloma, <i>Clemens</i> .....	126	<i>lateralis, Cresson</i> .....	405
<i>unipunctella, Clemens</i> ,	126	<i>modesta</i> .....	404

	Page		Page
<i>Cœlixys mœsta</i> , <i>Cresson</i> .....	403	for a new classification of Cy-	
8-dentata.....	401	nipidæ and descriptions of sev-	
quadridentata .....	409	eral new species, by Benj. D.	
rufipes .....	407	Walsh, M. A.....	443
rufitarsus.....	400	Cynips, Descriptions of supposed	
<i>Coleophora concolorella</i> ; <i>Clemens</i> ...	6	new species, with remarks on	
leucochrysellæ, <i>Clemens</i>	6	the formation of certain Galls.	
Rosacella, <i>Clemens</i> .....	426	by H. F. Bassett.....	323
Rosæfoliella, <i>Clemens</i> ...	426	<i>Cynips nubilipennis</i> .....	485
Coleoptera of N. A. Descriptions of		q. erinacei, <i>Walsh</i> (Gall)...	483
new species, by J. H. B. Bland.	319	q. flocci, <i>Walsh</i> .....	482
<i>Colias Alexandra</i> , <i>Edwards</i> .....	14	q. forticornis, <i>Walsh</i> .....	490
Christina, <i>Edwards</i> .....	79	q. globulus.....	328
Helena, <i>Edwards</i> .....	80	q. Osten Sackenii, <i>Bassett</i> ..	327
<i>Coloradia Pandora</i> , <i>Blake</i> .....	279	q. palustris.....	329
<i>Cordulia?</i> <i>molesta</i> , <i>Walsh</i> .....	254	q. petiolicola, <i>Bassett</i> ...487,325	
<i>Corimelæna ciliata</i> , <i>Uhler</i> .....	156	q. pilulæ, <i>Walsh</i> (Gall).....	481
cyanea, <i>Uhler</i> .....	157	q. podagre, <i>Walsh</i> .....	492
denudata, <i>Uhler</i> .....	157	q. punctata, <i>Bassett</i> .....	324
extensa, <i>Uhler</i> .....	155	q. singularis, <i>Bassett</i> .....	326
incerta, <i>Uhler</i> .....	156	q. sculptus, <i>Bassett</i> .....	324
minuta, <i>Uhler</i> .....	155	<i>Cyphoderris</i> , <i>Uhler</i> .....	250
<i>Corydalis cornutus</i> .....	265	monstrosus, <i>Uhler</i> ....	551
<i>Crocota</i> , Contributions towards a		<i>Dasycera Newmanella</i> , <i>Clemens</i> ....	428
Monograph of the genus, by		<i>Depressaria atrodorsella</i> , <i>Clemens</i> ..	124
Tryon Reakirt.....	371	cinereocostella, <i>Clemens</i>	422
<i>Crocota choriona</i> , <i>Reakirt</i> .....	371	pulvipennella, <i>Clemens</i>	421
immaculata, <i>Reakirt</i> .....	372	<i>Diastrophus cuscuteformis</i> , <i>O. S.</i> ....	39
nigricans, <i>Reakirt</i> .....	371	nebulosus, <i>O. S.</i> .....	36
opella.....	30	<i>Dichagramma</i> , <i>Grote</i> .....	439
quinaria, <i>Grote</i> .....	30	vinulenta, <i>Grote</i> ... 440	
tri-maculosa, <i>Reakirt</i> .....	373	Walkerii, <i>Grote</i> ... <sup>1</sup>	439
<i>Ctenucha Cressonana</i> , <i>Grote</i> .....	64	<i>Diphthera Græfii</i> , <i>Grote</i> .....	68
virginica.....	334	Diurnal Lepidoptera of the U. S.	
<i>Cycloplasis</i> , <i>Clemens</i> .....	423	and British America, certain	
Panicifoliella, <i>Clemens</i>	424	species of, by William H. Ed-	
<i>Cymatophora caniplaga</i> .....	56	wards.....	14, 78, 501
<i>Cymatophorina</i> found in the U. S.		Donations to Cabinet... 1, 22, 50, 61, 75.	
and British America, with de-		117, 133, 163, 277, 316, 368, 412	
scriptions of new species, by		Donations to Library... 2, 25, 50, 62, 76.	
Aug. R. Grote.....	54	117, 133, 164, 278, 317, 367, 369, 413	
Cynipidæ of the U. S. and their		<i>Ecpantheria scribonia</i> (larva).....	28
galls, by Baron R. Osten Sacken	33	<i>Elachista Brachyelytrifoliella</i> .	
<i>Cynips</i> , on Dimorphism in the Hy-		<i>Clemens</i> . 425	
menopterous genus. with hints		<i>Elachista?</i> <i>orichalcella</i> , <i>Clemens</i> ...	430

Page	Page
Elections of Corresponding Mem- bers...3, 27, 64, 77, 119, 279, 368, 415	cies of N. American, by Aug. R. Grote..... 431
Elections of Resident Members...64, 77, 279, 370	Gortyna cerussata, <i>Grote</i> ..... 431
Enicostoma? Packardella, <i>Clemens</i> . 125	Gracilaria coroniella, <i>Clemens</i> ..... 421
Epeolus donatus..... 396	venustella..... 10
fumipennis..... 398	Gryllotalpa cultriger, <i>Uhler</i> ..... 543
lunatus..... 394	Gryllus personatus, <i>Uhler</i> ..... 547
mercatus..... 395	Halonota Packardiana, <i>Clemens</i> .... 417
pusillus, <i>Cresson</i> ..... 398	Hamadryas, <i>Clemens</i> ..... 422
4-fasciatus..... 395	Bassettella, <i>Clemens</i> ... 423
remigatus..... 393	Hapithus, <i>Uhler</i> ..... 546
scutellaris..... 397	agitator, <i>Uhler</i> ..... 546
zonatus..... 397	Helops gracilis, <i>Bland</i> ..... 319
Ephemera myops, <i>Walsh</i> ..... 207	Hemipterological Contributions by P. R. Uhler..... 361, 155
Eresia cineta, <i>Edwards</i> ..... 502	Heptagenia, <i>Walsh</i> ..... 197
Eupithecia miserulata, <i>Grote</i> ..... 32	cruentata, <i>Walsh</i> ..... 205
Euterpe Eudocia, <i>Reakirt</i> ..... 345	maculipennis, <i>Walsh</i> . 206
Euthisanotia timais..... 441	simplex, <i>Walsh</i> ..... 204
Gastropacha vellea—var. minuta, <i>Grote</i> ... 433	Heriades carinatum, <i>Cresson</i> ..... 383
Gelechia angustipennella, <i>Clemens</i> . 119	simplex, <i>Cresson</i> ..... 384
apicilinella, <i>Clemens</i> ..... 120	Hesperia conspicua, <i>Edwards</i> ..... 17
brumella, <i>Clemens</i> ..... 416	Delaware, <i>Edwards</i> ..... 19
fuscopunctella, <i>Clemens</i> ... 12	Huron, <i>Edwards</i> ..... 16
gallægenitella, <i>Clemens</i> ... 420	Logan, <i>Edwards</i> ..... 18
gilvolinella, <i>Clemens</i> ..... 119	Mandan, <i>Edwards</i> ..... 20
gilvomaculella, <i>Clemens</i> ... 12	Mystic, <i>Edwards</i> ..... 15
Labradoriella, <i>Clemens</i> ... 12	nemoris, <i>Edwards</i> ..... 507
longifasciella, <i>Clemens</i> .... 12	Ocola, <i>Edwards</i> ..... 20
mediofuscella, <i>Clemens</i> ... 11	Omaha, <i>Edwards</i> ..... 21
nigratomella, <i>Clemens</i> ..... 11	Pontiac, <i>Edwards</i> ..... 17
ornatifimbriella, <i>Clemens</i> . 420	Uncas, <i>Edwards</i> ..... 19
pullifimbriella, <i>Clemens</i> ... 120	Wyandot, <i>Edwards</i> ..... 21
punctiferella, <i>Clemens</i> .... 119	Heterina americana?..... 210
Glyphipteryx impigritella, <i>Clemens</i> 9	pseudamericana, <i>Walsh</i> . 223
Gomphus amnicola..... 252	rupamensis, <i>Walsh</i> ..... 230
consobrinus, <i>Walsh</i> ..... 242	scelerata, <i>Walsh</i> ..... 267
fluvialis..... 252	texana, <i>Walsh</i> ..... 227
fraternus..... 238	Heterocampa subalbicans, <i>Grote</i> ... 336
graslinellus..... 242	Hexagenia, <i>Walsh</i> ..... 197
quadricolor, <i>Walsh</i> ..... 246	Holcocera, <i>Clemens</i> ..... 121
ventricosus, <i>Walsh</i> ..... 249	chaleofrontella, <i>Clemens</i> 122
Gonophora scripta..... 58	gilbociliella, <i>Clemens</i> ... 122
Gortyna, Description of a new spe-	modestella, <i>Clemens</i> ..... 122
	purpurocomella, <i>Clem's</i> 122

Page	Page		
Hypoprepia Packardii, <i>Grote</i> .....	31	by Brackenridge Clemens, M. D.....	4, 119, 415
Incurvaria Labradorella, <i>Clemens</i> ..	416	<i>Monochora fraterna</i> , <i>Uhler</i> .....	160
Jassus Kennicottii, <i>Uhler</i> .....	161	<i>Monumetha</i> , <i>Cresson</i> .....	387
Kricogonia, <i>Reakirt</i> .....	355	<i>argentifrons</i> , <i>Cresson</i> ..	387
Lacinia, <i>Grote</i> .....	55	<i>borealis</i> , <i>Cresson</i> .....	388
<i>cymatophoroides</i> .....	58	<i>obsoleta</i> , <i>Cresson</i> .....	388
<i>expultrix</i> , <i>Grote</i> .....	58	<i>Nathalis luteolus</i> , <i>Reakirt</i> .....	350
Lasioptera solidaginis, Communi-		Neuroptera, Observations on cer-	
cation from Baron R. Osten		tain N. A., by H. Hagen, M. D.,	
Sacken.....	77	with notes and descriptions of	
Lepidoptera of the U. S. Additions		about twenty new species of	
to the Catalogue of, by Aug. R.		Pseudoneuroptera, by Benj. D.	
Grote.....	30, 64, 273	Walsh, M. A.....	167
Lepidoptera, Descriptions of North		Nomada, North American species	
American, by A. R. Grote....	433, 334	of, by E. T. Cresson.....	280
Lepidoptera, Notes on Central Ame-		<i>Nomada annulata</i> .....	297
rican, with descriptions of new		<i>Americana</i> .....	308
species, by Tryon Reakirt...345,	135	<i>amœna</i> , <i>Cresson</i> .....	300
Lepidopterous Larvæ, on some hith-		<i>armata</i> .....	311
erto undescribed, by W. Saun-		<i>articulata</i> .....	297
ders .....	28	<i>bella</i> , <i>Cresson</i> .....	287
Leptina dormitans .....	57	<i>bisignata</i> .....	305
Doubledayi .....	58	<i>depressa</i> , <i>Cresson</i> .....	302
<i>latebricola</i> , <i>Grote</i> .....	57	<i>electa</i> , <i>Cresson</i> .....	290
<i>ophthalmica</i> .....	57	<i>fervida</i> .....	294
Lestes eurina .....	234	<i>festiva</i> , <i>Cresson</i> .....	289
Lozopera? fuscostrigana, <i>Clemens</i> ..	417	<i>gracilis</i> , <i>Cresson</i> .....	295
Lycæna Amica, <i>Edwards</i> .....	80	<i>imbricata</i> .....	296
Echo, <i>Edwards</i> .....	506	<i>incerta</i> , <i>Cresson</i> .....	309
Lycea, <i>Edwards</i> .....	507	<i>lepida</i> , <i>Cresson</i> .....	288
Marmara, <i>Clemens</i> .....	6	<i>luteola</i> .....	282
<i>salicella</i> , <i>Clemens</i> .....	7	<i>maculata</i> , <i>Cresson</i> .....	303
Mantispa interrupta.....	266	<i>miniata</i> .....	308
Masaris, new species of, from the		<i>modesta</i> , <i>Cresson</i> .....	286
Rocky Mountains, by E. T.		<i>obliterata</i> , <i>Cresson</i> .....	301
Cresson.....	69	<i>perplexa</i> , <i>Cresson</i> .....	306
Masaris vespoidea, <i>Cresson</i> .....	69	<i>placida</i> , <i>Cresson</i> .....	291
Megonostoma, <i>Reakirt</i> .....	356	<i>proxima</i> , <i>Cresson</i> .....	294
Helena, <i>Reakirt</i> .....	353	<i>punctata</i> .....	296
Melitæa Mylitta.....	504	<i>pygmæa</i> , <i>Cresson</i> .....	299
<i>pallida</i> , <i>Edwards</i> .....	505	<i>rubicunda</i> .....	299
Phaon, <i>Edwards</i> .....	505	<i>ruficornis</i> .....	310
Texana, <i>Edwards</i> .....	81	<i>superba</i> , <i>Cresson</i> .....	281
Microcoelia vinnula, <i>Grote</i> .....	436	<i>torrida</i> .....	300
Micro-Lepidoptera of N. America,			

	Page		Page
Nomada valida .....	308	Prionosoma podopioides, <i>Uhler</i> .....	364
<i>vicina</i> , <i>Cresson</i> .....	292	Pseudoneuroptera, Notes and de-	
<i>vincta</i> .....	284	scriptions of about twenty new	
North American Butterflies, Cata-		species of, by B. D. Walsh, M. A. 167	
logue of, by J. Wm. Weide-		Psocus bifasciatus, <i>Walsh</i> .....	183
meyer.....	513, 143	confluens, <i>Walsh</i> .....	185
Ophiogomphus mainensis, <i>Packard</i>	255	conterminus, <i>Walsh</i> .....	185
Oplomus annotatus, <i>Uhler</i> .....	362	lichenatus, <i>Walsh</i> .....	183
Ornix boreasella, <i>Clemens</i> .....	415	madescens, <i>Walsh</i> .....	186
Orocharis, <i>Uhler</i> .....	544	pernadidus, <i>Walsh</i> .....	185
saltator, <i>Uhler</i> .....	545	rufus, <i>Walsh</i> .....	185
Orthopterological Contributions, by		Raphia abrupta, <i>Grote</i> .....	336
P. R. Uhler.....	543	frater, <i>Grote</i> .....	435
Pachycoris complicatus, <i>Uhler</i> .....	361	Report of Recording Secretary.....	313
Stallii, <i>Uhler</i> .....	159	Rhodites bicolor.....	48
Wilsonii, <i>Uhler</i> .....	159	dichlocerus.....	46
Papilio, Description of a new spe-		ignota, <i>O. S.</i> .....	49
cies of N. American, by Aug.		radicum, <i>O. S.</i> .....	46
R. Grote.....	441	rosæ.....	47
Papilio Caleli, <i>Reakirt</i> .....	138	verna, <i>O. S.</i> .....	47
Calverleyi, <i>Grote</i> .....	441	Saperda Fayi, <i>Bland</i> .....	320
Copánæ, <i>Reakirt</i> .....	141	Saturniideæ, New genus and species	
Epidaus.....	135	of, from the Rocky Mountains,	
Tonila, <i>Reakirt</i> .....	140	by C. A. Blake.....	279
Tulana, <i>Reakirt</i> .....	140	Sialis infumata.....	261
Parectopa Robiniella, <i>Clemens</i> .....	4	Stelis elegans, <i>Cresson</i> .....	411
Parnassius Sayii, <i>Edwards</i> .....	78	federalis.....	410
Pentagenia, <i>Walsh</i> .....	196	lateralis, <i>Cresson</i> .....	410
quadripunctata, <i>Walsh</i>	198	obesa.....	409
Pezotetrix Scudderi, <i>Uhler</i> .....	555	Stenobothrus admirabilis, <i>Uhler</i> ...	552
Philochrysa, <i>Grote</i> .....	338	Strobisia levipedella, <i>Clemens</i> .....	4
regnatrix, <i>Grote</i> . 441, 339		Symphylus infamatus, <i>Uhler</i> .....	361
Phyllocnistis Liriodendronella,		Synerges mendax, <i>Walsh</i> .....	498
<i>Clemens</i> ...	13	rhoditiformis, <i>Walsh</i> .....	499
Phyllopalpus, <i>Uhler</i> .....	543	Synophrus albipes, <i>Walsh</i> .....	496
pulchellus, <i>Uhler</i> ....	544	leviventris.....	494
Pieris Kigaha, <i>Reakirt</i> .....	349	Terias Gratiola.....	359
Nasturtii.....	501	Thecla Clothilde, <i>Edwards</i> .....	15
vernalis, <i>Edwards</i> .....	501	Thyatira pudens.....	59
Pigritia ochreella, <i>Clemens</i> .....	126	Tinea acapnopennella, <i>Clemens</i> .....	127
ochrocomella, <i>Clemens</i> .....	126	biflavimaculella.....	415
Platæa californiaria.....	344	costisignella, <i>Clemens</i> .....	128
Plusia balluca (larva).....	29	tricingulatella, <i>Clemens</i> .....	128
ignea, <i>Grote</i> .....	274	Tineina. Observations on Ameri-	
Prionosoma, <i>Uhler</i> .....	363	can, by H. T. Stainton.....	130

	Page		Page
Tischeria Quercitella, <i>Clemens</i> .....	13	Wilsonia brevivittella, <i>Clemens</i> .....	429
Tribalia, <i>Walsh</i> .....	470	Written Communications...3, 27, 52, 76,	
batatorium, <i>Walsh</i> .....	471	118, 134, 164, 278, 367, 370, 414	
Vanessa Milberti (larva).....	28	Upsolophus flavivittellus, <i>Clemens</i> .	429
Walshia, <i>Clemens</i> .....	418	pauciguttellus, <i>Clemens</i> .	123
Amorphella, <i>Clemens</i> .....	419	punctidiscellus, <i>Clemens</i>	123
Wilsonia, <i>Clemens</i> .....	428	unicipunctellus, <i>Clemens</i>	123

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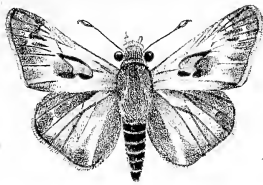
### ERRATA.

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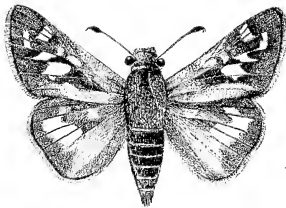
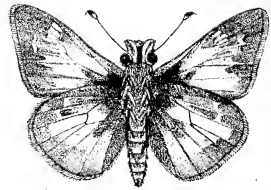
- 1, bottom line, for "*laekus*" read "*laetus*."  
27, line 16 for "Chapter 5" read "Chapter 6."  
34, line 28 for "*custutaeformis*" read "*cuscutaeformis*."  
70, line 12 for "retractile, curved under" read "not retractile, apex very much incurved."  
76, line 25 for "*du*" read "*der*."  
85, line 24 after the word "the" add "workers, although less than that of the."  
86, line 29 dele "—11."  
86, line 30 for "Sp. 12—13" read "Sp. 11—13."  
146, line 8 for "Orthoptera" read "Ornithoptera."  
149, line 19 for "*marcellus*" read "*marcellus*."  
191, line 31 for "1st basal" read "1st tarsal."  
196, line 12 after Table, for "even" read "ever."  
261, line 2 opposite woodcut, for "A terminal" read "A. Terminal."  
266, line 1 for "incurved" read "incurved."  
277, lines 23 and 24 for "*Corylura*" read "*Cordylura*."  
280, line 35 for "Maine" read "District of Columbia."  
334, foot-note, line 1 for "Bd." read "H-S."  
336, line 8 for "costal" read "discal."  
412, line 22 for "*Liopé*" read "*Lispe*."  
434, line 28 for "*virginicula*" read "*virguncula*."  
459, line 27 for "*Dorcatoma*" read "*Decatoma*."  
471, line 20 for "1st dorsal" read "2nd dorsal."  
478, line 24 for "cockoo-bees" read "cuckoo-bees."  
479, line 13 for "connate *joint*" read "connate."  
490, line 3 from bottom for "joint 1" read "joint 2."  
416, line 25, for "Unprecedented" read "Unrepresented."

See page 49 for Errata in Baron Osten Sacken's paper on the Cynipidæ of the United States and their galls.

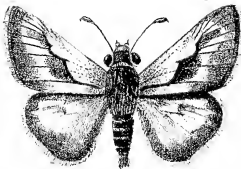
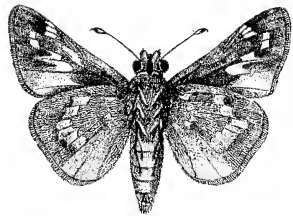
See page 271 for Errata in Mr. Walsh's paper on N. A. species of Pseudo-neuroptera.



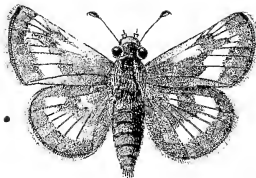
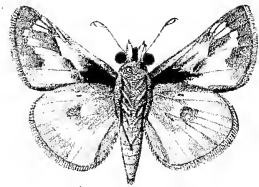
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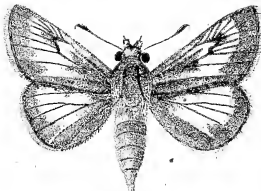
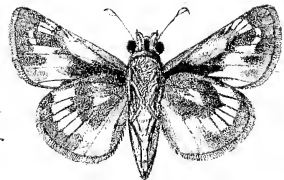
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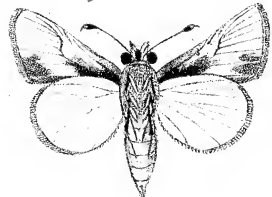
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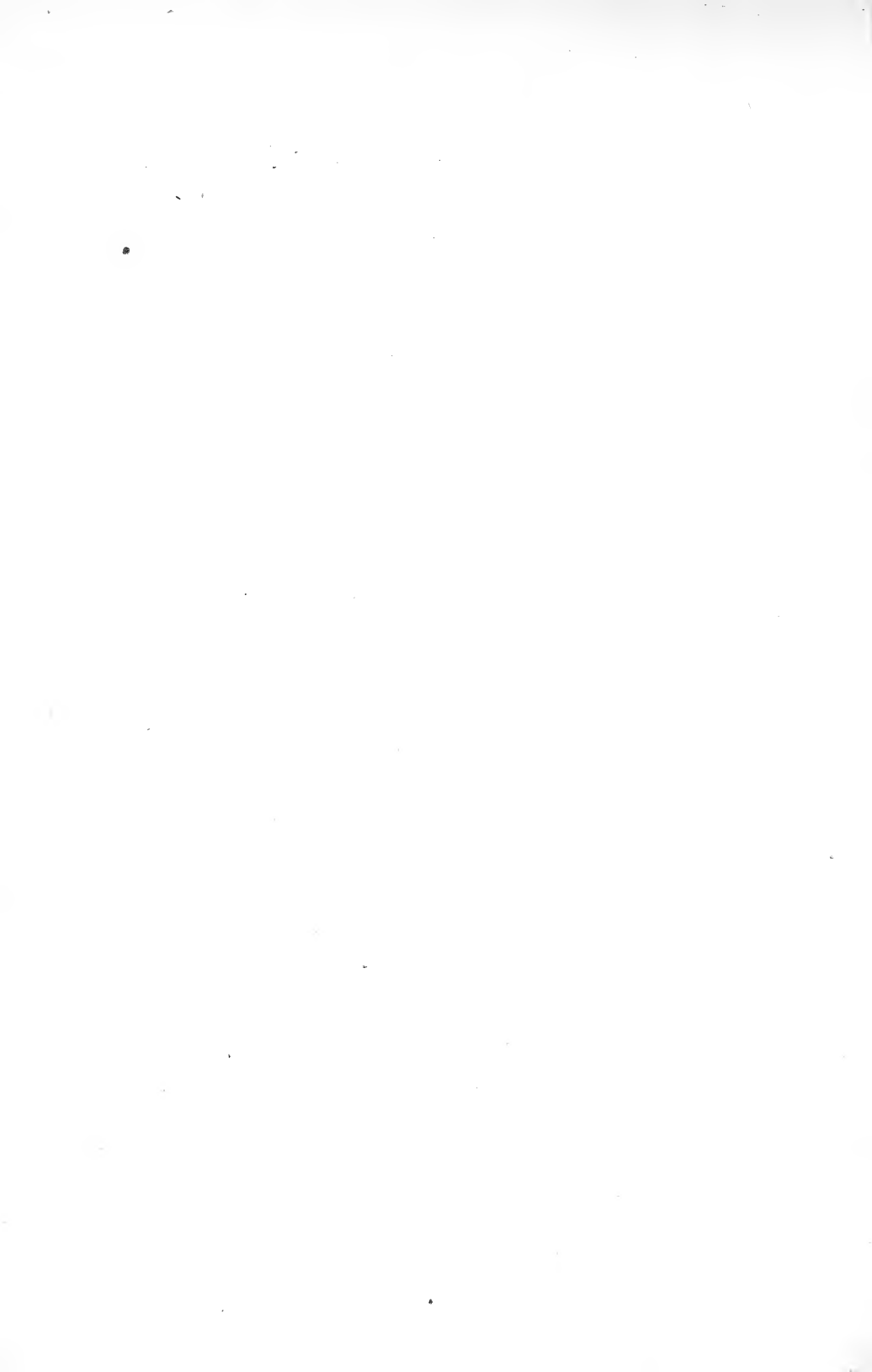
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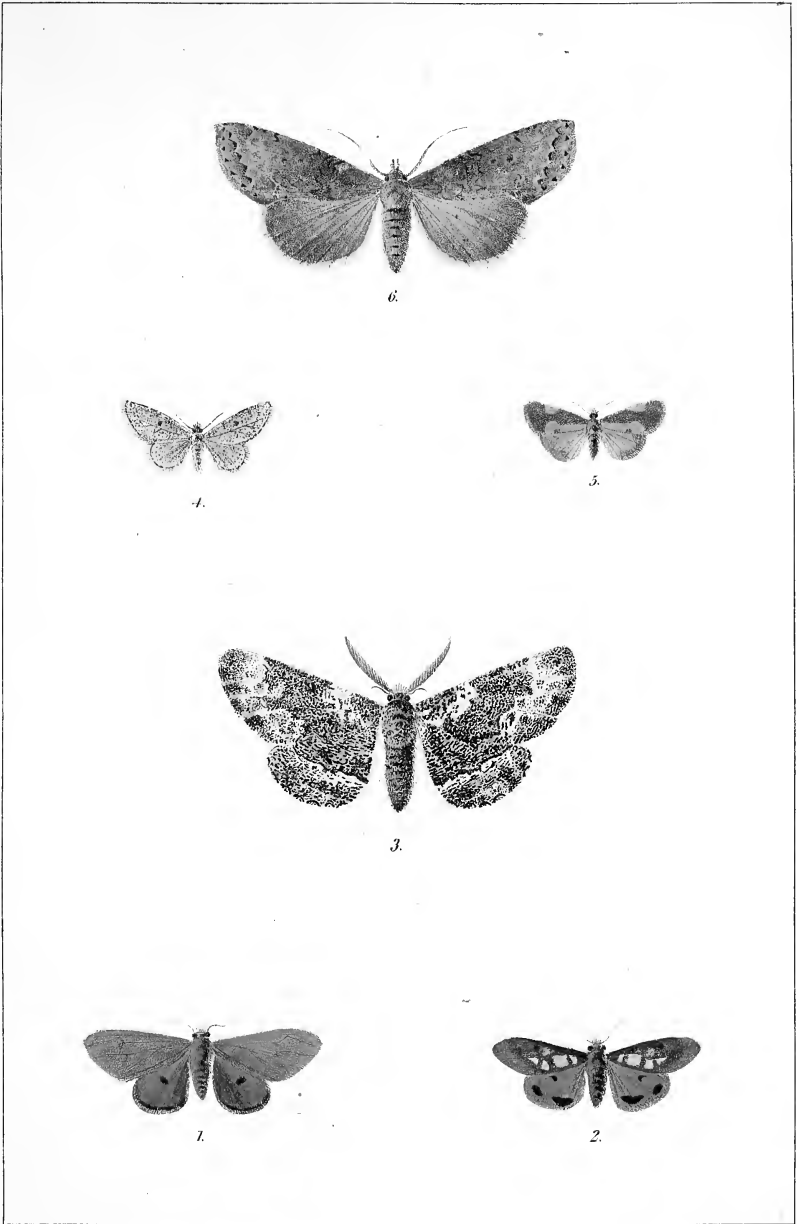
I. H. HURON ♂  
II. H. HURON ♀

V. H. LOGAN ♂

III. H. MYSTIC ♂  
IV. H. MYSTIC ♀





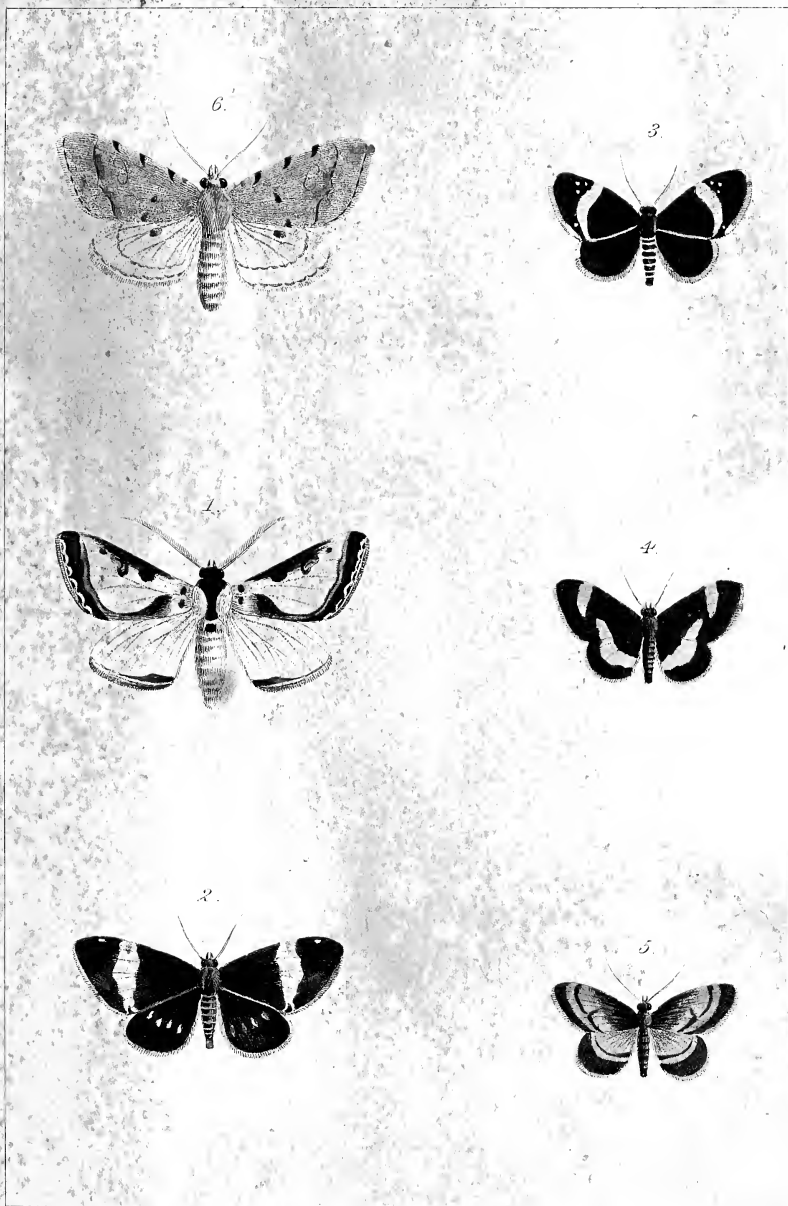


Drawn by C.P. Tholey.

Bowen & Co. lith & col. Philada.

1. *Crocota opella*, Grote, ♀, 2. *Crocota quinaria*, Grote, 3. *Amphidasys paenulataria*, Grote, ♂,  
 4. *Eupithecia miserulata*, Grote, ♀, 5. *Hypoprepia Packardii*, Grote, ♀,  
 6. *Lacinia expultrix*, Grote.

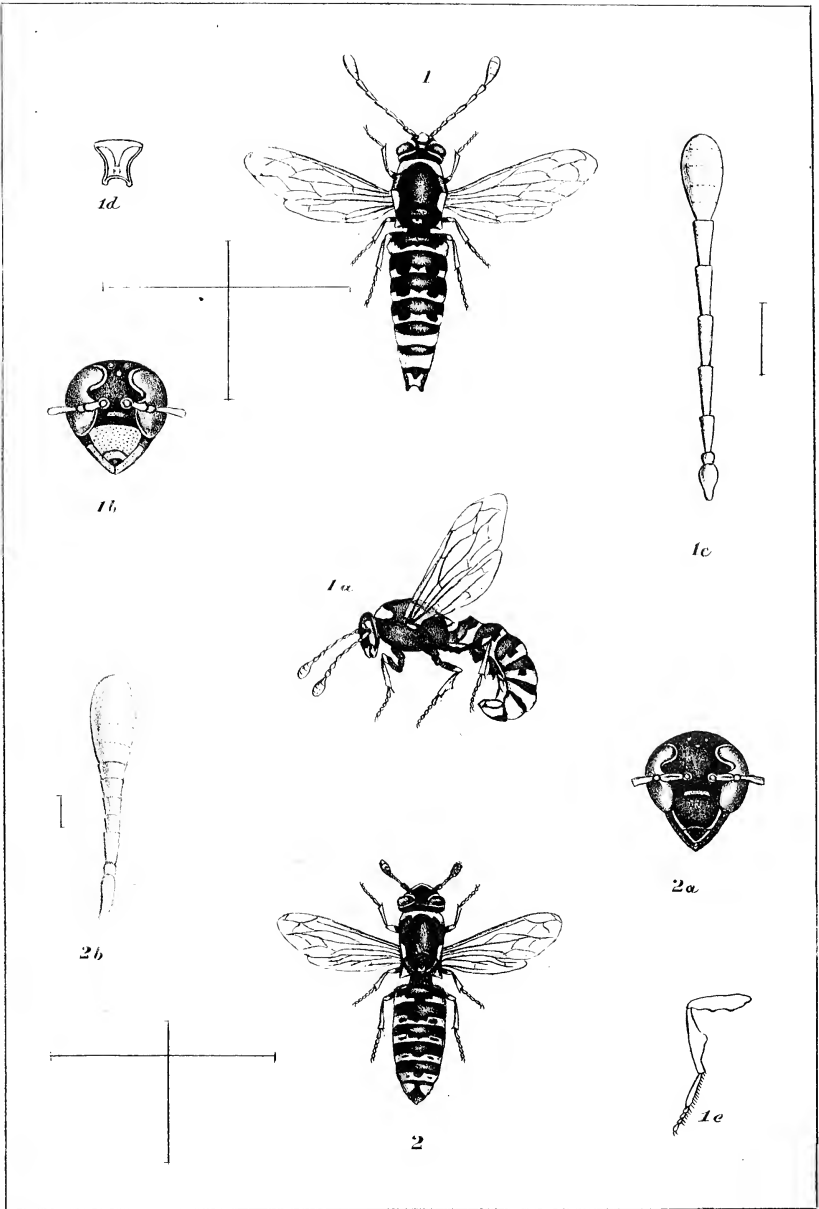




Hochstein pinxi.

- |                                 |         |                               |        |
|---------------------------------|---------|-------------------------------|--------|
| 1. <i>Cris Wilsonii</i> .       | Grote.  | 4. <i>Baphna insulata</i> .   | Grote. |
| 2. <i>Baphna albofasciata</i> . | "       | 5. " <i>elaborata</i> .       | "      |
| 3. " <i>albivittata</i> .       | Guenée. | 6. <i>Diphthera Graefii</i> . | "      |



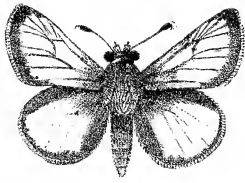


*Masaris vespoidea.*

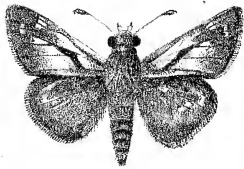
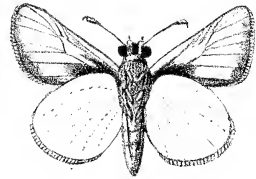




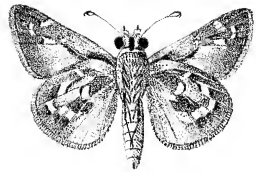
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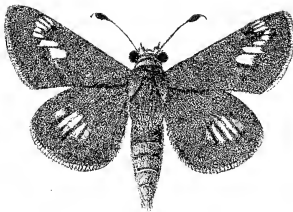
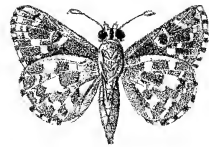
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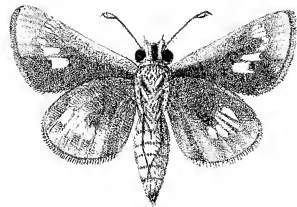
III.



IV.



V.



I. H. MANDAN ♂  
II. H. DELAWARE ♂

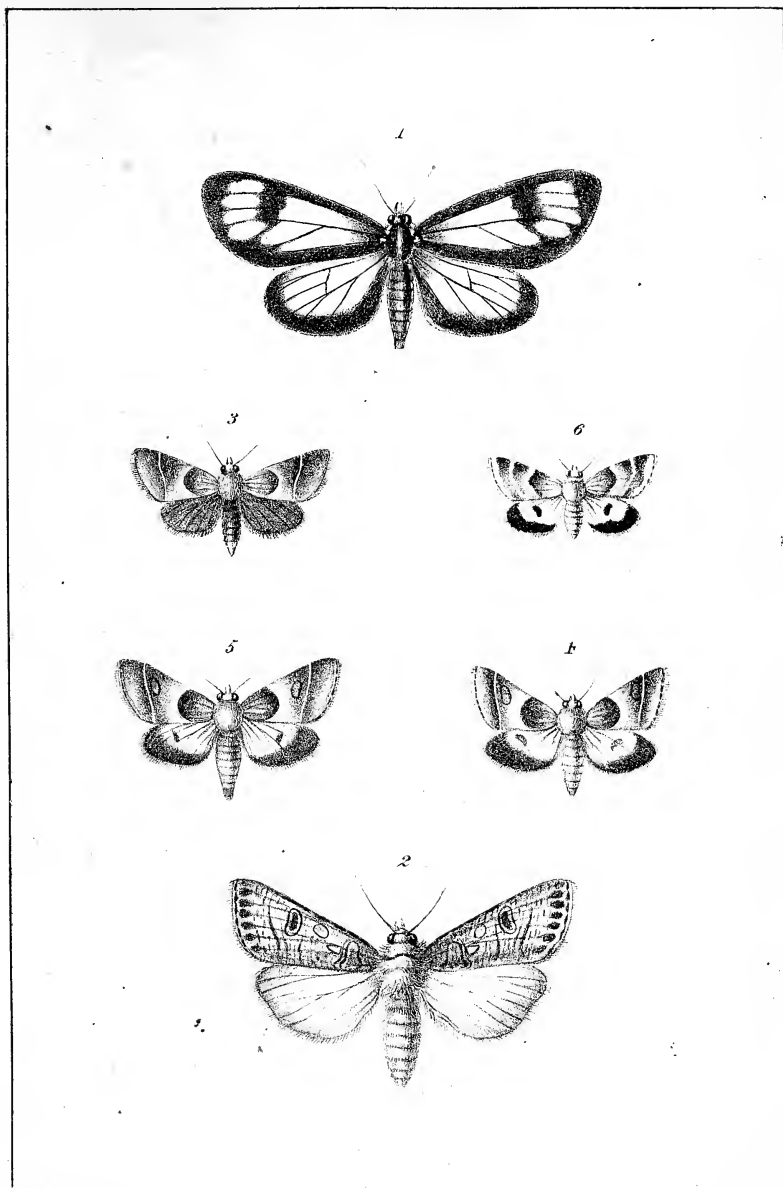
III. H. UNCAS ♂

IV. H. WYANDOT ♂  
V. H. CONSPICUA ♀





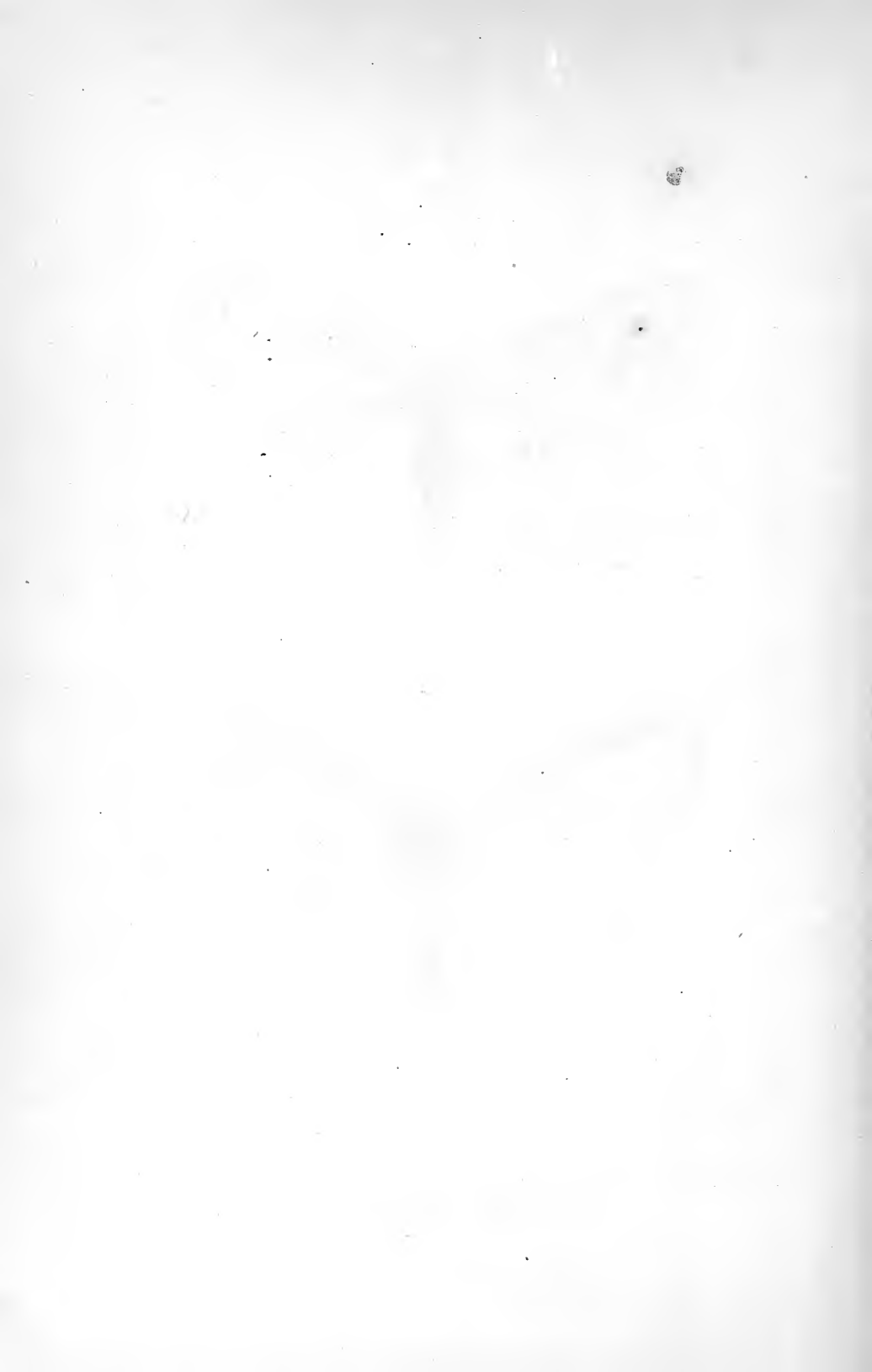
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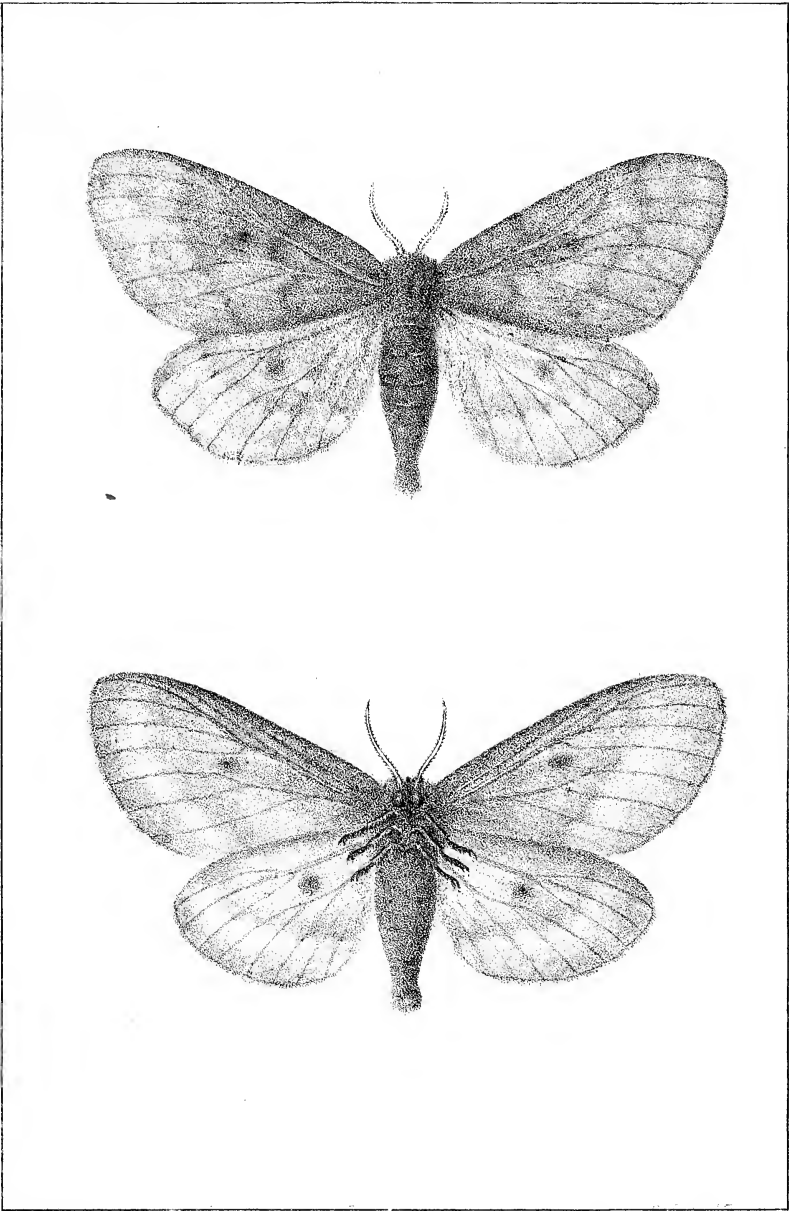


Hochstein pinx.

N. Y. 1863.

1. *Lamprosoma vermiculata*. Grote. 4. *Anthoecia Spraguei*. Grote ♂  
 2. *Agrotis texanus* " 5 " " " ♀  
 3. *Anthoecia arigera* Guenee. 6 " *lynx* Guenee

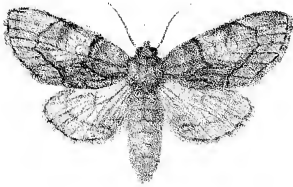




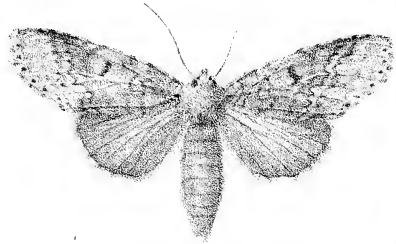
*W. C. C. C.*

*Colocadia Pandoza* Blake.





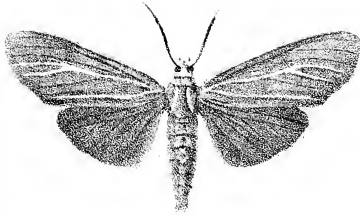
3.



2.



4.



5.



1.

1. *Arctia anna*, Grote, p.

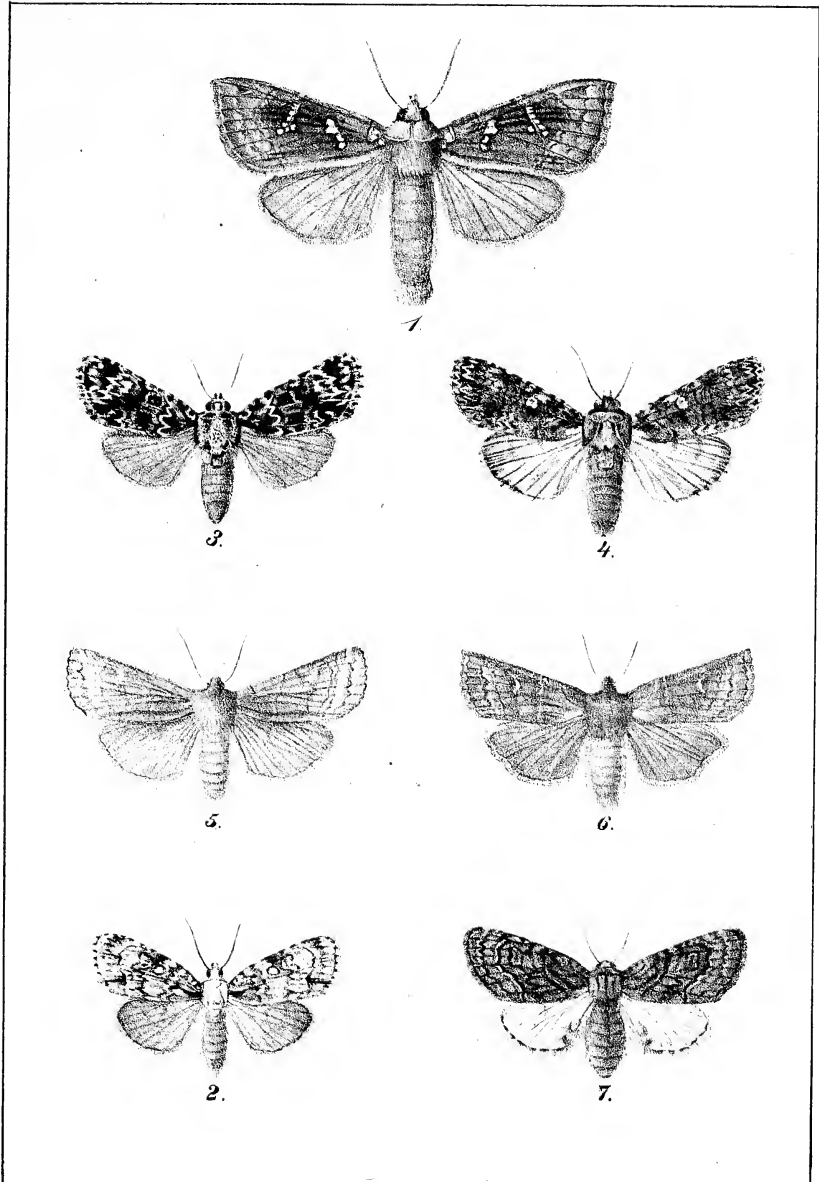
2. *Heterorampa subalbicans*, Grote, p.

3. *Raphia abrupta*, Grote, p.

4. *Philochrysa regnatrice*, Grote, p.

5. *Ctenucha Cressonana*, Grote.





1. *Gortyna cerussata*, Grote. ♂.

2. *Microcoelia vinnula*, Grote. ♀.

3. *Acronycta noctivaga*, Grote. ♂.

4. *Acronycta afflicta*, Grote. ♂.

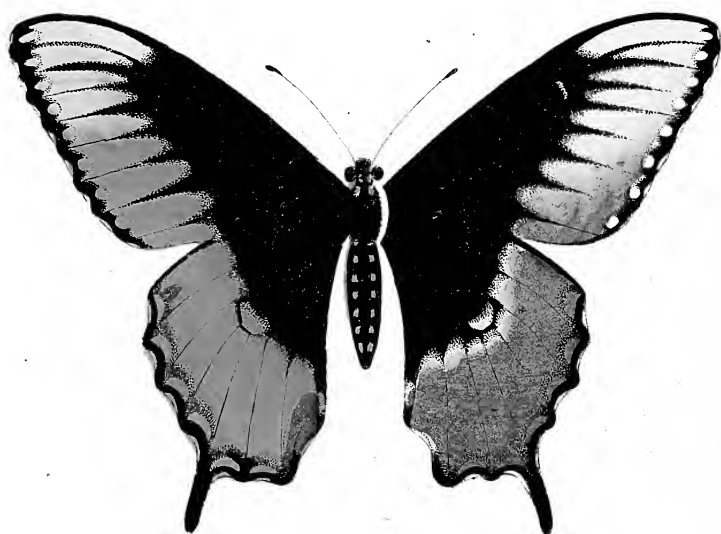
5. *Dichagramma Walkerii*, Grote. ♀.

6. *Dichagramma vinulenta*, Grote. ♂.

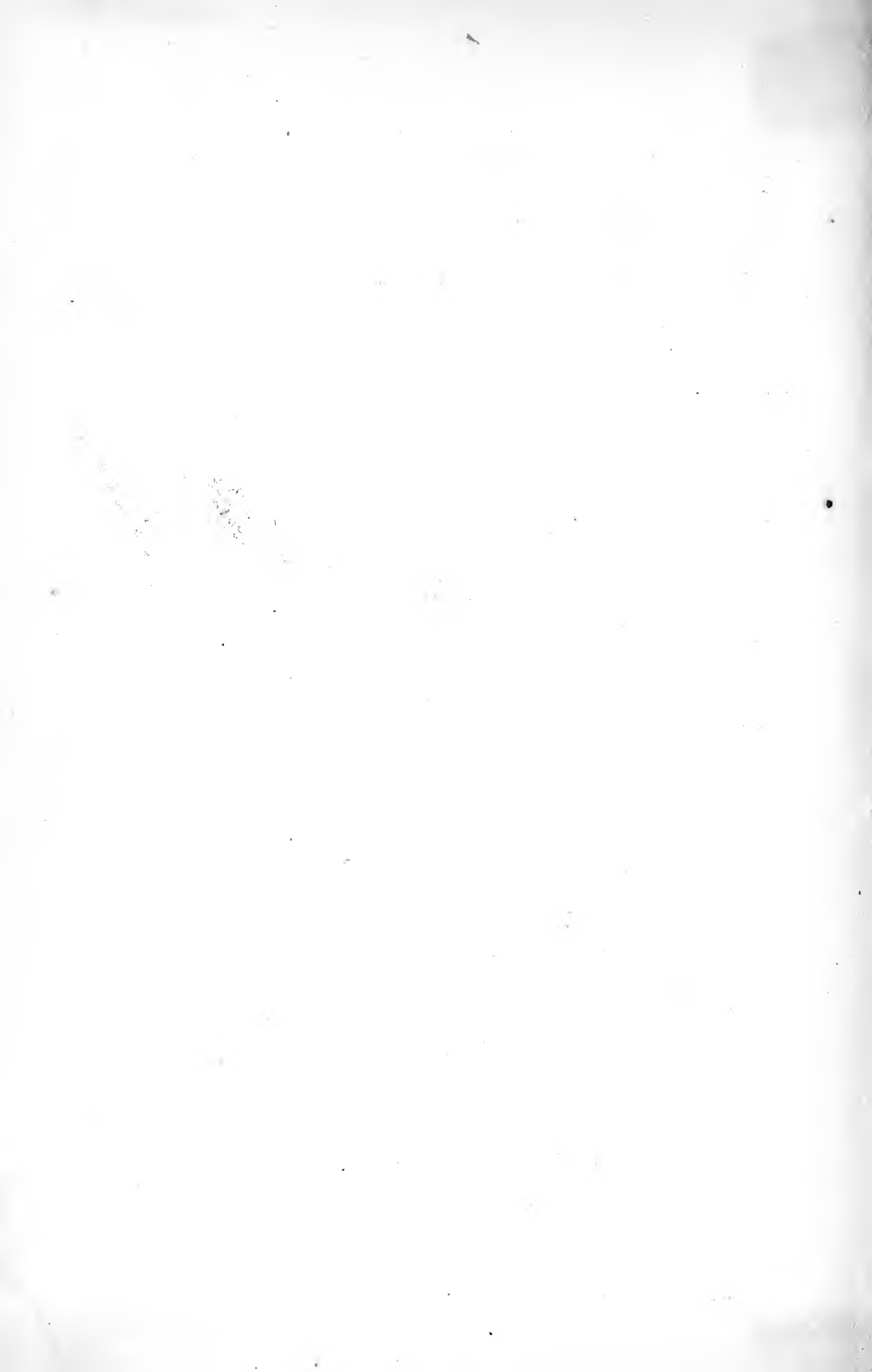
7. *Raphia frater*, Grote. ♀.

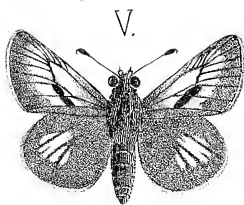
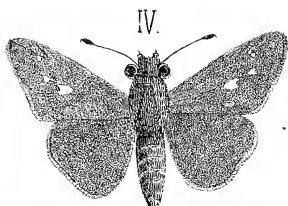
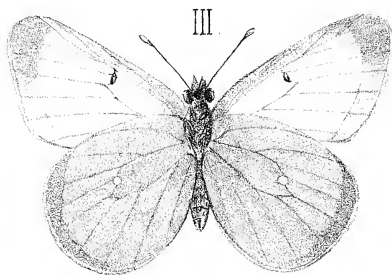
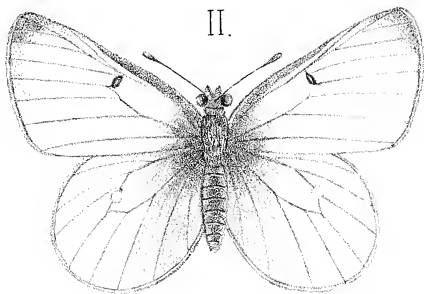
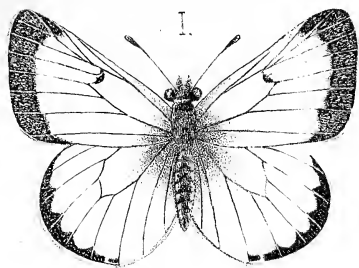






PAPILIO CALVERLEYI.





I. COLIAS ALEXANDRA ♂

II. COLIAS ALEXANDRA ♀

III. COLIAS ALEXANDRA ♂  
*reversed.*

IV. HESPERIA OCOLA ♂

V. HESPERIA PONTIAC ♂



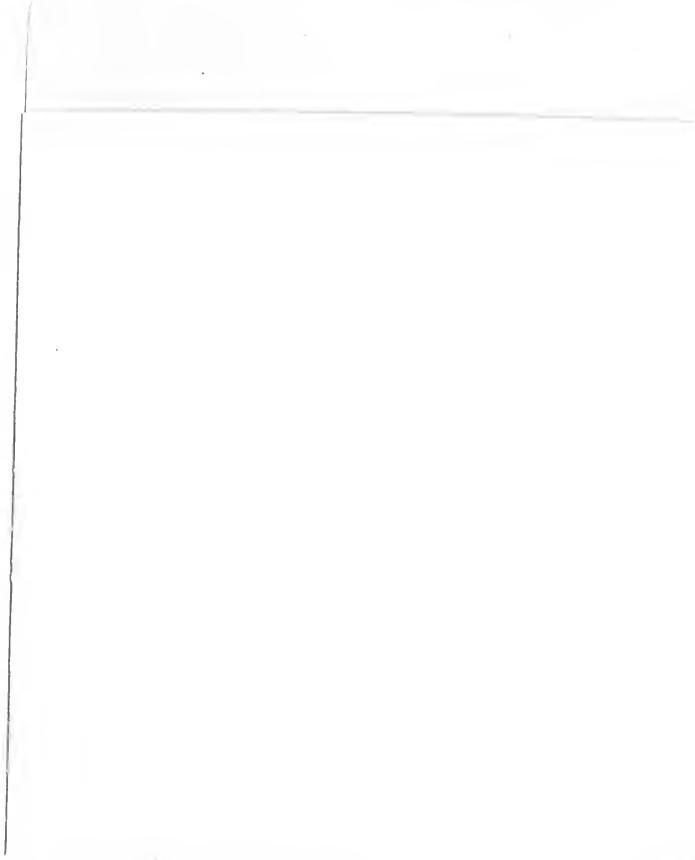












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