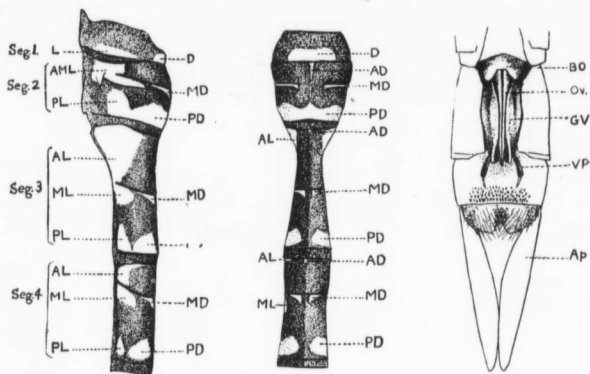


4

3



1

2

5

AESHNA JUNCEA AND INTERRUPTA. (See page 391.)

# The Canadian Entomologist.

VOL. XL.

LONDON, NOVEMBER, 1908.

No. 11.

## A KEY TO THE NORTH AMERICAN SPECIES OF AESHNA FOUND NORTH OF MEXICO.

BY E. M. WALKER, TORONTO.

Although nearly two years have elapsed since the writer commenced a critical study of the North American species of the Odonate genus *Aeshna*, Fabr., it will be some time yet before the work is completed. This delay has been chiefly due to the length of time required for the execution of the numerous illustrations and for obtaining a proper field knowledge of the various species, and also to difficulties experienced in collecting and rearing the nymphs.

This being the case, it was decided to issue in advance an analytical key to the species treated in the revision in order that, in the interval, species may be listed or otherwise referred to under the names employed therein.

It has been necessary to draw up a separate key for the determination of the females, as the chief diagnostic characters of the males are found in the superior appendages and accessory genitalia. This key to the females is largely artificial, and it has been very difficult to find reliable characters for the separation of some of the species, although with experience they can almost always be recognized at a glance. Of some of the species I have seen very few females, and it is very probable that with sufficient material some of the characters used will prove invalid.

A few of the terms employed in the key require special notice. The terms hamular process and hamular fold designate respectively the more superficial and deeper parts of the anterior hamules, and are sufficiently well indicated in figs. 2 and 3 on the plate.

As the colour pattern is of the same type throughout the genus as represented in North America, it has been found convenient to apply special names to the different bands and spots which characterize this pattern.

The name dorsal thoracic band requires no explanation. The first and second lateral thoracic bands are two oblique pale bands on the sides of the mesepimeron and metepimeron respectively. The names used to

designate the abdominal spots are given in the explanation of the plate, and in the key these are referred to under the same abbreviations as are used to indicate them on the plate.

KEY TO THE NORTH AMERICAN SPECIES OF AESHNA.

1. Males.

A. Anal triangle 3-celled; spine of the anterior lamina well developed, directed caudad and curved more or less cephalad.

B. A distinct spinulose ventral tubercle on abd. seg. 1; dorsum of seg. 10 with a median basal tooth-like elevation; superior appendages with a well-developed superior carina.

C. A black line on the fronto-nasal suture; superior appendages not apically forked, the apices obtusangulate or rounded; superior carina not angulate nor denticulate; inferior appendage somewhat less than half as long as the superiors . . . . . *A. californica* Calvert.

CC. No black line on the fronto-nasal suture; superior appendages in profile apically forked, the apices acute and decurved, superior carina angulate; inferior appendage distinctly more than half as long as the superiors . . . . . (*multicolor* group).

D. Abdomen (excl. appendages) nearly or quite four times as long as the thorax (excl. prothorax); ventral tubercle on seg. 1 but little elevated; superior appendages about five times as long as their greatest width, inferior subbasal tubercle at one-sixth to one-seventh the length of the appendage; height of superior carina above outer margin, in profile, much less than depth of appendage directly below it, its length rather less than one-third that of the appendage;

outer side of anal loop in hind wings about as long as inner side of triangle . . . . . 2. *mutata* Hagen.

DD. Abdomen (excl. appendages) less than three and one-half times as long as thorax; a prominent ventral tubercle on seg. 1; superior appendages about seven times as long as their greatest width, inferior subbasal tubercle at one-fourth to one-fifth the length of the appendage; height of superior carina above outer margin, in profile, not less than depth of appendage directly below it, its length distinctly more than one-third that of the appendage; outer side of anal loop in hind wings longer than inner side of triangle . . . . . 3. *multicolor* Hagen.

BB. Abdominal seg. 1 without a ventral tubercle; segment 10 without a median dorsal tooth; superior appendages without a superior carina, not apically forked, but with an antepical inferior spine, the apices broad and rounded . . . . . (*cyanea* group).

E. A black line (rarely absent) on the fronto-nasal suture; face pale yellowish; dorsal thoracic bands 1 mm. or less broad, tapering somewhat towards each end, or sometimes suddenly expanded at the extreme posterior end; lateral thoracic bands nearly straight and equal; spots on abdomen blue, of moderate or large size, PD on seg. 9 distinctly more than one-half as long as the dorsum of the segment; lateral carina of seg. 7 in ventral view slightly or not at all sinuate; generally one cell between A<sub>1</sub>, at its origin and the anal triangle . . . . . 4. *palmata* Hagen.

EE. No black line on the fronto-nasal suture ; dorsal thoracic bands rapidly widening caudad so as to be triangular in form with the base just in front of the antealar sinus ; generally two cells between  $A_1$ , at its origin, and the anal triangle.

F. Face rather dark olivaceous ; lateral thoracic bands rather narrow (about 1 mm.), straight, not widening above, nearly surrounded by a margin darker than the ground colour of the thorax ; abdominal spots mostly smaller than usual, more or less greenish, PD on seg. 9 less than one-third as long as the dorsum of the segment ; a pair of large pale bluish basal spots on the ventral surface of segs. 4, 5 and 6 ; lateral carina of segs. 7 and 8 in ventral view strongly sinuate in its anterior two-fifths. . . 5. *umbrosa*, n. sp.

FF. Face pale greenish-yellow ; lateral thoracic bands broader, not surrounded by a dark margin, widening above the middle margins of the first band, especially the anterior, distinctly sinuate ; spots of the abdomen well developed, mostly blue, PD on seg. 9 more than one-half as long as the dorsum of the segment ; ventral surface of abdomen without pale spots ; lateral carina of seg. 7 at most very feebly sinuate in ventral view. . . . . 6. *constricta* Say.

AA. Anal triangle 2-celled ; spine of the anterior lamina directed ventrad.

G. Hamular process continuous with hamular fold (Pl. X, fig. 3), spine of the anterior lamina short and blunt, projecting very little, if at all, below the general level of the ventral surface. . . . . (*clepsydra* group).

- H. A black line on the fronto-nasal suture; hamular processes short and broad, directed mediad and ventrad.
- I. Lateral thoracic bands each divided into a superior and inferior spot; dorsal thoracic bands reduced to a pair of small elongate spots narrowed at both ends and not reaching the antealar sinus; superior appendages with the inner margin distinctly sinuate in dorsal view, the apices rounded or bluntly angulate, seldom with a terminal tooth, superior carina minutely denticulated or smooth..... 7. *interrupta*, n. sp.
- II. Lateral thoracic bands not divided.
- J. Dorsal thoracic bands reduced to a pair of small pale, often almost obsolete, streaks, which do not nearly reach the antealar sinus; lateral thoracic bands not more than 1 mm. broad, nearly or quite straight.
- K. Superior appendages with a low basal tubercle on the ventro-internal surface (best seen in an oblique view from above); inner margin in dorsal view gently sinuate, in profile slightly concave before the middle, beyond which it forms a prominent more or less obtusangulate inferior carina; breadth at middle about twice that of the extreme base, thence narrowing gradually to the more or less acute apices, which terminate in a small spine; superior carina moderately elevated before the apex, with a few minute denticles; inferior appendage about three-fifths as long as the superiors; lateral thoracic bands about 1 mm. broad below, narrower above..... 8. *interna*, n. sp.
- KK. Superior appendages without any indication of a ventro-internal basal tubercle.

- L. Lateral thoracic bands linear, their breadth less than .75 mm.; inner margin of superior appendages in dorsal view very gently sinuate, in profile straight or slightly convex before the middle, the inferior carina rather low, its angle rounded or obsolete; breadth of appendage at middle scarcely twice that at the extreme base, thence narrowing gradually to the rounded or bluntly angulate apices, which do not normally bear a terminal tooth; superior carina but little elevated, finely denticulated or smooth; inferior appendage three-fifths to two-thirds as long as the superiors . . . . . 9. *lineata*, n. sp.
- LL. Lateral thoracic bands about 1 mm. broad near the lower end, somewhat narrowed at the middle; inner margin of superior appendages in profile slightly concave before the middle, in dorsal view strongly sinuate, the breadth of the appendage increasing rapidly from the basal fourth, so that at the middle it is fully twice as broad as at base, thence scarcely narrowing to the well-rounded apices, which bear near the outer margin a prominent tooth; inferior appendage slightly more than half as long as the superiors . . . 10. *nevadensis*, n. sp.
- JJ. Dorsal thoracic bands well developed, expanded and truncate at the upper end, which is just in

front of the antealar sinus; lateral thoracic bands more than 1.5 mm. broad, the first band deeply sinuate in front, the second more or less triangular.

M. Hind wing 43-48 mm.; no antehumeral spot; upper end of first lateral thoracic band not bent forwards; spots between first and second bands small and inconspicuous; superior appendages expanding almost symmetrically from the base; the inner margin in dorsal view not sinuate, apices rounded, normally without a terminal spine; outer margin in profile curved or bent upwards, both cephalad and caudad; superior carina rather strongly elevated in the apical fourth, bearing 6 or 8 well-marked denticles. . . . . 11. *eremita* Scudd.

MM. Hind wing 39-42 mm.; a large triangular antehumeral spot immediately in front of the inferior part of the first lateral thoracic band, the upper and narrower end of which is bent sharply forward; spots between first and second lateral bands unusually large; superior appendages expanding unsymmetrically, the inner margin being distinctly sinuate, the distal three-fifths equal, apices tapering rather abruptly and terminating in a well-marked slightly decurved spine; outer margin in profile nearly straight throughout; superior carina slightly elevated apically, bearing 3 to 5 small denticles. 12. *clepsydra* Say.

HH. No black line on the fronto-nasal suture.

N. First lateral thoracic band not tapering regularly dorsad, its anterior margin distinctly, usually strongly, sinuate; PD always present on abdominal seg. 10; superior appendages without a prominent inferior basal tubercle.



O. Larger and relatively stouter species (abdomen 49-55 mm., hind wing 43-48 mm.); lateral thoracic bands blue, sometimes partly green, the anterior margin of the first band very deeply sinuate or angularly excavated; superior appendages expanding almost symmetrically from the base, the inner margin in dorsal view not sinuate, apices normally rounded, not at all decurved, and without a terminal spine; superior carina rather strongly elevated in the apical fourth, bearing 6 or 8 well-marked denticles; a low rounded subbasal inferior eminence present; hamular processes directed mediad, short and broad, with a slender apical tubercle . . . . . II. *eremita* Scudd.

OO. Smaller and slenderer species (abdomen 42-45 mm., hind wing 39-42.5 mm.); superior appendages expanding unsymmetrically from the base, the inner margin in dorsal view distinctly sinuate; superior carina moderately elevated, apices acute, somewhat decurved, with a distinct terminal spine.

P. Lateral thoracic bands blue or green, the first generally green below, blue above, its anterior margin almost rectangularly sinuate; superior carina of the superior appendages with a few denticles, apices rather abruptly decurved; hamular processes rather long, directed cephalad, subparallel, with the tips somewhat convergent; PI. typically represented on abdominal segments 2-6 . . . . . 13. *canadensis*, n. sp.

PP. Lateral thoracic bands yellowish-green, the anterior margin of the first obtus-angularly sinuate; superior carina of

the superior appendages not denticulated, apices gently decurved; hamular processes directed mediad and ventrad, each consisting of a stout proximal and a slender distal part; PL typically represented on abdominal segs. 2-4 . . . . . 14. *verticalis* Hagen.

- NN. First lateral thoracic band tapering regularly dorsad, its margins nearly straight; abdominal seg. 10 without pale spots; superior appendages with a prominent inferior basal tubercle, expanding unsymmetrically from the base, the inner margin in dorsal vein distinctly sinuate; superior carina moderately elevated, not denticulated, the apices rounded, with a small terminal spine . . . . . 15. *tuberculifera*, n. sp.
- GG. Hamular process separate from the hamular fold (pl. X, fig. 4); spine of the anterior lamina long, generally sharp-pointed, projecting well below the general level of the ventral surface; a black line always present on the fronto-nasal suture.
- Q. Lateral thoracic bands more than 1 mm. broad, not sigmoid; hamular processes long, slender and spine-like, directed ventrad and mediad; superior carina of the superior appendages not denticulated, apices acute . . . . . (*juncea* group).
- R. Lateral thoracic bands straight and subequal; hamular folds fairly well developed, widely separated, plainly visible in a vertical view from beneath . . . . . 16. *juncea* L.
- RR. Lateral thoracic bands with the anterior margins obtusangularly excavated, the first band slightly bent a little above the middle; hamular folds very small, less widely separated, and almost concealed in a vertical view from beneath by the overlapping hamular processes . . . . . 17. *subarctica*, n. sp.
- QQ. Lateral thoracic bands less than 1 mm. broad, the first one sigmoid or bent by alternate angles; hamular processes broad, flat, triangular, with the inner margins

closely approximate, the apices directed cephalad; superior carina of the superior appendages more or less denticulated . . . . . (*caerulea* group).

S. Spine of the anterior lamina distinctly longer than the hamular processes, slender, curved ventrad, sharp pointed; distance from hind margin of occiput to frontal vesicle 2.5 mm.; MD small, triangular, yellowish . . . . . 18. *sitchensis* Hagen.

SS. Spine of the anterior lamina not longer than the hamular processes, rather stout, straight, bluntly-pointed; distance from hind margin of occiput to frontal vesicle less than 2 mm.; MD large, subquadrate, more or less bluish . . . . . 19. *septentrionalis* Hagen.

2. Females.

A. Abdominal segment 1 with a distinct ventral spinulose tubercle.

B. A black line on the fronto-nasal suture; length of abdomen (excl. appendages) 36-38 mm . . . . . 1. *californica* Calvert.

BB. No black line on the fronto-nasal suture; length of abdomen more than 40 mm.

C. Abdomen about four times as long as the thorax (excl. prothorax); ventral tubercle on seg. 1 but little elevated; appendages 7 mm. long, lateral thoracic bands widening above;  $A_2$  arising opposite or distal to the last cubito-anal cross-vein before the subtriangle; outer side of anal loop of hind wing about as long as inner side of triangle . . . . . 2. *mutata* Hagen.

CC. Abdomen less than four times as long as the thorax; a prominent ventral tubercle on seg. 1; appendages 5-6 mm. long, lateral thoracic bands subequal;  $A_2$  arising proximal to the last cubito-anal cross-vein before the subtriangle; outer side of anal loop of hind wing longer than inner side of triangle . . . . . 3. *multicolor* Hagen.

AA. Abdominal segment 1 without a ventral spinulose tubercle.

D. Basal plate of ovipositor not bilobed, posterior margin straight or slightly convex; PL generally connected with PD on abdominal segs. 2-4 (often separate in *Ae. umbrosa*), usually smaller than the latter.

- E. Genital valves 4 mm. or more in length; valvular processes as long as dorsum of seg. 10 (2 mm.); appendages rarely less than 2 mm. broad; proximal third broad with convex margins, expanding rapidly, so that the greatest breadth is reached before the middle, distal half gradually tapering to a more or less acute apex; no black line on the fronto-nasal suture.
- F. First lateral thoracic band with the front margin distinctly sinuate, the upper end giving off caudad a small spur; second band suddenly expanding at upper end; length of abdomen without appendages less than 45 mm., of ovipositor 6 mm., of appendages 6-7.5 mm.; apices acute ..... 6. *constricta* Say.
- FF. First lateral thoracic band with the front margin straight, or nearly so, gradually tapering dorsad, not giving off a distinct posterior spur; second band not suddenly widened above; length of abdomen 45 mm. or more, of ovipositor rather less than 5 mm., of appendages 7.5-9.5 mm.; apices acute or somewhat rounded. 15. *tuberculifera*, n.sp.
- EE. Genital valves less than 4 mm. long; valvular processes much shorter than dorsum of 10; appendages less than 2 mm. broad and, except in *Ae. sitchensis*, slender, the margins nearly straight in the proximal third, broadest beyond the middle, the apices rounded.
- G. Abdomen at least 40 mm. long; first lateral thoracic band never sigmoid nor bent by alternate angles.
- H. A black line on the fronto-nasal suture.
- I. Lateral thoracic bands each divided or very nearly divided into a superior and an inferior spot. . . . 7. *interrupta*, n. sp.
- II. Lateral thoracic bands entire.
- J. Lateral thoracic bands nearly straight, the anterior margin of the first band not distinctly sinuate.

- K. Lateral thoracic bands somewhat more than 1 mm. broad, yellow; ovipositor 4 mm. long; genital valves with tips elevated . . . 4. *palmata* Hagen.
- KK. Lateral thoracic bands not more than 1 mm. broad, generally pale bluish, rarely yellow; ovipositor 3.3 mm. long; tips of genital valves not elevated.
- L. Lateral thoracic bands about 1 mm. broad . . .  
8. *interna*, n. sp.
- LI. Lateral thoracic bands linear, generally less than .75 mm. broad . . .  
9. *lineata*, n. sp.
- JJ. Lateral thoracic bands broad, the first with the anterior margin strongly sinuate, narrowed about the middle, the second expanding dorsad, more or less triangular.
- M. Larger, stouter species; hind wing 45-46.5 mm. long; no antehumeral spot; first lateral thoracic band greatly constricted near the middle by a deep excavation of the anterior margin, upper end not bent forwards; spots between first and second bands small and inconspicuous . . . . 11. *eremita* Scudd.
- MM. Smaller, slenderer species; hind wing 40-42 mm. long; a conspicuous triangular pale antehumeral spot just in front

of the lower and broader part of the first lateral band, the upper end of the latter narrow and sharply bent forward; a large pale spot, including the spiracle, and another above

it . . . . . 12. *clepsydra* Say.

HH. No black line on the fronto-nasal suture.

N. Lateral thoracic green or yellowish-green (rarely blue) not margined with black, the anterior margin of the first band distinctly sinuate, the second band elongate triangular; PD on 2-5 at least 1 mm. long; ovipositor 3 mm. long; tips of genital valves not elevated.

O. First lateral thoracic band with the anterior margin almost rectangularly sinuate, its upper end giving off caudad a very narrow spur; posterior (postero-inferior) margin of second band generally curved ventrad at the upper end; appendages usually 5-6 mm. long (rarely 6.7

mm) . . . . . 13. *canadensis*, n. sp.

OO. First lateral thoracic band with the anterior margin obtusangularly sinuate, its upper end giving off caudad a rather broad spur; posterior margin of second lateral band straight; appendages 7 mm. long . . . . . 14. *verticalis* Hagen.

NN. Lateral thoracic bands bright yellow, margined with black or dark brown, about 1 mm broad, straight, the first band expanded a little below, but not at all sinuate, the second band with the margins subparallel; abdominal spots

- small, PD being on all the segments less than .5 mm. long; ovipositor 3.5 mm.; tips of genital valves elevated.....5. *umbrosa*, n. sp.
- GG. Abdomen not more than 38 mm. long; first lateral thoracic band narrow, sigmoid, or bent by alternate angles; a heavy black line on the fronto-nasal suture.
- P. Distance from posterior margin of occiput to frontal vesicle at least 2.5 mm.; appendages slightly longer than the dorsa of segs. 9 + 10, a little more than 1 mm. broad, tapering equally at base and apex, the latter distinctly though bluntly pointed. 18. *sitchensis* Hagen.
- PP. Distance from posterior margin of occiput to frontal vesicle about 1.5 mm.; appendages about as long as segs. 9 + 10; more slender proximally than distally, the apices rounded or broadly and obscurely pointed .....19. *septentrionalis* Hagen.
- DD. Basal plate of ovipositor distinctly bilobed (pl. X, fig. 5); PL separate from PD (sometimes narrowly connected on seg. 2), as large as the latter on segs. 2-5; a black line always present on the fronto-nasal suture; lateral thoracic bands yellow or greenish-yellow.
- Q. Appendages distinctly shorter than segs. 8 + 9 (5 mm. or less); margins of lateral thoracic bands nearly straight, first band gradually tapering to the upper end, without a distinct posterior spur .....16. *juncea* L.
- QQ. Appendages about as long as segs. 8 + 9 (6-6.5 mm.); lateral thoracic bands with their anterior margins obtus-angularly excavated, but not sinuate, posterior margins nearly straight; first band gently widening above the middle to the upper end, from which a narrow posterior spur is given off. ....17. *subarctica*, n. sp.
- Unknown.....10. *nevadensis*, n. sp.

## EXPLANATION OF PLATE.

Fig. 1, 2. *Aeshna juncea* L., ♂, abdominal segments 1-4. 1, lateral; 2, dorsal view.

D, dorsal spot of segment 1.

L, lateral " "

AL, anterior lateral spot.

ML, middle " "

PL, posterior " "

AML, the homologue of AL + ML on seg. 2.

AD, anterior dorsal spot.

MD, middle " "

PD, posterior " "

" 3. *Aeshna interrupta* Walk. ♂, anterior hamules.

HF, hamular fold; HP, hamular process; Sp., spine of the anterior lamina.

" 4. *Aeshna juncea* L., ♂. Letters as in Fig. 3.

" 5. *Aeshna juncea* L., ♀, ventral aspect of abdominal segments 9 and 10; Ov, ovipositor; BO, basal plate of ovipositor; GV, genital valve; VP, valvular process; Ap., appendage.

(To be continued.)

## NOTES ON SOME SOCIETY ISLAND MOSQUITOES.

BY R. W. DOANE, STANFORD UNIVERSITY, CALIF.

During a short stay in July and August on Tahiti, Morea and Tetioroa I found the mosquitoes very troublesome, particularly so in the dense growth where one could not get the sea breeze. I had not time to make any particular study of the species occurring there, but the following notes on the three species that I met with may be acceptable to those interested in the group.

*Stegomyia calopus*, Meig., and *S. scutellaris*, Walk., are the two common day mosquitoes, occurring in the houses and out of doors everywhere. They breed together in standing, sometimes rather foul, water. I have seen the larvæ by the millions in the small drainage gutters along the streets of Papeete. No effort is made to control them, although one man told me that at some seasons the mosquitoes were so bad in places that people took refuge in their beds to escape the pests. All the beds are provided with a canopy of mosquito netting, but there are no screens on the doors or windows.

With the opening of the Panama Canal and the consequent short and frequent passage of ships from that region to all of these Pacific islands,



the yellow fever is almost sure to be introduced there unless extraordinary precautions are taken to prevent it. Under the present sanitary conditions it would be impossible to control the disease once it gained a foothold. However, after the French officials learned that *S. calopus* was one of their most common mosquitoes, they said that steps would probably be taken to control them, at least in Papetee. As an example of how easily relief may be had in some instances I may give my experience on Tetioroa. The first day there I was badly pestered by the great number of these mosquitoes in the little native hut that had been assigned to me as my laboratory. A brief search around the premises showed that the water in the tanks that were used for storing rain-water was swarming with mosquito larvæ. Less than half a pint of kerosene served to treat this source of supply, and I experienced but little trouble after that about the laboratory.

While these two species are principally day feeders, they will occasionally bite at night after the lamps have been lighted. Usually, however, they are satisfied with their day's work and give way to the no less annoying or less dangerous night-flying species, *Culex fatigans*, Wied. If one happens to be sleeping out of doors or in a bed provided with only a poor screen, the low, sharp buzz and the vicious bite of these pests make sleep almost impossible. Or if disturbed sleep does come, it is only to dream of an arm or a leg swelling to horrible proportions, for one knows that any one of these mosquitoes as she bites may be transplanting to one's blood some of the filaria derived from a former meal on some of the elephantiasis patients who have been seen during the day.

Elephantiasis is quite a common disease on Tahiti and Morea. On the latter island it is said to be much more common on the lee side, where there is more low marsh land, than on the more rugged windward side.

The larvæ of *C. fatigans* are found in the same situations and often in the same pools as *S. calopus* and *S. scutellaris*. In a dipperful of water from any of the gutters along the roadside would usually be found the larvæ of these three species.

My specimens of *S. scutellaris* differ in some respects from the descriptions of the typical forms; the head has two white lateral bands; the white border of the eyes is very narrow or not apparent above; there are no lighter bands at the joints of the antennæ of the female; the white silvery line extends seven-eighths of the length of the mesonotum, much attenuated posteriorly; the white bands on the abdomen are represented only by white spots on the sides, but are very distinct below. It is probably close to var. *sumarensis*, Ludlow.

## NOTES ON THE COCCINELLIDÆ.

BY THOS. L. CASEY, WASHINGTON, D. C.

In his recent essays on this family of beetles, Mr. Chas. W. Leng (Journ. N. Y. Ent. Soc.) has given results betraying some superficiality of study and lack of sound discriminative judgment. He seems to have pursued the eminently conservative course of assigning all species which are in any way remindful of others to rank as varieties of the latter, incidentally giving them three names, and frequently in a wholly arbitrary and whimsical manner. If he had examined these so-called varieties at all carefully, he would have been spared the responsibility for many needless errors.\* The course followed by Mr. Leng and myself are at opposite taxonomic extremes. I tabulated virtually all the forms as species, because my material was not sufficient to warrant giving them a more definitive status, and not because I was not convinced that some of them might ultimately be proved to have less than specific weight. Mr. Leng, on the other hand, with material not so very greatly in excess of my own, has assumed to know that the true taxonomic position of practically every form which I defined is that of a variety or subspecies. He has apparently tried to imitate the European Catalogue in reducing most of the described forms of that region to varieties or aberrations, but if he were familiar with them, he would see that many differ only by the absence of a spot here or a dash there, and that a large proportion of them are really synonyms. The latest European catalogue has, however, gone too far in its reductions from the specific status; the reverse swing of the pendulum is too radical, and there will be a gradually decreasing oscillation to a more rational intermediate position. I have endeavoured to define our various modifications broadly, on lines of general form, size, sculpture, structure or radical divergencies in the colour scheme, and feel certain that most of them are true species. The truth lies between the

\*If Mr. Leng had taken the very slight trouble to communicate with me regarding the status of *Exochomus subrotundus* and other points, a good deal of uncertainty could have been cleared up. I would gladly have aided him through special observations, or have given him cordial welcome to personal study of my collections, and this despite a baseless rumor which, I am reliably informed, is being circulated with more or less pertinacity by a Washington entomologist of some repute, to the effect that my collections are inaccessible—a statement smacking strongly of malice aforethought. I might add, however, that one who is actively favouring a departure from customary methods of doing anything whatever may have a few friends or passive onlookers, but a far greater number of irreconcilable doubters, with a modicum of more or less virulent enemies, so that he generally comes to draw the line of personal favour somewhere, even in matters scientific, as we are all human after all.

course pursued by me and that suggested by Mr. Leng, but, for the above reasons, I anticipate the ultimate decision will be far nearer the former than the latter.

It is probably true that the various forms defined in the genus *Megilla* have rather less than full specific value, but the Brownsville modification is so much larger that it may possibly prove to have very nearly specific weight. Another form, from Cuba, in my collection, has the two thoracic spots completely united, but I do not know how constantly.\* Mr. Leng is, however, wrong in uniting *Macronæmia* with *Anisosticta*; it is a valid genus, and so recognized by Dr. Weise, who, however, arbitrarily changed the name to *Micronæmia*, a useless proceeding, as *Macronæmia* is amply protected by the laws of priority. *Paranæmia similis* is very readily distinguishable from the Californian *vittigera*, and is not a mere hypothetical race; it is certainly, at least, a valid subspecies.

*Hippodamia*, Chev.

I assumed the authorship of Chevrolat for this genus, and not Mulsant, as this seems to be the course adopted by the latter himself in the Monograph (1866). Owing to the large number of recognizable forms and the variability of markings, unusually pronounced for the Coccinellidæ, where ornamentation is frequently so free from marked instability, there will probably always be more or less divergence of opinion regarding specific limitation. The *5-signata*—*convergens* group, much the largest of the genus in America, includes many species of indubitable reality, a far greater number, in fact, than the half-dozen recognized by Mr. Leng.

This *5-signata*—*convergens* series embraces two not very strongly-differentiated groups, one in which there is a transverse subbasal elytral fascia, sometimes more or less permanently disintegrated into spots or wholly wanting, and attended by a general absence or very great reduction or instability of the diverging discal lines of the pronotum, represented by the former, and the other in which the subbasal spots are either wanting or generally isolated, and accompanied by a very pronounced

\**M. Cubensis*, n. subsp.—Smaller and rather less opaque than *fuscilabris*, red, the head black, with the usual acutely angulate frontal spot; pronotum solidly black, the apical and lateral margins alone pale, though broadly; elytra with the usual spots of *fuscilabris*, except that the sutural post-medial is resolved into two spots, each tangent to the suture. Length, 5.0 mm.; width, 2.8 mm. Cuba (Havana).

The form which I described under the name *medialis* seems to be that figured by Gorham in the *Biologia* (VII, Pl. 8, fig. 20).

development and persistence of the diverging thoracic lines, represented by *convergens*.

The *5-signata* group comprises by far the greater number of species. *Mesta*, Lec., has a very uncertain taxonomic status but is evidently a member of the *5-signata* series; we have as yet no biological evidence concerning its relationships. *Ambigua*, Lec., of broadly oval form and constant absence of elytral maculation, is one of the most isolated species of the entire genus and without any close affinities. *Extensa*, Muls., though a member of this series, differs from the common forms of the *5-signata* or *LeContei* types in its very finely-reflexed elytral side margins, and it is undoubtedly a distinct species, probably having as a subspecies *leporina*, Muls. Mulsant (Mon., 1866) states of *leporina* that it is elongate-oval, slightly convex, with a black pronotum, having at each side a white border almost interrupted at the middle, the elytra with a sub-basal band from callus to callus, and each with two black spots, the anterior somewhat in transverse triangle, the subapical smaller, obtriangular and united with the preceding; dimensions, 5.6 x 4.2 mm. California. So it cannot be considered in any way related to *vernix*, as stated by Leng. *Oregonensis*, Cr., is described as having a subbasal elytral band, with the posterior spots united to form a lunule, and the white thoracic side margin narrow; it is therefore probably a distinct species in this immediate neighbourhood, or, if not, may be a subspecies of *extensa*.

The species described by Kirby as *5 signata*, is essentially a boreal form, and may be known by the generally broad, solid and even bioblique subbasal band of the elytra, with a thick and obliquely transverse post-medial and full rounded subapical spot on each. The white lateral thoracic margin is confined to the apical angles; this oblique white area may sometimes be visible also at the basal angles, though I assume very rarely, and those examples with the pale area running down the sides, cited by Crotch, belong without much doubt to another species, mentioned below, and accidentally mingled with his true *5-signata*. The following is a more southern subspecies of *5-signata*:

*H. coccinea*, n. subsp.—More narrowly oval and smaller than *5-signata*, similarly moderately shining, closely and rather coarsely punctate; head black, with a large and irregularly rhomboidal pale spot; pronotum solidly black, without discal pale spots, the black area broadly bilobed in front, the lobes tangent to the apical margin, the sides obliquely pale in front, not at all pale posteriorly; elytra with a broad subbasal

fascia, which is sometimes even, but often irregular, its arms less anteriorly oblique than in *5-signata*, sometimes with a small post-humeral spot also, the oblique post-medial spot thinner and the subapical smaller, sometimes subobsolete; ground colour bright scarlet. Length, 5.4-5.6 mm.; width, 3.3-3.7 mm. Colorado (Eldora and Boulder Co.).

In *LeContei*, of which I have specimens from the type locality, New Mexico, the head always has a rhomboidal central pale spot as in *5-signata*, but the thoracic margins are broadly white at apex and base, though broadly subinterrupted at the middle by an abrupt spur from the central black area. There is less generally a subbasal fascia, and, when it occurs, it is more bilaterally attenuated. An allied form before me from Utah to Washington State, but probably specifically distinct and evidently a form frequently confounded with *LeContei*, may be distinguished readily by the broad entire white band on the head, from one eye to the other; this is constant in all my specimens. *Mulsanti*, of LeConte, from Lake Superior, the type locality, to Colorado, is a more northern form, with heavier subbasal marks, which frequently form a fascia, and this is no doubt the form frequently confounded with *5-signata*, as intimated above. The following might be regarded as another subspecies of *LeContei*:

*H. abducens*, n. subsp.—Much larger than *LeContei*, almost similarly marked, except that all black marks on the elytra before the middle are frequently obliterated; pronotum similar, except that the less angulate black area never completely divides the white margin, the diverging lines occasionally evident, but generally obsolete; surface slightly alutaceous, the punctures very fine; elytra before the two large posterior spots either devoid of all marking, even to the virtual obliteration of the sutural dash, or with a crescentiform fascia between the humeri, with but few intermediate stages of ornamentation, the post-humeral spot always completely obsolete; sixth ventral of the male without apical pit, even and entire. Length, 5.8-7.0 mm.; width, 3.7-4.3 mm. Colorado (Boulder Co.).

The general habitus of that form of *abducens* with obliterated ante-medial marks, strongly recalls the eastern *glacialis*, but it may be distinguished readily by its narrower form and feebly developed or obsolete diverging thoracic lines, besides differences in sculpture.

*Vernix* is a much smaller and narrower form, specifically different from *LeContei* in having the very large rhomboidal frontal pale spot more or less narrowly extending to the sides of the head and enveloping the anterior parts of the eyes; *subsimitis* may be held to be a subspecies.

Another form in my cabinet, departing radically from *LeContei* in having the pronotal side margins narrowly and subequally pale from apex to base, may be described as follows :

*H. Uteana*, n. sp.—Smaller than *LeContei* and bright scarlet, with isolated large subhumeral spot and trilobed scutellar star, similar in general form, more shining, the punctures distinct and rather sparser; head with rhomboidal isolated pale spot; pronotum solidly black, without trace of discal spots, the lateral spur of the black area very obtuse, so that the unusually narrow lateral pale margin is subparallel, not much wider at any point than the entire apical pale margin, and never divided; apex of the met-episternum pale, as well as the epimeron; elytra with oblique post-medial fascia and subapical circular spot. Length, 5.0–5.6 mm.; width, 3.25–3.4 mm. Utah (Sevier Lake, Marysvale and Nephi), Wickham.

Finally, we have a group of small species, in no way closely related to any others of the *5-signata* group. *Dispar* is recognized as sufficiently distinct to require no farther notice. *Puncticollis* is an equally isolated species, readily identifiable by its small size, narrowly oval outline, narrow and uninterrupted pale thoracic side margin, complete absence of discal diverging lines, strong and close pronotal punctures and the peculiarly irregular post-medial spot of the elytra. The following is a very distinct form related to *puncticollis* :

*H. liliputana*, n. sp.—Very small, narrow and parallel in form, the head with rhomboidal central spot as in *puncticollis*, but more slender, the pronotum much more sparsely punctate but otherwise nearly similar, except that there are two small basal impressions, at lateral fourth; elytra pale brownish-yellow, the margins more finely reflexed than in *puncticollis*, the broad entire bioblique basal fascia similar, with its outer ends truncate, the spot just behind the middle large, rounded, with an external posteriorly oblique spur, the subapical spot large, transversely oval; surface more shining, more coarsely and less closely punctate than in *puncticollis*. Length, 4.0 mm.; width, 2.2 mm. Colorado.

Most of the forms mentioned are, I think, true species; at least, there is no apparent reason for giving them less weight; they have distinctive and readily observable characters, seem to breed true within more or less wide, though perfectly definite, limits of variation and satisfy all the usual definitions of species. It is too much to expect radical divergencies in colour pattern, for the general scheme of ornamentation in the Coccinellidæ is more of a generic than a specific character.

The species of the *convergens* group are fewer in number, those described thus far being *glacialis*, *convergens*, *15 maculata*, *obliqua*, *juncta* and *politissima*. In a very large series of *convergens* before me collected in many places from the Atlantic to the Pacific and as far south as Puebla, in Mexico, there is not a single example in which the slightest tendency to amalgamation of the post-scutellar spots to form a single star, or of the confluence of the post-median spots, either transversely or longitudinally, can be discovered. There may be such phenomena in nature, but I can only say that I have failed to observe them, and strongly suspect that those instances in which they have been announced, as in the unnamed form listed by Leng, refer to some other species, for it is only after much experience that the commingling of different species, so similar in their markings, can be avoided. The subbasal spots are sometimes obsolete, and occasionally all the spots, except the small scutellar dash, are wanting, but I have only observed this in a few Puebla specimens. The species described by Mulsant under the name *15-maculata* is much larger than *convergens*, and is abundantly isolated and perfectly valid, by no means a variety as surmised by Leng. I have a good series taken near St. Louis. *Juncta* is a very remarkable form, with a juxta-sutural vitta uniting the transversely confluent post-median spots with the subapical; it is apparently a species, but, if the future should decide otherwise, it will prove to be a subspecies of *obliqua* and not of *convergens*. *Obliqua* is a species quite distinct from *convergens*; it is smaller, still narrower and has several radical peculiarities of marking. As for *politissima*, it may for the present be disposed of as a subspecies of *obliqua*, of slightly shorter, stouter form, more obsolete punctuation and more polished surface. *Obsoleta*, proposed by Crotch as a variety of *convergens*, is to be completely suppressed as a manuscript name, for no description was given, the only statement made being "punctuation of elytra entirely obsolete," and this is erroneous, as no example of *Hippodamia* ever had the punctures entirely obsolete.

The *sinuata* section of the genus is composed of smaller and narrower species, on the whole, than those of the preceding, differing radically in the complete and constant absence of the two post-scutellar points, and in exhibiting a marked tendency to the longitudinal amalgamation of the discal spots to form vittæ from the humeral callus, there never being any tendency to posterior elongation of the subhumeral spot in the *5-signata*—*convergens* series. There are four known species, *spuria*, *Crotchii*, *sinuata*

and *trivittata*. *Spuria*, Lec., is distinguished by the more gradually narrowed elytra behind the middle, or more elongate-oval form, as mentioned by LeConte. In the typical form, from Oregon and Washington State, the spot on the callus is always isolated and rounded, though the three posterior spots may be joined together to form a design resembling that of *parenthesis*, and the scutellar dash is always short, terminating abruptly near basal fourth, though frequently notably expanded at tip; *Americana*, of Crotch, is a subspecies occurring in New Mexico, having a greatly extended scutellar spot and the subhumeral and median spots frequently united, and, from Washington State and Utah, I have an intermediate form with scutellar spot extending about to the middle or a little beyond. In *Crotchi* the body is more oblong, the elytra more rapidly narrowed and rounded apically, and, in typical forms, the subhumeral spot is always joined to the medial by a subparallel black vitta; the scutellar spot attains basal third and is always more or less broadly rhomboidal, the conformation being as in the subspecies *complex*, of *spuria*. The side margins of the elytra are extremely finely reflexed, and not with a distinct gutter as in *spuria* and its variations. In *sinuata* there is a discal vitta on each elytron, which is almost semicircularly curved apically, and in *trivittata*, which is a much smaller species, the vitta is almost straight throughout, becoming but feebly oblique apically. *Falcigera*, of Crotch, because of the black met-episterna and lack of discal thoracic spots, always so well developed in *sinuata* and allied species, must be considered as a section by itself. I am disposed to hold that the coarse-print paragraph under *Americana*, in Crotch's paper, was really misplaced by the printer in making up the page, and should have followed the preceding *falcigera*, because the met-epimera in *Americana* are undoubtedly pale, as in the other species.

Finally, in regard to the *parenthesis* section, there can be little or no reasonable doubt that *parenthesis* and *apicalis* are distinct species. In the former there is never any tendency in the circular spot on the callus to prolong itself posteriorly, and the subapical spot never attains the sutural angle, while in the latter there is a marked tendency in the subhumeral spot to posterior elongation, and the subapical always attains the sutural angle. I have never seen an exception to these laws in large series, even where the eastern and western species come together on common territory in Colorado, and have never seen anything that appeared to be a hybrid, although hybrids between distinct species frequently do occur, so that this would not be conclusive evidence. As for the exceptional form figured by Leng, having the humeral spot connected with the



post-median, the latter not attaining the sutural angle, I can only say that if the short, broad form of the body and the peculiar form of the anterior margin of the prothorax are truly drawn, it is entitled to a distinctive name, either as a species or a very peculiar subspecies of *parenthesis*. The following is also an interesting subspecies of *parenthesis*:

*H. expurgata*, n. subsp.—Shorter, rather smaller and relatively broader than *parenthesis*, highly polished, with distinct moderate punctures, pale brownish-flavate; prothorax shorter and more transverse, nearly similar in maculation; elytra with a scutellar dash, rapidly expanded at its tip and a rounded subhumeral spot, the remainder of the elytra without spots or with a small post-median spot, and sometimes a still smaller subapical one. Length, 4.0 mm; width, 2.6 mm. Colorado (Boulder Co.).

Mr. Leng has also figured this form having a small posterior dot.

This *parenthesis* group has a distinct suggestion of the two post-scutellar points of the *5-signata* group, combined with the vitta-forming tendency of the *sinuata* group and a system of pronotal maculation peculiar to itself.

*List of American Hippodamia.*

- |  |   |
|--|---|
| <p style="text-align: center;">A</p> <p>1. 13-punctata, Linn. — Holarctic<br/><i>tibialis</i>, Say.</p> <p style="text-align: center;">B</p> <p style="text-align: center;">*</p> <p>2. <i>mœsta</i>, Lec.—Pac. coast.<br/>3. <i>ambigua</i>, Lec.—Calif.<br/><i>punctulata</i>, Lec.</p> <p>4. <i>extensa</i>, Muls.—Calif.<br/>    ssp. <i>leporina</i>, Muls.—Calif.</p> <p>5. <i>oregonensis</i>, Cr.—Oregon.</p> <p>6. <i>5-signata</i>, Kirby.—B. Am.<br/>    ssp. <i>coccinea</i>, Csy.—Col.</p> <p>7. <i>Uteana</i>, Csy.—Utah.</p> <p>8. <i>LeContei</i>, Muls.—New Mex.<br/>    ssp. <i>Mulsanti</i>, Lec.—L. Sup.<br/>    to Col.<br/>    ssp. <i>abducens</i>, Csy.—Col.</p> <p>9. <i>vernix</i>, Csy.—Wy.<br/>    ssp. <i>subsimitis</i>, Csy.—Col.</p> <p>10. <i>puncticollis</i>, Csy.—Can. R. Mts.</p> <p>11. <i>liliputana</i>, Csy.—Col.</p> <p>12. <i>dispar</i>, Csy.—Col.</p> <p style="text-align: center;">**</p> <p>13. <i>glacialis</i>, Fabr.—East. N. Am.</p> | <p>14. <i>convergens</i>, Guer.—Atl., Pac.<br/>    and Mex.<br/>    <i>obsoleta</i>, Lec., i. litt.</p> <p>15. <i>obliqua</i>, Csy.—Calif.<br/>    ssp. <i>politissima</i>, Csy.—Cal.</p> <p>16. <i>juncta</i>, Csy.—Calif.</p> <p>17. <i>15-maculata</i>, Muls.—Ill., Mo.</p> <p style="text-align: center;">C</p> <p>18. <i>spuria</i>, Lec.—Or., Wash., Ut.<br/>    ssp. <i>Americana</i>, Cr.—N. Mex.<br/>    ssp. <i>complex</i>, Csy.—Wash.,<br/>    B. Col.</p> <p>19. <i>Crotchi</i>, Csy.—Calif.</p> <p>20. <i>sinuata</i>, Muls.—Calif.<br/>    <i>interrogans</i>, Muls.</p> <p>21. <i>trivittata</i>, Csy.—Calif.</p> <p style="text-align: center;">D</p> <p>22. <i>falcigera</i>, Cr.—B. Am.</p> <p style="text-align: center;">E</p> <p>23. <i>parenthesis</i>, Say.—Atl. to Col.,<br/>    Wy., Wash.<br/>    <i>trideus</i>, Kirby.<br/>    <i>lunatomaculata</i>, Mots.<br/>    ssp. <i>expurgata</i>, Csy.—Col.</p> <p>24. <i>apicalis</i>, Csy.—Col. to Calif.</p> |
|--|---|

*Adalia*, Muls.

In my opinion *ophthalmica*, *ovipennis*, *annectans* and *transversalis* are valid species; *ornatella* might be regarded as a subspecies of *transversalis*, but no other close alliance can be discerned. The coarse and very conspicuous punctures of the latter, as well as *ornatella*, distinguish them at once from *annectans*, without noting peculiarities of ornamentation. I do not think that we have the true *Arctica*. The following is an interesting addition:

*A. coloradensis*, n. sp.—Form rather more narrowly oval than in *annectans*, convex, highly polished, finely and moderately punctate, pale brownish-red; head black, with a pale spot next each eye; pronotum solidly black, without trace of median basal pale spots, the very fine apical pale margin sometimes obliterated, the sides broadly pale, without black spot, being like those of *bipunctata*, except that the oblique sides of the black area are irregular, having a feeble oblique sinus at the middle; elytra wholly pale, excepting a feebly oblique transverse spot at middle, half as far from suture as side margin, and a transversely duplex subapical spot on each. Length, 3.9–4.6 mm.; width, 2.75–3.3 mm. Colorado (Boulder Co.).

Represented by three specimens holding together very well; in one of them there is an obtuse lateral spur from the black pronotal area just behind the middle, but it is of a piceous colour, adventitious and not properly homologous with the spur in *annectans* and allied forms.

*Coccinella*, Linn.

In this genus Mr. Leng has succeeded in augmenting the confusion and uncertainty, rather than contributing anything to the sum of human knowledge. A very cursory comparison, especially as to thoracic ornamentation, of the American examples referred by Crotch to *trifasciata* and typical native examples of the latter, would have shown him that specific identity is out of the question, and that the name *perplexa*, Muls., that I employed, and which he so unceremoniously rejects, is the only proper one to give the American species. Furthermore, there was no need to go back to the formerly assumed equality of *transversoguttata* and *5-notata*. A Siberian example of the former before me shows that the latter is a different species, larger, more convex and more elongate-oval, as well as somewhat differently marked, and *suturalis*, which he transforms into a variety, though sufficiently remarkable to bear the burden of italics, is in no way closely related to any other species, being

one of the most depressed and compact species known at present and evidently valid.

The genus as restricted in my Revision may be divided into two primary sections, the first having the black thoracic area extending broadly to the anterior edge, the second having the black area separated therefrom by a more or less broad complete pale border. The first section comprises most of the large species with tendency to transverse fasciation of the elytral markings. The second is divisible into three minor groups, represented by *g-notata*, *perplexa* and *tricuspis*. In the first section there are several primary type forms, represented by *5-notata*, *monticola* and *Californica* respectively. To the *5-notata* group belong in addition only *nugatoria*, *Johnsoni* and *Sonorica*. The *monticola* group includes as species *monticola*, with *impressa*, differing in sculpture but probably a subspecies, the distinctly isolated *suturalis*, *alutacea*, much larger, more convex and with a much more pronounced posterior prolongation of the lateral thoracic white area, *prolongata*, with very irregular white lateral area, which, by a transverse spur, tends to form a partial apical white margin bordering the black area, and *difficilis*.

The *Californica* group includes besides only *Nevadica*, agreeing in the total absence of discal spots on the elytra but differing in its more broadly oval form, pale and not blackish sutural edges, and, more particularly, in its much coarser, denser and more conspicuous punctuation.

The first group of the second section includes *g-notata*, *degener* and *Oregona*, the last two of which may be regarded as subspecies. The second group is composed of *perplexa*, *subversa*, with subspecies *Juliana*, of which *barda* is a synonym, and *Eugenii*, the latter a valid species. The third group consists of the remarkably isolated *tricuspis* alone.

The following are the new species or subspecies mentioned above :

*C. Sonorica*, n. sp.—Large, broadly oval, very convex, rather shining, finely and inconspicuously punctate; head with the usual juxta-ocular spots; pronotum with a moderate quadrate spot at each angle, extending posteriorly only to the middle, the black, however, ascending along the edge almost to the angle, the entire hypomera black except at tip; elytra with a large transversely biangular scutellar spot, a thick transverse spot on each at the middle, from inner fourth to outer third, without trace of additional external spot, and a subapical similar spot from inner third to outer sixth. Length, 6.2–7.0 mm.; width, 4.8–5.4 mm. Mexico (Colonia Garcia, Chihuahua), Townsend.

*C. Johnsoni*, n. sp.—Not very broadly oval, very convex, polished, extremely minutely punctulate; head with the usual two large pale spots; pronotum with a quadrate spot at the angles, with the lateral border black for some distance anteriorly, the hypomera pale only at apex, the pale area extending posteriorly near the edge to apical two fifths; elytra with the sutural edges finely blackish, a moderate rhomboidal scutellar spot, and each with a circular subhumeral, a medial from inner fourth to the median line, a very small submarginal at a third from the base and two subapical spots, the outer of which is much the smaller but detached. Length, 6.0 mm; width, 4.7 mm. California (San Diego).

This form, which I originally considered a spotted modification of *Californica*, but which in reality is a very well-marked species of the *5-notata* series, is dedicated with pleasure to Mr. Roswell H. Johnson, who is now engaged upon a general biological study of colour variations in the Coccinellidae.

*C. Oregona*, n. subsp.—Large in size, distinctly elongate-oval, yellowish, polished, finely punctate; head pale, the apical and basal margins evenly, transversely black; pronotum with a large quadrate anterior spot at each side, the two united along the apical margin, the hypomera pale in apical three-fifths; elytra with the sutural edges finely blackish, a small subrhombiform scutellar dash, and each with the usual spots of *9-notata*, though much reduced in size, especially the subhumeral, which is almost obsolete. Length, 6.4 mm.; width, 4.9 mm. Oregon (southern).

I have a good series of *difficilis* from Utah, collected by Wickham, and its broadly rounded, subhemispherical form and markings evidently ally it to the *monticola* group, in the vicinity of *alutacea*, and not, as indicated by Crotch, to *perplexa* (= *trifasciata*, Cr., nec L.). I have also received the true *nugatoria*, from Santiago, Mexico, since my last revision of the genus, and find that the subhumeral spot is well formed and circular, the post-humeral also distinct and the scutellar blotch transversely oval, indicating that it does not coalesce with the subhumeral, and the elytral punctures are so nearly obsolete that they are only to be discerned with difficulty. In *5-notata* the subbasal fascia is seldom resolved into three spots, and then in such ragged fashion as to show at once that they have been derived by disintegration, and the elytral punctures are very distinct. I think, therefore, that *nugatoria* ought to have the status of a species.

*List of Coccinella.*

- |   |   |
|---|---|
| <p style="text-align: center;">A</p> <p style="text-align: center;">*</p> <p>1. 5-notata, Kirby.—Mont, Ut.,<br/>N. Mex.</p> <p>2. nugatoria, Muls.—Mex.<br/><i>transversalis</i>,    Muls.</p> <p>3. Johnsoni, Csy.—Calif.</p> <p>4. Sonorica, Csy.—Mex.</p> <p>5. monticola, Muls.—L. Sup. to<br/>Vanc.<br/><i>lacustris</i>, Lec.<br/>ssp. <i>impressa</i>, Csy.—Calif.</p> <p>6. suturalis, Csy., Calif.</p> <p>7. alutacea, Csy.—Col., N. Mex.</p> <p>8. difficilis, Cr.—Utah.</p> <p>9. prolongata, Cr.—Col., Ut.<br/><i>montico'a</i>, Lec., nec Muls.</p> <p style="text-align: center;">**</p> <p>10. Californica, Mann.—Calif.<br/><i>franciscana</i>, Muls.</p> | <p>11. Nevadica, Csy.—Nev.</p> <p style="text-align: center;">B</p> <p style="text-align: center;">*</p> <p>12. 9-notata, Hbst.—Atl. to Col.<br/>ssp. <i>degener</i>, Csy.—Col.,<br/>N. M., Ariz.<br/>ssp. <i>Oregona</i>, Csy.—Ore-<br/>gon.</p> <p style="text-align: center;">**</p> <p>13. perplexa, Muls.—R. I., Mich.,<br/>Wis.<br/><i>trifasciata</i>, Cr., nec L.</p> <p>14. subversa, Lec.—Oreg.<br/>ssp. <i>Juliana</i>, Muls.—Calif.<br/><i>barda</i>, Lec.</p> <p>15. Eugenioi, Muls.—Calif.</p> <p style="text-align: center;">***</p> <p>16. tricuspis, Kirby.—Br. Am., L.<br/>Sup.</p> |
|---|---|

An examination of the Mexican species placed by Gorham in *Coccinella*, shows too great diversity for a single genus, and in fact the true *Coccinella*, as represented by the type, *7-punctata*, Linn., does not seem to be at all well represented in Mexico. For such species as *luteipennis*, *ampla*, *cyathigera* and *albopicta*, I would propose the generic name *Harmoniaspis* (n. gen.), and for *compta*, *concinna* and *pantherina*, with much shorter antennæ, the name *Harmoniella* (n. gen.). In imposing the name *Harmonia*, the type of which may be assumed to be the Brazilian *Sommieri*, upon such an inharmonious assemblage of species, it is assumable that Mulsant merely desired to indulge to a slight extent in entomological "plaisanterie." The name has since been used three or four times in other classes and orders of animals.

*Cycloneda*, Cr.

The species named "*ater*" in my Revision was first placed in *Exochomus*, where the name was given it, but afterwards transferred to *Cycloneda*, the name being inadvertently printed as at first applied. It is to be hoped that this explanation will be acceptable to Dr. Weise, who

kindly pointed out the error. The name of the species should be *atra*, and not "*ater*." It is a very peculiar species, only doubtfully a member of *Cycloneda*; but may remain there for the present. Although rejected by Leng, because of doubt concerning its geographic habitat, there can be but little question that it belongs to the fauna of this country, as there was but little or no foreign material in the Levette cabinet, whence it came. The error in the name "*ater*," just referred to, which, by the way, was not discovered by Mr. Leng, reminds me of a still more flagrant lapsus on p. 141 of my Revision, where I have imposed a name "*postpinctus*" upon a harmless Scymnid; it should of course be *postpictus*. And this leads me to notice a new high Latin rendition of the word fourteen, which Mr. Leng (Jr. N. Y. Ent. Soc., 1903, p. 206) informs us should be "*quatordecim*," in striving to write the name *quatordecimguttata*.

The true *Cycloneda* has as its type *sanguinea*, Linn. Such forms as *Gilardini*, Muls., from Colombia and Central America, form a distinct genus which may take the name *Spiloneda* (n. gen.).

#### *Olla*, Csy.

In Mexico there are several species of *Olla* still unnamed; one of these, from Vera Cruz, differing very radically from *abdominalis*, was outlined as a variety of the latter by Mr. Gorham (Biol. VII, p. 172, pl. 9, fig. 24). It differs in having two large elongate-oval subbasal and two large divaricately oblique elongate-oval median spots on each elytron. It may take the name *Olla Gorhami* (n. sp.). Besides *Vnigrum* and *Sallii*, the genus may also include, among the Mexican species, such forms as *Coccinella maculosa* and *quichensis*, although it is impossible to definitely decide this without actual observation.

The name *oculata*, Fabr., for the black forms in this genus, is, I think, clearly untenable. The statement that there is a rounded pale spot at each side of the pronotum in *oculata*, would seem to set the matter at rest, and the Fabrician *oculata* must apply to some species in another genus, probably *Ceolophora*, with the assumption that the locality given by Fabricius for *oculata* is erroneous; this is a much more legitimate conclusion than to assume the description to be erroneous, as suggested by Leng. The slender irregular pale area along the sides of the pronotum in these black forms of *Olla* could never, by any stretch of the imagination, be considered rounded, whereas the rounded form is very common in *Ceolophora*. It may be said, also, that casual observation of the series of these black forms in my collection must convince any

systematist that there are a number of distinct species, differing conspicuously in form and size of the body, as well as in the form and, to some extent, the position of the elytral pale spots. This would seem to militate against considering them a melanic modification of *abdominalis*; but this question appears to be no nearer a solution now than in former times. It would be one of the most interesting problems for the experimental biologists to solve. The following is allied to *abdominalis*:

*O. minuta*, n. sp.—Form as in *abdominalis*, almost impunctate; head pale, with a biangulate basal black area; pronotum with broad lateral and apical pale margins, the black area almost solid, having merely two very small, nubilous and elongate discal points; it is broadly bilobed anteriorly, and has at each side a post-median spur; elytra with the scutellum and sutural edges finely blackish, each with four subbasal spots as in *abdominalis*, though relatively larger, and three much larger median spots, the outer two elongate, extending to apical fourth, the subapical large, only narrowly isolated. Length, 3.2 mm.; width, 2.7 mm. Texas (Brownsville), Wickham.

Differs in its very much smaller size, still more highly polished surface and development of the markings, which are, however, of the same order as in *abdominalis*.

*Pseudocleis*, n. gen.

An examination of the figure of *Cleis lynx*, given by Gorham in the *Biologia*, indicates that our *Harmonia picta* cannot be associated with it, and should have a distinctive generic name. I would propose the name *Pseudocleis*, with *picta* as the type.

The species described by me as *Hudsonica* is perfectly valid, and not a variety of *picta*, as stated by Leng; *minor* is, however, properly a subspecies, and there are two other forms in my cabinet that might with some propriety receive varietal designations. It is almost superfluous to add, to anyone who has actually made careful comparative observations, that our *Anisocalvia cardisce* and *Victoriana* can in no wise be considered as closely allied to the European *14-guttata*. It may be barely possible that we have been misinterpreting the *12-maculata* of Gebler; at any rate, I am unable to verify the name by plain count of the spots; there are eleven on the elytra and two on the pronotum.

*Anatis*, Muls.

The species which I described under the name *LeContei* is so distinct from *Rathroni*, Lec., in every feature, that it could under no circumstances

be confounded with it, except by pure perversity. This error on the part of Mr. Leng, which is the most unaccountable that I can recall having seen in print, and, I understand, not typographic, as I had at first supposed, naturally engenders a suspicion that this author must needs have a very inconstant and peculiar personal equation in regard to reliability.

*Neomysia*, Csy.

Although the American and European species are probably congeneric, our European colleagues do not seem to have discovered that the name *Mysia* was long since preoccupied when imposed by Mulsant. The name *Neomysia* has therefore to be used for the species of both continents. Crotch, who had probably seen the type, states that *subvittata*, Muls., has the elytra broadly dilated at the sides, which makes it very doubtfully a species of *Neomysia*, where it is placed by Leng, but more probably an *Anatis*, to which genus it is assigned by Crotch. The synonymy proposed by Mr. Leng is therefore erroneous. The assignment of *interrupta* to *Horni* as a variety is, moreover, an error almost as flagrant as that noticed above under *Anatis LeContei*; the two are evidently distinct species, *Horni* being the smaller and much less broadly rounded, irrespective of differences in ornamentation.

*Psyllobora*, Chev.

Of the described forms in this genus, *20-maculata*, *renifer*, *borealis*, *tedata*, *deficiens* and *nana* are true and valid species; *obsoleta* may be considered a synonym of *20-maculata* and *parvinotata* as a subspecies; *separata* may be regarded as a subspecies of *tedata*.

Tribe EXOPLECTRINI.

This tribe, including such genera as *Rodolia*, *Vedalia*, *Novius* and *Exoplectra*, with rounded form, pubescent surface and wide, externally descending epipleura, should be interpolated in the table of tribes given in my Revision immediately after Epilachnini.

The genus *Neaporis*, of Gorham, is certainly composite and, as no type was named, I would propose *metallica*, Gorch., as the type. *Plagioderina*, Gorch., evidently forms another genus, much more broadly orbicular, for which the name *Aneaporis* (n. gen.) may be suggested. *Indagator*, together possibly with *compta*, probably forms another genus. Some important generic characters doubtless exist in antennal and sternal structure, to which Mr. Gorham makes little or no reference.



*Anovia*, n. gen.

Body rounded or broadly suboval, convex, evenly punctate and pubescent, the epipleura very vaguely and scarcely visibly impressed for the femora; prothorax distinctly narrower than the elytra, finely margined at base and truncate at the scutellum, broadly and deeply emarginate at apex; head with the eyes entire, only partially concealed by the prothorax, the epistoma and labrum broadly and very feebly sinuate; antennæ short and thick, 8-jointed, the club fusoid, with the joints compactly joined; maxillary palpi thick, the 1st joint strongly securiform; prosternum between the coxæ narrow, tumescent, rapidly sloping behind, the mesosternum with a transverse tumescent ridge at apex; abdominal plates very short, entire; anterior tibiæ flattened, their external edge longitudinally impressed for the reflexed tarsi; claws with a laminate internal tooth at base.

The type of this genus, which differs from *Novius* in its broadly and deeply sinuate apex of the prothorax, is the following:

*A. virginalis*, Wickh.—A cotype of this species from Chadbourne's Ranch, Utah, was kindly given me by Prof. Wickham. It was described under the name *Scymnus virginalis*, but the author recognized its generic incompatibility. The specimens from St. George, Utah, seem to be smaller, less suffusedly coloured and with rather straighter parallel sides of the prothorax, but they have the sixth abdominal segment, as in the cotype, well developed, and almost as long as the fifth; this sixth segment does not appear to differ much in the two sexes. I also have another specimen, differing but slightly, from El Paso, Texas.

*Chilocorus*, Leach.

In this genus the species *orbis*, Csy., is not a variety of *bivulnerus*, nor *confusor* a variety of *cacti*, as stated recently by Leng (l. c., 1908, p. 37, 38), but in each case specifically distinct. *Fraternus*, of LeConte, is at least a well differentiated subspecies of *bivulnerus*, recognizable by its smaller size and much less dilated form, as can be observed with greatest ease in large series. *Cacti*, Linn., is a very much larger and more broadly rounded species than *confusor*, as clearly shown by some specimens in my cabinet from Puebla, Mexico, and Honduras; the latter occupies the arid regions from San Diego to Nogales. I have recently seen a specimen of *fraternus* taken at Nogales, Ariz., which is probably near its extreme southern limit of distribution; besides being smaller and narrower than *bivulnerus*, the punctuation is much finer and feebler.

I have recently received a typical example of *Axion plagiatum* from Puebla, Mex., and am in position to prove that *Texanum*, Lec., is a distinct species, differing, among other characters, in that in *cacti* the two elytral spots are separated across the dorsal surface by only about half the distance that separates them in *Texanum*, due allowance being made for sexual differences. *Alutaceum* is smaller, narrower and more compressed than *Texanum*, and is probably specifically different; *pleurale* is also in all probability a distinct species and not a variety, as stated by Leng; at any rate, it would be a subspecies of the true *plagiatum* and not of *Texanum*.

*Exochomus*, Redt.

*Brumus*, "Weise" (Leng).

Mr. Leng divides this genus into three named subgenera, of which the first, *Arawana*, founded upon *Arizonicus*, is probably a distinct genus and not a subgenus, as it differs in important structural characters as well as in the entire scheme of coloration, which is almost as important. As to *Brumus*, "Weise," I am uncertain whether he means *Brumus*, Muls., or not. In his *Brumus* there apparently should be no acutely angulate quadrate unguis tooth, as in typical *Exochomus*, but there is always either a pronounced basal swelling or bulbosity, as in *parvicollis*, or a rapid thickening of the claw as in *Hogei*, or an almost completely simple form as in *septentrionis*, with the strong probability, when we consider the absolutely similar or correlative scheme of ornamentation and the identical facies, that there are intermediate forms. I therefore still hold that there is but a single genus, and that *Brumus*, "Weise" (Leng) would be a complete synonym of *Exochomus*, if there were no other distinction than that of the dentition of the tarsal claws. The case is parallel to that of *Oxynychus*, Lec., and *Hyperaspis*. But to show how very uncertain the boundaries of *Exochomus* and *Brumus*, Weise, become, when based solely on dentition, it may be stated that in *athlops*, Bland, the tooth is perfectly distinct and sharply angulate, as usual in *Exochomus*, though rather less elevated, but this species is placed by Weise and more reluctantly by Leng in *Brumus* and not in *Exochomus*. *Subrotundus* has tarsal claws nearly as in *marginipennis*, but with the apical part less abruptly deflexed and, as the ornamentation in *Exochomus* is not highly variable, as assumed, but on the contrary noticeably constant and persistent, I have no doubt that *subrotundus* is a valid species, and this is confirmed by its very small size and almost circular form. To compare it with *fasciatus*, with its much more elongate-oval form and different colour

scheme, as suggested by Leng, is a decided mistake. The tarsal claw of *fasciatus* is wrongly outlined on the plate by Mr. Leng, the basal tooth being large and subparallel as in *marginipennis*, though less elevated.

The tarsal claws in *deflectens*, *latiusculus* and *marginipennis*, very thick at base, with the apical part very slender and abruptly bent downward, are, however, noticeably different from the form assumed in the *athiope*, *septentrionis* and *desertorum* group. Perhaps it may be this quite perceptible difference in the shape of the claw that constitutes the true difference between *Exochomus* and *Brumus*, and not the mere presence or absence of a basal tooth; if this be the case the *Brumus* of Leng might possibly be considered a valid subgenus, although there are probably intermediates, and I would prefer to consider our species at least as constituting a single genus. The European *Brumus*, Muls., may, however, be different.\*

*Septentrionis*, Weise, is the northern and eastern species, of unusually large size, called *Davisi* by Mr. Leng, and it is not at all the *Högei* of Gorham, the latter being a far southern and essentially Sonoran form, very distinct in appearance and constant in ornamentation. *Desertorum* and *ovoideus* seem to have given rise to much unnecessary confusion on the part of Mr. Leng, for he puts one in the section with dentate claws and the other in his *Brumus*, Weise. They both belong to the latter section, and are mutually allied, though I am now convinced distinct species or subspecies. *Desertorum* is of very broadly oval outline, and generally has a long anterior wisp-like prolongation from the posterior spot, while *ovoideus* is very narrowly and more evenly elliptic, with the humeri scarcely at all exposed at base and has the posterior spot circular and clearly limited throughout its circumference, without suggestion of prolongation. Neither of these forms has anything whatever to do with *Californicus*, either in general appearance or other token of consanguinity.

The following species or subspecies may be made known at this opportunity:

*E. deflectens*, n. subsp.—Broadly oval, strongly convex, alutaceous and black, the anterior angles of the pronotum nubilously pale; elytra pale

\*The genus *Brumus*, Muls., as represented by its type, *8-signata*, which I have examined since the above was written, differs rather radically from this American *Brumus*, "Weise" (Leng), in having an entire basal margin of the pronotum, very large post-coxal arcs, much longer tarsal claws, and in its entire scheme of ornamentation. If, therefore, our species form a genus or subgenus distinct from *Exochomus*, it is still unnamed.

reddish, each with two very large subequal isolated black spots, one just before, the other well behind, the middle, the punctures fine, sparse and inconspicuous; legs pale, the femora piceous; claws as in *marginipennis*. Length, 3.0 mm.; width, 2.6 mm. Missouri.

Allied to *marginipennis*, but of broader outline, finer punctuation and with the anterior and posterior black areas of each elytron subequal in size and wholly isolated. It resembles *latiusculus* in form more closely, and may, for the present, be considered a subspecies of the latter, which is specifically different from *marginipennis* in its much more broadly rounded outline.

*E. Mormonicus*, n. sp.—Very broadly rounded, strongly convex, highly polished, virtually completely impunctate, deep black throughout; tarsal claws well developed, moderately and almost evenly arcuate, with a distinctly defined rectangular basal tooth within. Length, 3.2-4.0 mm.; width, 2.8-3.5 mm. Utah (Marysvale), Wickham.

*E. Townsendi*, n. sp.—Smaller, much more elongate-oval in form, very convex, polished, deep black throughout, virtually impunctate, the elytra vertically declivous to the lateral bead, which is finer than in *Mormonicus* and *athiops*, in which species also the elytra become evidently subexplanate along the sides, especially anteriorly; claws nearly similar, with an even more distinct acute rectangular tooth. Length, 2.8-3.0 mm.; width, 2.2 mm. Mexico (Colonia Garcia, Chihuahua), Townsend.

*Mormonicus* is larger, very much more nearly circular and more polished than *athiops*, Bland, and has the elytra practically impunctate even near the thick lateral bead, where numerous distinct punctures are observable in the latter; the prothorax is also larger and more especially of a different shape, being more elongate along the median line. Besides differing as stated in the description, *Townsendi* is of more narrowly oval form than the feebly alutaceous *athiops*, and has the front distinctly more advanced before the line of the eyes. Both of these forms are species distinct from *athiops*.

*E. parvicollis*, n. sp.—Very broadly rounded, convex, polished, virtually impunctate, black, the anterior thoracic angles not paler; elytra black, with a broad parallel lateral rufous area from the humeri, obliquely narrowed just before the middle, and extending thence narrowly and more nubilously for a short distance further, also extending along the basal margin, and sometimes with a slight posterior angulation, almost to the scutellum; also with a subangulate subapical discal pale spot; under

surface irregularly rufescent, the legs black; tarsal claws long, evenly arcuate, with a distinct though rounded swelling internally at base. Length, 2.4-3.0 mm.; width, 2.0-2.7 mm. Utah (St. George), Wickham.

Resembles *desertorum*, but differs in its much shorter and more broadly rounded form and relatively much narrower prothorax. Four homogeneous specimens.

In *septentrionis*, Ws. (= *Davisi*, Leng), the size is large, the form elongate-oval and the punctures rather coarse, deep and very conspicuous; there is only a distant relationship between this and *desertorum* and *ovoideus*, and the latter are properly true species and not varieties, at any rate as far as *septentrionis* is concerned; in them the maxillary palpi have the fourth joint much shorter and more securiform than in *septentrionis* among other differences.

*List of Exochomus.*

A	B
<i>Exochomus</i> in sp.	<i>Brumus</i> , "Weise" (Leng).
1. marginipennis, LeC.—S. Atl. <i>pratextatus</i> , Muls.	7. æthiops, Bland.—N. Mex, Col.
2. fasciatus, Csy.—S. Calif.	8. Mormonicus, Csy.—Utah, Nev.
3. latiusculus, Csy.—S. Tex. ssp. deflectens, Csy.—Mo.	9. Townsendi, Csy.—Mex.
4. Childreni, Muls.—Tex., Mex. <i>Guexi</i> , Lec.	10. parvicollis, Csy.—Utah.
5. Californicus, Csy.—N. Calif.	11. histrio, Fall.—S. Calif.
6. subrotundus, Csy.—El Paso.	12. desertorum, Csy.—Nev. ssp.? ovoideus, Csy.—Nev.?
	13. orbiculatus, Leng.—Ariz.
	14. septentrionis, Ws.—N.-East N. Am. <i>Davisi</i> , Leng.
	15. Högei, Gorh.—Mex, N. Mex. ssp. Nevadensis, Leng.—Nev.

*Brachyacantha*, Chev.

The following species is allied to *ursina*:

*B. Uteella*, n. sp.—Form elongate-oval, very convex, polished, minutely, rather sparsely punctate, black; female with yellow spots as in *ursina*, and nearly as large, except that the two medial are relatively more distant from the two basal, so that, instead of forming a square as in *ursina*, they form a slightly elongate rectangle; pale side margin of the prothorax much less broadly dilated anteriorly. Length, 3.6 mm.; width, 2.3 mm. Utah (Milford), Wickham.

A subspecies of *Uteella* may be defined as follows :

*B. Sonorana*, n. subsp.—Form still narrower than in *Uteella*, ellipsoidal, polished, black, very minutely, decidedly sparsely punctulate; female with spots nearly as in *Uteella* but much smaller, except that the rectangle formed by the basal and slightly post-medial spots is still more elongated and the humeral spot is reduced to a small dot; the basal spots differ in being very small, nubilous and wholly detached from the margin. Length, 3.0 mm.; width, 2.0 mm. Mexico (Colonia Garcia, Chihuahua), Townsend.

I have not examined the male in either of these forms, which differ profoundly from *ursina* in their narrower, more elongate outline, and, more especially, in the very fine and sparser punctures.

*B. metator*, n. sp.—Form and coloration nearly as in *testudo*, deep black, polished, the spots sharply defined, rather small and bright yellow; head (♀) black throughout, the pronotum black, with the yellow lateral margin moderate, dilated somewhat anteriorly; elytra distinctly though moderately punctate, the spots nearly as in *testudo* but smaller and more widely separated, the basal not basally truncate, but circular and only tangent to the basal margin; legs pale, the femora gradually piceous toward base. Length, 2.2 mm.; width, 1.7 mm. Texas (Del Rio), Wickham.

Differs from *testudo* and *Bolli* in having the head of the female black and not pale, and in the form of the basal spots of the elytra.

*Hyperaspis*, Chev.

In this genus the variety which I described under the name *angustata* should be considered a synonym of *elliptica*. On the other hand, the variety that I described under the name *omissa* would appear to have greater value, perhaps fully specific, as the form is rather more oblong and less convex, the punctures more crowded toward the sides of the pronotum, and the total absence of the conspicuous and very constant discal spot of *lateralis* gives it a very different appearance. *Notatula* should be removed from its position as originally published to the vicinity of *4-oculata*. The following species have come to light since my last revision :

*H. aemulator*, n. sp.—Broadly oval, very convex, black, shining, rather finely and loosely punctate; head (♀) piceous, very gradually darker basally; pronotum with a large internally rounded yellow spot, wider than long, at each side; elytra each with three moderately large

subequal yellow spots, one somewhat obliquely subquadrangular at two-fifths and inner third, another rather smaller, rounded and marginal, just visibly less basal and truncated by the margin, and another, somewhat transversely oval, near the apical margin, and much more distant from the suture; beneath black, the abdomen pale marginally, the legs pale. Length, 2.6 mm.; width, 2.0 mm. Arizona (Nogales), Nunenmacher.

To be classed with *medialis*, but not closely related, much larger, with slightly more anterior discal spot and piceous head in the female. The head is pale in both sexes of *medialis*.

*H. fastidiosa*, n. sp.—Broadly suboblong-oval, convex, black, polished, finely though rather strongly and closely punctate; head (♂) dark rufo-piceous, gradually becoming blackish basally and yellowish apically; pronotum with a large yellow spot, internally angulate and wider than long, at each side; elytra each with three large yellow spots, one elongate-oval, from basal seventh to the middle and inner sixth to just beyond the middle; another, marginal, from the humeri to apical third, acuminate anteriorly, and gradually though moderately dilated posteriorly, the third large, subobtriangular, very close to the apical margin, and but little further from the suture; beneath black, the abdomen nubulously pale marginally, the legs pale. Length, 2.2 mm.; width, 1.65 mm. California (San Diego), Nunenmacher.

*H. conspirans*, n. sp.—Smaller, less broadly and more evenly oval, convex, polished, black, finely, less closely punctate; head (♂) bright yellowish-white, abruptly black only at the base of the occiput; pronotum with a large internally arcuate yellow spot, as wide as long, at each side; elytra each with three rather large similarly straw-yellow spots, one rounded, from basal fourth to the middle and inner fifth to a little beyond the median line; another, marginal, semicircular, at the middle and the third somewhat smaller, slightly irregular, subtransversely oval, distinctly separated from the apical margin, and subequally so from the suture; under surface black throughout, the legs black, the anterior pale. Length, 1.6 mm.; width, 1.1 mm. Arizona (Nogales), Nunenmacher.

Both of the above species are allied to *gemma*, the first differing in its very differently coloured head in the male, and total absence of the conspicuous yellow apical thoracic margin of *gemma*. The second has the same pale yellow head in the male, but lacks the pale apical thoracic margin or any indication that it could exist, as the lateral spots are

rounded internally, their arcuate margin becoming more externally oblique anteriorly to the apical angles; a very similar species, of which I only have females at present, occurs at Alpine, Texas.

Mr. Chas. Schaeffer (Sci. Bull., Br. Inst., Vol. 1, p. 145) confuses *medialis*, and inferentially also *gemma*, *fastidiosa* and *conspirans*, with *sexverrucata*, Fabr., and *pratensis*, Lec., must be closely related. But Mr. Schaeffer is mistaken in this, as a little closer observation would have shown him that there are a number of distinct species, and, on consulting Mulsant's description of *sexverrucata* (Spec., p. 639), which is a South American insect, he would have read the following diagnosis: Briefly and obtusely oval; prothorax brown or red-brown, ornamented each side with a yellow border; elytra black or brown, each with three yellow spots, two suborbicular near two-fifths of the length, the external bound to the lateral border, the third subapical, obtriangular. The coloration of the pronotum prohibits any close alliance with these Sonoran forms, and Gorham was hasty in assigning those from northern Mexico to this species. It is a common type in the fauna of Mexico, but includes many indubitable species. Mr. Schaeffer seems of late to be somewhat solicitous concerning the distinctness of *Lengi* and *rotunda* (Journ. N. Y. Ent. Soc., Sept., 1908); the two appear to me to be amply distinct species, indeed not even closely related.

*H. imperialis*, n. sp.—Moderately broadly oval, very convex, polished, black, rather finely but strongly, the elytra not very closely punctate; head (♀) dull, black; pronotum black, the sides yellowish-red, the pale area longer than wide, parallel, with its inner margin bisinuate; elytra with the umboniform callus at basal fifth unusually pronounced, black, each with a large evenly elliptical dull red spot, from a fifth to six-sevenths of the length, and from inner fifth at apical fourth, where it approaches the suture most closely, to within a short but appreciable distance of the lateral margin; under surface and legs black throughout. Length, 3.6 mm.; width, 2.8 mm. Mexico (Puebla).

This very distinct species belongs to the same group as the Florida *regalis* and Mexican *panzosæ*. It differs from the latter in its more elongate form, much less basal pale elytral area, and in having the sides of the pronotum pale.

*H. oculifera*, n. sp.—Broadly oval, convex, shining, strongly and rather closely punctate, black, the entire head and a large subquadrate



spot at each side of the pronotum pale ( $\delta$ ); elytra each with a rounded yellowish spot at posterior third, barely perceptibly more distant from the suture than the side margin; legs short, dark testaceous, the posterior piceous-black, though paler at the knees. Length, 2.1 mm.; width, 1.6 mm. Arizona (Benson), Nunenmacher.

Belongs near *Wickhami*, but differs in the stronger and rather closer punctures, larger eyes, with narrower interocular surface and in the position of the elytral spots, which are much more nearly on the median longitudinal line.

*H. significans*, n. sp.—Oval, convex, polished, moderately finely and sparsely but rather strongly punctate, strongly and closely so beneath, black, the entire head and narrow pronotal side-margins pale ( $\delta$ ), or with the former picescent and the side-margins nubilous ( $\text{♀}$ ); elytra with a large and irregularly rounded lateral spot of red at the middle of the margin, by which it is diametrically truncated, and sometimes extending more than half way across the elytron; under surface piceous, rufescent peripherally, the legs slightly pale, the hind femora darker. Length, 2.2–2.5 mm.; width, 1.5–1.75 mm. Utah (St. George), Wickham.

May be placed near *pleuralis*, but differs in the much larger, red and less sharply-defined lateral spot, and much more elongate-oval form of body.

*H. concurrens*, n. sp.—Moderately elongate-oval, black or piceous-black throughout, polished, finely, not closely and rather strongly punctate; head ( $\delta$ ) pale, finely punctate and pubescent throughout; pronotum narrowly, nubilously rufescent at the sides; elytra without maculation of any sort; under surface piceous-brown, the metasternum densely punctate laterally. Length, 2.0–2.3 mm.; width, 1.4–1.65 mm. Utah (St. George), Wickham.

This distinct species may also be placed in the neighbourhood of *pleuralis*.

*H. aterrima*, n. sp.—Form nearly as in the preceding but smaller in size, deep black throughout ( $\text{♀}$ ), or with the entire head and narrow, abruptly-defined sides of the pronotum yellow ( $\delta$ ); elytra without maculation, polished, finely, rather sparsely punctate; under surface more coarsely, less densely punctate, black, the tibiae and tarsi feebly pallescent. Length, 1.6–2.1 mm.; width, 1.2–1.4 mm.—Utah (St. George), Wickham.

Differs from the preceding in its bright yellow and sharply-defined anterior markings of the male, but more particularly in the feebly punctate

and wholly glabrous frontal surface. The eyes are notably larger and the front narrower in the male than in the female.

*H. coloradana*, n. sp.—Form moderately elongate, oblong-suboval, not very convex, polished, strongly, not densely punctate, black; head, except at each side of the basal margin, and sides of the pronotum abruptly and narrowly but not extending to the base, though finely throughout the apical margin, yellow (♂); elytra with a moderately narrow, abrupt, subparallel yellow side margin from base to apical third, and a rather small, widely detached subapical spot; under surface black, the anterior legs pale; mes-episterna pale in external half. Length, 2.2 mm.; width, 1.6 mm. Colorado (Boulder Co.).

Resembles the Californian *dissoluta*, Cr., very greatly, but has the yellow side margin of the elytra much less sinuated internally and shorter, the apical spot smaller and rather nearer the suture and the outer half of the mes-episterna pale, but, more especially, in the much less convex, more oblong and less oval form of the body.

*H. serena*, n. sp.—Coloration, lustre and punctuation throughout nearly as in *inflexa*, but with the expanded apex of the marginal reddish vitta less anteriorly extended; form of the body more narrowly oblong and parallel, not regularly oval as in *inflexa*; abdominal plate more broadly rounded and not quite attaining the first suture. Length 2.5 mm.; width, 1.7 mm. Pennsylvania, Warren Knaus.

Differs from *inflexa* in the form of the body and other characters.

*H. Nunenmacheri*, n. sp.—Rather broadly oval and convex, nearly as in *postica*, black, polished, sparsely but more distinctly punctate; head and pronotum (♀) black, the latter without trace of pale side margin; elytra each with a parallelogramic marginal yellow spot at base, twice as long as wide, ending abruptly behind and truncate, and also a transversely but broadly oval subapical spot, twice as far from the suture as the apical margin; beneath black throughout, the tibiæ somewhat, and the tarsi decidedly, pale. Length, 2.75 mm.; width, 2.05 mm. California (River-side), Nunenmacher.

Allied to *postica*, Lec., but differs in the absence of the pale sides of the pronotum and in the presence of a short, broad, parallel humeral spot on the elytra.

*H. protensa*, n. sp.—Rather more elongate, narrow and parallel than any other species, shining, deep black above and beneath, the head and pronotum wholly black (♀), the elytra with a narrow even and feebly

bisinate yellow side margin, which is continuous throughout, though retreating from the edge posteriorly, not quite attaining the suture; under surface feebly and rather sparsely punctate, the anterior legs pallescent. Length, 1.8 mm.; width, 1.15 mm. Arizona (Nogales), Nunenmacher.

Belongs near *limbalis*, the ornamentation being almost identical, though more closely approaching the suture at apex, but differing greatly in the narrower, more elongate and parallel and much less oval form of body, and also in the sparser and very much feebler punctuation of the under surface. *Spiculinota*, Fall, belongs to the *4-oculata* series, as do also the two following:

*H. fidelis*, n. sp.—Form slightly more broadly oval, convex, polished, black; head black (♀), the pronotum with a similar lateral pale margin; elytra similarly rather strongly punctate, with a narrow pale lateral border, which is feebly and broadly sinuate within, in basal two-thirds, a large subtriangular subapical spot and a discal spot twice as long as wide, the centre of which is only very slightly before the middle; under surface black, the abdomen finely, sparsely punctate, the legs all pale red-brown, the metacoxal plate not quite attaining the apex of the segment, which it fully attains in *4-oculata*. Length, 2.3 mm.; width, 1.6 mm. California (Los Angeles).

*H. Bensonica*, n. sp.—Still more broadly oval and a little more convex, polished, black; head pale, except at the basal margin (♂), the pronotum with narrow parallel pale sides; elytra sparsely but strongly punctate, with a narrow yellow lateral border, which is strongly sinuated within and extending from the base to apical third, a transversely oval subapical spot and a circular discal spot at basal two-fifths, much in advance of the spot in *4-oculata* or *notatula*; abdomen more closely and strongly punctate, the legs blackish, except the anterior, the metacoxal plate about attaining the segmental apex. Length, 2.0 mm.; width, 1.5 mm. Arizona (Benson), Nunenmacher.

In the true *4-oculata*, from the middle California coast regions, there is normally no yellow elytral margin or spots, but occasionally there are two very feeble elongate streaks, at base and behind the middle. The male has the black base of the front deeply angulate, while in the male of *notatula* the black at the base is transversely truncate, except at the sides, where the pale area extends further posteriorly along the eyes, in a way just the reverse of *4-oculata*. *Horni*, of Crotch, would appear to be different from *4-oculata* and not identical, as I suggested in my Revision,

for the author states that it is smaller than *undulata*, shorter and rounder, more finely punctate, the elytra with a straight pale margin for two-thirds, a discal spot much nearer the base even than in that species and a triangular subapical spot. LeConte stated that it was a synonym of *lateralis*, but that is even more unlikely.

*H. Octavia*, n. sp.—Form nearly as in *undulata* but sensibly more broadly oval, more polished, deep black; head and pronotum (♂, ♀) almost similar, the latter more transverse; elytra more sparsely but more coarsely punctate, the punctures more impressed, each with three rather small and rounded, widely separated yellow spots along the sides, and one, discal and rounded, evidently before the middle. Length, 2.25–2.5 mm.; width, 1.6–1.8 mm. Mississippi (Vicksburg).

Related to *undulata* but differing in its more polished surface, coarser punctures, small, rounded, widely separated marginal spots, which never have any tendency to coalesce, in having the outer limit of the post-coxal arcs more distant from the abdominal side margin and the greater part of the mes-episterna pale in colour in the male, and not black throughout as in the male of *undulata*.

*H. filiola*, n. sp.—Elongate-oval, only moderately convex, obtuse before and behind, black, rather shining, the head alutaceous, the punctures rather strong and impressed but only moderately close-set; head and pronotum black throughout (♀); elytra with yellow side margin subequally wide throughout, bisinuate within, the apical part but little dilated, receding from the edge, nearly attaining the suture, and making an angle of about 100° with the part before it; each also with an elongate yellow spot, rather small in size, extending from three-sevenths to three-fifths of the length, and from inner two-sevenths not quite to the median line; under surface blackish, the tibiae and tarsi paler. Length, 2.1 mm.; width, 1.1 mm. Arizona (Nogales), Nunenmacher.

This small but distinct species may be placed near *paludicola*.

*H. revocans*, n. sp.—Very small, rather broadly oval, broadly obtuse behind, shining, black, wholly glabrous; head and sides and apex of the pronotum rather broadly yellow (♂), the latter finely punctulate; elytra virtually impunctate, the punctures very minute, only visible under high power, the side margins from base to apical third, moderately sinuate within, and on each a large subapical transversely oval spot and a broad discal vitta, somewhat sinuate on each of its sides, from the scutellum

obliquely backward to a little beyond the middle near inner third, yellowish-white; under surface piceous, the abdomen rather closely and strongly though finely punctate. Length, 1.4 mm.; width, 1.1 mm. Utah (St. George), Wickham.

This is a wholly isolated species, somewhat remindful at first of the genus *Hyperaspidius*; it may be placed just before *annexa* in the list but has no affinity with that species. The tarsal claws are obtusely swollen internally at base.

*H. tetraeneura*, n. sp.—Nearly as in *4-vittata*, though very slightly more broadly oval and decidedly less convex, similarly rather strongly and closely punctate, black, polished; head black; pronotum (♀?) black, with a very narrow, not very abruptly pale side margin; elytra with the side margin evenly and very narrowly pale to but little beyond two-thirds, each also with a similarly narrow even pale oblique vitta from basal sixth, slightly beyond the median line, to apical fifth at inner third. Length, 2.3 mm.; width, 1.45 mm. Colorado (Boulder Co.).

Resembles *4-vittata*, but differs in the abruptly abbreviated and much narrower vittæ, more finely and sparsely punctate abdomen, and, especially, in the much more narrowly rounded post-coxal arcs, which scarcely attain the first suture, along which they are contiguous for some distance in *4-vittata*.

The species described by Mr. Schaeffer (l. c., p. 143) as *Hyperaspis trifurcata*, is strongly remindful, in its form and general scheme of ornamentation, of a species published by me under the name *Hyperaspidius insignis*, and I would therefore advise a closer scrutiny of its generic characters. The species, though, is doubtless different.

#### *Hyperaspidius*, Cr.

The species described by LeConte under the name *vittigera* is not by any means the same as the Mexican *trimaculatus*, Linn., as becomes apparent at once on reading Mulsant's description of the latter. The species should therefore be known under LeConte's name, *vittigera* (= *trimaculatus*, Cr., nec Linn.).

*H. pallescens*, n. sp.—Broadly oblong, very obtuse at apex, moderately convex, polished; head and pronotum (♀) rufo-testaceous, the latter subimpunctate, with a narrow yellowish-white side margin; elytra rather finely and sparsely but strongly and evenly punctate, smooth, pale reddish-brown, the basal and lateral margins, retreating from the edge posteriorly; and not quite attaining the suture at apex, whitish, the basal stripe prolonged posteriorly, near the suture, touching or feebly joining the apex

of the marginal stripe; legs pale. Length, 1.3 mm.; width, 1.0 mm. Arizona (Nogales), Nunenmacher.

Allied to *vittigera* but smoother, more broadly oblong and differing in colour. The prothorax is but little narrower than the elytra and two and one-half times as wide as its greatest length. The species from El Paso, which I identified as *trimaculatus*, Linn. (Rev., p. 130), is as follows:

*H. oblongus*, n. sp. — (= *trimaculatus*, Csy., nec Linn.) — Differs greatly from *vittigera*, Lec., in the ornamentation of the male pronotum, which is said to be yellow, with a large basal black spot anteriorly lobed and extending beyond the middle in that species, according to Crotch (Rev., p. 232). It occurs in Missouri.

#### A REMARKABLE CECIDOMYIID FLY.

BY T. D. A. COCKERELL, BOULDER, COLORADO.

On Sept. 24, 1908, as I was walking down Seventeenth St, Boulder, Colorado, I noticed a very singular fly upon the pavement. At first sight I thought it might be a small Bibionid of some sort, but when I had it in the bottle, I was delighted to find that it was a most peculiar Cecidomyiid. It is one of the *Hormomyia* group, the first to be recorded from the West. I describe it as a *Hormomyia*, though its peculiar characters may eventually entitle it to a separate generic name.

#### *Hormomyia coloradensis*, n. sp.

♂.—Length,  $5\frac{1}{4}$  mm.; wings almost 6; thorax blood-red, so arched over head that the latter is quite invisible from above, and only the eyes can be seen from an angle of about  $45^\circ$  in front; dorsum of thorax with short scanty black hair; head pale; antennæ dark, at first sight appearing 26-jointed, but really 14 jointed, the joints after the first two being divided

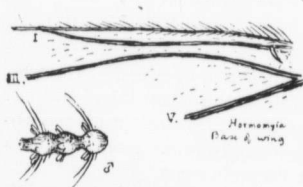


FIG. 19.—Base of wing and male antennal joints of *Hormomyia*.

into a basal swelling and an apical double swelling, each of the three swellings (counting the apical as two) ornamented with small white loops, while the lowest and highest each emit many long black bristles; all this being exactly as *Xylodiplosis precoc* (Bull. Soc. Ent., France, 1895, p. cxii), except that the long bristles are much longer, being much more than twice the length of the loops; wings strongly dusky, with much dark hair and a conspicuous dark fringe; legs very thick, almost

November, 1908

spider-like, dark reddish, with short black hair; coxæ and trochanters red; first tarsal joint very short, second long; claws slender, simple; abdomen shining red-brown, except first segment, which is pale reddish; segments 2 to 6 each with four transverse red spots, the midmost pair more basad than the others; sides and under surface of abdomen with black hair; claspers very small.

The venation is in general like that of typical *Hormomyia* (Williston, N. A. Dipt., 3rd Ed., p. 119, f. 4), except that the third vein does not bend down so much apically, while the lower branch of the fifth bends down more, entering the margin practically at right angles. There is, however, a much more remarkable character; the third vein is continued straight to the base of the fifth (it is reddish and very distinct), and *the little cross-vein to the first, which is supposed to be the real beginning of the third, is totally absent.\** There is a little vein leaving the first just above the origin of the third from the fifth, continuing a short distance obliquely downward and *basad*, and failing to connect with anything. I have examined the specimen over and over again with the lens and compound microscope, and there is no doubt about the structures. This affords, I think, a strong argument in favour of the view that the third vein is the real media (as I have suggested in my studies of Nemestrinidæ), the so-called cross-vein being part of it. According to this view, the condition found in *Sciara*, various Cecidomyiidæ, etc., is genuinely primitive, and a further investigation of these types may be expected to yield significant results.

#### NOTES ON THE GENUS *SITARIDA*, WHITE.

BY F. CREIGHTON WELLMAN, M. D., F. E. S., WASHINGTON, D. C.

The Australian Meloid genus *Sitarida* was founded by White in 1846 on *Sitarida Hopei*, a new species described by himself. The type, from New Holland, was a single ♀, which is still in the British Museum. In 1863 Pascoe erected the genus *Goetymes* for the reception of his newly-described *Goetymes flavicornis*, from Port Stephens, represented by a single ♂ specimen (type), also in the British Museum.

\*On one side only there is a thin colourless line, no thicker than the hairs on the same part of the wing, passing from the first vein to the third. It seems not to be a rudiment of a vein. At the base there is a thin colourless thread passing from the first to the third, touching the tip of the broken vein and ending a little before the forking of the third and fifth.

The only real differential character given by Pascoe for the separation of *Goetymes* from *Sitarida* is indicated in the following words: "The nearest ally of this genus is *Sitarida* White, from which, *inter alia*, it differs, as it does from every other of the family, in its flabellate antennæ." It need hardly be pointed out that the above-mentioned difference is nothing more than a sexual dimorphism, and a comparison of the types of the two genera has convinced me that they not only belong to the same genus, but that they probably even represent the sexes of one species. I am the more encouraged in this idea by finding while looking through the literature that Mr. Waterhouse has apparently held the same view, as Beau-regard (*Les Ins. Vés.*, p. 407) writes: "M. Waterhouse m'a dit qu'il avait des raisons de croire que *Sitarida* et *Goetymes* ne sont que le ♂ et la ♀ d'une même espèce." The differences in the antennal structures of the specimens examined by me may be given in Pascoe's own words, as follows: "In both they are 11-jointed; but in *Sitarida*<sup>1</sup> the first four are simple, while each of the remaining seven throws out laterally and at the base a short square lamina, this portion of the antenna being, in fact, pectinate. In *Goetymes*<sup>2</sup> the first three joints only are simple, the remainder being drawn out into long laminae, closely applied to each other at the base, and forming a compact mass when at rest." The other differences relate chiefly to the size and colour of the specimens, with the exception that the thorax in the ♀ is (as would quite be expected) somewhat more coarsely punctured than in the ♂. It may be added that the examination of the single specimens in the British Museum shows that both have simple claws, a character not elsewhere met in the family except in *Hornia*.<sup>3</sup>

Two additional forms, both of them evidently distinct, have been described, and, treating White's and Pascoe's species for the time being as separable, the list of species now stands as follows:

Genus—*Sitarida*, White, Stoke's Discov. in Austral., I, 1846, p. 508.

*Goetymes*, Pascoe, Journ. Ent., II, 1853, p. 47.

1. The female.

2. The male.

3. Westwood's statement (*Trans. Ent. Soc. Lond.*, 1875, p. 226), that his genus *Deridea* has simple claws, is a mistake; the claws, while very small, are of the usual Meloid type, as may be seen under the low power of a compound microscope.



Species—1. *Hopei*, White, *loc. cit.*, p. 508, tab. 2, fig. 2, ♀ (*Sitarida*).  
New Holland.

Large species, black, head convex, strongly rounded in front, coarsely sculptured, thorax subtrigonal, sides slightly rounded, coarsely punctured, legs robust, tarsi short.

2. *flavicornis*, Pasc., *loc. cit.*, p. 48, tab. 2, fig. 5, ♂ (*Goetymes*), Port Stephens.

Smaller than preceding, pale fulvous, head and thorax more finely punctured, the latter with a cruciform impression on disk.

3. *pictipes*, Blackburn, Trans. Roy. Soc. S. Austral., XXIII, 1899, p. 69, ♂ (*Goetymes*), Melbourne.

Half the length of *Hopei*, black, head and thorax closely and rather strongly punctulate, the latter transverse, canaliculate, elytra light brown, tibiae and tarsi yellow.

4. *minor*, Champion, Trans. Ent. Soc. Lond., 1895, p. 274, tab. 6, fig. 11, ♀<sup>4</sup> (*Sitarida*), Hobart (Tasmania).

Much smaller than preceding, head and thorax closely punctate (but with vertex sparsely so, and occiput almost smooth), vertex broadly and abruptly raised, subtruncate at summit, thorax strongly transverse, with two smooth transverse tubercular elevations on disk; legs very slender.

The following artificial table, based on the thoracic characters, may aid in separating the above forms:

A. Thorax canaliculate.

Thorax transverse, coarsely and rather strongly punctulate..... ♂ *pictipes*.

AA. Thorax not canaliculate.

a. Thorax subtrigonal, sides slightly rounded.

aa. Thorax coarsely punctured..... ♀ *Hopei*.

aa. Thorax more finely punctured, and with cruciform impression on disk..... ♂ *flavicornis*.

aa. Thorax strongly transverse.

Thorax closely punctate, and with two smooth transverse tubercular elevations on disk..... ♀ *minor*.

4. Champion gives his insect as a male, but judging from his description and figure (I have not seen his type), I think this must be a mistake. If his determination of the sex should prove to be correct, it would necessitate the erection of a new genus.

THE RHOPALOCERA OF SANTA CLARA COUNTY,  
CALIFORNIA.

BY KARL R. COOLIDGE, PALO ALTO, CALIF.

Santa Clara County borders on the Bay of San Francisco, extending back therefrom through the Santa Clara Valley to the Santa Cruz Mountains, which perhaps average 2,500 ft. in altitude. Owing to the diversity of the topography, many species are found to be very locally confined. For instance, *Gaïdes gorgon* is but rarely met with in the valley, its habitat being on the hot, dry hillsides where *Eriogonum* thrives. The home of the *Argynnids* is on the highest ridges, and they are seldom seen elsewhere. To the bay region no species are strictly confined, but some of the *Lycenidae* and *Hesperidae* are more abundant there than elsewhere. Along the inner sloughs, where *Salix* occurs, a few species, such as *Papilio rutulus* and *eurymedon*, *Basilarchia Lorquinii* and *Limenitis Bredowii*, var. *californica*, which have willow or oak for their food-plant, are common. In the valley proper a great majority of the species occur. There is a sharp distinction in the faunal aspects, although only a few hundred feet difference in altitude between the valley and the foothills. In the hills, *Mimulus* and *Castilleja* furnish food for the *Lemoniids*, which fly in countless numbers. Many species of *Lycenidae* have for their food-plants *Lupinus*, *Æsculus* and *Hosackia*, which occur everywhere in the hills. To the mountain region a number of species, such as *Chrysobia mormo*, *Habrodias grunus* and others, are confined. Thus, one might collect here for years and then not have taken all the species. This localization can be accounted for directly by the range of the food-plants. In the open fields of the valley, *Euchloë sara* and *ausonides* are common, flying about *Brassica*, their food-plant. Ascending into the hills, *ausonides* becomes rarer and higher up is never met with. *Sara*, on the other hand, flies almost everywhere, but I am quite positive that in the hills it has a different food-plant, as mustard is "few and far between," and *sara* is often found far away from it. I might say here that I do not believe in determining species by the localities from which they come. It should be remembered that butterflies, like other insects, must be allowed some variation which the effects of climate, etc., impose upon them. In some of our genera, particularly *Argynnis* and *Lemonias*, which have many western species, a large number of these so-called species will prove but geographical forms of others. Lepidopterists distinguish between *Lemonias Wrightii* and *leanira* because one is from Southern California and the other from farther north. If a ♀ *Wrightii* (from Los Angeles) and a ♂ *leanira* (from San Francisco) should meet, I am sure they would

never take each other for foreigners. In fact, in a long series of specimens from either locality you might pick out "types" of either form, and besides find a couple of "new" species. The value and necessity of western local lists is thus shown. The sooner we know better the range, etc., of some of these doubtful species, the sooner we shall be able to place them correctly in our catalogues. The following list is, I think, quite complete, except in the *Hesperidae*, to which I hope to make numerous additions.

I am deeply indebted for various notes and favours to Mr. J. G. Grundel, of Alma; Mr. F. X. Williams, of San Francisco; Mr. Fordyce Grinnell, jr., of Pasadena, and Mr. E. J. Newcomer, of Palo Alto.

#### PAPILIONIDÆ.

*Papilio eurymedon*, Boisd.—The commonest of the genus here, flying from April to July. The food-plant is *Rhamnus californicus*.

*Papilio rutulus*, Boisd.—Not as abundant as *eurymedon*. The usual food-plant is *Salix*, but also *Rubus* and *Magnolia*. May to September.

*Papilio zolicaon*, Boisd.—Fairly common from May to November. The larva feeds on *Umbelliferae*, particularly *Feniculum vulgare*.

*Papilio polyxenes*, Fab.—Probably the variety *asteroides*, Reakirt. I have not seen it, but it is reported to be common at Santa Clara. The larval food-plant is probably *Daucus carota*.

*Laertias philenor*, Linn.—Rare. It has been taken in February and September. The larva, as in the east, feeds on the Dutchman's Pipe (*Aristolochia serpentaria*), which is very rare in this county.

#### PIERIDÆ.

*Pontia occidentalis*, Reak.—Common everywhere in the valley. The variety *calyce*, Edw., is the cold-weather form.

*Pontia protodice*, Boisd.—Rare. *Protodice* is the southern representative of *occidentalis*, and this is about the northern limit of its range. The variety *vernalis*, Edw., is the cold-weather form, appearing in late winter and spring.

*Pontia napi*, Linn.—The varieties *venosa*, Scudder, and *castoria*, Reakirt, are not rare in the lower foothills, where their food-plant grows.

*Pontia rapæ*, Linn.—Superabundant everywhere, except in the higher mountains, where it is rarely met with.

*Euchloë ausonides*, Boisd.—One of our earliest species, appearing sometimes as early as February. The life-history was described in the May "Entomological News" by Mr. E. J. Newcomer and myself.

*Euchloë sara*, Boisd., and *Reakirtii*, Edw.—Also common and early. *Reakirtii* is the spring and *sara* the summer form. The larval habits are much similar to those of *ausonides*.

*Zerene eurydice*, Boisd.—Not common. It is abundant to the north in Marin and Sonoma counties, where its food-plant, *Amorpha californica*, is found.

*Eurymus eurytheme*, Boisd., and varieties *ariadne*, Edw., and *keewaydin*, Edw.—Very common everywhere, especially flying about the flowers of *Brassica*, *Radix* and alfalfa.

## NYMPHALIDÆ.

*Agraulis vanille*.—Very rare. I have taken but a single specimen, in late August. The larva feeds on *Passifloræ*, the Passion vines.

*Argynnis coronis*, Behr.—Common throughout California. In this county it appears toward the end of May, sometimes earlier, and is also found on the wing in August and September. Like the other local *Argynnids*, except, perhaps, *callippe*, it flies almost altogether in the mountains, about the flowers of the wild tansy, which grows on the dry hillsides. The larva feeds on wild violet.

*Argynnis liliana*, Hy. Edw.—*Liliana* is intermediate between *callippe* and *coronis*, partaking of the characters of both. It is not at all rare in the Santa Cruz Mountains, emerging towards the middle of June and flying about the flowers of the wild tansy. Food-plant wild violet.

*Argynnis callippe*, Boisd.—This species is the most common one in the lower foothills and valleys. I have seen quite a number in early fall about the sloughs of the marshes near the bay. There is but one generation, the imagines emerging in June and July. As with our other local species of this genus, the food-plant is *viola*.

*Argynnis adiate*, Behr.—The habits of *adiaste* are much similar to those of the preceding species. It usually appears about the end of June, but this year I took many fine specimens the last day of May. Females were also quite common this year, whereas they are ordinarily quite rare. *Adiate* is very limited, only occurring, so far as known to me, from San Francisco (San Francisco County) to Santa Cruz (Santa Cruz County), a distance of about eighty miles.

*Argynnis egleis*, Boisd.—I have not seen this species, but Mr. Grundel tells me it is not rare at Mt. Hamilton in early July.

*Brenthis epithore*, Boisd.—*Epithore* flies in the open patches near shaded woods, where its food-plant, *viola*, is found. I have never seen it in the lower hills or valleys.

*Lemonias chalcedon*, Dbl. and Hew.—Very abundant and variable. The larva feeds on a variety of plants, more especially *Mimulus*, *Castilleja*, and occasionally *Rosa*. Last summer I saw a curious female aberration

in the collection of Mr. J. C. Grundel, and as he has taken another similar one this season, I consider it sufficiently constant to be worthy of a name.

*Lemonias chalcedon* aberr., *Grundeli* aberr., nov.—♀. On primaries the spots are produced into long bars, which are arranged more or less regularly into three series, the outer two somewhat rounded; very little red, except on outer margin. On secondaries the markings are in the shape of long yellowish bars, eight in number; a very fine marginal border. Beneath, on primaries the markings are repeated apically, as in typical specimens. On the secondaries the bars are repeated and are broken centrally by an irregular ferruginous band; base ferruginous, with several black patches. Expanse, 2.10 inches. Cathran Gulch, Wright's Station, Calif., May 17, 1902. The ornamentation above resembles that of *Lemonias Hoffmanni* aberr., *mirabilis*, Wright (Butt. West Coast, pl. XX, fig. 184 and b). The specimen taken this year is somewhat smaller, and the black basal area of the upper wings is produced further exteriorly. Otherwise it is much similar.

*Lemonias palla*, Boisd.—Plentiful in the canons. It is dimorphic, two forms of females being found, one a foxy-reddish colour and the other blackish. All intergradations may be found. *Eremita*, Wright, and *sabina*, Wright, are females of *palla*. This species is confined more to the foothills, like *leanira*, and unlike *chalcedon*, does not occur in the valley. The known food-plants are *Castilleja* and *Plantago*.

*Thessalia leanira*, Boisd. Not uncommon. Specimens vary greatly in size, from 1.40–2.00 inches. The variety *obsoleta*, Hy. Edw., was described from San Rafael, in Marin County, and probably occurs here. Nothing is known of the preparatory stages.

*Phyciodes pratensis*, Behr.—Quite plentiful. May be found in numbers about puddles in early summer. The larva feeds on *Carduus*.

*Phyciodes mylitta*, Edw.—Much rarer than *pratensis*. The food-plant is the same as the preceding.

*Polygonia satyrus*, Edw.—This is our commonest angle-wing, and may be found flying a greater part of the year.

*Polygonia satyrus*, var. *marsyas*, Edw.—A darker form than *satyrus*, which I take to be the variety *marsyas*, is much rarer than the lighter. The food-plant of this and the preceding is nettles.

*Polygonia zephyrus*, Edw.—May be found sparingly along roadsides and open spots in the canons where water is found. Wright, in his Butterflies of the West Coast, states that "the larval food-plant of all Graptas is

nettles," but the larva of *sephyrus*, as is well known, feeds on *Azalea occidentalis* and the elm, hop-vine and various species of the *Grossulacæ*, furnish food for other species.

*Eugonia californica*, Boisd.—Flies in the mountains where its food-plant, *Ceanothus*, is found. Seldom seen in the valley. It appears to have been plentiful in the past, but has since become quite rare.

*Euvanessa antiopa*, Linn.—The "mourning cloak" practically flies here the year round, as it often comes out of its hibernation on warm days. The variety *hygiea*, Heyd., has been reported from San Jose.

*Vanessa atalanta*, Linn.—Abundant, its habits being similar to those of the preceding.

*Vanessa huntera*, Fabr.—Not so common. Until this season I had only seen one specimen, but I found it abundant enough on dry hillsides flitting about various flowers.

*Vanessa cardui*, Linn.—Common everywhere.

*Vanessa caryæ*, Hub.—Another common species, the larva feeding on *Malva*. I have not observed the aberration *Muelleri*, Letcher.

*Junonia cænia*, Hub.—Always quite common. Food-plants *Plantago* and *Antirrhinum*, preferably the latter.

*Basilarchia Lorquini*, Boisd.—Plentiful in the vicinity of *Salix*, its food-plant.

*Limenitis Bredowii*, Hub., var. *californica*, Butl.—Not rare. The larva feeds on the young tips of *Quercus*, and is very similar to *Basil. Lorquini*.

## AGAPETIDÆ.

*Cercyonis alope*, Fabr., var. *boopis*, Behr.—Rather rare. It appears in July.

*Cercyonis charon*, Edw.—Confined to the hills and mountains. Early July.

*Cænonympha californica*, Dbl. and Hew.—Common.

## LYMNADIDÆ.

*Anosia plexippus*, Linn.—Occasionally seen, but by no means abundant. As in the east, the food-plant is *Asclepias*.

## RIODINIDÆ.

*Chrysobia mormo*, Feld.—Found only on the dry and sandy hillsides with its food-plant, *Eriogonum*. The larva is nocturnal, hiding in the daytime in the leaves and rubbish at the base of the plant, where pupation also occurs. The female, *Argynnid*-like, sometimes drops her eggs while on the wing.

## LYCENIDÆ.

*Habrodias grunus*, Boisd.—I have collected this species commonly in fall in the mountains, flying about its food-plant, *Quercus chrysolepis*, Lieb.

*Attilides halesus*, Cramer.—Very rare. I have only seen one specimen from this locality. The larva feeds on *Phoradendron villosum*, Nutt., with which *Quercus* is badly parasitized.

*Uranotes melinus*, Hubn.—Appears in late June, and is then abundant, flying about the flowers of *Brassica*, *Radix* and others. The larva lives on the flower-buds of *Malva*.

*Thecla sœpium*, Boisd.—Scarce, several specimens have been taken in the mountains in September.

*Incisalia iroides*, Boisd.—I have not examined specimens of this species closely, but I have seen several specimens collected at Alma, which I would consider as belonging to this species.

*Callophrys dumetorum*, Boisd. (= *affinis*, Edw., = *viridis*, Edw.).—Not rare in the foothills from April to May. The larva feeds on the buds of *Hosackia*.

*Tharsalea arota*, Boisd.—*Arota* flies in the mountains in late June about the flowers of *Ceanothus*. The larva feeds on *Ribes*.

*Gœides xanthoides*, Boisd.—Sparingly found in June and July on the blossoms of *Brassica*.

*Gœides editha*, Mead.—Occasionally seen, but not at all common.

*Gœides gorgon*, Boisd.—Rather common in the mountains in the vicinity of its food-plant, *Eriogonum*. The habits of the larva are quite similar to those of *Chrysobia mormo*. The imagoes emerge, as a rule, in early June, and the females are quite scarce.

*Epidemia helloides*, Boisd.—Quite common everywhere. The food-plant is *Polygonum aviculare* and others of that genus.

*Cupido icarioides*, Boisd.—Not rare in early spring in the foothills, flying about *Lupinus*, upon which the larva feeds.

*Nomiades antiacis*, Boisd., var. *Behrii*, Edw.—Usually not uncommon in the valley, flying from May to November. The food-plant is *Lupinus* of several species.

*Philotēs sonorensis*, Feld.—This species I have not met with myself, but Mr. Grundel has taken two at Alma, both in February. W. G. Wright (Butt. West Coast) gives Gilroy, in this county, as the extent of its northern range, and I believe it has been collected there by earlier collectors.

*Rusticus acmon*, Boisd.—Abundant in spring and fall. The larva feeds on *Hosackia*. This species is much given to variation, and I think good series from various localities would show that a number of so-called species are but forms of this.

*Cyaniris ladon*, Cramer, var. *piasus*, Boisd.—This is one of the earliest and commonest butterflies in California, where it replaces the Atlantic *ladon* (*pseudargiolus*, Boisd. and Lec.). The caterpillar feeds on the flowers of the California Buckeye (*Æsculus californicus*). Feb. to July.

*Everes amyntula*, Boisd.—Common in May and June. Frequents the flowers of *Æsculus*, which is most probably the food-plant.

*Brephidium exilis*, Boisd.—Abundant, except in the hills, from May to June. The food-plant is *Atriplex*.

#### HESPERIIDÆ.

*Anthomaster agricola*, Boisd.—Rather common on flowers in August and September.

*Anthomaster pratincola*, Boisd. (?)—Several specimens taken at Black Mountain in September and October appear to belong to this species.

*Hylephila campestris*, Boisd.—Not rare in early fall.

*Polites sabuleti*, Boisd.—Flies from May to September.

*Phycanassa melane*, Edw.—May to October. Not common.

*Thanaos propertius*, Lint.—Flies in early April and May quite abundantly.

*Thanaos clitus*, Edw.—Common. I am in doubt as to the correct identification of this and the preceding.

*Hesperia ericetorum*, Boisd.—Rare. I have seen but a single specimen taken in this county.

*Hesperia tessellata*, Scudder.—Common everywhere. The fact that the life-history of *tessellata* has been fully described by French in his Butterflies of the Eastern United States (Supp., p. 404), appears to be overlooked. In this locality the larva feeds on *Malva borealis*, and I have found eggs, pupæ and larvæ in all stages. Much irregularity is exhibited. On October 14th I observed a female ovipositing, and collected a number of eggs. Two eggs hatched October 18th, and on the 20th two more. The remaining two did not hatch until the middle of December. The larva emerges from the egg by eating out a round circular hole at the apex. The pupa is formed in the leaves.

*Hesperia cæspitalis*, Boisd.—Occasional in the mountains, from April to July.



## MEIGEN'S FIRST PAPER ON DIPTERA.

Since the publication of my article in the October number, page 370-373, I have received Vol. III of Kertész's *Catalogus Dipteriorum*, and I notice that he accepts all of the 1800 names that come within the limits of this volume, five in number. I also have received the September number of the *Wiener Entomologische Zeitung*, in which Dr. Bezzi reviews Kertész's third volume. He makes the remarkable admission that the rules of the International Zoological Congress perhaps do not justify the use of the 1800 names, but at the same time praises Kertész for adopting them. As the admission is fatal to the case built up by Hendel and Bezzi (with the present co-operation of Kertész), I deem it advisable to quote his exact language (*Wien. Ent. Zeit.*, XXVII, 252):

"In diesem Bande hat sich der Herr Verfasser streng an das Prioritätsgesetz gehalten; wir finden fünf Neigensche Gattungen von 1800 wieder in Gebrauch gestellt, und zwar *Potamida* für *Ephippium*, *Hermione* für *Oxycera*, *Eulalia* für *Odontomyia*, *Erinna* für *Xylophagus* und *Chrysozona* für *Haematopota*. Aus demselben Grunde sind auch *Solva*, Walker, für *Subula* (*Xylomyia*, Rond.), *Pantophthalmus*, Thunb., für *Acanthomera* und *Rhagio* für *Leptis* gebraucht. . . . .

"Ganz besonders hervorzuheben ist die richtige Nomenklatur, welche, wenn auch nicht immer den neuen internationalen Regeln entsprechend, jedenfalls mit den klassischen Grundsätzen der Wissenschaft übereinstimmend ist."

As I showed last month, it was Dr. Bezzi and Mr. Hendel together who worked up the 1800 paper of Meigen; we now have the feeble suggestion of one of them that their proposed names, "even if not entirely in agreement with the new International rules, are, at any rate, in harmony with the classic principles of science."

I surely need not pursue the subject further.

J. M. ALDRICH, Moscow, Idaho, Oct. 10, 1908.

## A CORRECTION.

On page 349 of this volume, the expanse of wings of *Argyroploce abietana*, n. s., should have been given, 11-13 mm. and not 21-23 mm.

C. H. FERNALD.

Mailed November 3rd, 1908.