

The Canadian Entomologist.

VOL. XXXIX.

LONDON, FEBRUARY, 1907.

No. 2

NOTES ON CHALCOLEPIDIUS AND THE ZOPHERINI.

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The species and subspecies of *Chalcolepidius* having the side margins of the upper surface densely clothed with white or whitish scales, are very numerous in Arizona and northern Mexico, constituting one of the characteristic northern types of the genus. The recent appearance of a paper by Dr. Otto Schwarz (*Deutsche Ent. Zeit.*, 1906, p. 97), describing two of these forms, has suggested the general revision here attempted, although, after careful study of these descriptions, I am forced to the conclusion that *substriatus* is nothing more than a slight modification of the typical *Webbi*, Lec., in which the lateral white vittæ of the pronotum are sometimes transversely coalescent at the middle of the length, and that *parallelus* is identical with *tartarus* Fall. Most of the new forms here described were taken by Prof. F. H. Snow, in the course of his many fruitful expeditions to Arizona.

Because of the want of data which might in any way enable me to determine or even infer their true relationships with the material at hand, I have tentatively assumed all the forms described to have the weight of species, not attempting to indicate those that may prove ultimately to be more properly subspecies. A few new Mexican species are also included in the following table :

1. Scutellum triangular, flat, deflexed and evidently notched anteriorly. . 2
- Scutellum triangular, deflexed but not evidently notched anteriorly ; antennæ pectinate in the male, serrate in the female, the third joint but little longer than the second, the fourth longer than the two preceding together ; body uniformly and more or less densely clothed with brilliant bluish, greenish or coppery squamules, except, as usual, along a denuded median line on the under surface ; form narrow, elongate, parallel, only moderately convex, black, shining, the basal angles of the prothorax not or only very feebly everted ; descriptions drawn from the female 18
- Scutellum transverse, suboval, bilimpresed, not emarginate anteriorly ; body uniformly clothed with minute close-set olivaceous squamules ; antennæ serrate in both sexes ; tibiæ not ciliate in the male . . . 20

2. Antennæ serrate in both sexes 3
 Antennæ pectinate in the male, serrate in the female, the third joint about half as long as the fourth; body narrow, elongate, rather convex, the elytra moderately narrowed from base to apex; integuments black, shining, uniformly but not very densely clothed with minute olivaceous squamules; elytral striæ deeply impressed, strongly punctured, the intervals uniform and convex; scutellar notch feeble. Atlantic nearctic fauna 17
3. Epipleura in colour and vestiture similar to the marginal parts of the upper surface 4
 Epipleura in colour and vestiture similar to the under surface 16
4. Pronotum, and usually the elytra, margined at the sides with dense, closely-decumbent scales, which are larger, flatter and more strigose than those clothing the remainder of the surface, which are very small, pointed, convex, feebly or not strigose and metallic in coloration, forming a more or less pronounced bloom; integuments black throughout; anterior and middle tibiæ generally ciliate beneath in the male 5
 Pronotum not vittate at the sides; body black, the elytra and epipleura red; anterior tibiæ ciliate beneath in the male 15
5. Elytral intervals flat or nearly so, sometimes feebly concave, the striæ unimpressed or very feebly impressed and finely punctate 6
 Elytral intervals evidently though moderately convex; equal in width, the deeply impressed striæ strongly punctured 13
 Elytral intervals very uneven in width, strongly elevated, the striæ sulciform, with the punctures concealed by the dense vestiture of the sulci. Mexico 14
6. Pale pronotal vittæ pure white, unusually broad, dilated inwardly at the middle, where each is much wider than the intervening dark space, the white margin at the sides and base of the elytra unusually wide, the white scales having a tendency to invade also the intervals within the border, from the humeral regions posteriorly; surface rather convex, the minute squamules olivaceous-green, rather dense and more persistent than usual; basal angles of the prothorax slightly everted, the sides becoming strongly convergent and rounded in apical third; third antennal joint more than twice as long as the second, about two-thirds as long as the fourth. Length 25.0-29.0 mm.; width 7.5-8.8 mm. Arizona (Yuma). [= *substriatus*, O. Sch.]

Webbi, Lec.

- Pale pronotal vittæ narrower, more or less nearly half as wide as the intervening dark space, distinctly dilated internally just behind the middle; third antennal joint as in *Webbi* 7
- Pale vittæ relatively very narrow, much less than half as wide as the intervening dark space, and never dilated internally near the middle; third antennal joint more elongate, about three times as long as the second and but slightly shorter than the fourth, except in *simulans*; species larger in size, the elytral intervals alternating but slightly in width in the females, from which sex all the descriptions are taken; minute squamules moderately close-set, forming a thin blue to olivaceous bloom, very readily denuded 10
7. Body stouter and strongly convex, the elytra feebly narrowed from the base to about apical third, then more strongly, arcuately narrowed to the tip; sides of the prothorax arcuately shouldered anteriorly; minute squamules producing a thin cobalt-blue bloom 8
- Body narrow, less convex, the sides of the elytra gradually and almost evenly converging from the base nearly to the narrowly rounded apex, and feebly arcuate; minute squamules easily denuded as usual, producing an olivaceous bloom as a rule, becoming blue in some cases; elytral intervals slightly alternating in width 9
8. Strial intervals of the elytra conspicuously alternating in width toward tip; lateral vittæ of the pronotum and elytra pure white, the under surface with a blue bloom, the hypomera with several widely scattered white scales. Length (σ) 29.0-32.0 mm.; width 9.0-10.0 mm. Arizona (Bill Williams Fork) *Snowi*, n. sp.
- Strial intervals uniform in width throughout or very nearly so; lateral vittæ yellowish-white, the under surface as in *Snowi*; elytra and prothorax more elongate. Length (ρ) 30.0 mm.; width 9.0 mm. Arizona (B. Wms. Fork) *idoneus*, n. sp.
9. Sides of the prothorax obliquely rounded and shouldered anteriorly; body smaller and more slender, the abdomen simple, the fourth segment (σ) not at all impressed at the sides; hypomera usually with numerous white scales clustered longitudinally at the centre. Length 27.0 mm.; width 7.5 mm. Arizona (B. Wms. Fork) *Arizonicus*, n. sp.
- Sides of the prothorax evenly arcuate, and converging from the middle to the apex, the prothorax about a third longer than wide (σ) or somewhat shorter (ρ); abdomen in both sexes with a pronounced and clearly limited impression at each side of the fourth segment;

- hypomera without white scales. Length 30.0-32.0 mm.; width 8.8-9.1 mm. Arizona (B. Wms. Fork) *abdominalis*, n. sp.
10. Elytra scarcely more than twice as long as wide, with the white lateral margin (♀) about twice as wide as in the other three species, and one-fifth as wide as the elytron; third antennal joint two-thirds as long as the fourth; hypomera with same large scattered white scales in addition to the bluish or olivaceous squamules of the general surface; male much smaller, with the intervals alternating in width. Length 29.0-35.0 mm.; width 8.8-11.0 mm. Arizona (B. Wms. Fork) *simulans*, n. sp.
- Elytra very distinctly more than twice as long as wide, the pale lateral margin very narrow, even in the female, where it is usually a little wider than in the male; hypomera without white scales. 11
11. Sides of the elytra strongly converging from the base to the narrowly rounded apex, and feebly arcuate; yellowish-white lateral vittæ of the pronotum extending to the lateral bead at apex; last abdominal segment (♀) much less than twice as wide as long, the sides only moderately oblique. Length 39.0 mm.; width 12.4 mm. Arizona (near Fort Apache) *acuminatus*, n. sp.
- Sides of the elytra very feebly converging and slightly arcuate to near apical fourth or fifth, then more strongly arcuate and converging to the apex; marginal vittæ of the pronotum flexed inward from the beaded edge toward apex; last abdominal segment (♀) strongly oblique at the sides, fully twice as wide as long. 12
12. Scutellum wider than long; pronotum strongly, irregularly foveate anteriorly and laterally as in *acuminatus*, the sides rather abruptly converging and rounded in apical third, parallel thence to the acute but virtually unreflexed basal angles; marginal vittæ pure white. Length 38.0 mm.; width 12.0 mm. Arizona (near Fort Apache) *Apacheanus*, Csy.
- Scutellum longer than wide; pronotum more finely sculptured, the sides broadly arcuate and converging from the middle to the apex, very feebly diverging posteriorly to the slightly and very gradually everted basal angles; side vittæ pale straw-yellow. Length 42.0 mm.; width 12.8 mm. Arizona (Cochise Co.) *nobilis*, n. sp.
13. Body parallel, only moderately convex, the elytra arcuately narrowed toward tip, the prothorax rounded at the sides anteriorly, with the lateral vittæ brownish, nearly half as wide as the broad dark space and almost even; minute squamules olivaceous, the under surface

- with pale scales on the hypomera and at the sides of the abdomen ; tibiae not ciliate in the male. Length 28.0-32.0 mm.; width 8.0-9.5 mm. Arizona (Phoenix). [= *parallelus*, O. Sch.] *tartarus*, Fall
14. Body elongate-oval, the elytra not distinctly wider than the prothorax, the latter narrowed very slightly from the large and feebly everted basal angles to apical third, then more strongly rounded to the apex, the lateral vittae pale brown in colour, attenuate and retreating from the margin anteriorly, their width at apex a third that at base ; elytra without paler lateral margin, the scales pale brown, dense in the sulci, minute and sparser on the convex intervals ; hypomera without larger pale scales. Length (♀) 32.0 mm.; width 10.0 mm. Mexico (Guerrero) *Astecus*, n. sp.
- Body much smaller and still more slender, the elytra not narrowing behind the middle only, as in *Astecus*, but narrowed from base to apex, with feebly arcuate sides, the prothorax similar, but with the lateral vittae pure white and less attenuate anteriorly, their apical width about half the basal ; elytra with a narrow white margin, the other vestiture as in *Astecus* ; hypomera with a line of white scales along the central part. Length (♀) 26.0 mm.; width 7.8 mm. Mexico (Guerrero) *sodalis*, n. sp.
15. Form parallel, strongly convex, the prothorax, scutellum and entire under surface densely clothed with green squamules, sometimes becoming bluish toward the sides of the first, which is elongate, parallel, broadly, arcuately narrowed in about apical half, with the basal angles strongly and acutely everted ; elytra scarcely more than twice as long as wide, parallel, arcuately narrowed near the apex, the striae impressed, finely punctate, the intervals equal, feebly convex and clothed uniformly and sparsely with extremely minute grayish-blue squamules. Length 33.0-38.0 mm.; width 10.5-13.0 mm. Lower California *rubripennis*, Lec.
16. Elongate-oval, moderately convex, black, polished, densely clothed throughout above with large white scales, which thickly fill the sulci of the elytra, the prothorax elongate, moderately narrowed from the everted basal angles, more strongly and arcuately toward apex, the surface somewhat rugose, without lateral vittae ; elytra parallel, arcuately narrowed behind the middle, with deep sulci and convex subequal intervals ; entire under surface, except the usual glabrous median line, densely clothed with rather smaller suberect brown scales. Length 37.0 mm.; width 11.6 mm. Honduras. *amicus*, n. sp.

17. Elytra (♀) nearly two and one-half times as long as wide, the striae punctures toward the sides moderately coarse and well separated; basal angles of the prothorax gradually and feebly everted. Length 24.0 mm.; width 6.2 mm. Pennsylvania. *viridipilis*, Say
- Elytra (♀) but little more than twice as long as wide, the sulci toward the sides very coarsely punctate or closely foveate; basal angles of the prothorax abruptly and feebly everted and more obtuse. Length 20.0-22.0 mm.; width 5.7-6.0 mm. North Carolina and District of Columbia. *debilis*, n. sp.
18. Median part of the prosternum narrow, parallel and flat from the anterior lobe to the coxæ; elytra parallel and straight at the sides from the base to slightly behind the middle, then but just visibly converging to the rather broadly rounded tip; elytral striae very finely punctate, unimpressed; last ventral segment (♀) short and much more than twice as wide as long; tibiae not ciliate beneath in the male; vestiture only moderately dense, green, varying to coppery in colour. Length (♂ and ♀) 26.0-29.0 mm.; width 6.8-7.5 mm. Arizona (San Bernardino Ranch, Cochise Co.), Snow. *rectus*, n. sp.
- Median part of the prosternum broadly convex anteriorly near the apical lobe. 19
19. The median part becoming narrow, parallel and flat from before the middle to the coxæ; elytra shorter and broader than in *rectus*, parallel, rounded at the sides of the apex; striae scarcely impressed, the punctures fine; last ventral (♀) relatively narrower and less abbreviated, less than twice as wide as long; vestiture dense, uniform and bright bluish-green in colour. Length 27.0 mm.; width 7.3 mm. Arizona. *smaragdinus*, Lec.
- The median part broader, flattened and with posteriorly converging sides from very near the lobe to the coxæ; elytra still shorter and broader, parallel to slightly behind the middle, then rather strongly narrowed and with moderately arcuate sides to the tip, which is relatively narrower than in the two preceding species; sculpture similar; last ventral (♀) strongly trapezoidal, more than twice as wide as long; vestiture very dense, almost uniform greenish-blue, sometimes variegated with cobalt-blue; male much more slender than the female, as in the two preceding species. Length (♂ and ♀) 28.0-30.0 mm.; width 7.4-8.0 mm. Arizona (Bill Williams Fork and Congress Junction), Snow. *ostentus*, n. sp.

20. Form narrowly elongate-oval, rather strongly convex, the prothorax elongate, broadly rounded and narrowed toward tip, the sides slightly sinuate posteriorly just before the small and sharply everted basal angles; elytra rather strongly narrowed and broadly, feebly arcuate from base to apex, the latter relatively narrow and arcuato-truncate; striae feebly impressed, finely punctate, the intervals nearly equal and but slightly convex, strongly so at the sides, minutely, not densely punctulate. Length (δ) 28.5 mm.; width 7.6 mm. Arizona (Benson), Dunn..... *Behrensi*, Cand.

The form of the pale margin of the prothorax seems to be comparatively constant and therefore useful in classifying the species as above. The species figured in the "Biologia" as *Webbi*, by Mr. Champion, and subsequently referred to *Apacheanus*, is distinct from both; it has the marginal pronotal vittae broader than in *Apacheanus* and allies, and slightly dilated inwardly near the middle, a character never observable in those forms. It may be named *Sonoricus* (n. sp.). In like manner the species published on Plate 12 of Vol. III, part 1, fig. 3, of the "Biologia," appears to be more than a variety of *virginalis*, and it may take the name *Championi* (n. sp.). The form given in fig. 8 of the same plate, as a variety of *Desmaresti*, may take the name *brevicollis* (n. sp.); it is narrower and more parallel than *Desmaresti*, with a much shorter prothorax, having a broader median dark vitta and with much finer elytral ridges between the striae. *Astecus* and *sodalis*, of the above table, are related to *approximatus*, Er., differing in their much narrower form, less anteriorly converging sides of the prothorax and less dilated elytra, among other characters, and *amictus* is related to *pistorius*, being very much more narrowly oval. The form identified above as *Behrensi*, Cand., may not be wholly identical, but it reasonably satisfies most of the characters of the very short description of that species. The species of *Chalcolepidius* are very local in distribution in the Sonoran regions, as in the case of many other genera.

ZOPHERINI.

The genera of this tribe are well defined in available works, and it is therefore unnecessary to repeat the table given by Leconte and Horn in the "Classification"; it should be mentioned, however, that the genus *Zopherus*, as at present organized, is composed of four genera, three of them at least very sharply delimited and distinct in structure and facies. These genera may be defined as follows:

1. Elytra with distinct and entire epipleura defined by an acute edge; antennal cavities rounded at tip; body rather depressed. Type *Z. Chiliensis*, Gray *Megazopherus*
Elytra without clearly defined epipleura 2
2. Antennal cavities posteriorly angulate at apex; body rather large and strongly convex, always pale, with black mottling; pronotum impunctate. [Type *Z. Mexicanus*, Gray] *Zopherus*
Antennal cavities rounded at tip; body small, strongly convex, the pronotum punctate 3
3. Elytra not impressed near the suture at apex, each with a large, rounded, flattened and abruptly formed tubercle at tip; body black, sometimes with pale venation or general ground colour, usually only visible at the sides; sculpture very coarse. [Type *Z. limbatus*, Csy.]
Zopherinus
Elytra impressed at each side of the suture at tip, each with a small oblique ridge at apex; body as far as known deep black, without pale maculation, the sculpture more or less fine. [Type *Z. tristis*, Lec.]
Zopherodes

The species described by G. H. Horn under the name *Zopherus elegans*, is very exceptional in having the lateral margins pale and the sculpture fine; I have not seen it, but would infer that its structural characters may differ somewhat from those of either *Zopherinus* or *Zopherodes*; it may be attached at present to *Zopherodes*. The type of *Megazopherus* (n. gen.) is the largest species of the tribe. Of *Zopherus*, I have before me one nondescript form, which may be described as follows:

Moderately stout, very convex, the prothorax as wide as the elytra, slightly wider than long, constricted at base, dilated and bisinuate at the sides, yellowish-white, with large spots of black, of which two elongate and approximate, from the base to the middle, sometimes confluent, one at each side before the middle, and the usual transverse spot at the apical margin are unusually distinct; elytra nearly twice as long as wide, with a tolerably regular sutural series of small spots and a marginal series of about five, with other series of small spots much interrupted by very large irregular blotches of black; apex quadrituberculate; under surface black, with numerous black-speckled white blotches. Length 18.0-24.0 mm.; width 7.0-9.0 mm. Mexico (Guerrero) *marmoratus*, n. sp.

Belongs near *reticulatus*, Ch., but less tuberculose beneath, and with

much larger and more irregular black blotches on the elytra, about four or five on each, arranged without semblance of order.

ZOPHERINUS, n. gen.

This genus is represented before me by the two following species, of which the first may be regarded as the type :

Elongate, convex, dull in lustre, the tubercles of the elytra feebly shining black, the side margins of the pronotum and elytra finely veined with yellowish-white in about a fifth of the total width ; prothorax slightly elongate, somewhat narrower than the elytra, narrowly rounded at the sides, constricted at base, the surface uneven, sparsely punctate, and with large, very flat tubercles toward the sides ; a quadrilateral of four median indentations usually distinct ; elytra nearly twice as long as wide, with rows of large flattened tubercles, the interspaces coarsely rugose ; under surface black throughout ; posterior ridge of the fifth ventral with a large and parallel-sided median spur projecting anteriorly ; the excavation with a tubercle at each side. Length 17.0-20.0 mm. ; width 6.0-7.5 mm. Mexico (Amecameca) *limbatus*, n. sp.

Elongate, very convex, nearly as in *limbatus*, but with a much more shining surface, the elytra less elongate, much wider than the prothorax, wholly black and with large irregular transverse tubercular folds, scarcely arranged in definite lines ; prothorax black throughout, as long as wide, very convex, the surface uneven, with four large median depressions forming a square, strongly tuberculose toward the sides, the tubercles posteriorly abruptly elevated, the punctures sparse ; fifth ventral as in *limbatus*. Length 19.0 mm. ; width 7.0 mm. Mexico (Amecameca) *laevicollis*, Sol.

The specimen doubtfully referred to *laevicollis* has the surface of the pronotum rather uneven, and the posterior ridge of the fifth ventral could scarcely be described as "trilobed" ; it is broadly, feebly sinuate, with a long abrupt parallel-sided spur projecting anteriorly from the bottom of the sinus. *Venusus*, of Champion, is peculiar in coloration, having the white indument covering the entire surface, excepting certain black maculation, as in the true *Zopherus* ; *limbatus* is undoubtedly a very different species, which appears to have been overlooked. Specimens in this genus, as well as the other *Zopherini*, should be thoroughly soaked for at least a day in benzine before studying, as the exuded grease otherwise completely conceals their ornamentation.

ZOPHERODES, n. gen.

The species of this genus, so far as known to me, are all deep black, without pale ornamentation and with comparatively fine sculpture, the pronotum always punctate. Those in my cabinet may be readily known as follows :

1. Elytra subcylindrical, more abruptly narrowed at base and toward apex ; pronotum strongly convex 2
Elytra evenly oval in outline ; pronotum usually less convex 3
2. Pronotal punctures not larger or denser toward the sides. Body moderately stout, dull in lustre, the prothorax as long as wide, angulate at the sides anteriorly, not strongly or muricately, sparsely and evenly punctate, each puncture with a short yellowish seta ; elytra rather wider than the prothorax, three-fourths longer than wide, with uneven series of large flattened elevations, the interstices with smaller elevations of the same kind, all with a small setulose puncture at their hind margins. Length 15.0 mm.; width 5.9 mm. Arizona (Gila Valley), Dunn *aequalis*, n. sp.
Pronotal punctures strong but not muricate, uneven in distribution, denser and coarser toward the sides. Body nearly similar, the prothorax less strongly angulate at the sides anteriorly, the surface more coarsely punctate, the elytra not wider than the prothorax, the uneven tuberculose sculpture less definitely lineate; prosternum more clearly, very coarsely punctate ; abdomen similarly coarsely punctate. Length 12.0-16.0 mm.; width 4.5-6.4 mm. Arizona *tristis*, Lec.
3. Elytra tuberculose 4
Elytra without tubercles, the surface smooth, alutaceous, with sparse vermiculate incised lines ; prosternum tuberculose 11
4. Integuments polished. Form moderately stout, very convex, the prothorax scarcely as long as wide, the sides very feebly angulate before the middle, constricted at base as usual, coarsely, sparsely, irregularly and simply punctate, closely toward the sides; elytra as wide as the prothorax, rather less than twice as long as wide, coarsely, very strongly, closely and more or less irregularly tuberculose; prosternum roughly punctured and tuberculose. Length 14.5-16.5 mm.; width 5.4-6.4 mm. New Mexico *concolor*, Lec.
Integuments more or less dull in lustre 5
5. Elytra but little more than one-half longer than wide. Form stout, the prothorax nearly as long as wide, rounded at the sides, the latter

- slightly subangulate before the middle, the surface coarsely, sub-muricately punctate, only slightly more closely toward the sides; elytra evidently wider than the prothorax, finely, strongly and unevenly tuberculose, the tubercles slightly shining; prosternum irregularly, closely and muricately tuberculose. Length 16.5 mm.; width 7.0 mm. California *induratus*, Csy.
- Elytra at least twice as long as wide in both sexes 6
6. Elytra evidently wider than the prothorax, greatly so in the female. Rather stout, the prothorax fully as long as wide, very coarsely and strongly (δ) or moderately (♀) muricately punctate, the surface (δ) more shining than in the ♀ , the punctures slightly closer toward the sides, which are rounded, only slightly prominent before the middle; elytra rather finely but very irregularly, closely tuberculose, the lustre very dull in the ♀ , rather shining in the δ , the sculpture transversely and very unevenly rugulose in the latter; prothorax very unevenly punctato-tuberculose. Length 18.0-19.0 mm.; width 6.9-7.5 mm. California (southern) . . . *ventriosus*, n. sp.
- Elytra never distinctly wider than the prothorax in either sex 7
7. Elytral tubercles larger, strong, approximating half the thickness of the femora in diameter, arranged more or less definitely in close series 8
- Elytral tubercles minute, sometimes very feeble, confusedly arranged. 9
8. Form rather slender, dull in lustre, the prothorax nearly as long as wide, parallel and broadly rounded at the sides, narrowing toward base, strongly, sparsely, non-muricately punctate, more closely and coarsely toward the sides; elytra with the tubercles large, strongly convex and less dull, the interstices densely dull and with small, remote and perfectly simple punctures; prosternum coarsely punctato-tuberculose. Length 17.0 mm.; width 6.2 mm. New Mexico *guttulatus*, Horn
- Form nearly similar, the pronotum more uneven, with two more or less distinct medial indentations transversely arranged, the punctures coarser muricate, still larger toward the sides; elytra with smaller tubercles, less than half the thickness of the femora in diameter, less opaque than the interstices, which are strongly, muricately punctate; prosternum with small, distinct and sharply elevated tubercles; abdomen finely, sparsely punctate, more strongly toward base. Length 14.5-16.0 mm.; width 5.3-6.2 mm. New Mexico (Fort Wingate), Schufeldt *otiosus*, n. sp.

9. Punctures of the pronotum fine, sparse, very faintly muricate, much stronger, closer and muricate toward the sides, without trace of a median impunctate line. Body very slender, dull; prothorax as long as wide, rounded at the sides and slightly prominent just before the middle; elytra moderately opaque, the tubercles moderately small, in mutual contact, extremely feeble in elevation and separated by fine feeble lineiform depressions; prosternum rather finely, acutely tuberculose. Length 15.0 mm.; width 5.0 mm. Arizona...

prudens, n. sp.

Punctures of the pronotum coarser, strongly muricate, divided along the middle by a more or less incomplete narrow impunctate line ... 10

10. Elytral tubercles in mutual contact, rather strongly elevated and somewhat shining, the incised lines between them fine but distinct; prothorax fully as long as wide, subcordate, coarsely and conspicuously muricato-punctate, very coarsely toward the sides, the latter only very obtusely prominent just before the middle; elytra elongate, each of the small muricate punctures, at the hind margins of the tubercles, bearing a rather distinct yellow seta; prosternum strongly tuberculose. Length 17.5 mm.; width 5.9 mm. Utah (south-western), Weidt..... *Uteanus*, n. sp.

Elytral tubercles clearly isolated by the densely opaque interstices, very flat but very much more shining than the surface separating them, larger and smaller alternating in very obscure inconstant lines at some parts of the disk; prothorax cordate, fully as long as wide, the punctures strongly muricate but not much larger or closer toward the sides, the latter rounded, only very obtusely prominent before the middle; elytra elongate; general form very slender; prosternum tuberculose. Length 17.0 mm.; width 5.5 mm. Utah..

Mormon, n. sp. (Horn, MS.)

Elytral tubercles very small, not larger than the muricate punctures of the pronotum; entire surface very densely opaque as in *Mormon*, the body larger and less slender; prothorax formed nearly as in *Mormon*, the punctures strong and only slightly muricate on the median parts, becoming very coarse and muricate toward the sides; prosternum coarsely, deeply punctate, not tuberculose. Length 18.8 mm.; width 6.5 mm. Utah..... *opacus*, Horn

11. Terminal grooves of the elytra very long, about a fifth of the total length. Body very slender, dull in lustre; prothorax a little longer than wide, the sides nearly straight and subparallel anteriorly,

strongly rounding to the apex and slightly prominent before the middle, thence strongly converging to the base, finely, sparsely punctate, the punctures rather abruptly coarse and slightly muricate near the sides; elytra with minute, sparse and simple punctures, much wrinkled toward base, and with some small tubercles near the humeral angles. Length 16.0 mm.; width 5.5 mm. Arizona . . .

caudalis, n. sp.

Terminal grooves very short as usual. 12

12. Form very slender in the ♂ and nearly similar in the ♀; prothorax as long as wide, or slightly longer (♂), finely, feebly, rather sparsely and simply punctate, abruptly coarsely, densely and submuricately so very near the lateral edges, the latter converging and straight from the feeble ante-median prominences more than half way to the tip, then rounded to the apex, converging and broadly arcuate toward base; elytra nearly as in *caudalis*, but rather more rugulose. Length 18.0 mm.; width 5.8 mm. Arizona (Grand Canyon of the Colorado) *lugubris*, n. sp.

Form moderately slender, larger and less slender than in *lugubris*, similarly dull in lustre; prothorax fully as wide as long, in form and sculpture nearly similar to *lugubris*, but less prominent at the sides just before the middle, and much more tuberculose on the flanks, thence to the base; elytra nearly similar, but with coarser vermiculate impressed lines and shorter, stronger apical tubercles; prosternum much more strongly tuberculose, not evenly as in *lugubris*, but in uneven transverse lines. Length 19.0 mm.; width 6.6 mm. Arizona (Grand Canyon of the Colorado), T. Mitchell Prudden . . .

Pruddeni, n. sp.

Form stouter and more parallel than the two preceding, and less constricted at the junction of the elytra and prothorax, the latter nearly as in *lugubris*, but with less converging straight sides anteriorly, which are more abruptly and briefly rounded to the apex at tip; similarly converging and arcuate, with the flanks tuberculose, posteriorly; surface minutely, sparsely, simply punctate, the punctures not noticeably coarser or denser toward the sides, except slightly along the immediate subprominent edge anteriorly; elytra somewhat flattened above, almost smooth but dull as usual, with a few fine tubercles near the humeral angles. Length 20.0 mm.; width 7.0 mm. Arizona *luctuosus*, n. sp.

The species described by Horn under the name *granicollis* is not at hand at present, and therefore cannot be inserted at its proper place in the table; it is distinctly isolated in sculpture and can be readily identified from the original description. *Gracilis* Horn, is also unique as far as known; it may be distinguished from *caudalis* and allies by its shining surface and punctured, not tuberculate, prosternum. *Elegans* may be provisionally attached to this genus, as before remarked.

PHLEODES, Lec.

Of the two described species of this genus, *diabolicus*, inhabiting the more northern regions of California, has dense pale vestiture on the apical declivity of the elytra, while *pustulosus*, Lec., from San Diego, has no pale incrustation, and is a much larger insect. The species or subspecies are rather numerous, and those in my cabinet may be described in outline as follows:

1. Elytra with more or less pale vestiture on the apical declivity 2
 Elytra without paler vestiture at apex 4
2. Form stout, the prothorax as wide as long, very nearly as wide as the elytra; velvety spot at the middle and base of each elytron small and very inconspicuous; whitish vestiture forming a large solid patch at each side of the apical declivity. Length 16.0-19.5 mm.; width 6.4-7.5 mm. California (Mt. Diablo) *diabolicus*, Lec.
 Form slender 3
3. Prothorax slightly longer than wide, sculptured nearly as in *diabolicus*, the head with small tubercles throughout, and not sparsely tuberclose at the middle of the vertex as in that species; elytra oval, only very slightly wider than the prothorax, the pale vestiture more diffused between the rugosities of the apical declivity, the central velvety spot slightly arcuate and oblique, the basal short. Length 14.0-16.0 mm.; width 5.4-6.2 mm. California, Cab. Levette
ovipennis, n. sp.
 Prothorax distinctly elongate, the finer tubercles aggregated in two longitudinal sinuous median lines more obviously than in *diabolicus*, the head covered throughout with small tubercles which are close-set, and, as in *ovipennis*, densely punctulate on their convex surfaces; elytra oblong-oval, with the pale vestiture confined to the apical parts of the declivity, the velvety spots large and distinct, the basal much elongated. Length 17.0 mm.; width 6.4 mm. California (Kern Co.)
elongatus, n. sp.

4. Prothorax as wide as the elytra (σ) or nearly so (ρ); sculpture very rugose; colour deep black throughout; elytra oblong; anterior femora tuberculose. Length 19.0-22.5 mm.; width 7.4-8.8 mm. California (San Diego)..... *pustulosus*, Lec.
Prothorax much narrower than the elytra 5
5. Pronotum rather strongly elevated along median third; body rather narrow, elongate; prothorax longer than wide, the slopes of the median elevation slightly concave and devoid of tubercles, the latter close along the sides of the elevation; elytra evenly oval, about two-thirds longer than wide, rugose as usual. Length 19.5 mm.; width 7.2 mm. California (near San Diego), Dunn.... *scaber*, n. sp.
Pronotum but feebly elevated along the middle 6
6. Elytra oblong, about one-half longer than wide, deeply and roughly sculptured, with the velvety spots well developed: prothorax slightly longer than wide, strongly and rather closely though unevenly tuberculose over the entire surface. Length 20.0 mm.; width 7.8 mm. California, Cab. Levette..... *latipennis*, n. sp.
Elytra oval, much narrower and more elongate, nearly three-fourths longer than wide, scabrous as usual, the velvety spots indistinct; prothorax narrower and still more elongate, very unevenly and more sparsely tuberculose, with large areas along the middle and lateral third devoid of tubercles; body much more elongate and narrower in form. Length 19.5 mm.; width 7.2 mm. California, Cab. Levette. *angustus*, n. sp.

The forms above enumerated are mutually very similar in facies and sculpture and may prove to be subspecies of a single stock, but they are at least recognizable.

NOSERUS, Lec.

The three species in my cabinet may be known by the following characters:

1. Prothorax evenly cordate, narrowed behind from near the apex 2
Prothorax parallel and rounded at the sides, narrowed posteriorly only behind the middle 3
2. Body broad in form, the prothorax slightly longer than wide, scarcely at all convex, irregularly tuberculose and uneven, with two longitudinal ridges, angulate toward the median line, especially evident; elytra slightly wider than the prothorax, oblong, flattened above, rapidly declivous at the sides, each with three large tumidities on

the strongly declivous apex, one oblique just behind the middle and a short longitudinal median ridge basally, the ground surface finely, sparsely tuberculose. Length 15.5-16.0 mm.; width 6.3 mm. California (Monterey), Dunn.....*plicatus*, Lec.
 Body nearly similar but much smaller and relatively narrower, the elongate prothorax with coarser tubercles toward the sides and finer and sparser elsewhere, the inequalities of the surface nearly as in *plicatus*, but with the elevations more pronounced; elytra not (♂) or but slightly (♀) wider than the prothorax, with the principal elevations nearly as in *plicatus*, but with the ground surface more coarsely pitted and still more minutely tuberculose. Length 14.0-15.5 mm.; width 4.7-5.7 mm. California, Cal. Levette.....
torvus, n. sp.

3. Form relatively broader and more parallel, the prothorax less narrowed at base, flat above, and not longer than wide, with many unevenly disposed tubercles, the elevations of the same general form as in the two preceding but very much feebler; elytra not wider than the prothorax, scarcely more than one-half longer than wide, sculptured nearly as in the preceding, the longitudinal basal ridge more acutely elevated. Length 16.0 mm.; width 6.2 mm. California, Cal. Levette.....*collaris*, n. sp.

The species described by G. H. Horn under the name *emarginatus* I have not seen; it occurs in Texas. *Noserus* greatly resembles *Nosoderma* in facies, but differs in its slightly grooved tarsi, and in having a feeble antennal groove anteriorly.

PHELLOPSIS, Lec.

This genus resembles *Nosoderma* in having the tarsi not grooved and the antennal cavities wholly wanting, but differs greatly in facies and in having eleven free antennal joints. Dr. Horn surmises in the "Classification," that *porcata*, of LeConte, may be only a variety of *obcordata*, Kirby, and it is so indicated in the Henshaw list, but the two forms are in reality well differentiated species. The four species in my cabinet may be readily known as follows:

1. Outer of the two discal ridges of each elytron obsolete at about a fourth of the total length of the elytra from the base; sides of the elytra parallel.....2
 Outer ridge obsolete much nearer the base, this distance being a sixth or seventh of the total length; sides of the elytra feebly converging from the rounded humeri to the subapical tumidity...4

2. Elytra much more than twice as long as wide, the general form more slender, with a relatively somewhat smaller prothorax, the sides of which are subparallel for more than half the length from the apex, then strongly converging to the base, the surface uneven, with an elevation at each side near the middle and a large elongate-oval median elevation in basal two-thirds, which is concave anteriorly and deeply foveate at base, the tubercles of the general surface moderate, not parted along the median line at the centre of the pronotum; elytra each with two discal ridges and three strong subapical tumidities, coarsely foveato-punctate in series. Length 12.0-13.5 mm.; width 4.2-4.9 mm. Oregon *porcata*, Lec.
Elytra together twice as long as wide 3
3. Body nearly similar throughout to *porcata* but very much stouter, the elytral punctures more shallow and obscure, the pronotum with very coarse tubercles anteriorly, the basal pubescent fovea of *porcata* replaced by a short nude sulcus, the central part of the disk not sulcate, but more coarsely tuberculose than in *porcata*; elytra nearly similar, except that the outer of the three subapical tumors is very much smaller and less prominent. Length 14.5 mm.; width 5.5 mm. Idaho (Cœur d'Alene) *robustula*, n. sp.
Body stouter than in *porcata*, the prothorax rounded and subprominent at the sides anteriorly, more strongly narrowed posteriorly from the middle or still more anteriorly; elevations of the surface nearly as in *porcata*, but with the oval central inclosure much more open anteriorly and with very large tubercles ranged in series along a narrow nude longitudinal sulcus at the centre of the pronotal disk; subapical tumors of the elytra large and conspicuous; elytra nearly similar but with much deeper, more perforate and distinct serial foveæ. Length 10.8-14.0 mm.; width 3.9-5.1 mm. New Hampshire (White Mts.) and Pennsylvania *obcordata*, Kirby
4. Body generally similar to the preceding but with the prothorax rounded at the sides anteriorly and moderately narrowed in basal two-fifths, the general surface flatter, with less prominent elevations, the median basal oval elevation much shorter, not extending before the middle, with a narrow sulciform fovea at the centre of the pronotal disk, and a larger and more rounded pit at the base; tubercles throughout strong and distinct; elytra with the inner of the longitudinal ridges less obliterated behind basal fourth, almost

continuous, the punctiform serial foveæ smaller, the lateral subapical tumors rather smaller and less prominent than in *porcata* and *obcordata*, but much more so than in *robustula*. Length 12.0-14.5 mm.; width 4.5-5.4 mm. California (Placer Co. and Lake Tahoe)..
montana, n. sp.

Other species of this genus probably exist in collections.

ENTOMOLOGICAL SOCIETY OF AMERICA.

The initial meeting of the Entomological Society of America was held in the American Museum of Natural History at New York City, Dec. 28, 1906.

On the evening of December 28, Prof. Wm. M. Wheeler delivered before the Society an illustrated lecture on "The Polymorphism of Insects." Immediately after the lecture the business meeting took place. Prof. J. H. Comstock, of Ithaca, N. Y., was elected chairman, and E. S. G. Titus, of Washington, D. C., secretary of the meeting. The new Society then adopted a constitution and by-laws, and elected officers and the other members of the Executive Committee.

The following are the officers: President, J. H. Comstock, Ithaca, N. Y.; 1st Vice-President, James Fletcher, Ottawa, Can.; 2nd Vice-President, Henry Skinner, Philadelphia, Pa.; Sec.-Treasurer, J. Chester Bradley, Berkeley, Cal.

The Executive Committee consists of the officers and the following: Wm. M. Wheeler, New York, N. Y.; John B. Smith, New Brunswick, N. J.; Herbert Osborn, Columbus, O.; C. J. S. Bethune, Guelph, Can.; F. M. Webster, Washington, D. C.; and Chas. W. Johnson, Boston, Mass.

Following the business meeting, there was a smoker at the Hotel Endicott, given by the Brooklyn, Newark and New York Entomological Societies to the Association of Economic Entomologists and the Entomological Society of America.

The Executive Committee, at a meeting held December 29, decided to call a meeting of the Society at Boston, Mass., in connection with the meetings of the International Congress of Zoology in August, 1907. Full announcement will be made later.

All persons interested in entomology, and residing anywhere in the Americas, are invited to apply for membership. The dues are one dollar a year. The membership now exceeds 250. The American Association for the Advancement of Science granted affiliation to the new Society at their New York meeting.

E. S. G. TITUS, Secretary.

ON THE CLASSIFICATION OF THE MOSQUITOES.

BY HARRISON G. DYAR AND FREDERICK KNAB.

Now that Professor Williston has cleared the ground and destroyed the Theobaldian classification of Culicidæ, let us try a little constructive work. We regard it as essential that all the groups, both generic and higher, should be based only on characters found in both sexes of the adults; that these characters should be fundamental as generally recognized by systematists, and that they should be supported by sound larval characters. We have only one cause of difference with Prof. Williston's remarks, namely, his implied statement that the palpal characters are of value in generic definition. They are not, in the case of the mosquitoes. The differences consist in varying length and the number of joints. They seem at first sight interesting, and we were much attracted to them on beginning our generic studies. But they prove to be entirely secondary sexual characters, not correspondingly represented in both sexes, and are, therefore, ruled out. Moreover, the small terminal joint or joints of the female palpi, on the presence or absence of which Neveu-Lemaire's classification is based, is variable within the limits of a single species (*Culex tarsalis*, Coq.), and is gradually evanescent in another series of species (*Aedes*, spp.), besides there being no modification in the male to correspond with it. The long palpi of the male have been developed independently in several groups (the short palpi being the generalized condition), and are therefore a parallel development without fundamental value. Therefore, the old classification, which Prof. Williston advises his readers to retain, is unsound, as it is based on these palpal characters. We may remark that the same condition appears to obtain in the Tipulidæ, since Loew says, speaking of the division of the family on the long and short palpi: "The division, indeed, is no natural one" (Dipt. No. Am., 10, 1862).

All the subfamilies of the Culicidæ recognized by the Theobaldian school are untenable, including the Anophelinæ. We have found only two subfamilies, the Culicinæ and Sabethinæ. We will not quarrel with Prof. Williston over the terminology, but hasten to call them tribes. The Culicini, then, have the metanotum devoid of setæ; the larvæ furnished with a median ventral brush on the anal segment; the Sabethini have a group of setæ on the metanotum, and the larvæ without a ventral brush on the anal segment. These are primary and essential divisions, the two groups showing a general dissimilarity in their appearance and habits, both as adults and larvæ, beside the structural points noted.

In tabular form we recognize the following genera. We have employed one new character, the tibial comb or scraper, a microscopic structure situated at the end of the tibiae, and consisting of a row of fine spines. It apparently functions as a cleansing organ for the body parts or wings.

CULICINI.

1. Scutellum evenly rounded, not lobed 2.
Scutellum distinctly trilobed 3.
2. First submarginal cell longer than its petiole *Anopheles*.
First submarginal cell less than half as long as its petiole. *Megarhinus*.
3. Hind tibial scraper with a row of 7 to 12 closely set setae 4.
Hind tibial scraper with none to 5 sparsely set setae 13.
4. Scutellum with central lobe elongate, collar-like, not tubercularly prominent 5.
Scutellum with central lobe distinctly prominent and tubercular 6.
5. Terminal antennal joints slender, long *Mansonia*.
Terminal antennal joints short, broad *Aedeomyia*.
6. Second joint of antennae very long, 14 x 1 *Deinocerites*.
Second joint of antennae moderate, less than 8 x 1 7.
7. First submarginal cell less than half as long as its petiole. *Uranotenia*.
First submarginal cell at least nearly as long as its petiole 8.
8. Head with a distinct neck, the occiput broad and exposed *Psorophora*.
Head without a distinct neck, appressed to the thorax 9.
9. Cross veins tending to lie in line, the third separated from the second by less than its own length *Culiseta*.
Cross veins normal, widely separated, the third distinct from the second by its own length 10.
10. ♀ with the last segment of the abdomen not extensile, large, squarely ended; ♂ genitalia with the harpes slender, columnar with bent spined tip *Teniorhynchus*.
♀ with the last segment of the abdomen extensile, slender; ♂ genitalia with harpes broad, concavely curved 11.
11. Clypeus bare 12.
Clypeus with dense appressed scales *Stegomyia*.
12. Prothoracic lobes approximate *Hæmagogus*.
Prothoracic lobes well separated *Ædes*.
13. Feet with large empodia *Lutzia*.
Feet with small empodia *Culex*.

SABETHINI.

1. Clypeus without hairs.....2.
 Clypeus hairy on the sides.....*Joblotia*.
 2. Prothoracic lobes contiguous, densely hairy.....*Sabethes*.
 Prothoracic lobes well separated.....3.
 3. Eyes separated by a narrow wedge; proboscis rather short, swollen
 at tip.....4.
 Eyes contiguous on vertex.....5.
 4. Claws of hind tarsi two, normal.....*Wyeomyia*.
 Hind tarsi with but a single claw.....*Limatus*.
 5. No erect forked scales on occiput; proboscis longer than the
 body.....*Phoniomyia*.
 With a row of erect forked scales on occiput; proboscis not longer
 than body.....6.
 6. Front of head normal, smooth.....*Lesticocampa*.
 Front with a conical process above the clypeus.....*Runchomyia*.

List of American genera, with principal synonyms.

- | | |
|---------------------------------|-------------------------------|
| Anopheles, Meigen. | <i>Conchyliastes</i> , Coq. |
| <i>Myzomyia</i> , Blanch. | <i>Grabhamia</i> , Theob. |
| <i>Cyclolepteron</i> , Theob. | <i>Howardina</i> , Theob. |
| <i>Nototricha</i> , Coq. | <i>Culiselsa</i> , Felt. |
| <i>Cellia</i> , Theob. | <i>Culicada</i> , Felt. |
| <i>Arribalzagia</i> , Theob. | <i>Ecculex</i> , Felt. |
| <i>Cælodiazesis</i> , D. & K. | <i>Protoculex</i> , Felt. |
| Megarhinus, R.-D. | <i>Pseudoculex</i> , Dyar. |
| Mansonia, Blanch. | <i>Gymnometopa</i> , Coq. |
| <i>Pneumaculex</i> , Dyar. | <i>Lepidoplatys</i> , Coq. |
| Ædeomyia, Theob. | <i>Feltidia</i> , Dyar. |
| Deinocerites, Theob. | <i>Ceratocystia</i> , D. & K. |
| Uranotænia, Arrib. | Hæmagogus, Will. |
| Psorophora, R.-D. | <i>Cacomyia</i> , Coq. |
| Culiseta, Felt. | <i>Stegoconops</i> , Lutz. |
| <i>Theobaldinella</i> , Blanch. | Stegomyia, Theob. |
| Tæniorhynchus, Arrib. | Lutzia, Theob. |
| <i>Coquillettidia</i> , Dyar. | Culex, Linn. |
| Edes, Meig. | <i>Neoculex</i> , Dyar. |
| <i>Ochlerotatus</i> , Arrib. | <i>Culicella</i> , Felt. |
| <i>Heteronychia</i> , Arrib. | <i>Melanoconion</i> , Theob. |
| <i>Janthinosoma</i> , Arrib. | <i>Tinolestes</i> , Coq. |

<i>Micraedes</i> , Coq.	Limatus, Theob.
<i>Isostomyia</i> , Coq.	<i>Simondella</i> , Laveran.
<i>Mochlostyrax</i> , D. & K.	Phoniomyia, Theob.
Sabethes, R.-D.	Lesticocampa, D. & K.
<i>Sabethoides</i> , Theob.	Runchomyia, Theob.
Wyeomyia, Theob.	Joblotia, Blanchard.
<i>Dendromyia</i> , Theob.	<i>Trichoprosopon</i> , Theob.

A NEW SPECIES OF MEGARHINUS.

BY FREDERICK KNAB, WASHINGTON, D. C.

A small lot of mosquitoes which were recently received from Dr. W. F. Thornton, of Bluefields, Nicaragua, contains a single specimen of a *Megarhinus*, which represents a new species. It is related to the forms with white-ringed tarsi, recently dealt with in a paper by Dr. Dyar and myself (Smithsonian Miscellaneous Collections, Quarterly Issue, xlviii, 241-258, 1906), but differs from all the known species in that the white on the hind tarsi does not encircle them, but is upon the outer side only.

Microscopic preparations show that the so-called second and third segments of the male palpus are really one, being only apparently divided by a false joint, a slight constriction accentuated by a difference in the coloration of the scales. The male palpus is, therefore, only four-jointed, consisting of a very short basal joint, a very long second joint (apparently homologous with the third joint of the males of the Culicine and Anopheline forms), a third shorter joint, and a fourth long and sabre-like. In the female there is a fifth very minute terminal joint, hidden beneath a dense vestiture of scales. What has been called the first abdominal segment in previous descriptions is in reality the post-scutellum, which overlaps the basal portion of the abdomen. In the following description, for the sake of uniformity, the palpi are treated as in previous descriptions.

Megarhinus hypoptes, new species.—Male: Head behind the eyes velvety-black, the eyes broadly bordered with light metallic-blue, beneath and at the sides silvery. Antennæ densely plumose; the toruli with silvery lustre; second segment long and stout, longer than the three succeeding ones, somewhat compressed laterally, the heavy scaling of the crest condensed to a prominent iridescent blue patch on the anterior portion. Palpi metallic-blue and purple, segments 2 to 4 pale lilac at the tip, second and fourth segments nearly equal, the third longer, fifth twice as long as the fourth. Prothoracic lobes deep metallic-blue. Mesothorax greenish-black on the disk, with a few coppery scales intermixed; the anterior and

posterior margins, an ill-defined median line and patches at the middle of the sides metallic-blue. Scutellum and post-scutellum bright metallic-blue. Pleura and coxæ silvery. Abdomen above deep blue, passing from greenish to a violaceous-tinge towards the tip, segments 6, 7 and 8 marked with gold at the hind angles, the seventh with a fine golden hind margin. Claspers violet-scaled. Sixth and seventh segments laterally expanded, reaching their greatest width at the tip of the seventh. No caudal tufts. Lateral abdominal cilia pale on all the segments but the last, dark on the eighth and the genitalia. Abdomen beneath yellowish-silvery, with a median blue stripe. The stripe is widest on the third and fourth segments, and narrows to a fine line on the sixth and seventh. Eighth segment violaceous beneath, tipped with gold. Legs deep violet and blue, the hind tarsi only white-marked. Under surface of the femora bright brassy. On the hind legs the fourth and fifth tarsal joints are silvery-white on the outer side, black on the inner. Length, 9.5 mm. (exclusive of appendages).

Type.—Cat. No. 10, 146, U. S. Nat. Mus.

Locality.—Bluefields, Nicaragua. (W. F. Thornton.)

TWO NEW BEES OF THE GENUS *TRIEPEOLUS*.

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

Triepeolus grindelia, n. sp.—♀. Length 10–11 mm.; black, the legs red, with black spurs; pubescence pale cinereous, with a slight yellow tint. Wings nearly clear; tegulae orange ferruginous; mesothorax with two short longitudinal bands of pubescence; antennae black except the third joint and extreme base of fourth, which are dull red; clypeus with very dense minute punctures, and scattered larger ones; labrum black; mandibles largely red; lower part of pleura bare, densely punctured; scutellum rather prominent, bilobed; lateral teeth black, short but rather sharp; broad apical bands on abdominal segments 1 to 4 entire; transverse black area on first segment as in *helianthi*, *occidentalis*, etc; oblique patches at sides of second segment pointed, and making an angle of about 45° with apical band; apical segment reddened; pygidial area large and circular; last ventral segment curved downwards at apex. By the shape of the last ventral segment, and the comparatively small size, it is allied only to the Californian *T. callopus*, Ckll., from which it differs by the larger size, grayer pubescence, circular (instead of oval) pygidial area, black labrum, more strongly bilobed scutellum, etc.

Hab.—Boulder, Colorado, three at flowers of *Grindelia*, Aug. 7, 1906 (W. P. Cockerell).

Triepeolus Eldredi, n. sp.—♂. Length, 12 mm.; black, including the legs, but the small joints of the tarsi are dark reddish, and there is a bright ferruginous patch on the flagellum in front near the base, occupying parts of the third and fourth antennal segments; pubescence of thorax and abdomen above dull creamy, but of face, pleura and legs silvery-white; mandibles with a reddish median spot; labrum black; face and nearly all of clypeus covered with shining silvery hair; pleura entirely covered with hair; mesothorax dull and rough, deeply longitudinally sulcate, with a reniform black area, which is joined to the margin by a black band anteriorly; anterior part of mesothorax with a transverse band of light hair, but there is a narrow black area between this and the prothorax; tegulae black, punctured; third submarginal cell very broad above; scutellum bigibbous, the lateral teeth very small; abdomen 6-banded, the last one whiter than the others; black area on first segment a transverse band; bands on first and second segments quite entire; band on second segment with a lobular projection at each extreme side, but this projection is not so high as the width of the band, and is not at all directed inwards. Very close to *T. Wyomingensis*, Ckll., but differs from that species by the broad, clean-cut transverse black band on first abdominal segment, the third s. m. wider above, the broader and flatter scutellum, the duller mesothorax and tegulae, the pleura covered with hair, and the red spot on the antennae.

Hab.—N. Yakima, Washington State, Aug. 7, 1903 (Eldred Jenne).

ENTOMOLOGICAL SOCIETY OF ONTARIO.

MONTREAL BRANCH.

Three meetings have been held since the summer recess, one during each month. At these the members exhibited their summer catches, and discussed them with each other. A certain genus was set aside at each meeting for comparison, and we have had discussions on *Xylina*, *Acronycta* and *Datana*, the members exhibiting any specimens that they had obtained; Mr. Lyman gave his experience with each genus, and helped to clear up some of the difficulties. Mr. Chagnon read papers on Coleoptera, particularly one on the genus *Chrysobothris*, and exhibited all of the known Canadian species. Mr. Denny read a paper on "Collecting Catocalas in the daytime," and exhibited a number of specimens that he had taken. Mr. Moore reported on Hemiptera taken at Como, P. Q., during the past summer, and exhibited specimens. GEO. A. MOORE.

NEW MICRO-LEPIDOPTERA.

BY W. D. KEARFOTT, MONTCLAIR, N. J.

(Continued from page 9.)

*Eucosma fusca*na, sp. nov.—Expanse, 23 to 30 mm. Head, palpi, thorax and fore wings, brownish-fuscous, finely irrorated with whitish scales; basal area darker, in middle extends two-fifths length of wing.

Head rough, tuft on second joint of palpi flatly triangular, extending below beyond third joint, latter only exposed from above. Head, palpi and thorax grayish brown or brownish-fuscous, finely and closely irrorated with whitish scales, the tip or outer end of each scale is whitish. Abdomen whitish-cinereous, anal tuft cinereous, speckled with white. Legs cinereous, speckled with fuscous, fronts of femora and tibiae of anterior pair brownish-fuscous.

Fore wing brownish-fuscous, finely and closely irrorated with whitish. The white irrorations are not evenly spread over the entire surface, their absence or partial absence in some places forms darker area; the most prominent of the dark shade is the basal area, which on the dorsum reaches beyond inner third, thence obliquely and somewhat concave to middle of wing at two-fifths from base, above the middle from base to apex the upper half is evenly irrorated, hence the basal dark area is only sharply defined on the dorsal half of wing. At outer third is a more or less obsolete darker angulated fascia; from dorsal margin in the form of a narrow bar pointing toward middle of termen, but in length less than one-third the width of wing, directly above it a similar bar reaches to upper edge of cell; between this outer fascia and dark basal area the white irrorations are thickest, giving the appearance of a paler fascia between these darker shades. Paralleling the termen the white irrorations are arranged in irregular and broken lines. Male costal fold narrow, about one-third length of wing, appressed and darker brown. Cilia same as outer end of wing.

Hind wing above and beneath, and cilia uniformly pale fuscous.

Under side fore wing, same shade of brownish-fuscous as above, but without the paler irrorations.

Four specimens: Rounthwaite, Manitoba, July, Marmont; Iowa, Ac. Cat., No. 182, C. P. Gillette; Chicago, Illinois, C. H. Fernald, and one specimen from Prof. Fernald, bearing label "10733, Aug. 31," but no locality.

Co-types in U. S. Nat. Mus., Prof. Fernald's and in my collection. In the four specimens before me quite a little variation is observable,

caused by the more or less density of the white irrorations, in one specimen the basal dark area can hardly be defined.

Eucosma bilineana, sp. nov.—Expanse, ♂, 24 to 30 mm.; ♀, 32 mm. Fore wing pale clayish-ochre, with two horizontal black lines, one from base to middle, and one above it from middle to apex, the latter divided and more or less diffused on its outer half.

Head rough, dull brown in front, shading into ochreish-brown on top. Palpi flattened, ovate, scales neither compressed nor loosely laid, apical joint exposed above, but hidden below by projecting tuft from second joint; colour pale ochreish, darker on outer sides and below, apex brown. Antennæ ochreish, lightly ciliated in both ♂ and ♀. Thorax whitish-ochreous, shading into dark brownish-ochreous anteriorly. Abdomen and legs cinereous, tarsi and tibiæ marked and dotted with dark brown.

Fore wing pale, terra-cotta or clayish-ochre; palest along dorsal margin, and overlaid with a deeper ochreous shade along costa and outer third. A narrow black line through middle of wing from just beyond base, nearly to end of cell, where it diminishes to a hair streak and follows vein ii nearly to angle. Above the outer end of the thickened part of this line, at two-thirds length of cell, another wide line begins, and continues to end of cell, where a narrow spur from its up edge continues in termen just below apex; the inner end of this line is somewhat clavate, beyond its outer end, below the apical spur, is a cloud of whitish, dark brown and ochreous scales, between veins v and vii, and over the latter line is a second spur of black scales, but much broken. The costal fold is nearly half the length of wing, closely appressed at base, but rolled over at its outer end; colour, ground colour, but of a more sombre hue; costa beyond fold pale ochreous, with five evenly-spaced black dots, below these are five or six other black dots, not evenly spaced. On the dorsal margin are about the same number of black dots, closer together about the middle. A row of similar dots along the termen, and a few others scattered over the wing, several in the ocellic space, one below outer end of second horizontal line, and a faint line below and paralleling the inner half of the inner line. Cilia grayish-fuscous, paler basally and mottled with darker fuscous scales. Hind wing above and below smoky-ochreous, cilia paler. Under side fore wing smoky-fuscous, paler along costa, where the dark costal dots are repeated. Cilia paler. The above description is from an average ♂, in other specimens the intensity of the dark lines and dots are less or greater. In one ♂ specimen the dark markings are nearly obsolete, leaving only a faint basal and faint outer line, no dots at all, while

in another the dark marks are intensified and the whole outer upper half of wing is clouded with dark scales; the outer end of the outer line divides into three distinct lines or spurs.

I have but one ♀, which differs considerably from the ♂. All of the head, palpi and thorax colouring is much darker. The fore wing is a dull brown, overlaid on lower half below cell with whitish-gray scales, a line of these same scales are above and join the internal black line, and above this is a parallel line of gray-white scales, all the veins beyond the cell are overlaid with the same, and the intervening spaces rather closely speckled with them. The outer black line with its spurs is obsolete, but three or four black dots remain on outer half of costa, and a cluster of black dots on the ocellic space, of which four are in a vertical row along termen and three or four before them.

Seven ♂ and one ♀ specimens. West Manitoba, July, Hannam; Illinois, Prof. Fernald; Iowa, U. S. Nat. Mus. Ac. Cat. No. 383.

Co-types in U. S. Nat. Mus., Prof. Fernald's and my collections.

Eucosma madderana, sp. nov.—Expanse, 13 to 14 mm. Fore wing grayish-white. A large rounded brown-madder spot on outer end of wing, interior of wing washed with fainter shades of this same colour, especially over the basal area, and an oblique semi-fascia from costa beyond middle.

Head rough, rose-madder, palpi same, but a shade darker above and outwardly, tuft compressed, flattened, ovate; outer joint not hidden, brown. Antennæ cinereous, annulated with a darker shade. Thorax smooth, light brown-madder, posteriorly and tips of patagia paler. Abdomen pale fuscous, anal tuft cinereous. Legs steely-fuscous, tibiæ and tarsi streaked and spotted with brown-madder.

Fore wing grayish-white, this ground colour is only distinct before the ovate terminal spot and on dorsal margin before ocellic space, on the latter space it is overlaid with darker scales. Basal area, which extends to inner third at middle and inner fourth on costal and dorsal margins, is a light pink-madder. From the costa just at and beyond middle, an oblique flattened ovate spot on fascia of brown-madder crosses wing towards anal angle, but terminates in a pointed end at vein iii. Between this spot and basal area the colour is a rosy-madder over the gray-white ground. A large, ovate brown-madder spot, its outer margin involving the termen from anal angle to apex, its inner margin curving easily inward from angle to end of cell, then outward to costa before apex; veins iv to viii where they cross this patch are overlaid with fuscous-brown, and where

each terminates on margin are a few yellowish scales, between these is a dark line on the termen, before the cilia.

Costal fold narrow, not closely appressed, about one-third length of wing, colour brown-madder. Costa beyond fold same colours as fascia and patches that touch it. Before the ovate terminal spot the ground colour is the whitest of any part of the wing, and offers a sharp contrast to the dark outer spot; it is divided by a line of madder scales. Cilia grayish-white, tipped with fuscous.

Hing wing pale smoky-fuscous, slightly darker at apex, where a few darker scales form a dot; cilia paler, preceded by a darker, then a paler line. Under side same, but darker.

Under side fore wing dark smoky-fuscous, dark scales more intense at apex, shading narrowly into madder on costa before and at apex; cilia gray, preceded by a darker and paler line, an additional faint narrow dark line precedes these ciliate lines on the termen.

Four specimens. Rounthwaite, July, Marmont; West Manitoba, Hanham; Ottawa, Quebec, vi, 26; Regina, Assiniboia, Willing.

Type in my collection.

Eucosma Heathiana, sp. nov.—Expanse, 17 to 18 mm. Fore wing cream-white, with a dark fuscous dorsal blotch below fold, not touching base and ending before ocellic spot.

Head, frontal tuft pure white, tuft between eyes tinged with very pale brown in some specimens, in others pure white. Palpi pure white, second joint loosely clothed below and above. Scales below longer than above, and the ends almost concealing tip at outer joint, which is obtuse and cream-white. Antennæ white, annulated with light fuscous. Thorax smooth, white, posteriorly stained with fuscous, this darker shade concentrated in form of a dark dot on each side of dorsal line. Abdomen and legs cream-white, tarsi annulated with fuscous.

Fore wing cream-white, a conspicuous dark fuscous blotch occupies all the space between fold and dorsal margin, except at extreme base and ocellic spot. In the most strongly-marked specimens the dark shade is sharply defined by the line of the fold as far as end of cell, beyond it slightly swells upward, terminating in a rounded spot before the ocellic space. In less strongly-marked specimens the white ground colour more or less overlaps the fold, reducing the width of the dark blotch. This fuscous blotch is more or less overlaid with black scales; the latter are more frequent in the rounded process at the outer end. Costa from ♂ fold to apex dotted with about ten brownish to black short dashes, nearly

evenly spaced; from each alternate dash a dark-cream or pale-brown line runs obliquely towards termen, the first merging into second before reaching termen, the three outer ones merging and reaching termen just below apex; the lines are nearly obsolete in some specimens. Between these lines, along costa, the white ground colour has a shining iridescent appearance. The ocellic spot is of the same shining white, enclosing a cream or very pale-brown centre, and contains three short, horizontal black dashes, vertical to each other, with two similar black dashes before the ocellus. These black dashes are easily removed, in some slightly rubbed specimens. Some or all are entirely missing. Cilia cream-white, thickly powdered with dark-gray atoms. Hind wing, above and beneath, very pale fuscous, cilia white, with a faint fuscous line beyond base.

Under side fore wing shining brassy-fuscous, costa narrowly white, cilia cream-white.

Eleven specimens, ♂ and ♀. Cartwright, Manitoba, E. Firmstone Heath; Washington Co., Arkansas, July and August, A. J. Brown. I take much pleasure in dedicating this species to the Dean of our Canadian entomologists. The species is one of the strongly protected kind, and doubtless when at rest on a leaf, with wings folded, it as closely resembles a bird-dropping as the well-known *Stenoma Schlegeleri*, Zell., which it superficially resembles.

Co-types: Mr. Heath's and my collection.

Thiodia ochrotermenana, sp. nov.—Expanse, 11 to 15.5 mm. Fore wing, inner three-quarters mottled black, ocellic spot and termen, including apex, dull ochreous.

Head rough, brownish-ochreous. Palpi flattened, compressed, third joint not exposed, brownish-ochreous, stained with darker brown in front and below, and streaks of same colour on outer sides towards base. Antennæ, basal joints light brown, outer joints dentate in ♂, simple in ♀, dark fuscous.

Thorax ochreous-brown anteriorly, patagia same, a dark brown streak on posterior half of thorax. Abdomen cinereous, anal tuft clearer yellow. Legs cinereous, tibiæ and tarsi annulated and streaked with blackish-brown.

Fore wing, inner two-thirds to three-quarters dull black, flecked with a few brown scales, and with darker-black lines, like watered silk. A few brown scales at extreme base, a few about middle of wing on lower half, and two paler spots on costa beyond middle, each enclosing a darker dot. The ocellic space and above it to apex, including the cilia, is dull ochreous.

This ochreous shade begins on costa about one-sixth before apex, as a light ochreous spot with black centre, the division line continues obliquely inward nearly to end of cell, thence to dorsal margin, which it reaches at outer three-quarters; the internal boundary on the lower half is dark brown, the ocellic space beyond is defined by a large U-shaped mark of shining ochreous scales, a narrow horizontal bar and a few black specks of black cross this space, above it, to costa, the ochreous colour is paler than the colour of extreme termen and cilia, but is more or less mottled with shining as well as darker scales. The extreme edge of costa, when viewed from the front, is ochreous its entire length, but interrupted by numerous black scales. The basal area is not defined. Hind wing smoky cinereous, darker towards apex and termen, cilia paler, preceded by a darker, then by a paler line; beneath cinereous. Fore wing beneath smoky black, with four geminated ochreous spots on outer half, and a few single spots of same colour on inner half of costa. Gray below the fold. Cilia ochreous, and a few ochreous scales are scattered along the termen.

Thirty-five specimens, ♂ and ♀. Rounthwaite, Manitoba, July, Marmont; Montreal, viii, 15, A. F. Winn; Chicago, Ills., September, J. H. Reading; Winchenden, Mass., ix, 1, and New Brighton, Pa., viii, 6 to 10, F. A. Merrick; Nicholson, Pa., viii, 5, A. E. Lister; Plummer's Isl., Md., viii, 10, A. Busck; Montclair and Essex Co., N. J., viii, 20 to 26, Kearfott.

Co-types: U. S. Nat. Mus., and in collections of Merrick, Lister and Kearfott.

Proteopteryx Criddleana, sp. nov.—Expanse, 13 to 17 mm. Fore wing whitish-gray, with a bold blackish-gray basal area, sharply angulated outwardly, and a shade of dark colour from end of cell to apex.

Head gray, speckled with fuscous above, face white, palpi, tuft on second joint flattened, rounded above and below, outer half of third joint exposed; whitish-gray, speckled with fuscous above and on outer sides, a strong streak of blackish through middle of tuft from base on the outer side. Antennæ grayish, annulated with fuscous. Thorax smooth, gray, heavily overlaid with black scales in some specimens, patagia same. Abdomen gray, anal tuft cinereous. Legs whitish, fore and middle pairs annulated and streaked with black.

Fore wing: ♂ costal fold narrow, over one-third length of wing, not closely appressed, in several specimens the tuft is expanded fan-like in front of the costa, and fold bent under the costa. Colour whitish-gray, with wave-like shades of cinereous-gray on the outer two-thirds, nearly

paralleling the outer margin of basal area. The latter is large, and is the only distinctly-defined marking on the wing; it consists of black scales heavily overlaying the ground colour, and on costa extends to inner fourth, angulated sharply outward to middle of cell, where it reaches inner third of wing, thence obliquely inward to dorsal margin; it is indented once above and twice below middle. The costal fold is ground colour, with four or five black spots. Costa beyond fold ground colour, with faint streaks of cinereous; towards and at apex and before termen these streaks are more distinct and of an olivaceous cinereous shade. A more or less illy-defined shade of blackish scales begins in the extreme apex and runs obliquely to end of cell; in darkest specimens, usually females, the dark scales forming this shade are roughly grouped in two irregular spots, one involving the apex and nearly to end of cell, the other over end of cell and nearly reaching apex of basal area. Ocellic spot not clearly defined. An irregular vertical bar of lustrous-whitish scales before, and another shorter horizontal bar above the space, a few scales of the same below apex. On the darkest specimens the dorsal margin is dotted with black, in paler specimens these dots are cinereous. Cilia grayish-fuscos, preceded on upper half by a narrow black marginal line, twice interrupted, darker below middle. Hind wing, above and below, smoky-cinereous, darker towards apex, cilia a shade lighter, preceded by a darker, then a paler line.

Under side fore wing smoky-fuscos, grayish-white along costa; cilia grayish-fuscos.

Seventeen specimens, male and female, sixteen from Norman Criddle, Aweme, Manitoba, vii, 24, to viii, 13, and one from L. E. Marmont, Rounthwaite, Manitoba, July. I take great pleasure in giving Mr. Criddle's name to this species, as a slight appreciation of his thorough and systematic work in these minute specimens.

Co-types: Marmont's, Criddle's and Heath's and in my collection.

Hysterosia Merrickana, sp. nov.—EXpanse, ♂ 19 to 25 mm., ♀ 22 to 26 mm. Light-brownish-fuscos, outer fourth of fore wing dark brown, an oblique streak of the darker colour arising from dorsum a fifth beyond base, and absorbed in ground colour between middle and upper edge of cell.

Head cinereous, a dot of blackish above eye, beneath base of antennæ. Palpi long, once and a half the length of head, slender, second joint rather closely clothed, above and beneath, tuft longer below, outer joint less than half length of second, exposed; cinereous, dotted with

brown on outside. Antennæ, basal joint large, black, outer joint pectinate in ♂, simple in ♀, fuscous.

Thorax smooth, cinereous, patagia brown. Abdomen and anal tuft cinereous; legs same, thickly dotted and streaked with dark brown.

Fore wing: costa moderately arched, apex rounded, termen straight. Colour in some specimens cinereous-brown to cinereous-gray, in others reticulated all over the surface with fine darker lines. A prominent dark-brown or blackish-brown patch involves the outer fourth, its inner edge begins on costa at three-quarters and proceeds obliquely to anal angle, the division line is slightly concave inwardly. ♂ costal fold less than one-third length of wing, narrow, compressed dark brown. Costa between fold and dark outer patch with seven or eight obscure blackish dots. Sometimes two or three about the middle of costa form a darker shade. From dorsum at inner fourth a streak of brown goes obliquely towards costa, and merges in this middle costal shade; this streak is sharply defined inwardly, but outwardly it is gradually lost in the ground colour; width differs in different specimens, in some it is a narrow band, in others it is distinctly defined for a space equal to a sixth the length of wing. Female specimens are generally several shades darker in all particulars. Ocellic spot not defined, before the ocellic space a quadrate spot of a darker shade than the ground colour, and above it a similar smaller spot. Dorsal margin dotted with black. Two small black dots at end of cell, oblique to each other. The outer dark patch contains three darker dots on costa, and one below costa, a darker reticulation before its inner margin. The basal area is paler than any other portion of the wing. Cilia fuscous.

Hind wing pale fuscous, closely reticulated with darker fuscous, cilia fuscous, preceded by a paler line, hind wing beneath the same, but reticulations more distinct, cilia cinereous.

Fore wing beneath dark smoky-fuscous, costa dotted with cinereous, cilia latter colour.

Eight males, five females. Cartwright, Manitoba, viii, 3, Heath; Cincinnati, Ohio, viii, 30, Miss Braun; Algonquin, Illinois, viii, 4-5, W. A. Nason, M. D.; Mt. Desert, Me., Fernald; New Brighton, Penna., vii, 22, to viii, 31, Frank A. Merrick, whose name I take pleasure in honouring.

Co types: Collections of Fernald, Braun, Merrick, and Kearfott. This species is of the same general appearance as *H. inopiana*, Haw. The latter, however, lacks the conspicuous terminal patch.

(To be continued.)

ON *RHAGOVELIA OBESA*, UHLER.

BY J. R. DE LA TORRE BUENO, NEW YORK.

Rhagovelia, Mayr,* is well characterized by the long spindle-shaped deeply-cleft intermediate tarsi, a peculiarity noted by most of the authors who have referred to the genus. This genus is found in Asia, Africa and the three Americas, but the larger part of the known species is native to the Western Hemisphere, no less than fifteen (including undescribed forms in my collection) being Central American. All the species are fluviatile, save two, which are marine. The marine forms are found in estuaries or along the coasts, and by some authors are held to form a different genus, known as *Trochopus*.

The one species to be found commonly in the Eastern United States is Uhler's *Rhagovelia obesa*,† which can be found in almost any swift streamlet in little congregations, weaving zigzags where the current is most rapid, swimming against it, or else sheltered in the eddy behind some projecting rock, where, in the latitude of New York, the rare winged form is most likely to be found. My collection contains specimens from the following regions: New York, New Jersey, Washington, D. C., and North Carolina. The various local lists we have mention it as occurring in Tennessee, North and South Carolina, Maryland, Virginia, Pennsylvania, Massachusetts, Ohio, New Jersey, and Ontario, Canada. Prof. Uhler states that it is found in the Atlantic States.

In their generic characterization, Mayr, Stal (under the generic name *Baecula*)‡ and Uhler note the deeply-cleft intermediate tarsi, but it fell to Champion§ to refer to the tuft of hairs in the cleft in the following terms (which Distant quotes in "Fauna of British India, Rhynchota, Vol. II., p. 171"): "Rhagovelia is well characterized by the 3-jointed tarsi, and the long, deeply-fissured terminal joint of the intermediate tarsi. In this fissure there is a series of long ciliated hairs arising from a common stem, which are probably extended fan-like when the insect moves about on the surface of the water; these hairs are sometimes partly extended in dried specimens, but they are usually hidden within the fissure."

Champion's remarks on the hairs are substantially correct, as can be

*Verh. Zool., bot. Ges. Wien., XV., 445, 1865. Reise der Novara, Hem., 181.

†1871. Proc. Bost. Soc. N. H., XIV., 107.

‡1865. Hemiptera Africana, Vol. III., p. 167.

§1901. Biologia Centrali Americana, Heteroptera, Vol. II., p. 131.

seen from the accompanying figures (3, 4 and 5), but his surmise as to the manner of their employment is ambiguous in form, because under it



FIG. 3.—*Rhagovelia obesa*, Uhler. Third joint of intermediate tarsus, showing cleft and swimming hairs, x 10. (Original.)

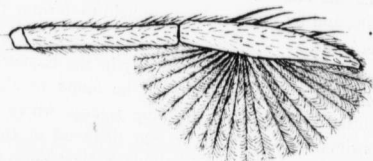


FIG. 4.—*Rhagovelia obesa*, Uhler. Tarsus of intermediate, showing ciliated swimming hairs spread. Side view. x 10. (Original.)

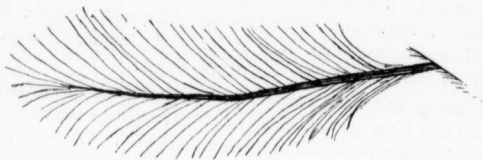


FIG. 5.—*Rhagovelia obesa*, Uhler. Ciliated hair from intermediate tarsus. x 82. (Original.)

one may conclude that they are spread out *upon the surface* to support the bug, or else that they are employed in propelling the insect when moving about on the surface. At any rate, he merely states an hypothesis in vague terms, based on the appearance of the structures and in the absence of direct observations. The abundance of *Rhagovelia obesa* about New York has made it possible to study the living Hemipteron on a number of individuals I secured for that purpose. I had over twenty living specimens in an aquarium this past summer (1906), under close observation, and the following notes are taken from my field-book, in which I noted the behaviour of the living bugs as I watched them.

The manner of using the tarsal hair tuft, it should be noticed, is very difficult to observe satisfactorily, as the active bug moves its legs very swiftly when swimming. At times, however, either through exhaustion from long-continued rowing, or through weakness in partly drowned individuals, they move the legs more slowly, so it is possible to see the use of the hairs plainly, of which, when swimming fast, it is possible to get only the merest glimpse. The ciliated hairs (figs. 3, 4 and 5), are extended fan-wise (fig. 4), as may sometimes be seen in dried specimens.

The tarsus is in contact with the water along its entire length, with the slit vertical to the surface. When in this position the spread tuft of hairs projects beneath *into* the water, and is a powerful auxiliary in swimming. When swimming under water the hair tuft is also expanded, and is of great assistance. The necessity for an aid in swimming at the surface is explained by the fact that *Rhagovelia* is to be found in the swiftest part of streams, where it may be seen zigzagging against the current in little schools, which in June and July are made up principally of the sexes in copulo. The very young nymphs betake themselves to sheltered and still nooks along the banks.

In cop. the ♂ is above, as is usual with insects. When the ♂ first seizes the ♀ she endeavours to throw him off, and flings herself on her back with the ♂ under her. After a moment's struggle they right themselves. During this the ♂ sets the hind femora at right angles to his body, bending the tibiæ under, and, by means of them, holding the ♀'s second and third pair of legs straight and close to her body. Once he is firmly on her, he releases this hold, but maintains his position by the anterior legs, which clasp the ♀ over the prothorax. He is not connected with the ♀ continuously while on her back. To complete the act, he seizes her as at first, by means of the hind legs. At other times he merely lies on her back quiescent, with his second and third pairs of legs extended, but not touching the surface. As long as the ♂ is on her the ♀ does all the swimming.

It is known that *Rhagovelia* swims freely under water, and to my disgust the individuals I had persisted in diving. They were taken in the afternoon, and being put in an aquarium, when night came, they took to diving. By 11 p.m. they were all actively swimming under water. To penetrate the surface film they put the head down at the surface, and, by means of a few vigorous swimming-strokes with the intermediates, they force themselves under. When under water they swim about freely and rapidly by means of the intermediates, the tarsal swimming-tuft being fully

expanded. In order to come out they swim strongly upwards, and the head breaking through the surface film, the body is forced out by vigorous strokes. When the entire body has emerged it is still held by the surface film, but the dorsum is dry, the velvety pile which clothes the insect shedding the water. Now, by main strength, the legs are lifted free from the imprisoning film, and, when this is accomplished, a few strong heaves and jerks liberate the body, and the bug once more glides over the water. Under water *Rhagovelia* appears to be made of silver, owing to the large quantity of air carried down by it enmeshed in its pile.

Rhagovelia is predaceous in common with all the Gerrids, and feeds on such insects as fall into the water, or on its own kind when there is no other food. The winged form is very rare in this latitude, although it is quite common in species from the tropics. The majority of the species of this genus have incrassate hind tarsi in the male, in some cases out of all proportion to the size of the bug.

NEW SPECIES OF NORTH AMERICAN LEPIDOPTERA.

BY WM. BARNES, S. B., N. D., DECATUR, ILLINOIS.

(Continued from page 15.)

Tricholita artega, n. sp.—Expanse, 40 mm.

Fore wing reddish-brown, slightly hoary from a thin admixture of whitish scales. Markings distinct though not contrasting, except white scales on outer side of reniform and the pale orbicular. Basal half line present, dentate, double, pale filled. T. a. almost transverse, scalloped, double, pale filled. Median shade present though not prominent, rather darker brownish-red than rest of wing, as are the other lines. T. p. evenly exerted beyond cell, thence in rather a straight line to inner margin, scalloped between veins, the outer accompanying line barely indicated. The pale filling between the lines is specially indicated on costa and inner margin. Two or three pale points on costa beyond t. p. line. S. t. pale, irregular, rather diffuse, preceded by a slightly darker shading. Veins, especially through terminal and subterminal space, slightly darker. Fringe yellowish-white at base, darkened outwardly. The wing is somewhat lighter along costa and inferior portion of median space, from the increase in number of white cells in these portions. Orbicular a somewhat round yellowish spot, pale contrasting with ground colour. Reniform long, slender, upright, with faint black ring, especially marked on outer side, filled through outer half and lower end with white scales, the remaining portion being of the ordinary ground colour.

February, 1907

Hind wing rather even dark fuscous, with very faint trace of discal bar. Fringe with pale line at base, followed by dusky shade, whitish terminally.

Beneath a well marked mesial band on both wings. Fore wings dusky centrally, yellowish-brown outwardly, along costa and inner margin. Head and collar concolorous with fore wing. Quadrate tuft at base of abdomen, with whitish scales at tip. Abdomen fuscous, terminal segment with long pale yellowish-white hair, separated by sharp line from the fuscous tint of remainder.

Male similar to female except the antennæ, which are broadly pectinated, while simple in the female, and the terminal abdominal tufting, which is here yellowish-brown instead of white.

Type, ♂ and ♀, Santa Catalina Mts., Ariz., August.

Xanthia cordova, n. sp.—Expanse, 25 mm.

Resembles *Alcandra*, Druce Biol. Centr. Amer., Plate 44, fig. 12.

Fore wing yellow, with purplish-brown markings. T. a. line somewhat outwardly oblique, dentate. T. p. line scalloped, moderately exerted over cell, then with a gentle inward curve to inner margin. A row of intravenular patches of purplish-brown scales represent the s. t. line. Broad purplish shade between reniform and t. p. line, another between ordinary spots, the two joining below reniform into a single band, which is cut squarely off before reaching inner margin. Purplish patch in cell to inner side of orbicular. None of these shades quite reach costa. Three or four purplish spots on costa before apex. Fringe concolorous, with slightly darker line at base. Hind wings semi-translucent, pale-yellowish, slightly darker outwardly. Fringe concolorous, with slightly darker line at base. Head and thorax somewhat more brownish than fore wings. Abdomen somewhat paler shade of the same colour.

Beneath, fore wings even pale-yellowish. The ordinary spots and surrounding darker area of upper surface transmitted through wing. Mesial band from costa to middle of wing yellowish-brown, angled below costa, some dark scales along costal edge, and shade of same from apex to angle of mesial band. Fringe concolorous with darker line at base, slightly checkered by some orange hairs between the veins. Hind wing with yellowish-brown mesial band from costa to middle of wing. A slight scattering of brownish scales along costa. Fringe concolorous with darker line at base.

Types Chiricahua Mts., Ariz.

Xanthodes amorata, n. sp.—Expanse, 28 mm.

Fore wings pale straw colour, with yellowish-brown markings. Blackish spot on costa, about two millimetres from base. Wing between that and base brownish. Wing crossed by three narrow brown lines, the first slightly before middle of wing, outwardly oblique to cell, transverse across cell, thence inwardly oblique to inner margin; the second strongly outwardly oblique from costa to beyond cell, thence making an acute angle inwardly oblique, with slight inward curve to inner margin. This line in upper portion somewhat heavier than the others. Third line parallel to second, and about midway between it and outer margin. From end of cell to outer margin there are two parallel brown dashes about a millimetre apart, the upper one passing through apex of angle of outer line. Submarginal row of small black dots. The wing, especially in the mesial portion, is thinly dusted with brownish scales; these are somewhat more thickly grouped between the parallel dashes. Fringe brownish, with a darker line at base. Hind wing pale yellowish-white, fringe concolorous. Head, collar and thorax slightly darker than ground colour. Abdomen ground colour, slightly ringed with brownish.

Beneath, fore wing yellowish-white, somewhat more yellow along costa and at apex. Fringe brownish-black. The second line above quite well marked below, and traces of the third can be made out. Hind wing pale yellowish-white, slightly more yellow along costal half. Mesal band partially crossing wing from costa.

Fore legs with tarsi heavily coated with long yellowish-brown hair.

Type, ♂ and ♀, Babaquivera Mts., Ariz., August.

Lythrodes arivaca, n. sp.—♀. Expanse, 32 mm.

Fore wings creamy-white, with faint yellowish tinge. Ordinary spots, a double band across middle of wing, and veins ochraceous-brown. Orbicular and reniform close together at end of cell, the former pale, centered with well-marked ring; the reniform, which almost touches it, is lunate, with well-marked outer ring and dark centre. The inner of the two bands crossing wing is somewhat heavier than the outer. Beginning with rather a diffuse patch on costa, it passes, with a gentle curve, between the ordinary spots, then with a rather sharp angle downward and outward to inner margin. The outer line is separated from the first about a millimetre, and is parallel to it below the ordinary spots; in the upper portion of the wing it diverges somewhat, passing around the reniform; the space between the lines is filled with a paler shade of the same colour. There is a faint flush of the same shade beyond the reniform, and to a

lesser extent beyond the median band in the lower half of the wing. A faint ochraceous curved band leaves costa, above orbicular, passing downward and inward to base, almost at inner margin, dividing this portion of wing in about two equal parts, the lower half being somewhat more tinged with ochraceous than the upper. Fringe white, with ochraceous blotches between veins. Hind wings yellowish-white, more or less tinged with fuscous, especially outwardly. Fringe white.

Beneath, fore wing blackish centrally, paler along costa and outer margin. Hind wings pale yellowish-white.

Collar, patagia and thorax creamy-white, with ochraceous shading. Thorax with posterior tuftings. Abdomen fuscous-yellow.

Type, one ♀, Southern New Mexico, from Mr. Poling.

Chamaeclea gladiola, n. sp.—Expanse, 28 mm.

Fore wing, at base, beyond s. t. line and a large oval patch in the centre below costa, creamy-white. Remainder of wing dark olivaceous-brown, with an admixture of violet and paler olivaceous and yellow scales. Ordinary lines not distinctly marked. Basal portion of wing is creamy-white except along costa, where it is of the same shade as the median portion of wing. The reniform is present at outer edge of oval white patch, though not very plainly marked. It is pale-ringed, with dark centre, narrow and upright. Indications of a row of terminal black intravenular dots. Fringe white. Hind wings blackish-brown, with faint indications of mesial band and discal dot. Fringe white.

Beneath, fore wings blackish, with central yellowish patch, yellowish along costa. Hind wings yellowish-white, with dusky mesial band. Collar yellowish at base, remainder of collar, patagia and thorax white. Thorax posteriorly with some olivaceous and violet scales.

Types, ♂ and ♀, Santa Catalina Mts., Ariz.

This species should stand next to *Anthæcia scira*, Druce, Biol. Centr. Amer. Het., Pl. 28, fig. 5. The type of maculation and colours are about the same, but the Mexican species entirely lacks the large white patch in centre of wing.

Oxycnemis acuna, n. sp.—Expanse, 15 mm.

Ground colour gray, more or less covered with brownish scales, markings black. Ornamentation similar to other species of the genus. Claviform long linear, gray, narrowly outlined in black, brownish centered. Orbicular similar in form and size to claviform, gray, narrowly outlined in black, brown centered, lying parallel to and extending a little beyond claviform. Reniform gray, with brown centre, surrounded by a few black

scales, especially on outer and inner sides. A whitish shade extends from reniform superiorly to just before apex. S. t. line pale, irregular, broken, preceded by blackish markings, more pronounced at apex and towards inner angle, the remainder being broken into wedge-shaped markings. A neat, well-marked even terminal black line. Fringe concolorous, obscurely checkered, with paler basal and mesial line. Hind wings soiled whitish, with faint discal dot. Fringe a trifle paler, with well-marked line at base. Head and thorax concolorous with fore wing. Abdomen yellowish-fuscous.

Beneath, fore wing pale fuscous, somewhat paler along costa. Hind wing whitish, somewhat yellow along costa. Yellowish-brown terminal line at base of fringe.

Types San Antonio, Texas.

Grotella calora, n. sp.—Expanse, 17 mm.

Fore wing white. Black spot on costa at base, one at inner fourth, one on inner margin opposite to it, one in centre of wing between and a trifle inside of these, one on costa in middle of wing. An outer row of four spots: one on costa at outer fourth, one at end of cell, one on inner margin, with another somewhat above and to outer side of it. Fringe white. Hind wing uniform dark fuscous, fringe white.

(To be Continued.)

SOUTHERN BUTTERFLIES IN MASSACHUSETTS.

I should like to know whether any New England readers have noted the presence of *Laertias philenor* and *Achlarus lycidas* north of their usual haunts during the past season.

Both of these butterflies were extremely common this year at Melrose, Mass. (seven miles north of Boston). *Laertias philenor* larvæ were everywhere noticeable on *Aristolochia siphon*: the first brood in June and a second in August and September. The butterfly itself was frequent in the gardens throughout the summer.

Achlarus lycidas was easily captured during the early part of July in certain localities where its food-plant (Desmodium) was abundant. The females were readily detected laying their eggs singly upon the Trefoil or busily engaged feeding upon the wayside clover.

I am interested to know whether these species are generally moving northward into New England, or is Melrose one of a very few favoured spots?

ROLAND W. HARRIS, Boston, Mass.

Mailed February 14th, 1907.