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THE JAMES FLETCHER MEMORIAL FUND.

THE OTTAWA FIELD-NATURALISTS' CLUB. OTTAWA, MARCH 8TH, 1909.

SIR,—You have no doubt heard with regret of the death of Dr. James Fletcher, Entomologist and Botanist of the Dominion Experimental Farms, which occurred after a short illness at Montreal, November 8th, 1908.

Dr. Fletcher not only did most excellent work for the country in his official capacity, but, as is well known, took a most active part in encouraging the study of Natural History in its broadest aspects throughout the Dominion.

His activities in this connection have been widely recognized and greatly appreciated by scores of students and others who have benefited by his timely assistance and warm encouragement. He was always in requisition as a lecturer by Normal Schools, Natural History and other Societies, for he had gained a wide popularity as a charming and exceedingly instructive speaker.

The Ottawa Field-Naturalists' Club, of which Dr. Fletcher was one of the founders, have thought that his life-work was of such a national character that a permanent tribute to his memory should be made. Such a memorial would not only serve to commemorate for all time the good work done by Dr. Fletcher, but would also act as a stimulus to future generations in the study of the fauna and flora in Canada.

Several suggestions have been made as to the form the memorial should take, namely:

- (a). A fountain at the Central Experimental Farm.
- (b). A statue to be placed in the grounds of the new Natural History Museum.
- (c). A bust or portrait to be placed in that building, or at the Central Experimental Farm.
- (d). To found a bursary at some Canadian University.

Of necessity no decision can be reached until it is known, approximately at least, what amount of money can be raised.

The Council has appointed the members hereafter named to be a Committee to ascertain what response might be forthcoming to an appeal for contributions towards such a memorial.

Will you kindly inform the Secretary the amount you are agreeable to subscribe to this fund and send it at your earliest convenience to the Secretary-Treasurer of the Committee.

Committee: A. E. Attwood, M.A., President, O. F. N. C.; T. E. Clarke, B.A., Secretary, O. F. N. C.; Arthur Gibson, Treasurer, O. F. N. C.; Hon. Sydney A. Fisher, B.A., Minister of Agriculture; W. Saunders, C.M.G., LL.D., F.L.S., F.R.S.C., Director of Dominion Experimental Farms; E. R. Cameron, M.A., K.C., Registrar, Supreme Court; R. B. Whyte, Vice-President of Ontario Horticultural Association; Frank T. Shutt, M.A., F.I.C., F.C.S., F.R.S.C., Chemist, Dominion Experimental Farms; A. McNeill, Chief of Fruit Division, Dept. of Agriculture; H. M. Ami, M.A., D.Sc., F.G.S., F.R.S.C., Assistant Paleontologist of the Geological Survey.

Signed on behalf of the Committee,

E. R. CAMERON, *Chairman.*

ARTHUR GIBSON, *Secretary-Treasurer.*

(*Central Experimental Farm.*)

NOTES ON TENTHREDINOIDEA, WITH DESCRIPTIONS OF NEW SPECIES.

BY S. A. ROHWER, BOULDER, COLO.

Paper IV.

(New Species of Tenthredo.)

Tenthredo mellipes, n. sp.

Female: Length, 9 mm. Clypeus deeply, squarely notched; labrum rounded at the apex, fringed with long hairs; malar space distinct, but not very wide; frontal carinae large at the base (*i. e.*, at the antennae), larger than in *rufipes*, Say; frontal furrows distinct, reaching to the occiput; the furrow behind the ocelli indistinct. Third antennal joint longer than the fourth by about a third. Scutellum dull, rather densely punctured, the punctures coarser than those of the rest of the thorax. Tarsal claws with a tooth about a third of the length of the claw from the apex. The tran. rad. in about the middle of the third cubital cell. Abdomen more shining than the thorax. Colour black; labrum, apical

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margin of the clypeus, palpi, and all the legs dull brownish-yellow; the tarsi somewhat infuscated. Wings smoky hyaline; nervures and stigma dark brown.

Habitat: Graymont, Colorado, July, 1892 (C. P. Gillete). Type in the collection of the Colorado Agricultural College.

This species was given the manuscript name of *mellipes* by W. H. Harrington, at whose request I describe it. It is closely related to *T. erythromera*, Prov., but separated by the characters given below. The waxen brownish-yellow of the legs should help to distinguish this species from its allies. The following table will aid in the separation of most of the species with black abdomens; most of the following have the legs largely ferruginous:

Tegulae and collar black	1.
Tegulae and collar pale	4.
1. Legs dull brownish-yellow, the coxae of the same colour; no pale spot above the posterior coxae	<i>mellipes</i> , Roh.
Legs rufous (the anterior tibiae and tarsi in a few cases are yellowish)	2.
2. Coxae rufous; a pale spot above posterior coxae	<i>rufipes</i> , Say.
Coxae black	3.
3. A pale spot above the posterior coxae	<i>nigrisoma</i> , Harrg.
No pale spot above the posterior coxae	<i>erythromera</i> , Prov.
4. Pectus pale	5.
Pectus black	6.
5. Legs with a black line above	<i>zetes</i> , Kby.
Legs without a black line above	<i>rufopectus</i> , Nort.
6. Tibiae entirely rufous	7.
Tibiae, or at least some of them, with a black line	8.
7. Coxae black	<i>ruficollis</i> , Harrg.
Coxae rufous	<i>rufipes</i> , Say, var.
8. Posterior tibiae with a black line above	<i>Savagei</i> , MacG.
Posterior tibiae entirely rufous	<i>nigrifascia</i> , MacG.

Tenthredo ferrugineipes, var. *Pikei*, n. var.

Female: Length, 11 mm. Similar to *ferrugineipes*, Cress., but differs as follows: The yellow on the cheeks replaced by rufous, tegulae testaceous, not yellow; posterior femora; a black spot on the middle femora at

the base above; abdomen with only the fourth segment rufous; wings a trifle more yellowish.

Habitat: Pike's Peak, Colorado, alt. 10,000 ft., July 20, 1906 (L. Bruner). Type in the University of Nebraska.

This may prove to be a distinct species.

Tenthredo pallicolus, var. *Beulahensis*, n. var.

Female: Length, 10 mm. Differs from Dr. MacGillivray's description (Jn. N. Y. Ent. Soc., Sept., 1897, p. 160) of *pallicolus*, in having the inner orbits narrowly yellow, the base of the stigma only is luteous, and the venation is very pale brown. It is also smaller.

Habitat: Beulah, N. M., Aug. 3, 1902, "on foliage of *Veratrum*" (Cockerell).

Tenthredo relativus, n. sp.

Female: Length, 9.5 mm. Clypeus circularly emarginate, lobes broad; third joint of the antennæ longer than the fourth, all the joints somewhat enlarged at the apex. Head and thorax shining, without the usual punctures; postscutellum roughened; metapleuræ strongly produced at the sides; tarsal claws cleft, teeth equal; venation normal; sheath rather narrow, rounded at the apex, with a distinct fringe of hairs. Colour: head yellow; a large spot from the antennæ to the occiput, spot on the superior orbits, and the antennæ, except the two basal joints beneath, black. Thorax black, much marked with yellow; pronotum, except a transverse band, tegulæ, margin of the middle lobe of the mesonotum, scutellum, metanotum, a large part of the mesopleuræ, line from the middle coxæ to beneath the anterior wings, a spot above the posterior coxæ, and the basal plates, except a spot in the middle, *yellow*. Abdomen ferruginous, a band on the first three segments at the sides above, and a spot on each side of the fifth segment at the sides above, black. Anterior legs, middle and posterior coxæ except bases, middle and posterior trochanters *yellow*; middle and posterior femora, tibiæ and tarsi *rufous*. Wings yellowish hyaline, iridescent; nervures and apical third of the stigma dark brown; costa and base of the stigma testaceous.

Habitat: West Point, Nebraska, June 21, 1905 (H. S. Smith). Type in the University of Nebraska.

This species is near *rubripes*, MacG., but differs at once in the black pectus. It differs from *perplexus*, MacG., in having the legs below the

trochanters rufous, the costa testaceous, and the sutures of the anterior lobe of the mesonotum are yellow. It differs from *verticalis*, Say, to which it is also related, in the different coloured legs, and is much more shining than that species, lacking the dense punctures of the dorsulum that are present on *verticalis*.

Tenthredo zelmirus, n. sp.

Male: Length, 10 mm. Clypeus deeply emarginate, the lobes triangular, broad, the apex rounded; labrum rounded at the apex; eyes strongly converging below; third antennal joint about a third longer than the fourth, all the joints somewhat enlarged at the apex; middle furrow of the anterior lobe of the mesonotum distinct; mesonotum and scutellum densely punctured; tarsal claws cleft, the teeth spreading and small; the inner spur of the anterior tibiæ bifid; venation normal, transverse radial curved. Colour black; clypeus, labrum, mandibles, except the piceus apices, palpi, sometimes a spot above the posterior coxæ, and a small spot on the pleuræ yellow; abdomen, except the basal and the two apical segments, coxæ, extreme bases (the anterior coxæ in one specimen are black), femora, except a black line above (this line on the posterior femora is widely broken in the middle), and the four anterior tibiæ and tarsi rufous. Wings dusky hyaline; nervures and stigma black, the costa sometimes a little paler, venation strong.

Habitat: Ute Creek, Costilla Co., Colo., alt. 9,000 ft., July, 1907 (L. Bruner and R. W. Dawson); Russel, Colo., June 25, 1907 (L. Bruner); and Ft. Garland, Colo., July 12, 1907 (L. Bruner). Type and paratypes in the University of Nebraska, and paratypes in my collection.

This species should be easily known by the rufous coxæ. It may be the male of *tricolor*, Nort., or it might be the male of *sectiliformis*, Roh. It differs from this last species in having the legs marked with black, and in being a little larger.

Tenthredo Utensis, n. sp.

Female: Length, 10 mm. Clypeus deeply emarginate, lobes triangular; labrum large, rounded at the apex; frontal carinæ not so strong as usual; third antennal joint about as long as four plus five, from the third the joints gradually decrease in length, the entire antennæ covered with short, fine hair; middle furrow of the middle lobe of the mesonotum almost wanting; mesonotum and scutellum with well-separated punctures; inner spur of the anterior tibiæ with the apex bifid; tarsal claws cleft, the

inner tooth the shorter; tran. med. received basad of the middle of the cell; tran. rad. in about the middle; sheath rather long, the lower and upper margins parallel, the apex rounded, but more strongly so below; cerci robust, short. Colour black; clypeus, labrum, mandibles, except the piceous apices, palpi, lower part of the cheeks, posterior angles of the pronotum, tegulæ, a broad line on the mesopleuræ, a vertical line below the posterior wings, coxæ, trochanters (there is a small spot on the posterior pair above), femora, except a spot at the apex above on the anterior pair, a line above on the posterior pair and the apical third, tibiæ, except a line above (this line is sometimes interrupted), all the tarsi (the posterior pair are somewhat rufous) *yellow*; a spot above the posterior coxæ cream-colour; base of the venter and the sides of the basal plates *reddish-yellow*; the rest of the abdomen, except the three basal, tergal segments and the sheath, which are black, rufous. Wings clear hyaline, somewhat iridescent; venation rather weak, the veins and stigma brown, becoming pale at the base of the wing; the costa reddish-yellow.

Habitat: Ute Creek, Costilla Co., Colorado, alt. 9,000 ft., June 22, 1907 (R. W. Dawson). Type in the University of Nebraska.

This pretty species is quite distinct from all the other western species, coming nearest to *pallicolus Beulahensis*, but it is quite distinct from that species. It is perhaps closest to *Junghannsii*, MacG. (N. H.), but is smaller, the first three tergal segments are black, and all the tarsi are yellow.

A female from Hot Creek, Nebr., Aug., is not typical, but evidently the same.

Tenthredo varifrons, n. sp.

Male: Length, 9.5 to 11 mm. Clypeus sub-semicircularly emarginate, lobes somewhat variable in width, but broad and obtuse; frontal furrows distinct to occiput, the transverse furrow behind the lateral ocelli wanting or only faintly indicated; frontal carinæ not reaching to the anterior ocellus. Third antennal joint much longer than the fourth; the apical joint and the preceding of almost equal length; the apical joint obtuse at the apex. Furrow of the middle lobe of the mesonotum distinct; lateral lobes closely punctured, opaque; scutellum very closely punctured, almost granular; postscutellum not distinctly carinated. Venation normal; tarsal claws cleft, teeth about equal. Colour black; clypeus, labrum, cheeks, a dot between the antennæ sometimes, a spot above

each antenna, tegulæ, a spot on the posterior angles of the pronotum, spot on the propleuræ, a broad line on the mesopleuræ, mesopectus, spot above the posterior coxæ (sometimes two), sides of the basal plates, legs beneath from the coxæ to the tarsi except the hind tibiæ and tarsi (the middle tarsi are also sometimes black), *yellow*. Abdomen yellowish-ferruginous except the basal dorsal segments (sometimes the abdomen is almost entirely black). Wings dusky hyaline; venation dark brown.

Habitat.—Twenty-one males, Ute Creek, Costilla Co., Colorado, alt. about 9,000 ft., July, 1907 (H. S. Smith, L. Bruner and R. W. Dawson); 2 males, Sierra Blanca, Costilla Co., Colorado, alt., 10,000 to 11,500 ft., July (L. Bruner); 4 males, Florissant, Colorado, July, at flowers of *Heracleum lanatum* and on *Juncus*, sp. (S. A. Rohwer); one male from the top of Las Vegas Range, New Mexico, approx. 11,000 ft., June 28 (Cockerell).

This species is near *variegatus*, Norton, but distinguished at once by the longer apical antennal joint (the apical joint of *variegatus* is distinctly shorter than the preceding) and by the black tibiæ, as well as many other differences.

Tenthredo Titusi, n. sp.

Male: Length, 11.5 mm. Clypeus squarely emarginate; labrum rounded at the apex; antennal joints somewhat produced at the apex beneath, the third joint longer than the fourth; head shining, with a few fine widely-scattered punctures; meso- and metanotum closely punctured with well-defined punctures; postscutellum with a medial carina, which extends on the posterior part of the scutellum; tarsal claws deeply cleft; inner spur of the anterior tibiæ with a spur about one-third of its length from the apex; tran. rad. received near the tran. cub.; tran. med. received in the basal third of the cell. Colour black, yellow and rufous; head black, except the clypeus, labrum, mandibles (the apices piceous), lower half of the cheeks, palpi, a spot above each antenna, a spot between the antennæ, a spot on the upper inner orbits, which are *yellow*; thorax black above, except a spot behind the postscutellum and a transverse spot before the basal plates, which are *rufous*; posterior angles of the pronotum, lateral angles of the pronotum, tegulæ, mesepimera, except a transverse black band below the tegulæ, a vertical line below the posterior wings, spot above the posterior coxæ, sides of the basal plates, and a narrow apical margin of the same *yellow*; legs: four anterior coxæ, four anterior

trochanters, femora, tibiæ and tarsi, except a black line above (the intermediate tibiæ and tarsi are slightly rufous), posterior coxæ and trochanters, except a black line above, *yellow*; posterior femora, except a black line above, all of the tibiæ and tarsi, *rufous*; abdomen, except a narrow line on the margin of the posterior segment, *rufous*; venter at the base a little whitish. Wings subhyaline; nervures dark brown, costa and base of the stigma rufous.

Habitat.—Rist Canyon, Larimer Co., Colorado, July 3, 1897. "Taken sweeping rose bushes." Collected by E. G. Titus, for whom it is named. Type in the collection of the Colorado Agricultural College. A male from Ute Creek, Costilla Co., Colorado, alt., 9,000 ft., July 1, 1907 (R. W. Dawson), is a little smaller, and there is no black line on the anterior tibiæ.

This species comes near *messica*, MacG., but differs in not having the yellow of the mesopleuræ and the pectus confluent, and the entirely rufous posterior tibiæ.

Tenthredo divergens, n. sp.

This species is very close to *Titusi*, but the clypeus is deeply, circularly emarginate, and the following differences were noted:

T. Titusi.

1. Very robust.
2. Third antennal joint a third longer than the fourth.
3. Mesocoxæ almost all yellow.
4. Posterior tibiæ without a black line above.
5. Claws deeply cleft.
6. Postscutellum with a carina.
7. Tran. med. not so near the basal.

T. divergens.

1. Not so robust.
2. Third antennal joint but a fourth longer than the fourth.
3. Mesocoxæ almost all black.
4. Posterior tibiæ with a black line above.
5. Claws not so deeply cleft.
6. Postscutellum without a carina.
7. Tran. med. about a fifth of the length of the cell from the v basal nervure:

Habitat.—Florissant, Colorado, July 7 and 13, 1907, on foliage of *Salix brachycarpa* (S. A. Rohwer).

The Fyles Collection of Province of Quebec Lepidoptera has been purchased by the Quebec Government, for the Provincial Museum in the Parliament Building at Quebec. The Provencher Collection of Hymenoptera is in the same museum.

NOTES ON *ÆCANTHUS*.

BY C. O. HOUGHTON, DELAWARE EXPERIMENT STATION, NEWARK, DEL.

In Entomological News for February, 1904, the writer published some notes* concerning the oviposition of *Æcanthus niveus*, De Geer, and the habits of the nymphs and adults of this species in confinement. As the title of the article would indicate, it was thought at the time that the method of oviposition there recorded (the eggs being laid singly in apple and plum trees) was an unusual one, as all of the earlier writers credited the snowy tree-cricket (*O. niveus*) with the injury to pithy plants caused by the deposition of eggs in long rows. It seemed strange, however, that this species should have two methods of oviposition differing so widely as this would indicate, and the writer determined to rear some tree-cricket from eggs laid in long rows, as soon as an opportunity presented itself. This did not occur, however, until the past season.

Observations by Prof. P. J. Parrott and Mr. J. P. Jensen in New York State, and by the writer in Delaware, during the past season (1908) have shown that the earlier writers were evidently in error regarding the identity of the species injuring raspberry and blackberry canes, and other pithy plants (and also some fruit trees), by depositing its eggs in long rows. The species largely, if not entirely responsible for such injury, in this region at least, is undoubtedly Walker's *nigricornis* and its varieties.

So far as I am aware, all recent data on the subject tend to show that the method of depositing eggs singly, as discussed by me in my article in 1904, is the usual one in the case of the snowy tree-cricket, *O. niveus*.

On April 12, 1908, I collected near Newark, Del., a few pieces of branches of the common elder, *Sambucus canadensis*, L., which contained eggs, deposited in long rows, of a species of *Æcanthus*. Some of the rows of egg scars were evidently a year or more old, as they contained no eggs, but there were three or four that contained numerous living eggs. These sections of branches were brought to my laboratory and placed together in a glass cylinder. Frequent examinations of the cage were made, but no young crickets were found until May 16th. Several appeared on that date, and they continued to emerge until the 20th. In all, about 50 were secured and bottled singly or in pairs in shell vials. Several others got away. I fed the nymphs on various kinds of plant-lice, principally, until

*An Unusual Injury by the Snowy Tree-cricket and Notes on Its Feeding Habits. Vol. XV, pp. 57-61.

See also pp. 150-152 of the 15th Ann. Report of the Del. College Agric. Experiment Station.

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July 16th, when one of them, a male, reached maturity. At this time I had but one other living nymph, all the others having died, or having been killed by their mates or by ants in the vials with them, previous to the middle of July. This remaining nymph, a female, reached maturity on Aug. 6th, and died Sept. 5th, having lived on a diet of flies for a period of about seven weeks.

On June 30, 1908, I forwarded to Dr. L. O. Howard, Washington, D. C., a few of the nymphs which had died in confinement, and these were determined by Mr. A. N. Caudell as *O. quadripunctatus*, Beutenm. On Sept. 16, I forwarded to Dr. Howard the specimens that had reached maturity, with the request that these be placed in the collections at Washington. In reply, I received a letter from Mr. C. L. Marlatt, Acting Chief of the Bureau of Entomology, in which he stated that the specimens had been referred to Mr. Caudell, who submitted the following report :

"For some time I have had *Æcanthus quadripunctatus*, Beutenm., marked in the collection as a variety of *nigricornis*, Walker, and this rearing by Mr. Houghton proves that it is so. The nymphs sent some time ago, in the early part of July, showed the basal two segments of the antennæ each with two spots, as is characteristic of *quadripunctatus*. The adults now received, which are from the same deposition of eggs, are typically *nigricornis*. Thus the name *quadripunctatus* falls as a specific name, though I shall continue its use to indicate the adult forms in which the antennal markings remain separate."

Of course, it is possible, though hardly probable, that the eggs which I collected on April 12th were laid by two different species ; and some of my nymphs doubtless came from each of the three or four rows of eggs that I had under observation. My own opinion in the matter, however, is that Beutenmuller's *quadripunctatus* is simply a variety of Walker's *nigricornis*, as the above breeding experiments would seem to indicate. Additional data to support this theory are to be found in the fact that later in the season (Sept. and Oct., 1908) I found the typical *nigricornis* and its variety *argentinus* intimately associated with *quadripunctatus* in depositing eggs in long rows in young peach trees at Newark, Del., and in captivity a ♂ *quadripunctatus* mated with a ♀ *argentinus*.

In confinement the species under observation the past season acted much as did the nymphs of *niveus*, already reported upon. They fed freely upon various kinds of plant-lice and flies, and occasionally developed cannibalistic tendencies, the larger eating the smaller when two individuals were enclosed in one shell vial. In one instance a nymph

was found feeding upon a portion of a dead cricket in the vial with it, although the bottle contained a good supply of living aphids at the time.

On June 23, I collected some leaves of *Viburnum acerifolium*, L., upon which were numerous plant-lice and a few of their attendant ants. As it was rather difficult to remove all the ants without dislodging many of the aphids, I allowed three of the ants on one leaf to go into a shell vial with a tree-cricket, and a single ant to go into another vial with another cricket. The following morning both of the crickets were found considerably mutilated by the ants, one of them being dead and the other nearly so. After this experience I did not allow any ants to go into the vials along with the aphids.

Apparently but very little vegetable matter was eaten by the nymphs while in confinement, and I did not observe the adults feeding upon vegetation at any time. I once saw a nymph begin feeding upon some peach leaves, on sprouts bearing numerous aphids, before she began to eat the latter, but the larger part of her meal consisted of the plant-lice. Again, some radish leaves, with numerous aphids upon them, were slightly eaten by the young crickets in one instance. It is evident, however, from my observations upon the genus *Ecanthus*, that our tree-crickets feed almost entirely upon animal matter.

NEW HISTORIES IN PAPAPEMA (HYDRÆCIA).

BY HENRY BIRD, RYE, N. Y.

(Continued from Vol. XLI, page 68).

Few of our Noctuid moths constituting the genus *Papaipema*, Sm., have been so well known autopically as the species *rigida*, described by Grote in 1877 under the generic term *Gortyna*. In 1882 he published a very good figure of the moth,* and from that date, at any rate, identification has been easy. As it belongs to a group that fly readily to light, its captures here and there were duly noted, though always as a rare insect. At the time of the publication of the "Revision of Hydræcia," by Prof. J. B. Smith, in 1899, its range was given as the New England and northern Middle States, westward to the Mississippi, but it was recorded as "by no means common."

The writer's efforts to discover the larval habits in the group naturally brought this species early to mind, but it had never occurred in the Rye locality as a moth, and the years went by without encountering its larva.

**Papilio*, II, p. 64, Plate I, fig. 3, 3a.

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So attention was directed to other places, that have now produced the information desired. By far the most enticing was the New Brighton locality of western Pennsylvania, where the light traps of Mr. F. A. Merrick yearly secured a few of the moths. Conditions of these captures were such as to prove that the larvæ must be at work in the immediate vicinity of the traps, yet dig and delve as we may, search and eliminate, try and guess again, for three successive years at a proper date, we were unable to get the faintest clue to the food-plant. As if to give us the laugh, the traps each year kept taking an increasing number of the moths, and jovial Mr. Merrick, newer at the business and less callous to failure, concluded we were stirring them up at any rate. At the close of the third season, when the larval history of *rigida* began to look like an interesting problem, light dawned from an unexpected quarter, and it was learned that the insect had been reared by Mr. F. E. Moeser, of Buffalo, N. Y. A specimen was forwarded to make sure that the larva he had discovered was really Grote's species, and in the following summer, 1908, as a guest of Messrs. Moeser and Lucas, the writer was introduced to the limited locality wherein the species had occurred the year before.

The food-plant was pointed out, and the author was considerably allowed to locate and uncover unaided his first specimen of *rigida* larva, which was an easy matter. Of course it is in a root, as was long suspected, and when *Helianthus decapetalus* was shown to be the answer to the riddle, it was recalled that these plants had been duly examined at New Brighton, but the fates had not kindly directed us to infested examples.

At the middle of July there is little intimation of a larval presence, the plants seem to be doing nicely and are beginning to bloom, and it is only by close inspection at the root that the telltale frass and a minute hole in the stem at the ground level are to be discerned. Being a plant of the open, there are usually grasses or small weeds about the roots, completely hiding this evidence, while any wilting or other detective clues are wholly wanting. So the more credit to its discoverer, since only one *Papaipema* bent would ever be likely to find the species, and it is not strange that thirty years have elapsed without this larva being recorded.

That *Helianthus decapetalus* is a preferred or primitive food-plant, there can be little doubt, from the evidence at Buffalo, and what is known of the plant. This is a question to be determined, though the range of a food-plant does not necessarily restrict the faunal zone of a moth. A good example occurs with *P. impecuniosa*, Grt., which changes from *Aster* to *Helenium autumnale* west of the Alleghanies, and flies over a very wide

range. Still, one following the early histories of this genus must be struck by their persistence in selecting a certain food-plant, and it is like going by a well-blazed trail if the list be but known.

Rigida matures at a mean date for the genus, about Sept. 15th, and emerges, from the hibernated egg unquestionably, about the first of June. The earlier stages were not observed, but where a larva passes its existence in a limited gallery, something can be gleaned of the early procedure. The newly-emerged larva bores to the centre of the stem, slightly above the crown, turns downward with the gallery, preserving and keeping free the original opening. It must reach the root early, else there would be a considerable enlargement at the crown, and this has not been noticed. In well-established plants a firm and entangled cluster of fleshy rootlets support three or four larvæ without serious detriment to their growth. There being no principal taproot, the tangle is pierced to some extent without regard for boring an individual section. This is especially true at maturity. The larva leaves the root-clump to pupate, the boring not offering advantages for the moth's escape. Of parasites, the limited observations only disclosed the presence of the species of *Hemiteles*, which is such a common check in this genus. Observations of the larva were sufficient to determine the most important question, its position compared with its allies, placing it in the section with *inquasita* and others, wherein the stripes are eliminated centrally, the effect of some former habit at an earlier epoch.

Penultimate stage of larva: Head normal, smooth and shining, yellowish-brown; the labrum, mandibles and ocelli touched with dark brown. There is no side line nor shade connecting the ocelli with the darkened edge of the shield; setæ normal; width 22 mm. Body cylindrical, less attenuated than some, colour dull pinkish, brighter doubtless in preceding stages. The dorsal and subdorsal lines rather broad, yellowish-white, all break abruptly at, and do not cross, the first four abdominal segments, where the even body-colour prevails. On the remaining abdominal joints, in addition to the whitish lines, the larva becomes white ventrally. On the meso- and metathorax the skin shows the usual creased or puckered appearance, which becomes filled out at the final stage. Cervical shield wide as head, of the same polished, corneous nature, though a little lighter in colour, its lower, lateral border edged with dark brown; the usual complement of setæ. Tubercles rather small for the stage, not very contrasting, mostly pale brown in colour; i and ii are minute, iv and v best shown, iv is largest, the size of the spiracle. On

joint ten this number is low, and has no accessory at the upper corner of the spiracle. Anal shield and preceding plates light in colour and of less prominence than in some cases. Spiracles elliptically ringed with black. Length, 27-30 mm.; termination of stage July 20th to 25th.

Last stage: Head darker and less polished, no side line evident; width, 2.5 mm. Body gains in fullness more than length, colour yellowish-white, the lines lost. Tubercles and plates the same, the former more accentuated as their colour has darkened. Cervical shield preserves its prominence, the darkened lower edges merge together over the anterior portion. Lateral tubercles nearly of one size, iv low on joint 10; all are black. Spiracles now black. Length, 32-34 mm. Maturity is reached Aug. 1st to 6th. Pupa is rather slender, of the normal light chestnut-brown colour, the spiracles slightly darker, spur bifidate. There are no modifications of importance. Dates for emergence, Sept. 12th to 20th.

Superficially, *rigida* larva seems most like *sciata*, and when first encountered was welcomed as differing from the prevalent *nitela* class, where specific limitations are meagre. Frequently one finds in its company, in the same root cluster, the little *Sesia rutilans*, Hy. Edw., which seems fond of the *Helianthus* generally. Indeed, it must be a very general feeder, from its wide distribution and the number of food-plants already known, and it seems to have an unusual distinction in another direction. If Beutenmuller has the synonymy correct, a description under eight different names in one paper, with a place in two genera, is no mean record for such a little fellow.

TWO SUBMERGED SPECIES OF GEOMETRIDÆ.

BY RICHARD F. PEARSALL, BROOKLYN, N. Y.

It is rather curious that the application of our geometrid names should have become so confused. The two instances which, at this time, I seek to correct, concern species comparatively well known. Turning to our List (Dyar, No. 3383), we find *Mesoleuca hersiliata*, Guen., with synonym *flammifera*, Walker. This is correct, so far as it goes, but after completing his description referable to *hersiliata*, Walker added the following: "Var. B.—Fore wings with the exterior emitting a much shorter tooth toward the discal mark; exterior band quite obsolete hindward, apical black mark much larger, marginal black line divided into pairs of points." In this brief reference he characterizes a species which has never been separated from *hersiliata*. It is entirely distinct in pattern of markings, and is larger in size, though its colour scheme is much the same. A detailed description follows under the name of

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Mesoleuca Walkerata, n. sp.—Expanse, 28–30 mm. Best described by comparison with the familiar *hersiliata*. On fore wings the basal line turns outward below costa, forming a long sharp point below subcostal vein, and another above vein 1, in general course receding toward base. In *hersiliata* this line curves outward at costa, then runs in straight line to inner margin. Basal space gray, succeeded by an orange-brown band, rather narrow at costa, the discal line which forms the outer limit irregularly toothed across wing until it reaches vein 1, which it follows outwardly to about the width of band, then at right angle drops to inner margin. This band above vein 1 is sometimes entirely obscured by gray atoms, leaving only the square block below vein 1, in orange-brown or yellow. This line in *hersiliata* runs nearly parallel with basal line, or with an outward trend near inner margin, but not at all as in *Walkerata*. A band of dark gray, bordering discal line outwardly, follows its sinuosities and above inner margin, also abruptly turns outward at vein 1, forming between that and inner margin a square block of dark gray scales. A similar band runs from costa to angle, within extra-discal line, from which to inner margin it fades out into the paler area of gray, traversed by one or two wavy lines, which occupies the central discal space. Discal dots small, linear, black. The extra-discal line starts from costa nearer the apex than in *hersiliata*, its outline much the same, except that the tooth-like projections are angulate, not rounded, and the notch opposite discal point is barely traceable in ♂ type, while in the ♀ it is quite apparent. This notch is not always a deep indenture in *hersiliata*, but is generally so. Colouring and lines of marginal space as in *hersiliata*. Hind wings evenly dusky, with faint extra-discal, but rather more angulate, and beneath all parts as in *hersiliata*.

Type, ♂ taken in Catskill Mts., July 2, 1905; type, ♀, July 1, 1899; co-type, one ♂ from same locality in the writer's collection. These are all I have secured in many years' collecting, so that the species is a rare one. In the Brooklyn Inst. Museum are specimens taken in the White Mountains of New Hampshire many years ago.

The second species is referred to by Dr. Packard (Mono., page 438), where in describing *Cymatophora (Cleora) larvaria*, Guen., he says: "This common species is divided into two races, one smaller and darker, with the antennæ more broadly pectinated, while the outer line in the hind wing is less angulated," etc. They are not races of the same species, as their structure and markings amply demonstrate, though they fly at the same season. I take both in moderate quantity each year in the Catskill Mts. I have named it

Cleora takenaria, n. sp.—Expanse, 25 mm. Palpi moderately stout, dark brown, tipped with white. Front, thorax and abdomen pale whitish-ash,

sprinkled with brown atoms; a band of these crosses front beneath antennæ, and across thorax in front. Each segment of abdomen narrowly edged with pale buff posteriorly, with a dorsal black spot anterior to it, largest on terminal segment. Second segment slightly darker. All wings broad, rounded, edges waved. Colour pale bluish-ashen, nearly white on discal space and beyond extra-discal line. Cross lines narrow jet black, heaviest on fore wings at costa. Basal line on fore wings one-fourth out, curves sharply outward below costa, then recedes toward base, as it crosses wing. Intra-discal when present encloses but does not obscure the large, elongate-oval discal ringlet, below which it can be traced faintly to inner margin, parallel with basal line. Extra-discal about two-thirds out, runs outward from costa, making a sharp angle at vein 5, reaching in one broad outward scallop the inner margin at about its middle. A pale olive-brown broad shade line runs outside the extra-discal and within the basal lines, sometimes clouding the entire basal area. A well defined serrate white line divides subterminal space centrally, outside which the wing is slightly darker. Two of its teeth at costa and opposite angle of extra-discal are filled in with jet-black scales. Fine marginal line black, with dots inside it, between veins. Fringes dusky. Hind wings with basal line heavy, black, running straight across wing, sometimes double part of length. Extra-discal angulate opposite cell, recedes toward base, passing beneath and touching the elongate oval discal ringlet, thence wavy to inner margin, parallel with the basal line. Otherwise as in fore wing, the three costal serrations of white line bordered internally with black. Beneath evenly dark gray, heaviest on fore wings. These have a broad black or dusky shade line, from costa just before apex, running parallel to margin, but narrowing and fading out before reaching internal angle. Basal and extra-discal lines faintly shadowed. Discals on all wings large, linear jet black. Abdomen beneath and legs white, the latter powdered with brown scales.

Type, ♂ taken in Catskill Mts., July 24, 1908; type, ♀ from same locality, August 4, 1908, and co-types in author's collection. Readily separated from its congeners by the large linear discal spots beneath, and from *larvaria* by the course of basal and extra-discal lines on hind wings at inner margin. In that species they both curve strongly downward. I suspect this may be Walker's *larvaria* (List Lep. Br. Mus., xxi, 344, 1860), since he mentions the large discal spots beneath, but his name falls, having been preoccupied by Guenée. It may, however, explain the association of these two species under that name.

ALLEGATIONS: NEW AND OLD.

BY W. L. DISTANT, LONDON, ENG.

In the CANADIAN ENTOMOLOGIST (ante p. 31), Kirkaldy writes: "*Budeus*, Distant, was founded on nymphs (mistaken for short-winged adults!)." In my description of the genus (Faun. Brit. Ind. Rhynch., 11, p. 76) I stated: "This genus is founded on six apparently undeveloped specimens." Comment is needless.

ORIENTAL CULICIDÆ.

In the October number of last year, page 376, is a criticism by Dr. H. G. Dyar of my recent CATALOGUE OF ORIENTAL CULICIDÆ, in which he refers to a printed slip containing additions and corrections, and which, as I therein noted, was to be regarded as M.S. corrections only, and not as a published supplement.

In fact, I intended to make the, at first, few corrections, actually in my own handwriting, but the publication of Mr. Theobald's fourth volume of his Monograph necessitated so many alterations and additions that it became impractical to adopt this plan, and I therefore had them printed, intending my correspondents to *enter them themselves in manuscript and then destroy the printed slip*, exactly as I should, in receiving a new book, turn first to the page of "*errata*" and make the necessary emendations in accordance with it. Thus they would have fulfilled the request I particularly made at the heading of the slip, to regard them literally as M.S. corrections by me.

As the printing of a few notes, lists or catalogues (under the express stipulation that they are issued in printed form merely to save the labour of copying) does not constitute publication, these notes are most certainly *not* "published." I, only, possess them; they are not on sale nor obtainable elsewhere; they bear no date, and, I repeat, were issued expressly as personal corrections only. Unless they are received in this manner I shall discontinue adding them to the separate copies of my Catalogue.

As regards the criticism of my work, I have nothing to say, except that my "new classification," as Dr. Dyar calls it, was not intended at all as a fresh view on this subject.

It was necessary to adopt some groups higher than genera, and therefore, to the *Culicinae* and *Corethrinae* subfamilies, which the authors of the recent Palearctic Catalogue deem sufficient, I added the *Anophelinae* and *Aedeomyiinae*, mainly as a concession to the views of workers in this family.

I certainly cannot regard all the subfamilies admitted by Theobald in the "Genera Insectorum" as of subfamily rank. The *Culicidae* suffer, in my thinking, from the usual tendency prevailing amongst specialists who limit their studies to a single family, and often have a very slight knowledge of the rest of the animal kingdom. This is to very much overrate the comparative value of the various distinctive characters.

Thus two or three allied genera get split off into a subfamily, whilst genera, subgenera and species are created *ad infinitum*, on the slenderest and often inconstant characters. In support of the expressed opinion in my Catalogue, that many of the new species could not hold specific rank, may be noted a tendency now to speak of "Culex so-and-so and its allies," which is a very convenient way of intimating the vagueness of the specific limitations.—E. BRUNETTI, Calcutta, India, January, 1909.

P.S.—Perhaps it may not be out of place here to incidentally record my complete agreement with Prof. Aldrich's views as to the inadvisability of overturning so many of Meigen's later (1803) generic names for those first (1800) adopted by him and subsequently discarded, and I regret much to see one or two of our leading European Dipterologists accepting the changed nomenclature.

THREE NEW SPECIES OF THE GENUS *BDELLA* (MITES).

BY H. E. EWING, URBANA, ILL.

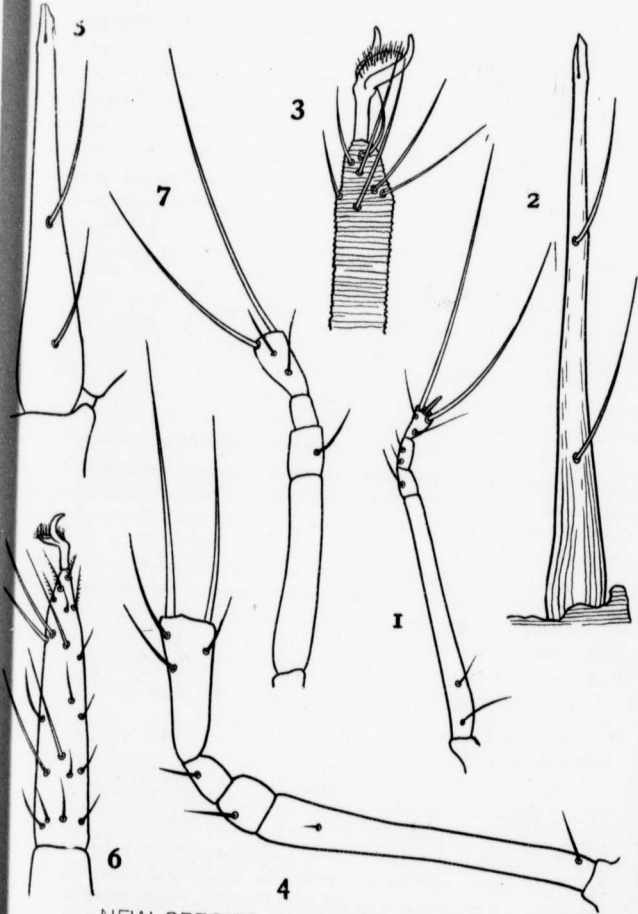
The genus *Bdella* is by far the richest in species of any of the genera of the family BDELLIDÆ, the members of which are especially characterized by their large beak, and frequently have their palpi geniculate. The members of this family of mites are predaceous, using their powerful chelate mandibles for attacking their prey. Up to the present time only ten species of this genus have been recorded from the United States, this paper bringing the number up to thirteen known to our country.

KEY TO SPECIES DESCRIBED.

1. Segment 3 and 4 of palpus subequal *B. corticis*.
Segment 3 much stouter than 4 2.
2. Distal segment of palpus over twice as long as segment 4 . . . *B. muscorum*.
Distal segment of palpus scarcely one and one-half times as long as
segment 4 *B. depressa*.

Bdella corticis, n. sp. (Plate vi, figs. 1, 2, 3).—Colour yellowish-green, with blotches of black.

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NEW SPECIES OF BDELLA (MITES).

Cephalothorax as broad as long; beak three-fourths as long as leg 1; each mandible bears dorsally two rather prominent bristles, a large bristle situated at about one-third the distance from the anterior to the posterior end of the mandible, and a similar bristle at about an equal distance from the base of the same. Palpi surpassing the mandibles; second segment almost equal to the mandibles in length; third and fourth segments subequal in length, but the third slightly stouter than the fourth; distal segment equal to the fourth in length, but about twice as broad at the distal end as at the proximal end. Second segment with three or four moderate bristles; third with a single bristle; fourth with two subequal bristles on the outer margin, each about as long as the width of the segment itself; distal segment with six bristles, two very large tactile ones at the end of the segment, the outer about as long as the palpus itself, the inner about three-fourths as long; between the two large tactile bristles are situated two small bristles, the outer about as long as the segment itself, the inner about two-thirds as long; one situated laterally, about as long as the segment itself, one situated dorsally near the base. A single pair of eyes is present at the postero-lateral border of cephalothorax.

Abdomen about three-fifths as broad as long, broadest at the anterior end; two rather prominent, straight, posterior bristles situated on the posterior margin near the median plane; a pair of small shoulder bristles also present.

Legs large; posterior pair longest; anterior pair about one and one-half times as long as the beak, and each succeeding pair slightly longer than the pair preceding it. Claws and caroncle of legs small. Tarsus of leg 1 longer than tibia.

Length, 0.70 mm.; breadth, 0.52 mm.

Under bark of cottonwood. Collected by the writer at Urbana, Ill.

Bdella muscorum, n. sp. (Platevi, figs 4, 5, 6).—Red, body somewhat darker than the legs and palpi.

Cephalothorax large, lateral margins convex. Beak about as long as the cephalothorax. Mandibles each with a prominent curved bristle near the middle of the dorsal surface, and a smaller bristle near the base. Palpi slightly surpassing the beak; second segment fully two-thirds as long as the mandibles; third segment shorter but stouter than the fourth; distal segment about one-half as long as segment two, but stouter, being enlarged at its distal end. Segment two of palpus bearing a short bristle on its

inner margin near the base, and three or four short bristles on its outer margin; segment four with a superior and a lateral bristle; distal segment with two very large terminal bristles, the outer of which is the longest, being equal to the total length of the palpus, the inner being about three-fourths as long, three other bristles on the distal segment, two on the outer margin near the distal end, and one near the inner margin about one-third the distance from the distal to the proximal end. Two pairs of eyes present, situated close together at the postero-lateral aspect of the cephalothorax.

Abdomen about one-half as broad as long, with a pair of small shoulder bristles and two pairs of subequal posterior marginal bristles.

Anterior pair of legs about one and one-half times as long as the beak. The two posterior pairs of legs are longer than the two anterior pairs of legs. Tarsus of leg 1 one and one-half times as long as the tibia; claws and caroncle of tarsus stout.

Length, 0.85 mm.; breadth, 0.60 mm.

In moss. Collected by the writer at Muncie, Ill.

Bdella depressa, n. sp. (Plate vi, fig. 7).--Cephalothorax, not including the beak, about one-half as long as the abdomen; beak two-thirds as long as the abdomen. Palpi surpassing the beak; segment two almost as long as the beak; segment three twice as long and almost twice as thick as segment four; distal segment equal to segment three in length, but only as broad as segment three at its distal end, which is much broader than the proximal end. Distal tactile bristles of the end segment almost equal, being about as long as the total length of the palpus. A double pair of eyes present; situated at the postero-lateral aspect of the dorsal surface of cephalothorax about their width from the cephalothoracic abdominal suture.

Abdomen twice as long as high; very sparsely clothed with simple, stiff, short bristles, which are slightly longer towards the posterior margin.

Anterior pair of legs as long as abdomen; tarsus of leg 1 longer than the tibia; claws and caroncle stout, situated on a pedicel as long as the thickness of the tarsus. Legs clothed with simple bristles, which are longer towards the distal end of the leg.

Length, 0.70 mm.; breadth, 0.50 mm.

Under bark. Collected by the writer at Arcola, Ill.

EXPLANATION OF PLATE 6.

- Fig. 1.—*Bdella corticis*, n. sp., left palpus, x 108.
 " 2.— " " right mandible from above, x 240.
 Fig. 3.—*Bdella corticis*, tip of tarsus of leg 1 with ambulacra; from the inside and below, x 500.
 Fig. 4.—*Bdella muscorum*, n. sp., left palpus, x 160.
 " 5.— " " right mandible, x 140.
 " 6.— " " tarsus of leg 1, x 160.
 " 7.—*Bdella depressa*, n. sp., right palpus, x 240.

NOTES ON SOME HEMIPTERA TAKEN IN THE BERMUDAS
BY W. J. PALMER.

BY E. P. VAN DUZEE, BUFFALO, N. Y.

I am indebted to Mr. W. J. Palmer, of Buffalo, N. Y., for a small but very interesting collection of Hemiptera taken by him on the Bermuda Islands on December 9th, 1908. He was on the islands but two or three days, and had very little time for scientific work, but he was able to secure 120 specimens representing seventeen species. A very good showing, considering the season and the limited fauna of these islands. Prof. Verrill, in his "Bermuda Islands," published in 1903, lists all the species known to him to have been recorded as taken in these islands up to that time. Excluding the plant lice, he enumerates 20 species, to which must be added one, *Tinobregmus vittatus*, Van Duzee, recorded by Prof. Herbert Osborn, but overlooked by Prof. Verrill, and possibly the *Cicada* recorded by Dr. Uhler as *tibicen*, but perhaps considered identical with *Bermudiana* by Prof. Verrill. To these must now be added twelve of the species recorded below as taken by Mr. Palmer, making a total of thirty-four species now known from these islands. The identity of a few of those quoted by Prof. Verrill is doubtful. The *Lygus* he figures at plate 99, fig. 17, may be *Lygus apicalis*, var. *prasinus*, Reut. The *Rhaphigaster cydnus* recorded by J. M. Jones is unknown to me, and may represent merely a clerical error. The *Nabis* reported by Dr. Dahl may very likely be the *Reduviolus capsiformis* taken by Mr. Palmer. These identifications may reduce the total number of recorded forms to 30 or 31.

It is a somewhat remarkable fact that all the species taken by Mr. Palmer, and most of those recorded by Prof. Verrill, have also been taken in Florida. If this holds true for all the insect fauna of these islands, as it is very likely to do, we must look for the origin of this fauna to the

"draft" brought from the coast of Florida by the ocean currents. Of the thirty or more species now known from these islands, six are widely distributed forms common to Europe and America. These six are: *Nezara viridula*, Linn.; *Corizus hyalinus*, Fabr.; *Reduviolus capsiformis*, Germ.; *Cimex lectularius*, Linn.; *Lygus apicalis*, var. *prasinus*, Reut.; *Lygus pratensis*, Linn.; and *Trigonotylus ruficornis*, Fall. Five others, *Mormidea lugens*, Fabr.; *Jassus olitorius*, Say; *Ormenis pruinosa*, Say; *Liburnia ornata*, Stal, and *Agallia sanguinolenta*, Prov., have an extended range on the mainland of North America, where they occur as far north as Canada. Eight species: *Nezara viridula*, Linn.; *Corizus hyalinus*, Fabr.; *Pamera bilobata*, Say; *Reduviolus capsiformis*, Germ.; *Lygus apicalis*, var. *prasinus*, Reut.; *Lygus olivaceus*, Reut.; *Liburnia albolineosa*, Fowl., and *Athysanus exitiosus*, Uhler, are known to me to inhabit the West India Islands. *Cicada Bermudiana*, Verrill, if it prove to be a valid species, is the only precinctive form known from these islands. The following are the species taken by Mr. Palmer:

Nezara sp. Two nymphs. These are quite distinct from any nymphs of either *viridula* or *marginata* which I have seen, but they may represent some stage of one of those species. They most closely resemble the adults of *Nezara bipunctata*, Stal, from Brazil, but it seems unlikely that they could be of that species.

Corizus (Liorhyssus) hyalinus, Fabr. Two dark-coloured examples.

Pamera bilobata, Say. Three specimens.

Reduviolus capsiformis, Germ. Two examples.

Lygus pratensis, Linn. Common.

Lygus apicalis, var. **prasinus**, Reut. Four examples. Dr. Reuter reports the variety *inops*, Horvarth described from Spain to be identical with this American form.

Lygus olivaceus, Reuter. This was described by Dr. Reuter from material taken by me in Jamaica, and I have lately taken it in southern Florida.

Lygus sp. A strongly-marked species doubtfully identical with a species taken in Florida.

Amphiscepa pumila, Van D. Mr. Palmer reports this as very abundant on a low bush with thick succulent leaves, probably the "yellow daisy bush," *Borrchia arborescens*. I took it on what was probably the same plant in Florida, in which State the type specimens were taken by Mrs. Slosson.

Liburnia albolineosa, Fowler. Twelve specimens, all of which are paler than those from Florida, the West Indies and Mexico, but apparently not distinct.

Liburnia circumcincta, Van Duzee, M.S. Three examples. This species is described in a report on Florida Hemiptera, now in press.

Liburnia ornata, Stal. One brachypterous female.

Agallia sanguinolenta, Provancher. One example.

Athysanus exitiosus, Uhler. Common here as in Florida and Jamaica.

Thamnotettix perpunctata, Van Duzee. Several taken on the fine shore grasses.

Tinobregmus vittatus, Van Duzee. Two males, one female and two larvæ. The male has more recently been described by Prof. Osborn. On the mainland it has been taken only in Florida and along the gulf coast.

Jassus olitorius, Say. Common. These were of the typical dark variety found throughout the northern States.

SOME NEW BEES, AND OTHER NOTES.

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

Melissodes dagosa, n. sp.

♂. Length, 10 mm; black, with the clypeus bright lemon-yellow; the labrum (except at extreme sides) and a small spot on the mandibles also yellow; hair of head and thorax abundant, silky-white, without any black; eyes pale greenish; antennæ reaching to metathorax, scape black, flagellum black above, but broadly pale reddish-orange beneath; wings clear, nervures and stigma ferruginous; legs black, with light hair; small joints of tarsi red; hair on inner side of hind basitarsus orange; abdomen with pale hair; hind margin of first segment broadly hyaline; hind margins of segments 2 to 6 with broad, conspicuous white hair-bands; sixth and seventh segments toothed laterally, the teeth short; hind margins of ventral segments reddish-subhyaline. In my table of *Melissodes* (Trans. Amer. Ent. Soc., 1906), this runs to *M. lupina* and *M. agilis*, which it greatly resembles, but from which it differs in the very much shorter antennæ. The middle joints of the flagellum are little more than half as long as they are in those species. The antennæ are also wholly without crenulation.

Hab.—Grand Coulee, Washington State, at Osborn's Ranch, July 8, 1902. (*Wash. Agric. Exper. Sta.*)

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Melissodes Tuckeri, n. sp.

♀. Runs in my tables to *M. perplexa*, Cresson, which it very greatly resembles. It differs from *perplexa* and all the allied species by the character of the mesothorax, which is shining, and closely beset with very deep and large punctures. Compared with a co-type of *perplexa*, the abdomen appears at first sight to be the same, but there are the following differences: Dorsal region of first segment, except the apical portion, strongly and quite closely punctured (very feebly in *perplexa*); middle of second segment below the band distinctly though delicately punctured (impunctate in *perplexa*); nude margin beyond the white hair-band on third segment very narrow (broad in *perplexa*). The white hair on second segment takes the form of broad oblique bands at the sides, failing in the middle; this is nearly as in *perplexa*, and entirely different from the straight bands (a broad one basal and a narrow one in middle) of *M. communis*. The legs are practically as in *perplexa*; the hind legs have the scopa very large, strongly plumose, pale ochraceous, with the hair on inner side of hind basitarsus brown-black; the wings are strongly dusky, the tint blackish; tegulae shining piceous, with a patch of velvety dark fuscous pile, surrounded by pale hairs, in front. The very pale ochraceous hair of the front of the thorax extends back to the level of the tegulae. The head is like that of *perplexa*, except that the vertex is more strongly punctured, and the flagellum, except at base, is red beneath.

Hab.—Plano (about 17 miles north of Dallas), Texas, October, 1907.
(E. S. Tucker.)

The bee-fauna of Plano, as shown by Mr. Tucker's captures, includes a mixture of humid and arid region species, being, in fact, near the borders of these regions. He has taken there and kindly submitted to me *Megachile vallorum*, Ckll.; *M. brevis*, Say; *M. kallstræmiæ*, Ckll.; *Melissodes Hitei* (described as *M. Martini Hitei*, Ckll., but evidently a distinct species), and *Florilegus condigna*, Cresson.

Sphecodes pecosensis, Ckll.

A variety of the female, with the mesothorax even rougher than in the type, and the area of the metathorax more irregularly sculptured, has been taken at Troublesome, Colorado, June 9, by Mr. S. A. Rohwer, and at Florissant, June 14 and 26, by Mr. Rohwer and myself. At Florissant it visits *Ribes vallicola* and *Prunus melanocarpa*. The male has not been described, but specimens were taken at Florissant by Mr. Rohwer, one on sand, two at flowers of *Prunus melanocarpa*, all June 21. This male

agrees with the female in having a strong constriction at the base of the second abdominal segment, and I feel assured that it is correctly assigned to it; but it has all the characters of Robertson's genus *Proteraner*, while the female will by no means agree with Robertson's definition of ♀ *Proteraner*. It appears that *Proteraner* was defined on characters which, in part at least, are only of specific value; either it must be redefined or else dropped. I incline to the opinion that it will prove a valid genus, but further investigation is required.

The Florissant male now assigned to *S. pecosensis* is so close to *Proteraner rhois*, Ckll., that I formerly identified a specimen as that species. On examining the types of *P. rhois*, I find a striking character not mentioned in the original description; the middle femora are much flattened and sharply keeled beneath, with a conspicuous angle near the end of the basal third. In the Florissant ♂ *S. pecosensis* all this is merely suggested by a slight flattening, and there is no definite angle.

Osmia metitia, n. sp.

♂. Length, $10\frac{1}{2}$ mm.; head blackish, with yellow-green tints; thorax very densely punctured, the mesothorax and scutellum yellow-green, the pleura and metathorax blue-green; abdomen with the first segment, especially on the hind margin, yellow-green; the other segments very dark purplish, with the hind margins shining dark bluish-green; venter dark blue; legs black, without metallic tints; face with very abundant long white hair; vertex and thorax above with pale ochraceous hair, not mixed with black, except at sides of vertex; cheeks with long black hair, ochraceous above; pleura with light hair, but a little black in front and behind; lower two-thirds of sides of metathorax with black hair, the upper third with pale; first three segments of abdomen with glittering pale hair, the rest with black, and some black at apex of third, and intermixed at sides of second and third; legs with black hair, but anterior ones with pale hair behind, and middle femora with some pale hairs beneath; tegulae shining black; wings hyaline, very slightly dusky, no strong cloud in the marginal cell; edge of clypeus a little wavy, but essentially normal; antennae ordinary, long, entirely black, third joint shorter than fourth; middle tibial spine very sharp, bent sideways; middle basitarsus normal, but the joints 2 to 4 (especially 2 and 3) swollen and broadened, 2 greatly swollen one side; sixth abdominal segment entire, seventh bidentate; second ventral perfectly normal at apex; third deeply emarginate, the emargination fringed with orange hair; fourth broadly truncate; posterior spur of hind tibia about one-fourth longer than anterior,

Hab.—Boulder, Colorado, at flowers of *Ribes pumilum*, April 17, 1908. (*Glenn M. Hite.*)

The following key separates several males from Colorado, in which the small joints of the middle tarsi are thickened :

- Hair of cheeks and sides of metathorax entirely pale ; insect steel-blue *O. universitatis*, Ckll.
- Hair of cheeks and sides of metathorax at least largely black 1.
1. Abdomen beyond first segment very dark purplish, the tint (except on the hind margins) reddish rather than bluish ; second and third joints of middle tarsus obtuse on one side *O. metitia*, Ckll.
- Abdomen beyond first segment brilliant deep blue 2.
2. Larger ; hind margins of abdominal segments concolorous with the rest ; second and third segments with a good deal of pale hair *O. integrella*, Ckll.
- Smaller ; hind margins of abdominal segments violaceous ; abdomen without green tints *O. amala*, Ckll.

In *O. integrella* and *O. amala* the basal nervure meets the transverso-medial ; in *O. metitia* it falls short of it.

These insects show a distinct approach to the group which Robertson named *Centrosmia*, and indicate that the latter can hardly stand as a genus.

SOME RECENT WORK IN HEMIPTERA.

BY J. R. DE LA TORRE BUENO, WHITE PLAINS, N. Y.

Recently, by favour of the authors, I received three interesting papers on the Hemiptera. The most important of these is by the learned DR. E. BERGROTH, and is entitled "ENUMERATIO PENTATOMIDARUM POST CATALOGUM BRUXELLESEM DESCRIPTARUM," which appeared in the "Annales de la Société Entomologique de Belgique."* Of the other two, one by C. W. Kershaw and G. W. Kirkaldy, "On the Metamorphoses of two Hemiptera-Heteroptera from Southern China," appeared in the Transactions of the Entomological Society of London,† and the other by the latter author, is "A Catalogue of the Hemiptera of Fiji," which appeared in the to us little-known and out-of-the-way publication, "Proceedings of the Linnean Society of New South Wales."‡ To all working

* 1908, Vol. XV, pages 132-200.

† 1908, pt. 1, pp. 59-62, pls. iv and v.

‡ 1908, Vol. XXXIII, pt. 2, pp. 345-391, pl. iv.

April, 1909

Hemipterists, Dr. Bergroth's work is indispensable, because it brings down to the end of the year 1907 the important Hemipterous family, Pentatomidæ, listed by Lethierry and Severin only up to 1893. The treatment of the synonymy, new names, and other more or less unsettled questions, is tempered by the author's well-known aversion to what to him appears to be unnecessary radicalism, and in consequence, for reasons satisfactory to himself, he rejects much that to others might seem more or less reasonable. The linear arrangement, as the preface states, is the same as that of Lethierry and Severin for practical reasons, which are sufficiently obvious in view of its character as a sequel to the Brussels catalogue. Another point calling for special mention is that omissions in the former catalogue are made good in this one. Among the omissions of Lethierry and Severin may be cited the following American forms in Gerridæ: *Hydrometra lineata*, Say (now *Martini*, Kirk.), and *Gerris canaliculatus*, Say.

For the convenience of those who may not be in a position to consult this work, the changes, additions and omissions in our North American forms, enumerated by Dr. Bergroth, are here briefly noted :

Subfamily THYREOCORINÆ.

(= *Corimelænida*, L. & S.)

Thyreocoris, Schrank.

(= *Corimelæna*, White.)

Gillettei, Van Duz.

obtusus, Uhler.

renormatus, Uhler.

Sayi, Van Duz.

|| *albipennis*, Say.

Subfamily SCUTELLERINÆ.

(= *Scutellerida*, L. & S.)

Tetyra, Fabr.

robusta, Uhler.

Fokkeria, Schouteden.

producta, Van Duz. (*Odontoscelis*.)

= *crassa*, Schout.

Phimodera, Germar.

torrida, Reut.

Euptychodera, Bergroth (n. n.).

(|| *Ptychodera*, Reuter.)

corrugata, Van Duz. (*Phimodera*.)

Vanduzeeina, Schouteden.

Balli, Van Duz. (*Odontoscelis*.)

Subfamily GRAPHOSOMATINÆ.

(= *Graphosomide*, L. & S.)*Podops*, Lap.(= *Amaurochrous*, Stål, Schout.)*parvulus*, Van Duz.

(In this genus Dr. Bergroth does not accept the synonymy presented by Schouteden.)

Weda, Schouteden.*Horváthi*, Schout.

Subfamily PENTATOMINÆ.

(= *Pentatomide*, L. & S.)*Brochymena*, A. & S.*affinis*, Van Duz.*Peribalus*, M. & R.*abbreviatus*, Uhl. (*Holcostethus*.)

(Omitted by Lethierry and Severin)

tristis, Van Duz.*Chlorochroa*, Stål.(= *Pentatoma*, Fieber.)*Osborni*, Van Duz.*Carpocoris*, Kol.*remotus*, Horv.(This is recorded in all catalogues as *lynx*, from the United States.)*Euschistus*, Dallas.*conspersus*, Uhler.*inflatus*, Van Duz.*politus*, Uhler.*Hymenarcys*, A. & S.*crassa*, Uhler.*Cosmopepla*, Stål.*cærulata*, Mont.*Uhleri*, Mont.*Eusarcocoris*, Hahn.*intergressus*, Uhler.*Thyanta*, Stål.*brevis*, Van Duz.*punctiventris*, Van Duz.*Dendrocoris*, Bergroth.(|| *Liotropis*, Uhler)*contaminatus*, Uhler.*pini*, Mont.*Schæfferi*, Barber.

Brepholoxa, Van Duzee.

Heidemanni, Van Duz.

Subfamily ARMINÆ.

(= *Asopidæ*, L. & S.)

Perilloides, Schouteden.

(N. gen. for *Perillus bioculatus*, Fabr.)

Podisus, H. S.

(Dr. Bergroth does not accept Schouteden's change of this genus to *Apateticus*, Dall.

maculiventris, Say.

(Noted by L. & S. as *spinusus*, Dallas.)

mucronatus, Uhler.

placidus, Uhler.

(Omitted by L. & S.)

Subfamily ACANTHOSOMATINÆ.

(= *Acanthosomidæ*, L. & S.)

Elasmostethus, Fieb., Stal.

(= *Acanthosoma*, for certain American forms.)

Atricornis, Van Duz. (*Acanthosoma*.)

Cooleyi, Van Duz. (*Acanthosoma*.)

Kershaw and Kirkaldy, in their metamorphosis paper have added to our knowledge of Hemipterous life-histories, but that wealth of references which ordinarily characterizes the work of the junior author is regrettably absent. They treat of a Scutellerine and a Coreid, the former *Chrysocoris Stollii*, Wolf, and the latter *Riptartus linearis*, Linné. The female of the first-mentioned lays about a dozen eggs on leaves, mainly belonging to several species of *Glochidion*, on the fruit of which the bug feeds in all stages, although it accepts other fruits. This adaptability to other food than the normal is not uncommon among the Hemiptera, as my observations on *Nezara hilaris*, *Brochymena quadripustulata* and *Acanthocerus galeator* have shown me, for the nymphs of these three species, while in nature feeding on golden-rod, trees and other wild vegetation, all thrive and came to maturity on plants of the cultivated bean. The authors describe the manner in which the eggs are deposited, and note the changes of colour and markings caused by the advancing development of the embryo, a process which can be very readily observed in the white ova of various water-bugs. The nymphs hatch in four days. Unfortunately the number of nymphal instars was not positively ascertained, but I am

inclined to believe that when the life-history is fully worked out they will be found to number five, which, so far as I am aware, appears to be the usual number in Heteroptera, although there are certain exceptions to this rule. Mention is also made of the absence of a distinctive coloration of the nymphs immediately after moults, a fact easily observable in many Hemipterous nymphs. The plate (IV) for this species shows three figures of the egg, the nymph just hatched and the 2nd, 3rd and "penultimate" (4th?), instars of *C. Stollii* and the last-mentioned instar of another species. Two figures of the adult are given, one from above and the other from the side, the latter showing the bug in the natural standing position. In regard to the nymph, the explanation of the plate calls fig. 6 "penultimate instar," while the text calls it "final nymph," which latter it certainly is. To avoid confusion, it seems to me the plate should have termed it "last nymphal instar," which would have been perfectly unambiguous.

Riptartus linearis is treated of with equal succinctness. The bug is vegetarian, and feeds on the seed-pods of various *Leguminosae*. The cauldron-shaped dark bronzy-brown, sometimes pruinose ova, are deposited irregularly on the stems and leaves of the food-plant. One batch of 11 deposited on September 30th was observed, which gave adults on October 23rd following, which is to say, in 23 days, a remarkably short developmental period for Heteroptera, to be explained by the favourable conditions of heat and moisture, since it would appear that the period of abundance of the insect is the wet season. In our Northern latitudes these changes take longer, although it should be noted that certain *microveliae* are equally rapid in their transformations in the immediate vicinity of New York. The changes in nymphal colouration of *Riptortus* are noted, and also its resemblance in all nymphal instars to ants. In this it is like our common northern *Alydus curvius*, the blackish nymphs of which very strongly simulate our large black *Camponotus Pennsylvanicus*, and are very often taken with it in clover patches in fields. Whether this resemblance is protective or not would be very hard to say, as the authors remark in regard to *Riptortus*. The number of moults is given as four, with the corresponding number of nymphal instars. It might seem, perhaps, that some moult has passed unnoticed, possibly the first one, because the cast skins are then very diaphanous and fragile. I know *positively* of only one Heteropteron with only four nymphal instars, and this I have bred a number of times to ascertain beyond doubt that it was an actual fact, and not a mere error of observation.

I do not wish to be construed as wantonly criticising a paper that distinctly adds to our knowledge, but the facts as stated are so at variance with my personal observations that I must ask my friends to look again. The best way would be by isolating single nymphs and carefully following each through all instars. The plate of this life-history is more satisfactory than the other, although both are excellent. It depicts the ova, three nymphal instars, and the adult, and from these figures one is struck with the great similarity of the species to our native forms of *Alydus*. On the whole, as an addition to our knowledge of life-histories in a much-neglected group, this paper is of value. A more profound study of nymphal variations in structure and appendages would have greatly enhanced its importance, but knowing as I do, the difficulties incident on such work it is only bare justice to commend highly the good beginning made.

The *Catalogue of the Hemiptera of Fiji* is conceived and carried out in the spirit of accuracy so characteristic of its author's work, and reflects his well-known views on phylogeny and synonymy, the arrangement of the Heteropterous families being that he has adopted for his forthcoming catalogue. This paper is based on the collections made by Koebele and Muir when searching for parasites to control the sugarcane leaf-hopper, and includes an account of some Hemiptera from Charles H. Knowles, Superintendent of the Department of Agriculture of Fiji. The previous total of 40 Hemiptera known from the Islands is increased to 205, but he says, it is evident that the endemic forms are scarcely collected. "Fiji was associated, by Wallace, with the Pacific Islands, in a 'Polynesian sub-region,' but its Hemipterous fauna seems decidedly continental, and to be included in the 'Austro-Malayan Sub-region' of the Australian Region."

Eleven genera and thirty-four species are described as new. The catalogue is enriched by notes on food-plants, habits, occurrence, description of nymphs, and other valuable details. The plate figures the widely-distributed *Orthæa* (= *Pamera*) *vincta*, Say, brachypterous adult, nymph, and tegmen of macropterous form; *Brachylybas variegatus* from above and from side, together with the odoriferous orifice, much enlarged; *Ontiscus vitiensis*; the tingids *Mesocypselas dicysta* and *Holophygdon melanesica*, from above and from side; and the hemelytra of *Ploiariodes medusa*. Taken as a whole, this is a most important addition to our knowledge of the Hemipterous fauna of the Pacific Islands.

Mailed April 7th, 1909.