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THE EGG-LAYING HABITS OF SOME OF THE ACRIDIDÆ (ORTHOPTERA).

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The egg-laying habits of the Orthoptera have not received as much attention as one might expect, considering the economic importance of many of the species involved. Even Riley, with all his remarkable researches, failed to observe that a locust's abdomen curls outwardly instead of under the insect when ovipositing and, strange as it may seem, his illustration has been accepted, until very recently, as correct. Much has yet to be learned regarding the exact number of eggs deposited by the various species, as well as the number of egg masses produced in a season, time of oviposition, etc. In the present paper an attempt has been made to show how some of our common Manitoba species proceed in the task of egg-laying and how the work is completed. So far as the notes presented below are concerned it will be seen that the species of Acrididæ, which oviposit in the soil, may be divided into two groups according to their method of covering the egg-sacks; the first of these comprising the Œdipodinæ, using the hind legs for that purpose, while the second—the Locustinæ—make use of the abdomen and ovipositor to attain the same end. These divisions, based upon habits, are, of course, subject to verification by the study of other species, but as they fall into natural groups there is reason to suspect that the rule will hold good, at least in those species which make an attempt to cover the eggs at all.*

With reference to the general attitude of locusts while oviposit-

*Hancock in his Tettigidæ of North America has related, with some detail, the egg-laying habits of Acrydium (=Tettix) also of *Tettigidea* in which strangely enough, the former is said to cover the eggs by use of the hind legs, while the latter uses the ovipositor.

Kellog and Gough—Rept. on Great Invasion of Locusts in Egypt in 1915 state that *Schistocerca peregrina* egg masses can be located while fresh by means of the white froth showing above the ground, hence it is probable that no covering is attempted in this species.

ing, this is usually similar to that of an individual while at rest. Occasionally, however, the legs are held rather far apart and rarely are elevated. The pictures of ovipositing females holding the posterior legs high above their body depicts a common attitude while the insect is forcing her abdomen into the soil. In the Œdipodinæ, at least, the position is so natural that it is necessary to view the insect closely to ascertain whether she is ovipositing or merely resting.

The fact that egg sacks are of various shapes is due to obstacles met with while the insect is drilling—egg masses are thus, at times, almost perpendicular, at others semi-horizontal. The natural shape is a gradual curl away from the ovipositing insect.

Œdipodinæ.

Arphia pseudonietana Thom. This beautiful species reaches maturity late in summer and oviposition takes place in September and October. An individual located on September 21, 1917, had her abdomen fully inserted into the ground when she was first found, in which position she remained stationary for 24 minutes. She then withdrew her ovipositor without depositing any eggs, and moving slightly commenced a fresh hole, taking six minutes in the operation. While thus employed she rested upon her four front legs and held the hind ones in the air, kicking spasmodically with first one and then the other. Having obtained the desired depth she became motionless and remained thus for 28 minutes. She then again withdrew her abdomen and commenced a fresh hole within an inch of the last, the results of which could not, unfortunately, be ascertained owing to the observer having to hasten away to catch a train. The situation in which this locust was attempting to oviposit consisted of sparse vegetation alongside of a dry ditch, the soil being rather hard and clay-like in texture. Many individuals of the same species were present in the vicinity.

A search on October 1st was rewarded by two examples being discovered ovipositing on the edge of an old trail, their operations were evidently well under way and became completed in 26 and 33 minutes, respectively. On withdrawing their abdomens the insects remained motionless for a few seconds and then slowly commenced kicking the soil into the cavity, pushing it in from

close around first and afterwards reaching out to gather it from as far as could be conveniently reached by stretching out for it with the hind legs. This work was done very thoroughly so that no sign other than a slight elevation remained to indicate where the eggs had been laid. The hind legs are generally used alternately for this work and are applied with additional vigor as the task proceeds. Then having completed their work the locusts either hop or fly quickly away. The egg-sacks were of the usual curled shape with a neck of glutinous matter that did not quite reach to the surface of the ground. They contained 24 and 25 eggs, respectively.

Camnula pellucida Scudd. Several examples were observed ovipositing near Boissevaine, Man., on September 20th. The land was dry and hard, and the vegetation thin with bare spots between. Many individuals were present. The egg-laying habits of this species are very similar to those of *Arphia*, described above. One example took 23 minutes to conclude her operations from the time when she was first observed with her abdomen inserted. She then carefully filled in the cavity using both hind legs for that purpose—the egg-sack contained 18 eggs.

Dissosteira carolina Linn. This large species can be found ovipositing without much difficulty during the month of September. For that purpose it seeks soil which is comparatively free from vegetation and situations that are fully exposed to the sun. A large, yellow female was found on September 19, 1915, having just completed working her abdomen into the soil, from which time she took 48 minutes to finish egg laying. The hole was then covered by use of the hind legs which were applied quite vigorously, the loose earth being chiefly drawn towards the insect from behind. This egg sack was almost two inches long, of which rather more than a third consisted of neck. It contained 42 eggs. A second example observed ovipositing on September 22 occupied an hour and 19 minutes, and took three extra minutes to cover the egg cavity. This latter operation was done entirely with the left leg. Three others were found on September 28, one of which took an hour and 21 minutes from the time she was first noted with her abdomen in the soil. In these instances both hind legs were used in covering the egg chamber.

Spharagemon collare Scudd. Egg-laying covers approximately the same dates as the *Dissosteira*. A female was seen seeking a suitable situation on September 25, and after three attempts to insert her abdomen chose a place close to some herbage in sandy soil. The customary kicking motion accompanied the drilling process. At the end of 34 minutes she withdrew her abdomen and hopped away without depositing any eggs. A second attempt, covering approximately the same time resulted in eight eggs being laid; whereupon the locust departed without any attempt to fill in the cavity. Another female on the same date took two hours and three minutes seeking for a suitable place to oviposit, and during that time thrust her abdomen into the soil on 24 occasions, remaining in some places for 15 minutes, at others merely making a short test. She frequently returned to the same situation, as a consequence of which seven tests were made within a few inches of each other. Eventually becoming satisfied she placed her eggs among the roots of a lambs'-quarters plant, commencing at dusk and finishing at 7.50 p.m. She then carefully covered the hole with her hind legs and staggered away, being weak from the cold—the temperature registering 50 degrees F. This egg-sack had practically no neck and contained but 11 eggs. Another specimen, on September 30, covered the hole with both forward and backward kicks. The egg-sack, though considerably larger than those mentioned above, contained but two eggs. A fourth egg mass provided 12 eggs. These were all buried on stubble land.

Spharagemon bolli Scudd. This species is often found associating with the last, but prefers less open situations. An ovipositing female, on September 29, had chosen a place in the middle of a trail close to some trees. She remained without moving for 42 minutes from the time when first noticed. The egg chamber was covered in the usual fashion and the egg-pod, with a neck reaching almost to the surface of the ground, contained 10 eggs. A second individual located two days later did not differ in its methods from that of the above.

Locustinæ.

Melanoplus atlanis Riley. This species, known popularly as the lesser migratory locust, ranks above all our native grasshoppers

in its economic importance. The destruction wrought by it in Canada has been second to none in recent times, and its numbers have only been surpassed by its close ally *spretus*, which caused such severe losses in Manitoba during 1873 to 1875 as well as on several dates previous to these dates. *Spretus*, however, does not seem to be a native of Canada, hence *atlanis* holds first rank in destructiveness as an inhabitant of our country. It may seem strange that a species so widely distributed and so well known as *atlanis* should have had so little attention devoted to its egg-laying habits. We are, of course, aware that it seeks dry, firm soil for ovipositing in and that it prefers stubble lands or old, deserted fields for that purpose, but while I can claim to have handled hundreds of egg-pods, I have only one record of seeing this species actually ovipositing.

The individual referred to was on the border of a stubble field and had partly completed her task before being observed. This, insect on withdrawing her ovipositor, carefully shoved the loose soil into the vacated cavity by aid of the abdomen, using the valves of the ovipositor as a rake. The earth in this case was first pushed in from close around and afterwards the insect reached out to the full extent of her abdomen and drew the soil towards her. Thus, in a short time no sign of the hole remained, after which the locust hopped quickly away. This egg-pod contained 16 eggs, which is about an average for the species.

Melanoplus angustipennis Dodge. The Manitoba examples of this species are chiefly of the red-legged form, called by Scudder *coccineipes*. It is a common insect which is most frequently met with on edges of low bushes.

On September 19th a female was observed searching for a suitable situation for egg-laying. She had already forced her abdomen into the soil and remained in that place for 10 minutes. She then moved away and tested 14 other spots within an hour and 10 minutes. During this search she travelled over considerable ground, usually walking, occasionally hopping and twice flying. The process of inserting the abdomen occupied approximately seven minutes. The method employed, which is practically the same in all species, consists of drawing the abdominal extremity well under the insect and then raising the hind legs and

throwing all possible weight backward on to the ovipositor, the valves of which are kept constantly in motion, in which the hind legs seem, as it were, to beat time. By this method the body is rapidly worked into the soil, after which the insect becomes motionless until she has laid her eggs. Unfortunately the individual mentioned above could not be followed in her final task. A second example observed, on September 22, first drilled into a clear piece of sandy soil, where she remained for 12 minutes, then becoming dissatisfied she hopped away and rested for a short time upon some herbage. The search was then continued and two more holes made, the last of which proved satisfactory. Here she remained, with her legs stretched far apart, for 87 minutes, after which the cavity was carefully covered in the manner described under *atlanis*. This last task occupying three minutes. The slowness of her work was doubtless due to the lateness of the hour, 5.42 p.m. and the coldness of the atmosphere, 51 degrees F. The egg-sack contained 14 eggs. A third locust, noted on September 29, continued her quest for an egg site for 27 minutes, inserted her abdomen into the soil four times and made a wide circuit among low bushes before she discovered a place to her liking. This proved to be alongside of a clump of grass upon which she rested her forelegs while drilling. Egg-laying on this occasion took 37 minutes; time, 3.57 p.m.; temperature, 73 degrees F. A fourth specimen on October 1st had already inserted her abdomen when first observed, and from then took 49 minutes in ovipositing. The egg mass consisted of 14 eggs.

Melanoplus packardii Scudd. Two examples were found on October 1st, ovipositing on the edge of a trail. The operations were evidently well under way and soon after being observed both locusts completed their work, covering the egg chambers with the abdomen in the customary manner. Egg-sacks contained 16 and 19 eggs, respectively. A third individual found searching for an egg site on the same date postponed her search after 32 minutes, owing to the weather becoming rainy and cold. When last seen she was hiding among the grass.

Melanoplus bivittatus Say. This is a locust of some economic importance, especially in the vicinity of low lands. It is very easily discovered while egg-laying, owing to its habits of oviposit-

ing along roadways or on old pocket gopher hills. An individual discovered on September 9th finished her work soon after being found, and her method of covering the egg cavity did not differ from that of *atlanis*. A second example found on a trail on September 26th, produced an egg-sack, the lower two-thirds of which was almost horizontal owing to the hardness of the soil beneath. A third, located September 28th, was on the edge of a stubble field alongside of a *Dissosteira carolina*, engaged in the same operation. When first discovered the former had her abdomen fully extended into the soil but ten minutes later she abandoned this place, due to the approach of a male *Dissosteira*. She returned, however, a few minutes later, and drilled a hole close to the former, one taking ten minutes to do so. She then became motionless for 49 minutes, at the end of which her work was completed. The egg-sacks of these three individuals contained 94, 98 and 102 eggs, respectively.

AN INTERESTING NEW HYMENOPTEROUS PARASITE.

BY A. B. GAHAN, BUREAU OF ENTOMOLOGY, U.S. DEPT. OF AGRICULTURE, WASHINGTON, D.C.

The description of this new species is desirable at this time in order to make the name available for use by Prof. S. I. Kornhauser, of Northwestern University, Evanston, Illinois, who contemplates the early publication of an account of its life-history.

Family BETHYLIDÆ.

Subfamily DRYININÆ.

Aphelopus theliæ, new species.

Female.—In Ashmead's key to species of this genus (Bull. 45, U. S. N. M.) this species runs to *melaleucus* but differs in the colour of the legs and in the absence of any white on the head. In J. J. Kieffer's key (Das Tierreich, 1914, Vol. 41, p. 215) it runs to *affinis*, but differs from the description of that species in having the face entirely black and the legs almost entirely black.

Length 2.2 mm. Black, mouth-parts except mandibles pale yellow, mandibles piceous; antennæ black, the scape beneath and the pedicel reddish; front tibiæ and tarsi more or less reddish; wings hyaline, the stigma black; veins pale. Whole head very finely, closely, almost granularly punctate, the punctures slightly

stronger on the clypeus; the anterior margin of clypeus slightly rounded; mandibles tridentate; face with a weak carinate median line extending from the base of clypeus half way to the anterior ocellus; eyes with only a very few scattered hairs, practically bare; antennal pedicel and first flagellar joint subequal, and together slightly longer than the scape; second flagellar joint a little shorter than the first; following joints to the last gradually shortening, apical joint nearly twice as long as the one before it, which is one and one-half times as long as broad; ocelli in an obtuse triangle; postocellar line much longer than the ocellocular; mesoscutum and scutellum sculptured like the head, parapsidal grooves absent; propleura longitudinally striate at least below; mesopleura a little more coarsely and irregularly sculptured than the mesoscutum; propodeum dorsally with coarse reticulations, the sides and posterior face more finely rugulose-punctate; stigma subovate, the stigmal vein slightly shorter than the width of stigma opposite; abdomen smooth and polished, ovate, a little longer than the thorax.

Male.—Agrees with female except as follows: palpi fuscous, antennæ wholly black, clypeus nearly truncate anteriorly, antennal joints a little more distinctly separated than in the female, the first flagellar joint scarcely longer than the second, flagellar joints beyond the first subequal except the apical one which is about one and one-half times as long as the penultimate joint.

Type locality.—Cold Spring Harbor, Long Island, New York.

Type.—Cat. No. 21604, U. S. N. M.

Host.—*Thelia bimaculata* Fabr.

One female and a male specimen sent to the Bureau of Entomology by Prof. S. I. Kornhauser, of Northwestern University, who is authority for the host record.

Subsequent to the drawing up of the above description, Prof. Kornhauser very kindly furnished the following note together with twenty additional specimens of the insect: "Specimens were reared from larvæ which bored through the sternites of the parasitized *Thelia*, dropped into jars of moist earth and there pupated. Fifty to seventy larvæ came from a single *Thelia*. This is a polyembryonic form. Oviposition takes place in early June, a single egg being deposited within the *Thelia* nymph. Emergence of full-grown larvæ takes place from the middle to the end of July."

DESCRIPTIONS OF EIGHT NEW SPECIES OF COLEOPTERA IN THE FAMILY MORDELLIDÆ.

BY EMIL LILJEBLAD, CHICAGO, ILL.

In the course of the writer's studies of the Mordellidæ, several collections have been submitted to me. Among these, there are several new species, which are described in this paper. Five of these, from Texas and New Mexico, are from the collection of Mr. J. W. Green; three species, two from the Atlantic Coast, and one from the Pacific Coast, are described from the collections of C. A. Frost, F. R. Mason, and F. W. Nunenmacher.

Diclidia propinqua, sp. nov.

Moderately elongate, clothed with very fine silvery pubescence, finely, transversely strigate; head behind the antennæ dark reddish brown; mouth-parts testaceous; maxillary palpi scalene; antennæ testaceous, first and second joints equal, each one-third shorter than the third, third and fourth equal, fifth one-third shorter than the fourth, sixth a little shorter than the fifth, seventh to tenth equal, converging towards the apex, eleventh elongate, pointed at tip, one-third longer than the seventh; thorax testaceous, sides rounded and rapidly converging from the middle to apex; mesosternum very little compressed and elevated; elytra with scutellar cloud, the suture to middle, a median band, and the apex, black; legs testaceous; abdomen black, or very dark brown; sixth ventral segment not visible. Length 3¾ mm.

Two female specimens from Jemez Mts., New Mexico, July 12–18; collected by Mr. John Woodgate.

The type is in the possession of the writer; the paratype is in the collection of Mr. J. W. Green, from whom the specimens where received.

This species is most closely allied to *Diclidia lætula* Lec., but can readily be distinguished from it by the character of the antennal joints, and by the colour of the elytra (which are pale at the apex in *D. lætula*).

Diclidia greeni, sp. nov.

Moderately elongate (more robust in the female); nearly entirely testaceous or flavo-testaceous (except in some specimens, which have an indication of a dark, transverse cloud near the apex

of the elytra), densely and very finely pubescent, transversely strigose; head a little darker; eyes black, emarginate and coarsely granulated; antennæ with third and fourth joints equal, fifth one-third shorter than the fourth, sixth shorter than the seventh, seventh to tenth nearly equal and a little wider than the sixth, eleventh twice as long as the tenth; thorax about one-half broader than long, the sides rounded and rapidly converging from a little before the base; mesosternum very much compressed and elevated; abdomen of the male with two long, flattened appendages which are widened distally and obliquely truncate at the apex.

Length 3–3¾ mm.

Thirteen specimens: one male from Davis Mts., Texas, July 9; four males and eight females from Chisos Mts., Texas, July 18–22; collected by Mr. J. W. Green, to whom this species is dedicated.

The type, from Chisos Mts., is placed in the writer's collection, paratypes in that of Mr. J. W. Green.

This species differs from *Diclidia lætula* notably in the shape of the mesosternum, in the character of the antennæ, and in the nearly uniform pale colour. J. B. Smith notes that his "specimens [of *D. lætula*] vary in the distinctness of the black markings, which are sometimes barely discernible;" these pale specimens are perhaps referable to *D. greeni*, rather than to *D. lætula*.

Anthobates LeConte.

Anthobates LeConte, in Agassiz, Lake Superior, 1850, p. 231.

This genus was based on the same type (*Anaspis trifasciata*) as *Pentaria*, and is of earlier date. The fact that the genus was based upon "false characters"* does not invalidate its use, according to opinion 14 of the International Commission on Zoological Nomenclature.

Anthobates dispar, sp. nov.

Subcuneate; clothed with very fine silvery pubescence, finely transversely strigose; head testaceous or flavo-testaceous; maxillary palpi scalene, acute at tip; antennæ with the six basal joints testaceous or flavo-testaceous, seventh to eleventh fuscous, first and second joints nearly equal in length, but the second the more

*For this reason LeConte and Horn did not use *Anthobates*. (Smith. Misc. Coll., 26, 1883, p. 408).

robust, third to fifth equal, sixth a little shorter than the fifth, seventh to tenth becoming gradually wider distally, eleventh elongate, one-third longer than the tenth; eyes elongate, black, very slightly or not at all emarginate, moderately granulated; prothorax testaceous or flavo-testaceous, widest at middle, then rapidly converging towards the apex, subrectangular at base; mesosternum much compressed and elevated; elytra black, with an oblong, testaceous or flavo-testaceous humeral spot, which reaches nearly to the middle, and an indistinct subapical pale spot; abdomen black; sixth ventral segment not visible. No sexual characters have been discovered. Length 2½ mm.

Four specimens from Jemez Mts., July 15–21, collected by Mr. John Woodgate.

The type is placed in the writer's collection, paratypes in that of Mr. J. W. Green, from whom the specimens were received.

A. dispar does not resemble any of the described species.

Anthobates bicolor, sp. nov.

Subcuneate, rather robust; densely and very finely pubescent; finely transversely strigose; head black; the mouth-parts and the six basal joints of the antennæ testaceous; antennæ with first and second joints equal, rather broad, third to fifth about equal, each shorter than the second, sixth a little shorter than the fifth, seventh to tenth gradually increasing in width, eleventh elongate; eyes black, with the emargination quite deep; maxillary palpi scalene, with the inner angle rounded; prothorax black, rapidly converging from base to apex; elytra testaceous, or flavo-testaceous, with dark scutellar cloud, and narrowly black suture; legs testaceous, the femora darker; undersides of the body black; sixth ventral segment not visible.

Length 2½–3 mm.

Nine specimens, five from Davis Mts., Texas, July 6–9; four from Chisos Mts., Texas, July 19; all collected by Mr. J. W. Green.

The type from Davis Mts., is placed in the writer's collection, paratypes in Mr. J. W. Green's.

A. bicolor seems to be nearest to the Mexican species, *P. brunneipennis* Champion, but differs from it in having the dark colour confined to the scutellar space.

Anthobates pallidus, sp. nov.

Moderately elongate; entirely testaceous or flavo-testaceous (except the antennæ, which have the five apical joints fuscous, and the eyes, which are black), densely and very finely covered with pale yellow or silvery pubescence, finely transversely strigose; antennæ with first to third joints about equal in length, the first and second more robust than the third, fourth and fifth about equal, each shorter than the third, sixth to tenth gradually increasing in width, eleventh elongate-narrow, one-third longer than the tenth; eyes rather coarsely granulated, with a shallow emargination; maxillary palpi scalene, concave on distal margin, pointed at tip; prothorax evenly rounded from base to apex, with a very faint impression on each side, basal angles rectangular; sixth ventral segment not visible. Length 2—3 mm.

Eight specimens from Jemez Mts., New Mexico, June 10–21; collected by Mr. John Woodgate.

The type is placed in the writer's collection, paratypes in that of Mr. J. W. Green, from whom the specimens were received.

This species is closely allied to *A. bicolor*, but can be readily separated by the pale colour of the head, thorax and under surface.

Mordellistena frosti, sp. nov.

Hind tibia with one strongly marked oblique ridge, about one-fourth from apex; first joint of hind tarsus with one very small ridge near the tip.

Linear; head black; mouth-parts and anterior legs ferruginous; antennæ reddish brown; thorax fuscous or with a trace of reddish brown lustre, basal angles and a narrow line at base with golden yellow pubescence; scutellum triangular, pale, and with minute punctures; elytra black, finely punctate, covered with fine brown iridescent pubescence; under surface black; anal style short and very slender, black. Length 4mm.

Two specimens from Aziscoos Lake, Maine, July 8; collected by Mr. C. A. Frost.

The type is retained by the writer; the paratype is in the collection of Mr. Frost, from whom the specimens were received, and to whom the species is dedicated.

This species is most closely allied to *Mordellistena confusa*

Blatch., but can be distinguished from it at once by the absence of the humeral spot on the elytra.

There is a slight variation in the colour of the antennæ in the two specimens at hand, the type having the apical angles of each joint yellow, whereas the antennæ are entirely unicolorous in the paratype. This difference may prove to be sexual on the examination of a large series.

M. frosti should follow *M. confusa* in a systematic arrangement.

Mordellistena masoni, sp. nov.

Hind tibia with four strongly marked oblique ridges (and a very small rudiment of a fifth); first joint of hind tarsus with four, second with two ridges.

Subcuneate; head and thorax dark reddish brown, covered with fine golden yellow pubescence; antennæ, legs and underside a little paler; elytra dark brown, with silky, golden pubescence forming the following pattern,—an oblique band from humeri nearly to suture, an entire marginal line, widest at the middle, where it forms an abbreviated band, a sutural streak, an apical blotch connected with the marginal line, and several spots located between the bands; anal style long and slender, black at tip. Length 4 mm.

Five specimens: two from Hemlock Falls, New Jersey, July 10; two from Eagle Rock, New Jersey, July 8; and one from Westville, New Jersey, July 21; all collected by Mr. Frank R. Mason.

The type, from Hemlock Falls, New Jersey, is placed in the writer's collection, paratypes in the collection of Mr. F. R. Mason, to whom this species is dedicated.

This species is nearest *M. cinereo-fasciata* Smith, differing from it in having a narrower form, and no pale humeral spot. It can be readily recognized by the presence of light pubescent spots on the dark area. In two or three specimens the middle band reaches nearly to the suture, and the marginal line is partly broken, suggesting that further variation may be found in a large series.

This should follow *M. cinereo-fasciata* in the systematic arrangement.

Mordellistena nunenmacheri, sp. nov.

Hind tibia with three short, slightly oblique ridges; first joint of hind tarsus with three, and second with two ridges.

Linear; entirely black, covered with short, brown, sericeous pubescence; head large and nearly as wide as the thorax; eyes coarsely granulated; thorax longer than wide, a little wider than the elytra, its base at middle with a diagnostic, V-shaped notch as wide as the scutellum; anal style moderately long, rather robust. Length 5 mm.

Seven specimens: five from Josephine Co., Oregon, June 8, and one from Plumas Co., California, June 14; all collected by Mr. F. W. Nunenmacher.

The type from Josephine Co., Oregon, is placed in the writer's collection; paratypes are in the collection of Mr. F. W. Nunenmacher, to whom this species is dedicated.

This species is nearest *Mordellistena unicolor* Lec., or *sericans* Fall., but can at once be distinguished by the triangular-shaped notch at the base of the thorax. Some of the specimens at hand have a very small rudimentary ridge on the tibia and first joint of the hind tarsus.

This should follow *Mordellistena ambusta* in systematic arrangement.

NEW NEARCTIC CRANE-FLIES (TIPULIDÆ, DIPTERA) PART V.

BY CHARLES P. ALEXANDER, UNIVERSITY OF KANSAS, LAWRENCE, KAS.

Subfamily Limnobiinæ.

Genus *Gonomyia* Meigen.

Gonomyia (Gonomyia) kansensis, new species.

Belongs to the *cognatella* group; antennæ orange basally; wings with cell *1st* M_2 open by the atrophy of the outer deflection of M_3; male hypopygium with the third pleural appendage powerful, bifid, the two arms subequal.

Male.—Length 4.5 mm.; wing 4.7 mm.

Rostrum and palpi dark brown. Antennæ with the basal segments orange, the flagellum dark brown with a dense pale pubescence. Head mostly pale, orange.

Thoracic notum brownish yellow with a sparse, grayish bloom. Pleura yellowish with a broad, dark brown, pleural stripe extending from the cervical sclerites to the base of the abdomen. Halteres

brownish. Legs with the coxæ and trochanters pale; femora and tibiæ light brown; tarsi towards the tips dark brown. Wings with a grayish yellow suffusion; stigma pale brown, indistinct; veins dark brown. Venation about as in *cognatella: Sc* ending just before the origin of the sector; cell R_2 very large; cross-vein *r-m* very long; cell *1st* M_2 open by the atrophy of the outer deflection of M_3; basal deflection of Cu_1 at the fork of *M*.

Abdomen dark brown, the tergal segments with the apical third yellow so the abdomen appears broadly annulated; hypopygium yellowish. Hypopygium of the *cognatella* type but differing notably in the details of structure: outer pleural lobe with long bristles on the outer half along the margin and a single stout bristle on the outer face near the base; pleural appendages as follows: outer appendage (*2*) (Fig. 1) very long and slender, with numerous hairs along the margin; pleural appendages *3* (Fig. 2) bifid as in *cognatella*, but shorter and more powerfully constructed, the dorsal arm blackened and strongly chitinized at its tip, the two arms about equal; appendage *d* (Fig. 3) is rather stout with about three tubercles before the apex each with a long bristle; at the tip with a long, curved bristle. Penis-guard (Fig. 4) as seen from the side shaped as in figure. Gonapophyses (Fig. 5) with an acute spine near the base.

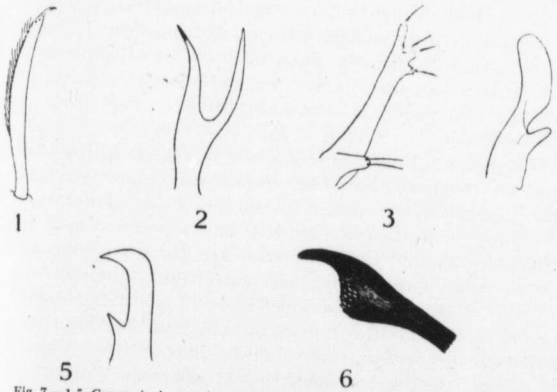

Fig. 7.—1-5, *Gonomyia kansensis*, n. sp., hypopygial details; 6, *Molophilus ursus*, n. sp., ventral hook of hypopygium.

Habitat.—Kansas.

Holotype.—♂, Jetmore, Hodgeman Co., Kansas, July 18, 1917 (Alexander).

Allotype.—♀, Larned, Pawnee Co., Kas., Aug. 1, 1917 (Alexander).

Paratypes.—4 ♀s, 1 ♂, with the allotype.

A review of the species of this genus in the United States will be found in the Proceedings of The Academy of Natural Sciences of Philadelphia, October, 1916, p. 508–528, Figs. 17–33, wings, and 59–91, hypopygial details. The lettering of the appendages is explained in that article under the consideration of *G. cognatella* and *G. florens*.

The majority of these specimens were taken along the Arkansas River near Larned; in life the specimens appear very pale and teneral as though not fully coloured. The immature stages are spent in the moist sand along the river, pupæ being secured from which the adults were bred.

Genus *Molophilus* Curtis.

Molophilus perflaveolus, new species.

Antennæ of the male not elongated; general coloration very light yellow; male hypopygium with four long, slender, chitinized appendages that are slightly curved toward their tips.

Male.—Length about 3.5 mm.; wing 5 mm.

Rostrum and palpi dark brown. Antennæ with the basal segments yellowish, flagellar segments brown, oval, slightly elongated, bearing long verticils that are much longer than the segments that bear them. Head reddish yellow, darkest on the disk of the vertex.

Mesonotum light orange-yellow, the interspaces with a whitish bloom, on the præscutum bearing numerous long, erect hairs. Pleura orange-yellow, sparsely white pruinose. Halteres light yellow. Legs with the coxæ and trochanters yellow; femora light brown, paler basally; tibiæ and tarsi light brown. Wings light yellowish; veins yellow with long, pale hairs. Venation somewhat as in *M. flutonensis;* basal deflection of Cu_1 longer than the deflection of M_3; Cu_1+M_3 not twice the length of the deflection.

Abdominal segments light brown; hypopygium elongated, light yellow, the pleural hooks black; abdomen clothed with

abundant long, pale hairs. Hypopygium with the pleural chitinized hooks four in number, very long and slender, not toothed, slightly curved toward the acute tips.

Habitat.—California.

Holotype.—♂, Fieldbrook, California, May 29, 1903, (H. S. Barber).

Molophilus spiculatus, new species.

Antennæ of the male not elongated; general coloration brown, the pseudosutural foveæ dark brown, conspicuous; male hypopygium with the dorsal pleural appendage short and broad, the dorsal face spiculate; ventral appendage long and slender with a few scattered teeth.

Male.—Length about 4 mm.; wing 5.3 mm.

Rostrum and palpi dark brown. Antennæ short, dark brown; second segment of the scape enlarged, cyathiform, dull yellowish; flagellar segments oval, slightly elongated. Eyes widely separated. Head gray, the anterior parts of the vertex and the occiput brighter coloured.

Pronotum yellow, medially with two dark brown spots. Mesonotal præscutum deep liver-brown, very sparsely gray pruinose; pseudosutural foveæ long and narrow, dark brown, conspicuous; space on the humeral angles before the foveæ yellowish continued back along the lateral margin of the sclerite to the wing-root; tuberculate pits conspicuous, separated from one another by a distance a little less than twice the diameter of one; remainder of the mesonotum bright brown. Pleura light brown. Halteres pale throughout. Legs with the coxæ and trochanters dull brownish yellow; femora dark brown apically, the basal half much paler; tibiæ dull yellow, broadly tipped with brown; tarsi brown, the basal portion of the metatarsi paler; last two tarsal segments almost black. Wings subhyaline or slightly grayish; veins brown, clothed with long, brown hairs. Venation $Cu_{1+}M_3$ about equal to the first section of M_{1+2} alone.

Abdomen dark brown, the hypopygium elongated, reddish; abdomen clothed with abundant pale hairs. Hypopygium with the ventral, finger-like lobe stout with scattered elongate hairs. The four chitinized appendages of the hypopygium shaped as follows: dorsal lateral arm broad, flattened, slightly curved, on the

dorsal face set with abundant spicules, the extreme apex a cylindrical spine; this appendage is bent slightly dorsad at its tip; ventral appendage much longer and more slender from enlarged, brown bases, with about six scattered teeth, at the apex bent strongly ventrad.

Habitat.—Colorado.

Holotype.—♂, Platte Canyon, Colorado, altitude 10,000 feet, August 26, 1915, (Oslar).

Closest to *M. paulus* Bergroth (Alaska) but the hypopygial details different, the dorsal appendage of *paulus* being shaped as follows: short, bent slightly inward, the apex an acute point, the surface of the appendage indistinctly denticulate; teeth on the ventral appendage differently arranged.

Molophilus ursus, new species.

Antennæ of the male not elongated; general coloration dark brown, the pronotal scutellum and the humeral angles yellowish; male hypopygium short with the ventral hooks powerful, at about mid-length enlarged and densely set with sharp, appressed spines.

Male.—Length 3.5 mm.; wing 5 mm.

Female.—Length 4.5 mm.; wing 5.8 mm.

Rostrum and palpi dark brown. Antennæ short, dark brown, the flagellar segments oval-cylindrical with long, dark verticils. Head brownish gray with long bristles.

Pronotum light yellowish. Mesonotum dark brown, sparsely gray pruinose; a conspicuous light yellowish triangle occupying the humeral portions of the præscutum before the foveæ. Pleura dark brown. Halteres dark brown, the bases pale, the knobs with pale, silky hairs. Legs with the coxæ and trochanters yellowish; femora brown, pale at the extreme base; tibiæ and tarsi dark brown. Wings dark-coloured; veins dark brown with long, dark brown hairs. Venation: Cu_1—M_3 moderate in length, a little shorter than the basal section of M_{1+2}; in one paratype very much shorter, subequal to the basal deflection of Cu_1.

Abdomen dark brown, the segments ringed caudally with paler; hypopygium short, stout, dark coloured; ventral hooks short and powerful (Fig. 7, *6*), narrow basally, gradually enlarged to about midlength, the outer angle thence produced outward as a strong, black, slightly curved tip, the middle portion of the ap-

pendage on the cephalic face densely beset with close, appressed spines.

Habitat.—New Mexico,

Holotype.—♂, Jemez Springs, New Mexico, altitude 6,400 feet, August 21, 1916. (John Woodgate).

Allotype.—♀, with the type.

Paratopotypes.—2 ♂♂.

Genus *Ulomorpha* Osten Sacken.

Ulomorpha sierricola, new species.

Size large, wing of the male 9 mm.; stigma of the wing pale brown, distinct.

Male.—Length 10 mm.; wing 9 mm.

Described from an alcoholic specimen.

Rostrum yellowish; palpi dark brown. Antennæ rather long and filiform, dark brown; flagellar segments elongate-cylindrical with numerous long bristles that are somewhat scattered, on the basal flagellar segments arranged in two distinct verticils, but on the terminal segments becoming much more scattered. Head dark brown above, paler beneath.

Thoracic dorsum dark brown, the humeral region of the præscutum paler. Pleura dull yellow. Halteres brown. Legs with the coxæ and trochanters dull yellow; femora dull yellow tipped with brown; tibiæ brownish yellow tipped with brown; tarsi dark brown. Wings with a strong, pale, brownish suffusion; stigma small, oval, brownish; veins brown; pubescence of the basal cells sparse and confined to the middle portions of the cells.

Abdominal tergites dark brown, including the hypopygium. Venation: vein R_{2+3} very short to lacking so that cell R_2 is very short-petiolate to sessile; cell M_1 lacking.

Abdominal tergites dark brown, including the hypopygium; basal sternites more yellowish.

Habitat.—Washington.

Holotype.—♂, Mt. Rainier, Washington.

In its pubescent wings this species suggests *Limnophila nigrilinea* Doane, but this last-named form has the venation entirely different and the resemblance is superficial only. From *Ulomorpha pilosella* (O. S.) it may be distinguished by its con-

spicuously larger size, distinct though pale stigma and slight differences in venation.

Genus *Eriocera* Macquart.

Eriocera brevipila, new species.

Cell *M1* of the wings present; antennæ short in the male; size small (wing of the male about 13 mm.); general coloration light gray; body clothed with a pale, moderately long pubescence.

Male.—Length 10.5 mm.; wing 12.8 mm.

Rostrum dark brown; palpi elongated, black. Antennæ short (for the male sex of this group of species), if bent backward extending about to the wing-root; first segment short and stout, dark above, pale beneath; remaining segments dark brown; first flagellar segment a little reddish at the base, on the ventral face with about four stout spines. Head dull gray, on the vertex before the tubercle, surrounding the antennal bases and adjoining the inner margins of the eyes reddish; an indistinct delicate, brown median vitta.

Thorax light gray, the præscutum with four dark brown stripes, the median pair separated from one another by a distance that is a little less than the width of one, these stripes not attaining the suture; lateral stripes shorter but broader; pile on the thoracic interspaces abundant, pale, shorter than in *albihirta;* scutum gray, each lobe with two brown marks; scutellum gray with conspicuous white pile; postnotum dark brown. Pleura with a sparse pruinosity; dorso-pleural membranes more yellowish. Halteres pale, the knobs dark brown. Legs with the coxæ pale grayish pruinose with a dense white pile; trochanters dull yellowish; femora dark brown, the bases yellowish, on the four anterior legs, including only the extreme base; tibiæ brown, broadly tipped with still darker brown; tarsi dark brown. Wings with a pale, brownish gray suffusion, the costal and subcostal cells darker; stigma small, oval, brown; veins dark brown. Venation: *Sc* ending opposite the fork of R_{2+3}; cross-vein *r* at about one-third the length of R_2, far removed from the tip of R_1; basal deflection of Cu_1 nearly at the middle of cell *1st* M_2; cell M_1 present.

Abdominal tergites dark brownish gray pruinose, the apical half of the organ somewhat darker than the basal half; sternites

brown, grayish pruinose; male hypopygium small, the appendages of the pleurite long and slender.

Habitat.—California.

Holotype.—♂, Bair's Ranch, Redwood Creek, Humboldt Co., Cal., June 12, 1903. (H. S. Barber).

This species is much smaller than the related *E. albihirta* Alex., differing ,moreover, in the shorter pile and the differently constructed male hypopygium.

Eriocera rubrinota, new species.

Coloration of the thoracic dorsum rusty red, remainder of the body, including the basal plates of the ovipositor, dark brown; cell M_1 absent.

Female.—Length 13 mm.; wing 11.5 mm.

Rostrum very short, brown; palpi dark brown with an indistinct grayish bloom and an indistinct median brownish line; vertical tubercle low with a deep notch.

Pronotum and mesonotum deep, rusty red without apparent markings. Pleura dark brown. Halteres dark brown, the extreme bases lighter coloured. Legs with the coxæ and trochanters dark brown; femora dark brown, yellow at their bases, these pale basal portions narrowest on the fore legs, broadest on the hind legs; tibiæ and tarsi dark brown. Wings suffused with brown; veins dark brown. Venation: *Sc* ending slightly beyond the middle of R_{2+3}; R_{2+3} a little shorter than R_2 alone; cross-vein *r* inserted on R_2, some distance beyond the fork of R_{2+3}; basal deflection of Cu_1 just beyond the fork of *M*.

Abdomen dark, shiny, blackish brown, including the basal portions of the ovipositor.

Holotype.—♀, in the collection of Kansas University, labeled "No. 40" without locality, but almost certainly from Western America, along with the other Williston material in the collection.

This species is abundantly different from all the forms described from the New World. It comes in the group with *E. fuliginosa* O. S., *E. tristis* Alex., etc., but is readily separated from them by the coloration of the mesonotum and the colour and structure of the ovipositor.

(To be continued.)

LECTOTYPES OF THE SPECIES OF HYMENOPTERA (EXCEPT APOIDEA) DESCRIBED BY ABBÉ PROVANCHER.

BY A. B. GAHAN AND S. A. ROHWER, WASHINGTON, D. C.

(Continued from page 137.)

Phygadeuon ovalis. Type.—Female, yellow label 211. 2nd Coll. Pub. Mus., Quebec.

Phygadeuon pallicoxus. Type.—Yellow label 457. 2nd Coll. Pub. Mus., Quebec. Thorax, legs and wings on pin, rest missing.

Phygadeuon parallelus. Type.—Male, yellow label 939. 2nd Coll. Pub. Mus., Quebec.

Phygadeuon planus. Type.—Female, yellow label 223. 2nd Coll. Pub. Mus., Quebec.

Phygadeuon pubescens. Type.—Male, yellow label 273. 1st Coll. Pub. Mus., Quebec.

Phygadeuon rectus. Type.—Male, yellow label 204. 2nd Coll. Pub. Mus., Quebec.

Phygadeuon robustus. Type.—Female, yellow label 458. 2nd Coll. Pub. Mus., Quebec.

Phygadeuon rotundiceps. Type.—Female, yellow label 220. 2nd Coll. Pub. Mus., Quebec.

Phygadeuon rubricus. Type.—Female, yellow label 701. 2nd Coll. Pub. Mus., Quebec. Extreme apex of left antenna gone.

Phygadeuon rubrocinctus. Type.—Female, yellow label 259. 1st Coll. Pub. Mus., Quebec. Somewhat oily.

Phygadeuon ruficornis. Type.—Male, yellow label 222. 2nd Coll. Pub. Mus., Quebec.

Phygadeuon rufipes. Type.—Not in Pub. Mus., Quebec, unless under *Platylabus lineolatus*. Prov.

Phygadeuon segnis. Type.—Female, yellow, label 267. 1st Coll. Pub. Mus., Quebec.

Phygadeuon signatus. Type.—Female, yellow label 258. 1st Coll. Pub. Mus., Quebec.

Phygadeuon similaris. Type.—Male, Harrington Coll. Pink label "P. 399." Antennæ gone beyond 3rd joint; mounted so propodeum is hard to see.

Phygadeuon subspinosus. Type.—Male, yellow label 668. 2nd Coll. Pub. Mus., Quebec.

Phygadeuon tegularis. Type.—Not in Pub. Mus., Quebec, unless under *Phygadeuon alacris* Cress.

Phygadeuon terminalis. Type. — Not in Pub. Mus., Quebec, unless under *Ichneumon caudatus.*

Phygadeuon terminatus. Type.—Female, yellow label 437. 2nd Coll. Pub. Mus., Quebec. Abdomen off but glued on label.

Phygadeuon 3-annulatus. Type.—Female, yellow label 981. 2nd Coll. Pub. Mus., Quebec. Abdomen and apices of antennæ gone.

Phygadeuon truncatus. Type.—Not located.

Phylax niger. Type.—Ent. Branch, Dept. Agr., Ottawa.

Phyliœcus bicinctus. Type.—Female, yellow label 180. 1st Coll. Pub. Mus., Quebec.

Phytodietus elegans. Type.—Female, yellow label 1653. 2nd Coll. Pub. Mus., Quebec.

Phytodietus ornatus. Type.—Female, yellow label 1654. 2nd Coll. Pub. Mus., Quebec.

Phytodietus superbus. Type.—Female, yellow label 1652. 2nd Coll. Pub. Mus., Quebec. Lacks antenna beyond annulus.

Phytodietus zonatus. Type.—Yellow label 514. 1st Coll. Pub. Mus., Quebec. Lacks abdomen and right antenna.

Pimpla æqualis. Type.—Female, yellow label 715. 2nd Coll. Pub. Mus., Quebec. Lacks apex of left antenna.

Pimpla hirticauda. Type.—Female, yellow label 1252. 2nd Coll. Pub. Mus., Quebec.

Pimpla 4-cingulatus. Type.—Female, yellow label 714. 2nd Coll. Pub. Mus., Quebec.

Platygaster aneurus. Type.—Yellow label 1329. 2nd Coll. Pub. Mus., Quebec. Fair.

Platylabus aciculatus. Type.—Yellow label 1187. 2nd Coll. Pub. Mus., Quebec. Lacks one hind leg beyond femora.

Platylabus cincticornis. Type.—Female, yellow label 1188. 2nd Coll. Pub. Mus., Quebec.

Platylabus crassicornis. Type.—Female, yellow label 1186. 2nd Coll. Pub. Mus., Quebec.

Platylabus lineolatus. Type.—Female, yellow label 686. 2nd Coll. Pub. Mus., Quebec.

Platylabus magnificus. Type.—Female, old rose label 66, yellow label 1184. 2nd Coll. Pub. Mus., Quebec.

Platylabus mitralis. Type.—Female, yellow label 1185. 2nd Coll. Pub. Mus., Quebec.

Platylabus ornatus. Type.—Female, yellow label 244. 1st Coll. Pub. Mus., Quebec. Head missing.

Platylabus 4-carinatus. Type.—Male, yellow label 443. 2nd Coll. Pub. Mus., Quebec. Antennæ gone.

Platylabus rubricapensis. Type.—Female, yellow label 717. 2nd Coll. Pub. Mus., Quebec.

Platylabus ruficornis. Type. — Male, Harrington Coll. Pink label "P. 417." Lacks apices of antennæ. Allotype.—Female, yellow label 1211; blue-gray label 418. 2nd Coll. Pub. Mus., Quebec.

Platylabus scutellatus. Type.—Yellow label 195. 2nd Coll. Pub. Mus., Quebec.

Platylabus signatus. Type.—Not located.

Platymischus torquatus. Type.—Old rose label 53; yellow label 1337. 2nd Coll. Pub. Mus., Quebec. Badly glued.

Plectiscus gracilis. Type.—Female, yellow label 369. 1st Coll. Pub. Mus., Quebec. Good, but part of wings on pin.

Plectiscus niger. Type.—Male, yellow label 723. 2nd Coll. Pub. Mus., Quebec. Part of antennæ gone.

Podogaster radiolatus. Type.—Female, yellow label 482. 2nd Coll. Pub. Mus., Quebec. Antennæ broken at tip.

Podogaster sulcatus. Type.—Yellow label 1225. 2nd Coll. Pub. Mus., Quebec. Right antenna at scape and abdomen gone.

Polistes anaheimensis. Type.—Cat. No. 1978, U. S. Nat. Mus.

Polyblastus annulicornis. Type.—Male, yellow label 97, also yellow label 1243. 2nd Coll. Pub. Mus., Quebec. Provancher mistook sex.

Polyblastus decoratus. Type.—Male, blue label 486. 2nd Coll. Pub. Mus., Quebec.

Polyblastus dilatatus. Type.—Female, yellow label 334. 2nd Coll. Pub. Mus., Quebec. Lacks antennæ.

Polyblastus gaspesianus. Type.—Not located.

Polyblastus inornatus. Type.—Female, blue label 566. 2nd Coll. Pub. Mus., Quebec.

Polyblastus quebecensis. Type.—Female, yellow label 427. 1st Coll. Pub. Mus., Quebec.

Polysphincta acuta. Type.—Female, yellow label 393. 2nd Coll. Pub. Mus., Quebec. Lacks abdomen, apices of antennæ and apical joints of hind tarsi.

Polysphincta bruneti. Type.—Female, yellow label 710. 2nd Coll. Pub. Mus., Quebec.

Polysphincta cingulata. Type.—Yellow label 486. 1st Coll. Pub. Mus., Quebec. Only thorax, left wings and a set of legs present.

Polysphincta pleuralis. Type.—Not in Pub. Mus., Quebec, unless under *Bassus pulchripes* Prov.

Polysphincta rubricapensis. Type.—Female, yellow label 403. 2nd Coll. Pub. Mus., Quebec.

Polysphincta rufopectus. Type.—Not in Pub. Mus., Quebec, unless under *P. limata* Cress.

Polysphincta vicina. Type.—Male, unlabeled. 1st Coll. Pub. Mus., Quebec. Lacks flagellum. Stands with female bearing yellow label 394.

Pompilus apicatus. Type.—Female, yellow label 769. 2nd Coll. Pub. Mus., Quebec. Lacks left flagellum.

Pompilus castaneus. Type.—Male, yellow label 774. Name label *Pampilus argenteus* Cress. 2nd Coll. Pub. Mus., Quebec. Lacks apices of antennæ. Proved by Prov. Catalog.

Pompilus coquilletti. Type.—Male, Cat. No. 1980, U. S. Nat. Mus.

Pompilus griseus. Type.—Male, yellow label 1011. 2nd Coll. Pub. Mus., Quebec. Lacks antennæ, rather dirty.

Porizon albipes. Type.—Male, yellow labels 1554 (Prov.) and 150 (not Prov.). 2nd Coll. Pub. Mus., Quebec. Left antenna gone. Provancher mistook sex.

Porizon angulare. Type.—Male, yellow label 452. 2nd Coll. Pub. Mus., Quebec. Left antenna broken near base.

Porizon boreale. Type.—Female, yellow label 370. 1st Coll. Pub. Mus., Quebec. Head and left fore leg missing.

Porizon californicum. Type.—Male, small, square, white labels 34 and 2 (s); yellow label 1480. 2nd Coll. Pub. Mus., Quebec. Right antenna at scape, left at middle, and left hind wing, gone.

Porizon elongatum. Type.—Male, yellow label 1226. 2nd Coll. Pub. Mus., Quebec.

Porizon rugosum. Type.—Male, yellow label 445. 2nd Coll. Pub. Mus., Quebec. Antennæ broken near middle.

Posocentrus huarti. See *Phœogenes huarti.*

Praon simulans. Type.—See introduction (Aphidiinæ).

Prionony x canadensis. Type.—Male, yellow label 1070. 2nd Coll. Pub. Mus., Quebec.

Proctotrupes flavipes. Type. — Yellow label 618. 2nd Coll. Pub. Mus., Quebec.

Proctotrupes rufigaster. Type.—Female, yellow label 641. 2nd Coll. Pub. Mus., Quebec.

Prosapha hyalina. Type.—Male, yellow label 1586. 2nd Coll. Pub. Mus., Quebec. Right antenna at scape, wings on right and legs on right, except fore and hind femora, gone.

Pteromalus acutus. Type.—Yellow label 922. 2nd Coll. Pub. Mus., Quebec. Badly glued.

Pteromalus nigricornis. Type.—Yellow label 1602. 2nd Coll. Pub. Mus., Quebec. Badly glued.

Pteromalus pieridis. Type.—Yellow label 628. 2nd Coll. Pub. Mus., Quebec.

Pyracmon annulatum. Type.—Yellow label 524. 2nd Coll. Pub. Mus., Quebec. Left antenna at scape, right at middle, posterior legs except right coxa, and abdomen gone.

Pyracmon incompletum. Type.—Female, yellow label 1224. 2nd Coll. Pub. Mus., Quebec.

Pyracmon macrocephalum. Type.—Female, yellow label 305. 2nd Coll. Pub. Mus., Quebec. Antennæ gone.

Pyracmon rufum. Type.—Female, yellow label 1031. 2nd Coll. Pub. Mus., Quebec. Lacks apex of left flagellum.

Radiolaria clavata. Type.—Blue label 742(s); yellow label 1290. 2nd Coll. Pub. Mus., Quebec. Tag-mounted, right antenna broken at tip.

Rhogas quebecensis. Type.—Female, yellow label 545. 2nd Coll. Pub. Mus., Quebec.

Rhogas rugosulus. Type.—Female, yellow label 1567. 2nd Coll. Pub. Mus., Quebec. Lacks ovipositor and most of legs.

Rhogas sancti-hyacinthi. Type.—Female, yellow label 546. 2nd Coll. Pub. Mus., Quebec. Antennæ broken at tips.

Rhopalicus pallipes. Type.—Not located.

Rhopalophorus. See Eustalocerus.

Ropronia pediculata. Type.—Blue label 314, yellow label 1278. 2nd Coll. Pub. Mus., Quebec. Lacks abdomen.

Roptrocerus (sic) rectus. Type.—Yellow label 1386. 2nd Coll. Pub. Mus., Quebec. Badly glued.

Sapyga maculata. Type.—Female, yellow label 754. 2nd Coll. Pub. Mus., Quebec.

Sciapteryx punctum. Type.—Yellow label 480. 2nd Coll. Pub. Mus., Quebec. Lacks hind tarsi.

Scotioneurus dives. Type.—See introduction (Aphidiinæ).

Scotioneurus stenostigma. Type. — See introduction (Aphidiinæ).

Selandria canadensis. Type.—Female, yellow label 1148; name label "Hoplocampa canadensis Prov." 2nd Coll. Pub. Mus., Quebec. Proved by Provancher Catalog.

Selandria flavicornis. Type.—Male, yellow label 60, name label "Selandria halcyon Harris." 2nd Coll. Pub. Mus., Quebec. Lacks flagellum. See introduction.

Selandria marginata. Type.—Harrington Coll. Flagellum wanting.

Selandria paupera. Type.—Yellow label 696. 2nd Coll. Pub. Mus., Quebec.

Semiotellus cupræus. Type.—Yellow label 920. 2nd Coll. Pub. Mus., Quebec.

Semiotellus fasciatus. Type.—Yellow label 226. 2nd Coll. Pub. Mus., Quebec. Fair.

Semiotellus fuscipes. Type.—Female, yellow label 918. 2nd Coll. Pub. Mus., Quebec.

Semiotellus melanicrus. Type.—Female, yellow label 627. 2nd Coll. Pub. Mus., Quebec. Fair.

Semiotellus minimus. Type.—Yellow label 921. 2nd Coll. Pub. Mus., Quebec. Fair.

Semiotellus oblongus. Type.—Female, yellow label 919. 2nd Coll. Pub. Mus., Quebec.

AN ANNOTATED LIST OF THE CERAMBYCIDÆ OF CALIFORNIA. (COL).

BY RICHARD T. GARNETT, UNIVERSITY OF CALIFORNIA, BERKELEY, CAL.

Not having noticed of late any list of California Cerambycidæ in any publication, I submit the following annotated list of that favourite family of collectors, the information gleaned from many fields and the note-books of many workers and collectors.

Acknowledgements are due to many of the Pacific Coast entomologists, for the greater part of the data on the insects contained in this list were obtained from their experience, particularly from Dr. Edwin C. Van Dyke. Several workers have kindly allowed me to examine their series, and a wider range of dates and localities has thus been obtained.

Many of the species I have collected in the various parts of the State during the past four years, a trip to Donner Lake and the surrounding section of the Sierras having been especially fruitful of results. Many others are unrepresented in my collection, but the data in this list on them has been procured from the collections and notes of others.

The longicorns of Lower California are included in the list because some of them are sometimes found not far from our borders, and may some day, or may have already, unknown to collectors, spread their territory into California proper.

Any changes in synonymy were suggested by Dr. E. C. Van Dyke last year while he was still on this coast. Examples of such changes are seen in numbers 100 and 69 of this list.

1. *Ergates spiculatus* LeConte.

   This is found in Northern California and the Sierras. Taken by author at Donner Lake from pupal cells in yellow pine; also breeds in other coniferous trees. June 20–August 7.

2. *Mallodon mandibularis* Harold.

   This probably occurs near Yuma, and is also found at San José del Cabo, Lower California.

3. *Mallodon melanopus* Linné.

   This was taken from pupal cells beneath bark of mesquite near Indio, Riverside County.

4. *Derobrachus geminatus* LeConte.
   This was taken at Palm Springs, Riverside County. Also present in Lower California. May 30.

5. *Prionus californicus* Motschulsky.
   This is found throughout the State and works on the roots of the coast live oak, *Quercus agrifolia*. Common. May 22–October 8.

6. *Tragosoma depsarium* Linné [*harrisii* Leconte].
   This works on tamarack and yellow pine in the Sierras, and is also found about other coniferous trees on several of which it is supposed to work. Taken by the author at Donner Lake beneath the bark of *Pinus ponderosa*. July 2.

   Tragosoma pilosicornis Casey.
   This is nothing more than a form of *T. depsarium*. Found on Mount Diablo.

7. *Asemum atrum* Eschscholtz.
   This is very common in the northern part of the State and in the Sierras. This opaque species breeds in the Douglas Spruce (*Pseudotsuga taxifolia*). I took it abundantly early in July at Donner Lake and Tahoe Tavern. July 3–28.

8. *Asemum nitidum* LeConte.
   At Monterey this works on *Pinus radiata*. It is also found in the Middle Sierras, Yosemite, and Tahoe. I have taken it along with *atrum* at Donner Lake and Tahoe Tavern. June 17–July 21.

9. *Nothorina aspera* LeConte.
   This most probably works in coniferous trees. Found in Siskiyou County.

10. *Criocephalus productus* LeConte.
    This beetle is found commonly throughout the northern part of the State, though but few specimens have been taken in Southern California. It works on *Pseudotsuga taxifolia*, and is supposed to work on grape-vine roots also. May 7–August 2.

11. *Criocephalus asperatus* LeConte.
This is found in the northern part of the State and the Sierras. It has been found flying around alpine fir. It probably breeds in coniferous trees, especially firs and spruces. July 20.

12. *Tetropium velutinum* LeConte.
This breeds in *Pseudotsuga taxifolia* and is moderately common in spruce forests north of San Francisco. A variety is found in the Giant Forest, Tulare County. June 1–August 9.

13. *Opsimus quadrilineatus* Mannerheim.
This breeds in *P. taxifolia* and is found from Alaska to San Francisco Bay. It probably also breeds in Sitka Spruce (*Picea sitchensis*).

14. *Dicentrus bluthneri* LeConte.
This is found in coast counties north of San Francisco and also rarely in the Sierras, near coniferous trees.

15. *Hylotrupes amethystinus* LeConte.
This is found in the Sierras from Shasta to Mt. San Bernardino, rarer in the South. Breeds in *P. ponderosa* and *Libocedrus decurrens*. Taken in numbers at Tamarack, Nevada County by the author. July 2.

16. *Hylotrupes ligneus* Fabricius.
Found through the Sierras, also in the Coast Range to Monterey. Taken by author on July 1 at Donner Lake. This breeds in *P. taxifolia* in the Sierras, *Pinus radiata* at Monterey, and probably in the sapwood of *Sequoia sempervirens* also.

17. *Hylotrupes litigiosus* Casey.
This so-called dark variety is a good species (teste Van Dyke). It breeds in the Sierra Fir near Forest Hill, Placer County.

18. *Phymatodes variabilis* Fabricius.
This is only found occasionally in imported wood.

19. *Phymatodes blandus* LeConte.
This is rarely found in Northern California. Supposed to breed in grape vine. July 16.

20. *Phymatòdes obscurus* LeConte.

This is found throughout the State, and has been taken by the author at Auburn and Calistoga in August and May, respectively. It breeds in *Quercus agrifolia*. Has been reared from tan oak in Marin County by L. S. Smith, and from *Quercus lobata* in the Sonoma Valley by A. E. Wieslander. May 25–November 8.

21. *Phymatodes aeneus* LeConte.

This feeds on *P. taxifolia* and is found north of San Francisco.

22. *Phymatodes dimidiatus* Kirby.

This is a northern species, running over into this State in Trinity County. It breeds in *P. taxifolia*. July 2–August 23.

23. *Phymatodes vulneratus* LeConte.

This is quite rare, and probably breeds in oak and other soft woods. Has been beaten from *Q. agrifolia* by Van Dyke.

24. *Phymatodes varius* Fabricius.

Found from San Francisco Bay north. In Sonoma County it breeds in *Pseudotsuga taxifolia* and *Pinus radiata*. June 24.

25. *Phymatodes decussatus* LeConte.

Has been reared from white valley oak in Northern California. June 26.

26. *Phymatodes nitidus* LeConte.

Found from San Francisco Bay north. Reared from *Cupressus macrocarpa* by Nunenmacher and myself, from the sapwood of *Sequoia sempervirens* and *P. taxifolia* by Van Dyke. May 21.

27. *Phymatodes juglandis* Leng.

Taken from California walnut in Los Angeles County by Coquillett.

28. *Callidium antennatum* Newm.

This breeds in most coniferous trees, often being taken from *P. taxifolia*. Taken at San Francisco and north, also throughout the Sierras and in the San Bernardino

Mountains. Taken in abundance by the author at Willits in July. May 20–July 11.

29. *Callidium hirtellum* LeConte.
Found in the Sierras. Beaten from *P. taxifolia*, and also found about twigs of *Pinus ponderosa*. June 25–August 29.

30. *Callidium vile* LeConte.
Found near San Francisco and north. Is very rare. July 4.

31. *Xylocrius agassizii* LeConte.
This is rare in California and is a coast species. Works on gooseberry and has been beaten from willow by Van Dyke.

32. *Xylocrius cribratus* LeConte.
This is rare in California and is a Sierran species. July 17.

33. *Malacopterus lineatus* Guer.
Found along the Colorado River and out from Fort Yuma.

34. *Oeme costata* LeConte.
Found in Sierras. One taken by Van Dyke in Yosemite.

35. *Oeme strangulata* Horn.
Have no records regarding this species.

36. *Oeme gracilis* LeConte.
This has been taken by Fall and Van Dyke from Catalina Island and Los Angeles County.

37. *Eudistenia costipennis* Fall.
Five specimens have been taken by Dr. Fenyes and H. C. Fall near the summit of the Sierra Madre Mountains above Pasadena, and one by Baker near Claremont, being beaten from live oak, in which the insect probably breeds.

38. *Eucrossus villicornis* LeConte.
Found in Nevada, Arizona, and Inyo County, California. Fall has taken one in the San Bernardino Mts. Reported as attracted to light by Nunenmacher.

39. *Haplidus testaceous* LeConte.
One specimen has been taken by Van Dyke in Nevada County.

40. *Achryson surinamum* Linné.
Found normally in Southern Arizona; probably occurs in the Colorado desert. June 10–July 18. (Dates for Arizona).

41. *Hammaticherus mexicanus* Thomson.
Found at Cape San Lucas, Lower California.

42. *Brothylus gemmulatus* LeConte.
This has been taken by Van Dyke on the beach at San Francisco and at Mt. Wilson, Los Angeles County.

43. *Brothylus conspersus* LeConte.
This rarity has been taken by Kusche on dead white valley oak in Sonoma County. It is found about San Francisco Bay and north.

44. *Osmidus guttatus* LeConte.
Taken at San José del Cabo, Lower California.

45. *Gnaphalodes trachyderoides* Thomson.
Taken at San José del Cabo, Lower California.

46. *Eburia ulkei* Bland.
Taken at Cape San Lucas, Lower California.

47. *Eburia conspersa* Horn.
Found at San José del Cabo, Lower California.

48. *Romaleum simplicolle* Hald.
Taken on Catalina Island by H. C. Fall, and at Santa Monica by E. C. Van Dyke.

49. *Romaleum seminitidum* Horn.
Taken by H. C. Fall along the Colorado River.

50. *Elaphidion punctatum* LeConte.
Taken at Cape San Lucas, Lower California.

51. *Elaphidion imbelle* LeConte.
Found in Sonoma and San Diego Counties. Has been bred by Dr. Blaisdell from live oak. June 16–August 3.

52. *Elaphidion albofasciatum* Linnell.
Taken by Coquillett in the foothills along the southern border of the Mojave Desert.

(To be continued)

KEY TO THE NORTH AMERICAN SPECIES OF AGROMYZA RELATED TO *SIMPLEX* LOEW (DIPTERA).

BY J. R. MALLOCH, URBANA, ILL.

The species in this group are distinguished from their allies by the following combination of characters: Body entirely black, with sometimes a metallic bluish or greenish tinge, halteres black, costa ending at or slightly beyond apex of third vein.

Only five species are known to me, one of which is undescribed.

KEY TO SPECIES.

1. Mesonotum with 3 pairs of dorso-centrals.....2
   Mesonotum with 2 pairs of dorso-centrals.....3
2. Orbits distinctly shining; 5 pairs of orbitals present; anterior pair of dorso-centrals weak. Larvæ in twigs of willow. N. Y.; Ill.....*salicis* Malloch.
   Orbits opaque; 7 pairs of orbitals present; all 3 pairs of dorso-centrals strong. Food-plant unknown.....*tamia* Melander.
3. Abdomen with a distinct bluish tinge; cheek almost linear, not over one-eighth as high as eye. Food-plant unknown. Md.....*winnemanæ* Malloch.
   Abdomen glossy black, or at least without bluish tinge; cheek about one-fourth as high as eye.....4
4. Outer cross-vein about half its own length from inner; wings barely more than twice as long as broad; frontal and facial orbits glossy. Larvæ mining in stems of asparagus. N. J.; N. Y.; Va.; Ill.; Europe.....*simplex* Loew.
   Outer cross-vein at its own length from inner; wings about 2.5 times as long as broad; frontal orbits very slightly shining, facials opaque. Food-plant unknown. Ill.....*similata* Malloch.

Male.—Black; head opaque, orbits and triangle slightly shining, thorax and abdomen distinctly shining. Wings clear, veins black. Squamæ fuscous, fringes black. Halteres black.

Frons over one-third the width of head; ocellar triangle poorly defined, extending almost to anterior margin of frons; posterior

ocelli separated by nearly twice the distance between anterior and posterior ocelli; orbits narrow, about one-sixth as wide as interfrontalia; orbital bristles short, 4 in number, hairs weak and sparse; antennæ small, third joint rounded in front; arista bare, slightly swollen and pale at base, its length slightly greater than anterior width of frons; cheek one-fourth as high as eye, marginal hairs weak, more numerous anteriorly, vibrissa weakly differentiated. Mesonotum with 2 pairs of dorso-centrals; discal setulæ becoming sparse posteriorly and not continued to posterior dorso-centrals; prescutellars absent; basal pair of scutellars stronger than apical pair. Apical abdominal segment 2.5 times as long as preceding segment; hypopygium larger than in allied species. Legs rather slender; mid tibiæ with very weak posterior setulæ. Inner cross-vein below apex of first; outer cross-vein at its own length from inner; apical sections of third and fourth veins slightly divergent apically; ultimate section of fourth vein about six times as long as penultimate; last section of fifth vein about four-fifths as long as preceding section; sixth vein very distinct, ending at one-third from margin of wing.

Length 2 mm.

Type locality, Dubois, Ill., May 24, 1917 (J. R. Malloch).

Food-plant unknown.

BOOK NOTICE.

BIOLOGY OF THE MEMBRACIDÆ OF THE CAYUGA LAKE BASIN. By W. D. Funkhouser, Memoir 11, Cornell University Agricultural Experiment Station. Pp. 177–445, 44 plates. Ithaca, N.Y., June, 1917.

In this study Mr. Funkhouser has given us a valuable summary of his work on the Membracid fauna of the Cayuga Lake Basin, together with an excellent introduction to the general study of this attractive family.

The first part of the paper contains a useful general description of the geology, physiography and climatology of the district, and its characteristics as a faunal and floral area, followed by an account of the local Membracid fauna, the distribution of which

is considered with reference to a number of somewhat arbitrary stations into which the region is divided for convenience. Some general matters are also touched upon in this connection, such as the theories of origin of the family, paths of migration, and the general distribution of the group throughout the world. "In North America the family is best represented in Mexico, where the characteristic bizarre forms are plentiful. Southern United States shows fewer species, and these lose their grotesque appearance as they spread northward. Northern United States continues to show the thinning out of the forms as the climate becomes colder, and the native species are, on the whole, smaller and of less striking development. Canada marks the northern limit of the family and shows few representatives."

The greater part of the paper is taken up with the descriptions, bibliography and notes on the life-histories of the sixty-one species of the district, all of which are figured, the early stages as well as the adult characters being shown in many cases. There are also keys to the subfamilies, genera and species.

Following this descriptive list a number of general matters are discussed. These include a detailed account of the external anatomy, which although approached mainly from the taxonomic viewpoint will doubtless prove useful to the morphological student as well as the systematist.

The concluding portion of the book is occupied by an interesting account of the general features of the life-history, habits, host relations, ecology, etc., of the family. Among the more interesting features of their habits are those of oviposition, of which there are a number of rather distinct types. This subject is of some interest from the economic standpoint, since the only kind of real injury caused by any of the species is due to the egg-laying habit, as in the well-known case of *Ceresa bubalus*. Even this injury, however, is exceptional, and the Membracidæ are not to be regarded as of any great economic importance.

This study will be useful, not only to Hemipterists and general entomologists, but also to anyone interested in the faunal characteristics of the Cayuga Lake Basin and neighboring or similar regions.

Mailed May 10th, 1918.