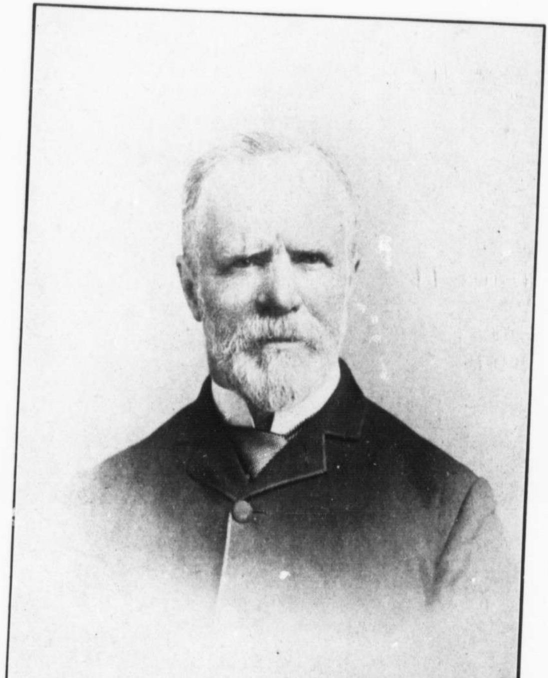

EDMUND BAYNES REED.
Original member of the Entomological Society of Ontario, 1863-1916.

The Canadian Entomologist.

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EDMUND BAYNES REED.

Few of the present members of the Entomological Society of Ontario have any knowledge of the pioneer work which was done more than half a century ago by a small band of enthusiastic entomologists. Very few of those who joined in its organization on the 16th of April, 1863, survived to witness its Jubilee three years ago; among these were Mr. Edmund Baynes Reed, and now he has in his turn been removed by death after a long illness due to heart trouble. He died at Victoria, B.C., on Saturday, November 18th, in the 79th year of his age.

Mr. Reed came to Canada from England when a young man and settled in London, Ontario, where for some years he practiced his profession as a lawyer. The kind of work it entailed was not very congenial to him, and was consequently abandoned.

As a devoted member of the Church of England, he took a keen and active interest in its concerns, and became Secretary-Treasurer of the Synod of the Diocese of Huron—a position which he continued to hold until his removal to British Columbia in the year 1890.

From his boyhood days in England he was devoted to Natural History, and especially to the collection and study of insects. To these pursuits he devoted most of his leisure hours, and when the Society was formed he became one of its most energetic and useful members. To him was chiefly due the establishment of the library which is now one of the most valuable of the kind in the Dominion. In co-operation with Dr. William Saunders he was instrumental in forming the London Branch of the Society, which grew and flourished for several years and was finally absorbed by the parent Society when its headquarters were removed to London. When it was decided to send a representative collection of Canadian insects to the Centennial Exhibition in Philadelphia in 1876, Mr. Reed devoted all his spare time during many months to its preparation and contributed the whole of his collections. He was Secretary-Treasurer of the Society in 1871 to 1873 and from 1880 to 1886; member of the Council from 1874 to 1876; Vice-President in 1874, 1877 and from 1887 to 1889; and during most of these years Curator and Librarian as well.

The following extract from the report of the Council for the year ending August 31st, 1890, is a well-merited appreciation of the many services that he rendered to the Society: "The Council desire to place on record their feelings of deep regret at the removal of Mr. Reed from this Province and the loss which the Society thereby sustains. Mr. Reed is one of the original members of this Society, and for more than a quarter of a century has been one of the most active and zealous of its officials, filling at different times the positions of Vice-President, Secretary-Treasurer, Librarian, Curator and Auditor. To him it is especially due that the Library has grown to its present dimensions and value, and that so much progress has been made by the Society in many directions. The Council beg to thank Mr.Reed for his services in the past, and wish him all possible success and prosperity in his new and important sphere of labour."

When the Society was called upon in 1870 to make its first Annual Report on insects in relation to agriculture and fruit-growing, Mr. Reed joined with Dr. Saunders and Dr. Bethune and contributed the article on "Insects affecting the Plum;" a further article in continuation of the same subject was published in the Second Report, and also papers on "Insects injurious to the Potato," and "Insects attacking the Cucumber, Melon, Pumpkin and Squash." His further contributions to the annual reports were "Insects affecting Maple Trees," "Insects affecting the Peach," and addendum to the "Insects injurious to the Potato" (3rd Report, 1872); "On some common insects which affect the Horse, the Ox and the Sheep" (4th Report, 1873); "Entomological Contributions: The Io Moth, the Flat-headed Apple-tree Borer and the Locust-tree Borer" (5th Report, 1874); "Sphingidæ—Hawk-moths" (12th Report, 1881); "Diptera—Two-winged Flies" (13th Report, 1882); and a number of short notes in several of the volumes. He also prepared a useful Index to the first thirteen Reports 1870–1882, a pamphlet of 35 pages.

Mr. Reed was also a constant contributor to the Canadian Entomologist. His articles related chiefly to the Lepidoptera and included descriptions of larvæ, records of rare captures, collecting notes, and popular papers on various common insects. He was equally interested in both systematic and economic Entomology.

Though specially devoted to the study of insects, he was for many years engaged as an amateur in taking meteorological observations. In co-operation with the Observatory at Toronto, he installed the necessary apparatus, using the tower of the Cathedral for his anemometer and vanes, and connecting them with his house which was near by. His records were so accurate and satisfactory that he was selected to take charge of a newly-established Observatory at Victoria, British Columbia, to which place he removed in 1890 and there remained for six and twenty years—respected by all who came in contact with him and beloved by his friends.

During Mr. Reed's residence in London the writer had the pleasure of intimate friendship with him, and often enjoyed his hospitality when attending the Annual Meetings of the Society. He was always an agreeable and sympathetic companion, merry and vivacious, cheerful and happy hearted. Since his removal to the distant Pacific Coast, the friendship has been maintained by correspondence in default of ever meeting; his last letters related to the celebration of the Society's Jubilee, in which he was deeply interested.

C. J. S. BETHUNE.

POPULAR AND PRACTICAL ENTOMOLOGY.

On the Portrait of a Wolf Spider.

BY CHARLES MACNAMARA, ARNPRIOR, ONTARIO.

The number of species of insects and their allies in the world is a frequent subject of discussion among entomologists, and it may be remarked that writers differ a good deal on the question. But I have never come across any attempt at a general insect census. Doubtless the numbers are too appalling, and the would-be enumerator must shrink aghast before the frightful superabundance of invertebrate life. To count the stars of the Milky Way would be easy compared with numbering these little creatures. If the task were attempted, the ordinary units of our decimal notation would be found useless, and our only hope would be to adopt some vast measure like the "light-years" of the astronomer. But if we cannot even guess at the number of individuals in these lower forms of life, we may at least form some rough estimate of the *relative* abundance of the various orders and like divisions.

But here again there are likely to be decided differences of opinion. There is such a tremendous flow and ebb in the tide of "insect" life—using the term in its wide, popular significance—that it is not easy to infer which kind is really in the majority. Speaking of conditions in this country, the student of pond-life must be persuaded that at certain times of year there are more Daphnia and Cyclops and other minute crustaceans in his pools than any other form of Arthropoda in the district. Again sometimes lepidopterous larvæ, such as the tent-caterpillar and the army-worm, seem to outnumber all other insects. May-flies and grasshoppers also appear on occasion in immense numbers. The minute springtail, too, must not be forgotten, for certain species of this family sometimes emerge in winter in such abundance as to blacken the snow over considerable areas. Mosquitoes are quite as plentiful as anyone could desire, but we are perhaps apt to overestimate their importance in the numerical scale on account of their obtrusive manners which force them unduly on our attention, and the same is true of the house-fly. But I was long convinced that ants must hold the record for numbers of individuals, for anyone who has collected them must have been struck by their wide distribution and their great abundance. They are to be found simply everywhere: in dense woods, mossy swamps, dry, open fields, rocky hills, and hot, sandy beaches. The sacred dwelling of man himself is seldom exempt. One or other species of the Formicidæ adapts itself to these most varied habitats, and flourishes in all.

However, I recently changed my opinion on this point. In the course of a forty-mile drive on the first of October last through parts of the counties of Renfrew, Lanark and Carleton in Ontario, I was fairly astounded at the evidence of the numbers of spiders there must be in the country. Our road lay mostly through cultivated land, and everywhere over the tens of thousands of acres we passed were laid the gossamer threads of spiders, so thickly set that I doubt if one could have placed as much as a finger tip anywhere in the fields without touching several strands of the webs. Every tall weed and every fence streamed with the threads, and towards evening the rays of the westering sun were reflected from the shimmering fields like moonlight on a lake. All this was the work of so-called gossamer spiders, formerly thought to be a distinct kind but now known to include the young of many different species. The number of individuals necessary to produce the wonderful effect must have been stupendous indeed, for our drive did not circumscribe the area thus affected, and no doubt the same condition obtained for many miles around our course.

Spiders are always connected in the popular mind with the spinning of webs and snares to catch the unwary fly, but a great many species resort to no such subterfuge. Of course, all true spiders can spin, but many use their silk only for the manufacture of egg-bags or to line their burrows, or as a life-line by which they can drop from danger or save themselves from a fall. Chief among those that spin no web may be mentioned the Attids or Jumping Spiders which leap on their victims unawares; the Thomisids or Crab Spiders that lie in wait in flowers to seize insects that come in search of nectar; and the Lycosids or Wolf Spiders, exceedingly active runners, that hunt down their quarry in much the same manner as their mammal namesakes. Of these three families the Wolf Spiders are by far the commonest, and are found everywhere in great variety. The original of the accompanying "portrait" belonged to a rather small-sized species numerously inhabiting a sandy beach on the shores of the Ottawa River near Arnprior. The claw terminating the palp shows this specimen to be a female, for the palps of male spiders end in a curious knob-like organ. This species, which is a typically swift runner, is thickly clothed with very fine, light brown hair, with darker markings—it might almost be called a "fur"—a coloration well calculated to conceal it in its sandy habitat. Indeed, I seldom saw one of these spiders on my frequent visits to this spot during the summer, but one day in the late autumn I noticed the surface of the beach dotted with scores of tiny heaps of fresh, damp sand. On investigation each of these was found to close the mouth of a vertical tunnel twelve to eighteen inches deep, at the bottom of which was a torpid spider of this species, evidently retired for the winter. Obviously the spider population of the beach was much greater than I had suspected.

Keenness of vision is as necessary to the wolf spider as agile limbs, and so it is well provided with eyes, which are, too, much better developed than those of the snare weavers that depend largely on their sense of touch to acquaint them of the approach of their prey. Apparently the "Wolf" can see in every direction, above, before and behind. On the front of its head a row of four small eyes surmounted by two larger ones inform it of happenings before it and to either side, while two other large eyes on the top of the head are directed upwards and backwards. The powerful jaws, armed with a pair of needle-sharp fangs, each grooved with a poison duct, are almost hidden by the long hair covering them. She has indeed a repulsive countenance. We are often told of the beauties revealed by the microscope. In this case it is a horror that has been disclosed. But the race is not always to the swift nor the battle to the strong, for with all her panoply, this redoubtable spider was overcome by an antagonist more terrible yet, as I will relate.

One day in early September when seated on a log at my favorite beach, and taking a quiet entomological survey of the surroundings. I suddenly caught sight of an extraordinary many-legged insect buzzing rapidly across the sand towards me. A second glance resolved the anomaly into a digger wasp dragging with it a wolf spider which it had paralyzed with its envenomed sting, and was carrying to its nest to provide fresh food for its future larvæ. The wasp's shallow, sloping tunnel was in the sand close to my feet, and she quickly pulled her prey within. I waited some time in vain for her to emerge, and then dug up the nest. The wasp escaped with a whirr of wings but the wretched spider, although alive, was incapable of movement of any kind, and remained inert in my hand. Commiserating a spider caught at its own rapacious game is something like wasting pity on the incinerated crew of a baby-killing Zeppelin, but I could not help feeling sorry for this erstwhile lightning runner of the sands doomed never to move its swift limbs again. Here, however, was an excellent and unusual opportunity to secure a photograph of a wolf spider. For the living, uninjured Lycosid is so nimble and nervous that it is a most difficult matter to photograph it successfully, while it is very hard to "set up" the dead spider properly. So I carefully carried my spider home.

Here a few concise, technical notes may be of interest to the photomicrographer. The negative of the accompanying photograph was made with an ordinary whole plate view-camera provided with both front and back focussing. A half plate or even quarter plate camera would have served equally well or better, but no smaller instrument of sufficient extension was available. The lens used was an Aldis photomicrographic anastigmal of 2 in. focus, an admirable little lens of moderate price that can easily hold its own with much more expensive objectives. My camera and object stand is a home adaptation of the swinging frame of the photo-engraver. It consists of a board 4 ft. long by 14 ins. wide swung by cotton ropes at the four corners from two light trestles about 3 ft. high, and is a device I find very useful to avoid vibrations during long exposures.

At one end of the board is a narrow, longitudinal slot, one foot long, through which a bolt with a wing nut fastens the camera firmly at any position along the slot. As the object must be placed very close to a lens of such short focus, if the latter is mounted in a lens board in the ordinary way, the shadow cast by the relatively large camera front is sure to cause trouble. To obviate this I have the lens mounted at the truncated apex of a copper cone, 3 ins. long, the base of which, 2½ ins. in diameter, screws into a lens flange attached to the usual lens board which fits the camera front. A stand was made for the spider with several small blocks of wood, about 8 in. x 3 in. x 1 in. thick, piled up like steps of stairs. On these, by means of dark-room pins, was fastened a curved piece of smooth, white paper, with its top sloping away from the lens. The middle of the curve formed a little shelf just opposite the lens, and on this the spider was placed. This arrangement offered a plain background, and a shadowless support on which the spider was carefully posed, her limbs and palps being put in position with a couple of botanical needles.

The illumination used was daylight, the whole apparatus having been set up in a large bay window looking north. A camera extension of 18 inches was employed, which, with the 2-inch lens, gave an image enlargement of 8 diameters. The ground glass of the camera is provided with a clear spot in the centre, and on this the image was critically focussed with the aid of a focussing magnifier. The lens was stopped down to f.45 to gain the necessary depth of field, and the required exposure was calculated with a Watkins exposure meter, the normal time, as shown by the meter, being multiplied by the square of the magnification, in this case 64.

The plate was a Wratten & Wainwright backed panchromatic, but as it was used without a screen, any good ortho plate would have given much the same result. It is customary in photographic data to mention the developer, but for ordinary negative work there is no essential difference between the many developers on the market, and one should always use the solution one is accustomed to. Personally, I admit a preference for the well known "B. J." pyro-soda, and with this the spider negatives were developed. Several exposures were made of different views of the spider, and thanks to the excellent lens and small stop, all the negatives turned out so sharp and with such good depth of focus that they can be enlarged to any reasonable size. In fact I have enlarged the "portrait" to 75 diameters, and only stopped at that size for want of a larger sheet of bromide paper. The image would not be unduly soft at 150 or 200 diameters.

The spider proved a most amenable sitter, and would remain motionless for an indefinite time in any position she was put in. But if the poison of the wasp had fettered her limbs, it had not tamed her ferocious spirit, for I can read a felonious glare in those nightmare eyes.

After photographing her, I kept her under observation in a pill box to see if the effects of the wasp's sting would wear off. After about a week the paralysis seemed to be passing, and she began to make a few constrained movements. I hoped, if she recovered, to set her free once more on her native beach. But who can escape his fate? The very steps we take to avoid our destiny lead us irresistibly towards it. This spider's doom was to be eaten alive by a wasp larva, and it found her even in the pill box; my

PORTRAIT OF A WOLF SPIDER.

(Page 39)

intervention availed nothing. One day I opened the box as usual, and to my surprise found therein a small voracious grub which had already devoured about half of the hapless Lycosid. I had carried none of the wasp's nest material from the beach with the spider, and although I am told that these wasps are not known to attach the egg to the food supply, I can only suppose that in this case the egg was in some way fastened to the victim, and when it hatched out the grub began work at once on the food supply provided by the marvellous instinct of its mother. Next day there remained only the scattered legs of the spider, and a couple of days later, the grub itself, pining for the "optimum" conditions of its sandy nest, died also.

INSECTS IN OCEAN DRIFT.*

I. Hemiptera Heteroptera.

BY H. M. PARSHLEY, BUSSEY INSTITUTION, HARVARD UNIVERSITY.

Insects cast up by the waves are often found on the shores of bodies of fresh and salt water, as is well known to most collectors. Specimens found in this way are usually few and scattering, and their presence in the water is probably due simply to an unusually venturesome flight which may have carried them too far for a safe return to land. On rare occasions, however, much more extensive flights may occur, with the result that the shipwrecked are cast ashore in unbelievable numbers, sometimes forming a windrow for miles along the beach. This phenomenon is not to be explained in connection with the spring and fall flights when the air seems alive with insects on the wing, as it has been observed at various other seasons, and for the same and other reasons such flights do not appear to be nuptial in character. Sometimes a violent off-shore wind has been held accountable for the presence of the insects in the water, but this explanation will not fit the cases which I have observed; in fact, no satisfactory hypothesis has been advanced as yet. As a knowledge of the species concerned is important in the explanation of insect activity, I append a list of the Hemiptera Heteroptera which I have taken in ocean drift, leaving the list of the other groups for a later paper.

* Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 123.

For several years I have spent the summer at Beach Bluff, Mass., during which time I have seen the phenomenon under discussion on only three occasions, each time in the afternoon: June 21, 1915, July 18, 1915, and Aug. 1, 1916. In each case there was a light on-shore breeze with fair weather, and in none was the occurrence preceded by an unusually violent off-shore wind, though on the day before the last a moderate land breeze was observed. The insects were not washed up in such enormous numbers as in the cases reported by Needham,* where the shore was blackened by them for miles, but nevertheless the stranded insects were very numerous, in some places forming a continuous line along the beach. The occurrences which I observed were remarkable for the large number of different species represented, with relatively few specimens of each, unlike some of the previously reported cases where the flotsam consisted largely of a single species in enormous numbers. As noted by J. R. de la Torre Bueno in his paper on the subject,† the collector finds in beach drift many species whose retiring habits ordinarily save them from capture, and in the following list are a number whose presence in the vicinity I had not suspected. All the specimens recorded below were taken from the sand immediately on being left by the waves, and I can thus vouch for the fact that all actually took part in the flights over the water. Those marked with an asterisk are mentioned in the list of ocean drift Hemiptera given by Bueno.

List of Species.

Scutelleridæ.

Eurygaster alternata Say, July 4, 1915.

Cydnidæ.

Thyreocoris ater A. & S., June 21, July 18. (2)
T. nitiduloides Wolff., June 21.
T. pulicarius Germ., June 21, July 18. (6)

Pentatomidæ.

**Podops cinctipes* Say, June 21.
**Mormidea lugens* Fab., June 21, July 18. (2)
Dendrocoris humeralis Uhl., July 18.

* Insect Drift on the Shore of Lake Michigan, Occas. Mem. Chicago Ent. Soc., vol. 1, No. 1, 1900.
Beetle Drift on Lake Michigan, Can. Ent., vol. 36, 1904, p. 294.
† Heteroptera in Beach Drift, Ent. News, vol. 26, 1915, p. 274.

Perillus exaptus Say, June 21.
**Apateticus cynicus* Say, July 18.
**A. bracteatus* Fh., Aug 1.

Lygaeidæ.

**Lygæus kalmii* Stal., July 18.
Ortholomus longiceps Stal., July 18.
**Nysius ericæ* Schill., June 21.
**Ischnorrhynchus geminatus* Say, Aug. 1.
Cymus angustatus Stal., July 18.
C. discors Horv., June 21.
Geocoris bullatus Say, June 21. (6)
G. bullatus discopterus Stal., June 21. (2)
G. uliginosus speculator Mont., July 18. (3)
G. uliginosus limbatus Stal., June 21. (4)
**Ligyrocoris diffusus* Uhl., June 21, Aug. 1. (10)
Rhyparochromus plenus Dist., July 18, Aug 1..

These specimens seem to agree with the description and figure given by Distant in the Biologia Centrali-Americana of a form from Guatemala, but there is some question in regard to the generic reference. I have seen a specimen from Mt. Tom, Mass., and others have been found at Georgetown, Conn., and in the Huachuca Mts. Ariz. For most of this information I am indebted to Mr. H. G. Barber, who spares neither time nor trouble when called upon for assistance in some difficult question relating to the Hemiptera.

**Eremocoris ferus* Say, June 21, July 18. (11)

Piesmidæ.

Piesma cinerea Say, June 21.

Not found heretofore north of Rhode Island.

Tingidæ.

Corythucha marmorata Uhl., July 18.
C. sp. nov., June 21.

The description of this and several other new species of Corythucha will be published elsewhere.

C. cratægi Morrill, Osb. & Drk., Aug. 1.
Melanorhopala obscura Parsh., (Psyche, Vol. 23, 1916, p. 167) June 21.

Nabidæ.

**Nabis ferus* Linn., July 18.

Miridæ.

Miris dolabratus Linn., June 21. (2)

Platytylellus sp.?, June 21.
Neurocolpus nubilus Say, Aug. 1.
Pœcilocapsus lineatus Fab., July 18.
Capsus ater Linn., June 21. (4)
C. ater semiflavus Linn., June 21.
Camptobrochis grandis Uhl., July 18. (7)

Gerridæ.

**Gerris marginatus* Say, July 18. (4)

Saldidæ.

Saldula major Prov.
S. pallipes Fab., July 18. (2)
S. sphacelata Uhl., June 21.
S. opacula Zett., July 18.
S. sp.?, June 21, Aug. 1. (3)
**Micracanthia humilis* Say, June 21, Aug. 1. (9)

Some of these were taken under seaweed where they were very numerous on Aug. 1, though not so ordinarily. Stranded specimens were very active as soon as they left the water, and probably those under the seaweed had taken temporary refuge there after escaping the waves.

Corixidæ.

Corixa verticalis Fieb., July 18. (2)

Kindly identified by Prof. J. F. Abbott.

It is well known that some insects can withstand prolonged submergence in salt water, but from the condition of the more fragile species, many of which gained the shore alive, it seems to me probable that the flights occurred on the same day, shortly before the insects were washed ashore. If this be true, a possible explanation of the flights presents itself. On a clear day with a light, on-shore breeze the surface of the ocean reflects the sunlight with a peculiar sparkling brilliancy which might conceivably attract insects already flying above the land in unusual numbers because of some favouring combination of atmospheric conditions. The absence of the latter factor would account for the lack of a flight on days which were otherwise favourable. Thus, a light, on-shore breeze rather than a strong, off-shore wind may be the more frequent cause of the flight of insects over the water, and their consequent presence in the drift.

THE CALIFORNIA SPECIES OF MYZUS, WITH THE DESCRIPTION OF A NEW SPECIES.

BY G. O. SHINJI, BERKELEY, CALIFORNIA.

The following species of Myzus have been collected by the writer in the vicinity of the University of California during 1915.

1. *M. cerasi* (Fabr.). Taken from curled leaves of cultivated cherry (*Prunus cerasus*) within sixty feet of the University of California campus.

2. *M. circumflexum* Buckton. Found on following plants: *Vinca major*, *Solanum tuberosum*, pansy, *Ceanothus* sp., *Stachys bullata*, *Plantago* sp., *Senecio nickanioides*, *Solanum nigrum*, *Fuchsia* sp., wall flower (*Cheiranthus cheeri*), lilies, iris, gladiolus, *Nasturtium* sp., water cress, foxtail, *Cerastium viscosum*, buck-eye (*Æsculus californica*), *Sisymbrium* sp., *Viola* sp., *Symphoricarpus racemosus*, Boston ivy, Digitalis.

3. *M. rosarum* Walk. Taken on wild and cultivated roses.

4. *M. rhamni* Boyer. Taken from leaves, stems and berries of California coffee-berry tree (*Rhamnus californica*) and also Cascara sagrada.

5. *M. ribis* (L). Collected from under side of leaves of wild gooseberry, University of California campus, April 10, 1915.

6. *M.* sp. This species will be named by Professor Essig. Host plant *Aquilegia vulgare* and *A. truncata*. Date of collection, April 20, 1915, Berkeley, and also May 20, 1915, Inverness, Marin County, California.

7. **Myzus godetiæ,** n. sp.

Alate viviparous female.—General colour light green. Length of body 1.6 mm. Width of abdomen .7 mm. Wing expansion 3.9 mm. Head broader than long, dusky, eyes dark red. Antennæ arising from prominent frontal tubercles, dusky. Length of antennal joints: III, .5 mm.; IV, .3 mm.; V, .2 mm.; VI, .1 mm.; Spur .4 mm. 10-12 sensoria on III. Prothorax dusky, broader than long, wider than head. Thorax dusky, width .7 mm. Legs with apical two-thirds and one-third of tibia dusky, remaining parts green. Abdomen green with large median dorsal patches or rows and also marginal dots of black. Cornicles dusky to black,

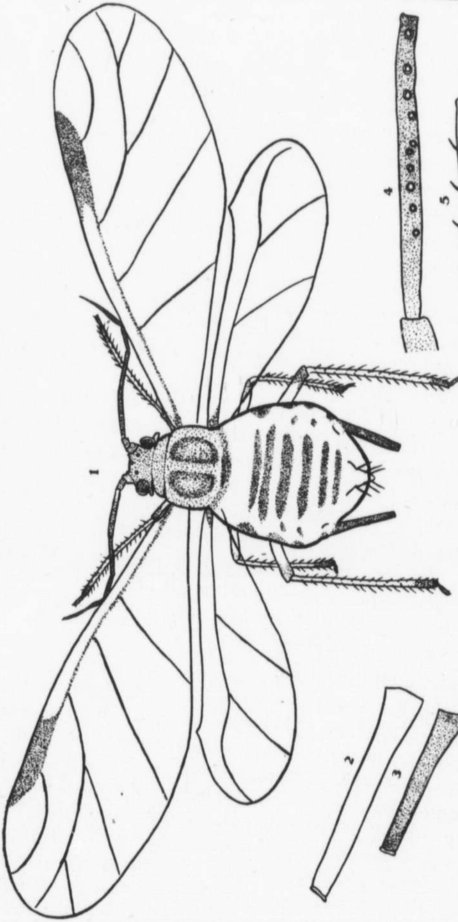

Fig. 4.—*Mysus godetiæ*. 1, alate viviparous female; 2, cornicle of apterous viviparous female; 3, cornicle of alate viviparous female; 4, second and third antennal articles of alate viviparous female; 5, same of apterous viviparous individual.

.4 mm. long, decidedly tapering toward the distal end. Style somewhat conical, slightly dusky.

Apterous viviparous female.—General colour green. Length of body 1.6 mm. Width of abdomen .7 mm. Head green, broader than long. Eyes dark red. Antennæ situated on frontal tubercles, green with sixth including filament and also apical half of fifth, dusky. Rostrum beyond second coxa, tip dusky. Thorax and abdomen green. Legs green, with apices of tibia and tarsal joints dusky. Cornicles green, slightly swollen near apex, .5 mm. long. Cauda green, conical.

Host plant—Godetia amœna (Lehn.). Lilja?

Locality.—University of California campus, Berkeley, California.

Date of collection.—April 4, 1915.

A NEW SPECIES OF AMPHROPHORA FROM CALIFORNIA.

BY G. O. SHINJI, BERKELEY, CAL.

Amphrophora cicutæ n. sp.

Alate viviparous female.

Slightly smaller than *A. rubi* Kalt. General colour light green or pale. Length of body 3 mm. Width of abdomen 1.15 mm. Wing expansion 5.4 mm. Head pale, broader than long, width between the eyes .45 mm. Beak reaching second coxa, tip dusky. Antenna situated on prominent frontal tubercles, slightly dusky, more intensely so at the joints and apex of VI and spur. Length of antennal joints: III, 1.1 mm.; IV, .9 mm.; V, .64 mm.; VI, .25 mm.; spur 16 mm.; III with about 18 sensoria in a row. Prothorax with a small tubercle on each side, nearly as wide as head, broader than long, width .6 mm., slightly dusky, especially when viewed from side. Meso- and metathorax slightly dusky. Width of mesothorax .8 mm. Abdomen pale, with small, red spots scattered throughout. Legs moderately long, tarsi and apical portion of tibia dusky, the rest the colour of the body. Cornicles swollen beyond the middle, tip dusky, the rest the colour of the body. Length 1.1 mm. Style pale, .45 mm. long.

Apterous viviparous female.

Light green or pale according to niches. Length of body 2.6–3.4 mm. Width of abdomen 1.2 mm.–1.7 mm. Eyes dark red. Beak reaching third coxa, tips dusky. Antenna situated on frontal tubercles, apices of III, IV, apical half of V and VI including spur dusky, rest pale or green. Head, thorax and abdomen light green or pale. Legs colour of body except tarsi, which are dusky. Cornicles colour of body, swollen beyond middle, length .7–9. mm. Style moderately long, colour of the body.

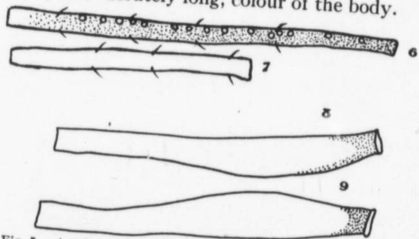

Fig. 5.—*Amphrophora cicutæ.*—6, third antennal articles of alate viviparous female; 7, third joint of apterous viviparous form; 8, cornicle of alate, and 9, cornicle of apterous female.

Host plant—*Cicuta virosa* var. *californica.*

Locality.—University of California campus, Berkeley, California.

Date of collection.—April 20, 1915.

Notes.—This species is nearer to *A. rubi* Kalt. than *A. latysiphum* Davdn. It differs from *A. rubi* in the following characters: (1) Spur with its base longer or at least as long as V plus IV or III plus V. (2) Sensoria on III about one-half as many as in *A. rubi.* (3) III of apterous forms without or with fewer sensoria. (4) Shape, size and coloration of cornicles.

The following numerical data, obtained with the writer's collection of *A. rubi* Kalt. at the same date and locality, may be of use for comparison:

A. rubi Kalt.—Length of antennal joints of alate form: III, 1.2 mm.; IV, .7 mm.; V, .6 mm.; VI, .2 mm.; spur, 1.3 mm. Length of body 3.5 mm. Width of abdomen 1.4 mm. Width of prothorax .7 mm. Sensoria on III 35–45.

Host plants.—Wild and cultivated blackberry.

OBSERVATIONS ON THE LIGHT-EMISSION OF AMERICAN LAMPYRIDÆ:

THE PHOTOGENIC FUNCTION AS A MATING ADAPTATION; 5th PAPER.

BY F. ALEX. McDERMOTT, WASHINGTON, D.C.

The following paper embraces the results of some observations made since the fourth paper in this series was published. (See Canadian Entomologist, 1910, vol. 42, p. 357; 1911, vol. 43, p. 399; 1912, vol. 44, p. 73; 309.)

1. *Pyractomena borealis* Randall. (*) The presence of this species in the neighbourhood of Washington, D.C., was established by Mr. W. S. Fisher, who found it pupating in large numbers in deep crevices in bark at Great Falls, on the Potomac River, about fifteen miles northwest of the U. S. Capitol at Washington. It is quite a large Lampyrid, and its flash appeared to the writer to be the brightest of any of the known local fireflies. When flying at a height of from eight to ten feet above the ground, its flash produced a distinct though faint illumination over an area perhaps ten feet in diameter on the ground.

The distribution of the luminous organ in this species is very similar to that in *P. angulata* and *P. lucifera*. In the male, the entire ventral surfaces of the two segments before the last show the yellow colour of the luminous tissue, while in the female this tissue area is restricted to two irregular patches on these segments. The male should, therefore, give distinctly the brighter light. The habit of the insects of pupating in crevices in bark several feet from the ground, as observed by Fisher, together with the known reluctance of many female lampyrids to fly, even when possessing wings, would make it seem probable that the females would be found on the bark of the trees where they emerged, or not very far away.

* In a former paper the writer adopted the late E. Olivier's name *Lecontea* for this genus. Olivier's reasons for the change, however, appear to be invalid, according to Rule 36 of the International Commission on Zoological Nomenclature. As a matter of interest it may be mentioned that Mr. H. S. Barber, of the U. S. National Museum, calls my attention to the fact that the name *Pyractomena* was originally applied by Dejean (1833) to a genus containing only manuscript names of species. Leconte, in 1850 applied this generic name to *Lampyris borealis* Randall, a described species, which therefore automatically became the type for this genus. This publication antedates that usually given, Leconte, 1852. The other species, *lucifera* and *angulata*, are correctly placed in this genus.

The writer's observations on this species were made at Great Falls, over the same area where Fisher had found the species, and on the evening of May 3, 1916, several days after Fisher's observations. The insects did not appear until it was quite dark—about 8.00 p.m.—when numbers of them were seen along the top of the bluff, some forty or fifty feet high, which marks the former river bank at this point. On ascending this bluff, the insects were found to be flying around in the foliage, principally from ten to twenty feet above ground, flashing at intervals of five to ten seconds; they soon became very plentiful. At first their flight appeared to be entirely aimless, and even long and close watching failed to reveal any replies to the flashes from females on bark or twigs, but presently a fainter occasional flash was observed on a trunk about 8 feet above ground, where the brighter flashes of the males had already been observed. It soon appeared that the fainter flash emanated from a point between two males, each of the latter some six or eight inches from the faint flashes. An electric flashlight revealed an imago of this species on the bark, but just out of reach; it cannot be stated positively that this was a female, but the conduct of the faint flashes points strongly in that direction, as the fainter flash was several times observed to follow closely flashes from one of the two males; it did not follow all of these flashes, which may have been due to the irregularities in the bark hiding the flashes of the male at times. The males, as was found later, on alighting near a supposed female, run fairly rapidly over the area, apparently in search of her. In this case, the male lower down on the bark was captured and identified. They were still flying and flashing an hour after the first observation, apparently as thickly as at first, this conduct resembles *Photuris* more than *Photinus*—indeed, except that the light is not quite as green to the writer's eye, the flight of this species suggests that of *Photuris*.

The flash of the male is a single, rather short and intense flash, followed in many instances, though not in all, by a very faint, slow or "trailing" secondary flash. This secondary flash varied greatly with different individuals, being in some cases so distinct as to suggest the double flash of *Photinus consanguineus*, while in other specimens it was apparently absent. The males, when approaching a supposed female, usually, though not always, exhibit a faint, continuous glow between flashes. The flash of the female—if this may be judged by the specimen seen on bark and assumed to be a female—is a much less intense and slower flash, given almost immediately after the flash of the male she is answering. Representing these in the manner used by the writer in his review of this subject (Zeitschrift für wissenschaftliche Insektenbiologie, 1914, Bd. 10, pp. 303–307), the flashes of this species would appear as shown in the sketch, Fig. 1.

Experiments with a pocket flashlight soon showed that the flying males would pay no attention to the unshielded light, when flashed immediately after their flashes (although the toads in the neighbourhood seemed greatly interested, and could be heard hopping toward the experimenter from several directions after each flash!) When, however, the fingers of the free hand were so disposed over the bulb as to completely prevent the escape of any direct light, the luminous surface being the portion of the finger tissue through which the light passed, it was found easy to attract flying males from a distance of as much as twenty-five feet, by flashing immediately after the flash of the male. The reaction was so definite as to leave no doubt of the matter; of ten males captured in perhaps fifteen minutes, nine were obtained as the result of attraction to the experimenter by means of the flash light. For instance, a male was observed to be flying in a direction about at right angles to the path which the experimenter was following, and about fifteen feet ahead and perhaps twenty feet in the air. Immediately after he flashed, the shielded lamp was flashed; the flying insect immediately turned, flying downward and along the line of the path, almost in a direct line for the experimenter's hand. Each time he flashed, the flash was answered, as he drew nearer, and when quite close, he swerved suddenly and alighted on the coat sleeve of the extended hand. One or two of those taken were caught in flight, but most of them were allowed to alight on the coat sleeve, and then captured; they usually landed at a distance not more than about eight inches from the light, running around rather rapidly after lighting, stopping occasionally and waving the antennæ somewhat after the manner of *Photinus pyralis* when mating. It is interesting to note that the distinctly red colour of the light from the flash light after passing through the tissue of the experimenter's fingers, did not seem in the least to interfere with the phenomenon, although decidedly different from the colour—to the human eye—of the light of the female insect.

A flash of a flying Lampyrid, closely resembling that of the male of this species, was observed by the writer in the Soldier's Home Park, in Washington, D.C., about April 20, 1911, and was at that time ascribed. by Mr. H. S. Barber, to some northern species not yet recorded from this locality. The distribution of *P. borealis* in the surrounding country has not been worked out, but it would appear possible that the flash seen in 1911 might have been due to a chance male of this species. The spring of that year was rather warmer than usual, possibly accounting for the early date.

Olivier (Accouplements anormaux chex les insects. Premier Cong. Internat. d'Entomologie, 1910, pp. 143–145; see also Gadeau de Kerville, Bull. Soc. Ent. France, 1896, No. 4, p. 85) has mentioned the comparative frequency with which two male lampyrids are found attempting to mate. During this investigation a number of live males of *Pyractomena borealis* were placed in a test-tube, and upon examining them about half an hour later it was found that two of them had coupled, the penis of the upper one being held between the mandibles of the other; they remained in this position at least two hours. The position of the terminal segments of the upper male were those of normal intromission. There was no evidence that one insect had attacked the other, nor did either appear to be injured.

It may be noted that the odor of this insect, while resembling that of *Photinus pyralis*, is still rather different from that of the latter species.

2. *Photuris pennsylvanica* DeGeer. This species was observed for the first time during the season of 1916, along the Conduit Road between Great Falls and Cabin John Bridge, on the evening of May 27. The insects first appeared as isolated, scattered specimens about 8.15 p.m., but by 9.00 o'clock there were thousands of them flashing in the trees and over the fields. As previously noted (Can. Ent., 1911, vol. 43, pp. 403–4) difficulty had been experienced in connecting the luminosity with the mating conduct in this species. Experiments with the use of the electric flash light

were begun on the above date, using both the naked bulb and the bulb covered with the hand, as just described for *Pyractomena borealis*, but no evidence of attraction toward the lamp was obtained. In view of the fact that the light of this species is rather more greenish than that of the other local Lampyridæ which have been studied (Coblentz, Can. Ent., 1911, vol. 43, pp. 355–360, and previous papers by the present writer) the experiment was tried of covering the bulb of the lamp with a thin leaf. With this modification of the colour of the light, and by using a long flash, in imitation of that previously described as one of the methods of light-emission of this species, it was found comparatively easy to attract the males so that they would approach the flashed light, but unless the bulb were shaded more as they drew nearer, they appeared to recognize some difference in the light and would fly away again. The response was not entirely uniform, even in the early evening when but comparatively few were flying; later, when several hundred insects might be within the range of the flash, a definite response was decidedly the exception, unless a particular, isolated insect near the electric light responded.

Four distinct types of light-emission on the part of this species were observed, agreeing with those previously reported (Can. Ent., 1910, vol. 42, pp. 358–360). First noted was a series of usually three, though sometimes four or five rapidly repeated flashes of considerable intensity, followed by darkness for several seconds; the flashing thus was repeated at intervals of from not more than three seconds to as much as half a minute. The series of flashes is suggestive of that of the male of *Pyractomena lucifera*, except that ordinarily not as many separate flashes are given, that there is a distinct interval of darkness between succeeding flashes in the series, and that the flashes in any series appear to be of diminishing intensity, (see diagram, Fig. 6). The specimens which exhibited this type of flash, came to the lamp when given the long flash described, and were *usually, though not always*, found to be males.

The second type of lighting observed was that which the writer has previously described as "a faint glow rapidly increasing in brilliancy. . . . . It then ends suddenly. . . ." The only correction to make on this earlier observation is that this flash, when observed close at hand, is seen not to be a continuous steady flash, but a series of very rapid pulsations, or a flash of very rapid variations in intensity, such as may be observed in a moving mirror image of an arc-lamp operation on alternating current. (See diag[illegible]). As compared with the phenomenon of the alternating

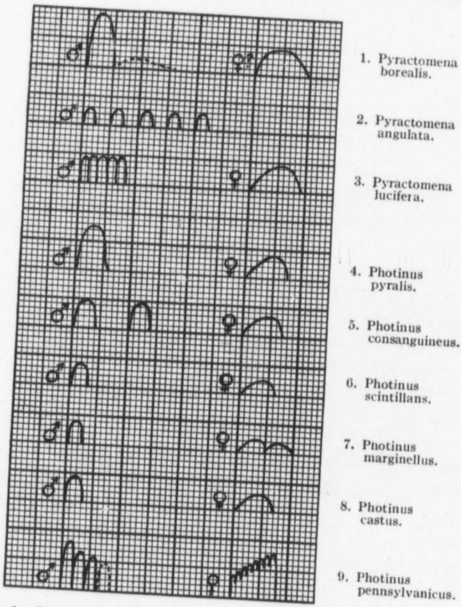

Fig. 6.—Chart showing relative intensities and durations of flashes of American Lampyridæ. (1 cm. vertically equals approximately 0.02 candle power; 1 cm. horizontally equals approximately one second in length of curves; space between curves representing flashes of male and female of same species, is arbitrary.

current arc-lamp, the "frequency" appeared to be about 50 per second, rather slower than the lamp (60 cycles). One insect flashing thus was caught on the evening of May 27, and found to be a female, but at this time, none could be attracted to the electric light, by imitating either this flash, or that described in the preceding paragraph, for the male. Later, notably on the evening of June 17, along the Chesapeake and Potomac Canal, only a few hundred yards from where the first observations were made, females giving this long flash, repeatedly came to electric lights operated in the flashing manner of the male, when used both by the writer and by Mr. H. S. Barber, the bulbs in both cases being shielded by a leaf. The reverse attraction, as described in the foregoing paragraph, was also observed at this time, and had previously been observed by Mr. Barber and the writer, along the Canal on the evening of June 3. There were, however, some curious exceptions: for instance, on the evening of June 5, at the writer's residence, 1901 Jackson St., N. E., this city, an insect giving the long flash was attracted to a lamp giving the flashing light, and when captured proved to be a male; also on the evening of June 13, at the same place, using the electric lamp giving a long flash, two females and four males were attracted, caught and identified. It was not found necessary that either sex be flying to respond; insects at rest on leaves and fences repeatedly responded by flashing to stimulation with the electric lamp, and would sometimes leave their locations and fly to the light. Good results were never obtained unless the light was either shielded with a leaf, or the bulb coated with a solution of malachite green and chlorophyl in collodion.

The third method of lighting observed for this species was that already described as single, not very bright flashes, emitted at intervals of a second or two while the insect is flying through the air in almost any direction, dropping from a tree, or running around on the ground or on the grass. In every instance these insects were found to be females. Operating the electric light in imitation of this flash did not seem to cause attraction of either sex, but in one instance, when a male was observed on a fence rail, giving his usual triple flash, and responding to the electric light flashes in imitation of the usual long flash of the female, the change to the type of flash above described caused him immediately to cease to respond. Provisionally we may regard this as the flash of a pregnant (or hungry) female.

The fourth type of light-emission consists of a single, short, bright flash, repeated at intervals of about four seconds or more. This flash is the least common, and insects flashing thus were found to be males, and did not respond satisfactorily to the electric light.

Only rarely was attraction between the sexes in this species noted, and as mentioned in a previous paper, it is very rarely that pairs in couple are seen or taken. On account of the great numbers of the insects, and their habit of flying quite high, it is very difficult to follow closely any particular individual or pair. On one occasion a male and female were confined in a tube for some time, hoping that mating would take place; the male flashed irregularly, in single flashes, and the female appeared to answer him, but although she ceased to light and became quiet whenever the male touched her or ran over her back, he appeared to pay no attention whatever to her, and no mating was observed.

Mr. Barber informs the writer that he has frequently noticed dim, fixed points of light in the woods at night, which on investigation, proved to come from the luminous organ of a small adult *Photinus* that was being devoured by an adult *Photuris*, the latter in each case appearing to be a female. In several cases where a male and female of *Photuris* were confined together to secure eggs, the male was found to have been devoured during the night. These appear to be natural habits of the insect, both of which the writer has been able to conform. Mr. Barber also states that he has been informed by Mr. Harry L. Parker, of Hagerstown, Md., who has observed the pupa of this species, that in addition to the anal lights, there is a constant light emitted from the pupal prothorax, which persists through the teneral adult stage, but disappears as the beetle hardens.

3. *Pyractomena lucifera* Melscheimer. Experiments on the evening of May 15, on the attraction of the males of this species to a flashed electric light, were entirely negative. A lamp shielded with a leaf was not used at this time, but was tried later, still with negative results.

4. *Pyractomena angulata* Say. A male of this species was captured at the writer's residence on the evening of June 13; when in flight it gave a series of short, dim flashes, not unlike those described for the pregnant or hungry female *Photuris*, but fainter and of a decidedly orange colour. (See fig. 6). No attraction to the flashed electric light was noted. A female of this species

was taken in flight in mid-day near the same locality on May 30; in fact all females of this species which the writer has taken, have been caught flying in daylight. This flash does not agree with that of the insect which the writer supposed to be a male of *P. angulata* in 1912.

5. *Photinus consanguineus* Lec. This species was observed at Plummer's Island, Md., on June 3, and along the Canal on June 17. The interval between the two flashes constituting the light-emission of the male, was found to be variable, sometimes as much as two seconds. No attraction of the male to the electric bulb could be secured.

6. *Photinus scintillans* Say. The previous observations on this species were plentifully confirmed, but no new facts brought forth.

During this season a flash was observed on two separate occasions, but in the same locality, which does not correspond with that of any known Lampyrids of this vicinity. It consisted of a series of quite rapid flashes, somewhat like that of the male of *Pyractomena lucifera*, but of a distinctly orange tone. Both observations were made long after the normal period of prevalence of the *lucifera*. It was found impossible to capture the insect at this time, and the flash was not seen again, on later visits.

NEW NEARCTIC CRANE-FLIES (TIPULIDÆ DIPTERA). PART II.

BY CHARLES P. ALEXANDER, ITHACA, N. Y.

(Continued from page 31.)

The following records also undoubtedly pertain to this species, but in the absence of the material are not included in the type series:

Fort Kent, Aroostook Co., Maine, August 19 (Johnson); White Cap Mt., Maine, August 17, 1905 (Jones); Dedham, Mass., Sept. 4, 1906 (Johnson); Brookline, Mass., Sept. 6, 1906 (Johnson); Cohasset, Mass., Oct. 1, (Bryant); Mt. Marcy, Essex Co., N. Y., July 30, 1913 (Young); Elm Lake, Hamilton Co., N. Y., August 2, 1912 (Young); Hazleton, Luzerne Co., Pa., August 20, 1909 (Dietz).

This interesting late-summer and early-autumn species is similar to *T. calcar* O. S., which, in the male sex, has the stigma of the wings almost indistinct, and the hypopygium very small and provided with short hairs; in *autumnalis* the stigma is brown and the elongate male hypopygium is densely provided with long, dark hairs. In the female sex, the reduced wings of the new species are very curious, (*autumnalis*, length of body 20 mm.; wings 9.5 mm.; *calcar*, length of body 17 mm.; wings 14 mm.), and the ovipositor has the tergal valves strong, powerful, almost straight and rather blunt at their tips; in *calcar*, the tergal valves are shorter, strongly up-curved and more pointed at their tips.

Tricyphona cervina, sp. n.

Allied to *T. septentrionalis* Bergr.; colour light fawn-yellow; antennæ brownish black throughout, the basal flagellar segments crowded, the apical ones attenuated; mesonotum with three stripes; ovipositor and hypopygium bright yellow.

Male.—Length 6 mm.; wing 7.8 mm.

Female.—Length 8 mm.; wing 8.5 mm.

Rostrum and palpi dark brown. Antennæ dark brownish black, the first segment a little grayish pruinose; first six segments of the flagellum large and closely approximated, the remaining segments elongate and attenuated (as in *T. septentrionalis*). Head brownish gray, clearer gray behind and on the genæ beneath.

Mesonotal præscutum light brown with a golden pollen, with three dark brown stripes; the middle stripe is longest, narrowed behind, broadened anteriorly, indistinctly bisected behind by a vitta of the ground-colour; lateral stripes short; scutum and postnotum grayish yellow; scutellum more yellowish. Pleura reddish brown with a sparse gray or grayish-white bloom. Halteres pale yellow, the knobs very slightly darkened. Legs with the coxæ yellow, sparsely gray pruinose on the outer face; trochanters dull yellow; femora dull yellow, passing into brown at the tips; tibiæ yellowish brown, a little darkened apically; tarsi brown. Wings nearly hyaline; stigma pale brown; veins brown. Venation: petiole of cell R_4 moderate, about equal to or shorter than cell *1st* M_2; cell *1st* M_1 pointed at inner end (as in *septentrionalis*); petiole of cell M_1 long, much longer than either cell M_1 or *1st* M_2; basal deflection of Cu_1 at or just beyond the fork of M, about in a line with cross-vein r-m; cross-vein m rather indistinct.

Abdominal segments dark brown, the caudal and lateral margins narrowly paler, hypopygium with the pleurites bright yellow.

The female is similar to the ♂ but slightly larger, full-winged; ovipositor powerful, yellow, strongly upturned.

Habitat.—Colorado.

Holotype, ♂, Platte Cañon, Colorado, July 17, 1915, (Oslar.)

Allotype, ♀, with the type.

This little species differs from both *debilis* Will. and *vitripennis* Doane, in the considerably smaller size; it differs from *debilis* in the paler fawn colour of the body, the long petiole of cell M_1, the structure of the antennæ,and in numerous other details; from *vitripennis* in the gray head, dark antennæ, differences in the thoracic pattern and colour of the abdomen and its appendages. It differs from the more closely related *septentrionalis* Bergr. in the unmarked wings and fawn-coloured body.

Tricyphona glacialis, sp. n.

Allied to *T. debilis* Will.; colour dark brown; antennæ dark brown throughout, the flagellar segments oval to rounded-oval, not attenuated; wings with a pale brown suffusion; cell *1st* M_2 and and M_1 very long; abdomen dark brown, the basal sternites more yellowish.

Male.—Length 9.6 mm.; wing 10.6 mm.

Rostrum and palpi dark brown. Antennæ dark brown, the segments of the flagellum oval, the basal ones not crowded, the apical ones shortened, almost rounded. Head broad, black, very sparsely grayish pruinose; frontal tubercle distinct, high.

Mesonotum dark brown, very sparsely gray pruinose on the postnotum, the scutellum paler, more yellowish. Pleura dark brown, gray pruinose. Halteres very long and slender, brown, brightened at the extreme base. Legs with the coxæ brownish yellow; femora dull yellow, passing into brown on the apical third; tibiæ brownish yellow, a little brighter basally; tarsi dark brown. Wings with a pale brown tinge; stigma indistinct; veins brown. Venation: petiole of cell R_4 moderate, a little shorter than the elongated cell *1st* M_2; petiole of cell M_1 about one-third the length of the cell and of cell *1st* M_2; cross-vein *m* connects M_{1+2} with M_3, weak and tending to atrophy; Cu_1 leaves M_3 before mid-length of the long cell *1st* M_2.

Abdomen elongated, tergites dark brown, the caudal margins of the segments narrowly paler; basal sternites more yellowish than the terminal segments; hypopygium brown.

Habitat.—Alaska.

Holotype, ♂, Sitka, Alaska; June 16, 1899 (Kincaid).

Allotype, ♀, Saldovia, Alaska; July 21, 1899 (Kincaid).

Paratypes, ♂ ♀, Yakutat, Alaska; June 21, 1899 (Kincaid); ♂, Virgin's Bay, Alaska, June 26, 1899 (Kincaid); ♂, Saldovia, Alaska, July 21, 1899 (Kincaid).

The type is in the collection of the United States National Museum; the species is based on material taken on the Harriman Expedition, and was determined by Coquillett as being *T. debilis* Will.

The species agrees with *debilis* in many respects, but the general coloration is dark brown, not yellow; the basal segments of the antennæ are not reddish and the venation is different, the cells *1st* M_2 and M_1 being greatly elongated. The abdomen and halteres are longer than is usual in this group of the genus.

GEOMETRID NOTES.

The Genus Dysstroma Hübner.

BY L. W. SWETT, WEST SOMERVILLE, MASS.

The genus *Dysstroma* Hüb. (Verz. p. 333, 1825) with its type *truncata* Hufn. seems to be a natural group by itself. Hulst (Trans. Am. Ent. Soc., vol. XXIII, p. 283, 1896) under *Hydriomena*, cites *truncata* Hufn. as the type of *Dysstroma*. Warren and Hampson both refer the *truncata* group to *Polyphasia* Stephens, but treat it as a separate genus (Proc. Zool. Soc., p. 373, 1893, and Ind. Moths, III, p. 378). Mr. L. B. Prout points out in Trans. London Ent. Soc., part XVIII, p. 33, 1908, that *Polyphasia* cannot hold, as Hübner's name *Dysstroma* has priority. According to Mr. Prout's and my own views, what we have been calling *truncata* in North America is really *citrata* Linné ("Fauna Suecica," ed. II, p. 332, 1761).

Werneburg (Stett. Ent. Zeit., vol. XIX, pp. 49-57, 1855) shows, I believe for the first time, that *citrata* Linné is related to *truncata*. In Linné's original description of *citrata*, he speaks of the fore wings having a grayish central band, with a variegated outer margin and reddish yellow costal spot. *Dysstroma citrata* Linn. with its variations appears to be our American form, and *truncata* Hufnagel, though closely resembling it, is quite distinct. There is much doubt also as to the occurrence of *truncata* Hufn. in South America, as I have never seen authentic specimens of it.

I shall use the term *aberration* in this paper in place of *variety* in conformity with the practice of the European specialists, while variety will be employed in the sense of local race.

The typical *Dysstroma citrata* Linn., or gray form with variegated outer margins, seems to be rare, and is only found in cold climates and high altitudes. Our commonest form, which generally stands in collections as *Dysstroma truncata* Hufn., is *D. citrata* Linn. aberration *punctum-notata* Haworth, with the central band of the fore wings clear white. In Dyar's List, page 281, the aberrations of *truncata* Hufn. and *citrata* Linn. are badly confused, but I shall only consider *citrata* here; so the rest may be referred to *truncata*. *Dysstroma citrata* Linn., and its aberrations may be listed as follows:

I. *Dysstroma citrata* Linné.—Fore wings with a gray central area, variegated outer margin with reddish yellow costal spot.

This appears to be rather a rare form, probably occurring in the mountainous regions and colder climates. The central band of fore wings is even, uniform gray, with enough variegation in the outer margins not to be unicolorous. I have this form, if I have identified it correctly, from Atlin, British Columbia, collected by Mr. Anderson. The gray form taken in the East is not exactly the same, but I will place it here tentatively until more is known of the group and the genitalia can be studied. I have not seen aberration *fusca* Prout (Trans. London Ent. Soc., part XVIII, p. 50, 1908), which is unicolorous dark gray without variegations, but I hardly think it applies to the forms mentioned above.

Ab. (a) *punctum-notata* Haworth (Prod. Lep. Brit., p. 26, 1802).

This form has the central band of the fore wings clear white, the intra- and extradiscal lines not touching. In most collections it has been placed under *truncata*, in error, though the resemblance is close, but beneath, on hind wings, the extradiscal line of *citrata* has a much sharper angle. *Punctum-notata* Haw. occurs in most of the Eastern States and a few of the Western, and also in British Columbia. Packard seems to have found it quite abundant in the White Mountains of New Hampshire, and has quite a series in his collection from there. Mr. Prout has pointed out the distinctiveness of this aberration from *truncata* Hufn., and was one of the first to do so.

Ab. (b) *immanata* Haw. (Lep. Brit., II, p. 323, 1809). This form has the prominent, reddish yellow costal spot, with central band solid blackish gray, and brownish variegated outer margins. It appears to be rather a rare form in North America, but it may be more common in the north. I have specimens from Victoria, B.C., received from Mr. E. H. Blackmore, and also from Mt. Washington, New Hampshire. The black, central band will distinguish it at once from all other forms.

Ab. (c) *simpliciata* Walk. (List Lep. Brit. Mus., XXV, p. 1422, 1862).

This form has the central band blackish as in the aberration *immanata* Haw., but there are white spots at costa and inner margin. I have never taken exactly this form, the white spots in my specimens not being intense enough, but rather grayish. Possibly it is nearer the aberration *tysfjordensis* Strand. (Nyt. Mag. Nat., XXXIX, p. 62, 1901). The latter form is said to have a gray black central band with gray spots at costa and inner margin. I list these two forms provisionally, but we get aberrations which are very close to them if not identical. I believe these to be rather northern forms and not very common.

Ab. (d) *insolida* Prout (Trans. London Ent. Soc., p. 59, 1908).

This form has the central band pale gray, with the inner and outer lines on either side strongly contrasting black. I have two specimens from British Columbia which approach it very closely. The black, contrasting lines on either side of the central band will readily separate this form from all others.

?Ab. (e) *rufibrunnea* Warren (Nov. Zool., VII, p. 181, 1900).

This seems to be a form close to *punctum-notata* Haw., in which the white central band is more or less suffused with light reddish brown. The types, two females, came from Argentine, South America, so there is always a slight doubt as to their standing. Mr. Prout, who has seen the types, believes they are aberrations of *citrata*. The form I have identified as this one came from Mr. E. H. Blackmore, Victoria, British Columbia, and seems quite rare. There are several other aberrations of *citrata* Linn. found in Europe, but as I have not seen them as yet from North America, I think it is better not to list them.

2. Var. *brunneata* Packard, (Proc. Bost. Soc. Nat. Hist., XI, p. 47, 1867 [1861 in error, in Dyar's list]; Monograph, p. 108, pl. VIII, fig. 38, 1876).

This northern form was described from Labrador by Packard, and is very closely allied to *citrata* if not a variety or race of it. It is a small, stunted form, brown-shaded, with a cinereous central band, three times as wide at costa as on inner margin. It is difficult to say whether this should be listed as a distinct species or variety, as I have only seen two or three specimens other than the type. Taylor's *Mesoleuca casloata* resembles *brunneata* Pack., but is larger. They are, however, closely allied. In Dyar's list *brunneata* Pack. is incorrectly placed under *truncata* Hufn., and should be referred to *citrata*. In Ent. Zeit. Stettin, XXV, p. 160, 1874, Mœschler described "*Cidaria suspectata*," which must be close to *brunneata* according to the description. There is a copy of the original description in the Packard Monograph, page 130, 1876. The type of *suspectata* is said to be in the Staudinger collection and was taken in Labrador, as was *brunneata*. Both Staudinger and Mœschler later regarded *suspectata* as identical with *brunneata*, but there is a slight doubt as to the correctness of this view. The older authors did not have a very clear eye for differences, and in most cases were not very careful in their comparisons. Packard in the Monograph mixed the forms, as figure 38, plate VIII, is evidently *Dysstroma citrata* ab. *punctum-notata* Haw., the white central band of the fore wings showing plainly. On the same plate, figure 39, is *brunneata* Packard, while figure 40 is probably *ethela* Hulst. In the Packard collection there is a specimen just like figure 40 from Victoria, B.C., which is *ethela* Hulst. Figure 41 of the same plate is our eastern *hersiliata*, while figure 42 is *Dysstroma* (*Mesoleuca*) *occidentata*, described by Taylor in the Canadian Entomologist, vol. XLII, p. 86, 1910. Note the sharp indentation of the intradiscal line in the figure, on the median vein, also the peculiar central band and wide basal space. There is always a chance of error in determining species from figures, but as Packard had the specimens in his collection, from which the figures were made, I think I have identified them correctly.

Dr. Dyar (Proc. U. S. Nat. Mus., vol. XXVII, p. 897, 1904) describes the larvæ of *hersiliata* Guenée and mentions rearing them on currant. Dr. Dyar also mentions that there is considerable variation in this species, there being a dark and a light form, and he thought the latter might be *ethela* of Hulst. Both forms will have to be studied as they seem to differ from our eastern *hersiliata*. Possibly they may be forms of *occidentata* Taylor.

Traversata Kellicott (Bull. Buffalo Soc., Vol. V, p. 45, 1886 [*transversata* in error in Dyar's List]) is not to be considered under *citrata* (*truncata*) as it belongs to another group.

Atrifasciata Hulst. (Entomologica Americana, vol. III, p. 214, 1887) described from one female from California, turns out to be a *Eustroma* or *Lygris* and not *Cleora* or *Mesoleuca* as placed by Hulst. (See Grossbeck's notes in Trans. Amer. Ent. Soc., vol. XXXIII, p. 338, November, 1907.)

Mesoleuca mulleolata Hulst is placed incorrectly as a synonym of *truncata* in Dyar's List. It was described in the Bulletin of the Brooklyn Entomological Society, vol. IV, p. 26, 1881, and is a very large species and very distinct when once separated. There were two types from Colorado in the Hulst collection, and I shall restrict the type to the white banded form there. This, in a general way, resembles the aberration *punctum-notata* Haworth of *citrata*, but the basal band of the fore wings has two very strong, toothed projections and the intradiscal band is inwardly less crenulate than in *citrata*. The extradiscal line of the fore wings runs straight from costa about 2.5 mm. before the first projecting tooth, and also the costal reddish spot is more accentuated than in *citrata*. The hind wings of *mulleolata* Hulst are darker than those of *citrata*, and the extradiscal line makes a much sharper angle. Then again, *mulleolata* emerges a month earlier than *citrata*, namely in June, while the latter appears in July and August. The genitalia also show it to be distinct from *citrata*, the terminal spines being nearly three times as long and much stouter. The species, therefore, should be considered as distinct and so listed. Hulst's types are not in very good condition and more or less rubbed, so this is probably the reason why the older authors regarded it as *truncata*. I have specimens from Mr. Fernekes from Tacomah, Washington, and from Mr. Blackmore and Dr. Dyar from Victoria, B.C., and the Rocky Mountains. It is evidently a rare species in collections, but probably the characteristic locality has not been found.

Mulleolata Hulst has several striking forms which correspond to the forms of *citrata* and should be described, so that they may be understood. I may perhaps be criticized for naming aberrations, but I feel that we cannot correctly understand the limits of variation unless we do so. In many species it is absolutely necessary to do this, as different species have corresponding forms and would otherwise be confused with one another. I think it unnecessary to go as far as the European specialists do, but certainly every distinct form should have a name, and both Dr. Bastelberger and Mr. Prout concur in this view. The difficulty is to avoid splitting the forms too finely, as in the case of *truncata* and *citrata*. It is better to take a conservative view of them where confusion might arise, e. g., in the case of the white-banded forms of *citrata* and *mulleolata*, or the black-banded forms of the same, or in the case of many of the species of Hydriomena.

We may next consider the forms of *mulleolata* Hulst which seem to be worthy of names.

Dysstroma mulleolata Hulst, ab. *sobria*, nov.

Expanse 36–39 mm.

This is the black-banded form of *mulleolata* Hulst, corresponding to ab. *immanata* Haworth of *citrata*. The central band of the fore wings is solid black with no markings or whitish spots visible. The wing pattern is otherwise the same as in normal *mulleolata*, except that possibly the brown is a trifle more yellowish extradiscally. The aberration *sobria* can be easily recognized by the solid black central band and the date of appearance. Apparently this is one of the rarer forms, as other specimens show the transition between the black-banded and the white-banded forms, the bands having begun to break up into spots of white or gray.

Holotype.—♂, Victoria, B.C., June 22, 1914, E. H. Blackmore, in my collection.

Dysstroma mulleolata Hulst, ab. **subumbrata,** nov.

Expanse 39–40 mm.

In this form the black central band has begun to break up into grayish spots, especially at costa and inner margin. This form tends to show the transition from the black-banded to the gray or white-banded form. It corresponds to the abberration *simpliciata* Walker and *tysfjordensis* Strand of *citrata*. The outer area has the normal wing pattern of *mulleolata*, but in the character of the central band it is allied to *sobria*, except that the band is not solid black but broken into gray spots.

Holotype.—♂, Victoria, B.C., June 14, 1914; from E. H. Blackmore, in my collection.

Allotype.—♀, Victoria, B.C., June 24, 1915; in the collection of Mr. Blackmore.

Paratypes.—Victoria, B.C.; ♂, June 2, 1914; ♀, June 16, July 22, 1914, and June 26, 1915; in coll. Blackmore.

Dysstroma mulleolata, ab. **ochrofuscaria,** nov.

Expanse 37–39 mm.

This form has the central brand whitish, suffused with reddish brown, in fact, the whole fore wing is more or less suffused with brownish. It seems to be a somewhat rare form and represented in few collections and corresponds to ab. *rufibrunnea* Warren of *D. citrata*. It is yellowish along the costa just beyond the extradiscal band of the fore wings, and has a large, reddish brown costal spot at the anal angle. The hind wings have a reddish tinge along the outer margin.

Holotype.—♂, Victoria, B.C., June 27, 1915; in coll. Blackmore.

Allotype.—♀, Vancouver Island, B.C., July 16, 1905; in my collection.

Paratypes.—Duncans, B.C.; ♂, June 14, 1910; in coll. A. W. Hanham; ♀, Aug. 7, 1908; in coll. G. O. Day.

The forms of *D. citrata* and *mulleolata*, together with related species I have seen, may be listed as follows:—

1. *Dysstroma citrata* Linn. (gray central band).
   (a) Ab. *punctum-notata* Haw. (white central band).
   (b) Ab. *immanata* Haw. (black central band).
   (c) Ab. *simpliciata* Walk. (black central band, white spots at margins).
   (d) Ab. *tysfjordensis* Strand (black central band, gray spots at margins).
   (e) Ab. *insolida* Prout. (gray central band, black at edge).
   ?(f) Ab. *rufibrunnea* Warren (white centrally, suffused with reddish brown).
   ?var. *brunneata* Pack. (blackish central band, brownish basally and extradiscally).
   Syn.? *suspectata* Moesch.
2. *Dysstroma mulleolata* Hulst.
   (a) Ab. *sobria* Swett.
   (b) " *subumbrata* Swett.
   (c) " *ochrofuscaria* Swett.
3. *Dysstroma hersiliata* Gn.
   " ab. *mirandata* Taylor.
4. " *walkerata* Pears.
5. " *occidentata* Taylor.
   " ab. *mutata* Taylor.
6. " *ethela* Hulst.
7. " *casloata* Taylor.
8. " *boreata* Taylor.
9. " *decorata* Taylor.
10. " *hulstata* Taylor.

There are other species to be added, but I have not had the opportunity to examine them in series, so will omit them for the present. The aberrations *simpliciata* Walker and *tysfjordensis* Strand, I have doubtfully referred to our fauna, but at least we have very closely allied forms which, if not identical with the European forms, are hardly distinct enough to warrant description. A very interesting fact is brought forth by Edelston (Zool., XXI, page 8784), viz., that *truncata* is normally double brooded and passes the winter in larval form, while *citrata* is single brooded and passes the winter in the egg. The larva of *truncata* differs from that of *citrata* in colour and form of anal joints.

In conclusion I wish to thank Mr. E. H. Blackmore and also Messrs. G. O. Day and A. W. Hanham for suggestions and loan of specimens. I am also deeply indebted to Mr. L. B. Prout, of London, England, for notes and references.

ON MILITARY SERVICE.

The following is a list of the officers and employees of the Entomological Branch of the Dominion Department of Agriculture, Ottawa, who have enlisted for Overseas Service either in the Canadian or Imperial Forces:

H. F. Hudson, B.S.A.—Field Officer, Strathroy, Ont., 16th Battery, C. F. A. Wounded and permanently disabled for further active service.

E. H. Strickland, M. Sc.—Field Officer, Lethbridge, Alta., Machine Gun Section, 196th Battalion (Western Universities), C. E. F.

H. S. Fleming.—Messenger, Ottawa, 52nd Battery, C. F. A.

F. M. MacKenzie.—Assistant, Fredericton, N.B., Princess Patricia's Canadian Light Infantry, (P. P. C. L. I.).

*F. W. Walsh.—Assistant, Lethbridge, Alta., Welsh Fusiliers.

H. S. Brodie.—Assistant, Agassiz, B.C., Imperial Forces.

H. Curran.—Assistant, Vineland Station, Ont.

C. A. Williams.—Inspector, Fredericton, N.B., 23rd Battery, C. F.A.

G. F. Ball.—Inspector, Fredericton, N.B., 104th Battalion, C.E.F.

H. S. Flewelling.—Inspector, Fredericton, N.B , P. P. C. L. I.

**J. C. Shipton.—Assistant and Inspector, Annapolis Royal, N.S., P. P. C L. I.

L. M. How.—Inspector, Annapolis Royal, N.S., 112th Battalion, C. E. F.

T. H. H. Fortier.—Inspector, Annapolis Royal, N.S., Heavy Artillery, C. E. F.

W. L. Harris.—Inspector, Annapolis Royal, N.S., Heavy Artillery, C. E. F.

*Killed.
**Died in Hospital in France.

S. N. Lord.—Assistant, Ottawa, 75th Battalion, C. E. F.

T. Rankin.—Assistant, Ottawa, P. P. C. L. I.

*A. H. Bush.—Inspector, Vancouver, B.C., Pioneer Battalion.

The above list would be considerably longer had it been possible for the Government to release for military service more of the scientific officers. Most of the officers of the Branch have applied for leave of absence for military service, but in view of the importance which the Government lays on the maintenance of the agricultural production of the country it has decided that such trained men are serving the country to the best advantage by continuing their present work, especially in view of the scarcity of trained men, than by undertaking duties of a military character, and for this reason it has not been possible to release more than those whose names are included in the above list.

THE BAY FLEA-LOUSE, TRIOZA ALACRIS FLOR. AS A NEW PEST IN NEW JERSEY.

BY HARRY B. WEISS, NEW BRUNSWICK, N.J.

For the past several years, this psyllid has been present in several green-houses in New Jersey, but only recently has it increased numerically enough to disfigure seriously its host, *Laurus nobilis*, the victor's laurel of the ancient Greeks. Its presence on bay trees can be readily detected by the curled, discoloured leaves, usually at the tips of the branches, containing what appear to be cottony masses. Upon uncurling a leaf, the nymphs are easily seen, clothed in a white, waxy secretion. As a rule, the edges of infested leaves are rolled in tightly toward the mid-rib and become thick, distorted and of a whitish colour, giving the tree in severe infestations, a sickly and unwholesome appearance.

In "Ziekten en Beschadigingen der Tuinbouwgewassen," by M. Van Den Broek en P. J. Schenk (Holland, 1915), the authors state that the bay leaf flea, so called, overwinters in the adult stage, appearing in the spring and depositing eggs on the undersides of the leaves, and that bays in and out of green-houses are

*Killed.

subject to injury. They also state that it is not a serious pest in Holland. In New Jersey, it is customary for owners of bay trees to keep them out of doors during the summer, and cool, storage sheds where the temperature is around 38 and 40 degrees F. during the winter. It is during the summer months, of course, when the trees are either outside or under glass that most of the damage takes place. Sometimes nearly every leaf on a tree is curled and discoloured, but as a rule it is the young, developing leaves which are infested. Trees thus disfigured are not salable, and when one considers that bay trees sell at from $10.00 to $100.00 and more for single specimens it is readily seen that a considerable money loss can be laid at the door of this psyllid.

Coming to remedies, picking off and destroying the infested leaves is one method, practical only if the infestation is slight or the number of infested trees small. Eight ounces of Black Leaf 40 plus eight pounds of whale-oil soap to one hundred gallons of water has been used in New Jersey with a fair degree of success as a summer spray. It is impossible, however, to reach the nymphs protected by the tightly curled edges of the leaves. According to Dafert and Kornauth in the Report on the Work Done at the Imperial and Royal Chemical Research Station in Vienna, 1913, pp. 80–95, a review of which appears in the Review of Applied Entomology, Series A, vol. II, 1914, p. 482, cyanide fumigation was tried against *Trioza alacris* Flor., on laurel with complete success. The reviewers state that the American 1-1-3 formula was used, but nothing is said about the cubic contents, temperature, length of exposure, etc.

At one place in New Jersey, where the infestation was severe during the summer and not completely controlled by the nicotine and soap spray, many last stage nymphs and adults were found on the trees November 15, after they had been placed in a storage shed, and it seems quite probable that fumigation with hydrocyanic acid gas at this time might be effective, inasmuch as both forms were fairly active. The adults evidently hibernate on the bay trees and become active as the temperature increases. Another dealer in bay trees in New Jersey allows his trees to remain out of doors until late in the season, taking them in only shortly before freezing weather is likely to set in, and his trees are rarely troubled by the psyllid. This, however, may be only a coincidence.

This pest was evidently introduced into New Jersey on bay trees imported from Belgium, as practically all of such trees come from that country, and psyllid injured leaves are frequently noted when the stock arrives. Inasmuch as many of the trees are later shipped out of the State, it would not be strange if specimens of *Trioza alacris* were turned up in other places, especially the Southern States. Van Duzee in his "Check List of the Hemiptera of America, North of Mexico," records it from California with *lauri* Targ., as a synonym.

ADDITIONS TO THE LIST OF MISSOURI CICADELLIDÆ (JASSOIDEA).

EDMUND H. GIBSON, U. S. BUREAU OF ENTOMOLOGY.

The following list of 25 species is offered as an addition to the "Preliminary List of Jassoidea of Missouri with Notes on Species," which was published by the writer in joint authorship with E. S. Cogan in the Ohio Journal of Science for December, 1915, vol. XVI, No. 2, pp. 71–78. H. L. Horsfall published an addition of 29 species in the same journal for May, 1916, vol. XVI, No. 8, p. 53. The present paper brings the total number of species reported from Missouri up to 152:

Macropsis occidentalis Van D. Adults were swept from willows at Charleston during May.

Macropsis gleditschiæ O. & B. Quite numerous during May and June in southeastern counties. Captured principally from locust trees.

Macropsis tristis Van D. A specimen from central Missouri is in the collection of the U. S. National Museum.

Idiocerus ramentosus Uhl. Rather abundant on willows during late spring and early summer months in Southeast Missouri.

Idiocerus pallidus Fh. A few adults captured from an alfalfa field at Branson, in the heart of the Ozark Mts.

Idiocerus lachrymalis Fh. Occurs throughout the State, but not abundant.

Homalodisca liturata Ball. Occasional specimens taken in southern counties. Swept from weeds.

Gypona modesta Spangb. Two adults captured at Poplar Bluff.

Gypona bimaculata Spangb. Collected by sweeping rank growth in marshes near Charleston.

Platymetopius acutus var. *dubius* Van D. Rather numerous on grass in southwestern part of the State.

Deltocephalus melscheimeri Fh. Occasional specimens captured. Occurs throughout the State.

Athysanus comma Van D. One adult taken at St. Louis.

Athysanus anthracinus Van D. Rather numerous in western counties.

Phlepsius fulvidorsum Fh. Numerous on willows growing along creeks and rivers in Southwestern Missouri.

Phlepsius nebulosus Van D. Occasional specimens taken near Charleston.

Thamnotettix brittoni Osb. A few adults were swept from weeds at Charleston.

Chlorotettix balli Osb. Specimens captured were all from northern parts of State.

Chlorotettix lusorius O. & B. Occurs most numerous in eastern counties.

Jassus melanotus Spangb. Collected by F. M. Moody at Branson, by sweeping weeds growing on high ridges of the Ozarks.

Tinobregmus pallidus Osb. Two adults captured by F. M. Moody from low shrubs growing wild in the woods at Branson.

Cicadula punctifrons Fall. Few adults captured at Dexter.

Empoasca flavescens Fabr. Abundant on willows at Branson.

Empoasca trifasciata Gill. One specimen captured at Charleston, July 26.

Erythroneura illinoiensis Gill. Rather abundant in eastern counties.

Erythroneura crevecœuri Gill. Not common. Occasional specimens taken at Charleston.

Mailed February 14th, 1917.