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POPULAR AND PRACTICAL ENTOMOLOGY.

COLLECTING TERRESTRIAL ARTHROPODS IN BARBADOS AND ANTIGUA, BRITISH WEST INDIES.

BY DAYTON STONER, IOWA CITY, IOWA.

(Continued from p. 178.)

II. ANTIGUA.

The island of Antigua is situated in latitude 17° 6′ N., and is the principal island of the Leeward group of which it is the political capital. It is roughly oval in outline, twenty-four miles long by about fifteen broad, with an area of 108 square miles and a population of about 36,000. The central part of the island is low and flat and the soil more or less clayey; the southern and southwestern parts, in the vicinity of English Harbour, where a large share of the collecting was done, are volcanic and mountainous and covered, in many places, with dense forests. The greatest elevation is about 1,500 feet. To the north and northeast the soil is composed of calcareous marls and coarse sandstones.

Extended periods of drought often visit the island, and the average annual rainfall is a little less than fifty inches. As a result of the nature of the soil and the protracted dry periods the uncultivated vegetation is largely of a xerophytic nature. However, the soil where it can be worked at all is fertile and retains well the small amount of moisture. Sugar is the principal industry although corn, yams and pineapples are cultivated on a small scale.

Antigua is not under so high a state of cultivation as is Barbados; neither is it so thickly populated as that island; natural enemies of insects are not numerous—all these conditions make for a more abundant and varied insect fauna than we found at Barbados.

The majority of native Antiguans living in the rural districts and small villages are extremely poor, but they are neither so inquisitive nor so insistent on offering their services in collecting specimens as are the Barbadian negroes. This was a great relief to us, and much less trying on our temper and vocabulary.

While the Imperial Department of Agriculture maintains some of its activities on Antigua there is at present no resident entomologist, and we came upon none of the inhabitants of the island who were particularly interested in entomology as a science.

Of the lower forms of terrestrial Arthropods, scorpions and tarantulas, as well as other forms of Arachnids, are abundant. In low-wooded areas, under dried leaves, we found considerable numbers of a large brachypterous cockroach, but in reaching out to seize these agile fellows it was necessary for the collector to look sharply in order to make sure that a scorpion or two did not lurk close enough to be dangerous. Centipedes are not uncommon in moist places.

In addition to the large cockroach above mentioned, two other forms, *Periplaneta australasiæ* and *P. americana* are also very common. A greater

variety of both Acridiids and Locustids was secured here than at Barbados, the large *Schistocerca pallens* being among the former. The Phasmid *Bostra maxwelli* is very common in some portions of the wooded districts.

There are few fresh-water streams and ponds on Antigua. However, one of these ponds, situated about three-fourths of a mile from the Dockyards at English Harbour, was made the object of a rather intensive study. Among the more interesting forms of insect life found here is the mole cricket (*Gryllotalpa* sp.) which we had not discovered at Barbados. The mud shores of the little pond in some places were literally undermined by the tunnels of these peculiar insects. Other groups represented in the pond were Gerrids, Notonectids, Hydrobatids, Belostomids, Hydrophilids and Dytiscids, dragon-fly and damsel-fly larvæ and adults, various species of dipterous larvæ—in fact, the place was found to be a veritable storehouse of interesting entomological material. Of course, such ponds offer excellent breeding places for mosquitoes, and we found great numbers of both larvæ and pupæ. Needless to say, mosquito nets are a part of the furnishings of every well-ordered house on the island.

The low, grassy lands towards the centre of the island furnish a great variety of insects, particularly in Hemiptera and Orthoptera, and collecting with a sweep net was very productive of results in such situations.

At the south end of the island, where most of our collecting was done, many localities are heavily wooded. Small cultivated and semi-cultivated places on both high and low lands offer excellent collecting grounds. In many places highly xerophytic conditions prevail, particularly on the hills in the in the vicinity of English Harbour. Here the soil is very thin, although it is able to support many harsh and spiny plants. On the mud flats near the harbour at the foot of the hills are to be found great numbers of the elusive tiger-beetle *Cicindela trifasciata* var. *tortuosa*. The same white form (*C. suturalis* var. *hebræa*) that we found at Barbados was also discovered on the sand beaches at Half Moon Bay.

In walking through the wooded districts about Antigua the newcomer is at first struck by the great number of what appear to be climbing vines on the trees. Upon closer examination it is discovered that these "vines" are really the covered galleries through which the termites travel from place to place. These tunnels are everywhere, winding about over the trunks and branches of the trees, and usually terminate in a nest of some size either on the ground or in the trees themselves. The termites are usually sightless, and, being averse to the light, construct tunnels when it becomes necessary to cross an open surface. Both the nests and tunnels are made of pellets of chewed wood fastened together with sticky saliva secreted by the insects, and turn grayish after short exposure to the elements. When thoroughly dry the nests are very tough and resistant, being of about the consistency of hard rubber. The galleries are much more fragile

A most interesting and, to the writer, unusual place in which to find insects is in the great epiphytes or air plants locally known as wild pineapples which grow, sometimes in great numbers, on the manchineel and other trees in the wooded districts. Upon carefully removing one of these "pines" from the tree to which it is ordinarily loosely attached and turning it upside down, the co lector is often well repaid for his efforts. Spiders, scorpions, beetles and cock-

roaches are sure to be found. The large leaves of this plant form a receptacle for water, and it is not an uncommon occurrence to find mosquitoes, both larvæ and adults, in such situations.

Among the commonest insects on Antigua are cotton-stainers (*Dysdercus* spp.) of which two or three forms occur on the island. Adults were found in copula in late June and early July at which times also nymphs in all stages of development were taken, particularly along the edges of cultivated fields and on low grasses in open places near woods. By preference these bugs feed on the bolls, seeds, leaves and tender shoots of the cotton plants, but when cotton is lacking they will feed upon other related plants. In addition to lessening the vitality of the plant by extracting the juices, cotton-stainers have been found to transmit a fungous disease which has become serious in some of the islands of the West Indies. Indeed, these pests are responsible, in large measure, for the almost complete abandonment of the cotton-growing industry in Antigua. The name stainer arises from the fact that the cotton lint is discoloured by the excrement of the insects and by the fungous disease which gains entrance through the punctures as well as by the crushing of the insects themselves in the gins.

Other kinds of Hemiptera, both Homoptera and Heteroptera, were taken in great numbers from the grasses and bushes in the cultivated and partly cleared areas all over the island. In fact, the hemipterous fauna exceeded that of any other group of insects, both in variety and abundance. One of the principal families of Heteroptera represented is the Pentatomidæ, of which more than fifteen species were taken. Of these, *Solubea pugnax*, *Piezodorus guildinii* and *Euschistus crenator* are perhaps most generally abundant. In favourable localities *Mormidea vosilon* is often abundant on Solanaceæ. Open fields in the central flats yielded great numbers of *Thyanta antiguensis*, and on the low grass within the crumbling walls of Fort Barclay the peculiar *Mecidea longula* was extremely abundant. A colony of the beautiful steel blue and red *Vulsirea nigrorubra* was found on a small tree along a trail leading through the woods.

The cleared spaces in and near the woods offer good collecting grounds for butterflies. On ascending Monks Hill from the south side by one of the numerous trails great numbers of gaily coloured Hesperids, Nymphalids and Lycaenids are to be found in the neighbourhood of the little truck patches.

In the low cultivated fields along the hills great numbers of larvæ and adults of the boll-worm (*Heliothis* sp.) and the cutworm (*Prodenia* spp.) were found, and some injury was being done to various plants, including corn and sweet potatoes. In such places also the familiar *Chrysopa* larvæ and adults are very common. Small Chrysomelids are not uncommon, *Homophæta aequinoctialis* and *Chaetocnema* sp. being among them.

Very often moths of different kinds were attracted by the lights in our quarters at night, the most notable of these being several forms of *Protoparce* and a specimen or two of the interesting noctuid, the black witch (*Erebus odora*).

With such a variety of habitats and faunas represented, collecting was indeed a pleasure, and many localities still remained to be investigated at the expiration of our allotted time upon this interesting tropical island. Although one often associates large, striking or bizarre forms of insect life with tropical countries, particularly with tropical islands, such forms are, with few exceptions, lacking on both Barbados and Antigua.

A great mass of material was secured, and as soon as it is put into proper shape for examination will be submitted to specialists for detailed study and report. As might be expected, the Antiguan material is much in excess of that secured at Barbados.

FOUR NEW AFRICAN MEMBRACIDÆ.*

BY W. D. FUNKHOUSER, LEXINGTON, KY.

1. **Anchon gunni,** sp. nov. (Figs. 1 and 2).

Near *A. nodicornis* Germar but lacking the anterior tooth on the angle of the posterior process, and differing in the markings of the pronotum and tegmina.

Slender, black, punctate, sparingly pubescent; densely white tomentose behind suprahumeral horns and on sides of thorax; suprahumeral horns long, broadly foliaceous at tips which are strongly decurved and sharply pointed; posterior process strongly angular at base, depressed at centre, tip just reaching apex of abdomen; scutellum about as long as broad, strongly bidentate at tip; tegmina smoky-hyaline with ferruginous margins; legs and under surface of body brown, tarsi flavous.

Head broader than long, finely punctate, rather densely pubescent with white hairs; base strongly convex, slightly sinuate; eyes prominent, gray-black; ocelli large but not conspicuous, sordid gray, about equidistant from each other and from the eyes and situated about on an imaginary line drawn through centres of eyes; inferior margin of genæ strongly sinuate; clypeus twice as long as wide, black, punctate, pubescent, extending for more than half its length below inferior margins of genæ, tip rounded and weakly pilose.

Pronotum black, finely punctate, rather sparingly pubescent with white or silvery hairs; metopidium perpendicular, somewhat convex, about as broad as high, narrowest at bases of horns; humeral angles very prominent, triangular, acute; median carina strongly percurrent; suprahumeral horns long, narrow at base but broadly foliaceous at tip, practically contiguous at bases, extending upward and outward, the tips flattened, triangular, sharp, and suddenly bent outward and backward; posterior process rising well above scutellum, then bent sharply backward, sloping downward to meet internal angles of tegmina and then following margins of tegmina to a point about as far caudad as the end of the abdomen, tip very sharp and slightly decurved; scutellum about as long as broad, black, punctate, gradually narrowed towards the apex which is strongly bidentate; a dense linear patch of white tomentose pubescence extends backward from the posterior base of each suprahumeral horn over the pronotum and on to the base of the scutellum.

Tegmina long, narrow, smoky-hyaline, much wrinkled; base narrowly brown, punctate and pubescent, internal apical margin tinged with ferruginous; tips pointed; costal margin not marked with brown; five apical and two discoidal cells. Hind wings with three apical cells.

Under surface of body dark brown; sides of mesothorax and metathorax densely white tomentose; hind trochanters not armed with spines; femora and tibiæ brown, tarsi flavous; claws brown.

*Contribution from the Zoological Laboratory of the University of Kentucky.
October, 1919

Length including tegmina 7 mm.; width between tips of suprahumeral horns 5.8 mm.

Type.—Female.

Locality.—Pretoria, South Africa.

Described from a specimen collected by Mr. David Gunn on January 8, 1915. Type in author's collection. I take pleasure in dedicating this species to Mr. Gunn, who has so kindly furnished me with a large number of interesting species of Membracidæ from South Africa.

The genus *Anchon* is apparently well represented in South Africa. Mr. Gunn has sent me specimens of *A. senegalensis* Fairm., collected at the same locality and at the same time as the above.

2. **Anchonoides minutus,** sp. nov. (Figs. 3 and 4).

Small, black, punctate, densely pubescent; suprahumeral horns short and very thick; posterior process raised above scutellum, strongly sinuate but not angulate, extending beyond internal angles of tegmina but not reaching apex of abdomen; scutellum entirely exposed, longer than broad, bidentate; tegmina smoky-hyaline faintly tinged with ferruginous, base brown; under surface of body black; legs dark brown with tibiæ somewhat ferruginous and tarsi flavous.

Head wider than long, black, finely punctate, densely pubescent; much swollen in front; base convex and sinuate; eyes large, prominent, brown; ocelli small, pearly, conspicuous, somewhat protruding, about equidistant from each other and from the eyes and situated about on a line drawn through centres of eyes; inferior margins of genæ sinuate, lobed at margins of clypeus; clypeus longer than wide, extending for half its length below inferior margins of genæ.

Prothorax very dark brown in front, black behind, finely punctate, very densely pubescent with silvery hairs; metopidium higher than wide, narrowest at base of suprahumeral horns, brown on upper two-thirds, black just above head, very roughly sculptured, swollen along central line; median carina percurrent; humeral angles large, prominent, triangular, acute; suprahumeral horns very thick, heavy, short, roughly quadricarinate, extending almost directly outward, about as long as the distance between their bases, tips sharp and decurved; posterior process long, very slender, strongly sinuate, smooth, tricarinate, base raised high above scutellum, tip sharp and decurved, extending beyond internal angles of tegmina but not reaching apex of abdomen; scutellum entirely exposed, a little longer than wide, brown, punctate, densely pubescent, gradually narrowed toward tip which is strongly bidentate; a linear white tomentose patch extending backward over the pronotum from the base of each suprahumeral horn and covering external basal angle of scutellum.

Tegmina smoky-hyaline, wrinkled; a ferruginous spot at internal angle, another at distal end of basal costal cell and a faint fascia at apical margin; base brown, coriaceous and punctate; tip rounded; veins strong, ferruginous, marked with brown in central areas; four apical cells. Hind wings with three apical cells.

Under surface of body black; sides of thorax densely pubescent; margins of abdominal segments ferruginous; coxæ, trochanters and femora dark brown, tibiæ ferruginous and minutely spined, tarsi flavous.

Length including tegmina 5 mm.; width between tips of suprahumeral horns 3 mm.

Type.—Female.

Locality.—Pretoria, South Africa.

Described from a specimen collected by Mr. David Gunn on Nov. 3, 1914. Type in author's collection.

3. **Otinotus pilosus,** sp. nov. (Figs. 5 and 6).

Large, brown, very densely pilose; suprahumeral horns short, heavy, blunt, extending outward and upward and no longer than the distance between their bases; posterior process long, slender, sinuate, impinging on tegmina and extending to a point about half-way between internal angles and apices of tegmina; tegmina hyaline, wrinkled, base narrowly brown; legs and under surface of body uniformly brown.

Head twice as wide as long, subquadrate, dark brown, finely punctate and densely pubescent; base sinuately convex; eyes large, prominent, brown; ocelli large, prominent, glassy, transparent, considerably nearer to each other than to the eyes, and situated about on a line drawn through centres of eyes; inferior margins of genæ rounded; clypeus nearly three times as long as wide, extending for three fourths its length below inferior margins of the genæ, margin adjoining genæ angulate, tip broadly rounded.

Pronotum dark brown, finely punctate, densely pilose with yellowish hairs; metopidium about as broad as high, nearly perpendicular above the head, slightly convex; median carina distinctly percurrent; humeral angles very large, prominent, triangular, blunt, extending almost as far lateral as the suprahumeral horns above them; suprahumeral horns short, heavy, blunt, somewhat compressed dorso-ventrally, strongly tricarinate, extending outward and slightly upward, tips as seen from above roughly truncate; scutellum well exposed on each side, apex yellow, smooth and bidentate, base ferruginous, punctate and densely pilose; posterior process long, slender, sinuate, tricarinate, impinging on tegmina, base not elevated above scutellum, tip acuminate, decurved and black, extending to a point about half-way between internal angle and apex of tegmen but not reaching extremity of abdomen.

Tegmina hyaline, wrinkled; base narrowly brown, coriaceous and punctate; tip pointed; five apical cells. Hind wings with four apical cells.

Legs and under surface of body uniformly dark ferrguinous brown; sides of thorax densely white tomentose; tibiæ closely pilose with long, white, bristly hairs.

Length including tegmina 9 mm.; width between tips of suprahumeral horns 4.7 mm.

Type.—Female.

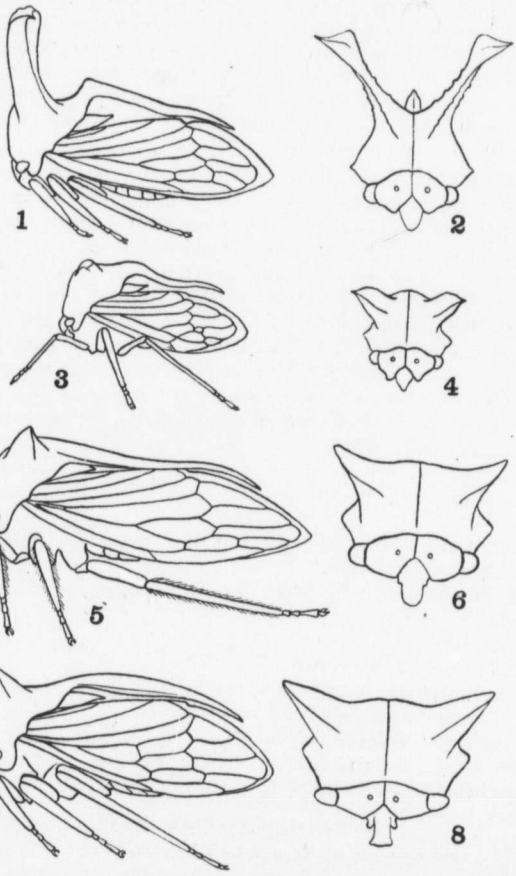
Locality.—Dutch East Africa.

Type in author's collection.

This species is apparently close to *O. nigrorufus* Distant, but differs in colour, in the markings of the tegmina and in the structure of the base of the posterior process.

4. **Otinotus arcuatus,** sp. nov. (Figs. 7 and 8).

Large, robust, ferruginous-brown; suprahumeral horns short, pyramidal, sharply angular, extending outward and upward and about as long as the distance between their bases; posterior process long, heavy, strongly arcuate, the



NEW AFRICAN MEMBRACIDAE.

base slightly raised above the scutellum, tip sharp and extending to a point about midway between internal angles and tips of tegmina; tegmina sordid hyaline, wrinkled, base brown and punctate; legs and under surface of body ferruginous-brown.

Head twice as broad as long, bright reddish brown mottled with black, roughly sculptured, sparingly punctate, sparsely pubescent with silvery hairs; base regularly rounded; eyes large, prominent, dark brown; ocelli large, reddish, somewhat protruded, conspicuous, much nearer to each other than to the eyes and situated about on a line drawn through centres of eyes; inferior margins of genæ nearly straight, sloping downward; clypeus nearly three times as long as wide, lobed at angles of genæ, extending for three-fourths its length below margins of genæ, tip swollen and subtruncate.

Pronotum reddish brown, finely and closely punctate, sparingly pubescent with whitish hairs; metopidium broader than high, swollen in centre, perpendicular above the head, a large irregular callosity above internal angle of each eye; median carina strongly percurrent; humeral angles large, prominent, triangular, blunt; suprahumeral horns short, straight, heavy, strongly tricarinate, acute, extending outward and upward, about as long as the distance between their bases; scutellum broadly exposed on each side, brown, punctate, pubescent, gradually narrowed to apex which is smooth, white and bidentate; posterior process long, heavy, strongly arcuate, tricarinate, the base slightly upraised above scutellum, the tip acuminate and extending to a point about midway between internal angles and apices of tegmina, but not nearly reaching extremity of abdomen.

Tegmina hyaline, wrinkled; base brown, coriaceous and punctate; veins prominent and brown; no maculations; five apical cells. Hind wings with four apical cells.

Legs and under surface of body uniformly ferruginous-brown; sides of thorax densely white pubescent.

Length including tegmina 8 mm.; width between tips of suprahumeral horns 5.8 mm.

Type.—Female.

Locality.—Pretoria, South Africa.

Described from two females collected by Mr. David Gunn on January 11, 1915. Type and paratype in author's collection.

The South African species of the genus *Otinotus* bear a strong superficial resemblance to the old genus *Centrotus* (Fabr.), but may be at once separated from the genus by the difference in the number of apical cells of the hind wings.

Explanation of Plate XIX.

Fig. 1. Lateral outline of *Anchon gunni*, sp. nov.
2. Frontal outline of *Anchon gunni*, sp. nov.
3. Lateral outline of *Anchonoides minutus*, sp. nov.
4. Frontal outline of *Anchonoides minutus*, sp. nov.
5. Lateral outline of *Otinotus pilosus*, sp. nov.
6. Frontal outline of *Otinotus pilosus*, sp. nov.
7. Lateral outline of *Otinotus arcuatus*, sp. nov.
8. Frontal outline of *Otinotus arcuatus*, sp. nov.

REPORT ON A SECOND COLLECTION OF NOVA SCOTIAN EUPTERYGID LEAF-HOPPERS, INCLUDING DESCRIPTIONS OF NEW VARIETIES.

BY W. L. MCATEE, WASHINGTON, D.C.

Like a previous collection* sent to the writer by Professor W. H. Brittain, Provincial Entomologist of Nova Scotia, the present is reported upon in print, because it contains undescribed forms. All specimens are in the collection of the Nova Scotia Department of Agriculture.

LIST OF SPECIES.

Alebra albostriella var. *fulveola* Herrich-Schäffer.—Digby Co., N. S., Aug. 14, 1918.

Empoasca atrolabes Gillette.—Digby Co., N.S., Aug. 3, 1918.
" *obtusa* Walsh.— " " " " 15, "
" *pergandei* Gillette.— " " " " 3, "
" *unicolor* " " " " " 15, "

Typhlocyba querci Fitch.

This is a robust *Typhlocyba*, measuring up to 5 mm. in length. The length of vertex in proportion to width of space between inner margins of eyes (synthlipsis) is as 7–8: 14–16. The ground colour usually is pale yellow.

The colour varieties including those hereafter described may be separated by the following key:

A. Elytral markings in the form of small dusky spots.
  B. With spots only in apices of the discal cells of elytra.....var. *querci* Fitch.
  BB. With three pairs of spots along the commissural margin.....var. *6-notata* Van Duzee.
AA. Elytral markings in the form of cross-bands or lengthwise vittæ.
  C. The most conspicuous markings are cross-bands.
    D. Anterior cross-band narrow, directed backward on the sides. (var. *bifasciata* Gillette and Baker now called).....var. *gillettei* Van Duzee.
    DD. Anterior cross-band broad, directed forward on the sides.....var. *volans*, n. var.
  CC. The most conspicuous markings are lengthwise.
    E. Clavus except extremities and adjacent corium dusky; no posterior cross-band.....var. *grata*, n. var.
    EE. Elytron with a lengthwise streak connecting anterior and posterior cross-bands.....var. *scripta*, n. var.

In the present collection are represented:

Typhlocyba querci var. *querci* Fitch.—Digby Co., N.S., Aug. 3, 1918.

Typhlocyba querci var. *gillettei* Van Duzee.—Digby Co., N.S., Aug. 8, 1918; Victoria, B.C. July 17, 1918.

Typhlocyba querci var. **volans,** new variety.

With two dusky cross-bands, much broader than in variety *gillettei* Van Duzee, the posterior over the cross-veins, the anterior over middle of clavi, sloping forward on the corium parallel to anterior edge of elytron. In var.

*See Can. Ent., Vol. L, No. 11, 1918, pp. 360–361.

gillettei this band is narrower, nearer apices of clavi and slopes obliquely backward, not forward.

One ♀ specimen, Digby Co., N.S., Aug. 18, 1918.

Typhlocyba querci var. **grata,** new variety.

Scutellum dusky; elytra with a large dusky saddle-spot, occupying most of the clavi, and a portion of each adjoining corium; no posterior band or clouding.

One ♀ specimen, Digby Co., N.S., Aug. 14, 1918.

Typhlocyba querci var. **scripta,** new variety.

Scutellum chiefly dusky; elytra with dusky bands at middle and on cross-veins, as in var. *gillettei*, apical cells smoky, and with a longitudinal dusky stripe on clavus and overlying claval suture connected with band over cross-veins. These markings leave the margin anteriorly and the tip posteriorly, of the clavus, of the ground colour.

One ♀ specimen, Digby Co., N.S., Sept. 5, 1918.

Typhlocyba rosæ Linnæus.—Digby Co., N.S., Aug. 3, 5, 8, 13, 15, 1918; Truro, N.S., July 24, 1918; Royal Oak, B.C., Sept. 29, 1917.

Erythroneura obliqua Say.—Acaciaville, N.S., May 16, 17, 1917.

DESCRIPTIONS OF FOUR CATOCALA LARVÆ.

BY R. R. ROWLEY, LOUISIANA, MO.

Among a number of mature Catocala larvæ, taken under the bark of hickory trees in the early part of last summer, a dozen or more proved of unusual interest, one a *lachrymosa*, previously undescribed, another a typical *obscura*, a third and fourth showing the slight differences between the closely related species *retecta* and *flebilis*, while still another gave *judith*, but the description was misplaced.

Other larvæ were of *angusi* and its variety *lucetta*, hardly distinguishable from *habilis*. Of six *angusi* moths, five were var. *lucetta*, only one being a typical *angusi;* a like ratio existing in the woods here between the variety and present form. The species, however, is usually rare.

Catocala flebilis.—Mature larva 2⅛ inches long, leaden gray with lighter tubercles. The mid-dorsal band lighter than the general body colour, constricted at the segment edges, forming a series of spots of chain-link appearance. The spots on the first, second and fifth abdominal segments bordered by a black encircling line (on three sides). A dark cross-band covers the back half of the fifth abdominal segment. A black-cross line behind the eighth abdominal segment. The sublateral line or narrow band is dark or quite black above the spiracles. True and pro-legs general body colour. The lateral line of setæ composed of so few and short bristles as to be hardly noticeable. Head gray, round, with short lateral mouth dash of black.

Ventral colour soiled white with faint red blotches about the row of mid-ventral black spots. Larva taken under bark of *Carya alba* (shag-bark hickory). Cocooned June 15th, and gave imago July 20th.

Catocala retecta.—Mature larva 2¼ inches long, dark leaden brown. A mid-dorsal longitudinal "chain link" like narrow band, a little lighter than the general body colour. Still narrower bands of darker hue bound the mid-dorsal band and, beginning with the second abdominal segment, these bounding bands

are very dark brown, almost black, for three or four segments. No dorsal hump. Lateral setæ very short. Head rounded, mottled gray and brown with a short, lateral black dash. Tubercles whitish. Ventral surface pale with greenish tinge except mid-ventrally where the black spots are set in pink patches, A wavy, longitudinal line or narrow band along the line of lateral setæ is dark or quite black.

Taken under the bark of *Carya alba* (shag-bark hickory). Spun cocoon June 11th, and gave imago July 15th.

Catocala lachrymosa.—Full-grown larva 2½ inches long, very dark brown with a lighter cross-band (irregular) over the first abdominal segment, and a less pronounced one behind the fourth pair of pro-legs. No dorsal hump. Head light gray mottled with darker markings. True and pro-legs dark. Tubercles very dark reddish brown. Lateral fringe of rather long bristles. Head round and full. Ventral surface pinkish, with the characteristic black spots. Larva taken under the bark of *Carya alba* (shag-bark hickory). Began spinning cocoon June 29th, and gave imago August 2nd.

Catocala obscura.—Larva 2½ inches long, leaden gray. with only dash lines No hump, no lateral row of setæ. Head round and streaked as in other hickory larvæ. Tubercles pale yellow or quite white, giving the body a speckled appearance. Ventral side of body white with tinge of green. Central row of black spots. Larva taken in hickory bark but fed through to maturity on pecan (*Carya oliviæformis*).

Larva cocooned July 8th, and gave moth August 7th. The imago has white fringe on back wing.

THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The Fifty-sixth Annual Meeting of the Society will be held at Ottawa, Ont., on Thursday and Friday, the 6th and 7th of November. All the sessions will be held in the Carnegie Library, (Metcalfe Street). On the evening of November 7th the members and visitors will be the guests of the Officers of the Entomological Branch of the Dominion Department of Agriculture, at a smoker, the place of meeting to be announced later.

Members or visitors having papers which they wish to present will please send the title of the same to the Local Secretary not later than October 18th, and state time required for presentation. It is requested that no paper exceed 20 minutes in length. If a lantern is required this fact should also be stated.

L. Caesar, President, O.A.C., Guelph; A. W. Baker, Secretary, O.A.C., Guelph; Arthur Gibson, Local Secretary, Entomological Branch, Dept. Agric., Ottawa.

Charles W. Leng, Secretary of the New York Entomological Society and Research Associate in the American Museum of Natural History, has been appointed Director of the Museum of the Staten Island Institute of Arts and Sciences. Mr. Leng has been interested in the natural history of Staten Island, where he was born and lives, since boyhood. Entomologists and other naturalists, visiting New York City, can reach the Museum of the Institute by a pleasant half hour's sail across the bay on the Staten Island ferry, and thus inspect the collections in all orders that have been accumulated.

MISCELLANEOUS APHID NOTES 1.

BY JOHN J. DAVIS, WEST LAFAYETTE, INDIANA.

Heteroneura, new genus.

Erected for the species *Aphis setariæ* Thomas, which is herewith designated the type. The genus may be characterized as a typical *Aphis* excepting the venation of the hind wings which have but a single cross-vein (Fig. 26). The filament of antennal segment VI is quite long, being 6 to 8 times the length of the base of this segment. *Heteroneura* is analogous to *Carolinaia* in the venation of the hind wing and bears the same relation to the genus *Aphis* as *Carolinaia* bears to the genus *Rhopalosiphum* (*Siphocoryne*). The late Theo. Pergande recognized this as a distinct genus, and used the name here adopted on his slides of *setariæ*.

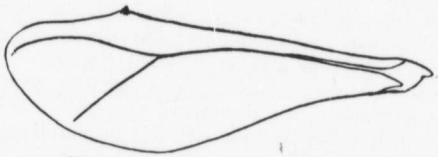


Fig. 26.—*Heteroneura setariæ* Thos. Hind wing.

Aphis scotti Sand.[1] is a synonym of *setariæ*. The description of *Aphis prunicoleus* Ashm.[2] is a clear characterization of this species and should be listed as a synonym. *Aphis bituberculata* Wilson [2a] is also a synonym of *setariæ* as determined by a comparison of the types by Wilson.

The writer's collection contains *setariæ* from Florida, Illinois, Indiana, Iowa, Kansas, Louisiana, Missouri, New York, Oklahoma, South Carolina, Texas and Wisconsin and our host records include, in addition to the reported hosts, the following: corn, sugar cane, *Eragrostis* sp., *Sorghastrum nutans*, *Panicum capillare*, *Paspalum dilatatum*, and Bermuda grass (*Cynodon dactylon*).

Aphis heraclella, n. n.

This new name is offered for *Aphis heraclii* Cowen, preoccupied by *Aphis heraclei* Koch.

Aphis rociadæ Ckll.

What is considered the same as Cockerell's *Aphis rociadæ*[3] was found abundant on the flower stalks of *Delphinium tricorne* at Lafayette, Indiana, May 9, 1913. The original description included only the apterous female, but certain characters are so unusual and prominent there appears to be little question as to the identity of our species.

Winged viviparous female: Head, thorax and abdomen very dark brown, apparently black. At base of each cornicle brownish. In some specimens the abdomen is distinctly shining dark brown. Antennæ and eyes black. Legs pale brownish, blackish at apices of femora and tibiæ, and tarsi black. Cornicles moderately dark brown. Wing veins black.

1. Bull. Ga. St. Bd. Ent., No. 17, p. 99, Oct., 1905.
2. Pacific Rural Press, Vol. 22, No. 1, p. 8, July 2, 1881.
2a. Ent. News, Vol. 25, No. 7, p. 298, 1 pl., July, 1914.
3. Trans. Amer. Ent. Soc., Vol. 29, p. 115, 1903. I have since had an opportunity to identify this species with certainty by comparing with the type, kindly loaned by A. C. Baker.

Antennæ reaching to or beyond tip of abdomen; segment III with 4 to 8, usually 5, round sensoria, and segments V and VI with the usual ones; filament of VI quite long, being more than half longer than III and seven times the length of VI base (fig. 2a). Beak reaching almost to coxæ of third pair of legs. Cornicles (fig. 2b) of moderate length, being approximately half the length of antennal segment III, cylindrical, and flaring at the tip. Cauda (fig. 2c) broadly rounded and scarcely visible. Wing veins dark brown, the second branch of discoidal branching about ½ the distance from tip to where first branches,

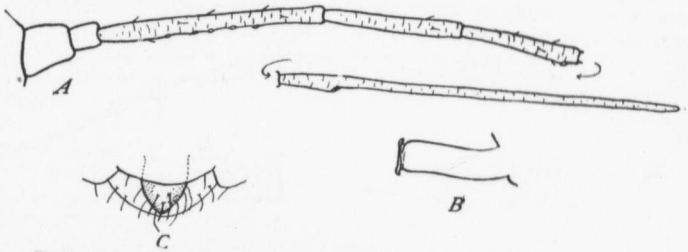


Fig. 27.—*Aphis rociadæ* Ckll. A, antenna; B, cornicle; and C, cauda, of winged viviparous female.

Wingless viviparous female: Entire body very dark shining brown, apparently black, excepting posterior end of abdomen which is of a slightly lighter brown. Antennæ apparently black excepting segment III, which is brownish. Legs as in winged female. Cornicles pale brown and black at tip. Cauda not apparent.

The antennæ similar to those of the winged female, except that they lack sensoria on segment III. Cornicles moderately short and cauda not exposed, but visible as a broadly rounded organ through the transparent body wall when mounted in balsam.

Since writing the above I have received from J. R. Parker sexes of what I believe may be this species, collected in Montana on larkspur. The males are winged and the noticeable differences from the winged viviparous female are as follows: Antennal segment VI, filament longer than III, but not one-half longer; segment III with 60 or 70 small, somewhat tuberculate sensoria, irregularly placed; IV with 12 or 15, and V with 10 similar sensoria; cornicles less prominent, being paler and less conspicuously shaped. The apterous oviparous female differs from the apterous viviparous as follows: Antennal segment VI filament, longer than III but not one-half longer; segment III with 15 to 20 small sensoria, irregularly placed on basal two-thirds; antennal hairs longer; cornicles as in male; and basal third of hind tibia swollen and bearing numbers of small inconspicuous sensoria.

Aphis cuscutæ, n. sp.

This typical aphis which appears to be undescribed, was collected by P. H. Timberlake at Kaysville, Utah, on dodder (*Cuscuta epithymum*) growing on alfalfa. Live specimens were received from Timberlake Oct. 21 and Nov. 10, 1914, from which the following descriptions are made.

It might be noted here that from this live material we reared (*Lysiphlebus*) *Aphidius testaceipes* Cress. (Gahan det.) and a syrphid (*Syrphus opinator* O. S., Aldrich det.).

Winged viviparous female: Head and thorax black, abdomen pale green with three dusky spots on each side anterior to the cornicles and one at the base of the cornicles, an impressed dusky dot on each side of each segment, a brighter green transverse area on each side of the dorsal median line of the segments anterior to the cornicles, a small dusky spot on the dorsal median line of the cornicle-bearing segment, and a similar transverse dusky to blackish marking on the penultimate and last abdominal segments. Antennæ black. Eyes dark reddish brown. Beak black at tips. Legs with femora pale dusky to blackish at tips, tibiæ brown to blackish at tips and tarsi black. Cornicles, cauda, and anal plate black.

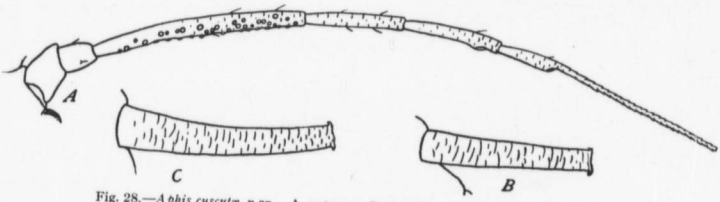


Fig. 28.—*Aphis cusculæ*, n.sp. A, antenna; B, cornicle, of winged viviparous female; C, cornicle of wingless viviparous female.

Antennæ reaching about to base of cornicles, segments III and filament of IV subequal, the former being slightly the longer, III subequal in length to IV and V combined, segment III with about 40 to 50 circular, slightly tuberculate sensoria scattered irregularly over the surface, and the usual sensoria at distal end of segment V and VI base (fig. 3a). Beak not quite reaching to coxæ of the middle pair of legs. Wings normal, veins narrow, and blackish, the branching of the third discoidal nearer the tip than point where second branches. Cornicles moderately long and reaching just a little beyond tip of body in live specimens (fig. 3b). Cauda typical of the genus, being slender, conical and constricted near the middle. The prothorax with a tubercle which is hidden by the mesothorax in mounted specimens; also a rather prominent tubercle on each side of the first abdominal segment.

Measurements: (Averages) Length of antennal segments III, 0.508; IV, 0.238; V, 0.228; VI, base, 0.122; VI, filament, 0.405 mm.; cornicles 0.379 mm.; cauda, 0.151 mm.

Pupa: Head dusky, thorax pale yellowish green and abdomen marked as in apterous form, but lacking the black markings and bearing a row of rather conspicuous pulverulent spots on each side of the median dorsal line, and the entire body covered with a fine inconspicuous pulverulence. Antennæ dusky to blackish, excepting segment III and base of IV, which are whitish. Eyes dark reddish brown, almost black. Beak not quite reaching coxæ of middle pair of legs. Wing-pads blackish at tips. Legs whitish, the tips of tibiæ and femur and all of the tarsi blackish. Cornicles black and not quite reaching to tip of cauda. Cauda pale with an almost imperceptible duskiness.

Wingless viviparous female: General colour pale green (Smith colour key) and entire body covered with a very thin pulverulence. Head and prothoracic segment dusky to blackish, second thoracic segment dusky on either side of dorsum and a fainter dusky area connecting the two. Abdominal segments

anterior to cornicles with an impressed dusky dot on each side and a brighter green transverse marking on each side of dorsal median line; also marked with a black dot at base of each cornicle and a transverse dusky band on the dorsum of last abdominal segment. Antennæ black excepting basal two-thirds of III which is whitish. Eyes apparently black. Legs with fore pair whitish excepting at joints and the tarsi which are black; middle and hind pair similarly coloured except the femur is dusky to blackish. Beak pale with tip dusky to black. Cornicles black, and cauda pale greenish to blackish,

Antennæ with relative lengths of segments as in winged form, no sensoria excepting the usual distal ones on segments V and VI, base. Prothorax bearing a moderate tubercle near the base on each side. Beak reaching a little beyond coxæ of the second pair of legs. Cornicles moderately long, curved outwards (fig. 3c) and in live specimens reaching beyond tip of cauda. Cauda conical and typical of the genus.

Measurements: (Averages) Length of antennal segment III, 0.486; IV, 0.230; V, 0.226; VI, base, 0.122; VI, filament, 0.452 mm.; cornicles 0. 527 mm.; cauda 0.191 mm.

Cotypes in the collections of the U. S. and Canadian National Museums, and in the writer's collection.

Siphonophora achyrantes Monell.

The type slide (Monell number 125x) of the species described under this name was examined by Monell and the writer in February 1914, and it was

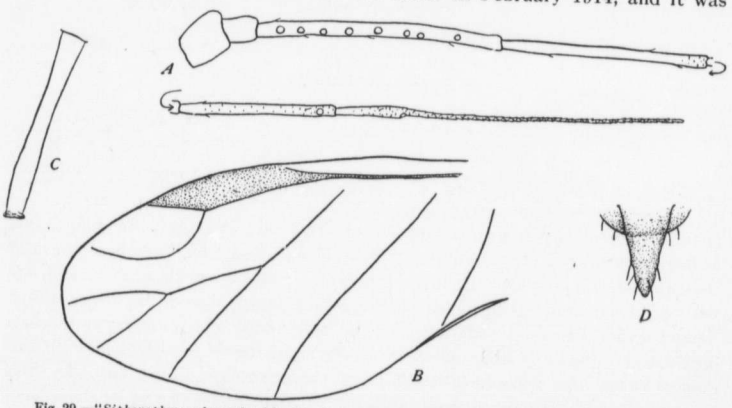


Fig. 29.—"*Siphonophora achyranthes* Monl." A, antenna; B, wing; C, cornicle; and D, cauda, of winged viviparous female. Drawn at St. Louis, Mo., Feb., 1914, from type specimen.

agreed that it was the same as *Myzus persicæ* Sulz. The frontal tubercles and abdominal markings were typical. Other important characters shown in the accompanying drawings (fig. 4) made from the type.

Macrosiphum ribiellum, n. sp.

What is here considered as a new species was originally described by the writer as *Marcosiphum cynosbati* Oestl.[4] Since writing this description the writer has had an opportunity to examine the type of *cynosbati*, and finds it

4. Studies on Aphididæ. Annals Ent. Soc. Amer., Vol. 2, 1909, p. 38, figs.

quite a different species, a typical Myzus. This species will be discussed in a following paragraph.

M. ribiellum (fig. 5) seems to be quite different from any previously described species occurring on *Ribes*. It is not a typical *Macrosiphum* but probably can best be placed in that genus. From other species occurring on *Ribes* it may be separated as follows. The slightly swollen cornicles and fewer sensoria on antennal segment III of the apterous distinguishes it from *Macrosiphum lactucæ* Schr. We are not familiar with *M. ribicola* Kalt., but Theobald gives it as a synonym of *M. lactucæ* Schr. *Rhopalosiphum lactucæ* Kalt. has much greater swollen cornicles which are conspicuously club shaped. Whether *R. sonchi* Oestl. is a synonym of *lactucæ* Kalt. is questionable in my mind. In examining specimens which appear to be typical *sonchi* collected on *Sonchus* and typical *lactucæ* collected on *Ribes*, I can make out no constant character to distinguish the two except that the filament of antennal segment VI in all my *sonchi* specimens is approximately one half longer than segment III, while in

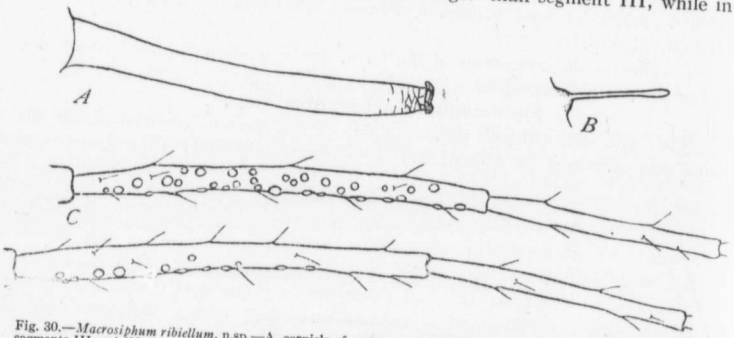
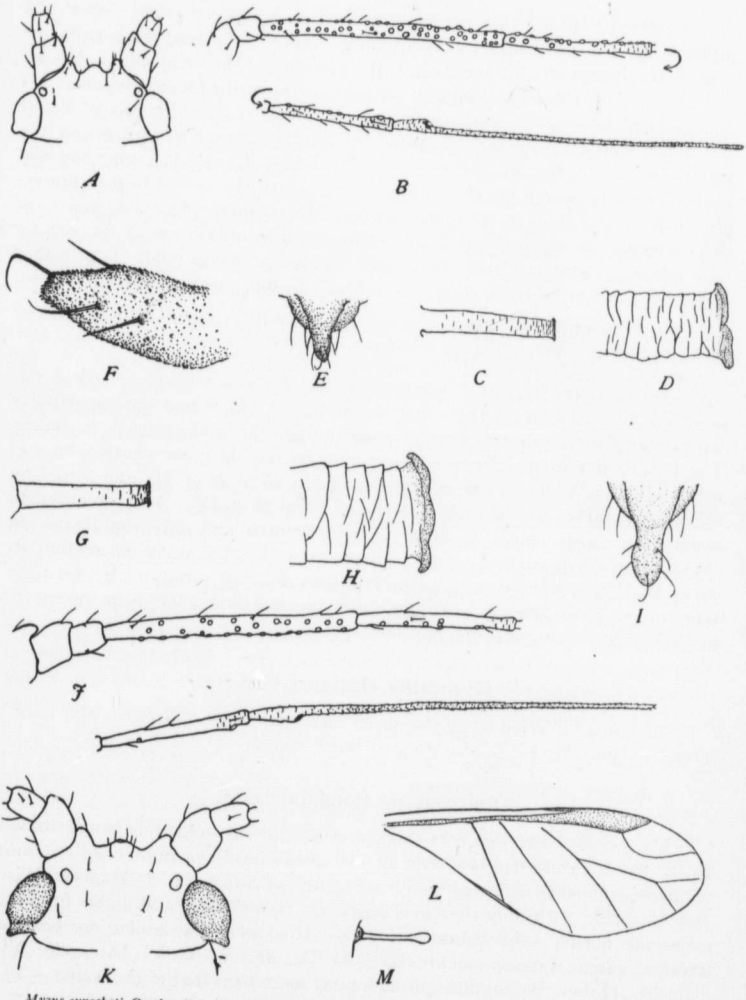


Fig. 30.—*Macrosiphum ribiellum*, n.sp.—A, cornicle of apterous viviparous female; B, antennal hair; C, antennal segments III and IV of winged viviparous female; D, antennal segments III and IV of apterous viviparous female.

lactucæ filament of VI is only very slightly (1/7 to 1/6) longer. *Rhopalosiphum brittenii* Theob. has large swollen cornicles like *lactucæ* which at once separates this species. *Myzus ribis* L. bears numerous sensoria on IV and V, and has very slender cylindrical cornicles which easily separate it from *Macro. ribiellum*. *Myzus whitei* Theob. is separated by the occurrence of a number of sensoria on IV and V, but resembles *ribiellum* in the character of the cornicles. *Myzus dispar* Patch also resembles *ribiellum* in the character of the cornicles, but *dispar* differs by having antennal segment VI filament twice the length of segment III. We have not seen *Rhop. ribesina* v. d. G., but the cornicles are said to be distinctly club-shaped and the antennæ to bear sensoria (10–15) on antennal segment IV. *Myzus cynosbati* Oestl. and *M. houghtonensis* Troop have more sensoria on segment IV and the cornicles are short, cylindrical and typical of many species of the genus *Myzus*. *Aphis* (*Myzus*) *neomexicanus* Ckll. is characterized by antennæ much shorter than body, cylindrical cornicles which do not reach tip of abdomen, and by black markings on abdomen of winged female. *Myzus ribifolii* Davidson is readily separated by the cornicles which are typically Myzus.



Myzus cynosbati Oestl. A, head; B, antenna; C, cornicle; D, tip of cornicle much enlarged; E cauda; F, side view of cauda; much enlarged, of winged viviparous female. Drawn from type specimen in collection of Prof. O. W. Oestlund.

Myzus houghtenensis Troop. G, cornicle; H, tip of cornicle much enlarged; I, cauda; J, antenna; K, head; L, wing; and M, antennal hair, of winged viviparous female. Drawn from type slide 9919a in the collection of The United States National Museum.

Myzus cynosbati Oestl.

As already stated the species described as *cynosbati* by the writer[5] is a different species. The accompanying figures (fig. 6, a–f) were made from the type slide through the kindness of O. W. Oestlund. The type slide is labeled "17/86" and bears dissected winged viviparous female. Antennal segment III bears 50 and 53 sensoria, respectively, (two antennæ on slide) irregularly placed the entire length of segment, segment IV 22–24 sensoria, V with 3 and the usual distal one. One of the wings on the slide is deformed, having the discoidal vein only once branched; the other wing with the second branch noticeably nearer apex than where first branches. Head mounted on side and view of tubercules not obtainable. Cornicles Myzus-like, imbricated at tip, slender and relatively short. Cauda also short as shown in figure 6e. Legs rather long. Sensilla of antennæ slightly swollen at tip but very inconspicuously so.

Myzus cynosbati we have collected on flowering currant (*Ribes aureum*) at Oak Park, Ill., June 23, 1909.

A species closely related which may prove a synonym of *cynosbati* was described by J. Troop as *Aphis houghtonensis*[6]. We have had the opportunity to examine the type slide of *houghtonensis* through the kindness of A. C. Baker. The types differ from the types of *cynosbati* by having fewer sensoria on segments III and IV of the winged female, having 25 to 28 on III and 2 to 7 on IV, while *cynosbati* has 50 to 53 on III and 22 to 24 on IV. Also the antennal sensilla are conspicuously knobbed in *houghtonensis* and only slightly so in *cynosbati*. (See figure 6, g to m). However, we have seen specimens sent us by R. H. Pettit collected on gooseberry which show all variations between the types of these two species. Further study and breeding work seems necessary to settle the question of synonymy in this case.

Myzocallis alnifoliæ Fitch.

The species referred to by the writer under the name *Callipterus alni* Fabr.[7] should be *alnifoliæ* Fitch according to Baker's key[8].

Saltusaphis elongata Baker.

The original description of this aphid was for the oviparous females only[9]. In the writer's collection is a slide of this species bearing a number of apterous viviparous females collected by J. G. Sanders on *Scirpus* sp. at Madison, Wis., July 13, 1912. It readily runs to *elongata* in Baker's key[10] and differs from the oviparous female only slightly as follows: Hind tibia not swollen nor bearing sensoria; antennal measurements, III, 1.34; IV, .65; V, .53; VI, base, .25; VI, filament, .42 mm., the total length noticeably more than that of the body.

5. Annals Ent. Soc. Amer., Vol. 2, 1919, p. 38.
6. Ent. News, Vol 17, No. 2, p. 59–60, 3 figs., Feb., 1906.
7. Jour. Econ. Ent., Vol. 3, p. 416, Oct., 1910.
8. Jour. Econ. Ent., Vol. 10, p. 423, Aug., 1917.
9. Can. Ent., Vol. 49, No. 1, p. 4, Jan., 1917.
10. Loc. cit., p. 2.

NOTES ON ALLOGRAPTA FRACTA O. S. (DIPTERA: SYRPHIDAE).

*BY W. M. DAVIDSON, U. S. BUREAU OF ENTOMOLOGY, SACRAMENTO, CALIFORNIA.

During the spring and early summer of 1918 the writer was stationed in the Imperial Valley of southern California, and was afforded good opportunity to observe the habits of the predaceous fly, *Allograpta fracta* O.S.

Previous to the first settlement and cultivation, some twenty years ago, the Imperial Valley was a flat, almost treeless, dry plain and, therefore, was not a habitat congenial to Syrphidæ, a family most of whose members prefer moist forested localities. In 1918 with several hundred thousand acres under cultivation to grains, corn, alfalfa, cotton and grapes and with canals everywhere a fairly rich syrphid fauna might have been expected. This was not the case, and with three exceptions the writer failed to observe during five months' time other than aphidophagous types and some of these, the species of *Melanostoma*, abundant elsewhere in California were conspicuous by their absence. The three exceptions above mentioned consisted of the species *Mesograpta geminata* Say, *M. marginata* Say, and *Ceria* sp., the last-named breeding in wounds in the trunks and limbs of cottonwood (*Populus fremontii*). From February to July *Allograpta fracta* was without doubt the most abundant species present, and the larvæ were very beneficial, acting as an undoubted check upon the barley and corn aphis (*Aphis maidis* Fitch). So mild was the winter that numbers of adults were observed January 3rd, on the occasion of a visit to the valley. After the middle of February, when the writer took up his duties, until the end of June, when he left the valley, the adult flies were seen nearly every day, often in abundance, about barley and corn fields infested with aphids. The first larva was observed February 19th, and thereafter larvæ and pupæ were to be found at any time first on barley and later on corn. The larvæ were especially beneficial to barley from March 15th to April 30th, at which date most of the grain had ripened, and to corn during May and June. In some fields they were more abundant than in others, and in those in which they especially abounded it was found that about 25% of the infested heads had larvæ working on the aphids. Experiments on the number of aphids a larva could destroy indicated that one could in its life-time eat all the aphids on from three to four heads of grain of average infestation. It therefore appeared that if at any one time larvæ were found to be working in a quarter of the infested heads in a field they might be expected to wipe out in due course between 75% and 100% of the infestation of aphids. In one field of 20 acres examined on a number of occasions, it appeared that *A. fracta* was responsible for an almost total destruction of barley aphids.

Larvæ of *Eupodes volucris* O.S., *Syrphus americanus* Wied., *Allograpta obliqua* Say, and *Catabomba pyrastri* L. were present in the barley and corn fields, but in much smaller numbers than those of *Allograpta fracta*.

In the Los Angeles district of southern California *Allograpta obliqua* is very abundant and *A. fracta* comparatively scarce, whereas in the Imperial Valley the reverse evidently holds true. *Fracta* is common in the San Diego mountains.

In 1918 *fracta* was not bred from any other host than *Aphis maidis*, except that a single larva was taken attacking *Aphis pseudobrassicæ* Davis. *Aphis*

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October, 1919

brassicæ L., *Myzus persicæ* Sulzer and *Macrosiphum pisi* Kalt. colonies were searched frequently, but in vain, for larvæ and pupæ of the syrphid.

Stages and Parasitism.

At El Centro 8 ova of *fracta* deposited March 22nd hatched 4 in two, 4 in three days, and two resultant larvæ pupated after a stage of 11 and 12 days; one individual emerged as an adult fly 8 days after it pupated. Six other individuals varied in the pupal stage from 5 to 12 days in April. From March 22 to April 30 the minimum daily temperatures ranged from 50 to 63 F., and the maximum from 71 to 96 F.; the average daily minimum was 58 F., and the average daily maximum 86 F.

Between the middle of February and the end of April 45 large larvæ and pupæ of *Allograpta* were collected in the field; of these 12 died in the pupal stage, 14 yielded mature *A. fracta*, 1 yielded mature *obliqua*, and 18 yielded parasites. From two of the parasitized puparia several imagoes of *Pachyneuron* issued, and from the other 16 puparia single Ichneumonid adults emerged. Most of the latter were *Eiplazon laetatorius* Fabr., adults of which were commonly observed flying about the fields. The puparia of the parasitized flies turned brown almost immediately after pupation. Within the puparia the parasites developed a little more slowly than the hosts.

DESCRIPTIONS

The egg is white, microscopically sculptured, elongate oval, in length about .85 mm.; in diameter about .25 mm.; deposited by the parent beside a colony of aphids. Eggs observed on barley plants were all placed so that their long axis was aparallel to the long axis of the blade.

At birth the larva is nearly cylindrical, widest at the middle, whitish in colour, the mouth-parts gray. Each segment bears small, fleshy, conical elevations. The posterior respiratory tubes are short, not fused, and divergent; they are whitish, tipped with light brown. The transverse folds of the body are faint. After feeding the colour of the larva during the first instar becomes grayish white, the area about the dorsal vessel pink.

After the first moult the larva measures about 4.5 mm. in length, and 1 mm. in breadth. The green colour which persists until the pupa is about to give forth the imago is now obvious. Each of the fleshy conical elevations of the integument is surmounted by a short pale bristle. The posterior respiratory tubes become lengthened, basally fused mesad, divergent at the apices, twice as long as their combined basal width, pale green tipped with brown. For a few days after the first moult the pink dorsal stripe is apparent, gradually fading away. The fat bodies show through the integument as two narrow whitish stripes running longitudinally one down either side of the narrow dark dorsal vessel.

The full-grown larva is 8 to 9 mm. in length, 2 mm. wide, and about 1.2 mm. in height; elongate oval, somewhat flattened on dorsum, the anterior end drawn out to a point when the insect extends itself; integument finely papillose, transversely wrinkled, the fleshy conical elevations surmounted with pale spines, colour green, with two narrow whitish longitudinal stripes flanking the dorsal vessel, posterior respiratory tubes fused mesad, .5 mm. long, the combined base about .27 mm. wide. The structure of the stigmal plates is very similar to

that of the larva of *Allograpta obliqua* as shown by Metcalf (1)*, except that the anterior interspiracular spine beside the circular plate is much less prominent in *A. fracta* than in *A. obliqua*.

The larva pupates commonly on the plant surface, generally close by the place where it last fed. On blades of barley and corn the pupæ were almost always oriented parallel to the long axis of the blade.

The puparium is green; the two whitish larval stripes apparent for a day or two; as the true pupa inside takes on the black and yellow colour of the adult fly the colour of the puparium changes until all the green vanishes. The anterior face is bulbous, the outline of the dorsum convex, curving downward to the base of the posterior respiratory tubes, not concave anterad of the tubes, the venter is gently concave, sides narrowing posterad. Armature consists in the pale inconspicuous bristles of the larval integment. Length of puparium 5 to 6.5 mm., maximum breadth 2 to 2.3 mm., height 1.7 to 2.1 mm. (7 individuals).

Adult Female.

Oval. Vertex shining black, continued as a broad stripe to base of antennæ, thence as a narrow stripe to, or almost to, mouth cavity, face narrow, pale yellow or white, the light colour coming up on the sides almost to the ocelli, cheeks pale yellow, in front below the eyes a small brownish spot; pile of face short, pale yellow; pile of frons chiefly light-coloured, but some examples have considerable black pile in the middle; profile of face below antennæ gently concave to the base of tubercle; occipital pile silvery, above fulvous. Antennæ reddish yellow; third segment blackish or grayish along the upper edge, oval in shape, but little longer than wide in middle; arista brown, lighter basally.

Thorax shining metallic green, with short fulvous pile; a pale, yellow lateral stripe from humerus to suture, three yellow spots on the pleuræ; scutellum yellow, the extreme anterior corners black, pile light yellow except for a few black hairs on the disc. Wings hyaline, stigma brownish yellow. Legs yellow, posterior femora with a brown ring near apex, posterior tibiæ with brown rings at basal third and before the apex, hind tarsi reddish brown, last three joints brown; pile light-coloured.

Abdomen narrow, oval; first segment metallic black, anterior and lateral margins pale yellow, sometimes almost half the dorsal surface of the segment is yellow; remaining segments with shining black cross-bands, one on anterior, one on posterior margin, the central black part opaque; second segment with a slightly arched yellow cross-band, reaching the sides for its full width, about one-third as wide as the segment, constricted and sometimes interrupted in the centre, in some individuals continued up the sides to the anterior angles of the segment; third segment with a similar cross-band, wider and more conspicuously arched, not constricted, between one-third and one-half as wide as the segment; fourth and fifth segments with two median longitudinal, narrow, yellow stripes, and with two obliquely placed yellow spots, the latter on the fourth segment rarely coming in contact with the central stripes and reaching the lateral margins in their full width about apical fourth of the segment. Pile of abdomen short, except on the sides of the two basal segments; colour light yellow, on the disc black and yellow mixed.

*Figures in parenthesis refer to Literature Cited.

Length 6 to 7 mm.; length of wing 5 to 5.5 mm.

Described from 12 specimens taken in 1918 at El Centro and Alhambra, Cal.

Adult male (after Williston's quotation of Osten Sacken) (2).

". . . Length 7 mm. Face, including the frontal triangle, pale yellow, slightly opalescent; a bluish black stripe extends from the oral edge to the antennæ, forming a semicircle above them. Antennæ reddish, third segment brown along the upper edge, vertex black. Thorax bright metallic green, a pale yellow stripe on each side between the humerus and the root of the wings; ante-scutellar (post-alar) callosity yellowish; scutellum of a saturate yellow, the extreme corners dark; halteres with yellow knobs. First abdominal segment metallic greenish black, its extreme anterior margin only yellow; the rest of the abdomen black, opaque; an interrupted yellow cross-band on the second segment equal to about one-third the segment in breadth; a somewhat broader, slightly arched, and not interrupted yellow cross-band on the third segment; on the fourth, two narrow, parallel, longitudinal lines in the middle and an obliquely placed, large, oval spot on each side of them, yellow; the narrow fifth segment shows a yellow picture, somewhat resembling that of the fourth segment. Legs yellow; tip of tarsi brownish; hind femora with a brown ring before the tip; hind tibiæ with two such rings, one before the middle, the other before the tip; hind tarsi brown, except the under side of the first joint. Wings hyaline; stigma brownish yellow."

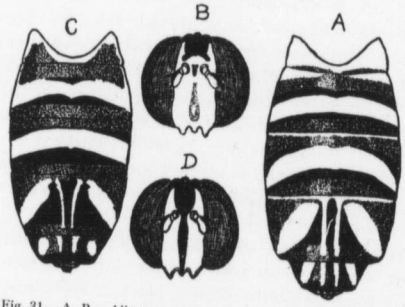

Fig. 31. A, B.—*Allograpta obliqua*, female, dorsum of abdomen and front view of head. C, D.—*Allograpta fracta*, female, dorsum of abdomen and front view of head.

Osten Sacken (3) described the species from a single male collected at Santa Monica, Cal., in 1876. There are before the writer 22 males from southern California; of these 20 have the cross-band of the second segment constricted in the middle and 2 have it interrupted, so that normally this band is not divided as in the type specimen. Also in these 22 males the coloration of the first abdominal segment varies as in the females, some having considerably more than the "extreme anterior margin only" yellow. In the males the cross-band of the third abdominal segment is on the average broader, and the oblique spots of the fourth segment larger than in the females.

Williston (2) indicated the differences between *Allograpta obliqua* and *A. fracta* to consist in the faint brownish facial stripe and yellow first abdominal

segment of the former as compared with the narrow, bluish-black facial stripe and blackish first abdominal segment of the latter.

In the writer's series of both species the facial stripe colour character holds good, although many *obliqua* specimens have the brown stripe hardly "faint" but quite prominent. In the *fracta* series no individual has as much as half the first abdominal segment yellow above, while in the *obliqua* series all specimens have considerably more than half the segment yellow, in fact only the posterior margin is black. The scutellar pile is a good character for separation; in *obliqua* it is all black, and in *fracta* almost all yellow. In both species the picture of the fourth segment is variable, but all the *fracta* females have the longitudinal stripes divergent anteriorly, while all the *obliqua* females have these parallel the whole length. This character does not hold for the males, owing to some of the *fracta* males having stripes not divergent.

A. fracta is a smaller species than *A. obliqua*. The immature stages are virtually indistinguishable.

The only known extra-Californian record for *A. fracta* is that of Metcalf (4) for Blowing Rock, N.C. This record suggests a transcontinental range for the species.

LITERATURE CITED

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(2) Williston, S. W. Synopsis of the North American Syrphidæ. Bull. U. S. Nat. Mus. 31, p. 97.

(3) Osten Sacken, C. R. West. Dipt., p. 331.

(4) Metcalf, C. R. A List of Syrphidæ of North Carolina. Jour. Elisha Mitchell Scientific Society, Dec., 1916, p. 102.

OBITUARY.

F. H. WOLLEY DOD.

On the 24th July, of enteric, at 49 Hospital, Chanak, Frederic Hova Wolley Dod, of Midnapore, Alberta, Sec. Lieut., Yorkshire Light Infantry, attached Macedonian Labour Corps.

Naturalists are born, not made, and if ever there was an enthusiast—a zealous seeker of scientific truths, it was our good friend who is gone. But to F. H. Wolley Dod even his beloved study of entomology had to take second place in his thoughts after the outbreak of war. He must go, and serve! and handicapped by his years, and his unfitness as a fighting man, he finally overcame all obstacles; obtained a commission; and served as a lieutenant in a Labour Battalion in Macedonia.

His last letter to me was joyous in the Allied victory, and full of plans for the future. "He must set up his Macedonian material, do a little collecting in England for old times sake; and then for Canada, and a trip into the mountains for alpine stuff. Would I go with him?" Aye, gladly would I go!

Dod was the pioneer worker in Alberta on the Ledpidoptera, with a special leaning to the Noctuidæ. For many years he contributed regularly to The Canadian Entomologist, the first of his long series of paper "Preliminary List of

the Macro-lepidoptera of Alberta" appearing in June, 1901. Five or six years ago he again went through his list, publishing additions and corrections. He also published papers in The Entomological News.

His great trait was thoroughness; and a bookcase of his notes on the type specimens, made on the occasions of his periodical visits to South Kensington, etc., not to mention his fine private collection, bear witness to his diligence. In the end he would take nothing for granted; and *believe nothing* unless substantiated by proofs. Nor can he be blamed for his incredulity when his own side of the case was told, viz., the confusion and added difficulties of his work in the early days, due to the snap judgments and incorrect identifications of the specialists of that time. So thoroughness begat real knowledge, and in the end he enjoyed an international reputation as an authority, if not the greatest authority, on the North American Noctuidæ.

A member of a well-known English family, and of excellent education, he loved his Alberta ranch at Midnapore next only to the Empire, and the science to which he devoted his lesiure hours for so many years.

As a scientist leaving an irreparable gap in the ranks, his death could be deplored, and as a friend I could find it in my heart to bitterly begrudge his loss. But neither of these would be worthy nor characteristic of the man—of the sacrifice he so gladly made, and the life he was so ready to give. He, I know, would have but one request to us all: "Continue the good work!"

F. C. W.

Mr. W. Downes, Temporary Assistant at the Dominion Entomological Laboratory, Victoria, B.C., has been appointed a Junior Entomologist and will assist Mr. R. C. Treherne, Entomologist in charge for British Columbia, in the investigations on small fruit insects that are being conducted on Vancouver Island and the Lower Fraser Valley.

Edmund H. Gibson has resigned his position with the U. S. Bureau of Entomology, and is entering upon a new field of endeavor for himself. Believing that entomology can be put on a dignified professional business basis the same as law, medicine, engineering, etc., he is taking the initial step, and believes that after a certain amount of pioneering work the field should open up to other entomologists. Mr. Gibson's headquarters, for the time being, will be Alexandria, Virginia. His professional card is worded "Consulting Entomologist and Agricultural Engineer."

Mailed October 14th, 1919