

THE TRYPETIDAE OF MICHIGAN

Thesis for the Degree of M. S.

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Ryoji Namba

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This is to certify that the

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The Trypetidae of Michigan

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of the requirements for

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Ray Hutson
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Date

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THE TRYPETIDAE OF MICHIGAN

By

Ryoji Namba

A Thesis

Submitted to the School of Graduate Studies of
Michigan State College of Agriculture and
Applied Science in partial fulfillment
of the requirements for the degree
of

MASTER OF SCIENCE

Department of Entomology

1950

THESIS

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Throughout this work the one thing that impressed me most was the willingness of authorities to help a beginner.

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METHODS AND PROCEDURE

METHODS AND PROCEDURE

This work was begun during the summer of 1948. In its initial stage it consisted of collecting material only. During late Fall of 1948 I visited the home of Mr. Steyskal where he made available to me the list and records of the Trypetidae of Michigan. Using this list as a basis, intensive collecting was done in 1949 to supplement the county records and material in species where few specimens were available.

As soon as adequate material was obtained figures were made. Drawings were made on engineering drawing paper with Hunt crowquill pens Nos. 102-107. Stippling was made with a No. 15 ballpoint pen.

Where enough material was available wings were mounted on slides and photographed. Wings were first washed in alcohol to remove all grease and debris. They were left on clean slides to dry. After the alcohol evaporated a drop of cedar oil was placed on each wing and let soak for about 10 minutes for softening. Excess oil was wiped off, then the wings were mounted in Canadian balsam.

Photography was done with an universal view camera with a bellows extension up to three and half feet. The lens used was a 35mm microtessar (Carl Zeiss Planar f4.5). Wing slides were placed on an adjustable microscope mount which was situated below the upright camera. Light source

was a microscope light, the light being reflected through the slide and into the camera by a mirror found under the microscope mount. Kodak Process Panchromatic plates were used.



THE TRYPETIDAE OF MICHIGAN

The Trypetidae (fruit flies) have attracted much attention because of their picturesque wing markings and economic importance. Rhagoletis pomonella (Walsh), the apple maggot, and Rhagoletis cingulata (Loew), the cherry maggot, have been serious pests in the orchards of this country, while the Mediterranean fruit fly is notorious as a cosmopolitan pest.

This paper attempts to present an accurate and complete manual for the systematist and economic entomologist on the Trypetidae of Michigan. All descriptions and drawings herein were made from Michigan specimens with the thought that if this paper should contribute anything to the systematic knowledge of the family Trypetidae, it will be in the description of the minute geographical differences we find within a species.

This family has been variously called Trypetidae, Trupaneidae, Trypaneidae, Tephritidae, and Euribiidae. C. W. Sabrosky (39, p. 167) proposes the use of the name Trypetidae because of its common usage and because of the nomenclatural complications and rare usage of the other names.

There are 40 species recorded in Michigan of which I have seen 37. Eurosta latifrons (Loew), one of the three I have not seen, was recorded as found in Michigan by

Osten-Sacken (1, p. 609). The whereabouts of the specimen(s) are not known to me. Phorellia tortilis Coquillett is in the United States National Museum in Washington, D. C. Though several specimens of Rhagoletis alternata (Fallen) have been caught in Michigan, I have not been able to locate these specimens.

The Trypetidae can be easily distinguished from the other acalypterates by the auxiliary vein which bends sharply towards the costa almost perpendicularly. The characters used in classification are the same as those used by Benjamin (5, pp. 4, 5).

KEY TO THE GENERA OF MICHIGAN SPECIES

1. Anterior pair of dorsocentral bristles located on prescutum or near transverse suture well in front of line drawn between the supraalars..... 2
 - Anterior pair of dorsocentrals located at most slightly in front, at any rate not near suture..... 11
- 2(1). First vein sharply bent at right angles making the stigma short; strong bristles located on the costa at the humeral cross-vein and at the end of the auxiliary vein.....
 - Stenopa Loew
 - Without the above combination of characters... 3
- 3(2). Scutellum globose, shining; mesonotum with pale scale-like hairs forming specific patterns; with presutural dorsocentral bristles 4
 - Without the above combination of characters... 5
- 4(3). Second vein with a perpendicular branch near the tip.....Callachna Aldrich
 - Without a perpendicular branch.....
 -Procecidochares Hendel

- 5(3). Wings almost entirely dark brown, with numerous hyaline and light brown droplets; a slim hyaline crescent on the antero-apical margin of wings.....Eutreta Loew
Wings not as above..... 6
- 6(5). With 3 pairs of fronto-orbital bristles, the lower pair may be small..... 7
Usually with 2 pairs of fronto-orbitals, if more than 2 pairs then wing pattern brown with numerous hyaline droplets..... 9
- 7(6). Wing pattern in the form of oblique bands on hyaline background.....Tomoplugia Coquillett
Wings without such pattern..... 8
- 8(7). Wings with no hyaline apical marginal indentation in the submarginal and first posterior cells; with two or three hyaline spots on the disk.....Xanthaciura Hendel
With hyaline marginal indentations; pattern stellate and subapical, the basal portion may be hyaline or lightly reticulated.....
.....Trupanea Guettard
- 9(6). Proboscis long, slim, and geniculated.....
.....Paroxyna Hendel
Proboscis not as above..... 10
- 10(9). Wing pattern stellate-like, subapical; basal portion of wing before a line drawn from tip of auxiliary vein to tip of sixth vein, mostly hyaline; if otherwise (T. albiceps) then third vein bare.....Tephritis Latreille
Wing pattern consists of dark markings with numerous hyaline droplets and marginal indentations; basal portion with almost equal amount of dark and hyaline; third vein bristled.....Euaresta Loew
- 11(1). Front wide, about twice the size of maximum width of one eye; reddish brown, robust species.....Eurosta Loew
Front narrower, at most a little wider than one eye..... 12
- 12(11). Wings broad, apex rounded, with two large marginal hyaline triangular indentation just beyond the stigma..... 13
Wings without above combination of characters. 14
- 13(12). With four pairs of fronto-orbital bristles....
.....Jamesomyia Quisenberry
With three pairs of fronto-orbital bristles...
.....Myoleja Rondani

- 14(12). Anterior crossvein situated distinctly beyond
the middle of the discal cell..... 15
Anterior crossvein situated before or near
the middle of the discal cell..... 19
- 15(14). With two pairs of fronto-orbital bristles;
wings broad, dark brown with numerous
hyaline droplets; hyaline marginal indenta-
tions small.....Xanthomyia Phillips
With three or more pairs of fronto-orbital
bristles; wings not as above..... 16
- 16(15). Metanotum yellowish, at most slightly brown-
ish; dorsocentral bristles not located on
black spots..... 17
Metanotum blackish, if yellowish then dorso-
central bristles located on black spots... 18
- 17(16). Wings with the margins dark brown, central
portion yellowish brown with numerous dark
brown angular spots; stigmal cell long,
nearly four times as long as wide.....
.....Icterica Loew
Wings not as described above; front often with
lateral margins raised so that it resembles
a basin; stigmal cell shorter, nearly
twice as long as wide.....
.....Strauzia Robineau-Desvoidy
- 18(16). With wing markings connecting the third and
fourth veins at the margin of the wing
apex.....Orellia Robineau-Desvoidy
Hyaline between third and fourth veins at the
apex.....Neaspilota Osten-Sacken
- 19(14). Third antennal joint rounded in front.....
.....Phorellia Robineau-Desvoidy
Third antennal joint pointed in front.....
.....Rhagoletis Loew

GENUS STENOPE LOEW

STENOPE VULNERATA (Loew)

Trypeta vulnerata Loew, 1873, Mon. Dipt. N. Am.,
part 3, p. 232.

Trypeta (Stenopa) vulnerata Loew. OSTEN-SACKEN,
1878, Smithsn. Misc. Collect. 270, p. 189.

Stenopa vulnerata (Loew). ALDRICH, 1905, Cat. N.

Am. Dipt. p. 603. PHILLIPS, 1923, Journ. N.

Y. Ent. Soc., vol. 31, p. 133, fig. 20.

General color black. Front with brownish band in central portion, whitish border next to eye. Face with broad, brown band running longitudinally, with whitish lateral bands. Antennae yellow. A patch of light brown is found between the ventral angle of eye and oral margin. Three pairs of fronto-orbitals and two pairs of upper fronto-orbitals, the uppermost pair white. Mesonotum black with golden pollen. Scutellum shining black, rather swollen, with four long black bristles. Metanotum shining black. Abdomen black; the first three segments with mostly short white hairs and a bit of small black hairs and the last two segments with short black hairs only. On the posterior margin of the last segment is a row of rather long black bristles. Ovipositor sheath black on the basal half, then brown, then black on the tip. Pleura black pollinose. Femora blackish except for tip which is yellowish brown. Tibia, tarsi, and fore coxae yellowish brown. Wing markings brownish black. There is a pair of strong bristles on the costa at the humeral vein and two pairs at the junction of auxiliary and costa. The first vein is abruptly bent upward like the auxiliary vein making the stig-matal cell very short. There are three red swellings of the vein; one where the humeral vein meets the auxiliary

vein, one at the point where the auxiliary vein bends upward and one at the junction of the second and third vein. Third vein bare. No figuring was made of this species because the one specimen was somewhat mutilated. Redescribed from one female caught on July 23, 1949 in Otsego county.

GENUS CALLACHNA ALDRICH

CALLACHNA GIBBA (Loew)

Trypeta (Cedaspis) gibba Loew, 1873, Mon. Dipt. N. Am., part 3, p. 260.

Trypeta (Cedaspis) gibba Loew. OSTEN-SACKEN, 1878, Smithsn. Misc. Collect. 270, p. 191.

Cedaspis gibba (Loew). SNOW, 1903, Kans. Univ. Sci. Bul., vol. 2, p. 219. ALDRICH, 1905, Cat. N. Am. Dipt., p. 606.

Procecidochares atra (in part) PHILLIPS, 1923, Journ. N. Y. Ent. Soc., vol. 31, p. 137.

Callachna gibba (Loew). ALDRICH, 1929, Proc. U. S. Nat. Mus., vol. 76, p. 11.

General color brown. Front yellow, face whitish. Antennae with first two segments yellow and the third brownish. In the specimen before me there are three fronto-orbital bristles on the right and two on the left. Around these are found irregularly placed white, stubby hairs which are almost one-half the length of the fronto-orbitals. Where the uppermost pair of the upper fronto-orbitals are usually found there are two bristles close together on each

side of the front. These will be considered as doubles. Vertical bristles black. Mesonotum ground color brownish black. Before the transverse suture on each side is a shining round area encircled by stout yellow hairs. Another shining area behind the suture on each side. These areas are divided transversely by a line of yellow hairs at about the level of the posterior pair of dorsocentral bristles. Middle of the thorax in front of the transverse suture mostly shining; behind the suture pollinose, covered with numerous stout yellow hairs. There are two pairs of dorsocentral bristles before the suture. Scutellum with four bristles, globose, shining brown. Anterior to the lateral pair of bristles is a cluster of stout yellow hairs on each side. Metanotum brown, densely pollinose on the upper half. Abdomen brown, densely pollinose, covered with numerous pale hairs. Pleura yellowish brown, pollinose, covered with white hairs except for the ventro-posterior portion of the sternopleura which is bare. Legs yellow. Wing markings light brown.

Redescribed from 1 male.

Recorded in Michigan from (two records only) May 14-May 28.

County records: Ingham, Oakland.

GENUS PROCECIDOCHARES HENDEL

PROCECIDOCHARES ATRA (Loew)

Described as Trypeta atra by Loew (Centuries, pt. 2, No. 74) in 1862. A complete synonymy is given by Aldrich (3, p. 7).

General color black. Front yellow to brown.

Ocellar triangle usually of darker color. Antennae brownish yellow. Two or three pairs of fronto-orbital bristles. I have one specimen with three bristles on the left and two on the right. Often bristles are situated so close that they can be considered as duplicated bristles. One pair of reclinate upper fronto-orbital bristles. Numerous white scale-like hairs are found next to the eye. Face whitish, cheeks darkened immediately below the eye. Occiput blackened, the black becoming lighter ventrally. Mesonotum black, with two shining areas on each side before the transverse suture, margined by one or two rows of pale scale-like hairs. Behind the suture are two more polished areas with pale scale-like hairs between them. One pair of presutural and two pairs of postsutural dorsocentral bristles. I have one specimen in which there is a doubling of the left dorsocentral immediately behind the suture. Scutellum shining black, globose, with two pairs of bristles. Metanotum polli-nose on upper half, shining black below. Abdomen black with white scale-like hairs and black hairs. In the female specimens I have on the second and third segments, the white hairs are located on the anterior half and the black on the posterior half. Ovipositor sheath black with black hairs. A patch of white hairs runs longitudinally through the mesopleura and pteropleura. Tibia, tarsi, and tip of femora, yellow. Wing bands dark brown.

Redescribed from 3 males and 10 females.

Recorded in Michigan from June 5 - September 15.

County records: Wayne, Ingham, Berrien, Cass, Kent,
Menominee, Van Buren, Midland, Oakland.

PROCECIDOCHARES PENELOPE (Osten-Sacken)

Trypeta (Cedaspis) penelope Osten-Sacken, 1877,
Western Dipt., p. 346.

Oedaspis penelope (Osten-Sacken). ALDRICH, 1905,
Cat. N. Am. Dipt., p. 606.

Procecidochoares penelope (Osten-Sacken). PHILLIPS,
1923, Journ. N. Y. Ent. Soc., vol. 31, p. 137,
fig. 29. JOHNSON, 1925, List Dipt. New Eng.,
p. 262. WEST, 1928, List Ins. New York, p.
852. ALDRICH, 1929, Proc. U. S. Nat. Mus.,
vol. 76, Art. 2, p. 3.

Front and antennae yellow to yellowish brown. Face whitish tinged with yellow or brown. Three pairs of fronto-orbital bristles. Other Procecidochoares have only one pair of upper fronto-orbitals but in the specimens I have of this species there are two pairs of these bristles. The distance between the upper fronto-orbitals are the usual distant apart so I am considering them as separate bristles and not doubles. There is a row of short brown hairs on the lateral borders of the oral opening. Post orbital row of hairs pale. There is a black shining spot on the anterior side of thorax next to head. Mesonotum ground color black except for humeral callosities and notopleura,

which are yellow. Hairs upon mesonotum short, stout, from white to pinkish in color, and form a definite pattern. The lateral borders are devoid of hairs. The presutural portion of mesonotum is covered with hairs. Posterior to the suture there are two longitudinal stripes of hairs on each side of center which diverge as they near the scutellum forming an inverted Y on the mesonotum. There is on each side a strip of hairs which runs from the suture, between the supraalar and the dorsocentral bristle right behind the suture, and up to the intraalar bristle. There is also a patch of hairs right before the supraalar bristle. A pair of presutural dorsocentral bristles is present. The usual pair behind the suture is in line with the supraalar bristles. Scutellum shining black, not as globose as P. atra, with 4 long brown bristles. Metanotum black, thinly pollinose except for shining central circular area. Abdomen yellowish brown, covered with pale hairs. Ovipositor sheath concolorous with abdomen, flat, and as long as the last abdominal segment. It is usually curved upwards. Pleura yellow except for the black of the ventral triangular portion of the sternopleura, a patch above the hind coxa, and a band which extends from the metanotum to above the upper posterior corner of the sternopleura. Legs yellow. Wing markings yellowish brown, darker brown on the apical margin, around the tip of the fifth vein, and in the axillary cell. Can be easily distinguished from P. atra by its yellow legs and abdomen.

Redescribed from 9 females caught in E. Lansing, Ingham Co.
on August 23, 24, 25, 1949.

GENUS EUTRETA LOEW

EUTRETA SPARSA (Wiedemann)

Described by Wiedemann (44, p. 492) in 1830. Since
described by many writers.

General color reddish brown. Front brownish yellow, whitish next to eye. Antennae brownish yellow. Face whitish, tinged with brown, with two black spots each side of center. Another black spot between base of antenna and anterior margin of eye. Often between ventral angle of eye and oral margin is a brown to blackish brown not too definite spot. Three pairs of fronto-orbitals and two pairs of upper fronto-orbitals, the uppermost pair pale and stout. Mesonotum rufous brown, covered with stout pale hairs. The lateral borders are darker brown with few stout pale hairs. Scutellum concolorous with mesonotum, with four long black bristles. Metanotum rufous brown, the central area often blackened. Abdomen with two rows of quadrangular black spots each side of center. Sometimes these spots are fused forming transverse bands. Posterior margins of segments usually paler in color. The last segment in males with more black than preceding segments. Ovipositor sheath rufous brown, blackened at tip. Pleura yellowish brown. A strip of pale stout hairs runs on the

upper border of the pleura from the lower half of the humerus to the base of the wing. The color of these hairs are variable from white to pinkish. There is also a short row of pale stout hairs on the propleura in front of the spiracle. Legs brownish yellow, the fore femora often with a black longitudinal band on the outside. Wings almost entirely dark brown except for pale droplets and hyaline areas on the margin.

Redescribed from numerous specimens.

Recorded in Michigan from July 14-September 6.

County records: Oakland, Schoolcraft, Marquette, Mackinac, Charlevoix, Huron, Washtenaw, Oakland, Midland, Alcona, Wayne, Ingham, Gogebic, Dickinson, Delta, Gladwin.

EUTRETA FRONTALIS Curran

Eutreta frontalis Curran, 1932, Am. Mus. Nov. 556,
p. 16.

Very similar to E. sparsa. Differ mainly in the shape of the front. In E. sparsa the front is wide and margins are almost parallel except for near the antennae where they converge. In E. frontalis the front is relatively narrower and the margins start to converge from the vertex of the head. Also E. frontalis tends to have wings with more light spots near the base than E. sparsa.

Redescribed from 5 males and 4 females.

Recorded in Michigan from July 7-September 7.

County records: Luce, Ogenaw, Mecosta, Cheboygan, Ingham,
Alger, Saginaw, Antrim, Ostego, Huron,
Emmet.

GENUS TOMOPLAGIA COQUILLET

TOMOPLAGIA OBLIQUA (Say)

Described as Trypeta obliqua by Say (40 p. 186) in 1830. Loew (29, pp. 251, 337) designated it as Trypeta (Plagiotoma) obliqua in 1873. Thereafter it was most generally cited as Plagiotoma obliqua until Coquillett proposed Tomoplaga instead of Plagiotoma in 1910. Since then Tomoplaga obliqua has been the popular combination.

General color yellow. Front and antennae yellow. Face and border of front next to eye whitish. Three pairs of fronto-orbitals and two pairs of upper fronto-orbital bristles. Mesonotum yellow, covered with pale hairs. There is a round brown dot on each posterior corner of the mesonotum. Scutellum yellow tinged with milky white. Metanotum yellow. Abdomen yellow, covered with pale hairs, with a row of round, brown, equidistantly placed, dots on each side near the lateral borders. Pleura yellow, except for a spot above the mid coxa, a spot above the hind coxa, and area around the base of the halteres, which are brown. Legs yellow. Wing markings faint yellowish brown.

Redescribed from 1 male and 1 female.

Recorded in Michigan from August 8-August 29.

County records: Wayne.

GENUS XANTHACIURA HENDEL

XANTHACIURA TETRASPINA (Phillips)

Aciura (Eucosmoptera) tetraspina Phillips, 1923,
Journ. N. Y. Ent. Soc., vol. 31, p. 132,
fig. 16.

Eucosmoptera tetraspina (Phillips). CURRAN, 1932,
Am. Mus. Nov., no. 556, p. 12.

Xanthaciura tetraspina (Phillips). BENJAMIN, 1934,
USDA Tech. Bul. 401, p. 46, fig. 33, A-L.

Front, face, and antennae rufous brown. Two pairs of fronto-orbitals and two pairs of upper fronto-orbitals, the uppermost pair pale. Thorax grey, pollinose, covered with pale scale-like hairs and yellow bristles. Scutellum concolorous with thorax with two pairs of bristles, the apical pair small, about one-third times the length of the anterior pair. Metanotum black. Abdomen reddish brown anteriorly, blackish posteriorly. Ovipositor sheath shining black. Wing markings dark brown. In the specimen I have, there are three hyaline marginal indentations in the costal cell, one before and two after the humeral vein as in Benjamin's (5, fig. 33 G) figure of the male wing. Redescribed from 1 female caught in E. Lansing (Ingham Co.) on June 30, 1949.

GENUS TRUPANEA GUETTARD

Key to the Michigan species of Trupanea.

1. With light reticulation over entire wing in addition to stellate subapical pattern...
T. abstersa (Loew)
 Wings with stellate subapical pattern; area basal to a line drawn from the stigma to the stigma to the apex of the sixth vein, hyaline..... 2
- 2(1). Dark ray in the discal cell basal to the posterior cross-vein reaches the margin of the wing.....T. dacetoptera Phillips
 Dark ray does not reach posterior margin of wing, at most up to the fifth vein.....
T. actinobola (Loew)

TRUPANEA ABSTERSA (Loew)

Described as Trypeta abstersa by Loew (6, p. 221, no. 77) in 1862. Since then it has been placed in different genera as Trypeta (Urellia), Urellia, Euaresta, and Trypanea, by various authors. Benjamin in 1934 (5, p. 58) placed it as Trupanea (Euarestoides) abstersa. The species Trypeta acutangula described by Thomson in 1873 and later placed in Tephritis by several authors, will be considered a synonym of abstersa.

No profile figure of the head was made because in the only specimen I have seen from Michigan the head was broken off and lost.

Recorded in Michigan (1 record only) on May 17.

County records: Ingham.

TRUPANEA DACETOPTERA Phillips

Trypanea dacetoptera Phillips, 1923, Journ. N. Y.

Ent. Soc., vol. 21, p. 148, fig. 59.

Trypanea dacetoptera Phillips. CURRAN, 1932, Am.

Mus. Nov. no. 556, p. 6. MALLOCH, 1942,

Proc. U. S. Nat. Mus., vol. 92, no. 3136,

p. 14, fig. 1, t.

Trupanea (Trupanea) dacetoptera Phillips. BENJA-

MIN, 1934, USDA Tech. Bul. 401, p. 54, fig.

38, A-G.

General color dark grey. Front yellow centrally, whitish next to eye, covered with white pollen which often obscures ground color. Three pairs of fronto-orbitals, the anterior pair small, and two pairs of upper fronto-orbitals, the uppermost pair pale and stout. Antennae yellow, face whitish. Mesonotum, except for humeri, with ground color black, pollinose. Scutellum, metanotum, and abdomen concolorous with mesonotum, pollinose. Ovipositor sheath shining black. Pleura with ground color black, except for upper border and area around anterior spiracle which forms a yellowish band with the humerus that runs down to the fore coxa. This band can be easily seen in greasy specimens. Pollen on pleura yellowish, darker anteriorly. Legs yellow. Wing markings dark brown.

Redescribed from 3 females, 3 males.

Recorded in Michigan from May 27-July 22.

County records: Antrim, Oceana, Washtenaw, Genesee,

Clinton, Ingham, Van Buren, Emmet,
Cheboygan, Otsego.

TRUPANEA ACTINOBOLA (Loew)

Trypeta actinobola Loew, 1873, Mon. Dipt. N. Am.,
part 3, p. 326.

Trypeta (Urellia) actinobola Loew. OSTEN-SACKEN,
1878, Smithsn. Misc. Collect. 270, p. 194.

Urellia actinobola (Loew). ALDRICH, 1905, Cat.
N. Am. Dipt., p. 613.

Trypanea actinobola (Loew). CURRAN, 1932, Am. Mus.
Nov. no. 556, p. 6. MALLOCH, 1942, Proc. U. S.
Nat. Mus., vol. 92, no. 3135, p. 16, fig. 1, x.

Trupanea (Trupanea) actinobola (Loew). BENJAMIN,
1934, USDA Tech. Bul. 401, p. 56, fig. 41, A-K.

Similar to T. dacetoptera except for wing markings.
In T. dacetoptera the dark brown ray immediately before the
posterior cross-vein crosses the fifth vein and reaches the
wing margin. In T. actinobola this ray may reach the fifth
vein but does not reach the wing margin.

Redescribed from 2 females.

Recorded in Michigan from June 5-September 8.

County records: Oceana, Livingston, Clare, Jackson, Benzie,
Kent, Ogemaw, Alger.

GENUS PAROXYNA HENDEL

PAROXYNA SCROGULA (Wiedemann)

This species was described by Wiedemann (44, p. 509) in 1830. It is synonymous to Acinia picciola Bigot and Trypeta humilis Loew.

General color greyish. Central portion of front, antennae and face, yellow; area next to eye whitish. Back of head fuscous except for borders next to eye, mouth, and vertex, which are yellowish. Two pairs of fronto-orbitals and two pairs of upper-fronto-orbital bristles, the uppermost pair pale. Proboscis long and slender. Mesonotum ground color black with golden pollen. Scutellum with two long basal bristles and two short, convergent, apical bristles. Abdomen black, pollinose, with two longitudinal black bands each side of center. Ovipositor sheath shining black. Pleura concolorous with mesonotum. Legs brownish yellow except for greater basal portion of femora which is dark brown, pollinose. Wing markings light brown, darker anteriorly.

Redescribed from 7 males and 4 females.

Recorded in Michigan from July 2-August 29.

County records: Wayne, Allegan, Ingham, Kent, Cheboygan, Presque Isle, Midland, Isabella, Clare, Van Buren, Benzie, St. Joseph.

GENUS *TEPHRITIS* LATREILLEKey to the Michigan species of *Tephritis*.

1. Wing pattern consists of stellate subapical markings; basal one-third of wings mostly hyaline..... 2
 Entire wing brown, with numerous hyaline spots.....*T. euryptera* (Loew)
- 2(1). Costal cell with dark spot present; wings somewhat milky; uppermost pair of upper fronto-orbital bristles dark.....
*T. pura* (Loew)
 Costal cell without dark spot, entirely hyaline; uppermost pair of upper fronto-orbital bristles pale.....
*T. angustipennis* (Loew)

TEPHRITIS *ALBICEPS* (Loew)

Described as *Trypeta albiceps* by Loew (29, p. 302) in 1873. Phillips (36, p. 150) in 1923 considered this species to be the same as *Tephritis euryptera* which was described as *Trypeta euryptera* by Loew (29, p. 304) in 1873.

General color grey. Front and antennae yellow, face white. Sometimes whole head white. There is a great deal of variation in the fronto-orbital bristles. Usually there are two pairs of black long fronto-orbital bristles. In one specimen there is only one pair of short bristles, in another there are one short brown and one white short bristles on one side and a white short bristle on the other. In still another there is only one pair of long black fronto-orbital bristles. Two pairs of upper fronto-orbitals, the uppermost pair short and white. Sometimes there is

a stout white bristle directly in front of the long black inner vertical bristle. Occiput blackish on the upper half except for the orbital borders. There is a black shining area on the anterior part of the thorax next to head. Mesonotum ground color black, except for humeral callosities which are yellow. Whole mesonotum pollinose. Scutellum pale yellow except for bases of anterior pair of scutellar bristles which are brownish. Sometimes the bases of the lateral borders blackened. Metanotum ground color black, pollinose except for lower part next to place of attachment of abdomen which is shining black. Abdomen grey pollinose with a row of brown dots running longitudinally on each side of center. Hairs upon abdomen pale. I have one male specimen with 6 long black bristles on the posterior margin of the last segment. Ovipositor sheath black on the base and extreme tip, brown on the central portion. Pleura mostly grey pollinose, except for upper border from humerus to wing base which is yellow. Legs yellow. Wing markings brown. There is a great deal of variation in the markings. Some have more hyaline areas than others.

Redescribed from 3 females and 5 males.

Recorded in Michigan from June 4-August 28.

County records: Emmet, Midland, Dickinson, Clare, Antrim,
Kent, Cheboygan.

TEPHRITIS PURA Loew

Trypeta pura Loew, 1873, Mon. Dipt. N. Am.,
part 3, p. 320.

Trypeta (Euaresta) pura Loew. OSTEN-SACKEN, 1878,
Smithsn. Misc. Collect. 270, p. 194.

Euaresta pura (Loew). ALDRICH, 1905, Cat. N. Am.
Dipt. p. 613. PHILLIPS, 1923, Journ. N. Y.
Ent. Soc., vol. 31, p. 146, fig. 56.

Trupanea (Tephritoides) pura (Loew). BENJAMIN,
1934, USDA Tech. Bul. 401, p. 59, fig. 44, A-M.

General color grey. Front yellow, whitish next to eye. Antennae yellow to reddish brown. Face white tinged with reddish brown. Two pairs of fronto-orbitals and two pairs of upper fronto-orbital bristles. There is a black shining spot on the anterior side of thorax next to head. Mesonotum ground color black, pollinose. There are four indistinct brownish pollinose stripes running longitudinally on the mesonotum. Humeral callosities, notopleura, and postalar calli, yellowish. Scutellum greyish brown with yellowish lateral borders. Metanotum black pollinose, shining only next to place of attachment of abdomen. Abdomen mostly grey, whitish to reddish only on the slim posterior margin of segments. Hairs on first segment pale except for a row of black on posterior margin. Rest of hairs on abdomen black, except for very few scattered pale hairs on the lateral borders. Ovipositor sheath shining

brown, black on extreme base and tip. Hairs on sheath white anteriorly, black posteriorly. Pleura mostly with ground color black, pollinose. The upper border from humeral callosity to base of wing somewhat yellowish. Legs, yellowish brown, the femora with scattered blackish areas. Wings milky white with dark brown markings. The markings are somewhat variable.

Redescribed from 1 female and 2 males.

Recorded in Michigan from May 21-July 2.

County records: Midland, Kalamazoo.

TEPHRITIS ANGUSTIPENNIS (Loew)

Trypeta angustipennis Loew, 1862, Germ. Zeitsch.,
vol. V, p. 382, pl. II, fig. 4.

Trypeta angustipennis Loew, 1873, Mon. Dipt. N. Am.,
part 3, p. 293.

Trypeta (Tephritis) angustipennis Loew. OSTEN-
SACKEN, 1878, Smithsn. Misc. Collect. 270,
p. 193.

Tephritis angustipennis (Loew). ALDRICH, 1905, Cat.
N. Am. Dipt., p. 611.

Euaresta angustipennis (Loew). PHILLIPS, 1923, Journ.
N. Y. Ent. Soc., vol. 31, p. 146, fig. 54.

General color grey. Central portion of front and antennae yellow to yellowish brown. Face whitish. Two pairs of fronto-orbitals and two pairs of upper fronto-

orbital bristles, the uppermost pair pale. Ground color of mesonotum black, pollinose. In the male specimen before me the posterior one-third of the mesonotum is yellowish brown with four indistinct stripes running out anteriorly. Scutellum pollinose with ground color black except for yellowish lateral borders. Metanotum black, pollinose except for area next to place of attachment of abdomen which is shining black. Abdomen grey. In the female specimen all the hairs on the abdomen are pale, while in the male the hairs on the first abdominal segment are all white but in the other segments there are some pale hairs mixed with black hairs, the greatest concentration of pale hairs on the lateral borders. Ovipositor sheath shining black with white hairs anteriorly and brownish posteriorly. Pleura ground color black, pollinose, only the upper border a bit yellowish. Legs yellow to yellowish brown, the femora with some black spots. Wing markings dark brown, somewhat variable. Can be differentiated from T. pura by the absence of definite brown spots in the costal cell and by the pale color of the uppermost pair of upper fronto-orbital bristles. Redescribed from 1 male and 1 female.

Recorded in Michigan from April 13-June 13.

County records: Midland.

GENUS EUARESTA LOEW

Key to Michigan species of Euaresta.

1. Metanotum black.....E. bella (Loew)
Metanotum yellow, at most slightly brownish..... 2

- 2(1). First posterior cell with black callus; no
brown longitudinal band in the front of
fore femora.....E. festiva (Loew)
First posterior cell without black callus;
fore femora with brown band.....
.....E. aequalis (Loew)

EUARESTA FLSTIVA (Loew)

Trypeta festiva Loew, 1862, Mon. Dipt. N. Am., part
1, p. 86, Tab. II, fig. 21.

Trypeta (Euaresta) festiva, Loew, 1873, Mon. Dipt.
N. Am., part 3, p. 309, Tab. X, fig. 21.
OSTEN-SACKEN, 1878, Smithsn. Misc. Collect.
270, p. 194.

Euaresta festiva (Loew). SNOW, 1894, Kans. Univ.
Quart. II, p. 171, pl. VI, fig. 9. ALDRICH,
1905, Cat. N. Am. Dipt., p. 613. PHILLIPS,
1923, Journ. N. Y. Ent. Soc., vol. 31, p.
146, fig. 51.

General color golden yellow. Antennae and front
darker yellow. Two pairs of fronto-orbitals and two pairs
of upper fronto-orbital bristles. Thorax bright golden
yellow. Scutellum same color as thorax with four long
bristles. Metanotum yellow. Abdomen golden yellow. Ovi-
positor sheath brownish, almost black toward the tip. Legs
golden yellow. Wing markings dark brown. Callus in first
posterior cell often difficult to see because it is not
darker than the general color of the wing markings.
Redescribed from numerous specimens.

Recorded in Michigan from July 7-September 15.

County records: Midland, Ingham, Wayne, Kent, Saginaw.

EUARESTA AEQUALIS (Loew)

Trypeta aequalis Loew, 1862, Mon. Dipt. N. Am., part
1, p. 86.

Trypeta (Euaresta) aequalis Loew, 1873, Mon. Dipt.
N. Am., part 3, p. 308. OSTEN-SACKEN, 1878,
Smithsn. Misc. Collect. 270, p. 194.

Trypeta aequalis Loew. MARIATT, 1891, Proc. Ent.
Soc. Wash., vol. 2, p. 40, fig. 2.

Euaresta aequalis (Loew). SNOW, 1894, Kans. Univ.
Quart., II, p. 171, pl. VII, fig. 10. ALDRICH,
1905, Cat. N. Am. Dipt., p. 613. PHILLIPS,
1923, Journ. N. Y. Ent. Soc., vol. 31, p. 146,
fig. 53.

Tephritis aequalis (Loew). COQUILLETT, 1899, Journ.
N. Y. Ent. Soc., vol. 7, p. 264.

General color yellow. Front brownish yellow. Antennae and face pale yellow. Two pairs of fronto-orbitals and two pairs of upper fronto-orbital bristles. Thorax, scutellum, and abdomen bright yellow, covered with numerous short yellow hairs. Scutellum with four long bristles. Metanotum brownish centrally, yellow on the sides. Legs yellow, except for a longitudinal brown band on the front of the fore femora. Wing markings brown. No black callus in the first posterior cell. Third vein distinctly bristled.

This species can be distinguished from E. festiva by the absence of the black callus, more hyaline or pale brown droplets in the wings, and by the presence of a brown band on the front of the fore femora.

Redescribed from 11 males.

Recorded in Michigan from June 11-September 6.

County records: Ingham, Wayne, Midland, Mecosta.

EUARESTA BELLA (Loew)

Trypeta bella Loew, 1862, Mon. Dipt. N. Am., part 1, p. 28, Tab. II, fig. 23.

Trypeta (Euaresta) bella Loew, 1873, Mon. Dipt. N. Am., part 3, p. 311, Tab. X, fig. 23. OSTENSACKEN, 1878, Smithsn. Misc. Collect. 270, p. 194.

Euaresta bella(Loew). ALDRICH, 1905, Cat. N. Am. Dipt., p. 612. PHILLIPS, 1923, Journ. N. Y. Ent. Soc., vol. 21, p. 146, fig. 52.

Euaresta (Euaresta) bella (Loew). BENJAMIN, 1934, USDA Tech. Bul. 401, p. 50, fig. 35, A-G.

General color yellowish grey. Head yellowish. Antennae and area of front between bristles darker yellow. Two pairs of fronto-orbitals and two pairs of upper fronto-orbital bristles. Thorax with ground color blackish, pollinose with golden yellow. Scutellum concolorous with thorax. Metanotum blackish. Abdomen dark yellow anteriorly, blackish posteriorly, the dark coloration usually show-

ing strongly from the second or third segments in the male and third or fourth segments in the female. I have seen two specimens with abdomen wholly blackish except for the posterior margin of each segment which is yellowish. Ovipositor sheath black. Legs dark yellow. Markings of wings dark brown. Number of hyaline spots in discal, third posterior, and axillary cells varies. First posterior cell may have a hyaline spot besides the marginal indentations. I have 10 specimens with a small but definite hyaline spot in the first posterior cell as in E. festiva. This species can be easily separated from E. festiva and E. aequalis by the black metanotum and blackish ground color of the thorax.

Redescribed from numerous specimens.

Recorded in Michigan from June 26-September 6.

County records: Berrien, Van Buren, Jackson, Washtenaw, Wayne, Ingham, Livingston, Kent, Clinton, Lapeer, Muskegon, Montcalm, Saginaw, Tuscola, Oceana, Mecosta, Midland, Lake, Osceola, Clare, Wexford, Leelanau, Presque Isle, Dickinson, Menominee.

GENUS EUROSTA LOEW

Key to the Michigan species of Eurosta.

1. Hyaline marginal indentation in second posterior cell of wings conspicuous, some of which are as deep as the anterior crossvein..... 2
- Hyaline marginal indentations in second posterior cell minute..... 4

- 2(1). Black elongated spot present in the first posterior cell.....E. latifrons (Loew) 3
 Black elongated spot absent.....
- 3(2). Hyaline marginal indentation in third posterior cell triangular in shape, large, extending into discal cell.....
E. solidaginis (Fitch)
 Hyaline marginal indentation in third posterior cell in form of a group of round hyaline spots.....E. reticulata Snow
- 4(1). Triangular hyaline indentation at the anterior margin of wing just beyond the stigma with a distinct comma.....E. comma (Wiedemann)
 No distinct comma present in the triangular indentation.....E. elsa Daecke

EUROSTA SOLIDAGINIS (Fitch)

Described by Fitch (21, p. 66) in 1855. Since discussed by many writers.

General color rufous brown. Front yellowish brown, broad. Number of fronto-orbitals variable. Often one or two of the bristles may be pale in color. Usually two pairs of upper fronto-orbitals but sometimes there are three on one side and two on the other. Doubling may occur in these bristles. Frequently the uppermost pair of the upper fronto-orbital bristles is pale. Mesonotum rufous brown, covered with pale scale-like hairs. There is a black stripe running each side of center, another stripe along side behind the suture, and still another above the base of the wings. Frequently a black area is present between the humerus and the midpoint of the transverse suture. Scutellum with variable number of bristles. In my specimens the number of bristles is from 2-4. Frequently doubling of bristles

occurs. The apical pair of bristles found in other Diptera is usually wanting. I have a few specimens with bristles close enough to the apex of the scutellum to be called apical bristles. Abdomen rufous brown, covered with pale scale-like hairs. Ovipositor sheath reddish brown with the extreme tip black. Legs yellow-brown, the femora a bit more brownish. Wing markings umber brown with light brown droplets.

Redescribed from numerous specimens.

Recorded in Michigan from April 8-June 9.

County records: Lenawee, Washtenaw, Wayne, Midland, Ingham, Ottawa, Saginaw, Clare, Livingston, Isabella, Shiawassee, Kent, Clinton, Sanilac, Lapeer.

EUROSTA RETICULATA Snow

Eurosta reticulata Snow, 1894, Kans. Univ. Quart.
2, p. 170.

Eurosta reticulata Snow. ALDRICH, 1905, Cat. N.
Am. Dipt., p. 609. PHILLIPS, 1923, Journ.
N. Y. Ent. Soc., vol. 31, p. 145, fig. 48.
BENJAMIN, 1934, USDA Tech. Bul. 401, p. 28,
fig. 21, A-M.

Benjamin (5, p. 28) is unable to differentiate between E. reticulata Snow and E. conspurcata Doane.

General color rufous brown. Front yellowish-brown, antennae and face, yellow. Number of fronto-orbital bristles

variable. Two pairs of upper fronto-orbitals, the uppermost pair may be pale. Mesonotum rufous brown, covered with pale, stout hairs. Black markings on mesonotum similar to that of E. solidaginis. Scutellum four bristled. Metanotum with large black central area, the sides rufous brown. Sometimes this black area is not distinct. Abdomen rufous brown, with scattered dark spots. Tibia, tarsi, and tip of femora yellow. Rest of femora mostly brownish. Wing markings umber brown with light brown and hyaline droplets. This specie can be differentiated from E. solidaginis by the numerous hyaline droplets in the wing markings.

Redescribed from 3 males.

Recorded in Michigan from May 14-June 10.

County records: Oakland, Midland, Ingham, Missaukee,
Osceola, Bay.

EURCSTA COMMA (Wiedemann)

Trypeta comma Wiedemann, 1830, Auss. Zweifl., II,
p. 478.

Trypeta comma Wiedemann. LOEW, 1862, Mon. Dipt.

N. Am., part 1, p. 93, Tab. II, fig. 28; Mon.

Dipt. N. Am., part 3, p. 280, Tab. XI, fig. 2.

Trypeta (Eurosta) comma Wiedemann. OSTEN-SACKEN,
1878, Smithsn. Misc. Collect. 270, p. 192.

Eurosta comma (Wiedemann). SNOW, 1894, Kans. Univ.
Quart. II, p. 169, pl. VII, fig. 3. ALDRICH,

1905, Cat. N. Am. Dipt., p. 609. PHILLIPS,
 1923, Journ. N. Y. Ent. Soc., vol. 31, p. 143,
 fig. 47. BENJAMIN, 1934, USDA Tech. Bul. 401,
 p. 28, fig. 20, A-M.

General color rufous brown. Front yellowish brown. Face and antennae yellow. Fronto-orbital bristles variable in number. Two pairs of upper fronto-orbitals, the uppermost pair may be pale. Mesonotum as in E. solidaginis. Scutellum concolorous with thorax. In the specimens I have the number of bristles on the scutellum is two, the posterior pair wanting. Benjamin (5, p. 28) states the number may be from 2-7. Metanotum may be darkened in the central area. Abdomen dark brown tinted with rufous. Legs concolorous with thorax, the tibia and tarsi often lighter. Wings umber brown with numerous light brown droplets. Marginal indentations minute compared to E. solidaginis. A dark comma mark runs through the hyaline, triangular, marginal indentation just beyond the stigma. There are a narrow hyaline crescent on the apex and a marginal hyaline area on the apex of the sixth longitudinal vein. Redescribed from 3 males and 1 female. Recorded in Michigan from Aug. 16-September 29. County records: Oakland, Wayne, St. Clair, Kent, Gladwin, Ingham, Washtenaw.

EUROSTA ELSA Daecke

Eurosta elsa Daecke, 1910, Ent. News, vol. 21, p. 342.

Eurosta elsa Daecke. PHILLIPS, 1923, Journ. N. Y.
Ent. Soc., vol. 31, p. 143, fig. 46.

Similar to E. comma except that the comma in the triangular marginal indentation just beyond the stigma is absent in this species. Also the ovipositor sheath is transversely ridged in E. elsa while in E. comma it is otherwise.

One specimen caught September 1, 1948 in Augusta, Michigan, Kalamazoo County. I have 2 other specimens caught in Michigan by other students without date and locality.

GENUS JAMESOMYIA QUISENBERRY

JAMESOMYIA GEMINATA (Loew)

Trypeta geminata Loew, 1861, Cent., II, p. 75.

Trypeta geminata Loew, 1873, Mon. Dipt. N. Am.,
part 3, p. 298, Tab. XI, fig. 1.

Trypeta (Tephritis) geminata Loew. COSTEN-SACKEN,
1878, Smithsn. Misc. Collect. 270, p. 193.

Tephritis geminata (Loew). ALDRICH, 1905, Cat. N.
Am. Dipt., p. 612.

Euribia geminata (Loew). PHILLIPS, 1923, Journ.
N. Y. Ent. Soc., vol. 31, p. 150, fig. 62.

Jamesomyia geminata (Loew). QUISENBERRY, 1949, Bul.
Brklyn., Ent. Soc., vol. 44, p. 50.

General color dark grey. Central portion of front yellow, sides whitish. Antennae dark yellow. Lower half

of face whitish, upper half dark brown, forming a transverse band between the eyes. Four pairs of pale fronto-orbitals and two pairs of pale upper fronto-orbital bristles. The vertical bristles are somewhat darker in color. Mesonotum ground color black, golden pollinose, except for humeri and posterior half of calli, which are yellowish. Mesonotum covered with numerous pale yellow, stout hairs. Few black hairs found next to humeri medially. Bristles placed on black spots, except for ones on humeri. Scutellum yellow posteriorly and dark brown on the extreme base, with two pairs of bristles, the anterior lateral pair placed on the dark brown of the base. Metanotum dark brown, pollinose. Abdomen yellow anteriorly, dark brown posteriorly. There are four longitudinal rows of black spots, the spots expanding successively in such a manner that from the third segment the spots seem to appear coalesced giving the dark brown color of the posterior. Hairs upon the abdomen numerous, pale yellow, except those on spots which are black. Ovipositor sheath brownish black with numerous minute golden hairs. A yellow band runs from the humerus to the base of the wing on the upper border of the pleura. Tibia, tarsi, and tip of femora, yellow. Rest of femora dark brown. Coxa and trochanter yellow, tinted with brown. Wing markings dark brown.

Redescribed from 2 females and 1 male.

Recorded in Michigan from July 9-August 9.

County records: Charlevoix, Cheboygan, Livingston,
Muskegon, Missaukee.

GENUS MYOLEJA RONDANI

MYOLEJA LIMATA (Coquillett)

Aciura limata Coquillett, 1899, Journ. N. Y. Ent. Soc., vol. 7, p. 265.

Aciura limata Coquillett. ALDRICH, 1905, Cat. N. Am. Dipt. p. 607.

Aciura (Eucosmoptera) limata Coquillett. PHILLIPS, 1923, Journ. N. Y. Ent. Soc., vol. 31, p. 131, fig. 17.

Eucosmoptera limata (Coquillett). CURRAN, 1932, Am. Mus. Nov. no. 556, p. 12.

Myoleja limata (Coquillett). BENJAMIN, 1934, USDA Tech. Bul. 401, p. 21, fig. 16, A-L.

General color brown. Front mostly yellowish brown, whitish next to eye. Antennae yellowish brown. Face yellowish brown, tinged with white. Three pairs of fronto-orbitals and two pairs of upper fronto-orbital bristles. Mesonotum with broad pale brown band on each side of center. Alongside, another not too distinct pale brown band, broken at the transverse suture. All these broad bands separated from each other by narrow strips of darker brown. In one specimen there are no bands, the central portion is dark brown and the lateral and posterior borders are pale brown. Scutellum pale brown with four long black bristles. Metanotum shining dark brown. Abdomen shining dark brown. Pleura light brown. Legs yellowish, the femora more or

less brownish. Wing markings dark brown.

Redescribed from 1 male and 1 female.

Only 2 specimens caught on August 1, 1934 in Lake Co.

GENUS XANTHOMYIA PHILLIPS

XANTHOMYIA PLATYPTERA (Loew)

Trypeta platyptera Loew, 1873, Mon. Dipt. N. Am.,
part 3, p. 306.

Trypeta (Tephritis) platyptera Loew. OSTEN-SACKEN,
1878, Smithsn. Misc. Collect. 270, p. 193.

Tephritis platyptera (Loew). ALDRICH, 1905, Cat.
N. Am. Dipt., p. 612.

Xanthomyia platyptera (Loew). PHILLIPS, 1923,
Journ. N. Y. Ent. Soc., vol. 21, p. 140, fig.
38.

General color brownish grey. Front yellowish, central portion darker than next to eye. Antennae yellow, face whitish. There is a light brown spot between eye margin and base of antenna. Two pairs of black fronto-orbitals and two pairs of upper fronto-orbital bristles, the uppermost pair pale. Outer vertical bristles pale and stout. Occiput is blackened on the upper half. There is a long black bristle on the cheek on each side. Mesonotum grey, pollinose with a brown longitudinal stripe through the middle. On each side is a row of spots, the first pair which is indistinct is located before the suture, the

second on the transverse suture, and the third at the base of the anterior dorsocentral bristles, these spots often streaked posteriorly. If these spots not streaked backward then posterior pair of dorsocentrals placed in brown spots. Other bristles of mesonotum are also placed in brown spots. Between the dorsocentral and alar bristle on each side is a streak of brown. Humeri yellow. Scutellum blackish in center, ivory to yellow on the lateral borders and apex. The scutellar bristles are placed in black dots within the pale borders; the black dot of the posterior pair connected with the black central color. Metanotum black, pollinose. Abdomen mostly blackish. A narrow grey longitudinal strip runs through the middle and on each side near the borders, a row of grey spots, the spots located on the anterior margin of the segments. Sometimes these spots extended to the posterior margin forming a longitudinal strip of grey on each side. First abdominal segment grey on anterior half. Ovipositor sheath shining, brownish black dorsally, yellow ventrally. Pleura mostly grey pollinose. The upper portion of the sternopleura, a patch above the hind coxa, a spot on upper portion of mesopleura, and along sutures between meso, ptero, and sternopleura, are yellowish. The propleura and the anterior border of the mesopleura are also yellowish. Legs yellow. There are two black spots on the underside of each hind and middle femora. The distal spots on the middle femora of one specimen are not distinct. In 2 male specimens

there is a brown spot on each fore femora on the underside at the base. Wing markings light brown.

Redescribed from 4 males and 1 female.

Recorded in Michigan from May 25-August 18.

County records: Oakland, Jackson, Washtenaw, Bay, Monroe, Wayne, Macomb.

GENUS ICTERICA LOEW

ICTERIA SERIATA (Loew)

Trypeta seriata Loew, 1862, Mon. Dipt. N. Am., part 1, p. 84.

Trypeta seriata Loew, 1873, Mon. Dipt. N. Am., part 3, p. 287, Tab. X, fig. 18, SNOW, 1894, Kan. Univ. Quart. II, p. 171.

Trypeta (Icteric) seriata Loew. OSTEN-SACKEN, 1878, Smithsn. Misc. Collect. 270, p. 193.

Icteric seriata (Loew). ALDRICH, 1905, Cat. N. Am. Dipt., p. 610. PHILLIPS, 1923, Journ. N. Y. Ent. Soc. vol. 31, p. 145, fig. 49.

General color yellowish brown. Head, including antennae, light brown. Three pairs of fronto-orbitals and two pairs of upper fronto-orbital bristles. Mesonotum light brown, tinged with yellow, covered with small yellow hairs. Scutellum concolorous with mesonotum, with four long brown bristles. Metanotum same color as mesonotum, pollinose. Abdomen yellowish brown with dark brown patches

here and there. Ovipositor sheath concolorous with abdomen, except for the extreme tip which is black. Pleura and legs light brown, tinged with yellow. Wings light brown with dark brown markings.

Redescribed from 3 females and 1 male.

Recorded in Michigan from June 2-September 4.

County records: Wayne, Oakland, Livingston, Huron, Midland, Tuscola, Van Buren.

GENUS STRAUZIA ROBINEAU-DESVOIDY

STRAUZIA LONGIPENNIS (Wiedemann)

Described as *Trypeta longipennis* by Wiedemann (44, p. 483) in 1830. There is a great deal of variation in this species. Loew (29, p. 238-243) separates the species into seven varieties. Phillips (36, pp. 125, 126) gives a key to the varieties. Since there is a great deal of intergradation between varieties, it is very difficult or perhaps impossible to place every specimen in one of the variety groups. In this paper it will be treated as one whole specific group.

General color yellow to yellowish brown. Front yellow, the lateral borders raised to form a basin which may be from very shallow to very deep depending on variety. Usually the ones with incrassated and truncated fronto-orbitals have deeper basins. Face whitish, antennae yellow. Three or four pairs of fronto-orbitals. One pair upper

fronto-orbitals have no upper fronto-orbital bristles. Mesonotum, scutellum, metanotum, abdomen, pleura, and legs, yellow to yellowish brown. In some specimens the base of the lateral borders of the scutellum is black. Ovipositor sheath yellow to yellowish brown, black or brown at the tip. Wing markings yellowish brown to dark brown, with a great deal of pattern variations. Wing bands may run obliquely in some specimens to a single somewhat longitudinal band in others.

Redescribed from numerous specimens.

Recorded in Michigan from April 26-July 27.

County records: Wayne, Washtenaw, Midland, Ingham,
Berrien, Kent, Hillsdale, Bay, Monroe,
Shiawassee.

GENUS CRELLIA ROBINEAU-DESVOIDY

CRELLIA RUFICAUDA (Fabricius)

Described as Musca ruficauda by Fabricius (20, p. 353) in 1792. The species commonly going under the name Terellia florescentiae in this country, described as Musca florescentiae by Linnaeus (26, p. 601) in 1758, should probably be referred to as Crellia ruficauda.

General color yellowish grey. Front and antennae pale yellow to yellowish brown. Face of paler color. Three pairs of fronto-orbitals and two pairs of upper fronto-orbital bristles. Mesonotum black pollinose, ex-

cept for the lateral borders and a triangular area extending from the posterior border, which are pale yellow or yellowish green. Some may have the whole mesonotum black pollinose. Scutellum pale yellowish green to yellow, except for extreme bases of lateral margins, which are brownish. Metanotum black, except for sides which are yellowish green. Abdomen yellowish green to grey with four longitudinal rows of black spots. The spots are sometimes joined transversely at the anterior margin of the segments. Male with additional spots on posterior margin of the last segment in line with the outer row, more frequently these spots are joined to the preceding dots. Ovipositor sheath rufous brown, black at the base and extreme tip. Pleura with a yellowish band running from the humerus to the base of the wing, with a brownish band below, ventral triangular portion of sternopleura and a spot above the posterior coxa, black. Legs yellow, the femora usually tinted with brown.

Redescribed from 10 females and 13 males.

Recorded in Michigan from June 14-September 5.

County records: Otsego, Midland, Ingham, Lapeer, Wayne, Wexford, Alpena, Missaukee, Washtenaw, Mason, Cheboygan, Iron, Tuscola, Schoolcraft, Grand Traverse, Alger, Eaton.

CRELLIA PALPOSA (Loew)

Trypeta palposa Loew, 1862, Mon. Dipt. N. Am. part
1, p. 74.

Trypeta palposa Loew, 1873, Mon. Dipt. N. Am. part
3, p. 253, Tab. X, fig. 9. SNOW, 1894, Kans.
Univ. Quart. II, p. 162. ALDRICH, 1905, Cat.
N. Am. Dipt., p. 605.

Trypeta (Trypeta) palposa Loew. OSTEN-SACKEN, 1878,
Smithsn. Misc. Collect. 270, p. 190.

Terellia palposa (Loew). PHILLIPS, 1923, Journ.
N. Y. Ent. Soc., vol. 31, p. 138, fig. 32.

General color yellow. Head yellow; front, between the fronto-orbital bristles and the third antennal segment darker yellow. Three pairs of fronto-orbitals and two pairs of upper fronto-orbital bristles. Thorax with a glossy brown or black area in the middle of its anterior side next to head. Mesonotum mostly brown, pollinose, covered with small pale hairs. The brown color forms four extensions posteriorly, the outer pair longer than the inner pair. Area from the posterior margin of the mesonotum to between the extensions, yellow. Sometimes this area is triangular in shape due to the fusion of the inner pair of extensions. A yellow streak, on each side, runs from the posterior margin to the transverse suture going between the dorsocentrals and alar bristles. Sometimes this streak is absent, making the entire mesonotum, except the humeri, brown, pollinose. The four dorsocentral bristles are placed on black dots. Scutellum yellow, only the base of the lateral borders, black. Metanotum brown or black, if black

then glossy area next to head black also. Abdomen yellow with four rows of longitudinal dots, the dots situated on the anterior edge of each segment. Males with two black dots on the posterior margin of the last segment in line with the outer rows of dots. Ovipositor sheath long and conical. Pleura with the upper edge yellow, and a yellowish brown band below. Ventral triangular portion of sternopleura and a patch above the posterior coxa, brown or black. Posterior border of metapleura next to halteres, blackened. Legs yellow with brownish tint. Can be easily distinguished from O. ruficauda by its yellowish general color.

Redescribed from 22 males and 7 females.

Recorded in Michigan from July 20-September 4.

County records: Ingham, Livingston, Kent, Montmorency, Antrim.

GENUS NEASPILOTA OSTEN-SACKEN

Key to the Michigan species of Neaspilota.

1. Wings with markings in addition to one in stigma.....N. vernoniae(Loew)
Only stigma marked or wings entirely hyaline..... 2
- 2(1). Stigma entirely brown or brownish black; grey of abdomen uniform.....N. albidipennis (Loew)
Stigma faintly yellowish; abdomen yellow to brown not uniformly grey.....N. alba (Loew)

NEASPILOTA ALBA Loew

Trypeta alba Loew, 1862, Mon. Dipt. N. Am., part

1, p. 100.

Trypeta (Aspilota) alba Loew, 1873, Mon. Dipt. N.

Am., part 3, 285, Tab. XI, fig. 11.

Trypeta (Neaspilota) alba Loew. COSTEN-SACHEN, 1878,

Smithsn. Misc. Collect. 270, p. 192.

Neaspilota alba (Loew). ALDRICH, 1905, Cat. N. Am.

Dipt., p. 610. CRESSON, 1907, Trans. Am. Ent.

Soc., vol. 33, p. 101. PHILLIPS, 1923, Journ.

N. Y. Ent. Soc., vol. 31, p. 139, fig. 35.

CURRAN, 1932, Am. Mus. Nov. no. 526, p. 3

BENJAMIN, 1934, USDA Tech. Bul. 401, p. 37,

fig. 27, A-K.

General color greyish yellow. Front and face pale yellow, antennae darker yellow. Three pairs of fronto-orbitals and two pairs of upper fronto-orbital bristles. Thorax with a shining black spot on anterior side next to head. Ground color of mesonotum mostly black, covered with pollen and small pale hairs. This black coloring forms four extensions posteriorly, the outer pair much longer than the inner pair. Sometimes the inner extensions are fused. The lateral borders and the area from posterior margin of the mesonotum to between the extensions, yellow. Scutellum yellow with four long bristles. Metanotum, except for sides, black covered with pollen. Abdomen yellow to brown. Ovipositor sheath yellowish brown, the lateral borders more yellowish. Pleura yellow, except for triangular spot on the lower part of the sternopleura and a spot above the hind coxa, which are black covered with

pollen. Legs yellow. Wings entirely hyaline except for stigma which may be very faintly yellow.

Redescribed from 2 females and 1 male.

Recorded in Michigan from July 1-August 6.

County records: Ingham, Oceana, Monroe.

NEASPILOTA ALBIDIPENNIS (Loew)

Trypeta albidipennis Loew, 1861, Cent., I, p. 73.

Trypeta albidipennis Loew, 1862, Mon. Dipt. N. Am.,
part 1, p. 100.

Trypeta (Aspilota) albidipennis Loew, 1873, Mon.

Dipt. N. Am., part 3, p. 286, Tab. XI, fig. 10.

Trypeta (Neaspilota) albidipennis Loew. OSTEN-
SACKEN, 1878, Smithsn. Misc. Collect. 270,
p. 192.

Neaspilota albidipennis (Loew). ALDRICH, 1905,

Cat. N. Am. Dipt., p. 610. PHILLIPS, 1923,
Journ. N. Y. Ent. Soc., vol. 31, p. 139, fig.

36. CURRAN, 1932, Am. Mus. Nov., no. 526, p.

3. BENJAMIN, 1934, USDA Tech. Bul. 401, p.

36. MALLOCH, 1942, Proc. U. S. Nat. Mus., vol.
92, no. 3133, p. 19.

General color grey. Middle portion of front and antennae brownish yellow. Face whitish. Three pairs of fronto-orbitals and two pairs of upper fronto-orbital bristles. Thorax with a black spot on anterior side next to head. Mesonotum, except for lateral borders and pos-

terior area, black covered with whitish pollen. Scutellum yellow. There is a slight indication of brown on the extreme base of the lateral margins. Metanotum black covered with whitish pollen. Abdomen grey, the lateral margins and often the posterior margins of segments yellowish. At any rate the posterior portion of the last segment in the male is distinctly yellow. Pleura grey, pollinose, except for the upper border and a longitudinal strip through the middle, which are yellowish. Legs yellow, the femora tinged with brown. Wings hyaline except for stigma which is distinctly brownish. Can be differentiated from M. alba by the uniform grey color of the abdomen and the distinct coloring of the stigma.

Redescribed from 3 males.

Recorded in Michigan from July 25-August 6.

County records: Kent, Livingston, Wayne, Monroe.

NEASPILOTA VERNONIAE (Loew)

Trypeta vernoniae Loew, 1861, Cent., I, p. 74.

Trypeta vernoniae Loew, 1862, Mon. Dipt. N. Am.

part 1, p. 101; 1873, Mon. Dipt. N. Am. part 3, p. 286, Tab. XI, fig. 8.

Trypeta (Neaspilota) vernoniae Loew. OSTEN-SACKEN, 1878, Smithsn. Misc. Collect. 270, p. 192.

Neaspilota vernoniae (Loew). ALDRICH, 1905, Cat.

N. Am. Dipt., p. 610. MALLOCH, 1942, Proc.

U. S. Nat. Mus., vol. 92, no. 3133, p. 18.

Terellia vernoniae (Loew). PHILLIPS, 1923, Journ.

N. Y. Ent. Soc. vol. 31, p. 138, fig. 33.

General color yellowish brown. Front and antennae yellow, face whitish. Three pairs of fronto-orbitals and two pairs of upper fronto-orbital bristles. Thorax with a brown shining spot next to head. Mesonotum brown, the lateral borders paler, covered with yellow short hairs. Scutellum yellow. Metanotum black with yellow lateral borders. Abdomen yellow tinted with dark brown. Ovipositor sheath brownish yellow, the tip darker brown. Pleura yellowish brown. Legs yellow to yellowish brown. Wing markings light brown. Easily distinguished from N. alba and N. albidipennis by having wing markings in addition to the stigma being colored.

Redescribed from 1 male and 1 female.

Recorded in Michigan from July 25-August 6.

County records: Livingston, Monroe.

GENUS RHAGOLETIS LOEW

Key to the Michigan species of Rhagoletis.

- | | | |
|-------|---|---|
| 1. | Wings with a clear hyaline band extending from the costal margin, going between the anterior and posterior cross-vein, to the posterior margin..... | 2 |
| | Wings without such hyaline band..... | 4 |
| 2(1). | Body yellowish brown..... <u>R. alternata</u> (Fallen) | |
| | Body blackish..... | 3 |
| 3(2). | Wings with a dark spot on the tip of the third vein, this dark spot may sometime be joined lightly to the adjacent dark band..... | |
| | <u>R. cingulata</u> (Loew) | |
| | Wings without such spot; an apical hyaline crescent present on the wing margin..... | |
| | <u>R. tabelleria</u> (Fitch) | |

- 4(1). Body blackish..... 5
 Body yellow, at most yellowish brown.....
R. suavis (Loew)
- 5(4). Wings with an apical hyaline crescent on
 margin..... 6
 Wings without an apical hyaline crescent on
 margin.....R. fausta (Csten-Sacken)
- 6(5). Wings with a hyaline band extending from the
 costal margin to between the anterior and
 posterior crossvein..R. tabellaria (Fitch)
 Wings without such hyaline band.....
R. pomonella (Walsh)

RHAGOLETTIS POMONELLA (Walsh)

Described as Trypeta pomonella by Walsh (43, p. 338-343) in 1867. Since discussed by many writers.

General color black. Front and antennae brownish yellow. Face pale yellow. Three pairs of fronto-orbitals and two pairs of upper fronto-orbitals bristles. Mesonotum dark brown with a longitudinal pollinose whitish band each side of center. Humeri ivory, porcelain-like. Scutellum with ivory porcelain-like area which covers the base of the apical pair of bristles but not the anterior pair; base brownish black. Metanotum shining blackish brown. Abdomen blackish brown with the posterior margins of the first three in the male and the first four segments in the female, whitish. Fleura shining blackish brown; a band which runs from the humerus to below the notopleura, to the base of the wing, ivory porcelain-like. Legs yellowish, the femora usually more tinted with brown than the other parts of the legs. Wing markings dark brown; the antero-apical margin with a narrow hyaline strip.

Redescribed from numerous specimens.

Recorded in Michigan from June 16-September 27.

County records: Oakland, Lapeer, Ingham, Shiawassee,
Bay, Charlevoix, Oceana, Berrien, Van
Buren, Monroe, Leelanau, Kalamazoo, Antrim,
Benzie, Livingston, Mecosta, Ionia, Mason,
Grand Traverse.

RHAGOLETIS FAUSTA (Osten-Sacken)

Trypeta (Acidia) fausta Osten-Sacken, 1877, Bul.

U. S. Geol. and Geo. Surv. III, p. 346.

Trypeta (Acidia) fausta Osten-Sacken, 1878, Smithsn.

Misc. Collect. 270, p. 189.

Rhagoletis fausta (Osten-Sacken). COQUILLETT, 1899,

Journ. N. Y. Ent. Soc., vol. VII, p. 260.

ALDRICH, 1909, Can. Ent., vol. XLI, p. 70.

HEWITT, 1911, Rep. Exp. Farms, Can., p. 230.

ILLINGWORTH, 1912, Bul. Cornell Agr. Sta.,

no. 325, p. 191. CAESAR, 1915, Rep. Ent.

Soc. Ent., vol. XLV, p. 107, fig. 22. PHILLIPS,

1923, Journ. N. Y. Ent. Soc., vol. 31, p. 135,

fig. 26. CRESSON, 1929, Trans. Am. Ent. Soc.,

vol. 55, p. 404, pl. XVI, fig. 2. CURTAN, 1932,

Am. Mus. Nov., no. 526, p. 6.

Acidia fausta (Osten-Sacken). ALDRICH, 1905, Cat.

N. Am. Dipt., p. 603.

Rhagoletis intrudens Aldrich, 1909, Can. Ent. vol.

XLI, p. 70, pl. 4, fig. 3.

General color blackish. Front and antennae yellow with brownish tint. Face pale yellow. Three pairs of fronto-orbitals and two pairs of upper fronto-orbital bristles. Mesonotum blackish brown, pollinose whitish bands running longitudinally as in R. pomonella. Humeri ivory, porcelain-like. Scutellum ivory, porcelain-like except for the bases of the lateral margins which are blackish. Metanotum shining black. Abdomen brownish black. Posterior margins of segments not whitish. Upper border of pleura with same porcelain-like band as in R. pomonella. Trochanter, apex of femora, tibia, and tarsi yellow; coxa and most of femora dark brown tinted with yellow. Wing markings dark brown; no hyaline antero-apical strip as in R. pomonella. This species can be easily separated from R. pomonella by the wing pattern, the extent of ivory on the scutellum, and by the lack of white on the posterior margins of the abdominal segments.

Redescribed from numerous specimens.

Recorded in Michigan from June 15-August 3.

County records: Kent, Leelanau, Allegan, Benzie, Oceana, Antrim.

RHAGOLETTIS CINGULATA (Loew)

Described as *Trypeta cingulata* by Loew (27, p. 76) in 1862. Since described by many writers.

General color blackish. Head yellow to brownish yellow. Three pairs of fronto-orbitals and two pairs of

upper fronto-orbital bristles. Mesonotum dark brown, pollinose except for posterior portion and three narrow stripes running longitudinally, one through center and on each side. Humeri ivory, porcelain-like. Scutellum as in R. fausta. Metanotum concolorous with thorax. Abdomen dark brown with whitish margins as in R. pomonella. Legs yellow, femora often tinted with brown. Wing bands dark brown. This species can be differentiated from the others in this genus by a infuscated spot at the apex of the third vein; from R. pomonella and R. fausta by a hyaline strip which runs from just beyond the stigma through the discal cell to the posterior margin. Redescribed from numerous specimens.

Recorded in Michigan from June 14

County records: Kent, Leelanau, Emmet, Allegan, Benzie, Oceana, Van Buren, Berrien, Charlevoix, Lapeer, Antrim, Grand Traverse, Manistee, Mason, Saginaw, Iron, Sanilac.

RHAGOLETIS SUAVIS (Loew)

Trypeta suavis Loew, 1862, Mon. Dipt. N. Am., part 1, p. 175, Tab. II, fig. 10.

Trypeta (Acidia) suavis Loew, 1873, Mon. Dipt. N. Am., part 3, p. 235, Tab. X, fig. 10. OSTEN-SACKEN, 1878, Smithsn. Misc. Collect. 270, p. 189.

Rhagoletis suavis (Loew). COQUILLET, 1899, Journ. N. Y. Ent. Soc., vol. 7, p. 260. BAEB, 1902,

Ent. News, vol. 12, p. 242, pl. 1. ALDRICH, 1909, Can. Ent., vol. XLI, p. 69. PHILLIPS, 1923, Journ. N. Y. Ent. Soc., vol. 31, p. 136, fig. 24. CRESSON, 1929, Trans. Am. Ent. Soc., vol. 55, p. 411, pl. 16, fig. 8. CURRAN, 1932, Am. Mus. Nov. no. 526, p. 6.

Acidia suavis (Loew). ALDRICH, 1905, Cat. N. Am. Dipt., p. 603.

In Curran's key (13, p. 6) "suavis" is spelled "sauvis" which is probably a typographical error.

General color yellowish brown. Front and antennae yellowish brown, face pale yellow. Three pairs of fronto-orbitals and two pairs of upper fronto-orbital bristles. Mesonotum yellowish brown covered with numerous pale short hairs, humeri ivory. Scutellum ivory, tinted with brown, the basal angles more brownish. Sometimes the scutellum is concolorous with the mesonotum. There are usually four bristles on the scutellum but I have one specimen with six definite bristles, the extra pair found on the **extreme** apex. Metanotum shining yellowish brown. Abdomen yellowish brown, the posterior margins of segments 1-3 in the males and 1-4 in the females, pale. Abdomen covered with numerous dark brown hairs and few pale hairs. The upper border of pleura with ivory-like band as in R. pomonella. Legs yellowish brown. Wing markings light brown. Can be easily distinguished from R. pomonella, R. cingulata,

R. fausta, and R. tabellaria by the yellowish brown general color; from R. alternata by the wing pattern.

Redescribed from numerous specimens.

Recorded in Michigan from June 1-September 26.

County records: Ingham, Livingston, Ionia.

RHAGOLETIS TABELLARIA (Fitch)

Described as Trypeta tabellaria by Fitch (21, p. 66) in 1856. Cresson (10, p. 406) says that this species is synonymous to R. ribicola of Doane (17, p. 69) and Aldrich (2, p. 69) and to R. juniperinus of Marcovitch (31, p. 171) and Phillips (36, p. 135).

General color black. Antennae and central portion of front yellow to yellowish brown. Face and part of front next to eye whitish. Three pairs of fronto-orbitals and two pairs of upper fronto-orbital bristles. Occiput black with whitish borders. Mesonotum black, except for humeri. Two pollinose strips run longitudinally on each side of center. Scutellum ivory-like on the central portion and apex, lateral borders and base black. Apical pair of scutellar bristles is located on the ivory color and the anterior pair on the black. Metanotum shining black. Abdomen mostly black, whitish on the posterior margin of segments. Ovipositor sheath shining black. Fleura brownish black with ivory-like upper border as in R. pomonella. Legs yellow, except for femora which is dark

brown. In one specimen I have seen there is a distinct band connecting the second and third bands on the posterior margin of the wing. This species can be distinguished from the other species of Michigan Rhagoletis by the wing markings.

Redescribed from 2 males and 1 female.

Recorded in Michigan from June 28-July 9.

County records: Mackinac, Cheboygan, Clare, Manistee,
Schoolcraft, Grand Traverse.

DISCUSSION

DISCUSSION

Inasmuch as there are slight differences within species it will be proper to discuss some variations from descriptions written by other authors, as seen by the writer, of Michigan specimens.

Differences in color and patterns were noticeable in Michigan specimens. Where other authors have said "yellow" Michigan specimens may be from "yellow to brown". This gradation of color may be due to the length of time the specimens were in the killing bottle or to the degree of greasiness. Yet it might be due to a natural physiological process or other unknown factors. As some descriptions were written from old specimens, fading may give a color deviation in the description.

Phillips (36, p. 172), in her description of Xanthaciura tetraspina, says that the "front, face, and antennae are yellow". In my specimen of this species they are rufous brown. Dark patterns on the mesonotum are variable in Crellia palposa and Measpilota alba. There are usually four dark extensions or lobes streaking posteriorly in the above two species. In some the two inner lobes are absent and in a few the entire mesonotum is dark with no specific pattern. Often where there were pollinose bands on the mesonotum, greasiness destroyed them.

In the Michigan species of genus Eurosta the metanotum showed a variation from a distinct black central

area to a unicolorous rufous brown metanotum. In species where there are rows of spots on the abdomen the usual variations are the differences in size of the spots and the fusion of the spots either longitudinally or transversely.

Wing markings show a great deal of variation, especially where the pattern consists of reticulation or dark color with numerous hyaline spots. Wing patterns which are in forms of bands or stellation are usually consistent. One noticeable exception in a band pattern, is a specimen of Rhagoletis tabelleria where there is a distinct band connection between the second and third cross-bands on the posterior margin of the wings. In Eucaresta bella there is some variation as to the amount of hyaline spots in various cells, but in the first posterior cell the usual pattern is no hyaline spot aside from those on the wing margin. I have several specimens where there is a small but distinct spot above the posterior crossvein.

Bristle variations both in number and color are also noticeable. In genus Eurosta the frontal bristles show a great deal of differences as described in this paper. On the scutellum of Eurosta solidaginis the usual number of bristles is two but in my specimens it varies from two to four, this includes duplicates. The usual apical pair of scutellar bristles found in other Diptera is usually absent in Eurosta solidaginis but in a few specimens I have, there are bristles on the apex.

In Procecidochares penelope there are two pairs of upper fronto-orbital bristles which is different from the single pair of the other species of Procecidochares.

I have one interesting specimen of Rhagoletis suavis which has 6 scutellar bristles instead of the usual four, the extra pair found on the extreme apex.

There will no doubt be other variations if more material is gathered. It is the writer's hope that this paper will show a better concept of the species described.

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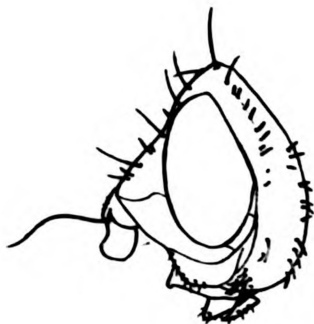
KEY TO THE PLATES

1. Euaesta aequalis (Loew)
2. Euaesta festiva (Loew)
3. Euaesta bella (Loew)
4. Ictericia seriata (Loew)
5. Eutreta sparsa (Wiedemann)
6. Eurosta solidaginis (Fitch)
7. Eurosta reticulata Snow
8. Eurosta elsa Daecke
9. Eurosta cornu (Wiedemann)
10. Neaspilota albidipennis (Loew)
11. Neaspilota vernoniae (Loew)
12. Neaspilota alba (Loew)
13. Tomoplagia obliqua (Say)
14. Xanthomyia platyptera (Loew)
15. Rhagoletis pomonella (Walsh)
16. Rhagoletis cingulata (Loew)
17. Rhagoletis suavis (Loew)
18. Rhagoletis fausta (Csten-Sacken)
19. Rhagoletis tabellaria (Fitch)
20. Trupanea cacetoptera Philips
21. Trupanea actinobola (Loew)
22. Trupanea absterse (Loew)
23. Janesomyia geminata (Loew)
24. Myoleja limata (Coquillett)
25. Tephritis pura (Loew)

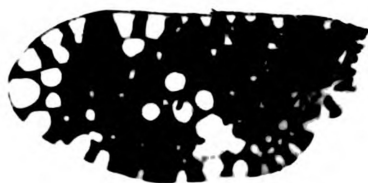
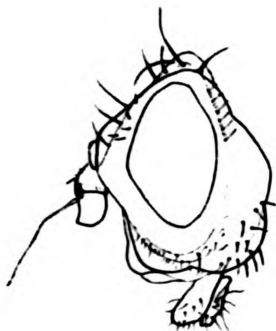
26. Tephritis angustipennis (Loew)
27. Tephritis albiceps (Loew)
28. Xanthaciura tetraspina (Phillips)
29. Paroryza sorocula (Wiedemann)
30. Procecidochares penelope (Csten-Sacken)
31. Procecidochares atra (Loew)
32. Callachna gibba (Loew)
33. Crellia ruficauda (Fabricius)
34. Crellia palposa (Loew)

PL. II

6



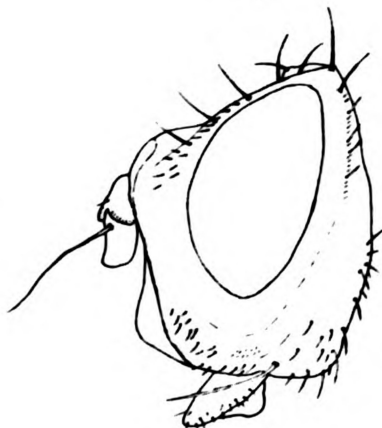
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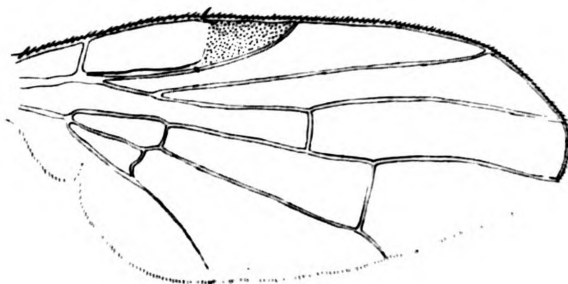
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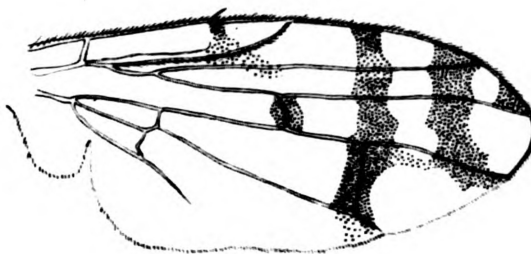
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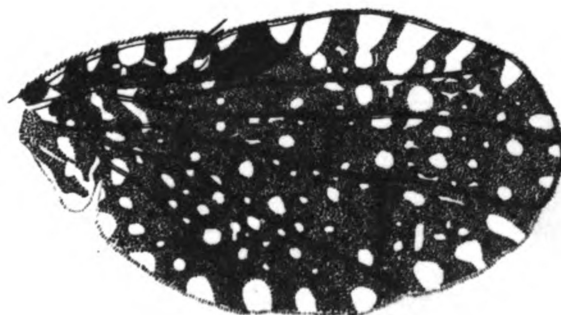
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PL. IV

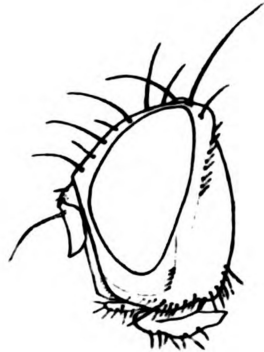
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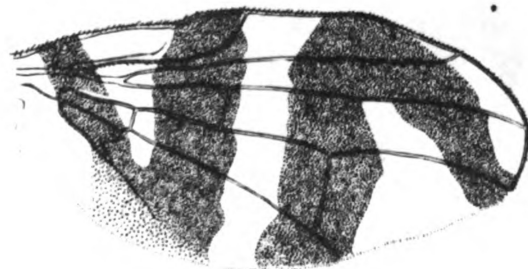
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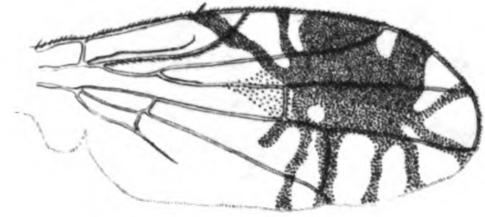


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PL.V

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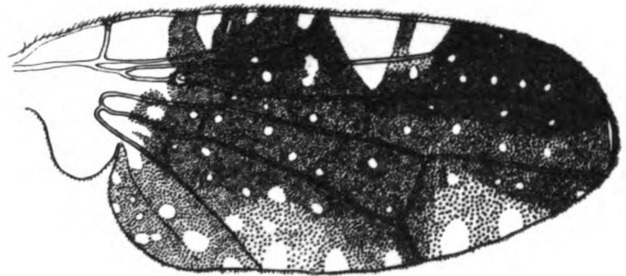
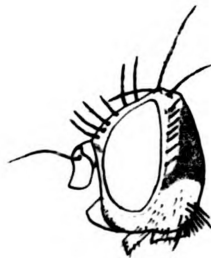
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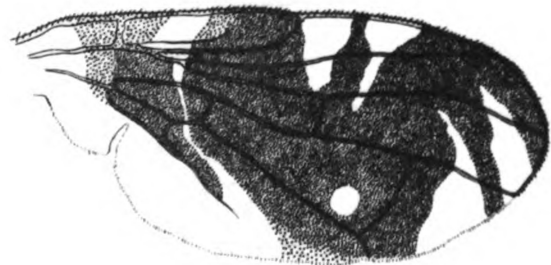
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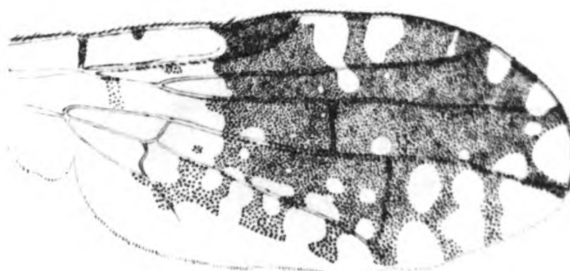


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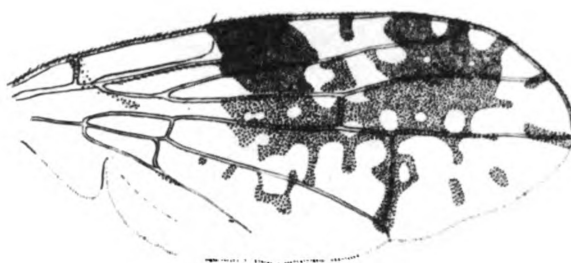


PL.VI

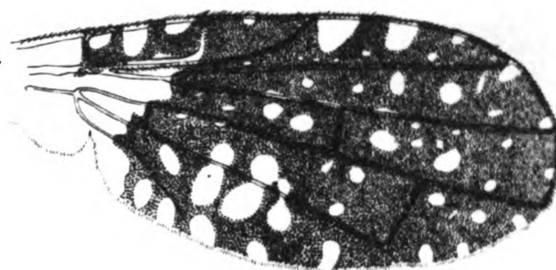
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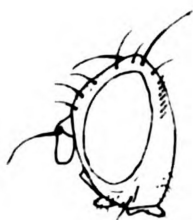


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PL.VII

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31



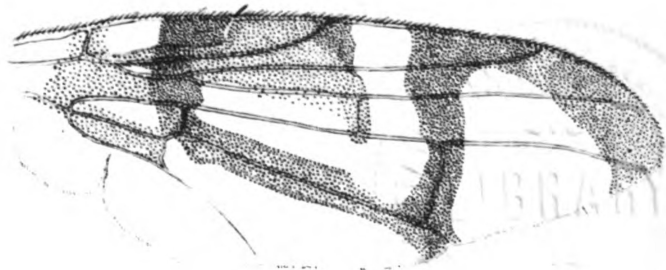
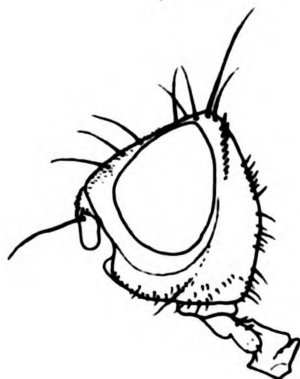
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