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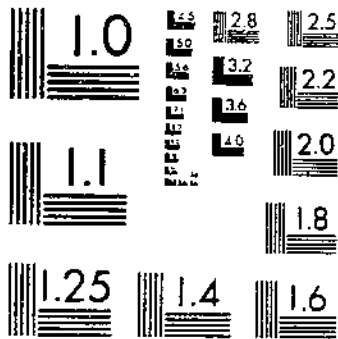
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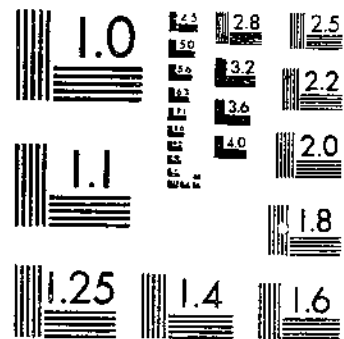
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DESCRIPTIONS OF SOME NATIVE TRYPETID FLIES WITH NOTES ON THEIR HABITS
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UNITED STATES DEPARTMENT OF AGRICULTURE
WASHINGTON, D.C.

DESCRIPTIONS OF SOME NATIVE TRYPETID
FLIES WITH NOTES ON THEIR HABITS

By FOSTER H. BENJAMIN, associate entomologist, Division of Identification and
Classification of Insects, Bureau of Entomology

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INTRODUCTION

The intensive inspections made in connection with the campaign to eradicate the Mediterranean fruit fly, *Ceratitis capitata* Wied., from Florida resulted in the collection of thousands of larvae and puparia of native flies belonging to the same family, the Trypetidae. Many of these represented little-known species of which the immature stages had neither been described nor associated with the adults. To make certain of identity, and thus avoid any possibility of confusion, some immature specimens of each different species were, as far as possible, reared to adults. Most of this rearing was done by D. J. Nicholson, working under the research unit. These rearings and the accurate, detailed biological notes made by Mr. Nicholson, form, in large part, the basis of this work. Only a comparatively

small percentage of the specimens discussed were reared by the writer or received from other sources.

The purpose of this publication is to describe these native species of trypetid flies, and discuss their classification so that they may be recognized from the immature stages, as well as from the adult flies. To make the text more accurate and complete, the types, as well as other specimens, in the collections of the United States National Museum, the Museum of Comparative Zoology at Cambridge, Mass., and the American Museum of Natural History in New York City have been studied and the results of these studies included.

RELATIONSHIPS AND STRUCTURAL CHARACTERS

Adult Trypetidae have three-jointed antennae, each antenna with a dorsal arista. The head usually possesses well defined frontal and other bristles, some of which may be obsolescent (but obsolescent in only one North American genus, *Toxotrypana*, which is so unique that it is easily recognized). The thorax has the transverse suture not completed across the dorsum. All possess a pair of wings, each of which has only a single marginal and single submarginal cell, or, in other words, only two veins running to the wing margin between the spined first vein and the first posterior cell, the latter easily recognized because of being separated from the first basal cell by the anterior cross vein; the auxiliary vein closely follows the course of the first vein, often appearing basally fused thereto, until sharply bent toward the costa; the anal cell is often drawn out to a point, or to a fingerlike projection on the sixth vein. The membranous lobe, called the calypter, on the thorax near the wing base, is small and inconspicuous, hence the name of the group, Acalyptratae. The foot (the terminal part of each last tarsal joint) does not have the central structure (the empodium) developed into a pad, and thus the empodium is stated to be not "pulvilliform" (i.e., not resembling the two other padlike structures (the pulvilli), one of which is near each claw. The abdomen has only four well-defined segments in the male, exclusive of the genitalia, and five in the female exclusive of the ovipositor sheath; the ovipositor sheath is conspicuous, seldom shorter than the length of the preceding segment and usually very much longer; the ovipositor (or sting) is hard and sharp pointed, and is retractile.

The eggs are variable in size and shape as between species or groups of species. The larvae are maggots living in fruits, flowers, galls, the stems of plants, or in mines in the tissue of the leaves. They are essentially primary feeders, eating the growing tissue, and not acting as scavengers upon decaying organic matter. The larva is divided into segments. The head is a compound structure which looks like a single small segment, with no definite head capsule, the mouth provided with two black or blackish hooks with which the larva obtains food by means of raking motions. The anterior spiracles are located one on each side at the base of the first thoracic segment, usually called, to the exclusion of the head, the first segment. These spiracles are the modified ends of tracheae, and are divided into small tubules, usually called beads, which vary in number from 2 to more than 30 on each spiracle. The number of beads on a spiracle in any given species is often subject to much variation;

but, within limits, the number of such beads is of specific significance. Counting from the rear of the head, the three following segments constitute the thorax. The abdominal segments are not superficially defined from the thoracic segments and, therefore, the first abdominal segment is usually called the fourth segment.

There are eight visible abdominal segments; which, counting the thoracic segments as 1, 2, and 3, are usually numbered 4 to 11. The eleventh segment has the hind (caudal) end more or less modified, sometimes almost appearing to be two segments.¹ Two spiracles, the only developed larval spiracles aside from the anterior pair, are located on the rear end of this segment. Except in very young larvae there are three spiracular openings, usually called slits, on each spiracle. These slits remain reasonably constant in shape, size, and arrangement within any given instar of a single species, but furnish characters separating species or groups of species. The larval skin is clothed with minute spines which appear to be obsolescent or obsolete on parts of the segments of various species, but are often conspicuous, especially near the margins of the segments and on the under (ventral) side of many species. After completing feeding, the larva forms a puparium, which is simply a resting stage of the larva, and not a true pupa. Within this puparium another larval stage (instar) is passed before the true pupa is formed. This last larval stage is but little known, and when occasionally observed is usually mistaken for a case of parasitization. The emerging adult forces off the end of the puparium by the expansion of a bladderlike structure, called the ptilinum, which is extruded through the frontal suture. This is one of the fundamental characteristics which helps to define a very large group of Diptera, including all of the Acalyptratae.

CHARACTERS USED IN CLASSIFICATION

An effort has been made to simplify the text. Nevertheless, certain terms are almost inescapable, especially the names of the different anatomical parts whose structure serves to supply differentiating characters. Definitions of the terms which are neither illustrated nor discussed under the heading Relationships and Structural Characters can be found in the larger dictionaries.

The terminology used for the various bristles, wing veins, and other structural parts is that recommended by J. M. Aldrich, associate curator of insects, United States National Museum.

In preparing the illustrations for this publication no uniformity in the scale of magnification of the various parts has been possible. Figures 1 to 10 are intended to indicate the nomenclature used in discussing the many parts of any of the species, although one particular species may have been used for the outline. For the important dimensions of the various species discussed and figured the reader is referred to the respective descriptions in the text of this publication.

The names of the parts of the head, including the names of the bristles (chaetotaxy), are shown in figure 1.

Figure 2 shows the names of the parts of the thorax, including the names of the bristles (chaetotaxy).

The names applied to the parts of the wing, illustrating two different systems of terminology, are shown in figures 3 and 4. Figure 3

¹ The eleventh segment, the eighth abdominal, is a compound segment, presumably formed from the primitive eighth, ninth, and tenth abdominal segments.

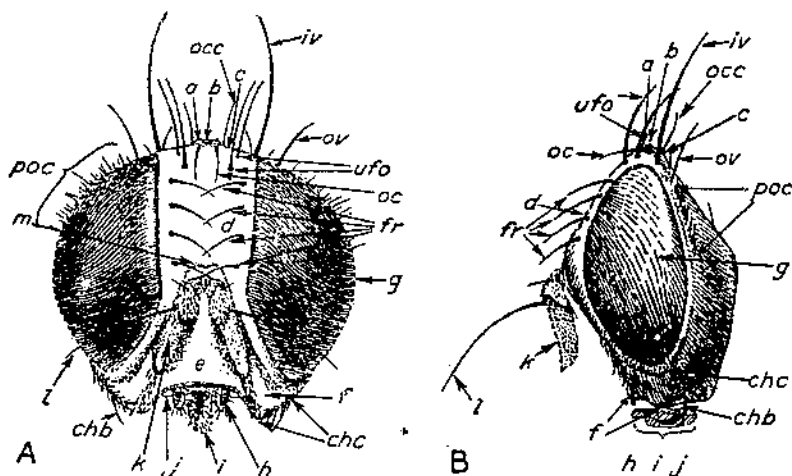


FIGURE 1.—Head of *Zonosemata electa*: A, Front view; B, side view; the parts are designated by the same italic letters in both views. a, Ocellar triangle; o, ocellus, two others not showing; c, vertex; d, front; e, face; f, cheek; g, compound eye; h, palpus; i, tongue, also called labelum or proboscis; j, mouth; k, antenna; l, arista (of the antenna); m, frontal suture; n, occipital bristle; o, inner vertical bristle; ov, outer vertical bristle; ufo, upper fronto-orbital bristles; oc, ocellar bristle; fr, frontal bristles; poc, postocular cilia; chc, cheek cilia; chb, cheek bristle.

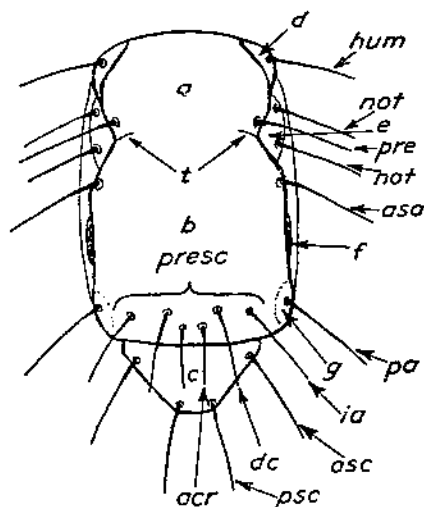


FIGURE 2.—Diagram of the dorsum (upper part) of the thorax of a species of *Anastrepha*: a, Prescutum of the mesothorax; b, scutum of the mesothorax (a plus b often called "the thoracic dorsum", or "the notum", or "the mesonotum"); c, scutellum; d, humerus; e, notopleuron or notopleura (in the plural also notopleura, or notopleurae); f, wing base; g, postalar callus (poorly defined, or invisible); h, the suture (the transverse suture, but usually called the suture); i, humeral bristle; k, notopleural bristles; l, presutural bristle; m, anterior supranalar bristle; n, postalar bristle; o, intralar bristle; p, dorsocentral bristle; q, acrostichal bristle; r, anterior scutellar bristle; s, posterior scutellar bristle; t, prescutellar row of bristles.

gives the names as used most extensively, and these are the names used in this publication. Figure 4 shows the names of the same parts as used in the Comstock-Needham system.

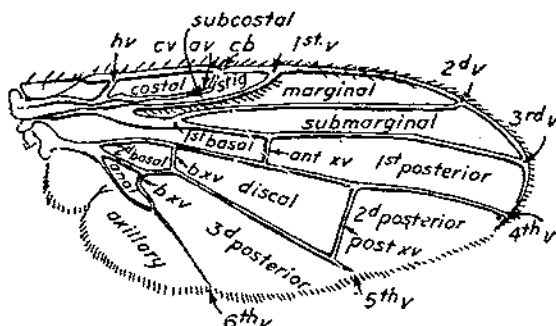


FIGURE 3.—Diagrammatic drawing of the upper side of the wing of *Rhagoletis cingulata*, with the names of the cells and the veins in general use by students of Diptera: *hv*, humeral cross vein; *av*, costal vein or costa; *av*, auxiliary vein; *1st v*, first (longitudinal) vein; *2d v*, second (longitudinal) vein; *3d v*, third (longitudinal) vein; *4th v*, fourth (longitudinal) vein; *5th v*, fifth (longitudinal) vein; *6th v*, sixth (longitudinal) vein; *ant xv*, anterior cross vein; *post xv*, posterior cross vein; *bxv*, basal cross vein; *cb*, costal break; *costal*, costal cell; *subcostal*, subcostal cell; *stigma*, stigma; *marginal*, marginal cell; *submarginal*, submarginal cell; *1st posterior*, first posterior cell; *2d posterior*, second posterior cell; *3d posterior*, third posterior cell; *arillary*, axillary cell; *1st basal*, first basal cell; *2d basal*, second basal cell; *anal*, anal cell.

The names applied to the parts of the abdomen and the male genitalia are given in figures 5 and 6. The genitalia are usually folded beneath the abdomen so the first genital segment is mostly hidden,

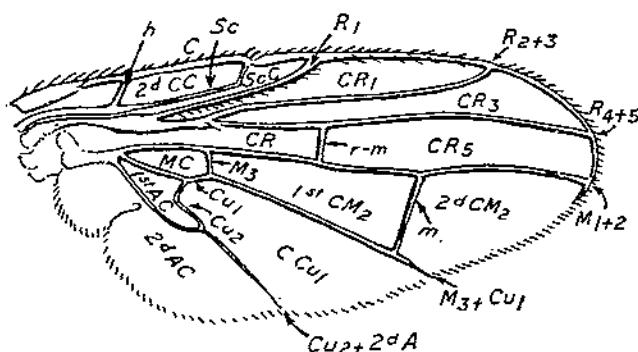


FIGURE 4.—Diagrammatic drawing of the upper side of the wing of *Rhagoletis cingulata*, with the names of the cells and the veins, according to the Comstock-Needham system: *h*, humeral cross vein; *C*, costal vein, or costa; *Sc*, subcostal vein; *R1*, (vein) radius 1; *R2+3*, (vein) radius 2 plus 3; *R4+5*, (vein) radius 4 plus 5; *M1+2*, (vein) media 1 plus 2; *M3+Cu1*, (vein) media 3 plus cubitus 1; *Cu2+2d A*, (vein) cubitus 2 plus second anal; *r-m*, radio-medial cross vein; *m*, medial cross vein; *2d C*, second costal cell; *Sc*, subcostal cell; *CR1*, cell radius 1; *CR3*, cell radius 3; *CR5*, cell radius 5; *2d CM2*, the second media 2 cell; *Cu1*, cell cubitus 1; *2d A*, second anal cell (the cell formed by the second anal vein); *CR*, the radial cell; *1st CM2*, first cell media 2; *M*, medial cell (the cell below the unbranched part of vein media, hence, the medial cell); *1st A*, first anal cell.

but often it overlaps a part of the ring of the second genital segment; and because of the folding the distal (tip) ends of the forceps are usually directed toward the thorax or toward the legs.

Figure 7 shows the names applied to the parts of the female genitalia.

The names applied to the parts of the larva (or maggot) are shown in figure 8, and the anterior spiracle is shown more in detail in figure 9.

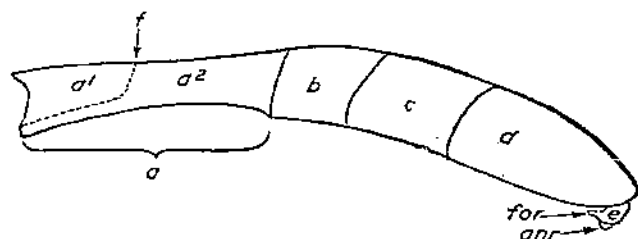


FIGURE 5.—Diagrammatic side view of the male abdomen of *Taxotrypana curvicauda*. Aside from the genitalia, only the upper plates (tergites) are visible, the lower (ventral) plates (sternites) being hidden: *a*, Usually called the first abdominal segment (in reality only the tergites of the first and of the second segments); *a*¹, the so-called proximal part of the first segment (in reality the tergite of the first abdominal segment); *a*², a part of the so-called first abdominal segment (in reality the tergite of the second segment); *b*, the so-called second abdominal segment (in reality the tergite of the third segment); *c*, the so-called third abdominal segment (in reality the tergite of the fourth segment); *d*, the so-called fourth abdominal segment (in reality the tergite of the fifth segment); *e*, male genitalia; *anr*, anal region; *for*, forceps; *f*, obsolescent division between the first and second tergites.

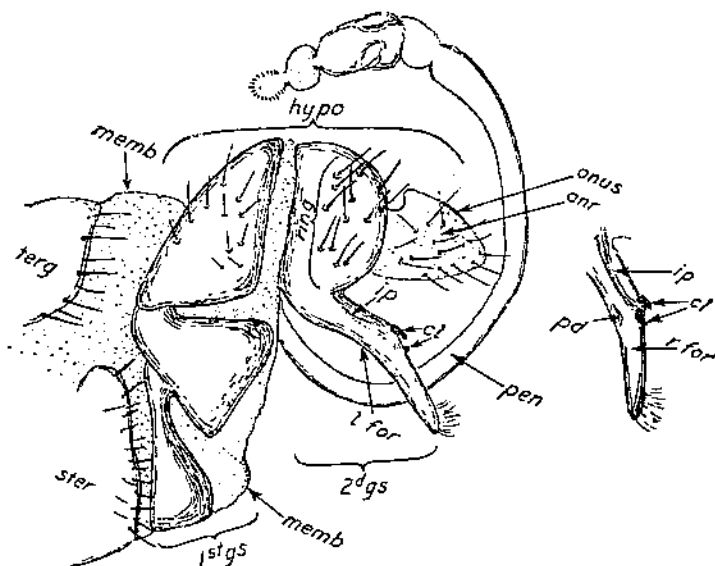


FIGURE 6.—Side view of caudal part of abdomen of *Rhagoletis cingulata*, showing the male genitalia, with a detached drawing of the inside of the right half of the forceps: *terg*, Tergite of the fourth (in reality the fifth) abdominal segment; *ster*, sternite of the fourth (fifth) abdominal segment; *1stgs*, first genital segment (in reality a modification of primitive segments 6, 7, and 8); *2dgs*, second genital segment; *ring*, the upper or ring-shaped part of the second genital segment; *l for*, the left half of the forceps, or left clasper; *r for*, the right half of the forceps, or right clasper, showing the structures of the inner part; *pd*, pad (a small soft structure, presumably sensory); *ip*, inner process (one on the inner side of each half of the forceps); *cl*, claws, or heavy spines; *pen*, penis; *anr*, anal region, or anal elevation (soft and distensible in life); *anus*, anus, or rectum; *hypo*, hypopygium (the visible structures of genitalia exclusive of the penis); *memb*, membrane connecting the various sclerites and the segments, a part of the body wall. Figured from microscopical preparations.

The caudal end of *Zonosemata electa* is shown in figure 10 with the names of the various structures indicated.

ECONOMIC IMPORTANCE OF THE GROUP

The trypetids, because their larvae begin feeding on growing or normal plant tissues, include many species which are serious economic pests. Of the species native to the United States, most of those

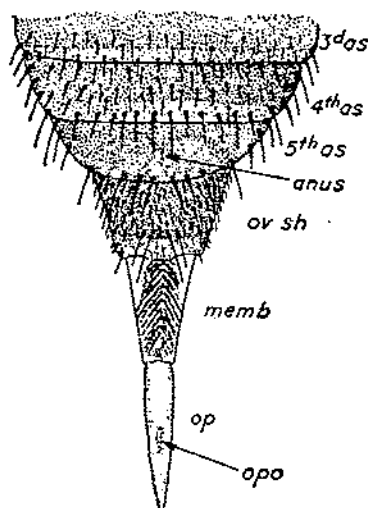


FIGURE 7.—Dorsal view of caudal part of abdomen of a female of *Ragoletis cingulata*, as seen on a microscope slide. *3das*, Third (in reality the fourth) abdominal segment; *4thas*, fourth (fifth) abdominal segment; *5thas*, fifth (sixth) abdominal segment; *ov sh*, ovipositor sheath (frequently called the ovipositor in various publications); *memb*, membranous part (more or less equipped with chitinated platelets usually arranged in inverted V-like rows, these platelets specifically modified into rectangular plates, spines, or clawlike structures); *opo*, ovipositor (or sting); *opo*, ovipositor opening (for the eggs) on the under side; *anus*, anus or anal opening, the opening of the alimentary canal, on the underside.

belonging to the genus *Ragoletis*, including the apple maggot, the cherry maggots, and the walnut husk maggots, are in the latter category. One native species, the pepper maggot, *Zonosemata electa*, is recorded as causing serious loss to pepper growers in New Jersey.

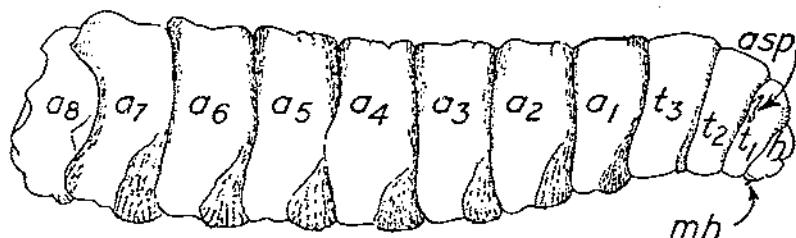


FIGURE 8.—Diagrammatic side view of the larva of *Zonosemata electa*: *h*, Head (more than a single segment); *t1*, first segment (first thoracic); *t2*, second segment (second thoracic); *t3*, third segment (third thoracic); *a1*, fourth segment (first abdominal); *a2*, fifth segment; *a3*, sixth segment; *a4*, seventh segment; *a5*, eighth segment; *a6*, ninth segment; *a7*, tenth segment; *a8*, eleventh segment (eighth abdominal); *mh*, mouth hooks; *asp*, anterior spiracle.

The papaya fruit fly, *Toxotrypana curvicauda*, which is now rather abundant in Florida, was probably introduced with papayas. A number of foreign species have been considered as ranking among the most serious of the insect pests of agriculture.

KEY TO THE GENERA AND SUBGENERA FOUND IN FLORIDA

The specific descriptions should be read in conjunction with the generic descriptions, as the characters cited under the generic names are not repeated under the specific names. The figures should be consulted when reading the descriptive text, as they illustrate the shapes and positions of the various structures, and, in part, the markings. In comparing the figures allowance must be made for the fact that these were drawn by various artists, each with a somewhat different technique. The drawings were made by Ezekiel Rivnay, Donald T. Ries, Mrs. E. A. Carlin, W. N. Dovener, and Mrs. E. B. Fitzgerald.

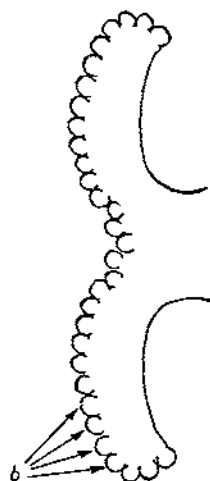


FIGURE 9.—Lateral view of the anterior spiracle of *Zonosmema electa*; b, beads.

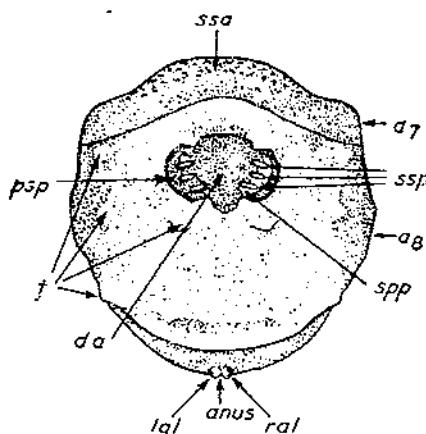


FIGURE 10.—Diagrammatic view of the rear end of a larva of *Zonosmema electa*: a, Tenth segment (seventh abdominal); a8, eleventh segment (eighth abdominal); ssa, spinose skin area; da, depressed area (obsolescent in many species); psp, posterior spiracle; spp, posterior spiracular plate; t, tubercles; anus, anus (rectum, or anal opening); ral, right anal lobe; lat, left anal lobe.

The measurements given are taken from normal specimens unless otherwise stated in the text. Specimens which have matured on either dried or decaying food are frequently much smaller than the normal.

The types of the new species described in this publication have been deposited in the United States National Museum.

The following key, based partly upon superficial characters, may help in the identification of the genera and subgenera found in Florida:

1. All head bristles short, the frontals, the orbitals, and the ocellars present but obsolescent and so weak that they are often broken and lost

Toxotrypana.

- At least some of the head bristles, including the frontals, strong and well defined..... 2.

2. Wing design never either reticulate or spotted; anal cell usually drawn out long and fingerlike to a point in the sixth vein, occasionally the pointed part moderate in length but never short; two pairs of strong upper orbital bristles; the dorso-central bristles in, or behind, the line of the anterior supraalar and not near the transverse suture..... 3.
Frequently the wing has either a reticulate design or many hyaline or pale and rounded spots interrupting the dark part of the pattern; either the anal cell has only a short projection on the sixth vein, or at least 1 of the 2 pairs of upper orbital bristles modified to scalelike bristles, or one or both pairs of the upper orbital bristles absent; or the dorso-central bristles close to the transverse suture and well in front of the line of the anterior supraalar..... 5.
3. Third vein unspined, or spined only on the knot at the junction with the second vein..... *Rhagoletia*.
Third vein spined distad of the knot at the junction with the second vein..... 4.
4. Third antennal segment with a spinelike tip..... *Zonosemata*.
Third antennal segment rounded at the tip..... *Myoleja*.
5. Frequently only a single pair of upper orbital bristles present; costa of wing normal; the scutellum swollen, globose, and polished. *Procecidochares*.
Usually with a single pair of strong upper orbital bristles and a second pair of pale scalelike upper orbital bristles, or with two pairs of strong upper orbitals, or the upper orbitals absent; if only a single pair of upper orbitals present the costa of the wing distorted; scutellum seldom swollen, never globose, and polished..... 6.
6. Vertex of the head at least twice as broad as the maximum width of 1 eye; third vein spined but the spines difficult to see; with at least 1 pair of upper orbital bristles; third antennal segment broad and more or less lobate..... 7.
Vertex of the head not twice as broad as the maximum width of one eye, the character only approximated in a single genus which has the third joint of the antennae elongated and pointed..... 8.
7. The black bristles of the head and thorax from conspicuous rounded black spots; usually with only a single pair of upper orbital bristles; wing with the costal margin distorted, the pattern consisting of oblique dark bandings usually joined near the costa, and with no trace of reticulation..... *Peronyma*.
The bristles of the head and thorax not from conspicuous rounded black spots; 2 pairs of upper orbital bristles, 1 pair frequently pale and scalelike; wing with the costal margin normal, and with a dark design obscuring most of the ground but broken by hyaline and semihyaline incisions and droplets which create a more or less reticulated appearance..... *Eurosta*.
8. Frontal bristles erect and scarcely converging; 3 pairs of long pale erect bristles inside of the frontals between the middle of the front and the vertex, possibly being the upper orbital bristles which are otherwise absent; head marked with conspicuous and contrasting black spots..... *Paracantha*.
Frontal bristles always converging, and usually strongly so; no long pale erect bristles inside of the frontals between the middle of the front and the vertex; 2 pairs of upper orbitals, 1 pair frequently scalelike..... 9.
9. Two pairs of strong upper orbital bristles of similar texture; third vein with at least several bristles distad of the stalk of the second vein; abdomen with conspicuous lateral or dorsolateral black spots..... 10.
Usually with 1 pair of the 2 pairs of orbital bristles scalelike; or if both pairs appear relatively strong and subequal, the third vein naked, or the abdomen not possessing lateral or dorsolateral black spots..... 11.
10. Wing design dark with hyaline rounded spottings; third antennal joint produced to a point..... *Acidogona*.
Wing design consisting of oblique bandings on a hyaline ground; third antennal joint rounded at tip..... *Tomoplagia*.
11. The upper pair of upper orbital bristles of the same texture as the lower pair, but nearly reclinate and conspicuously converging; third vein naked; wing, excepting the stigma, often entirely hyaline; usually with a polished and disconcolorous black spot on the thorax in back of the occiput..... *Neaspilota*.

- The upper pair of upper orbital bristles usually differentiated from the lower pair by being pale and scalelike, and never definitely converging; third vein naked or spined; wing, excepting the stigma, never entirely hyaline..... 12.
12. Head as long (front to rear) as high, and the proboscis very long, slim, and folded..... *Paroxyna*.
- Head seldom as long as high; the proboscis not long, slim, and folded..... 13.
13. Vertex of head conspicuously narrower than the maximum width of 1 eye; wing with a design interrupted by hyaline incisions only along the costal and the posterior margins, and with only 2 or 3 rounded hyaline spots or droplets on the disk..... *Xanthaciura*.
- Vertex of head subequal to, or broader than, the maximum width of 1 eye; wing usually with more than 2 or 3 rounded hyaline spots on the disk, or with either a reticulate or a stellate pattern..... 14.
14. Inner and outer vertical bristles brown and of the same texture, although the former are much longer than the latter; with at least 3 pairs of frontal bristles..... *Acinia*.
- Outer vertical bristles paler and more scalelike than the inner verticals; the only genus likely to cause confusion, because of the generally pale coloration of all of the head bristles; possesses only 2 pairs of frontals..... 15.
15. Second male genital segment much enlarged, and distally bearing several oblique ridges on each side of the anal region; no stellate subapical marking on the wing, the pattern formed of dark markings interrupted by hyaline spots and droplets; only 2 pairs of frontal bristles..... 16.
- Second male genital segment not conspicuously enlarged and not distally bearing several oblique ridges on each side of the anal region; wing either with a stellate subapical marking, or, if the pattern is formed of dark markings interrupted by hyaline spots and droplets, there is a pair of distinct but deciduous yellowish scalelike hairs below the 2 pairs of frontal bristles indicating a third pair of frontals..... 17.
16. A strong callus in the first posterior cell; third vein with the spines weak and difficult to see; 2 or 3 spines well before the anterior cross vein and several similar spines distad of the cross vein..... *Euaressta* subgenus *Euaressta*.
- No callus in the first posterior cell; third vein distinctly bristled..... *Euaressta* subgenus *Setigeresta*.
17. Wing without a stellate subapical design, the pattern formed of dark markings interrupted by hyaline spots and droplets; third vein with at least 1 small deciduous spine near the knot at the junction of the second vein and with about 4 similar spines on that part of the third vein which is over the first posterior cell..... *Dyseuaressta*.
- Wing with a stellate subapical design, the proximal part either hyaline or reticulate; third vein naked..... *Trupanea* 18.
18. Three pairs of frontal bristles, the lowest pair much reduced in length; scutellum with a single pair of bristles; base of wing hyaline, lacking reticulations..... *Trupanea* subgenus *Trupanea*.
- Either 3 subequal pairs of frontal bristles or only 2 pairs; scutellum with 2 pairs of bristles; base of the wing reticulate..... 19.
19. Three pairs of subequal frontal bristles..... *Trupanea* subgenus *Euaresstoides*.
- Two pairs of frontal bristles..... *Trupanea* subgenus *Tephritoides*.

THE GENUS TOXOTRYPANA GERSTAECKER

Adult.—Head flattened; vertex somewhat broader than maximum width of eye; the latter, while appearing elongate and narrow, so curved that it occupies part of the back of the head; frons sunken below vertex, produced as a peaked ridge over the antennae; third antennal joint elongate, narrow; the normal frontal bristles reduced, but neither pale nor scalelike; obsolescent or nearly so; practically lost in the scattered fine cilia which clothe the front and which are especially noticeable near the eyes; 3 pairs of these much reduced frontal bristles recognizable, occasionally a fourth pair; 1 pair of similarly reduced upper orbitals; 1 pair of similarly reduced ocellar bristles; occipitals very weak, but relatively long; inner and outer pairs of verticals short, but the strongest and best defined bristles of the head; the former strongly convergent, the latter strongly divergent; postocular cilia long and dark, but very fine and inconspicuous; cheek bristle not differentiated from the relatively long cheek cilia. Thoracic dorsum clothed with fine, glistening, brownish or pale hairs; the bristles more or less deciduous, thin, short, brownish, and inconspicuous; humeral pair of bristles absent or indistinguishable from vestiture; presutural pair almost indistinguishable; acrostichals absent; postalars,

intraalars, and dorsocentrals short and weak, but easily recognizable; scutellum with 1 pair of short apical bristles. Abdomen long and slender, clothed with a mixed vestiture of glistening pale and black hairs; basal segment long, clearly showing that it is composed of 2 fused segments; remaining abdominal segments, in the male, equal in length to the basal segment; subequal in the female because of the reduction and specialization of the last ordinary segment; last abdominal segment of the male as long as the 2 preceding segments, thus differing radically from the segment preceding the ovipositor sheath of the female; ovipositor sheath clothed with glistening brownish or blackish hairs, thin, but, while greatly variable in length, always exceeding total length of remainder of abdomen together with thorax and head. Male genitalia relatively small, the forceps narrowed and curved toward each other; internal process large and bearing 2 strong claws; penis of a length comparable with that of the ovipositor sheath of the female. Wing long and narrow; first vein spined; second vein irregular in its course, sexually dimorphic as illustrated; third vein with fine spines to well beyond the short, anterior cross vein; fourth vein much bent and waved in its course; posterior cross vein oblique; discal cell long and narrow, nearly attaining posterior margin; anal cell with tip drawn out to a long point on the sixth vein.

Type of the genus, *Toxotrypana curvicauda* Gerstaecker.

The generic name was proposed by Gerstaecker (29, p. 191)² in 1860, with *curvicauda* the sole species, and therefore the genotype. In 1884 Bigot (9, p. xxix) proposed the genus *Mikimyia*, with *furcifera* n.sp. sole species, and therefore genotype. The genotypes are conspecific and hence the two genera are synonymous. Some of the early workers were inclined to place the genus with the ortalids, while others suggested the trypetids. See Loew (60, pp. 27, 34, 36), Osten-Sacken (66, p. 181), Bigot (10, p. 292), Roeder (71, p. 31), and Snow (84, p. 117). Since the paper by Snow in 1895 the genus, which contains only a single known species, has been consistently retained with the trypetids.

TOXOTRYPANA CURVICAUDA Gerstaecker

(Fig. 11, A-Q)

Toxotrypana curvicauda was described by Gerstaecker (29, p. 194) in 1860. Subsequently it was described by Bigot (9, p. xxix) in 1884 as *Mikimyia furcifera*. Many authors have discussed the species because of its economic significance. The earlier references are indicated under the generic description. Most of the later references are easily available from the various indexes of economic entomology.

Adult.—Head, including the antennae, luteous, appearing more or less to be tinted with rufous brown on specimens which have aged. Thorax with the ground color lemon yellow, sometimes apparently sordid white or brownish on specimens which have aged, and marked with black and fuscous brown as shown in figure 11, k; scutellum concolorous with the thorax and likewise marked with fuscous brown and black on the proximal and lateral margins. Legs concolorous with the thorax, the hind femora and coxae more or less marked with fuscous brown and black. Abdomen with the lemon yellow ground color much obscured by brown, the ovipositor sheath appearing quite brownish. Wing hyaline, marked by luteous brown darkest toward the costa. Size: Variable; wings of normal males range from 7 to 10 mm in length and from 2.5 to 3.5 mm in width, of female 10 to 11 mm in length and 3.25 to 3.5 mm in width. Length of male 9.5 to 12.5 mm, of female 22 to 25 mm; abdomen and ovipositor so curved that a measurement following the curvature is from 4 to 7 mm longer.

Immature stages.—Eggs white, elongate. Larva white, large, the largest measuring about 14 mm in length and somewhat over 3 mm in diameter; segments clearly defined; skin, although appearing smooth, finely and densely stippled with minute spines which tend, near the segmental sutures, to be arranged in irregular rows; anterior spiracles asymmetrical in shape and with about 18 to 22 beads, usually in a single line, abnormally 1 or 2 beads out of alignment; posterior

² Italic numbers in parentheses refer to Literature Cited, p. 91.

spiracles large, relatively close together, the slits elongate, with subparallel sides, those on each spiracle nearly subparallel. Puparium brownish to dark rufous brown, the segmental lines distinct; measuring from about 8 to 9.5 mm in length and from 3.5 to 4 mm in diameter.

Host.—The female lays the eggs within the seed cavity in the fruits of papaya, *Carica papaya*, where the larvae normally feed.

Distribution.—Specimens were submitted for identification from over 60 different localities in Florida, and the species is probably quite generally distributed and abundant wherever its host is found in the southern half of the State, becoming scarce northward. The author has seen a single specimen caught in the Rio Grande Valley in Texas. The species is recorded from as far north as South Carolina (36, p. 10), and has been reported from many of the West Indian Islands, and from Mexico southward to Brazil and Peru.

THE GENUS RHAGOLETIS LOEW

Adult.—Head relatively broad, vertex narrower than maximum width of eye, frons scarcely tapered in width but distally somewhat produced; third antennal joint pointed; arista somewhat pubescent; head bristles all black or blackish except occipitals and cheek bristles and cilia; three pairs of long frontal bristles; two pairs of upper orbitals; one pair of long ocellar bristles; inner and outer verticals strong; occipitals weak, pale, short, and practically parallel; postocular cilia relatively strong, typically black or blackish; cheek bristle pale but strong; cheek cilia either pale or dark near the mouth, elsewhere pale; frons more or less clothed with short, sparse, brownish or dark hair. Thoracic dorsum clothed with short, fine cilia which are more or less concolorous with the parts from which they arise; normal bristles strong and black; dorsocentrals approximately in line with anterior supraalar but not close to the suture; acrostichals, intraalar, and postalar forming a transverse and almost straight prescutellar row; scutellum with two pairs of long black bristles. Abdomen, exclusive of the short and broad ovipositor sheath, subequal in length with the thorax, clothed with fine hair which approximates the coloration of the parts from which it arises, and with longer and dark bristly hair from the apices and the sides of the terminal segments. Male forceps conspicuously narrower than dorsal part of second genital segment, relatively flat and not incurved toward each other, internal process with two strong claws, anal region moderately large. Wing with first vein strongly bristled, third vein naked in the *pomonella* group, or with one or two bristles on knot at junction of second and third veins in the *cingulata* and *juglandis* groups; anterior cross vein near middle of discal cell, the latter relatively long and closely approaching posterior margin; anal cell produced on sixth vein to a moderate, or a long, point.

Type of the genus, *Musca cerasi* Linnaeus.

Many of the included species tend to form host strains and local colonies separable by slight differences in the amount of pollinose marking on the thorax, by the amount of brown marking which obscures the yellow of the legs, and by slight differences in the extensions and depth of coloration of the dark markings of the wings, so that from a small series of individuals, or from individuals selected from separate colonies, various supposed "species" might be selected. These differences appear to intergrade completely upon examination of sufficient material. Nevertheless some of the species are very closely allied, and, in the opinion of the author, the revision of the genus by Cresson (17) lumps too extensively. A recent paper by Curran (21, pp. 3-8) places too much stress on the exact shape of the broader end of the "sustentacular", or ejaculatory, apodeme of the male genitalia as a means of sorting closely related species. This is quite a variable structure, at least in *Rhagoletis*. The presence or absence of bristly hair tuftings on the forceps, and the shapes of the forceps

and of the second male genital segment, together with the nature of the hair on the latter, seem to be good specific characters.

The generic name was first proposed by Loew (59, p. 44) with *Musca cerasi* Linnaeus, and included synonyms, as the sole species. Coquillett (14, p. 599), in 1910, designated the genotype, *Musca cerasi* Linnaeus. Herrera, assisted by other authors, began a series of papers in 1901 in which the prefix *Ins* was consistently added to all insect generic names utilized in these papers. This treatment was accorded the generic names *Rhagoletis* (39, p. 410; 40, pp. 148, 153; 39, p. 410) and *Ortalis* (39, p. 411), the former in connection with *pomonella* Walsh and *cingulata* Loew, and the latter in connection with *cerasi* Linnaeus. These emendations have been ruled as zoological formulae, and hence unavailable as generic names (80, pp. 19-22). Aside from this deviation the name *Rhagoletis* has been used rather consistently from 1862 to the present time for all species herein discussed under that name. Occasionally, since 1862, authors have used the generic name *Trypeta*, but usually followed by the name *Rhagoletis* in a subgeneric capacity.

Rhagoletis is very closely related to *Zonosema*, which may ultimately have to assume subgeneric status, the essential differences being that *Rhagoletis* possesses a somewhat less globular head, has the spining on the third vein absent, or reduced to one or two spines on the knob at the junction of the second and third veins, and usually has a somewhat different wing shape and habitus. The species feeding as larvae within the husks of nuts are somewhat intermediate between the two genera, yet of themselves form a rather specialized group.

RHAGOLETIS CINGULATA (Loew)

(Fig. 12, A-D)

Described as *Trypeta cingulata* (57 p. 76) by Loew. The larva is often called the cherry maggot; and the adult, the cherry fruit fly. The species, a well-known pest of cherries, has been discussed by many authors. Either this species or the related *R. fausta* Osten-Sacken was recorded as early as 1835 (33, p. 80) by Harris under the generic name *Ortalis*, and confused with the corresponding European species, *cerasi* Linnaeus. Illingworth (42), in 1912, published on the biology, also giving citations to most of the more important bibliographical references to that date. Curran (21, p. 8), in 1932, redescribed the species as *Rhagoletis indifferens* based on specimens from Oregon reared from wild cherry, *Prunus marginata*. The character of the wide ejaculatory apodeme does not hold in slides made by the writer, this structure being quite variable in width, even in material reared from a single host in Florida.

Adult.—Head yellowish with a rufous cast, disconcolorously paler near eyes and mouth and beneath antennae. Thorax dark brown dorsally, somewhat paler laterally and ventrally; with a broad, somewhat divided, irregular, longitudinal, pollinose, whitish stripe on each side of center of dorsum excepting caudal half of mesoscutum, the two stripes almost joined mesially, and causing dorsum of thorax to appear very largely covered with pollinose white; humerus white and connected by a white lateral stripe with wing base; scutellum dark brown with a large dorsoapical white spot in which the posterior, and sometimes the anterior, pair of bristles are situated. Legs yellowish, more or less tinged with brown. Abdomen dorsally dark brown with white crossbands on the posterior margins of first three segments in male and first four segments in female. Male forceps relatively narrow, and with a conspicuous apical tuft of bristly hair. Wing

hyaline; marked by a fuscous brown pattern as illustrated in figure 12, G; the dark apical spot often touching the dark inverted V. Size: Variable, more or less in proportion to the size and quality of the host. Specimens from cultivated cherries, wild tea-olives, and fringetree fruits averaging larger than those from the smaller wild cherries. Specimens from wild cherry measure: Male wing 3.6 by 1.55 mm, female wing 3.8 by 1.7 mm; length of male 3.6 mm, of female 4 mm. Specimens from the larger host fruits measure: Male wing 4 by 1.8 mm, female wing 4.5 by 2.2 mm; length of male 4 mm, of female 4.6 mm.

Immature stages.—These have been fully described by many authors, and the reader is referred to the paper by Illingworth (42) for more detailed description. The larva is white, elongate, the segmental sutures usually constricted, causing a roughened appearance which is further exaggerated by lateral swellings and ridges; the skin possesses minute spines arranged in irregular transverse rows near the segmental lines on all segments, except the first, and obsolescent on that segment; the anterior spiracles vary in the number of beads but usually each possesses from 12 to 15, arranged more or less in a row, with an irregular secondary row of beads varying in number and tending to parallel the distal row; the posterior spiracles are relatively close together, the slits elongate with the sides more or less nearly parallel, each spiracle with the median slit tending to be bent so that the outer end is subparallel with the slit nearest the dorsum and the mesial end subparallel with the slit nearest the venter; the caudal end of the eleventh segment is strongly tuberculate in the manner illustrated. The puparium is straw to brownish in color, and the segmental sutures are easily seen. The larvae and the puparia vary greatly in size, depending upon the kind and quality of the host, fully matured larvae ranging from about 5.5 to over 7 mm in length, and from 1.1 to 2.1 mm in diameter. The puparia range from less than 3 to nearly 4 mm in length and from about 1.5 to 2.3 mm in diameter.

Hosts.—Adults were bred from larvae from the fruits of wild cherry (*Prunus serotina*), of fringetree (*Chionanthus virginica*), and of wild tea-olive (*Osmanthus americana*). The larvae are a well known pest of cultivated cherries. This host is, however, not present in the parts of Florida which were inspected.

Distribution.—New England to Georgia and Florida, and westward to Oregon; not as yet recorded from most of the Southern States or from any of the Southwestern States.

RHAGOLETIS POMONELLA (Walsh)

(Fig. 13, A-L)

The larva is often called the apple maggot or the railroad worm. The species was described as *Trypeta pomonella* by Walsh (93, pp. 338-343) in 1867, although usually credited to Walsh (94, pp. 29-33) as of 1868. It was discussed, without the proposal of a scientific name, in 1866, by Walsh (92, pp. 20-21) as a pest of apple, and had previously received some comment in local periodicals in New York State. Glover (30, pp. 72-73) discussed the species under the Walsh name. It was again mentioned by Walsh and Riley (95, p. 59) in 1868, and by 1869 had become so well known that it was discussed by Packard (67, p. 415) in a textbook on entomology. Since then the species has been repeatedly discussed by many authors in publications ranging from newspapers and magazines to bulletins. Illingworth's paper (41) in 1912 on the biology also contains summaries of the most important bibliographical references to that date. Snodgrass (81) has published an extensive paper on the anatomy of the larva. The name *albiscutellata*, appended by Say to a specimen now in the collections of the Boston Society of Natural History, was listed in 1835 (33, p. 80), in 1858 (65, p. 78), in 1862 (57, p. 57), and in 1873 (60, p. 335), but remained a nomen nudum until published by Johnson

(54, p. 97) in 1925. The author has examined the specimen and agrees with Johnson that it is a specimen of *pomonella*.

The recently described *Rhagoletis mendax* Curran (21, p. 7) has been omitted from consideration under *R. pomonella*. This name is applicable to the blueberry maggot and its adult.

Adult.—Head yellowish, with a rufous cast, disconcolorously paler near eyes and mouth and beneath antennae. Thorax dark brown to blackish brown, somewhat paler beneath; with a broad, somewhat divided, irregular, longitudinal, pollinose whitish stripe on each side of center of dorsum, excepting caudal end of mesoscutum; humerus white and connected by a white lateral stripe with wing base; scutellum dark brown, concolorous with thorax, with a large dorso-apical white spot not extending onto the lateral margins, the anterior bristles on the dark ground, the posterior pair on the edge of the white. Legs yellowish, the femora variable in coloration, but usually more or less tinged with brown. Abdomen dorsally dark brown with white crossbands on posterior margins of first three segments in male and of first four segments in female. Male forceps with edges evenly curved and subparallel. Wing hyaline; marked by a fuscous brown pattern as illustrated in figure 13, G; the hyaline triangle which invades the discal cell seldom, if ever, reaching the fourth vein. Size: Male wing 3.8 by 1.8 mm, female wing 4.2 by 2 mm. Length of male 4.25 mm, of female 4.6 mm.

These measurements apply as an average to series, exclusive of underdeveloped specimens, reared from *Crataegus*. The available specimens from apple do not differ conspicuously in size. Specimens reared from the fruits of dogwood are somewhat smaller. Those reared from wild plums are mostly somewhat smaller than those reared from dogwood, but this may be due to the food being inferior after the infested plums were gathered from the trees, as a number of specimens which emerged from puparia sifted out of the soil from beneath trees bearing infested plums closely approximate specimens reared from *Crataegus*.

Immature stages.—These have been fully described by many authors. The reader is referred to papers by Snodgrass (81) and by Illingworth (41) for more detailed description.

Larva white, elongate, about 5.5 to 7 mm in length and 1.5 to 1.6 mm in diameter, smooth in appearance, but possessing minute spines arranged in irregular transverse rows near the segmental lines on all segments, except the first. The anterior spiracles vary greatly in their exact shape and number of beads, but usually each possesses more than 20 beads, which are arranged in the peculiar manner shown in figure 13, B; posterior spiracles relatively close together, the slits elongate with approximately parallel sides, each spiracle with the two slits nearest the dorsum subparallel, the one nearest the venter more oblique; caudal end of eleventh segment strongly tuberculate as shown in figure 13, A and C. Puparium pale straw to brownish in color, with the segmental sutures defined but inconspicuous, from about 4 to 5.6 mm in length and 2 to 2.3 mm in diameter.

Hosts.—Adults were reared from larvae from the fruits of apple, of hawthorn (*Crataegus*), of dogwood (*Cornus florida*), of wild plums (*Prunus umbellata* and *P. angustifolia*), and of chokeberry (*Aronia arbutifolia*).

Distribution.—Only locally common in Florida, and apparently restricted to the northern half of the State. Recorded from Canada to Florida and westward, the extreme western records needing verification because of the general confusion of this species with the closely related *R. zephyria* Snow (*symphoricarpi* Curran). The author has seen larvae, which were presumably this species, from haws intercepted at the Mexican border as being of Mexican origin.

RHAGOLETIS ZEPHYRIA Snow

(Fig. 14, A-L)

Described as *Rhagoletis zephyria* (88, p. 164) by Snow in 1894. Doane (24, p. 69) questioned the validity of the species, and Aldrich (3, p. 69) and Treherne (89, p. 329) did not distinguish the species from *pomonella*. Curran (18, p. 57; 19, pp. 62-63) differentiated the species on the basis of examination of a so-called type female, and cited colorational characters to separate it from a series of specimens described as a new species under the name *R. symphoricarpi*. The type series of the latter are stated to have been reared from the fruit of the snowberry, *Symphoricarpus racemosus*, from localities in western British Columbia. Snow described *zephyria* from five specimens stated to have come from southern California and to be males. A male reputed to be one of these types and bearing a type label is in the Johnson collection at the Museum of Comparative Zoology. The genitalia have been examined by the author and appear identical with those of specimens bred from *Symphoricarpus*, from Victoria, British Columbia, and from Cervallis, Oreg. The aforementioned type specimen also appears to the author to be indistinguishable in coloration from some of the specimens in the reared series of *symphoricarpi*, and accordingly the latter name is placed as a synonym.

R. zephyria has previously been recorded only from the West, mainly from the region of southwestern Canada and the northwestern part of the United States not far from the coast. It has been reported as monophagous, the fruits of *Symphoricarpus* being the only known host.

Nearly a hundred adult specimens of a species of the genus *Rhagoletis* were reared from various localities in the northern half of Florida. Large numbers of larvae of this species were submitted for identification from similar Florida localities by various members of the inspection forces, the species being abundant and generally distributed throughout the more northern half of the State wherever its host, the fruit of the sparkleberry (*Batodendron arboreum*), was found. Superficially, the adult specimens are variable to the same degree as those comprising the series of *zephyria* reared from snowberry. The only difference is that the average individuals of the Florida series have the white of the scutellum slightly more extended than the average individuals of the western series. Yet the extremes both of extension and of reduction of the white are similar. No differences were found in the genitalia although these structures furnish characters to separate both the Florida and the western series from the closely allied *R. pomonella* and *R. mendax*. From shorter series, or by the selection of individuals, or by obtaining individuals from single localities in the East and in the West, or by obtaining specimens which have been killed before full coloration was attained, two "species" may easily be sorted.

A separate name for the Florida series, based solely upon locality labels and host records, seems, at this stage, quite superfluous, especially in view of the monophagous tendency exhibited by each series in localities lacking the alternative host.

The following descriptions are based on the Florida series:

Adult.—Similar in all superficial details to *R. pomonella*, except averaging slightly smaller in size. Coloration variable, covering the same range as that of *pomonella*, but possibly averaging somewhat darker, the scutellum tending to

have the white spot smaller than proportionate to the reduced size so that the posterior bristles usually appear definitely surrounded by some black at their bases, and the legs tend to be more heavily tinged with brown and nearly concolorous with the ventral part of the thorax. Male forceps of a somewhat different shape from those of *pomonella*, the edges not being evenly curved and subparallel.

Both this species and *pomonella* vary individually to such an extent that the author would have considered the slight size and color differences of no especial significance were the genitalia identical. The genitalia were pointed out by Curran (18, 19) as differentiating *R. symphoricarpi* from *R. pomonella*. Slides are usually unnecessary in order to see the character. However, a series of slides were made, and indicate it to be constant. Size: Male wing 3.0 by 1.5 mm, female wing 3.5 by 1.7 mm. Length of male 3.5 mm, of female 3.9 mm.

Immature stages.—Similar to those of *pomonella*; the larvae and puparia averaging somewhat smaller in size; and, usually, each anterior spiracle with 1 or 2 fewer beads, a matter of little significance.

The drawing of the anterior spiracle of *pomonella* (fig. 13, B) was made from a single spiracle, whereas that of *zephyria* (fig. 14, B) represents a composite made from several spiracles by careful selection. Scarcely any two anterior spiracles are identical in species of this group, usually differing somewhat on the two sides of the same larva. Nevertheless, the general pattern of the anterior spiracles in the *pomonella* group is radically different from that of the anterior spiracles of the *cingulata* group as may be visualized by a comparison of the figures. The fully matured larvae of *R. zephyria* seldom measure over 5 mm in length, and are about 1.2 to 1.3 mm in diameter. The puparia are similar to those of *pomonella*, but are only about 3.0 to 3.6 mm in length and 1.5 to 1.6 mm in diameter.

Host.—The only known host in Florida is the fruit of the sparkleberry (*Batodendron arboreum*).

Distribution.—Apparently rather generally distributed and abundant in the northern half of Florida, the larvae being submitted for identification by almost every inspector who examined wild fruits in that part of the State. How far northward of the State line the species extends, whether it is distributed throughout the range of its host, and whether it invades other hosts in the East, such as the fruits of *Symphoricarpos*, are still open questions.

THE GENUS ZONOSEMATA, NEW GENUS

Adult.—Head with vertex scarcely broader than maximum width of the narrow elongated eye, frons not tapered, flattened, produced near antennae; face with a pair of grooves to receive the antennae, the grooves separated by a flattened triangular area; tongue strong but not elongated; second antennal joint with a strong spinelike bristle, third antennal joint elongate, distally with a sharp edge and a spinelike tip; all head bristles, with the possible exception of the occipitals, strong and black; usually with four pairs of frontals, often with one or more of the individual bristles doubled, many specimens being asymmetrical in the bristling, while a single specimen has six pairs of these bristles, rarely one bristle of the normal four pairs of frontals lost; some pale hairs intermingled with a very few dark hairs on central area of frons and also forming a band near each eye; the two pairs of upper orbitals variable in size, but always long, and more or less directed outward; one pair of ocellar bristles; occipitals not long, parallel or nearly so, usually black, often one or both yellowish brown, but bristlelike and not flattened or scalelike; inner verticals variable in length, but always long,

strong, and at least slightly convergent; outer verticals long and strong; postocular cilia black, relatively strong, irregular in length; cheek bristle strong, black, well defined from the much shorter cheek cilia which are mixed luteous and black, the black cilia predominating toward the eye. Thoracic dorsum clothed with fine hairs, mostly pale, but those on the darker markings fuscous brown or black; with a pair of short, but distinct, black bristles just in back of the head and between the humeri; all of the normal thoracic bristles black; anterior supraalar well forward; dorsocentrals remote from the suture, well behind line of anterior supraalars, almost in line of postalars; acrostichals and intraalars in a line, and relatively close to caudal margin of scutum; scutellum with two pairs of long bristles. Fore and hind femora with long, black bristles. Abdomen, exclusive of the ovipositor sheath, subequal in length to the thorax, clothed with fine black hairs and terminal black bristles. Ovipositor sheath, when viewed from above, approximately equal in length to the preceding segment. Male genitalia with the forceps of the peculiar shape illustrated (fig. 15, K, L), the internal process, nearly hidden, bearing two strong teeth. Wing hyaline, with fuscous brown or blackish oblique bandings; the first and third veins spined; the anterior cross vein slightly distad of the middle of the long discal cell; anal cell produced fingerlike to a point on the sixth vein.

Type of the genus, *Trypeta electa* Say.

The new genus *Zonosemata* is *Spilographa* of Loew, 1873, in part (60, pp. 244 and 336); also *Spilographa*, at least in part, of Osten-Sacken, Snow, Williston, Doane, Johnson (prior to 1925), Britton, and Peterson. It is *Zonosema*, at least in part, of Coquillett, Howard, Phillips, Johnson, Johannsen, and Curran. It is also *Phorellia*, in part, of Hendel (36, p. 28), 1914.

Most of the species from the United States heretofore placed under the names *Zonosema* or *Spilographa* are not congeneric with *electa*, or with *rufigera* Coquillett, the latter possibly only a western race of *electa*.

Those species related to *setosa* Doane³ will fall into *Zonosema* Loew (59, p. 43) of which the genotype is *Trypeta meigenii* Loew by designation of Coquillett (14, p. 622) in 1910. These adults have the dorsocentral bristles almost in the line of the anterior supraalars. The postalars, intraalars, and acrostichals are in line and form a transverse prescutellar row, the spines on the third vein are much reduced in number, the head is much more globular, and the male genitalia are somewhat similar to those of *Rhagoletis*. Hendel (37, p. 74), in 1927, considered *meigenii* congeneric with *cerasi* and accordingly placed *Zonosema* as a synonym of *Rhagoletis*. The latter genus has already been discussed in the present publication.

The remaining American species of *Zonosema* authors (= *Spilographa* authors) fall into various genera, outside of the scope of this bulletin. The generic name *Spilographa*⁴ was proposed by Loew (59, p. 39) in 1862. Coquillett (14, p. 607) designated *Trypeta hamifera* Loew as the genotype. This is a European species belonging to a group feeding in the larval stages as leaf miners. The adults have the dorsocentral bristles nearly in the line of the anterior supraalars, and have globose heads, thus agreeing with the species of *Zonosema*, from which they differ on several characters, noticeably a more slender build, differently shaped antennae, and more spines on the third vein.

³ The Doane species seems practically identical with the European *alternata* Fallen, and both feed as leaf miners in rose hips. Longer series will be necessary to establish the synonymy.

⁴ The author omits the synonymy of the genus, for which there is at least one older name, as extraneous, only discussing the name because of prior use to include *electa* Say, and the fact that a number of species from the western part of North America will probably fall here.

ZONOSEMATA ELECTA (Say)

(Fig. 15, A-O)

Described as *Trypeta electa* by Say (75, p. 185) in 1830, the original description being reprinted in 1883. Osten-Sacken (65, p. 79), in 1858, and Loew (57, pp. 53 and 71), in 1862, placed the species in *Trypeta*. Loew (60, pp. 244 and 336), in 1873, and Osten-Sacken (66, p. 190), in 1878, used *Spilographa* as a subgenus of *Trypeta* to include *electa*. Thereafter several authors placed the species under the generic name *Spilographa* until 1899, when Coquillett (13, p. 261) introduced into American literature the name *Zonosema* for the species formerly placed in *Spilographa*. Aldrich (2, p. 604), in 1905, followed by several authors, dissented, and used the name *Spilographa*. Other authors adopted the name *Zonosema*; so since 1899 the specific name *electa* has been repeatedly transferred first to one and then to the other of the two generic names.

Adult.—Head and antennae yellowish, strongly tinged with rufous brown. Thorax with the ground color bright yellow, marked and tinted with rufous brown and brownish black, the brown forming a longitudinally banded design on the notum, as well as tinting and marking parts of the pleurae, the black spotting the areas near the bases of the wings, and the lateroproximal parts of the scutellum below the bristles. Legs yellowish. Abdomen yellowish, the terminal segment of the male and the segment preceding the ovipositor sheath of the female marked with one small black spot dorsolaterally near each proximal angle; ovipositor sheath concolorous with abdomen, except for a small amount of black at tip. Wing hyaline, with fuscous brown or blackish bandings. Size: Variable, largely depending upon the quality of the host; male usually about 6.5 mm in length, with a wing measuring about 5.6 by 2.4 mm; female usually about 7.5 mm in length, with a wing measuring about 6.5 by 2.4 mm.

Individual specimens are found which are considerably larger, but frequently the size is smaller, one specimen, a female, measuring only 4 mm in length, with a wing 4 by 1.6 mm. Some of these smallest specimens seem practically identical with a series from the Rio Grande Valley which closely match the type of *rittigera* Coq.

Immature stages.—Egg white, of the peculiar shape illustrated (fig. 15, A). Larva white, measuring, as a maximum, about 10 by 3 mm; skin conspicuously armed with minute spines tending to be arranged in irregular transverse interrupted rows near the segmental lines, and obsolescent on parts of the segments, the posterior end tuberculate, as illustrated (fig. 15, B, D); each anterior spiracle usually with more than 30 beads; posterior spiracles oblique, close together in a pitlike depression, spiracular plates well defined, slits on each spiracle elongate, subparallel, the sides of the individual slits more or less irregular but nearly parallel. The puparia vary much in shape, although usually tapered toward the head from a maximum width on the eighth segment; they measure from less than 6 to about 8 mm, with a diameter of 2.8 to 4.2 mm; the coloration varies between pale straw and deep rufous brown; segmental sutures plainly defined; anterior spiracles appearing as if definitely ahead of the segmental line and on the first segment; the pit containing the spiracles variable, always defined, sometimes deep, often shallow with the spiracular plates protruding, the extreme upper part of each spiracular plate usually covered by a fold or extension of the skin chitin. Both the larvae and the puparia, upon casual observation, convey an impression of belonging to some calyptrate muscoid series, yet upon study the close relationship to *Rhagoletis* becomes apparent.

Hosts.—The larvae of *Zonosemata electa* feed in some solanaceous fruits. Adults were reared in numbers from the fruits of *Solanum carolinense* and from *S. aculeatissimum*, the larvae normally feeding singly. Two larvae were found in a fruit of an eggplant (*S. melongena*) confiscated at a quarantine station, and a single adult was reared from these. Larvae were submitted as having been found in

tomatoes upon two occasions, and one adult fly was submitted from Georgia as having been reared from tomato (*Lycopersicon esculentum*). Peterson (68), in 1923, recorded the larvae, in New Jersey, as a "serious pest" of (the fruits of) various kinds of peppers (*Capsicum annuum*), and also injurious to (the fruits of) eggplants. The larvae have been recorded in *S. carolinense* by various authors. The Texas *ritigera*, mentioned in preceding paragraphs, were supplied by E. F. Pepper and J. W. Monk, the larvae feeding in the fruits of a *Solanum* stated to be *S. elaeagnifolium*.

Distribution.—The species is apparently abundant and generally distributed throughout the northernmost counties of Florida, and specimens were reared from fruits from various localities in St. Johns and Volusia Counties. Previously published records and the National Museum series indicate a general distribution from New York to Indiana and southward to Florida and Texas.

THE GENUS MYOLEJA RONDANI

Adult.—Head with vertex narrower than maximum width of eye, frons scarcely tapered, slightly produced distally; eye narrow, third antennal joint relatively long and narrow and with apex rounded; arista slightly pubescent; all head bristles and cilia blackish; 3 pairs of frontal bristles; 2 pairs of upper orbitals; 1 pair of ocellar bristles; occipitals short and nearly parallel, slightly divergent; inner and outer verticals not conspicuously long, the latter not much longer than the postocular cilia; cheek bristle relatively strong. Thoracic dorsum clothed with fine dark hair, with the dorsocentral bristles from only slightly behind the intraalars to nearly midway between these latter and the anterior supraalars, in no case near the suture; scutellum with two pairs of long, dark bristles. Abdomen small, exclusive of ovipositor sheath, about as long as the thorax, hairy. Ovipositor sheath short and broad, when viewed from above, scarcely as long as the preceding abdominal segment. Male forceps relatively flattened and neither twisted nor incurved, the internal process with 2 moderate claws. Wing with first and third veins bristled; discal cell long and closely approaching wing margin; anal cell produced to a long point on sixth vein.

Type of the genus *Tephritis lucida* Fallén.

The generic name was first proposed by Rondani (72, p. 112) in 1856 for the sole species *Tephritis lucida* Fallén, which is now considered congeneric with *Musca caesio* Harris.

Philophylla Rondani (73, p. 9), proposed in 1870 for the sole species *Musca caesio* Harris, is a synonym of *Myoleja* Rondani. Hendel (87, p. 96) credited the Rondani name to a publication (74, p. 175) in 1871, but the latter represents an unallowable change of concept by Rondani.

The generic name *Euleia* was first proposed by Walker (90, p. 81) in 1836 for *onopordinis* Fabricius together with supposed synonyms *centaureae* Fabricius and *caesio* Harris. The Harris specific name has priority and probably represents the species actually before Walker; however, the latter point is only taxonomic supposition and has nothing to do with genotype designation. The Fabrician names have since been usually considered conspecific but are now quite generally identified as both specifically and generically distinct from *caesio*. Westwood, in 1840 (96, p. 149), appears to have fixed the genotype of *Euleia* as *Musca onopordinis* Fabricius (not as *onopordinis* of Walker in part, not of Fabricius). The subsequent citations of *caesio* as the genotype by Coquillett (14, p. 541) and other authors appear to be invalid.

According to Scudder (73, p. 131) the name *Euleia* has also been spelled *Euleja* and *Eulia* in the literature. Sherborn (79) has omitted mention of *Euleja*, which scarcely constitutes emendation, and has been unable to ascertain the place and date of publication of the emendation *Eulia*. Hendel (37, p. 100) stated that the name *Euleia* Walker was preoccupied, presumably because of *Eulia* Hübner, and listed the name in the synonymy of *Myiolia*. The name *Euleia* Walker is not preoccupied by *Eulia* Hübner, and, because of the Westwood type fixation, is available for the genus which Hendel (37, p. 96) calls *Philophylla*, and is not a synonym of *Myoleja*.

Hendel (37, p. 100), in 1927, emended the name *Myoleja* Rondani to *Myiolia*, which he credited to Rondani. He also spelled the Rondani name "*Myioleia*" in the bibliography.

The genotype of *Myoleja*, *lucida*, has the dorsocentral bristles well behind the anterior supraalar. The genotype of *Philophylla*, *caesio*, has the dorsocentrals almost in line with the anterior supraalar and has a somewhat different wing pattern. The sole North American species which is herein assigned to *Myoleja*, *limata* Coquillett, has the wing pattern and the general appearance of *caesio*, but has the dorsocentrals even farther behind the anterior supraalar than in *lucida*. In view of the general similarity of the other structures, coupled with the similarity in biology, no new generic name is proposed for *limata*.

MYOLEJA LIMATA (Coquillett)

(Fig. 16, A-L)

Described as *Aciura limata* by Coquillett (13, p. 263) in 1899.

Adult.—Head luteous brown; antennae paler. Thorax luteous brown with a broad pale longitudinal band on each side of the center of the dorsum, the humeral and lateral areas pale; scutellum concolorous with the general thoracic ground color. Legs yellowish, more or less tinged with brown. Abdomen basally concolorous with the thorax, thence more or less strongly darkened, often appearing blackish. Wing hyaline much obscured by a pattern of fuscous brown which in some parts of the distal half is lightened by dull golden, the darker coloration acting as the margin of the markings. Size: Variable, depending in part upon the size and quality of the host, and in part upon the species of the host, the series of flies from any single species of holly tending to average a slightly different size from those from any other species of holly, but with complete intergradation of individuals.

Measurement of size is likely to create an erroneous impression. Among the smallest specimens are a male and a female from *Ilex cassine*, the male having a wing 3 by 1.3 mm and a length of 3.4 mm, and the female having a wing measuring 3 by 1.5 mm and a length of 3.5 mm. Among the largest specimens are some from *Ilex opaca*, one male with a wing measuring 4.5 by 2 mm and having a length of 5.4 mm, and one female with a wing measuring 4.6 by 2.1 mm and a length of 5.5 mm.

Immature stages.—Larva white, elongate; when fully grown, of a size proportionate with that of a corresponding adult, individuals from *Ilex cassine* measuring about 5.6 mm in length and 1.4 mm in diameter; skin appearing relatively smooth, but possessing transverse irregular rows of fine spines, noticeable on the cephalic margins of the second, third, and fourth segments; caudal segment tuberculate in the manner illustrated (fig. 16, A and C); anterior spiracles averaging 14 to 18 beads each; posterior spiracles close together but small, slits not long, but thin and nearly straight, those on each spiracle, subparallel. Puparium pale straw colored, sometimes ageing to pale brownish, of a size proportionate with that of a corresponding larva; those from *Ilex cassine* measuring about 3.5 mm in length and 1.5 mm in diameter.

Hosts.—The larvae feed singly in the berries of various species of holly, *Ilex*, and were found in *I. cassine*, *I. caroliniana*, *I. glabra*, *I. lucida*, *I. opaca*, and *I. vomitoria*. The puparium is formed in the ground.

Distribution.—The species has previously been recorded only from Massachusetts and Connecticut, but was found to be abundant and generally distributed throughout the northern half of Florida wherever the hosts were found.

THE GENUS *PROCECIDOCHARES* HENDEL

Adult.—Head with the vertex wide, nearly twice maximum width of eye, frons tapered, flattened, somewhat distally produced near antennae; the latter with third joint short and lobate; arista somewhat pubescent; head bristles dark, except as otherwise mentioned; 3 or 4 pairs of frontal bristles, perhaps occasionally only 2 pairs, the number of pairs present not a specific character; on each side an irregular band of small pale deciduous scalelike orbital cilia, not arranged in a single row; one pair of long dark upper orbitals, not infrequently one of these doubled causing asymmetry, or both doubled creating the appearance of two pairs of bristles; with scattered, small, pale, deciduous, scalelike cilia more or less surrounding bases of upper orbitals; one pair of long ocellar bristles; inner and outer verticals strong; occipitals weak, pale, scalelike, nearly parallel, short and not well defined from the similar postocular cilia; cheek bristle inconspicuous, brown, surrounded by brownish cilia, otherwise the cheek cilia pale. Thorax, excepting the underside, the metathorax, and the scutellum, with more or less of a pattern formed by a vestiture of relatively long, pale, deciduous, scalelike pile, the exact pattern on the notum of specific significance; specifically with or without a pair of dorsocentral bristles on the prescutum in the transverse line of the presuturals; the usual dorsocentral bristles of the scutum in a line with the anterior supraalar and not close to the suture; acrostichals nearly in the transverse line of the postalars, the intraalars caudad, in consequence the acrostichals appearing relatively advanced; scutellum swollen, globose, polished, and bearing two pairs of long bristles. Abdomen, exclusive of the ovipositor sheath, approximately as long as the thorax, similarly clothed with long pile usually intermixed with darker hairs. Wing with the first vein strongly bristled; third vein naked, anterior cross vein distad of basal two thirds of the relatively elongate discal cell and close to posterior cross vein; basal cross vein margining the anal cell only slightly bent, in consequence this cell produced to a short point on sixth vein; wing pattern characteristic, the hyaline ground being marked by a dark basal spot and crossed by three dark transverse bands, the proximal two uniting to form a broad inverted V, the distal one obliquely marking the terminal area from the costa to somewhat below the fourth vein.

Type of the genus, *Trypeta atra* Loew.

The generic name of *Procecidochares* was first proposed by Hendel (35, p. 91) in 1914, with *atra* Loew sole species mentioned, and designated genotype. The genus was again described as new by Hendel (36, p. 42), and the name has since been quite generally adopted by subsequent workers, including Bezzi (6, p. 7) and Phillips (69, p. 136). Aldrich (4) has published a revision of the genus. The species belonging in this genus were formerly placed in *Oedaspis* Loew.

The species with known biology all cause galls on composite plants, the galls being either on the stems or in the flowering parts of the hosts.

PROCECIDOCHARES AUSTRALIS Aldrich

(Fig. 17, A-P)

Described as *Procecidochares atra* variety *australis* by Aldrich (4, pp. 2, 9) in 1929.

Adult.—Head yellowish, tinged with rufous brown, and with some darker brown to fuscous brown markings; with either 3 or 4 pairs of frontal bristles, occasionally with 1 of these bristles doubled. Thorax purplish black above,

more rufous on the sides and beneath; dorsally with yellow, deciduous, scalelike hairs arising from roughened surfaces and defining 4 polished areas, one near each humeral angle, and a large one on each side of the mesonotum; scutellum globose, polished, purplish black. Legs yellowish brown, the femora and coxae tinged with fuscous brown. Abdomen blackish, with a purplish cast. Ovipositor sheath similarly colored, broad at base, narrow at tip, long, approximately two thirds length of abdomen. Male forceps strongly curved toward each other at their tips; internal processes relatively small, the usual two teeth present on each process but greatly reduced in size. Wing with oblique hyaline crossband cut in two, or nearly so, at or on third vein by an extension of the black of the terminal area, and more or less appearing as two triangular hyaline areas; the hyaline tongue, which cuts through the third posterior and the discal cells, variable in size and shape, occasionally with the edges nearly subparallel, occasionally with the edges strongly divergent and forming a triangular hyaline area; the dark markings, especially on the terminal half of the wing, more or less tinged with golden brown. Size: Male wing 2.8 by 1.2 mm, female wing 3 by 1.5 mm. Length of male 3 mm, of female 4.2 mm.

Immature stages.—Larva white, 3.6 mm in length and 1.65 mm in diameter, more or less dorsally marked by an irregular black blotch on the eighth, ninth, and tenth segments, sometimes indicated on the fifth, sixth, and seventh segments, stout, and of the peculiar shape illustrated (fig. 17, A); skin relatively smooth, skin spines obsolescent; each anterior spiracle usually with only 2 or 3 beads which are relatively large; posterior spiracles with the slits very short, broad, and rectangular, those on each of the browa, heavily chitinated, spiracular plates arranged in a fan. Puparia variable in shape, some being nearly elliptical, others decidedly shaped like an ordinary hen's egg; approximately 3.3 mm in length and 1.8 mm in diameter; segmental lines distinct.

When first formed, the puparium is practically white, and marked only by the black dorsal blotch of the larva and the brown of the posterior spiracles; subsequently the black dorsal blotch may fade to a blackish brown, and additional brown may be present as a ventral band usually extended around, and more or less obscuring, the caudal end of the puparium, in which event the white ground color is often tinged with brownish. Usually before the adult emerges the puparium has turned a deep brownish black, but adults emerged from variously marked puparia, occasionally emerging from puparia which were white save for the darker larval markings.

Hosts.—Adults were reared from larvae and puparia found in galls on *Heterotheca subarillaris* and *Erigeron pusillus*, commonly on the former and much more rarely on the latter. The galls were usually found on young shoots of plants that had not bloomed, occasionally in older more woody stems, and sometimes in the flowers. Some of the galls are of a size allowing only sufficient room for a single puparium; others were larger, containing from 2 to 8 larvae or puparia. All of the galls were difficult to see, being more or less hidden by clusters of young leaves which formed a part of the gall and by the dense natural clustering of the leaves of the host plant, or being hidden among the flowers, or rarely in a flower. As many as 6 or 7 galls were found on a single plant.

Distribution.—The species was formerly known only from the type female "reared at Waco, Texas, by W. Dwight Pierce, from the head of *Heterotheca subarillaris*" and two males which formed a part of the type series, one from Llano, Tex., the other from Orlando, Fla. A single adult specimen was captured by an inspector at Brooksville, Fla., and subsequently galls were found in quantity at Orlando and several other localities in Orange County. The species is probably more generally distributed than indicated by the foregoing records, as the galls can scarcely be found except by feeling the stems of the host for swellings.

THE GENUS *PERONYMA* LOEW

Adult.—Head with vertex more than twice as broad as maximum width of the narrow eye; frons scarcely tapered, more or less produced near antennae; second antennal joint with a conspicuously long bristle as well as the shorter bristles; third antennal joint almost lobate; head bristles short, but heavy and black excepting as otherwise noted; 2 pairs of frontal bristles; a band of pale, deciduous, scalelike hairs on each side of front near each eye, with similar but scattered hairs near center of frons; a patch of very small black bristles in center of frons near antennae; 1 pair of upperorbital bristles, the bristle on either side occasionally doubled; 1 pair of ocellars; inner verticals somewhat convergent, not much longer than the sharply divergent outer verticals; occipitals weak, deciduous, short, variable from nearly parallel to strongly divergent, usually pale, abnormally somewhat darkened at tips; postocular cilia pale, deciduous, scalelike; cheek cilia pale, long, the cheek bristle not longer than the cilia, either black or pale; a black patch on second antennal joint; tip of third joint blackened; a black patch on each side of mouth; another on each of the cheeks, contiguous with each eye; another between each of the eyes and the antennae; a conspicuous rounded black mark at base of each of the black facial bristles; tongue short, but the palpi conspicuously enlarged and lobate. Thoracic dorsum with a mixed vestiture of short, pale, scalelike hairs and black stubble; all of the ordinary bristles short but heavy and black, the dorsocentrals in a line with the anterior supraalar but remote from the suture; scutellum much swollen, but more or less divided into 2 lobes, and bearing 2 pairs of bristles, the apical pair usually much weaker than the proximal pair (according to prior descriptions possibly some specimens possess only the proximal pair of bristles), each bristle of thorax and scutellum arising from a conspicuous rounded black spot; a pair of large, black spots on the suture. Abdomen, exclusive of the ovipositor sheath, broad, about as long as the thorax; proximal segment apically banded, with short, black stubble; the four following segments clothed with sparse, short, black stubble. Ovipositor sheath nearly as long as the preceding abdominal segments, rounded above, somewhat flattened below, on each side marked by a strong lateral ridge. Male genitalia with the forceps twisted and ridged; the internal process heavily chitinized at the tip and bearing two short claws. Wing with oblique dark bands; costa distorted; first and third veins spined; anterior cross vein oblique and close to the slightly S-shaped posterior cross vein; discal cell long, narrow basally, broad distally; anal cell produced to a short point on the sixth vein.

Type of the genus, *Trypeta sarcinata* Loew.

The generic name *Peronyma* was proposed in 1873 by Loew (60, pp. 247, 250), who gave it generic rank, yet treated it as of subgeneric significance under the generic name *Trypeta*. Osten-Sacken (66, p. 190), in 1878, used the name as subgeneric under *Trypeta*. Subsequent authors, including Aldrich (2, p. 605), Coquillett (14, p. 587), Hendel (35, p. 87 and 36, p. 6), Phillips (69, p. 130), and Curran (22, p. 2) have adopted the name as generic. The generic name *Tomoplagina*, which the writer considers a synonym, was proposed by Curran (22, pp. 4, 14) in 1932 for the new species *maculata*, solely included species and designated genotype.

All stages, from egg to adult, indicate a close relationship to *Eurosta*, which is further substantiated by the biology.

PERONYMA MACULATA (Curran)

(Fig. 18, A-R)

Curran (22, pp. 4, 14) described *maculata* as a new species in the new genus *Tomoplagina*. Loew (58, p. 218, no. 78), in 1862, described a species from "Carolina" as *Trypeta sarcinata*. The subsequent references to *sarcinata* are the same as those listed under the present generic heading. Macquart (61, p. 383), in 1843, described a species from Georgia as *Tephritis quadrifasciata*, but the Macquart name is a secondary homonym of "*Trypeta quadrifasciata*" Meigen. The

writer believes that only a single species is involved, but until the synonymy can be definitely established by further rearings, he prefers to use the name *maculata* Curran for the Florida series with the warning that the name will probably prove to be a synonym. The apical bristles are easily lost from the scutellum, the thorax and scutellum frequently darken with grease, the exact extent of the markings on the wing is variable, and the oblique hyaline band distad of the anterior cross vein is nearly joined with a hyaline costal spot in occasional specimens from Florida, but none are quite like the Loew figure (60, pl. 11, fig. 16). One specimen in the Museum of Comparative Zoology agrees fairly well with the Loew description and figure, but is so stained that the original ground color is not evident. The single specimen from Alabama, discussed and figured by Phillips, is stated to have a "shining black" scutellum, but appears to have the wing pattern of the Florida series. The Macquart type of *quadri-fasciata* is stated to have a brown thorax, but the wing pattern is like that of the Loew figure. The only specimen in the National Museum collection is labeled as coming from southern Georgia (Morrison) and, while very old and in very bad condition, agrees perfectly with the Florida series, specimens of which were matched with the Curran type.

Adult.—Head, including antennae, luteous, conspicuously marked with black. Thorax luteous, pollinose, and marked by conspicuous black spots, with a paired, broad, more or less obsolescent, brown stripe on each side of center of dorsum; scutellum luteous, marked with black spots at bases of bristles, with 2 dorso-praximal black patches tending to suffusion, and with 2 similar patches on the underside; metathorax marked with fuscous brown patches. Legs more or less concolorous with the head and thorax, unmarked by dark patches or spottings. Abdomen, exclusive of the luteous brown, black tipped ovipositor sheath, luteous, more or less tinted with brown. Wing with a pattern of oblique golden brown bands which arise from a similar costal coloration, the golden brown margined by fuscous. Size: Wing of male 4.5 to 5 mm by 1.8 to 2 mm, of female 5 to 6 mm by 2 to 2.4 mm. Length of male 4.2 to 5 mm; female actually measuring about 5.5 to 5.6 mm but in reality much longer, the abdomen and the ovipositor sheath each strongly convex dorsally, so the ovipositor sheath, while more or less in a cephalocaudal line, is almost at a right angle to the dorsum of the last ordinary abdominal segments.

All specimens which are not freshly emerged or which have not been freed from grease tend to have the brownish and luteous colorations darkened, and appear brown or rufous brown. For further details of the black markings, which are of superficial generic significance, consult the generic description and the figures.

Immature stages.—Egg white. Larva white, soft, stout, the largest larva found measuring 5 mm in length by 3.4 mm in diameter; segments conspicuous; skin finely and densely stippled with minute spines although appearing relatively smooth; anterior spiracles with about five to seven beads; posterior spiracles small, widely separated; spiracular plates on the surface inconspicuous, those below the surface strong, and brown; slits short, often irregular in outline, but sometimes almost ovate, and sometimes nearly parallel sided, those on each spiracle arranged in a fan. Puparium pale brown, more or less tinted with darker to fuscous brown, especially on ends; measuring from 4.5 to 5.4 mm in length and from 2.4 to 2.9 mm in diameter, the diameter apparently less than that of a corresponding larva; sutural lines not distinctly visible.

Host.—The larvae feed in *Chrysopsis trichophylla*, in irregularly shaped galls, usually on the stems, but sometimes at the bases of the flowers, or on the tender growth from the root crowns. The galls are usually compound, and may contain from 1 to 8 separate cells with a single larva or puparium in each. The larva before forming

a puparium makes an exit place in the gall, only a thin and easily ruptured covering sealing the emergence hole.

Distribution.—Exclusive of the Carolina, Georgia, and Alabama specimens mentioned in the discussion, and which may not be conspecific, the species is known to the author only from the single type of *maculata* from Gotha, Fla., in the American Museum of Natural History, from the single specimen labeled as having been collected in southern Georgia by Morrison, and from the reared Florida series from 1 locality in Lake County and 4 localities in Orange County. The species seems restricted to local colonies each of which contains numerous individuals. All of the colonies which were found were on plants growing in a moist environment.

THE GENUS EUROSTA LOEW

Adult.—Head with vertex approximately twice as broad as maximum width of constricted eye, frons scarcely tapered, produced near antennae; third antennal joint broad and more or less lobate; arista pubescent; head bristles relatively short, black, except as otherwise stated; usually with three pairs of frontal bristles, the upper two pairs often close to margins of eyes, and resembling lower orbital bristles, the lower pair remote from eyes, sometimes pale and scalelike; two pairs of upper orbitals, the upper pair pale and scalelike or dark and subequal to lower pair, variable within individual species, frequently either bristle of the upper pair doubled, occasionally one of the bristles of the lower pair doubled; one pair of ocellar bristles; inner verticals usually strongly convergent; outer verticals usually strongly divergent; occipitals pale, weak, deciduous, scalelike, usually somewhat divergent; postocular cilia pale, deciduous, scalelike, mixed with short dark bristles; cheek bristle usually not defined from the strong cheek cilia. Thoracic dorsum clothed with small, pale, scalelike hairs; dorsocentral and anterior supraalar bristles well behind suture but nearly in a line, variable individually within single species, but usually with dorsocentrals somewhat in front of line of anterior supraalars in *solidaginis* and in *nicholsoni* and usually slightly behind line of anterior supraalars in *comma* and in *reticulata*, the anterior supraalar bristles frequently doubled on one or on both sides of the dorsum of individual specimens, the dorsocentrals occasionally similarly doubled, specimens of *solidaginis* sometimes with the paired dorsocentrals replaced by tufts containing several bristles; scutellum swollen, markedly convex, usually with 1 or 2 pairs of long bristles, but varying individually by possessing from 2 to 7 bristles within a single species. The doubling of almost any of the bristles is a trait possessed in common by the various species in the genus. Abdomen broad, usually somewhat longer than thorax, dorsally clothed with short, dark, glistening hairs, intermixed with some pale scalelike hairs, especially on the basal segment. Ovipositor sheath short, but not conspicuously broad. Ring of second male genital segment broad and conspicuously differentiated from the much narrower forceps; internal process with two strong teeth. Wing with a dark pattern obscuring most of the ground, but broken by hyaline and semihyaline incisions and droplets; first and third veins bristled; a single known species, *latifrons* Loew, with a well-defined callus in the first posterior cell, the other species with the callus variable, less well defined, but always causing a bending of the third vein; anterior cross vein approximately at distal third of discal cell; anal cell more or less bluntly pointed on sixth vein.

Type of the genus, *Acinia solidaginis* Fitch.

All of the species with known biology form galls on the roots or stems of goldenrod (*Solidago* spp.). Each larva before forming a puparium makes an exit in the gall, only a thin and easily ruptured covering sealing the emergence hole. The different species of *Eurosta*, at least locally, tend to be restricted to different species of *Solidago*; although, if the previous literature is accurate, different goldenrods may serve as hosts for a single species of *Eurosta* in different localities. Plants growing in a moist environment seem more subject to attack than those in dry soils.

The generic name was proposed by Loew (60, p. 280) in 1873 for *solidaginis* Fitch, but *comma* Wiedemann and *latifrons* Loew were also included. Coquillett (14, p. 543), in 1910, definitely designated *solidaginis* as the genotype. Osten-Sacken (66, p. 192), in 1878, listed *Eurosta* as a subgenus of *Trypeta* and (66, p. 260) stated that the name *Eurostus* Dallas does not conflict, but "should a change be thought necessary, add the syllable *Neo*."

Curran (22, p. 4), in 1932, proposed the monobasic generic name *Eurostina* with *Trypeta latifrons* Loew designated genotype, giving as the separating character from *Eurosta*, "anterior pair of dorso-central bristles situated close to the suture." This is not the case in the single specimen of *latifrons* in the collection of the United States National Museum. In this specimen there is but a single pair of dorsocentrals, and these are remote from the suture and only slightly in front of the line of the anterior supraalaris; hence the Curran name is placed as a synonym.

EUROSTA NICHOLSONI, new species

(Fig. 19, A-M)

Closely related to *Eurosta solidaginis* Fitch,⁵ and making similar, but much smaller, galls on the stems of a species of goldenrod. It differs from that species in that the adult has a greater extension of dark markings, and consequently less hyaline, on the wing. The male genitalia show slight differences which may or may not be significant when sufficient material from various colonies of both species is examined. The larvae average 1 or 2 fewer beads on the anterior spiracle than those of the available limited series of *solidaginis*. The posterior spiracles are similar. The larvae of both seem too variable to be distinguished by other characters.

Adult.—Head, including the antennae, yellowish, more or less tinged with rufous. Thorax with a rufous ground covered with bright pollinose yellow which speedily becomes obscured by grease, with some obscure dark markings tending to be arranged in longitudinal bands on the dorsum; scutellum similar in coloration to the thoracic dorsum, with from 2 to 4 bristles, the posterior pair usually present but normally much weaker than the proximal pair. Legs yellowish, more or less tinted with rufous. Wing with the pattern mostly blackish brown and luteous brown, interrupted by some hyaline spots. Size: Wing usually measuring about 7.5 by 3.25 to 3.5 mm, the wings showing little difference in size between the sexes. The male approximately 7 to 7.5 mm in length, the female 0.5 to 0.75 mm longer.

Immature stages.—Similar to the corresponding stages of *E. comma*; the larva and the puparium possibly averaging 0.25 to 0.5 mm longer. Anterior spiracles usually with from 3 to 5 beads each; posterior spiracles closer together, and the slits on each spiracle arranged in an oblique line with their apices pointed more in a lateral than in a ventral direction.

Hosts.—The larvae feed in small round galls on the stems of goldenrod (*Solidago* sp.).

Distribution.—This species was found only near the east coast, in Brevard County, Fla., but in several localities. Adults were reared from galls which came from near Titusville, from near Malabar, and from 5½ miles southwest of Indian River. The holotype male and

⁵ Described by Harris (34, p. 417) in 1841 as *Tephritis asteris*, but this name is a primary homonym of *T. asteris* Haliday (32, p. 186) described in 1838; hence unavailable. The species was again described as new by Fitch (28, p. 77) in 1855, and given the name *icinia solidaginis*. The Say manuscript name *nuphera* was mentioned by Harris (33, p. 80) in 1835, and by Osten-Sacken (65, p. 77) in 1858. This name was made available by Johnson (54, p. 19) in 1925. The only known "type" of both the Harris and Johnson (Say manuscript) names is discussed by Johnson. The author has personally compared this "type" with a specimen which agrees perfectly with the Fitch types of *solidaginis* in the United States National Museum.

allotype female are from $1\frac{1}{4}$ miles south of Titusville, the remaining series of 8 males and 6 females (paratypes) from $1\frac{1}{2}$ miles south of Titusville, from near Titusville, and from 1 mile south of Malabar, all from Brevard County, Fla.

EUROSTA COMMA (Wiedemann)

(Fig. 20, A-M)

Described as *Trypeta comma* by Wiedemann (97, p. 478) in 1830, and since discussed by many authors. It was figured by Loew (57, pp. 58, 93) (60, pp. 280, 336), Daecke (23, p. 342), Phillips (69, p. 144), and others.

Adult.—Head, including antennae, yellowish, more or less tinged with rufous. Thorax with a rufous ground, and covered with a bright pollinose yellow which speedily becomes obscured with grease; some obscure darker markings, tending to be arranged in longitudinal bands on the dorsum; dorsocentral bristles as well as other thoracic bristles occasionally doubled; scutellum similar in coloration to the thoracic dorsum; with from 2 to 7 bristles, reduced in numbers owing to the obsolescence of the posterior pair, or increased in numbers owing to some of the ordinary bristles being doubled. Legs concolorous with thorax. Wing with pattern blackish brown, luteous, and hyaline. Size: Aside from dwarf individuals, the wings of both sexes with little variation in size, usually measuring 7.25 to 7.75 mm by 3 to 3.25 mm. Male about 7 to 7.5 mm in length, female approximately 1 mm longer than a corresponding male.

Immature stages.—Egg white. Larva white, soft, when fully matured measuring from about 6 to 7 mm in length and sometimes more than 4 mm in diameter; skin densely clothed with minute spines; anterior spiracles usually with about 6 or 8 beads each; posterior spiracles widely separated; spiracular plates on surface inconspicuous and poorly chitinated, those below the surface strong, brown, irregular in outline; slits short, broad, ovate, and arranged in a fan on each spiracle. Pupa similar to the larva, but straw colored and slightly smaller.

Hosts.—The larvae normally feed in galls on the roots of goldenrod (*Solidago*), growing in damp or wet soils. Occasionally the root galls project above the surface of the ground. Sometimes galls are formed on the stems, especially when the roots of the host are covered with water, during oviposition. A patch of infested goldenrod will frequently yield many galls, often several on the roots of a single plant, but with only a single larva or puparium in each gall. The infestations are usually in the form of local colonies. There are many species of closely related goldenrods in Florida, and possibly more than a single species serves as host. One species was identified, through the courtesy of authorities at the United States National Museum, as *Solidago fistulosa*. Daecke (23, p. 342) recorded the host on Long Island, N.Y., as *S. juncea*.

Distribution.—The species is locally and colonially abundant in the northern half of Florida, and has previously been recorded from localities ranging from Maine to Virginia and Kentucky. Records from the West and Southwest possibly refer to *Eurosta fenestrata* Snow, which, in turn, may ultimately be proven only a western variant of *comma*. Johnson recorded *fenestrata* from St. Augustine, Fla. (52, p. 84).

EUROSTA RETICULATA Snow

(Fig. 21, A-M)

Described as *Eurosta reticulata* by Snow (53, p. 170) in 1894. The author is unable to differentiate *Eurosta conspurcata* Doane (25, p. 186), described in 1899, from this species. The Florida series has the wing pattern variable, but on the whole with some of the hyaline

markings in the third posterior cell so coalescing that an irregular hyaline area is formed, thus more closely resembling Doane's figure of *conspicua* than Snow's figure of *reticulata*. The biology has been discussed by Thompson (87, p. 71) and Stebbins (85, p. 52).

Adult.—Head, including antennae, yellowish, more or less tinged with rufous. Thorax, including scutellum, with a rufous ground tinted with luteous and marked by black which forms a broad band each side of center of dorsum, a blotch mesad of humerus, a broad band on each side of mesothorax between dorsocentral and intraalar bristles, a similar band touching base of anterior supraalar and extending between intraalar and postalar bristles, a spot at base of acrostichal bristles, and obscure dark marks on scutellum; entire thorax densely pollinose, this more or less completely hiding the ground color and black markings, causing the thorax to appear either silvery gray, or, when slightly greasy, ranging from luteous gray to almost golden, or, when soaked by grease, or when wet, allowing the ground color and markings to become visible; dorsum clothed with small, pale, scalelike hairs, except that those which arise from the dorsolateral area of the mesothorax are usually dark, but any of the pale hairs which have been soaked by grease may appear quite dark; scutellum usually four bristled. Legs yellow, more or less tinted with rufous. Wing with the pattern fuscous brown, luteous brown, and hyaline, presenting a banded, yet reticulated, appearance. Size: The wings show little difference in size as between the sexes, and usually measure slightly less than 7 mm in length and from 2.75 to 3.1 mm in width. Male usually from 5.5 to more than 6 mm in length, and the female about 0.5 mm longer.

Immature stages.—Similar to corresponding stages of *E. comma*, the larva and puparium possibly averaging somewhat shorter. The anterior spiracles usually have from 6 to 8 beads. The posterior spiracles are almost identical with those of *comma*, but are usually somewhat closer together.

Host.—The larvae feed in root galls on goldenrod (*Solidago semper-virens*). From 1 to 4 galls were found on a single host plant. Those having galls were growing in soil subject to standing brackish water during spring and summer. These galls, which may attain a length of over 45 mm and a diameter greater than 25 mm, are normally just below the surface of the ground. Usually each gall contains only a single larva or puparium, but very occasionally the galls are compound, containing two larvae or puparia separated by a thin partition.

Distribution.—The species was found in some numbers, but only by D. J. Nicholson and in a single locality 4 miles west of Indian River City, Brevard County, Fla. Previously published records, and the National Museum series, indicate a distribution from Maine through the Northeastern States westward to at least Montana and Colorado. The species appears to be restricted to certain localities and in those it is found in isolated colonies.

THE GENUS PARACANTHA COQUILLETT

Adult.—Head large; vertex somewhat wider than maximum width of relatively narrow eye; frons scarcely tapered in width, produced; third antennal joint slightly curved; arista with cilia short; head bristles strong and black, or yellow and scalelike; 3 pairs of erect, scarcely converging frontal bristles, the lower pair yellow, the upper 2 pairs black, close to the eyes and resembling lower orbitals; 3 pairs of pale, erect bristles inside of frontals between middle of front and vertex, possibly being the upper orbital bristles which are otherwise absent; inner verticals black; outer verticals yellow inconspicuously differentiated from the yellow postocular cilia; a strong pair of black ocellar bristles; occipitals yellow, divergent; postocular cilia mixed, yellow and shorter black bristles; cheek cilia mostly yellow, intermixed with some dark hairs; cheek bristle relatively strong, blackish. Thoracic dorsum with a reticulate pattern of yellow pile; dorsocentral bristles in front of anterior supraalars and close to suture; scutellum with two pairs of strong black bristles and a distal fringe of scalelike hairs, dorsally bearing some additional paired, long, scalelike hairs. Abdomen broad, tapered, short; exclusive of ovipositor of female, subequal in length with

thorax; dorsally clothed with pale scalelike hairs, and with dark short hairs along cephalic margin of segments. Ovipositor sheath broad, comparable in length with that of the 3 or 4 preceding abdominal segments; male forceps relatively short and twisted, the distal edge of the second genital segment sharp and either serrate or knifelike, the internal process with two strong claws, the anal region not large. Wing with the first vein bristled; stalk of second and third veins with 1 or 2 bristles; third vein naked; anterior cross vein at approximately the beginning of the distal third of the discal cell; anal cell broad, but drawn out as a long projection on sixth vein. In addition, the conspicuous black spots between and surrounding the antennae, and the peculiar maculation of the wings, will aid in the isolation of the genus.

Type of the genus, *Trypeta culta* Wiedemann.

The generic name *Paracantha* was first proposed by Coquillett (13 p. 264) in 1899 with *culta* sole species and designated type. This is the *Carphotricha* of some of the earlier authors and of Loew in part, a name generally used to include the species belonging in *Paracantha* until as late as 1910 when Coquillett (14) published his paper on the genotypes of American Diptera.

The genus contains several closely related species which have been generally confused in the literature.

PARACANTHA CULTA (Wiedemann)

(Fig. 22, A-P)

Described as *Trypeta culta* by Wiedemann in 1830 (97, p. 486) but this spelling obviously a typographical error corrected in the index of the original publication (97, p. 680) to *culta*. The latter spelling has been consistently employed by a long list of authors excepting Osten-Sacken (65, p. 79) in 1858. Macquart (61, p. 385, pl. 31, fig. 5), in 1843, redescribed the species under the new specific name *fimbriata*. The species seems to have been much confused in the past with *culturis* Coquillett (12, p. 72) and with neotropical species. Records of *culta* from the Pacific coast from Mexico and from Central America and South America are not to be trusted.

Adult. Head yellow, tinged with some brown, with conspicuous black patches as illustrated, also with an additional black patch behind each eye. Dorsum of thorax with a brownish ground color, interrupted by four irregular yellowish longitudinal stripes bearing yellow pile, creating the appearance of a yellowish thorax marked by brownish dots; humeral areas yellow; with a yellow lateral line; otherwise more or less tinged with brown somewhat interrupted by yellowish; scutellum yellowish brown, conspicuously marked by a black spot at base of each of the posterior, black, scutellar bristles. Legs yellowish brown, the fore femora each with a black spot, the mid and hind femora each with two black spots. Abdomen yellowish, more or less tinged with brown. Wing brownish orange on the disc, the coloration extending in rays bordered by fuscous to wing margin; the orange coloration often obscured or replaced by fuscous in the distal parts of these rays; spaces between the rays hyaline; ground color further mottled by hyaline spots with fuscous margins and shadings, and a conspicuous jet-black callus in first posterior cell; two rays between apices of third and fourth veins, the upper ray usually reduced to a terminal fuscous streak and not connected with the ground color of the wing, the lower ray oblique, nearly touching apex of fourth vein. Male forceps twisted, distal edge of second genital segment sharp and serrate. Ovipositor sheath approximately as long as total length of the four preceding segments. Size: Male wing 6 by 2.8 mm, female wing 7.4 by 3.5 mm. Length of male 6.5 mm, of female 8 mm.

Immature stages.—Egg white, with a long tapering stalk. Larvae white, with variation in size, when fully grown from about 6.1 to 7.5 mm in length and from about 2.8 to 3.4 mm in diameter; skin with an evenly scattered stippling of fine spines and appearing granular in consequence; each anterior spiracle with about nine beads; posterior spiracles with the slits parallel sided and relatively straight, each spiracle with the slits arranged in a fan with the lowest slit relatively more

oblique than the upper two. Puparia dark brown to blackish, each of a size comparable with the fully grown larva from which it was formed, about 0.5 mm shorter and 0.25 mm larger in diameter; segmental lines poorly defined but visible.

Host.—The larvae feed in the bases of the flowers of thistles, *Cirsium* sp., from 1 to 12 having been found within a single flower. Occasionally, especially before the blossoming period, larvae were found within the tender growing stems. Adults were obtained from *C. nuttallii*, from *C. horridulum* (*C. spinosissimum*), and probably from other species of thistles.

Note.—About 400 reared specimens of *culta* showed no intergrades with the following species.

PARACANTHA FORFICULA, new species

(Fig. 23, A-M)

Resembling *Paracantha culta* Wiedemann in all details of egg, larva, puparium, and adult, except as follows:

Adult.—Averaging about 25 percent smaller than *culta*; the facial black markings reduced in size, the spot on each side of the face and contiguous with the eye reduced to a heavy black dot and not elongate; with powdery black surrounding bases of all scutellar bristles, the black marking the bases of the apical pair of greater extent than in *culta* but less conspicuous because of its powdery nature; wing with hyaline droplets in axillary and third posterior cells tending to be more strongly defined by fuscous, the ray near center of distal hyaline area of first posterior cell usually connected with ground color of basal portion of cell, and the following ray nearly equally dividing remainder of hyaline area. Second genital segment of male with the distal portion drawn out to a knifelike edge but lacking definite teeth or serrations. Ovipositor sheath relatively short, being subequal to the last three preceding segments. The chitinous ovipositor only about 1.1 mm in length, as compared with 2.3 mm for that of *culta*, but similar in width, both being 0.4 mm.

Immature stages.—The egg, illustrated in figure 23, A, was removed from a female, while that of *culta* was laid by the female; hence no true comparison can be made between these eggs. The fully matured larva averages 25 percent smaller than that of *culta*, being somewhat smaller than the smallest fully matured larva of the latter. There are on an average 1 or 2 less beads on each anterior spiracle, and the slits of the posterior spiracles are shorter while remaining nearly as broad. The puparium is similar to that of *culta*, but about 25 percent smaller.

Host.—The larvae feed in the soft fleshy bases of the flowers of *Borrchia frutescens*, usually 1 to a flower but occasionally 2 or 3 in 1 flower.

The types are 100 adult specimens about equally divided as to sex, all reared by D. J. Nicholson from larvae or puparia from the following Florida localities: Cocoa Beach, Merritt Island, Key Largo, Jasmine Point, Naples, Boca Ciega, and Miami Beach. Dates of emergence range from May 2 to June 30, 1930, with the exception of a single emergence on October 21, 1930. The holotype male and allotype female are designated from Cocoa Beach, and the remaining 98 specimens are paratypes.

THE GENUS ACIDOGONA LOEW

Adult.—Head relatively broad, vertex slightly wider than maximum width of eye, frons tapered in width and distally produced; third antennal joint pointed; arista somewhat pubescent; head bristles black except the postocular cilia, the cheek bristles and cilia, and, occasionally, the occipitals; 3 pairs of frontal bristles, the upper 2 pairs close to the margins of the eyes and resembling lower orbital bristles; 2 pairs of upper orbitals; 1 pair of ocellar; each inner vertical close to the corresponding outer vertical; occipitals short, slender, dark or pale, nearly

parallel; the occiput also bearing an inner pair of deciduous, weak, convergent, scalelike hairs; cheek bristle relatively dark and strong. Thoracic dorsum clothed with yellow pile, with the dorsocentral bristles approximately in line with the anterior supraalar close to the suture; scutellum with 2 pairs of strong black bristles, and an apical and 2 subapical pairs of pale deciduous, scalelike hairs. Abdomen short and broad, covered with yellow pile intermixed with black bristly pile. Ovipositor sheath short, slightly longer than the preceding segment. Male forceps conspicuously narrower than the dorsal part of the second genital segment, the internal process with two strong claws, the anal region relatively small. Wing with the first vein strongly bristled; the course of the second vein interrupted by an excurve above the posterior cross vein; the stalk of the second and third veins bristled; with about 4 bristles on third vein distad of stalk of second vein and 1 more bristle distad of the anterior cross vein, which is somewhat distad of middle of discal cell; anal cell relatively short and broad, produced on the sixth vein to a short but acute point.

Type of the genus, *Trypeta* (*Acidogona*) *melanura* Loew.

Acidogona was first proposed by Loew (60, p. 285; but on p. 300 spelled *Acidigona*), as a subgenus of *Trypeta*, for *melanura* as sole species.

ACIDOOGONA MELANURA (Loew)

(Fig. 24, A-N)

Described as *Trypeta* (*Acidogona*) *melanura* by Loew (60, p. 288, pl. xi, fig. 6) in 1873.

Adult.—Adult characters, excepting coloration, as under the generic heading. Head including antennae pale luteous brown, ventrally and caudally paler; thorax with the dorsum blackish, the humeral and lateral areas luteous, the lateroventral and ventral areas blackish brown; scutellum brownish luteous, conspicuously marked with black and blackish brown, which forms disconcolorous spots at bases of bristles and darkens a large cephalomedian area. Legs bright yellow. Abdomen bright luteous, with conspicuous median and lateral black spots as illustrated; beneath luteous. Wing brown and blackish brown with hyaline spots, measuring 3.75 by 1.75 mm as an average for normal individuals.

Immature stages.—Egg white. Larva white, shaped as illustrated in figure 24, B; each anterior spiracle averaging six beads; posterior spiracles widely separated, the slits ovate, their position (fig. 24, D) abnormal for the family. Puparium dark brown, the segmental sutures obsolescent.

Hosts.—The larva feeds singly in an individual flower of *Hieracium*, the egg being deposited in the young bloom, which remains tightly sealed until the adult emerges. Adults were obtained from flowers of *H. argyraeum*, *H. scabrum*, and *H. gronovii*.

Distribution.—The species has heretofore been very rare in collections, and the only records seem to be that of the type from Washington, D.C., and the Massachusetts record of Johnson (53, p. 264).

THE GENUS TOMOPLAGIA COQUILLET

Adult.—Head with vertex wider than maximum width of eye, frons tapered, flattened, somewhat produced near antennae; antennae with third joint lobate; arista without noticeable pubescence; head bristles all pale but definitely of a bristly nature with the exception of the occipitals; three pairs of frontals, and some scattered thin pale hairs near margin of each eye; two pairs of upper orbitals; one pair of long ocellar bristles; about six pairs of short hairs on ocellar triangle, and one pair of similar hairs on occiput just behind ocellar triangle; inner and outer verticals strong; occipitals nearly parallel, somewhat flattened and scalelike, conspicuously longer than the postocular cilia, which are small and pale but definitely hairlike; cheek bristles and cilia relatively strong. Thoracic dorsum clothed with short, sparse, bristly hairs; all of the normal bristles yellowish but strong; dorsocentrals much in front of the line of the anterior supraalar and close to the suture; aesthetichs relatively far forward but behind the line of the anterior supraalar; scutellum bearing two pairs of strong but yellowish bristles. Abdomen clothed with sparse bristly hairs which appear either fuscous or luteous depending on the lighting. Ovipositor sheath broad, and relatively long in comparison with

the length of the abdomen. Wing with the first vein, the knot at the junction of the second and third veins, and the third vein, bristly; anterior cross vein strongly oblique; fourth vein excurved near base of second posterior cell; discal cell long and approaching the margin; anal cell produced to a long point on the sixth vein. The diagonally banded wings, coupled with the presence of at least some black spottings on the thorax and on the abdomen, are superficial characters suggestive of the genus.

Type of the genus, *Trypeta obliqua* Say.

The generic name was proposed by Coquillett (14, pp. 591, 615) in 1910 to replace *Plagiotoma* Loew, preoccupied, with *obliqua* designated type. The generic name *Plagiotoma* had been proposed by Loew (60, p. 252) in 1873 as a subgenus of *Trypeta*, with *obliqua* designated the type (60, p. 337). The Loew name is preoccupied by *Plagiotoma* Claparède and Lachmann, 1858, a name for a genus of Protozoa.

TOMOPLAGIA OBLIQUA (Say)

(Fig. 25, A-L)

Described as *Trypeta obliqua* by Say (75, p. 186) in 1830, placed in *Trypeta*, subgenus *Plagiotoma*, by Loew (60, pp. 251, 337) in 1873, and thereafter usually cited as *Plagiotoma obliqua* until Coquillett proposed the anagram *Tomoplugia* in 1910. Since that date the combination *Tomoplugia obliqua* has been in general use. The important references are mostly cited by Hendel (36, p. 35), excepting the subsequent paper by Phillips (69, p. 138) and the record from Lower California by Cole (11, p. 472).

Adult.—Head, thorax, abdomen, and legs yellow, more or less tinged with lemon yellow, the scutellum bright lemon yellow. Thorax marked by black spots; one on each side of the mesonotum near the scutellum, one above the mid coxa, one above the hind coxa, and one near base of abdomen on each side; and a black dot just behind the base of each wing. Abdomen marked on each side by a dorso-lateral row of black spots resembling buttons, the individual spots in each row about equally separated, one spot on each side of each visible segment, excepting the ovipositor sheath; thus the male has a total of 8 abdominal spots, and the female, 10. Ovipositor sheath broad, but approximately of a length equal to that of the three preceding segments. Male forceps twisted and also bent inward toward each other; each internal process with one relatively long claw and one short spinelike claw. Size: Male wing, 3.9 by 1.6 mm; female wing, 4 by 1.65 mm. Length of male 3.3 mm, of female 3.9 mm.

Immature stages.—Larva white, relatively stout, approximately 2.85 mm in length and 1.1 mm in diameter, marked by black which obscures much of the last segment and forms a dorsal mark on the preceding segment; skin coarsely granular; last segment with small but conspicuous tubercles; each anterior spiracle with 4 or 5 beads (the only larva examined which possessed 5 beads had 3 of these beads closely crowded, the larvae which possessed 4 beads had these beads symmetrically arranged); posterior spiracles with the slits small but elongate, those on each spiracle arranged in a fan. Puparium about 2.4 mm in length by 1.2 mm in diameter; the segmental lines variable but indistinct; dull brownish in color but marked with black similar to that of the larva.

Hosts.—Adults were reared from larvae and puparia in flowers of *Vernonia scaberrima*, *V. blodgettii*, and *V. gigantea*. Only an occasional flower is infested; and it contains a single larva or puparium, which is difficult to find.

Distribution.—Apparently rather generally distributed throughout Florida, including the Keys, and not rare, although never found in abundance. The species was originally described from Indiana. Other records cite New Jersey, Pennsylvania, Illinois, Iowa, Kansas, California, and New Mexico; also Mexico (Guadalajara, Orizaba, Vera Cruz, and San Pedro Martir Island, Lower California), and

Cuba. Owing to the large number of very closely related tropical species, records from the West Indies and Mexico are subject to question.

THE GENUS NEASPILOTA OSTEN-SACKEN

Adult.—Head with vertex approximately as broad as maximum width of eye; frons strongly tapered, sunken below ocellar triangle, strongly projecting near bases of antennae; third antennal joint more or less lobate, with a tendency toward a distal angulation; all bristles of the head and thorax yellow or yellowish brown, but not of a scalelike nature, except as otherwise mentioned; three pairs of frontal bristles; two pairs of upper orbitals, the upper pair as strong as the lower pair but nearly reclinate and converging; one pair of long ocellar bristles; occipitals pale and scalelike; inner and outer verticals long; postocular cilia scalelike but not weak; cheek bristle long, well defined; cheek cilia conspicuous. Thoracic dorsum finely pollinose in appearance, clothed with pale scalelike hairs; dorsocentral bristles remote from suture but only slightly behind line of anterior supraalar; scutellum with two pairs of long bristles. Abdomen, exclusive of the ovipositor sheath, approximately equal in length to thorax. Ovipositor sheath broad, but as long or longer than the two preceding abdominal segments. Male genitalia with the forceps curved toward each other, the internal process armed with two small teeth. Wing with the first vein strongly spined; with no trace of spines on the third vein, or on the knot at the junction of the second and third veins, either on the upper or the under side of the wing; anterior cross vein beyond the middle of the relatively long distal cell, at about the beginning of the distal third of that cell in most of the species; anal cell produced to a short point on sixth vein.

Type of the genus, *Trypeta alba* Loew.

The generic name *Neaspilota* was first proposed by Osten-Sacken (66, p. 192) in 1878 for a subgenus of *Trypeta* without designation of genotype, and as a new name to replace *Aspilota* Loew. The latter was described by Loew (60, p. 286) in 1873, but is preoccupied by *Aspilota* Foerster, 1862, a generic name in Hymenoptera. Coquillett (14, pp. 511, 574) designated *Trypeta alba* Loew genotype of *Neaspilota* Osten-Sacken and *Aspilota* Loew (not Foerster). Williston (99, pp. 285, 287), and Hendel (35, p. 92; 36, p. 7) spelled the name *Neospilota*. The genus has been discussed under the name *Neaspilota* by a number of authors, including Aldrich (2, p. 610), Cresson (16, p. 276), Phillips (69, p. 139), Curran (22, p. 3), and others.

With the exception of *vernoniae* Loew, which is atypical on several characters, and *achilleae* Johnson, which is structurally typical but easily distinguished by the dark markings on the wings, the genus contains a number of closely related species. These are extremely difficult to sort, and there are probably several more species than names.

There exist in Florida, and presumably elsewhere, two or more species with larvae which have 3 or 4 beads on each anterior spiracle, the caudal ends individually tending to become more or less blackened or powdered with black before the larvae form puparia, and otherwise practically identical, except in size, which is directly proportionate to that of the corresponding adults. This group is divisible on the stigma, forming two subgroups, one of which possesses a conspicuous black patch occupying the proximal part of the stigma, the other having the stigma ranging from nearly clear yellowish brown to suffused with brownish or fuscous in the proximal part. Corresponding with the heavily black-marked stigma, the abdomen has the ground color so marked with fuscous that at least on segments 2 to 4, inclusive, of the males and 2 to 5, inclusive, of the females, dorsally only a narrow strip of the yellowish ground color distally crosses each seg-

ment. Corresponding with the less heavily marked stigma the abdomen has the black which suffuses the ground color restricted to the proximal parts of segments 2 to 4 or 2 to 5. This abdominal character can be seen only in specimens which have been moistened or are greasy; all specimens have the abdomens heavily powdered with pollinose, so an abdomen which is heavily black marked appears mainly brownish or yellowish with the distal margins of the segments narrowly and disconcolorously lemon yellow; an abdomen with the fuscous suffusion limited to the proximal parts of the segments appears a brighter yellow, the distal margins of the segments being broadly and disconcolorously lemon yellow.

Specimens which have been killed before attaining complete coloration often appear to represent distinct species. Some of these, which would later have the darkly marked stigma and dark abdomens, may easily be mistaken for specimens belonging to the paler subgroup. These immature specimens have the abdomens usually brighter yellow with the dark markings only faintly visible, the stigma usually hyaline or nearly so.

To further complicate the situation, pinned specimens soon become greasy and much darkened, and the usual run of material found in collections is of this kind. Fully matured individuals which have obtained complete coloration are much more active in the field than the incompletely colored, adolescent individuals, so the latter are more easily caught and form a part of each collected series. Size, as a character, is of small value, except to sort the large and atypical *vernoniae* from the remainder of the genus, and even that species is probably more subject to variation in size than indicated in most collections. The size of the specimens of a series depends largely upon the kind and condition of the host, and specimens far smaller than normal for a given host are often reared because of drying of the food. The exact length of portions of veins, such as the terminal part of the fourth vein in relation to the length of the discal cell, a character used by some authors to place *vernoniae* in a different genus, is subject to much individual variation in bred series from the same host and which are obviously otherwise similar. The exact shape of the wing is subject to variation, especially within bred series, partly because of a tendency for specimens which are undernourished to develop shorter wings and more or less distorted costal margins, but also partly because the smallest individuals have wings which appear to be proportionately more reduced in width across the axillary region than in length, thus causing what at first seems to be quite distinct species on this character. Specimens which are small because of having fed as larvae within flowers of some plant such as *Erigeron*, usually have the frons much sunken and appear to have a head shape quite distinct from that of normal specimens from some of the larger host flowers. But intermittently, throughout series reared from some of the larger flowers, specimens are obtained which have heads similar to those of specimens from some of the smaller flowers; and apparently such specimens may be obtained by making the food unsuited, by drying or otherwise, for complete development to the adult. Specimens from any single locality and single species of host tend to form colonies which may be sorted by slight differences in wing shape, amount of black in the stigma, and amount of black marking the abdominal segments, with the result that several "species" might easily be named.

But these "species" often seem to intergrade completely when several series are obtained from the same host but from slightly different localities; also, when several series are obtained from similar, but distinct, species of hosts, such as, for example, the different-species of *Chrysopsis*.

The male genitalia are comparatively soft and easily distorted so that if examined on a few specimens they often seem to present specific differences, yet these apparent differences also seem to exist between otherwise identical specimens from a single host.

In short, from nearly 1,000 specimens reared from known hosts, the author was unable to select any character or set of characters based either on adult or immature stages which seemed stable enough to serve as a basis on which to split the series into more than two parts, although if parts of each series were discarded, several "species" would seem indicated.

A key is given which will aid in separating the described species, but it will serve only for typical and matured specimens which are neither stained nor greasy:

Key to species of Neaspilota

1. Wing with black markings on the disk in addition to black in the stigma... 2.
Wing without black markings, or with the marking restricted to the stigma... 3.
2. Size large, wing measuring more than 4 mm in length; the black on the wing reaching the apex of the fourth vein; the polished spot on the thorax in back of the head brownish..... *vernoniae* Loew.
Size smaller, wing measuring less than 4 mm in length; the black on the wing not reaching the apex of the fourth vein; the polished spot on the thorax jet black..... *achilleae* Johnson.
3. Abdomen uniformly purple-black, and with dark brownish or black vestiture; wing with the entire stigma dark fuscous brown or black..... *albidipennis* Loew.
Abdomen with a luteous or brownish ground color which is at least indicated on the apical margins of the segments, the abdominal vestiture with many pale hairs or scalelike hairs; wing with the stigma variously marked or unmarked, but not entirely dark fuscous brown or black..... 4.
4. Mature specimens with the stigma nearly hyaline, pale yellowish unmarked by brown or black; side of the thorax between the spiracle and the base of the wing (the mesopleura) fuscous, pollinose, and appearing of a gray color; larvae and puparia curved, each anterior spiracle usually with 6 or 7 beads; only known host, flowers of *Vernonia* sp..... *alba*.
Mature specimens with the stigma usually disconcolorous, either brownish, or fuscous, or marked with a spot; if the stigma is apparently nearly hyaline, the mesopleura appears bright yellow or lemon yellow, not fuscous overpowered with pollinose and appearing gray; larvae and puparia [where known] not conspicuously curved, each anterior spiracle with about 3 or 4 beads; hosts, flowers of various composites..... 5.
5. Cross veins and tips of some of the longitudinal veins dark brown, disconcolorous with the luteous or lemon-yellow parts of the veins..... 6.
Cross veins and longitudinal veins uniformly bright luteous or lemon yellow..... 7.
6. Stigma appearing nearly uniformly brown..... *brunneostigmata* Doane.
Stigma with a large proximal fuscous-brown or blackish spot contrasting with the pale yellowish almost entirely hyaline distal area..... *signifera* Coquillett.
7. Stigma with a large jet black proximal spot in contrast to an almost hyaline distal area..... *punctistigma*, new species.
Stigma with the proximal part brownish, occasionally powdered with grayish black, often appearing almost entirely hyaline..... *dolosa*, new species.

NEASPILOTA ACHILLEAE Johnson

(Fig. 26, A-L)

Described as *Neaspilota achilleae* by Johnson (46, p. 328) in 1900 and subsequently discussed by Johnson in several papers which added little excepting additional localities. Phillips (69, p. 140), in 1923, used the spelling "*achilliae*."

Adult.—Head, including the antennae, lemon yellow, paler near the mouth and eyes. Thoracic ground color bright lemon yellow; dorsum with a conspicuous polished black spot directly behind the head, with the mesothoracic ground color largely replaced by black, which in fresh specimens appears a pollinose silvery gray, extending in four tongue-like prolongations toward the scutellum, but leaving all of the long bristles on the yellow ground; otherwise, the thorax largely yellow marked by bright lemon yellow, and with gray-black, of the same nature as that on the dorsum, marking the metathorax and the areas between the coxae; scutellum lemon yellow, dorsally with a faint silvery-gray tinge. Legs yellow. Abdomen yellow, nearly unicolorous with the exception of the slightly more rufous ovipositor sheath, which is darkened at the tip. Any or all of the yellow of the head, antennae, legs, thorax, and abdomen tending to appear more or less tinged with rufous in all specimens with the exception of those which have been freshly killed. Wing hyaline, with a jet-black patch occupying the basal part of the stigma; and smoky-black markings as illustrated, these markings tending toward reticulation; the posterior margin not subparallel with the costa. Size: Male wing about 2.5 to 3.6 mm by 1.1 to 1.6 mm, female wing about 2.5 to 3.8 mm by 1.1 to 1.7 mm. Length of male 2.8 to 3.1 mm, of female 2.8 to 3.3 mm.

Immature stages.—Larva about 3.2 to 3.8 mm in length and 1.25 to 1.5 mm in diameter, usually slightly curved, white, with the caudal end often blackened, especially before forming the puparium; the skin appearing relatively smooth, but covered by a fine stippling of granular spines; anterior spiracles usually with about 3 or 4 beads; posterior spiracles close together, the slits on each spiracle elongate, straight sided, and subparallel, on obsolescent plates with more strongly chitinated plates showing through from below. Puparium about 3.1 mm in length by 1.4 to 1.6 mm in diameter; more or less ovate (not bean-shaped as in *N. alba*); the skin white or whitish, and translucent, the contained pupa creating a straw-colored appearance; the caudal end often blackened; the segmental sutures defined.

Hosts.—The larvae feed singly in the flowers of a large number of different composites. The preferred hosts in Florida seem to be various species of *Hieracium*. Adults were reared from *H. argyraeum*, *H. gronovii*, *H. scabrum*, and more rarely from *Sericocarpus acutisquammosus*, *Aster carolinianus*, *A. concolor*, *Chrysopsis latifolia*, *C. microcephala*, *C. oligantha*, *Erigeron ramosus*, and *E. vernus*.

Distribution.—The species seems generally distributed and abundant throughout at least the northern half of Florida. Previously published records cite Massachusetts, Pennsylvania, New Jersey, Georgia, and northern Florida.

NEASPILOTA ALBA (Loew)

(Fig. 27, A-M)

Described as *Trypeta alba* (56, p. 345) by Loew in 1861, and included in the Loew papers of 1862 (57, p. 100) and 1873 (60, p. 285), in the latter placed in the subgenus *Aspilota*. Osten-Sacken (66, pp. 192, 260), in 1878, placed the species in the subgenus *Neaspilota*, and records the larvae as living in the buds of *Vernonia*. The species has since been discussed by a number of authors, and consistently placed in *Neaspilota*.

Adult.—Head, including the antennae, yellowish, more or less tinted with ferruginous, paler near the mouth and eyes. Marking on the thoracic dorsum similar to that described for *N. achilleae*, with the black somewhat more extended, the yellowish lacking the lemon cast, and so tinted with fuscous that in conjunction with the general pollinose effect the yellow dorsal parts appear almost silvery gray, the coloration extending onto most of the dorsum of the scutellum to a greater degree than in *achilleae*; similar silvery gray also obscuring the yellow of most of the lateral margins of the notum and the pleurae, especially the mesopleurae. Legs ferruginous yellow. Abdomen more ovate than in *N. punctistigma* and *N. rosea*, ferruginous yellow with brownish or blackish bands occupying much of the dorsal parts of the segments, the yellow ground color showing laterally, and as terminal bands on all segments, only the first abdominal segment and the ovipositor sheath being more or less conspicuously yellowish. Ovipositor sheath relatively short and broad, only slightly longer than the two preceding abdominal segments. Wing, with the exception of the yellow veins and the very pale granular yellowish stigma, entirely hyaline; posterior margin oblique, not subparallel with costa. Size: Male wing about 3.4 by 1.6 mm, female wing 4 by 1.9 mm. Length of male 3.3 to 3.5 mm, of female 3.5 to 4 mm.

Immature stages.—Larva about 4 mm in length and 1.2 mm in diameter, curved, so that the midventral line is longer than the middorsal, white, with the caudal end not blackened; skin appearing relatively smooth, but covered by a fine stippling of granular spines; anterior spiracles usually with 6 or 7 beads; posterior spiracles close together; the slits on each spiracle elongate, straight sided, and subparallel, on obsolescent plates, strongly chitinized plates showing through from below. Puparium somewhat shorter than a corresponding larva, but of approximately the same diameter; the skin white or whitish and translucent, the contained pupa creating a straw-colored appearance; shape similar to that of the larva, curved; segmental sutures plainly defined.

Hosts.—The larvae feed in the flowers of various species of iron-weeds, *Vernonia*, including *V. scaberrima*, *V. gigantea*, and *V. blodgettii*.

Distribution.—The species seems generally distributed throughout Florida, and probably is present wherever its hosts grow in that State. The species was described from Pennsylvania, and has been recorded from Massachusetts, Rhode Island, New York, and New Jersey, also from Missouri, Colorado, and New Mexico. At least some of the records are subject to suspicion, as the various species in the genus have been much confused.

Note.—Florida specimens were compared by the author with the Loew types in the Museum of Comparative Zoology and appear to agree in all details. The figures and descriptions were made from Florida specimens reared from *Vernonia scaberrima*.

NEASPILOTA PUNCTISTIGMA, new species

(Fig. 28, A-L)

This apparently is the species listed as *Neaspilota signifera* Coquillett by Johnson (52, p. 84) in 1913.

Adult.—Head, including the antennae, yellowish, more or less tinted with ferruginous and with lemon yellow, paler and often grayish near eyes and mouth, frons often sunken on small specimens, and usually either flattened or slightly excurved on larger specimens, regardless of the host. Thorax colored and marked much like that of *N. achilleae*, the pleurae sometimes slightly tinged with silvery gray. Legs yellow, often tinged with lemon yellow. Abdomen more tapered and less ovate than that of *N. alba*, with a lemon-yellow ground color, but dorsally so heavily marked with transverse black bands and the whole so pollinose as to present the appearance of a brownish or yellowish abdomen with the distal margins of the segments narrowly and discolorously bright lemon yellow; ground colors visible in presence of grease, the yellows appearing tinted with ferruginous. Ovipositor sheath as long or longer than the three preceding segments; luteous brown or rufous brown, with a darker tip; the ovipositor showing through the thin chitin and causing the appearance of a dark longitudinal streak. Wing entirely hyaline, except for the yellow or lemon-yellow veins, and the

stigma, which normally is yellowish with a conspicuous jet-black proximal spot, but which may be nearly hyaline in occasional specimens which have been killed before attaining complete coloration. Size: Variable, largely dependent upon both the species and the quality of the host. Among the smallest specimens are a female from *Pluchea imbricata*, with a length of 1.8 mm and a wing 1.9 by 0.7 mm, and a male from the same lot with a length of 2 mm and a wing 2.1 by 0.8 mm—obviously undersized examples. Most of the specimens from *Pluchea* with a length of about 2.5 mm for the males and the females about 0.1 to 0.25 mm longer, the wings much the same in the two sexes, about 2.3 to 2.4 mm by 1 mm, those of the females possibly averaging very slightly longer and broader than those of the males; the transition in size gradual to the largest specimens, from *Sericocarpus*, one abnormally large female from the latter host having a length of 3 mm and a wing measuring 3.2 by 1.3 mm. Specimens from various species of *Chrysopsis* intermediate in size between the extremes.

Immature stages.—The larvae and puparia, which vary in size proportionately with the corresponding adults, are practically identical with those of *achilleae*.

Hosts.—The larvae feed singly in the flowers of various composites, and adults were reared from the following: *Pluchea foetida*, *P. imbricata*, *Chrysopsis* sp., *C. hyssopifolia*, *C. microcephala*, *C. mariana*, *C. traceyi*, *C. trichophylla*, *Sericocarpus acutisquamosus*, and *S. bifolius*. A single specimen was apparently reared from a flower of *Lantana sellowiana* but the record needs verification, as the adult may simply have been hidden within the flower.

Distribution.—Generally distributed and abundant throughout Florida, and probably in at least some others of the Southern and Eastern States.

Types.—To avoid the chance of a mixed-type series, the types are restricted to specimens reared from *Pluchea foetida*. Holotype male from 4 miles east of Fort Christmas, Fla., June 14, 1930; allotype female, from same lot, June 17, 1930. Seventy paratypes, about evenly divided as to sex, from the following Florida localities: 4 miles east of Fort Christmas, Fort Christmas, Bithlo, Oviedo, Orlando, Longwood, Branchboro, Cleveland, Wiersdale, Caryville, Forest City, Conway, and from Brevard County.

Note.—Specimens from *Pluchea foetida* and from *P. imbricata* were considered in the field as probably representing a species distinct from the feeder in *Chrysopsis* and in *Sericocarpus*, but this point must be held in abeyance, as the author is unable to find characters to differentiate the latter.

NEASPILOTA DOLOSA, new species

(Fig. 29, A-L)

Another species which the writer considers as new has been classed with *Neuspilota alba* Loew in some collections.

Adult.—Similar to that of *N. punctistigma*, with the following exceptions: Pleurae seldom, if ever, tinged with silvery gray; abdomen with a lemon-yellow ground color, but dorsally marked with transverse black bands only on the proximal parts of segments 2 to 4 in the male and 2 to 5 in the female, which, in conjunction with the pollinosity, creates the appearance of a luteous abdomen with the segments distally bright lemon yellow and proximally rufous brown. Stigma with the proximal part brownish, occasionally powdered with grayish black, or often appearing almost entirely hyaline. Size: Largely dependent upon the condition of the host; male ranging from about 2 to 2.8 mm in length and with a wing measuring 2 to 2.8 mm in length and 0.9 to 1.1 mm in width; female with a length of from 2.6 to 3.4 mm and a wing measuring 2.1 to 2.8 mm by 1 to 1.1 mm.

Immature stages.—The larvae and puparia, which vary in size proportionately with the corresponding adults, are practically identical with those of *achilleae*; and differ by usually having, instead of often having, the terminal segment

distinctly black marked, the black often extending dorsally onto the preceding two segments.

Host.—The larvae feed singly in the flowers of *Heterotheca subarillaris*.

Distribution.—Reared from the following Florida localities: Orlando, near Orlando, Forest City, Lockhart, Mount Dora, Leesburg, Wiersdale, Bellevue, Clermont, Fairville, Rocky Point, Cocoa, and New Port Richey.

Types.—Holotype male, Orlando, Fla., June 10, 1930; allotype female, same lot, June 14, 1930. One hundred and fifty paratypes about equally divided as to sex from the above-named localities.

Notes.—Short series reared from *Sideranthus megacephalus* and from *Erigeron vernus* and *E. ramosus* may be conspecific. Specimens of the first-mentioned average somewhat larger than those from *Heterotheca* and each has the stigma as pale as that of *N. alba*, but the body shape, the length of the ovipositor sheath, and the coloration definitely link the series with *dolosa* and separate it from *alba*. There is, also, some possibility that these specimens are immature examples of *punctistigma*, but the generally firm and matured appearance of the chitin almost precludes this possibility. The specimens from both species of *Erigeron* form a relatively compact unit, averaging smaller than those from *Heterotheca*, and with the stigmata, on the average, somewhat more contrastingly marked, smoky black being frequently present basally. Possibly this is only the result of a different food.

THE GENUS PAROXYNA HENDEL

Adult.—Head with vertex approximately as broad as maximum width of eye; frons tapered, strongly produced near antennae; third antennal joint slightly pointed; tongue very long and geniculate; head bristles black excepting as otherwise noted; 2 pairs of frontal bristles; a few deciduous pale cilia on each side of the front near the eyes; 2 pairs of upper orbital bristles, the upper pair pale and scalelike; 1 pair of ocellar bristles; inner verticals long and strong; outer verticals long, but pale and scalelike; occipitals pale, scalelike, scarcely divergent; postocular cilia often consisting mainly of short, black bristles, but with at least 2 pale scalelike bristles behind each eye; cheek cilia short and pale, the cheek bristle relatively strong, but caudad of the usual position in the group and inconspicuous. Thoracic dorsum clothed with pale, nearly scalelike hairs extending onto the scutellum; dorsocentral bristles in front of line of anterior supraalar and nearly on the suture; scutellum with one pair of strong bristles and usually with an additional posterior pair of bristles which may be short and black or pale and scalelike, the character of specific significance. Abdomen, exclusive of the ovipositor sheath, about as long as the thorax, dorsally clothed with pale scalelike hairs intermixed with darker short bristles, with conspicuous macrochaetae on last segment of male and on fourth and fifth segments of female; ovipositor sheath sparsely clothed with fine dark hairs, flattened, relatively broad, as long as preceding 2 or 3 segments. The male genitalia indicate two groups, possibly subgenera, and are discussed under the specific headings. Wing hyaline, with a dark reticulate design; first vein spined; third vein naked; anterior cross vein from near beginning of distal third of long discal cell; anal cell drawn out to a short point on sixth vein.

Type of the genus, *Trypeta tessellata* Loew.

The generic name *Paroxyna* was first proposed by Hendel (37, pp. 23, 146) in 1927, with *tessellata* Loew designated as type. The genus includes *Oryna*, in part, of Loew (59, p. 85) and other European workers and *Ensina* of papers on American trypetids.

The genus belongs with a group, including the genera *Ensina* Robineau-Desvoidy and *Oryna* Robineau-Desvoidy, the species of which all possess long geniculate tongues. Ultimately some generic lumping may be necessary. *Ensina*, as exemplified by *E. sonchi* Linnaeus,

has 4 strong scutellar bristles and 3 pairs of frontals. All of the specimens before the writer lack the dorsal pair of upper orbital bristles, but have a wing pattern and a habitus suggestive of *Neaspilota achilleae*. The genus *Neaspilota* does have characters in common with this long-tongued group. The general absence of spines on both under and upper sides of the wing on the third vein is one such character. Others may be seen by a comparison of the biologies and immature stages of *Ensina picciola* with those of the various species of *Neaspilota*.

PAROXYNA THOMAE (Curran)

(Fig. 37, A-G)

Ensina thomae was described by Curran (20, p. 70, fig. 30) in 1928 from a unique female type, now in very bad condition, in the American Museum of Natural History. The specimen seems to have been killed before gaining complete coloration, but the remnants of the wings appear to have more markings than shown in the original figure, which conveys an erroneous impression.

The Florida specimens here described were compared with the type of *thomae* by the author, who was unable to discern any specific distinction. Better specimens from St. Thomas must be awaited before the Florida species can be stated, with any certainty, to be conspecific. Nevertheless, agreement was noted on several specific characters, viz, the yellow apex of the scutellum, the somewhat longer ovipositor sheath, the dark coloration on the posterior femora, and the general pattern of the wing including the lack of a hyaline droplet above the termination of the second vein, and the style and extent of the apical dark markings. Williston's figure labeled *peregrina* Loew (98, p. 377, pl. 13, fig. 130) from St. Vincent, and subsequently published without specific name (99, p. 285, fig. 24) is probably the same species.

Adult.—Head yellowish in frontal view, antennae and lower part of the frons darker, almost rufous-orange, eyes surrounded by whitish, back of head fuscous. Thorax black, pollinose with yellowish and orange, and appearing gray, with longitudinal bands, more or less defined, one on each side of center of dorsum at bases of dorsocentral bristles, and a short similar band on each side of mesonotum at bases of presutural bristles; scutellum with a distinctly pale yellowish apical area, with 2 strong, dark anterior bristles, and with 2 short, weak, posterior bristles which are usually pale, deciduous, and scalelike (as a short, black bristle on one side, and as a pale scalelike hair on the other side, of the scutellum of a single specimen). Legs variable in coloration, luteous brown, sometimes with a rufous tinge, outer sides of femora, especially of hind legs, darker. Abdomen black, pollinose, appearing gray, a longitudinal band of dark patches on each side of center. Ovipositor sheath black. Male genitalia with ring of second male genital segment much enlarged, not retracted or hidden beneath the body, but visible as if it were a terminal appendage, of the peculiar shape illustrated in figure 37, C and D, and armed with strong, short, spinelike hairs; forceps practically invisible except from below, curved toward each other from near the proximo-ventral angles, each of the forceps bearing the usual internal process armed with teeth. Wing hyaline, with a reticulate black design, individually somewhat variable in extent and density, especially in second and third posterior cells, and surrounding the apical hyaline spot in first posterior cell, also with or without from 1 to 3 hyaline droplets interrupting the black subapical patch in submarginal cell. Size: Wing about 2.8 mm by 0.9 to 0.95 mm, the males frequently somewhat smaller, the females sometimes somewhat larger, but a sexual difference in size of wing not pronounced in normally developed individuals. Normal length of male 2.75 to 3 mm, of female 3 to 3.25 mm.

Immature stages.—Not differentiated from those of the related and much more abundant *Paroxyna picciola* Bigot.

Host.—The species was reared in quantity, but only from the flowers of *Bidens bipinnata*.

Distribution.—The only flowers of *Bidens bipinnata* collected were from Oriando, Oviedo, and Crystal River, Fla., and adult flies were obtained from these flowers. The Curran type is stated to have come from the Island of St. Thomas, West Indies.

PAROXYNA PICCIOLA (Bigot)

(Fig. 30, A-N)

Described as *Acinia picciola* by Bigot (8, p. 347) in 1856. The description and figure are unrecognizable, but the identity was established by Loew (60, pp. 291, 337) in 1873. *Trypeta humilis* Loew, described (57, p. 81) in 1862, and *Trypeta aurifera* Thomson, described (88, p. 585) in 1868, appear to be synonymous. Loew, in 1873 (60, pp. 291, 337), and Osten-Sacken, in 1878 (66, p. 193), placed the species in *Ensina* as a subgenus of *Trypeta*. Coquillett, 1899 (13, p. 264), used the generic name *Tephritis*. Since that date the species has quite generally been placed in *Ensina*. Hendel (36, p. 65), in 1914, listed the species as a synonym of *chilensis* Macquart (61, p. 387). None of the Florida series agrees with Hendel's figure.

Adult.—Head in frontal view and including antennae rufous, eyes surrounded by whitish, back of head fuscous. Thorax black, pollinose with yellowish, fresh specimens appearing luteous to luteous gray, with more or less obsolescent longitudinal bands; scutellum concolorous with remainder of thorax and lacking any trace of apical yellowish ground color, with two strong, dark, anterior bristles, and with two short, dark, weak, but distinct, posterior bristles. Legs variable in coloration, luteous brown, sometimes with almost a rufous tinge, usually somewhat darkened with fuscous, especially on outer sides of femora, which are quite disconcolorous. Abdomen black, pollinose, appearing gray, a longitudinal band of dark patches on each side of center. Ovipositor sheath black. Male genitalia with ring of second male genital segment narrowed to form the forceps, which are bent toward each other in a manner normal in the group; the internal process of the usual pattern, with two strong teeth; the entire genitalia partly fitting beneath the last abdominal segment in almost the usual manner, and as illustrated in figure 30, J. Wing hyaline, with a reticulate black design individually somewhat variable in extent and density. Size: Wing of male about 2.2 to 2.5 mm by 0.8 to 0.9 mm, of female 2.5 to 2.6 mm by 0.9 to 1 mm. Normal length of male 2.1 to 2.5 mm, of female 2.5 to 3 mm.

Immature stages.—Larva white; 2.5 to 2.75 mm in length and 0.8 mm in diameter; skin appearing relatively smooth, but covered with a stippling of fine spines; each anterior spiracle with about five beads; posterior spiracles close together, the slits on each spiracle elongate, straight sided, and subparallel, on obsolescent plates, more strongly chitinated plates showing through from below. Pupa only very slightly shorter and broader than a corresponding larva; of a color ranging between straw and pale brown; with most of the segmental sutures poorly defined.

Hosts.—The larvae feed in the flowers of many composites, and adults were reared in quantities from the flowers of *Bidens leucantha*, and more rarely from the flowers of *B. bipinnata*, *B. laevis*, *Actinospermum angustifolium*, *Coreopsis nudata*, *C. leavenworthii*, *C. tripteris*, *Tagetes erecta*, and *Cosmos* sp.

Distribution.—Vying with *Xanthaciura insecta* as the most generally distributed and abundant Florida trypetid. The Bigot and the Loew types of *P. picciola* are recorded as coming from Cuba. The Thomson types are supposedly from California. The species seems generally distributed throughout the Gulf States, but has been recorded also from Tennessee, Illinois, Iowa, Kansas, South Dakota, and Colorado, and also from Bermuda, Bahama Islands, Cuba, Puerto Rico, Jamaica, Mexico, and South America. Some of the records probably refer to closely related but distinct species.

THE GENUS *XANTHACIURA* HENDEL

Adult.—Head with vertex narrower than maximum width of eye; frons somewhat tapered and flattened, often sunken except approaching bases of antennae; third antennal joint relatively long, apex rounded; three pairs of blackish frontal bristles; with two rows of pale deciduous scalelike hairs, one row on each side of front near each eye; two pairs of upper orbitals, the upper pair small, pale, and scalelike, lower pair strong and dark; one pair of long, strong, dark, ocellar bristles; occipitals weak, pale, scalelike, poorly defined from the postocular cilia, parallel, and obliquely extending in a caudal direction; inner verticals very long, strong, dark, nearly parallel and recurved; outer verticals usually stronger and darker than postocular cilia; the latter scalelike, pale, relatively strong, and extending in a generally caudal direction; cheek bristle relatively strong, pale, but not scalelike; cheek cilia pale. Thoracic dorsum clothed with deciduous, pale, scalelike hairs, the anterior pair of supraalar bristles relatively caudad owing to the strong curvature of the suture, the dorsocentrals well in front of the supraalars and almost on the line of the suture, the acrostichals farther forward than usual in the family; scutellum with either 1 or 2 pairs of bristles and some pale scalelike hairs. Abdomen, exclusive of the ovipositor sheath, approximately equal in length to the thorax; ovipositor sheath short and broad; male genitalia of two different kinds as illustrated (fig. 31, *K* and *L*; compare with figs. 32, *H* and *I*, and 33, *H* and *I*), possibly indicative of two subgenera. Wing with the first vein strongly spined; second vein often uneven in its course; third vein, and the knob at its base, spined to near or just beyond the anterior cross vein, spines difficult to see, weak, and deciduous; anterior cross vein distad of middle of discal cell; anal cell nearly truncate, not produced along sixth vein and only slightly pointed.

Type of the genus, *Trypeta chrysura* Thomson.

The generic name *Xanthaciura* was proposed by Hendel (35, p. 86) in 1914 in a key, with *chrysura* Thomson the sole species and designated genotype. Later in the same year the same author again published (36, pp. 7, 46) the name *Xanthaciura* as a new generic name with *chrysura* designated genotype. The generic name *Tetraciura* Hendel was also proposed (35, p. 90) in the same key with *Xanthaciura* and also, as with the latter, again published (36, pp. 7, 48) as a new generic name later in the same year. A description accompanied each of the names in the second paper. *Xanthaciura* is based on species with the scutellum two-bristled, while *Tetraciura* is based on a single species with a four-bristled scutellum. The character is not of generic significance within this group.⁶ *Tetraciura* is, therefore, placed as a synonym. Phillips (69, p. 131), in 1923, erected, under the genus *Aciura*, the subgenus *Eucosmoptera* for three species, *nigricornis* Doane, *limata* Coquillett, and *tetraspina* Phillips, without designation of type. The first species, *nigricornis*, violates the characters assigned by the author to *Aciura* by having the dorsocentral bristles well behind the line of the anterior supraalars. It also practically falls into the category of a *species inquirenda*, and, therefore, should not be designated genotype (36, p. 26). The second species, *limata*, was unknown to the author of *Eucosmoptera*, except through information derived from the original description of that species and a drawing of the type specimen. It also violates the characters assigned to *Aciura* by having the dorsocentral bristles well behind the line of the anterior supraalars. Therefore it cannot logically be selected as the type of *Eucosmoptera*. The species is treated on p. 21 and assigned to the genus *Myoleja* Walker. This leaves *tetra-*

⁶ The biology, including the hosts, the shapes and the structures of the larvae, and the male genitalia, and the general habits of the adults all show *X. connexions* and *X. tetraspina* more closely related to each other than either are to *insecta*. Possibly a subgeneric division is indicated, but not based on the number of bristles on the scutellum. The taxonomic value of the number of scutellar bristles appears to vary with the group. In many instances these bristles furnish a superficial character assisting in the sorting of groups or of genera. In other instances, as with *Eurosta comma* Wiedemann, differences in the number of scutellar bristles are not of specific significance.

spina as the sole species in the subgenus *Eucosmoptera* agreeing with the generic characters assigned by Phillips to *Aciura*, and also as being the only species definitely and certainly known to the author of *Eucosmoptera*. But *tetraspina* has a truncate anal cell and thereby violates the description given under *Eucosmoptera*. In short, no species assigned by the author to the subgenus will logically serve as the type, yet a type must be selected if the name is to be restricted so that it is available for one of its component parts. Therefore the name best known to the author of *Eucosmoptera*, and the one which will cause the subgeneric name to be associated with the *Aciura* complex, *tetraspina* Phillips, is hereby designated the type. This selection causes the name *Eucosmoptera* to become a synonym of *Xanthaciura* for the reasons cited under the discussion of the name *Tetraciura* Hendel. Curran (22, pp. 4, 12), in 1932, used the name *Eucosmoptera* Phillips as a generic name, without designation of genotype, and included only the same three originally assigned species. Several authors have shown that the European genus *Aciura* Robineau-Desvoidy (70, p. 773), proposed in 1830, with genotype *Acinia femoralis* Robineau-Desvoidy by designation of Rondani (72, p. 113) in 1856, will not serve for the related American species. The genus *Aciura*, in the restricted sense, is discussed by Hendel (37, p. 108). The name *Xanthaciura* appears to be the oldest valid name for *Aciura* as used for American species by Loew (60, p. 263). The name *Aciura* as used by other authors dealing with American material prior to 1914 presents a badly mixed lumping of species representing several genera some of which, in the larvae, feed in fruits. The known larvae of *Xanthaciura* all feed in composite flowers.

XANTHACIURA INSECTA (Loew)

(Fig. 31, A-O)

Described as *Trypeta insecta* by Loew (57, p. 72) in 1862.

Adult.—Head, including the antennae, yellowish. Thorax black dorsally, laterally brownish black, ventrally yellow; scutellum black. Legs yellow. Abdomen yellow, sometimes strongly tinged with brown and blackish brown, which tends to darken the dorsum of the last one or two abdominal segments of the male, or to form two bands on the female, one including the distal half of the second abdominal segment with the third and fourth abdominal segments, the other darkening the tip of the yellow ovipositor sheath. Male forceps not conspicuously incurved, but each bearing a long, pointed, oblique projection (fig. 31, L), and a distal, short, heavily setulose lobe; internal process long and excurved, the normal two teeth practically fused into a chitinous pad. Wing nearly covered by a black pattern; with three hyaline spots in the costal cell, one being before the humeral vein; with two large, triangular, hyaline areas, extending from the costa through the first marginal cell and terminating in the submarginal cell; a small, round, hyaline spot in the first basal cell; two similar spots in the first posterior cell; six hyaline incisions along the posterior margin, the proximal two coalescing with the hyaline axillary area; the second vein uneven in its course. Size: Male wing 2.6 by 1.1 mm, female wing 3.2 by 1.2 mm. Length of male 2.9 to 3 mm, of female 4 mm.

Immature stages.—Egg white, ovate, with a small point on one end. Larva about 4 mm in length and 1.4 mm in diameter, white, with the caudal end truncate and blackened; skin quite generally covered with minute spines arranged in irregular and interrupted rows around the body, becoming obsolescent on first segment and upon caudal half of second segment; anterior spiracles averaging five beads each; posterior spiracles widely separated, the slits short, broad, and semioval, those on each spiracle arranged in a fan with the distal ends widely separated. Puparium about 2.75 mm in length and 1.4 mm in diameter, brown-

ish straw colored, with the caudal end truncate and black, the segmental sutures more or less defined

Host.—The larvae feed in the flowers of white sticktight, *Bidens leucantha*, an abundant and pernicious weed.

Distribution.—The species is abundant throughout Florida, and has been recorded from Bermuda, the Bahamas, and various of the West Indian Islands; also from Mexico and South America, but these latter records will need verification, as there are a number of closely related tropical species.

XANTHACIURA CONNEXIONIS, new species

(Fig. 32, A-L)

Adult.—Similar to *X. insecta* (Loew) and agreeing with that species in having the ventral part of the thorax yellow, and in having a 2-bristled scutellum. Differing therefrom by being smaller in size, the abdomen bright rufous yellowish; the male possessing conspicuous dorsal black marking which covers the two terminal segments and part of the preceding; the female with a spot covering most of the dorsum of the last three and one half segments, exclusive of the ovipositor sheath, which is bright rufous yellow with a black tip. Male genitalia almost identical with those of *tetraspina*, as differing greatly from those of *insecta*. Wing marked in a manner similar to the wings of *insecta* and *tetraspina*, with the posterior margin as in the latter, the discal cell as in the former, and differing from both by lacking the hyaline droplet in the first basal cell. Easily distinguished from all known species of the genus by the second vein being much shorter than normal, waved, with two noticeable bends toward the third vein, then with the apical portion conspicuously oblique to the costa. The species acts as a connecting link between the *insecta* series (*Xanthaciura*) and the *tetraspina* series (*Tetraciura*), as it has a 2-bristled scutellum like the former, but the male genitalia and the immature stages much like those of the latter. Size: Male wing 2.1 by 0.8 mm, female wing 2.25 by 0.95 mm. Length of male 2 mm, of female 2.8 mm.

Immature stages.—Larva 2.8 mm in length and 1.1 mm in diameter, white, with the caudal end of the last segment somewhat truncate but not blackened, the skin spines much reduced; each anterior spiracle with from 2 to 4 beads; posterior spiracles moderately separated, the slits short, broad, and semioval, those of each spiracle arranged in a fan with the distal ends widely separated. Puparium 2.1 mm in length and 1 mm in diameter, straw colored to pale brown, the caudal end rounded, segmental sutures defined but inconspicuous.

Hosts.—The larvae feed in the flowers. Reared from the mist-flower, *Eupatorium coelestinum* (*Conoclinium coelestinum*), from *Ageratum littorale*, and from a similar but unidentified composite with small lavender flowers.

Distribution.—The species was reared from the following Florida localities: Paradise Key, Opa Locka, 3 miles south of Florida City, 3 miles east of Wilson, 4 miles east of Wilson, Merritt Island, Broward County, Miami, Turners River, Lower Matecumbe Key, Key West, and Fort Christmas. Apparently generally distributed throughout the southern part of the State and abundant toward the tip of the peninsula. One specimen, presumably the same species, labeled Donna, Tex., was submitted by J. W. Monk as having been caught on *Grindelia*. Unique females are in the United States National Museum collection from Mexico and Nicaragua.

Types.—Holotype male, from 3 miles south of Florida City, reared from *Eupatorium coelestinum*, May 5, 1931; allotype female, same lot, May 6-7, 1931; 110 paratypes about equally divided as to sex, restricted to the series from the various Florida localities.

XANTHACIURA TETRASPINA (Phillips)

(Fig. 33, A-L)

Described as *Aciura* (*Eucosmoptera*) *tetraspina* by Phillips (69, p. 132) in 1923.

Adult.—Similar to *X. insecta* (Loew) and differing therefrom by the following characters: Tending to be slightly smaller; thoracic venter black and concolorous with dorsum; abdomen yellowish with entire tip of dorsum black in both sexes; ovipositor sheath concolorously black; scutellum bearing a pair of short, but dark and distinct, apical bristles as well as the normal long, dark pair. Male forceps strongly incurved toward each other, the internal process with two distinct teeth. Wing marked in a similar manner to that of *insecta*, but all of the hyaline incisions along the posterior margin, with the exception of the two in the second posterior cell, coalescing along the margin with the hyaline axillary area, the third posterior cell thus relatively hyaline, except for an extension of black along distal portion of fifth vein and three additional, short, broad, black extensions along fifth vein below discal cell, the latter marked with either 2 or 3 hyaline droplets contiguous with the fifth vein, the proximal droplet sometimes present on one wing and absent on the other wing of the same individual; second vein relatively even throughout its course. Size: Male wing 2.6 by 0.9 mm, female wing 3 by 1.05 mm. Length of male 2.5 mm, of female 3.5 mm.

Immature stages.—Larva 3.7 mm in length and 1.6 mm in diameter, white, with the caudal end of the last segment somewhat truncate but not blackened; skin spines much reduced; each anterior spiracle with from 4 to 6 beads; posterior spiracles moderately separated, the slits short, broad, and semioval, those on each spiracle arranged in a fan with the distal ends widely separated. Puparium about 3 mm in length and 1.8 mm in diameter, straw colored, the caudal end not conspicuously truncate; segmental sutures visible but inconspicuous.

Hosts.—The larvae feed in the flowers. Reared from the mist-bower, *Eupatorium coelestinum* and from *Ageratum houstonianum*.

Distribution.—The species was described from Missouri, and is in the National Museum collection from Indiana and Texas. In Florida it was found only at Orlando, being replaced farther south by *X. connexionis*.

THE GENUS ACINIA ROBINEAU-DESVOIDY

Adult.—Head with vertex slightly broader than maximum width of eye; frons flattened or slightly concave, more or less produced near antennae; mouth with a slightly raised edge; tongue short; third antennal joint distally somewhat angulate but not definitely pointed; head bristles pale brown but strong, except as otherwise noted; three pairs of frontal bristles, occasionally four bristles on one side on fresh specimens; a band of pale deciduous hairs on each side of front near each eye, with similar hairs near center of front (scalelike in *fucata*); two pairs of upper orbital bristles, the upper pair pale and scalelike; one pair of long ocellar bristles; inner verticals very long and strong, nearly parallel; outer verticals conspicuously shorter, divergent; occipitals pale and scalelike, relatively long, but inconspicuously defined from the longest of the scalelike postocular cilia; the latter more or less alternating between long, pale, scalelike hairs and shorter bristles (scalelike in *fucata*); cheek cilia long, pale, but hairlike (somewhat flattened in *fucata*); cheek bristle long and strong (not conspicuous in *fucata*). Thorax, in back of the head, with a conspicuous brown polished spot (black in *fucata*, as in *Neaspilota*); thoracic dorsum clothed with flattened pale hairs (definitely scalelike in *fucata*); the normal bristles brownish but strong; dorsocentrals well in front of line of anterior supraalar, and almost on the suture; scutellum bearing two pairs of long, strong, brownish bristles. Abdomen, exclusive of the ovipositor sheath, somewhat shorter than thorax, and weak in appearance; fourth segment in female about equal in length with fifth; clothed with flattened pale hairs (definitely scalelike in *fucata*); ovipositor sheath broad, and as long as two preceding segments, or slightly longer. Male genitalia with the forceps curved toward each other, bent and at least in part with a somewhat concave surface (conspicuously so in *fucata*); internal process with two strong teeth (weaker in *fucata*). Wing with a reticulate pattern of fuscous brown, with luteous droplets, and hyaline spottings, presenting a more or less tricolored appearance (conspicuously so in *fucata*) which in addition to luteous droplets

has part of the central design of the wing luteous bordered by fuscous; first and third veins spined; anterior cross vein at about beginning of distal third of discal cell; the latter rather long; anal cell produced to a short point on sixth vein.

Type of the genus, *Acinia jaceae* Robineau-Desvoidy.

The generic name *Acinia* was proposed by Robineau-Desvoidy (70, pp. 775-778) in 1830 for seven specific names, including *jaceae* and *claripennis* described as new species. There was no designation or indication of the genotype. Walker (90, pp. 75-79), in 1836, discussed the genus, placing therein several of the specific names originally assigned to the genus by Robineau-Desvoidy, as well as other specific names, including *Acinia jaceae* Robineau-Desvoidy as a synonym of *Tephritis corniculata* Fallén and *Acinia claripennis* as a synonym of *Musca leontodontis* DeGeer. Westwood (96, p. 148), in 1840 under *Tephritis* Latreille, stated "See Mr. Walker's monograph, in the Entomol. Mag. vol. iii", and thereafter mentioned "*Acinia* Macq." as a subgenus of *Tephritis*, with *T. leontodontis* (sans authorship) stated as "typical species". The citation of typical species by Westwood has been accepted as genotype fixation by the International Commission on Zoological Nomenclature with a proviso that the "species was available as genotype". It might be argued that the citation by Walker of the originally included name *claripennis*, as a synonym of *leontodontis*, explained Westwood's concept of the latter and his reason for selecting it as the genotype. But the facts remain that Westwood did not cite one of the included names, that he did not state whether he accepted or rejected the Walker synonymy, and that he credited the generic name as subgeneric to Macquart. The author does not believe that rigidly construed Westwood fixed the genotype of *Acinia* Robineau-Desvoidy. Rondani (74, p. 3), in 1871, emended the name *Acinia* to *Acynia*, credited the name to Robineau-Desvoidy, and cited "*Tephritis corniculata* Zett." as genotype. This is a name not originally included by Robineau-Desvoidy in *Acinia*, but Rondani cited as a synonym the name *jaceae* Robineau-Desvoidy.

The generic name *Acinia* was used by a number of the earlier authors for North American species, especially for the group containing *bella* Loew and for which Loew erected the "subgenus" *Euaresta*. This usage is not in accord with any of the originally included species. *Acinia* was also used by early workers in the sense of *Eurosta*; but this is also contrary to the originally included species.

Hendel (37, p. 136), in 1927, resurrected the name *Acinia* to include two European species, *bifera* Loew and *corniculata* Zetterstedt, citing the latter as the genotype and placing *jaceae* Robineau-Desvoidy in the synonymy. This is entirely in accord with the designation by Rondani.

The genus, as here used, equals *Oryphora* of Loew (59, p. 79) in part. There is a decided possibility that some of the closely related European genera, now generally accepted as distinct, will ultimately have to be combined. There is also the possibility that the American *fucata* may eventually need a separate genus, based in part upon the characters indicated in the generic description. These characters, however, are only differences in degree, rather than sharp divergence.

The known larvae of both European and American species are feeders in the flowers of composites.

ACINIA FUCATA (Fabricius)

(Fig. 34, A-M)

Fabricius (26, p. 359), in 1794, described a species stated to be from "*Americae meridionalis Insulis*", under the name *Musca fucata*, and in 1805 (27, p. 321) amplified the description. Wiedemann (97, p. 505), in 1830, is supposed to have compared specimens with the type, and Loew (60, p. 302), in 1873, accepted a Wiedemann specimen labeled "Buenos Ayres" and marked "type" as typical. Johnson (44, p. 280), in 1894, and Williston (98, p. 377), in 1896, record specimens from the West Indies; and the species has since been treated by many authors as occurring in the United States; see Doane (25, p. 189), Johnson (48, p. 100; 49, p. 162), Snow (82, p. 345), Aldrich (2, p. 611), Johnson (52, p. 84), Hendel (36, p. 67), and Phillips (69, p. 150).

Hendel sunk *Urophora tessariae* Kieffer (55, p. 439) as a synonym, but presumably incorrectly. The Kieffer species is stated to be a gall former on the stems of *Tessaria absinthoides*, and the Kieffer figure seems to represent a species quite distinct from the Florida series.

Insufficient West Indian and South American material prevents the author from changing the synonymy adopted by recent authors, but the Fabrician descriptions do not seem to fit, and in all probability will ultimately be found applicable to some other species, leaving the name *picturata* Snow, described as *Tephritis picturata* (83, p. 173) in 1894, for the North American species.

The species *fucata* has usually been placed in *Tephritis* or *Euribia* and not heretofore in *Acinia*.

Cole (11, p. 473), in 1923, described as a new species *Baryplegma maculipennis*, from a unique female type taken on Cerralbo Island, Gulf of California. No essential differences have been observed between Cole's figure and the Florida series, but the synonymy should await further specimens from Lower California.

Adult.—Head, including antennae, luteous, tinted with luteous brown, somewhat paler surrounding mouth and eyes, occiput with two black spots hidden by pollinose, and only visible on greasy specimens. Thorax with ground color bright yellow, dorsum marked with black, almost as in *Neaspilota*, and similarly marked with fuscous brown or blackish near and between the yellow legs and on metathorax; dark markings completely hidden by pollinose golden yellow and only visible on old or greasy specimens; scutellum yellowish, paler apically, and covered with the same pollinose as the remainder of the thorax. Abdomen with the ground concolorous with that of the thorax, tending to be slightly tinged with rufous, especially on old specimens, the ovipositor sheath with somewhat more of rufous cast and marked with blackish at tip. Size: Male and female wings about the same size, 3.4 to 3.5 mm by 1.4 mm. Length of male about 3.4 mm, of female 3.75 mm to 4 mm. Many runty specimens, males and females, are the result of improper or dried food. These have not been considered in the foregoing measurements.

Immature stages.—Larva white, soft, easily distorted, at least dorsally ex-curved, almost bean-shaped, measuring about 2.5 to 2.8 mm in length and 1.3 to 1.4 mm in diameter; segments very prominent, last segment with conspicuous folds and wrinkles caudally which surround the posterior spiracular area and never appear quite the same on any two larvae; skin densely covered with minute spines, although appearing smooth; anterior spiracles so reduced in size that they are difficult to see, each with 2 beads, possibly 3 in some specimens; posterior spiracles not widely separated, yet appearing so owing to their reduced size, the slits short, narrow, parallel sided, those on each spiracle practically contiguous mesially and arranged in a fan. Puparium bean-shaped, glossy rufous brown dorsally and laterally, somewhat paler and gray on the ventral surface, about 2 to 2.4 mm in length and 1.1 to 1.4 mm in diameter.

Hosts.—The larvae feed in the flowers of *Pluchea*, and were reared from *P. foetida*, *P. purpurascens*, *P. imbricata*, and an unidentified composite, probably a *Pluchea*.

Distribution.—The species appears to be generally distributed and not rare in Florida, recorded from as far north as Jacksonville and as far south as Key West. Also recorded from New Jersey, Florida (types of *picturata*), the West Indies (type of *fucata*), the Islands of Jamaica and St. Vincent, and Argentina; but at least some of the records are probably based on more than a single species.

THE GENUS EUARESTA LOEW

Adult.—Head with vertex broader than maximum width of eye; frons tapered, only slightly produced near antennae; third antennal joint lobate; 2 pairs of yellowish brown frontal bristles, with 2 irregular bands of small, pale hairs and scalelike hairs, 1 band on each side of front near each eye; 2 pairs of upper orbitals, the lower pair strong and yellowish brown, the upper pair weaker and matching the occipitals in color and texture; 1 pair of long, strong, yellowish brown ocellar bristles; occipitals parallel, or nearly so, not conspicuously defined by color, texture, or length from the postocular cilia; inner verticals long, strong, and yellowish brown; outer verticals similar in color and texture to the postocular cilia, but somewhat longer; postocular cilia pale and scalelike, but relatively strong; cheek bristle somewhat darker than the cheek cilia but inconspicuous. Thoracic dorsum clothed with deciduous, pale, scalelike hairs, all of the bristles yellowish brown; dorsocentrals near suture and in front of line of anterior supraalar; scutellum with two pairs of long bristles. Abdomen, exclusive of the ovipositor sheath, approximately equal in length to thorax, ovipositor sheath basally as broad as preceding segment, tapering distally. Male genitalia with forceps reduced in length and pointed toward each other, the internal process short, stout, bearing two short, black teeth, and hidden by the main part of the much enlarged second genital segment, which distally bears several oblique ridges each side of anal region. Wing with a dark design interrupted by hyaline marginal indentations and hyaline spottings and droplets on the disk; first vein strongly spined; knob at junction of second and third veins with 2 or 3 small spines; typically the third vein with 2 or 3 deciduous spines, which are difficult to see, well before the anterior cross vein, and several similar spines distad of cross vein; first posterior cell with a black callus distorting the wing membrane close to the third vein; anterior cross vein more or less distad of basal two thirds of discal cell; the latter long and relatively close to the wing margin; anal cell inconspicuously pointed on sixth vein.

Type of the genus, *Trypeta festiva* Loew.

The generic name *Euresta* was proposed by Loew (60, p. 295), in 1873, for a subgenus of *Trypeta*. Williston (98, p. 377), in 1896, used the spelling *Evaresta*. From about 1900 the name *Euresta* has been used in the generic sense to include a large number of species, the different authors limiting or defining the genus in a somewhat different manner. Coquillett (14, p. 540), in 1910, designated the genotype as *festiva* Loew, and since that date authors have consistently retained the Coquillett type fixation but have not agreed regarding what other species to consider congeneric. In the main, authors have assigned to the genus most of the smaller American species having the scutellum 4-bristled and the wing more or less reticulated, but have generally assigned *Trypeta mexicana* Wiedemann to the genus notwithstanding the fact that this species has a scutellum bearing only 2 bristles, as well as usually eliminating from the genus *Trypeta abstersa* Loew, which has a 4-bristled scutellum. In short, from this standpoint the genus would be scarcely if at all distinct from *Trupanea*.

There exist a number of closely related species which agree more or less in the chaetotaxy of the head and thorax; possess at least a few

spines on the third vein; and further agree by having the second male genital segment greatly specialized, being so enlarged that it cannot be retracted, and also conspicuously striated with oblique ridges and depressions. This group of species includes, among others, *aequalis* Loew, *festiva* Loew, *bella* Loew, *bellula* Snow, *stelligera* Coquillett, *tapetis* Coquillett, and *bullans* Wiedemann, but does not include *mericana* Wiedemann, *abstersa* Loew, *pura* Loew, or *subpura* Johnson, or any of the species usually assigned to *Trupanea*.

Hendel (38, p. 368), in 1928, split the genus *Euaresta* into several divisions which he called genera, and to *Euaresta* in the restricted sense assigned *festiva*, *bella*, and *bellula*, defining the genus as possessing 4 bristles on the scutellum, 2 pairs of frontal bristles, and 1 to 3 spines on the third vein, evidently having overlooked some of the spines. These three species further agree by having a distinct black callus in the first posterior cell. In 1914 (35, p. 95) Hendel proposed the name *Camaromyia* in a key, with *Trypeta bullans* Wiedemann, sole species and designated type, later in the same year (36, p. 63) again publishing the same generic name as "new", keeping the same genotype but, in addition, placing under the generic name the North American *aequalis*.⁷ The genus was largely based on the characters of two pairs of frontal bristles, a conical-shaped ovipositor sheath, and a naked third vein. Actually, in the genotype, there are a couple of small and deciduous bristles on the knob at the junction of the second and third veins, and by examining a long series of specimens a single similar bristle was located on 1 specimen, on that part of the third vein over the first basal cell, while several specimens showed 1 or 2 such bristles beyond the anterior cross vein. The presence of these few bristles in *Camaromyia*, together with the similar chaetotaxy of head and thorax and the peculiarly specialized male genitalia, indicates the close affinity between this group and *Euaresta* (in the restricted sense). The presence of the black callus in the first posterior cell of *Euaresta* and its absence in *Camaromyia* will distinguish the two groups. Whether this latter character is of generic or of subgeneric significance must await biological and revisional studies.

EUARESTA (EUARESTA) BELLA (Loew)

(Fig. 35, A-G)

Described as *Trypeta bella* by Loew (57, p. 88) in 1862, an adoption of an undescribed Fitch name. The species has been discussed by a number of authors.

Adult.—Head, including the antennae, yellowish. Thorax with the ground color blackish, with some luteous which tints the area above the fore coxa, the humerus, the lateral sutural area to the wing base, and most of the scutellum, the entire thorax heavily pollinose with golden yellow. Legs yellow. Abdomen luteous, often with more or less of a rufous tinge especially in old or greasy specimens, pollinose, clothed with sparse yellow hairs and scalelike hairs; ovipositor sheath dark brownish rufous, almost fuscous, tending to be cylindrical although frequently flattened, sparsely clothed with fine yellowish hairs, and of a length nearly equal to that of the three preceding segments. Wing with an inconspicuous

⁷ *Setigeresta* new subgenus. Type, *Trypeta aequalis* Loew. Monobasic. Differs from all genera and subgenera of the *Euaresta* group by having the knob at the junction of the second and third veins, and the third vein definitely bristly. Also differs from *Euaresta* by lacking the callus in the first posterior cell, and from *Camaromyia* by the more lobate antenna. Otherwise the characters are as given under *Euaresta*. The larvae feed in the seed pods of cocklebur, *Xanthium* (62, 63, and 84). The biology of *Euaresta* is unknown, but is presumably quite different. The species was not collected in Florida, but adult specimens taken in Alabama just over the Florida line were submitted for identification.

hyaline basal area, but otherwise mostly covered by a dark design ranging in color from luteous brown to fuscous brown which is interrupted by hyaline forming indentations along the wing margins and droplets in the cells. Size (based on Florida material): Variable, the smallest male with a wing measuring 2.2 by 0.9 mm and a length of 2.4 mm, and the largest having a wing 2.9 by 1.15 mm, larger than that of the largest female; average female length 3 mm.

Florida specimens seem to average smaller than those from farther north but no constant differences in either structure or coloration could be found.

Immature stages.—Unknown.

Hosts.—Unknown.

Distribution.—Recorded as abundant and generally distributed from New England to Florida and west to Colorado and Texas; also recorded from Mexico and the Bahama Islands. Specimens are usually caught on ragweed, *Ambrosia artemisiifolia*. Adults were quite numerous at Orlando, Fla., on this plant, and occasionally on other weeds growing within a few inches of ragweed. Repeated searching of ragweed did not reveal the biology of the insect.

THE GENUS DYSEUARESTA HENDEL

Adult.—The description of *Euaressta* applies with the following exceptions: Third antennal joint not lobate; the pale deciduous scale-like hairs which replace bristles similar in both genera; but the yellowish brown bristles of *Euaressta* black or dark brown in *Dyseuaresta*; a pair of short, but distinct, deciduous, yellowish, scalelike hairs below the 2 pairs of frontal bristles (indicating the reduced lower pair of frontal bristles of *Trupanea*); cheek bristle darker than the cheek cilia, all longer than in *Euaressta*; scutellum with only 1 pair of very long bristles, the posterior pair absent or possibly replaced by 2 small, deciduous, pale, scalelike hairs usually lost by rubbing; main part of second genital segment large, but lacking distal ridges; forceps reduced in length, but bent and semiparallel to each other; internal process short and stout, bearing 2 black teeth exposed by the bending of the forceps. Wing with knot at junction of second and third veins with 2 or 3 small spines; third vein with at least 1 small deciduous spine near knot, and with about 4 similar spines on the part of the third vein over the first posterior cell; an evanescent callus in first posterior cell, visible on dark specimens, obsolete on specimens which are not fully colored.

Type of the genus, *Euaressta adelphica* Hendel.

The generic name *Dyseuaresta* was proposed by Hendel (38, p. 368), in 1928, for *Euaressta adelphica* Hendel, *Euaressta gephyrae* Hendel, and *Trypeta mexicana* Wiedemann with *adelphica* designated as type. The original description cited characters of a 2-bristled scutellum, 2 pairs of frontal bristles, an unspined third vein, and a normal black abdomen. *Euaressta adelphica* is unknown to the author, except from the literature. Hendel's figure (36, fig. 64) represents a wing which appears almost identical with that of *mexicana*, and shows the evanescent callus in the first posterior cell. There seems little doubt that *adelphica* is correctly associated with *mexicana*. The characters, in the generic description written by the author, have been taken from specimens of *mexicana* from Florida.

DYSEUARESTA MEXICANA (Wiedemann)

(Fig. 36, A-G)

Described as *Trypeta mexicana* by Wiedemann (97, p. 511) in 1830. Loew, in 1862 (57, pp. 59, 96), stated that the species was unknown to him and described *Trypeta melanogastra* (57, p. 90), but in 1873 (60, p. 319) published a figure of the wing of the Wiedemann type and indicated the probable synonymy. Since that date several names have been proposed for other supposed species in the group, the names

usually based upon single specimens or very short series. The characters used to define these species have been the exact spotting on the wing, the presence or absence of certain hyaline spots, or the sizes, positions, and shapes of these spots. As will be noted from the following description based on reared specimens, these characters are subject to much variation. Nevertheless, in the very few tropical specimens which have been available, there exists sufficient difference in the proportionate length of the female ovipositor sheath to indicate the possibility of several very closely related tropical species. The author was unable to see any distinguishing characters between the Loew type of *melanogastra* and the Florida series, excepting that the type had the hyaline droplet, which is situated near the middle of the submarginal cell, below the dark bar which divides the two large hyaline patches in the marginal cell. Other specimens in the collections of the Museum of Comparative Zoology and of D. M. Bates indicate that this slight difference is of little or no significance. Among the other names proposed in the group is *Euaresta plesia* Curran (20, p. 71). The author was unable to find any characters to differentiate the type from the Florida series.

Adult.—Head, including the antennae, yellowish. Thorax black, tinged with some brown; humerus, wing base, and tip of the scutellum tinted with yellowish; most of thorax and abdomen clothed with sparse, yellow, deciduous, scalelike hairs. Legs yellow. Abdomen black or blackish brown, more or less basally tinted with yellow, the first segment, and sometimes the second, frequently appearing luteous. Ovipositor sheath black or blackish brown, nearly as long as the remainder of the abdomen. Wing with an inconspicuous hyaline basal area, otherwise mostly covered by a fuscous-brown design interrupted by hyaline forming indentations along the wing margins and droplets in the cells, the hyaline part of the wing variable, the number of spots in the discal cell ranging from 1, the usual number, to 4, the droplet in the second posterior cell frequently coalescing with the nearest marginal indentation, the hyaline in the third posterior cell near the sixth vein either more or less coalescing or irregularly divided into spots. Size: Variable, the smallest and largest specimens being females, the wing measuring from 2.4 by 1 mm to 3.25 by 1.25 mm, and the length from 3 to 4 mm.

The foregoing description is based entirely upon bred Florida specimens.

Immature stages.—Unknown.

Host. *Melanthera* sp.

Distribution.—Specimens were obtained by caging the flowering heads of the host,^a but comparatively few adults were obtained from hundreds of the flowers. Quantities of the host from Lower Matecumbe Key, from Williston, and from several localities in Brevard County were caged, and on each occasion this host yielded some adult flies. The species seems widely distributed, and not rare, in Florida. It has been recorded from Texas, Mexico, Cuba, Puerto Rico, St. Vincent, the Bahama Islands, and Paraguay. Some of the records may refer to distinct, but closely related, species.

THE GENUS TRUPANEA GUETTARD

Adult.—Head with vertex subequal to maximum width of eye, frons tapered and produced; third antennal joint relatively broad, not conspicuously pointed; arista somewhat pubescent; head bristles black or blackish brown, except occipitals, outer verticals, superior pair of upper orbitals, postocular cilia, and the cheek bristle and cilia; typically with 3 pairs of frontal bristles, the lower pair much reduced in length; atypically with the lowest pair subequal with the other

^a The host dries rapidly after being cut, and this may account, at least in part, for a considerable percentage of undersized specimens. The variation in size and in wing markings recorded in the above description of the adults was not restricted to any locality.

frontal bristles, or lacking the lowest pair of frontal bristles; typically the front with a band of irregularly arranged, short, thin, pale cilia near edge of each eye, and with the center naked; atypically with the cilia near the eyes mixed with scalelike hairs, and with scalelike hairs on or near center of frons; 2 pairs of upper orbital bristles, the dorsal pair pale and scalelike; 1 pair of ocellar bristles; inner verticals long; outer verticals and occipitals pale and scalelike, inconspicuously longer than postocular cilia. Thoracic dorsum clothed with scalelike hairs, with the dorsocentral bristles cephalad of the anterior supraalar and close to the suture; scutellum with at least some scalelike hairs, easily rubbed off, typically with 1 pair of bristles, atypically with 2 pairs. Abdomen, exclusive of the ovipositor sheath, approximately equal in length to the thorax; ovipositor sheath typically quite long and broad, about equal in length to the 3 preceding segments; atypically, broad but short, being shorter than the 2 preceding segments. Male forceps narrower than dorsal part of second genital segment, and incurved toward each other; internal process with two strong teeth. Wing typically with a subapical dark stellate pattern, the dark rays running toward the wing margins, the basal part of the wing hyaline; atypically, with the basal part of the wing having reticulate markings, and the ray to the stigma often very broad; first vein strongly bristled; third vein naked; anterior cross vein distad of basal two thirds of discal cell; anal cell inconspicuously produced to a short point.

Type of the genus, *Trupanea radiata* Fabricius (presumably a synonym of *Musca stellata* Guesly).

The generic name *Trupanea* was first proposed by Guettard (31, pp. 171-173) in a work which, though listed as of 1756, appears to have been printed as a unit in 1762. The work is binary but not binomial, the species being described but not named. Schrank (76, p. 147) in 1795 or 1796 adopted and used the Guettard generic name with *radiata* as sole included species. The generic name was again used in 1803 by Schrank (77, pp. 140-151), who included under it all of his "*Bohrfliege*." The name has since been used by many authors, although emended by Bezzi (5, pp. 84, 166) in 1913 to *Trypanea*, a spelling subsequently adopted by both Hendel and Phillips. The name *Trupanea* has usually been credited to Schrank as of 1803, but several recent papers have cited the Schrank 1795-96 reference. The generic name *Urellia* Robineau-Desvoidy (70, p. 774) — proposed in 1830 to accommodate two new specific names, *calceitrape* and *parisiensis*, both of which appear to be synonyms of *stellata* — falls as a synonym of *Trupanea*. The name *Urellia* was used extensively by authors before 1910, and most of the species described under this name belong in *Trupanea*.

The groups treated as subgenera of *Trupanea* in the present paper are of equivalent taxonomic value with many groups normally considered generic in the family. The author is not inclined to place generic valuation upon such characters as the presence or absence of basal maculation on the wing, the presence or absence of the lowest pair of frontal bristles, and the presence or absence of the apical pair of bristles on the scutellum. These characters have been consistently used in the past to separate genera or groups of genera. *Actinoptera* Rondani, *Ditricha* Rondani, and *Euarestella* Hendel, used as genera by Hendel (37) in 1927, are probably of subgeneric significance. The subgenus *Goniurellia* Hendel (37, pp. 23, 198) is probably available for some of the species of *Trupanea* from the Western States. *Trupanea*, in the sense herein employed, includes *Euribia* of authors and of Hendel 1914 (35, 36) but not 1927 (37, p. 37), *Tephritis* of authors and of Hendel 1927 (37, p. 176), at least in part, and *Euaresta* of American authors, in part.

THE SUBGENUS TRUPANEA GUETTARD

This is the typical subgenus of the genus *Trupanea* and has been described under the generic heading. The term "atypical" has been used in the generic description to point out those characters which are not possessed by the species of the typical subgenus. The stellate subapical pattern of the wing together with the lack of basal wing markings; the 2-bristled scutellum; the possession of 3 pair of frontal bristles, the lowest pair somewhat reduced; and the rather long ovipositor sheath, serve to differentiate this subgenus from the others under consideration.

The known larvae are typically feeders in flowers, or bore into the tender terminal stems.

TRUPANEA (TRUPANEA) DACETOPTERA Phillips

(Fig. 38, A-G)

Described as *Trypanea dacetoptera* by Phillips (69, p. 148) in 1923. The type of *Trypeta* (*Urellia*) *polyclona* Loew (60, p. 324), in the Museum of Comparative Zoology, seems closely related, and the Loew name may ultimately have to replace *dacetoptera*. Slight differences, probably of specific significance, seem to exist in the maculation of the wings. No trace of any apical pair of bristles was found on the scutellum of the Loew type. Further Cuban material will be necessary to settle the status of the name *polyclona*.

Adult.—Head, including antennae, yellowish brown; front suffused with pale pollinose gray which obscures the ground color and forms a stripe along the side of each eye. Thorax, including the scutellum, with a fuscous ground color marked by clay yellow near the spiracles, on the humeri, and on the sutures; pollinose, fresh specimens appearing bright gray, greasy or old specimens appearing dull black with the yellowish markings relatively conspicuous. Legs clay yellow. Abdomen concolorous with the thorax and pollinose in a similar manner. Wing entirely hyaline basally, distally with a brownish-fuscous stellate design sending five rays to the posterior margin and a short ray into the discal cell, the rays somewhat variable in width and shape as between different individual specimens; first basal cell with an apical fuscous-brown suffusion, occasionally a trace of a detached fuscous mark on or below the fifth vein. Male genitalia with the forceps curved toward each other, the inner process relatively strong and bearing two claws. Ovipositor sheath approximately as long as the three preceding segments. Size: Male wing 3 to 3.3 mm by 1.1 to 1.35 mm, female wing 3 to 3.5 mm by 1.25 to 1.4 mm. Length of male 3.2 to 3.3 mm, of female 3.6 to 3.8 mm.

Immature stages.—Unknown.

Hosts.—The food plants are *Gnaphalium obtusifolium* and *Chrysopsis microcephala*. The larvae are scarce and very difficult to find. Several adults were obtained by placing large quantities of *Gnaphalium* in breeding cages. On one occasion a few larvae and puparia were found in the tender tips of nonflowering plants of *G. microcephala*, and two adults were obtained from these.

Distribution.—Apparently rare and local in Florida, the only definite records being from Orlando. Previously recorded from New York (the types) and from New England. The species was unrepresented in the collections of the United States National Museum.

TRUPANEA (TRUPANEA) MEVARNA (Walker)

(Fig. 39, A-L)

Described as *Trypeta* (*Urellia*) *mevarna* by Walker (91, p. 1023) in 1849. A photograph of the wing of the alleged type which is in the British Museum shows a wing identical with that of a specimen

compared with, and agreeing with, the type of *solaris* Loew. Walker stated that the type had 9 dark rays and 2 included hyaline drops, indicating either a specimen of *dacetopectera* or an erroneous description. In this regard Loew (60, p. 325) seemed dubious of the validity of *polyclona*, but never questioned the distinctness of *solaris*. However, the British Museum specimen is considered by the author as probably the type, pending contrary evidence. This makes the Loew species, described as *Trypeta solaris* (57, p. 84, pl. 2, fig. 19) in 1862, a synonym. The Loew figure does not fit his description in details of maculation, but the specimen labeled type in the Museum of Comparative Zoology closely agrees with both the original description and the amplified description by Loew (60, p. 325) in 1873.

Several recent authors, Hendel (36, p. 76), Phillips (69, p. 148) and Curran (22, p. 6), have sunk the name to *daphne* Wiedemann (97, p. 508), with *duplicata* Wiedemann (97, p. 510) placed in the synonymy by Hendel, followed by Phillips. The Wiedemann species were described from Montevideo, Uruguay. None of the South American specimens which have been studied seem identical with any of the Florida series. The group contains a number of very closely related species which seem individually variable on many of the characters formerly considered of specific significance; especially in the presence or the absence of an isolated blackish mark on the fifth vein, and whether or not the first blackish ray in the discal cell touches the fifth vein. These characters seem, in part, sexual, although often not definitely so.

Coquillett (13, p. 266), in 1899, sunk *solaris* Loew and *actinobola* Loew to *mevarna* Walker. Many of the subsequent authors have used the name *mevarna* in place of *solaris*, but have retained the name *actinobola* in the category of an unidentified name.

Apparently *mevarna* is a relatively rare species in collections, and the names *daphne*, *mevarna*, and *solaris* as used by most North American authors usually refer to smaller species more closely related to *actinobola*.

The Florida series, described below, closely agrees with the Loew type of *solaris*.

Adult.—Entirely similar to *dacetopectera*, except as follows: Fifth posterior ray, counting from wing apex, ending at fifth vein instead of attaining wing margin; sixth ray much shorter and only indicated by a slight shading in the discal cell near the anterior cross vein; brownish suffusion in first basal cell frequently intensified, sometimes with a blackish blotch in the center of the brownish suffusion; ovipositor sheath about equal in length with that of the four preceding segments. Size: Male wing 3.4 to 3.6 mm by 1.4 to 1.5 mm, female wing 3.7 to 4 mm by 1.5 to 1.65 mm. Length of male 3.5 to 3.8 mm, of female 4 to 4.15 mm.

Immature stages.—Larva white; about 3.6 to 3.9 mm in length by 1.5 to 1.7 mm in diameter; skin stippled with minute spines scarcely noticeable toward the caudal parts of most of the segments; each anterior spiracle with about 5 to 7 beads; posterior spiracles like those of *Neaspilota*. Puparium black, about 3.5 mm in length and 1.5 to 1.6 mm in diameter.

Hosts.—The larvae feed in the flowers, buds, and tender tops of plants of the genus *Chrysopsis*. Adults were reared from *C. graminifolia*, *C. latifolia*, *C. oligantha*, and *Chrysopsis* sp.; also reared from flowers of a plant identified questionably as *Chrysopsis microcephala*.

Distribution.—The Florida series was reared from several scattered localities and indicates that the species is generally distributed throughout the northern half of the State, but local, and not abundant.

The Loew type came from Georgia, the Walker type from Florida. Recorded by various authors, under various names, from New England west to Colorado, Nebraska, and Oregon, and southward to Florida, Texas, and California; also from Mexico, the West Indies, and several countries in South America. Most of the records are apparently based on incorrect identifications or on erroneous synonymy.

TRUPANEA (TRUPANEA) AGERATAE, new species

(Fig. 40)

Adult.—Entirely similar to *dacotopetra*, except as follows: With more of a tendency for the hyaline incisions between the dark rays to be broken into drops; fifth posterior ray, counting from wing apex, ending at fifth vein but in so doing broadened to define two hyaline drops; sixth posterior ray with a slightly disjoined, large, black patch on the fifth vein which helps form the outline of a hyaline drop in the discal cell below the anterior cross vein; the brown in the first basal cell as dark as in the darkest specimens of *dacotopetra*. Agrees with *mevarna* in the length, but not in the direction, of the fifth ray, but disagrees in the sixth ray and the strong detached spot on the fifth vein, as well as disagreeing by the general droplike nature of the hyaline on the distal part of the wing. Size: Male wing 2.5 by 1.05 mm. Length of male 2.6 mm.

Immature stages.—Undescribed.

Host.—The larvae feed in the flowers of *Ageratum littorale*.

Distribution.—No Name Key, Fla., only definitely known locality.

Type.—Holotype male, November 23, 1930, unique.

Notes.—Larvae and puparia of a *Trupanea*, probably the same species, were also noticed in *Ageratum littorale* at Key West by Nicholson, but the material was not reared.

TRUPANEA (TRUPANEA) ACTINOBOLA (Loew)

(Fig. 41, A-E)

Described as *Trypeta (Urellia) actinobola* by Loew (60, p. 326) in 1873. The specimens labeled types in the Museum of Comparative Zoology represent two forms or species, the one agreeing with the original description, the other having the second costal hyaline V crossing the second longitudinal vein and reaching half across the submarginal cell. None of the Florida specimens appear to perfectly match either of the two types, and very probably none is conspecific, yet the one Loew type which does agree with the original description differs so little from the Florida series that the introduction of a different specific name seems superfluous until some of the various Texas forms are reared to ascertain the variation within specific units. Most of the specimens labeled *daphne*, *mevarna*, and *solaris* in collections from North America belong in the *actinobola* complex. Several forms from the Southwest have received names, but these must await rearing before the synonymy can be established.

Adult.—Very similar to *dacotopetra* and to *mevarna*, but smaller. Agrees with the latter in that the fifth posterior dark ray ends on the fifth vein and does not attain the wing margin. Disagrees with both species in the generally neater pattern and narrow rays; in almost lacking any trace of a sixth posterior ray; in that the first basal cell lacks brown tinting, except usually for some fuscous brown or blackish along the anterior cross vein, this coloration obsolete individually. A detached, dark mark individually present or absent on the fifth vein almost in a transverse line with the termination of the first vein; in the present species, apparently not a secondary sexual character. Slight differences, possibly of little significance, seem to exist in the male genitalia. Ovipositor sheath scarcely, if at all, longer than the two preceding abdominal segments. Size:

Male wing 2.1 to 2.5 mm by 0.95 to 1.05 mm, female wing 2.6 to 2.85 mm by 1 to 1.1 mm. Length of male 2.1 to 2.6 mm, of female 2.5 to 3 mm.

Immature stages.—Undescribed except for the puparium, which is similar to that of *mevarna* but smaller, measuring 2 to 2.1 mm in length and 1 to 1.25 mm in diameter. The puparium shows the larval skin to possess minute spines as in *mevarna*, the posterior spiracles similar to those of that species, the anterior spiracles with about four beads.

Hosts.—The larvae feed in the flowers of various composite plants, only very rarely more than a single larva in any one flower. None were found feeding in the buds, or in the tender tips of nonflowering plants. Adults were reared from *Erigeron vernus*, *E. quercifolius*, and various species of *Solidago*; also from 1 to 3 adults were obtained from each of the following hosts: *Aster adnatus*, *A. carolinianus*, *Actinospermum angustifolium*, *Coreopsis* sp., and *Hieracium* sp.

Distribution.—The Locw types are stated to have come from Texas (Belfrage). The Florida series came from various localities throughout that State, indicating a generalized distribution, seldom abundant, yet never rare. Specimens agreeing perfectly with the Florida series are in the collections of the United States National Museum, and are labeled as having been reared from *Erigeron vernus* at Brownsville, Tex., by J. C. Bridwell. Other specimens, which seem probably conspecific, indicate a generalized distribution throughout at least the eastern part of the United States.

TRUPANEA (TRUPANEA) ECLIPTA, new species

(Fig. 42, A-K)

Adult.—Closely related to the Florida series described under the name *actinobola*, and intermediate in average size between that species and *mevarna*. Differing from the former by the oblique dark band from the stigma toward the anterior cross vein being incomplete, and in that the second hyaline costal area, counting from the stigma, crosses the second vein and forms a large, often semidetached, drop in the submarginal cell, a character probably subject to more variation than that shown by the type series. Apparently lacking all traces of a detached dark mark on the fifth vein. Male genitalia very similar to those of *actinobola*. Ovipositor sheath of approximately the same width as that of *actinobola* but conspicuously longer, being approximately equal in length to that of the three preceding abdominal segments. Size: Male wing 2.8 to 3.05 mm by 1 to 1.2 mm, female wing 2.8 to 3.4 mm by 1.15 to 1.4 mm. Length of male 2.8 to 3 mm, of female 3.3 to 3.6 mm.

Immature stages.—Undescribed except for the puparium, which is similar to that of *mevarna*, but smaller, measuring 2.4 to 2.8 mm in length and 1.3 to 1.4 mm in diameter. The puparium showing the larval skin with minute spines as in *mevarna*, the posterior spiracles similar to those of that species, the anterior spiracles with about five beads.

Host.—The larvae feed in the flowers of *Eclipta alba*.

Distribution.—Only known locality, Orlando, Fla.

Types.—Holotype male, November 1, 1930; allotype female, same date; 170 paratypes, about equally divided as to sex, various dates from August 16 to November 2, all 1930.

THE SUBGENUS EUARESTOIDES, NEW SUBGENUS

Type of the subgenus, *Trypeta abstersa* Loew.

The subgenus *Euarestoides* differs from the typical subgenus by having the stellate subapical mark inconspicuous because of a general reticulate pattern which more or less covers the entire wing; by three pairs of subequal frontal bristles; by the irregular band of pale hairs on each side of the front near the eyes, composed of mixed pale hairs and deciduous pale scalelike hairs, and with additional pale scalelike hairs near the center of the frons; by the scutellum with two

pairs of strong bristles; by the relatively short ovipositor sheath; and by a stronger clothing of scalelike hairs on the thorax and abdomen.

In Hendel's tables (37, pp. 16-23) the present subgenus falls between *Acanthophilus* and *Tephritis*, fitting neither. The genus *Camaromyia*, which Hendel includes in the same group of genera, has been treated (p. 50) as a subgenus of *Euaresia*.

In *Euaresoides* the author places *abstersa* Loew and *acutangula* Thomson, distinct species, which have usually been considered synonymous, and which have repeatedly been shifted from one genus to another. The known larvae are feeders in flowers.

TRUPANEA (EUARESTOIDES) ABSTERSA (Loew)

(Fig. 43, A-L)

Described as *Trypeta abstersa* by Loew (58, p. 221, no. 77), in 1862. The species has since been repeatedly shifted from one genus to another. Loew (60, p. 323), in 1873, and Osten-Sacken (66, p. 194), in 1878, placed the species in *Trypeta* (*Urellia*); Doane, 1899 (25, p. 192), in *Urellia*; Coquillett, 1899 (13, p. 265), in *Euaresia*; Johnson, 1900 (45, p. 688), and Van der Wulp, 1903 (100, p. 426), in *Urellia*; Johnson, 1903 (47, p. 106), in *Euaresia*; Snow, 1904 (83, p. 345), Adams, 1904 (1, p. 450), and Aldrich, 1905 (2, p. 613), in *Urellia*; Cresson, 1907 (15, p. 106), in *Euaresia*; Johnson, 1909 (50, p. 113), 1910 (51, p. 808), and 1913 (52, p. 84), in *Urellia*; Hendel, 1914 (36, p. 81), Phillips, 1923 (69, p. 148), Johnson, 1925 (53, p. 264), Johanssen, 1928 (43, p. 853), and Curran, 1932 (22, p. 6), in *Trypanea*. The closely related species *acutangula* Thomson was described in 1868 (88, p. 583) in *Trypeta*, and subsequently usually considered a synonym of *abstersa*, but placed in *Trypeta* (*Tephritis*) by Loew (60, pp. 335, 342) in 1873, in *Trypeta* (? *Tephritis*) by Osten-Sacken (66, p. 194) in 1878, and in *Tephritis* by Aldrich (2, p. 611) in 1905.

Adult.—Head, including antennae, yellowish; metanotum dark brown; otherwise head, thorax, abdomen, and all appendages yellowish, excepting the wing, which is hyaline with a dark subapical stellate design and reticulate markings. Specimens which have been killed and preserved tend to have the thoracic dorsum and the dorsum of the abdomen darkly discolored by grease. Size: Male wing about 3.4 by 1.3 mm, female wing 3.5 by 1.4 mm. Length of male 3 mm, of female 3.4 mm.

Immature stages.—Larva white; short and stout, about 2.1 to 2.5 mm in length and 1.3 mm in diameter; the skin minutely spinulose, the spines tending to form irregular bands on the cephalic parts of the third to ninth segments, and on the dorso-caudal and caudolateral parts of the last two segments; anterior spiracle averaging five beads; each posterior spiracle with the slits parallel sided and relatively straight, arranged in a fan, the spiracular plate obsolescent, only slightly indicated below. Puparium scarcely smaller than the mature larva, blackish brown, the segmental sutures poorly defined.

Host.—The larvae feed in the flower heads of *Trilisa paniculata*.

Distribution.—The species was reared in quantity from localities in Orange County, Fla., where it was abundant. Recorded from New England to Florida and Texas, and westward to California, also from Cuba, Mexico, and South America, but at least two species are involved in these records.

THE SUBGENUS TEPHRITOIDES, NEW SUBGENUS

Type of the subgenus, *Euaresia subpura* Johnson.

Differs from the typical subgenus by having, in addition to a well-defined stellate subapical mark, a general reticulate pattern which more or less covers the basal portion of the wing, and a broad oblique band from the costa through the

stigma to, and including, the anterior cross vein; by possessing only two pairs of frontal bristles; in having the irregular band of pale hairs on each side of the front near the eyes mostly of a deciduous scalelike nature and with additional scalelike hairs near the center of the frons; by the scutellum having typically two pairs of long, strong bristles;^a by the relatively short ovipositor sheath; and by the strong clothing of scalelike hairs on the thorax and abdomen.

In Hendel's tables (37, pp. 16-23) the present subgenus runs to *Tephritis* of Hendel, which appears to be a complex of more than one evolutionary group.

In *Tephritoides* the author places *subpura* Johnson, *pura* Loew, *pacifica* Doane, and several other species usually placed in *Euaresta* by American authors.

TRUPANEA (TEPHRITOIDES) SUBPURA (Johnson)

(Fig. 44, A-M)

Described as *Euaresta subpura* by Johnson (50, p. 114) in 1909 and also placed in *Euaresta* by Phillips (69, p. 147) in 1923.

Adult.—Entire insect yellowish except for the tip of the ovipositor sheath, which is darkened, and the wing, which is hyaline, with a dark subapical stellate design, a broad, dark, oblique band from the costa through the stigma and anterior cross vein, and a generally dark reticulate pattern. Size: Male wing about 3.8 by 1.6 mm, female wing 4.4 and 1.8 mm. Length of male 4.5 mm, of female 4.75 mm.

Immature stages.—Larva white; measuring up to 4.4 mm in length by 1.9 mm in diameter; with the skin minutely spinulose, the spines tending to form irregular bands on the cephalic parts of the third to the ninth segments and on the dorso-caudal and caudolateral parts of the last two segments; the anterior spiracle averaging six beads; each posterior spiracle with the slits parallel sided, long, individually straight or angulate, subparallel, the spiracular plate obsolescent on the surface but strongly indicated below. Puparium slightly smaller than the mature larva, blackish brown, the segmental sutures poorly defined.

Host.—The larvae feed in the tender growing stems of *Baccharis glomeruliflora*, tunneling out as much as an inch of stem and usually, but not always, forming slight swellings.

Distribution.—In Florida the species is not rare, but is local, and was found only by Mr. Nicholson, and in localities in Orange, Osceola, Volusia, and Brevard Counties. Previously only recorded from the type specimens, taken on sea burweed (*Xanthium echinatum*) at Wildwood and Angelsea, N.J.

Notes.—The author was unable to distinguish between the Florida specimens and the type series in the Museum of Comparative Zoology. One of the paratypes, through the courtesy of the latter institution, has been deposited in the United States National Museum. Whether or not *Xanthium echinatum* is also a host must, for a time, remain unknown.

^a Possibly only a single pair in some species, as according to Bezzi and Tavares (7, pp. 163-165) their new species *Trupanea majuscula* is a gall former on the stems of its host plant and has a 2-bristled scutellum. This species, which is only known to the author from the original description and figure, has the wing pattern of *subpura* Johnson.

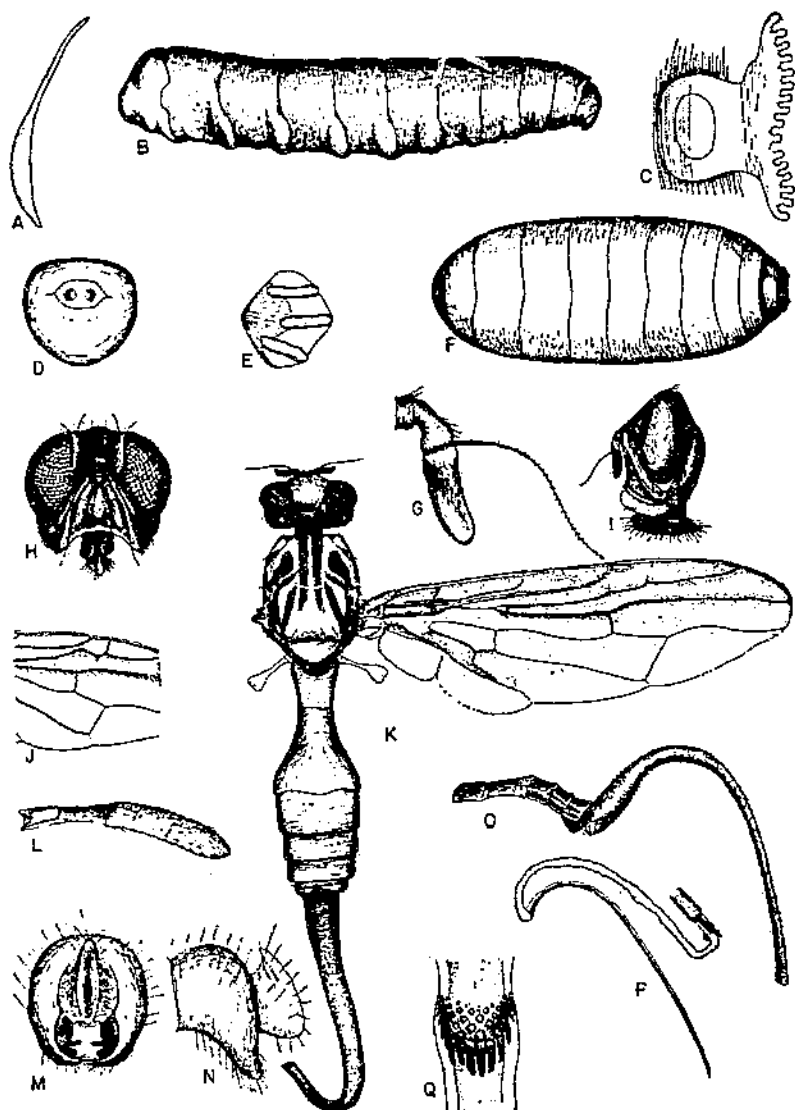


FIGURE 11.—*Tarotrypa curticauda*: A, Egg; B, larva (side view); C, anterior spiracle of larva; D, larva (rear view); E, posterior spiracle of larva; F, puparium (upper aspect); G, antenna of adult male; H, head of adult female (front view); I, same (side view); J, median area of wing of male; K, adult female; L, abdomen of adult male (side view); M, male genitalia (from anal end); N, same (side view); O, abdomen of adult female showing ovipositor sheath (side view); P, ovipositor; Q, armature on membrane of ovipositor.

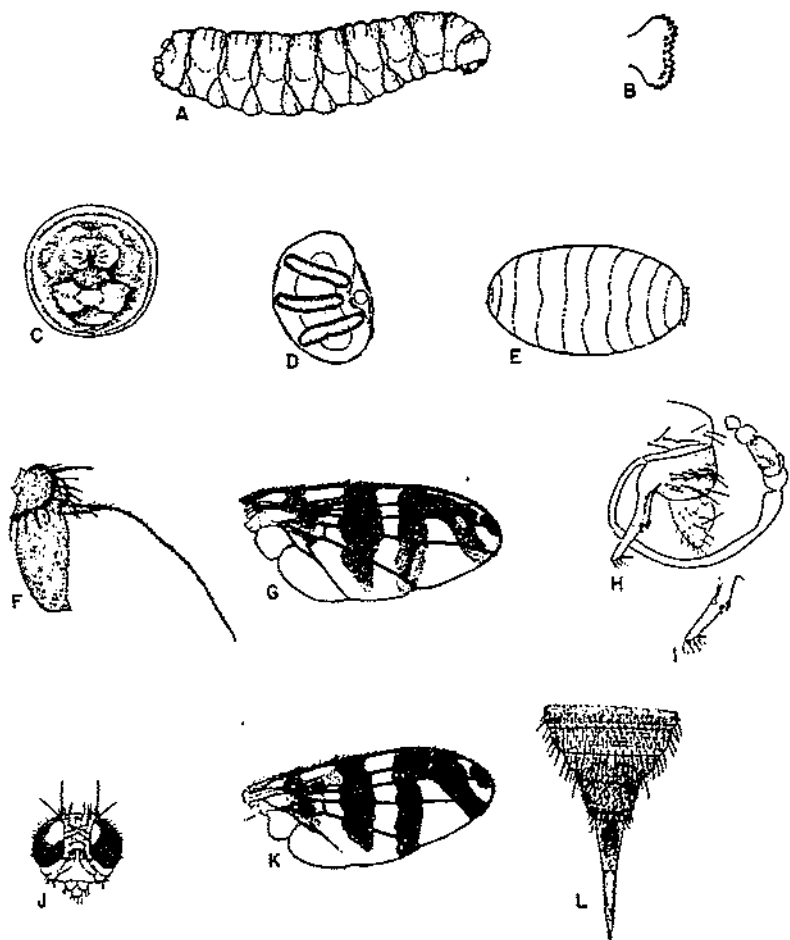


FIGURE 12.—*Rhyogolepis eingulata*: A, Larva (side view); B, anterior spiracle of larva; C, larva (rear view); D, posterior spiracle of larva; E, puparium (upper aspect); F, antenna of adult male; G, wing of adult male; H, male genitalia (side view); I, inner surface of right half of forceps of male genitalia (side view); J, head of adult female (front view); K, wing of adult female; L, part of abdomen of adult female showing ovipositor (upper aspect)

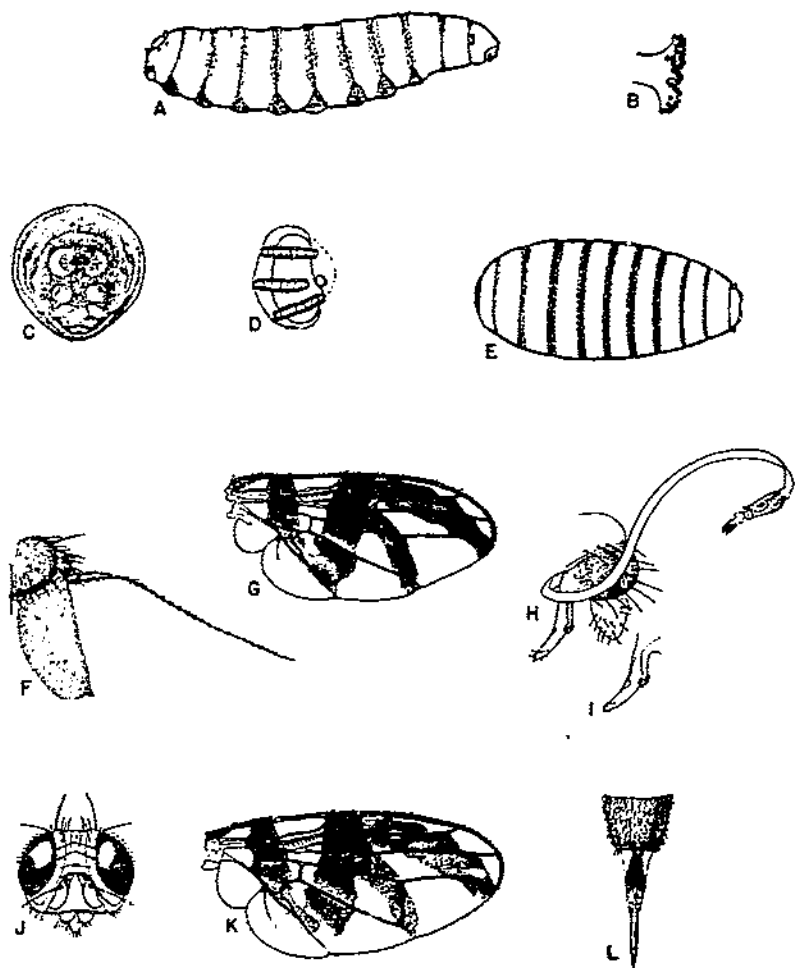


FIGURE 13.—*Rhagoletis pomonella*: A, Larva (side view); B, anterior spiracle of larva; C, larva (rear view); D, posterior spiracle of larva; E, puparium (upper aspect); F, antenna of adult male; G, wing of adult male; H, male genitalia (side view); I, inner surface of right half of forceps of male genitalia (side view); J, head of adult female (front view); K, wing of adult female; L, ovipositor sheath and fully extruded ovipositor (upper aspect).

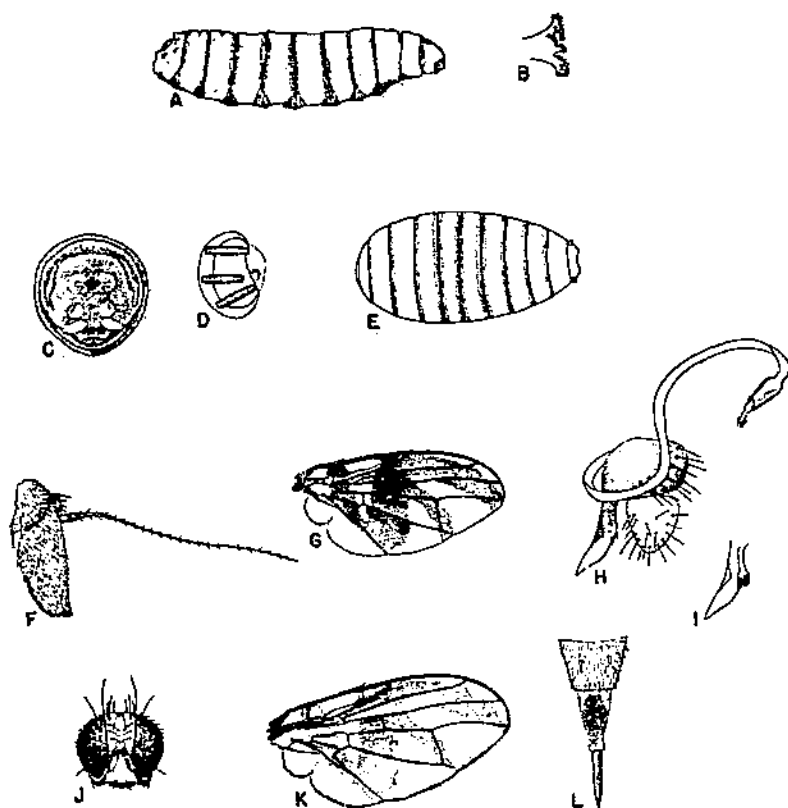


FIGURE 14.—*Rhagoletis zephyria* (from atypical Florida specimens): A, Larva (side view); B, anterior spiracle of larva; C, larva (rear view); D, posterior spiracle of larva; E, puparium (upper aspect); F, antenna of adult male; G, wing of adult male; H, male genitalia (side view); I, inner surface of right half of forceps of male genitalia (side view); J, head of adult female (front view); K, wing of adult female; L, ovipositor sheath and fully extruded ovipositor (upper aspect).

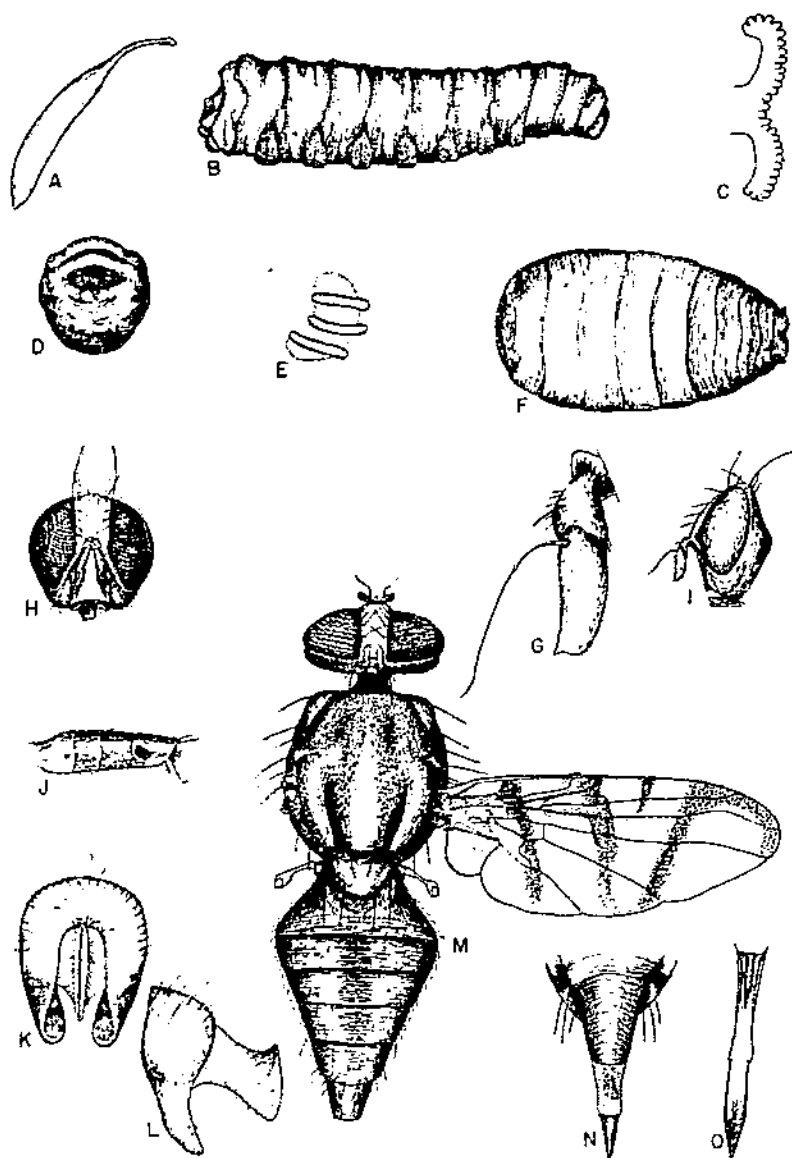


FIGURE 15.—*Zonosemata electa*: A, Egg; B, larva (side view); C, anterior spiracle of larva; D, larva (front view); E, posterior spiracle of larva; F, puparium (upper aspect); G, antenna of adult male; H, head of adult male (front view); I, same (side view); J, abdomen of adult male (side view); K, male genitalia (from anal end); L, same (side view); M, adult female; N, ovipositor sheath showing ovipositor partly extruded (from below); O, ovipositor (from below).

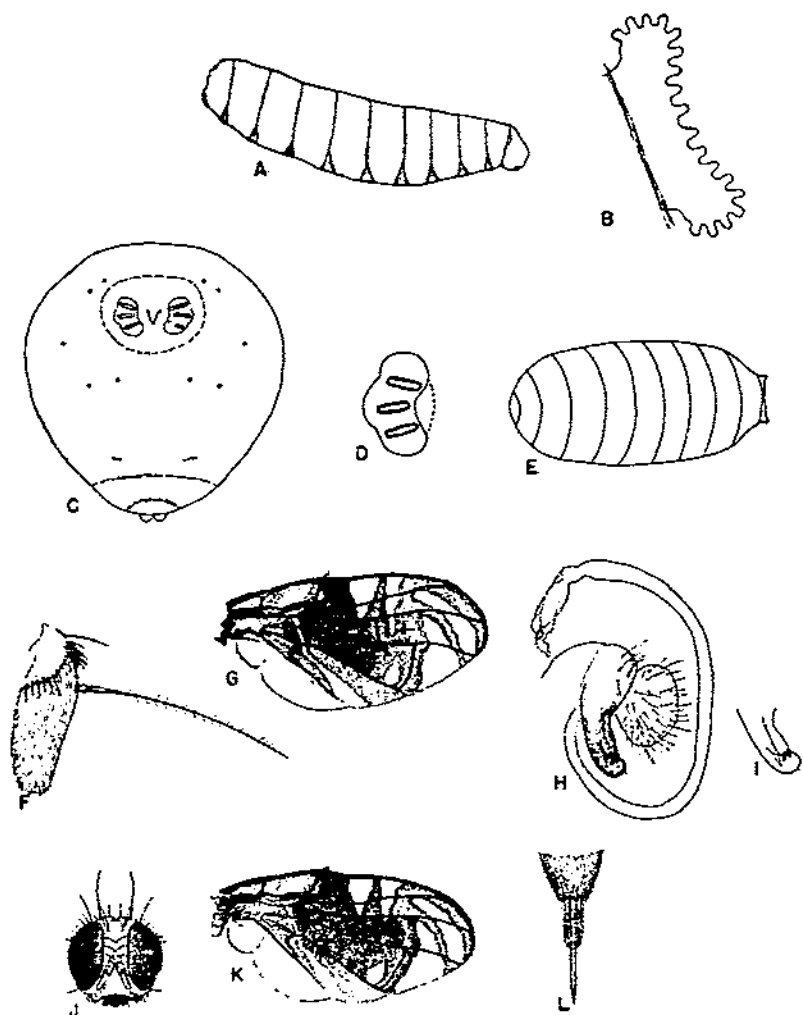


FIGURE 16.—*Myoteja limata*: A, Larva (side view); B, anterior spiracle of larva; C, larva (rear view); D, posterior spiracle of larva; E, puparium (upper aspect); F, antenna of adult male; G, wing of adult male; H, male genitalia (side view); I, inner surface of right half of forceps of male genitalia (side view); J, head of adult female (front view); K, wing of adult female; L, ovipositor sheath and fully extruded ovipositor (upper aspect).

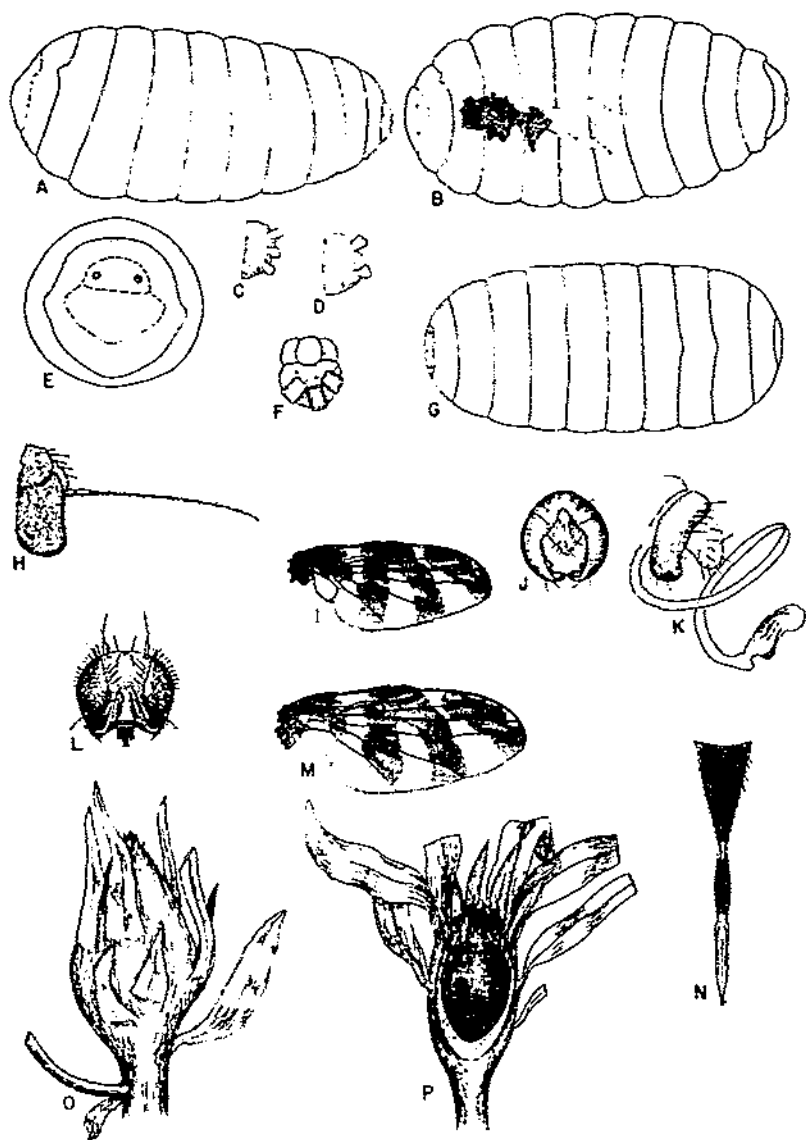


FIGURE 17.—*Procetidochara australis*: A, Larva (side view); B, larva (upper aspect); C, anterior spiracle of larva showing three beads; D, same but showing only two beads; E, larva (rear view); F, posterior spiracle of larva; G, puparium (upper aspect); H, antenna of male; I, wing of adult male; J, male genitalia (from anal end); K, same (side view); L, head of adult female; M, wing of adult female; N, ovipositor sheath and fully extruded ovipositor; O, gall on *Heterotheca subaustriaris*; P, same cut open and showing puparia.

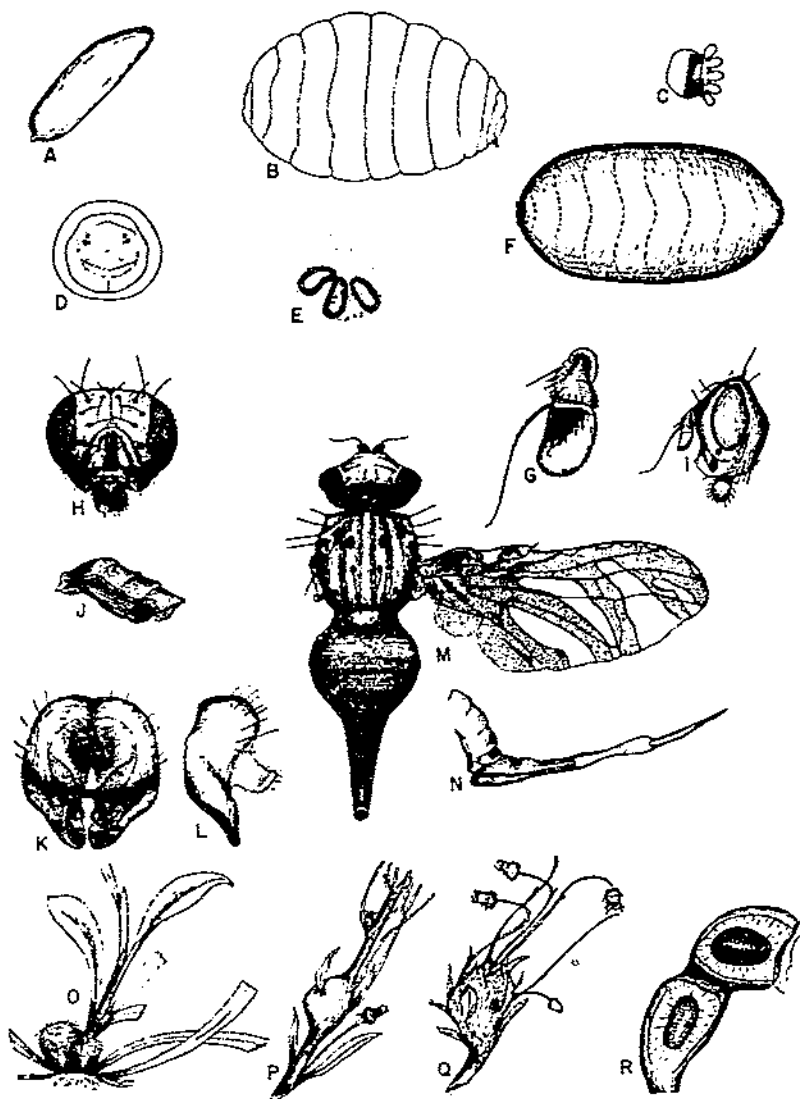


FIGURE 18.—*Peromyia maculata*: A, Egg; B, larva (side view); C, anterior spiracle of larva; D, two posterior segments of larva (rear view); E, posterior spiracle; F, puparium (upper aspect); G, antenna of adult male; H, head of adult male (front view); I, same (side view); J, abdomen of adult male (side view); K, male genitalia (from anal end); L, same (side view); M, adult female; N, part of abdomen of adult female showing ovipositor sheath and completely extruded ovipositor (side view); O, two galls on the root crown of *Chrysopsis trichophylla*; P, gall on the stem of *C. trichophylla*; Q, gall at the bases of flowers and showing exit hole; R, two galls cut open, the upper one showing a puparium.

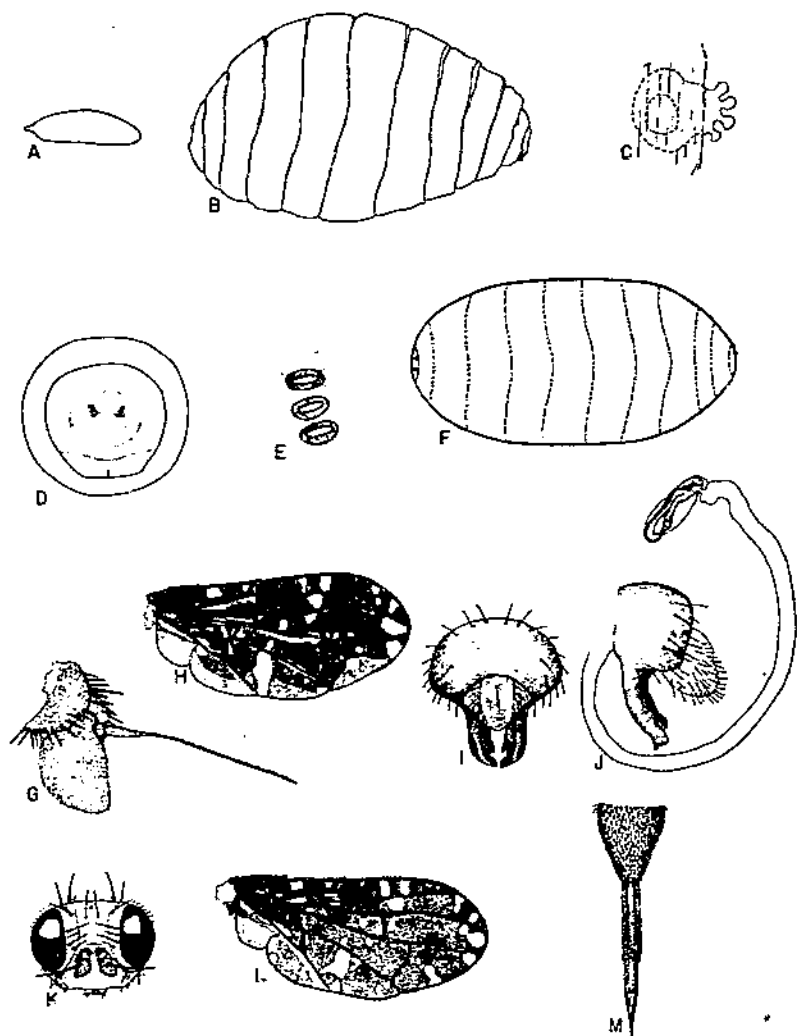


FIGURE 19.—*Eurosta nicholsoni*, new species: A, Egg; B, larva (side view); C, anterior spiracle of larva; D, two posterior segments of larva (rear view); E, posterior spiracle; F, puparium (upper aspect); G, antenna of adult male; H, wing of adult male; I, male genitalia (from anal end); J, same (side view); K, head of adult female; L, wing of adult female; M, ovipositor sheath and completely extruded ovipositor (upper aspect).

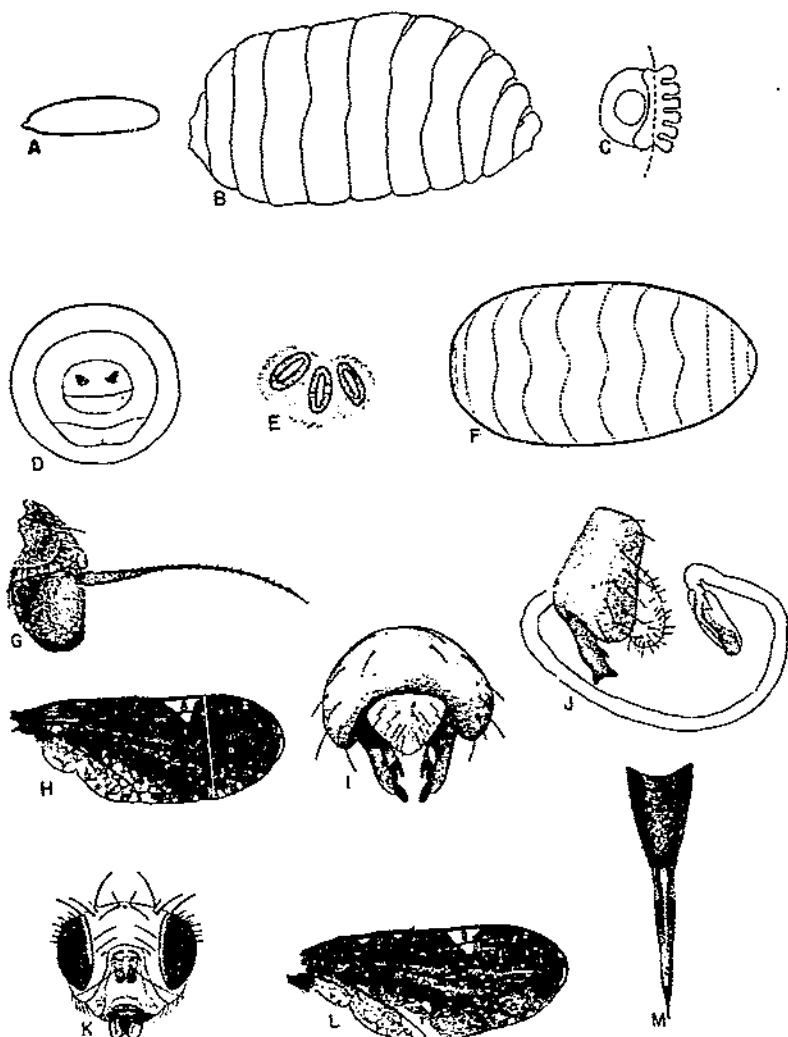


FIGURE 20.—*Eurosta comma*: A, Egg; B, larva (side view); C, anterior spiracle of larva; D, two posterior segments of larva (rear view); E, posterior spiracle of larva; F, puparium (upper aspect); G, antenna of adult male; H, wing of adult male; I, male genitalia from anal end; J, same (side view); K, head of adult female; L, wing of adult female; M, ovipositor sheath and completely extruded ovipositor (upper aspect).

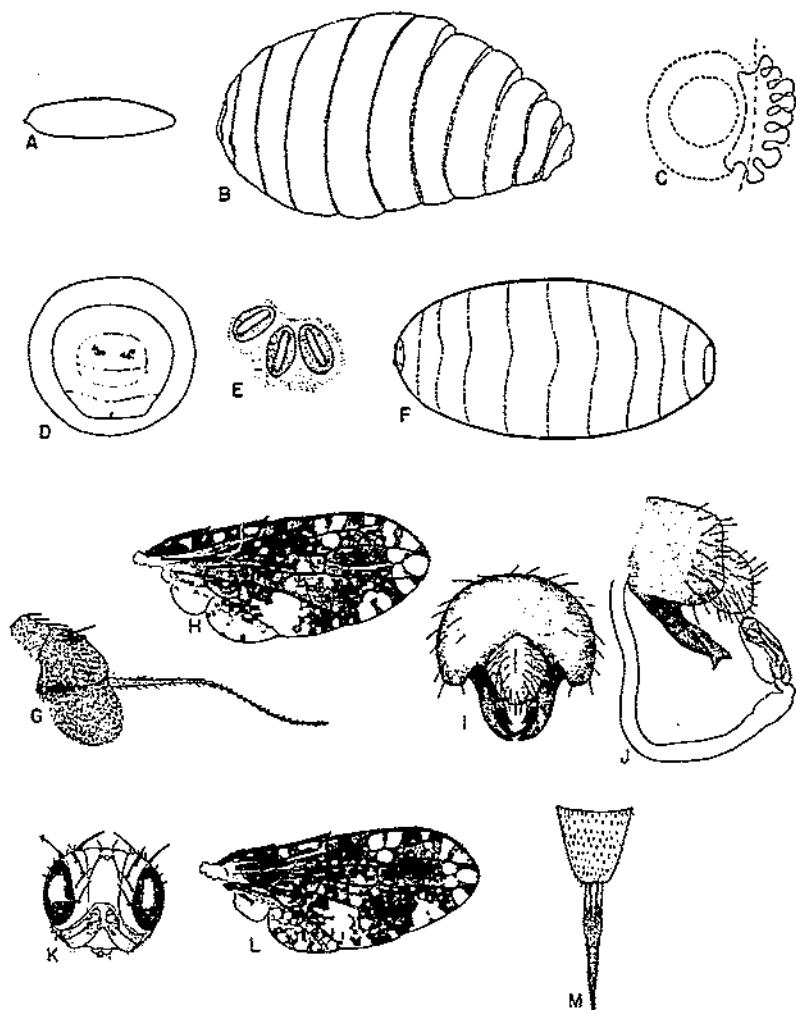


FIGURE 21.—*Eurosta reticulata*: A, Egg; B, larva (side view); C, anterior spiracle of larva; D, two posterior segments of larva (rear view); E, posterior spiracle; F, puparium (upper aspect); G, antenna of adult male (from inner side); H, wing of adult male; I, male genitalia (from anal end); J, same (side view); K, head of adult female; L, wing of adult female; M, ovipositor sheath and completely extruded ovipositor (upper aspect).

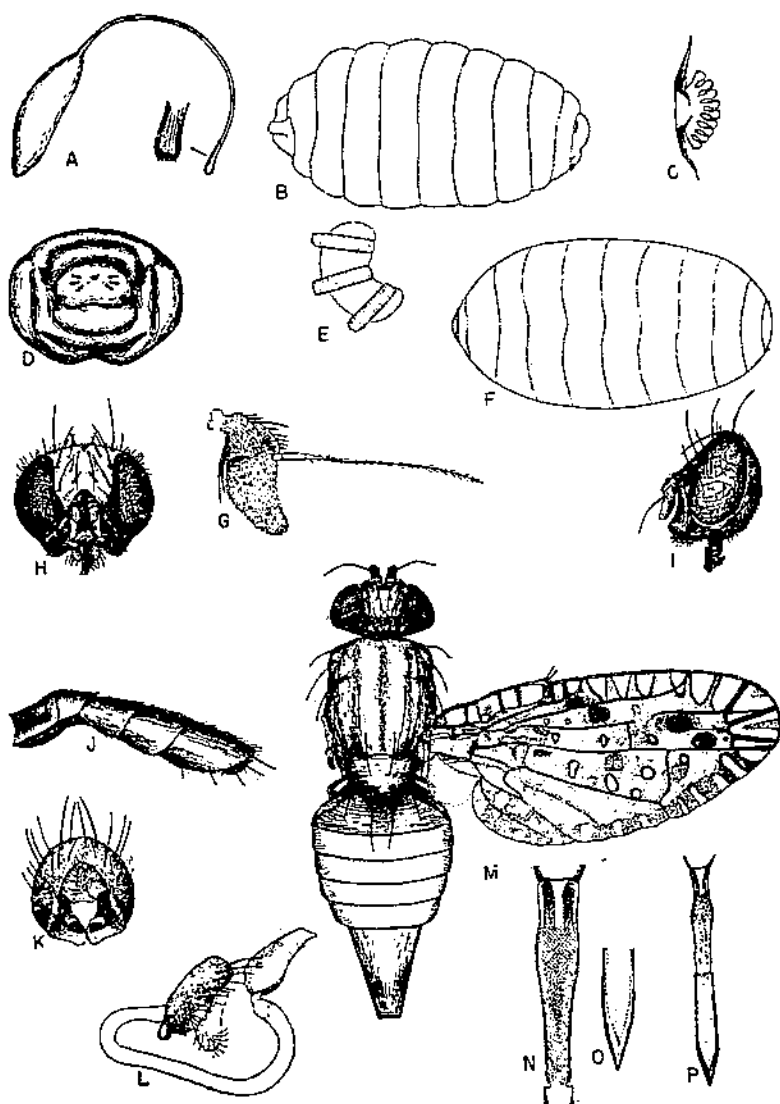


FIGURE 22.—*Paracantha culta*: A, Egg; B, larva (side view); C, anterior spiracle of larva; D, two posterior segments of larva (rear view); E, posterior spiracle of larva; F, puparium (upper aspect); G, antenna of adult male; H, head of adult male (front view); I, same (side view); J, abdomen of adult male (side view); K, male genitalia (from anal end); L, same (side view); M, adult female; N, membrane connecting ovipositor and ovipositor sheath showing armature; O, tip of ovipositor; P, tip of ovipositor sheath and fully extruded ovipositor (upper aspect).

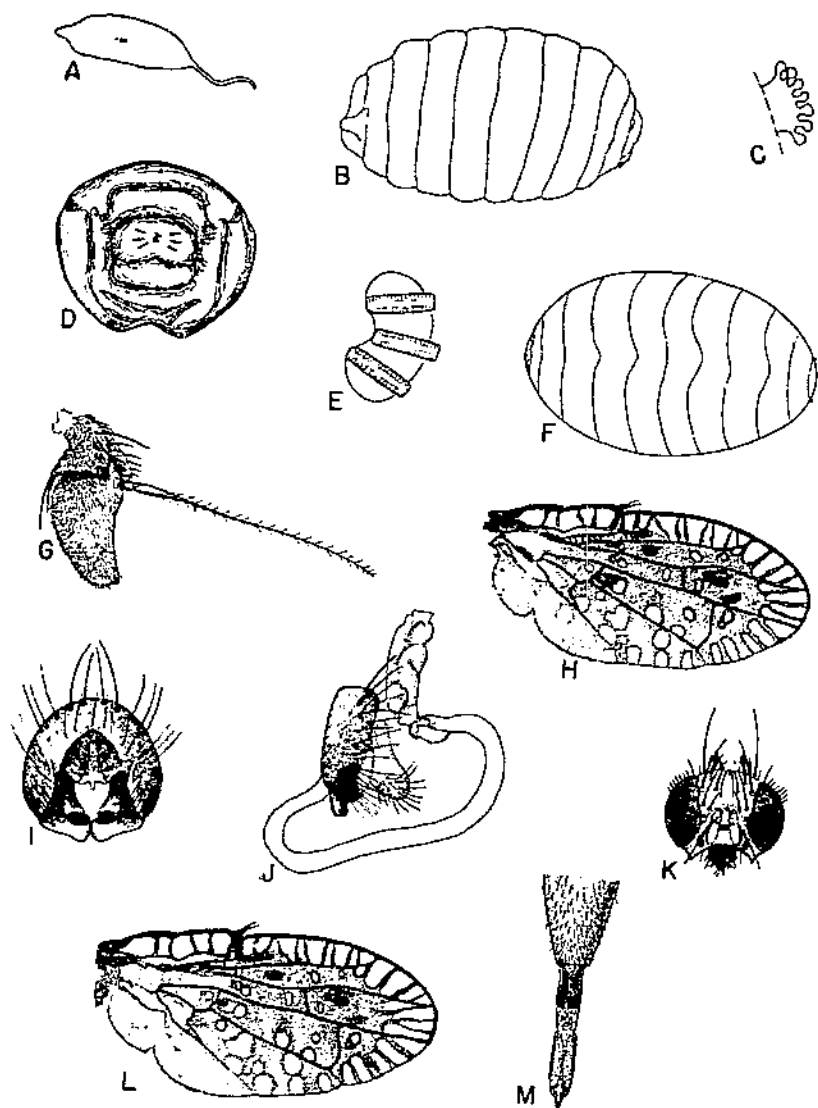


FIGURE 23.—*Paracantha forficula*, new species: A, Egg; B, larva (side view); C, anterior spiracle of larva; D, two posterior segments of larva (rear view); E, posterior spiracle of larva; F, puparium (upper aspect); G, antenna of adult male; H, wing of adult male; I, male genitalia (front view); J, same (side view); K, head of adult female (front view); L, wing of adult female; M, ovipositor fully extruded from the ovipositor sheath (upper aspect).

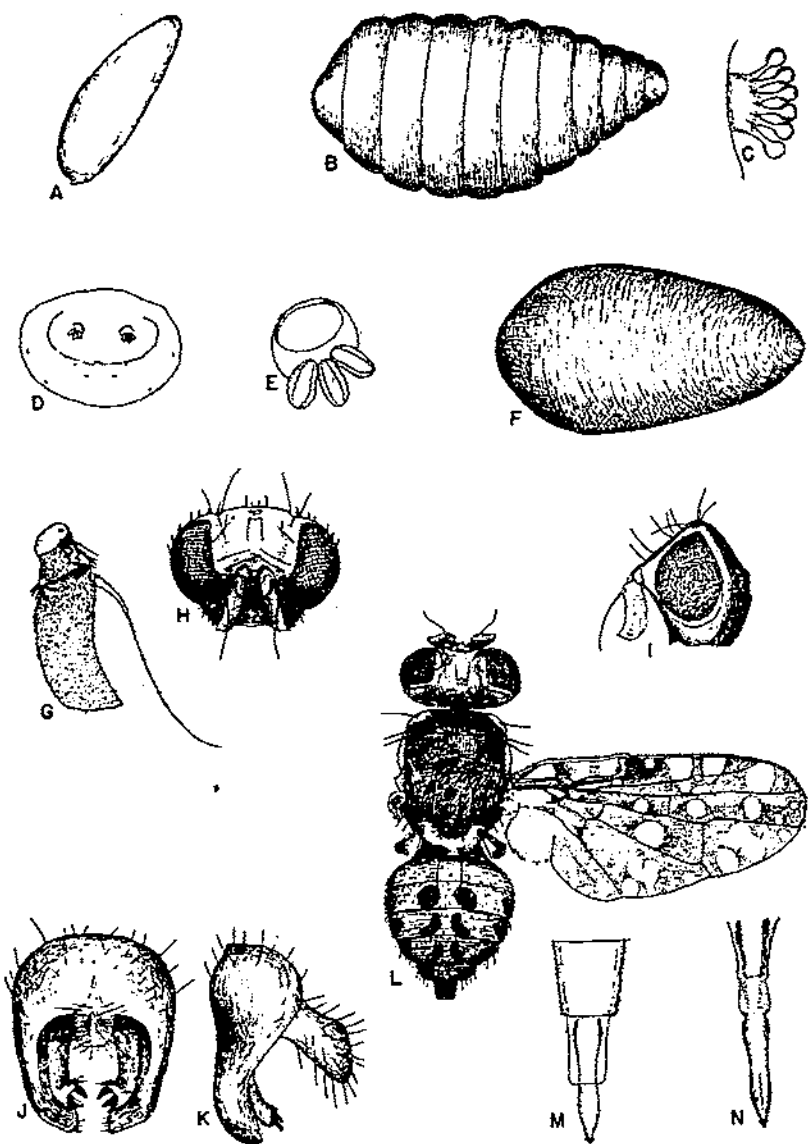


FIGURE 24.—*Acidogona melonura*: A, Egg; B, larva (side view); C, anterior spiracle of larva; D, upper half of posterior segment of larva (rear view); E, posterior spiracle of larva; F, puparium (upper aspect); G, antenna of adult male; H, head of adult male (front view); I, same (side view); J, male genitalia (from anal end); K, same (side view); L, adult female; M, ovipositor sheath and partly extruded ovipositor (upper aspect); N, ovipositor (from below).

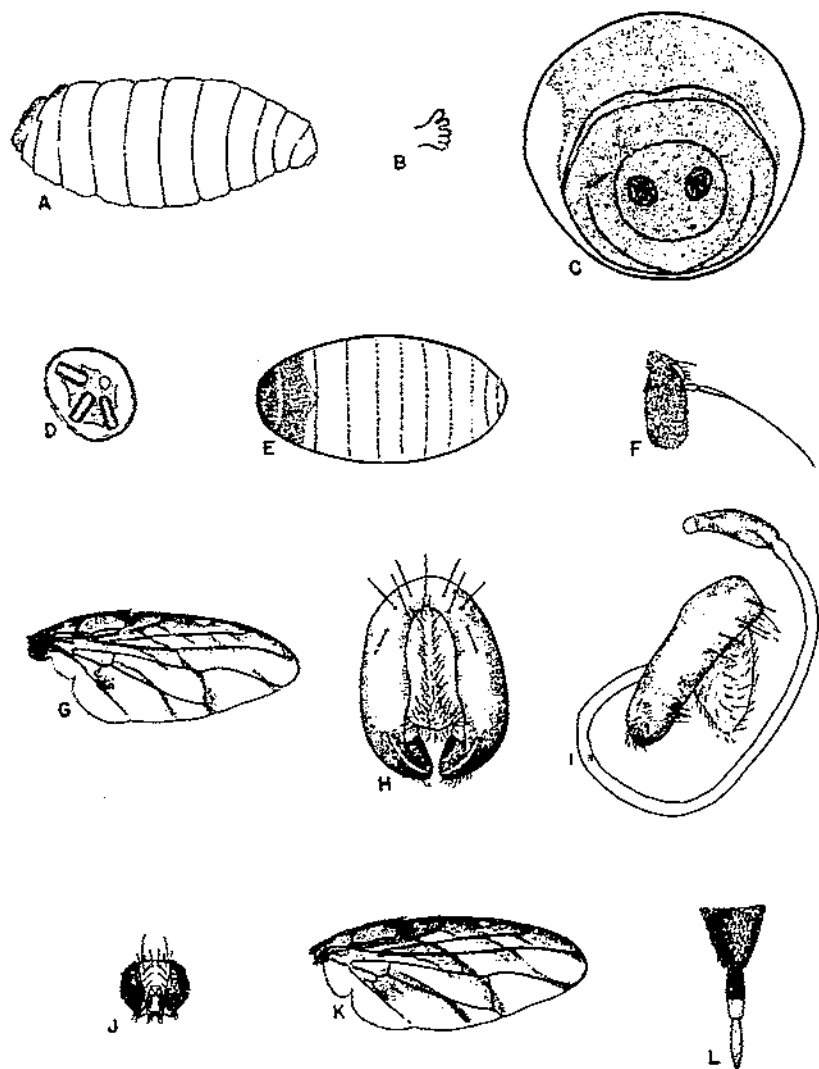


FIGURE 25 — *Tomoplagia obliqua*: A, Larva (side view); B, anterior spiracle of larva; C, two posterior segments of larva (rear view); D, posterior spiracle of larva; E, puparium (upper aspect); F, antenna of adult male; G, wing of adult male; H, male genitalia (from anal end); I, same (side view); J, head of adult female; K, wing of adult female; L, ovipositor sheath and fully extruded ovipositor (upper aspect).

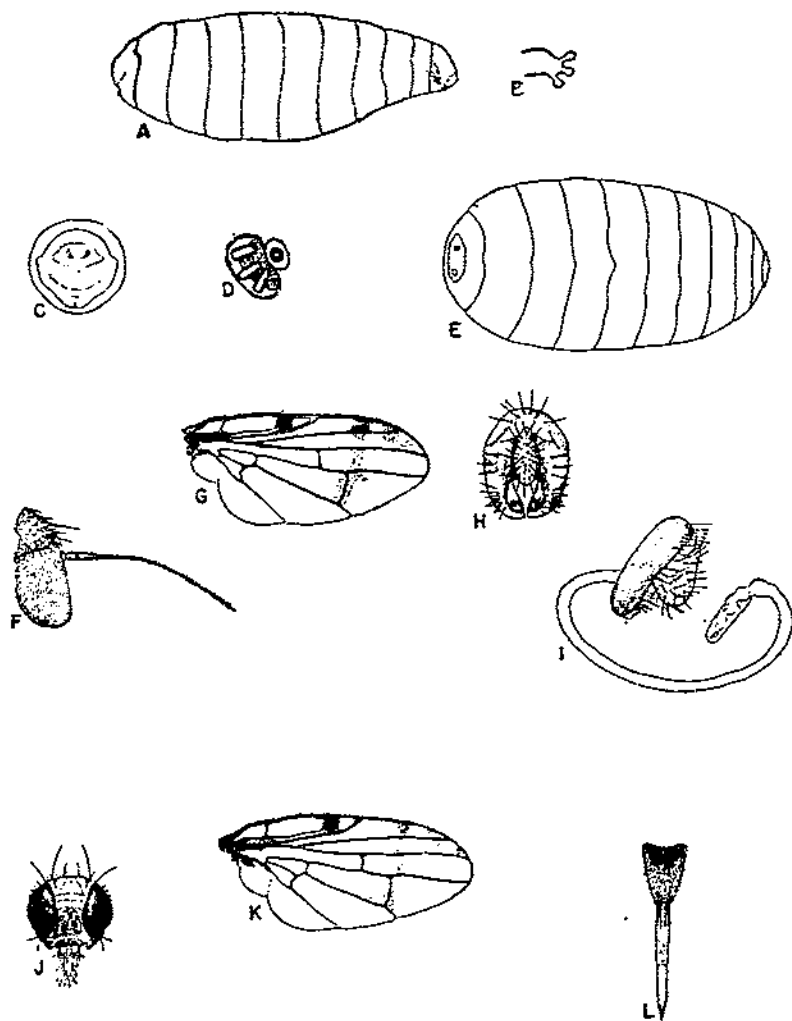


FIGURE 26.—*Neaspilota achilleae*: A, Larva (side view); B, anterior spiracle of larva; C, two posterior segments of larva (rear view); D, posterior spiracle of larva; E, puparium (upper aspect); F, antenna of adult male; G, wing of adult male; H, male genitalia (from anal end); I, same (side view); J, head of adult female (front view); K, wing of adult female; L, ovipositor sheath and fully extruded ovipositor (upper aspect).

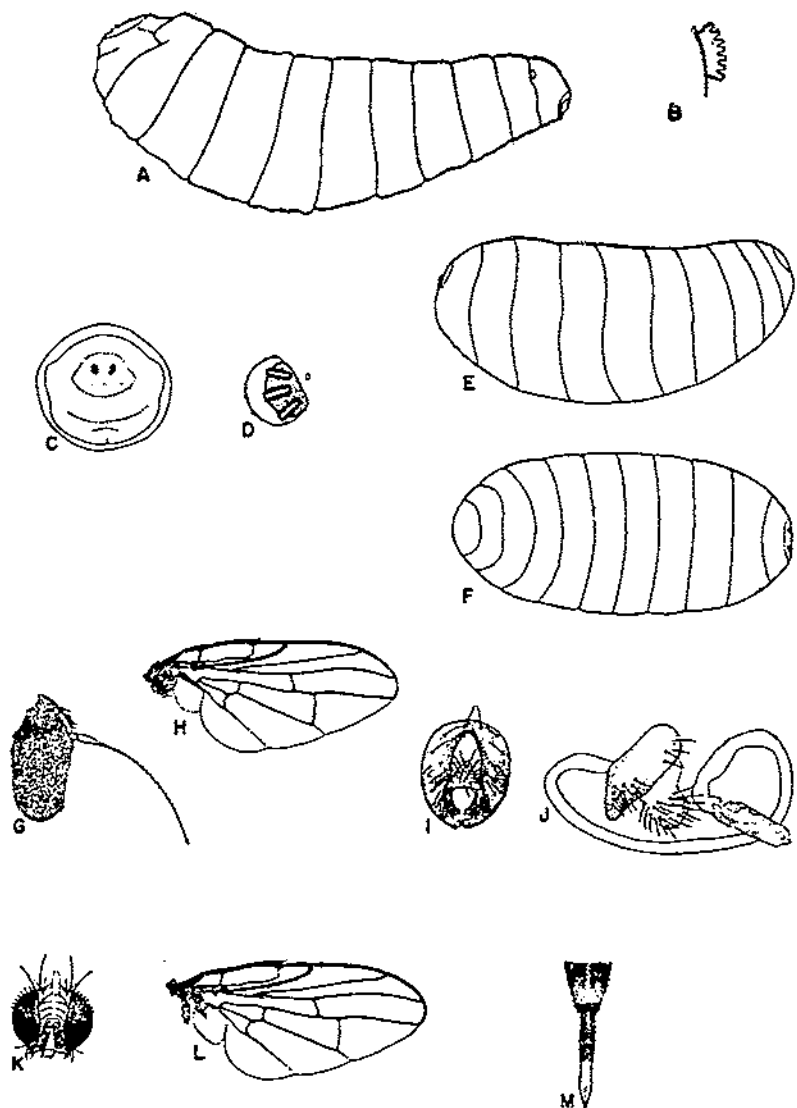


FIGURE 27.—*Neaspilota alba*: A, Larva (side view); B, anterior spiracle of larva; C, two posterior segments of larva (rear view); D, posterior spiracle of larva; E, puparium (side view); F, same (upper aspect); G, antenna of adult male; H, wing of adult male; I, male genitalia (from anal end); J, same (side view); K, head of adult female (front view); L, wing of adult female; M, ovipositor sheath and fully extruded ovipositor (upper aspect).

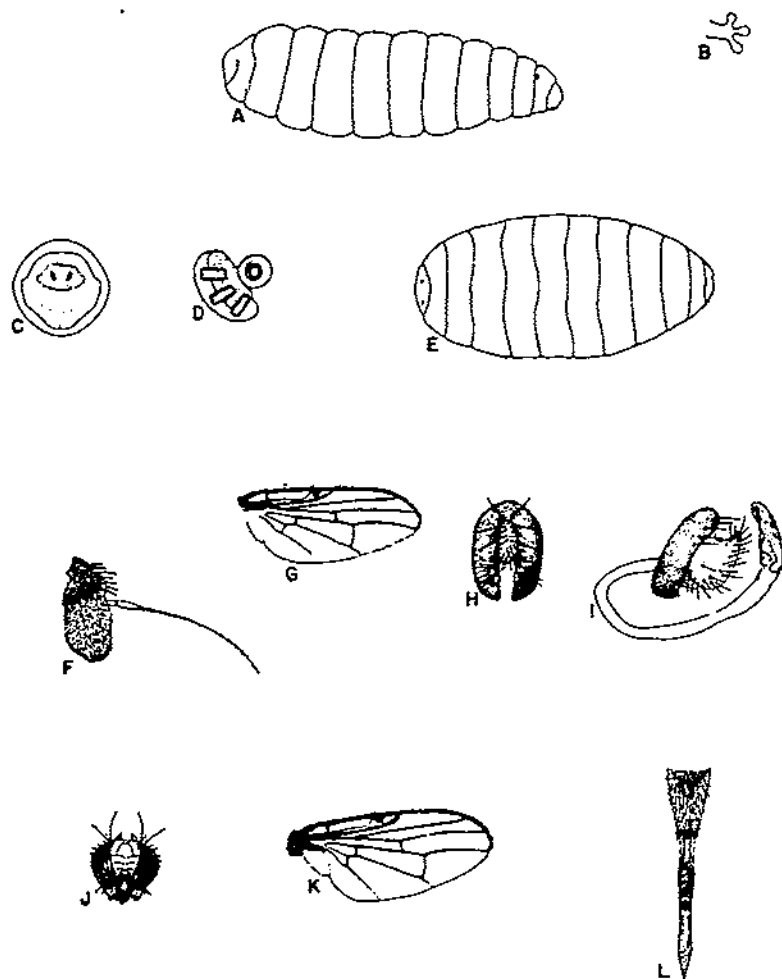


FIGURE 28.—*Neaspilota punctistigma*, new species: A, Larva (side view); B, anterior spiracle of larva; C, two posterior segments of larva (rear view); D, posterior spiracle of larva; E, puparium (upper aspect); F, antenna of adult male; G, wing of adult male; H, male genitalia (from anal end); I, same (side view); J, head of adult female (front view); K, wing of adult female; L, ovipositor sheath and fully extruded ovipositor (upper aspect).

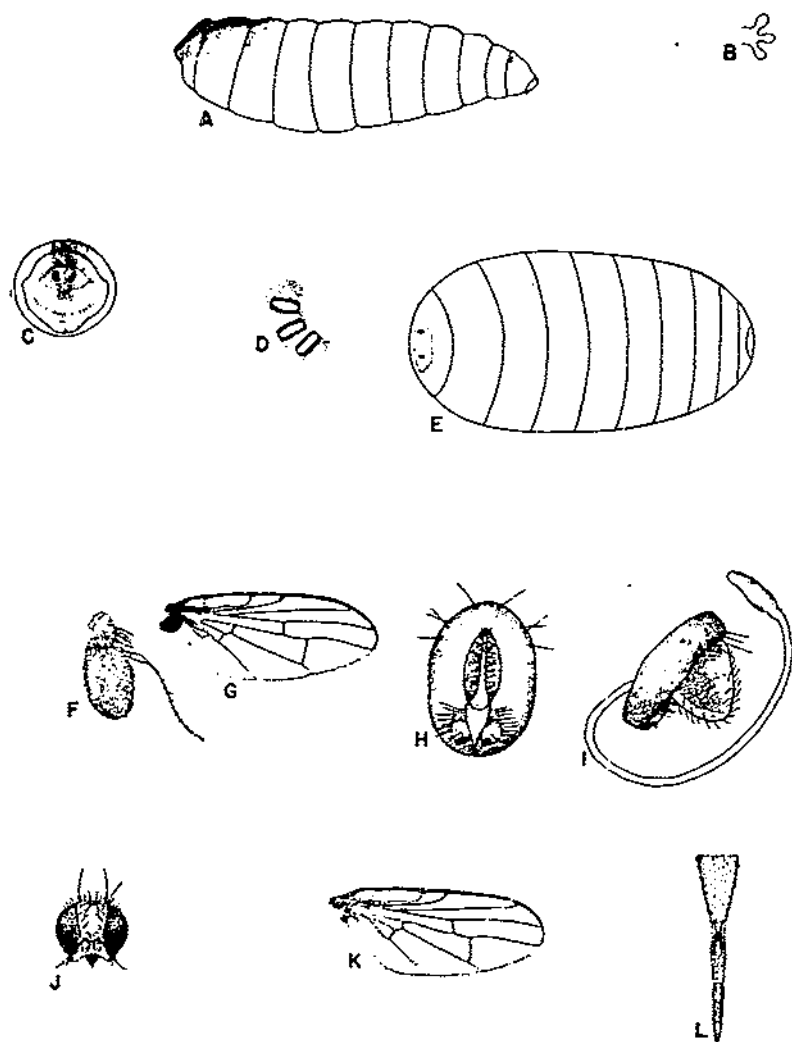


FIGURE 29.—*Neaspilota dolosa*, new species: A, Larva (side view); B, anterior spiracle of larva; C, two posterior segments of larva (rear view); D, posterior spiracle of larva; E, puparium (upper aspect); F, antenna of adult male; G, wing of adult male; H, male genitalia (from anal end); I, same (side view); J, head of adult female (front view); K, wing of adult female; L, ovipositor sheath and fully extruded ovipositor (upper aspect).

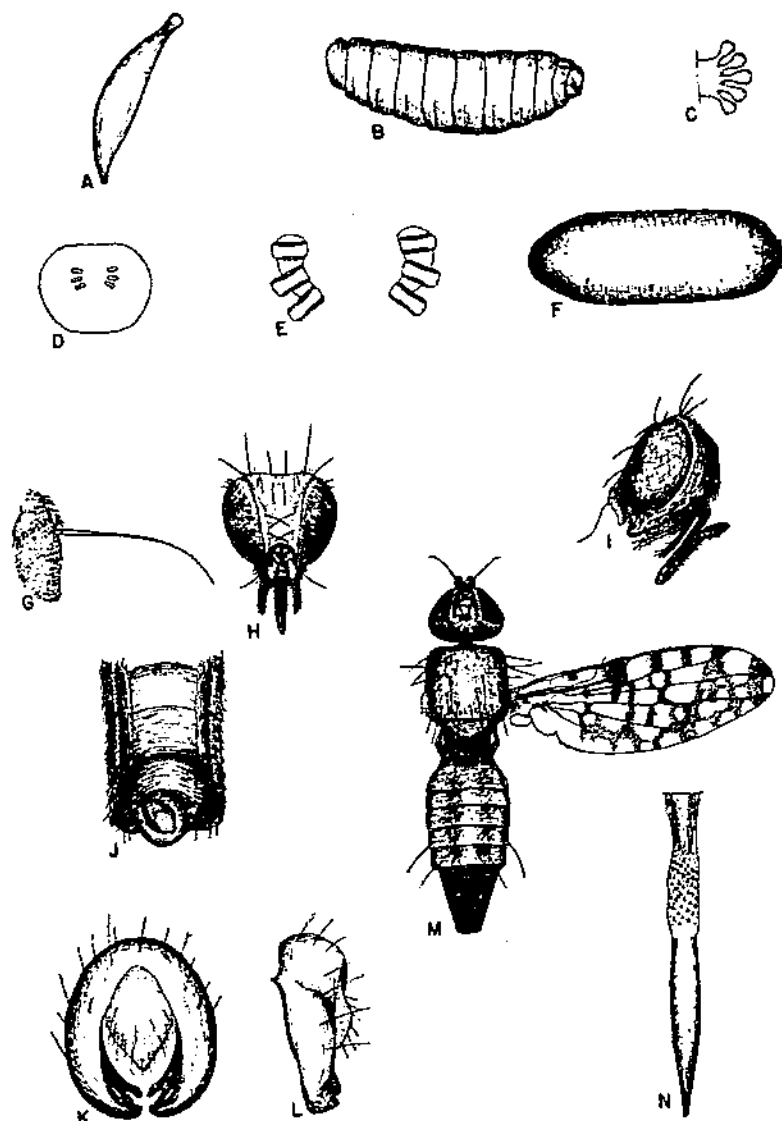


FIGURE 30.—*Paroryza picciola*: A, Egg; B, larva (side view); C, anterior spiracle of larva; D, upper half of posterior segment of larva (rear view); E, posterior spiracles of larva; F, puparium (upper aspect); G, antenna of adult male; H, head of adult female (front view); I, same (side view); J, terminal segments of abdomen of adult male with genitalia in natural position (from below); K, male genitalia (from anal end); L, same (side view); M, adult female; N, ovipositor with membrane showing armature (upper aspect).

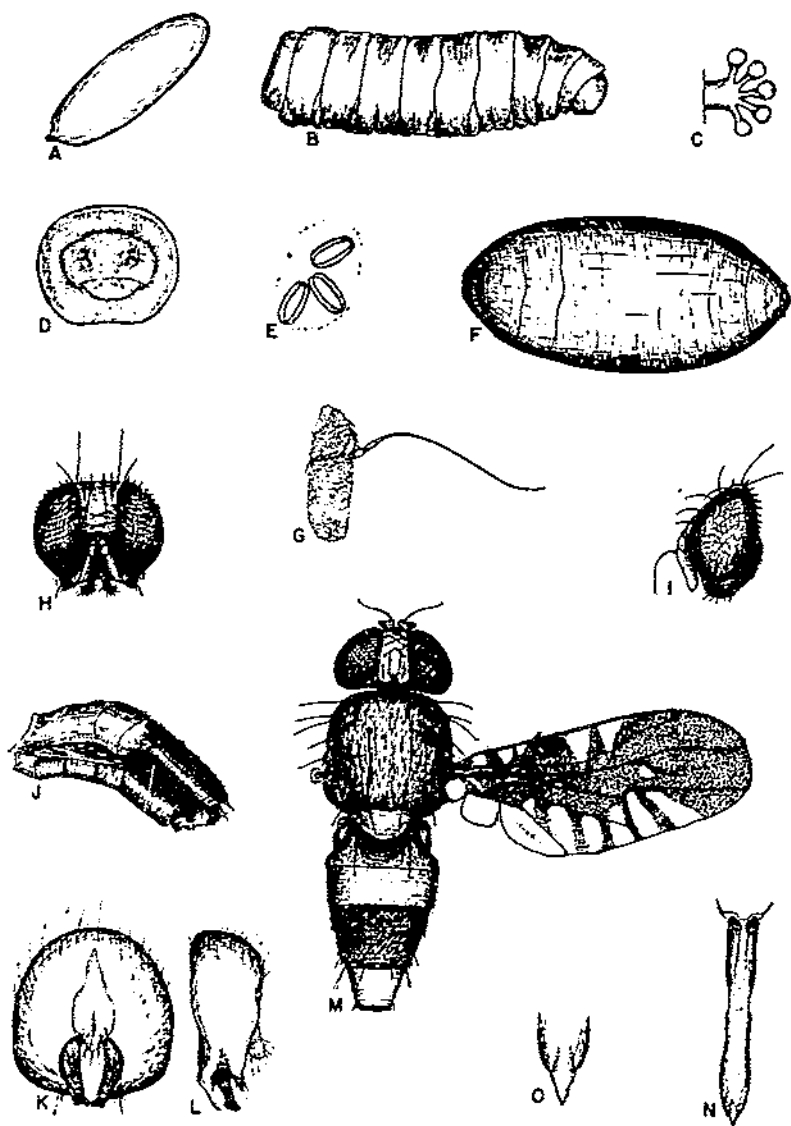


FIGURE 31 *Xanthaciura insecta*: A, Egg; B, larva (side view); C, anterior spiracle of larva; D, posterior segment of larva (rear view); E, posterior spiracle of larva; F, puparium (upper aspect); G, antenna of adult male; H, head of adult female (front view); I, same (side view); J, abdomen of adult male with genitalia in natural position (side view); K, male genitalia (from anal end); L, same (side view); M, adult female; N, ovipositor with membrane (upper aspect); O, tip of ovipositor (upper aspect).

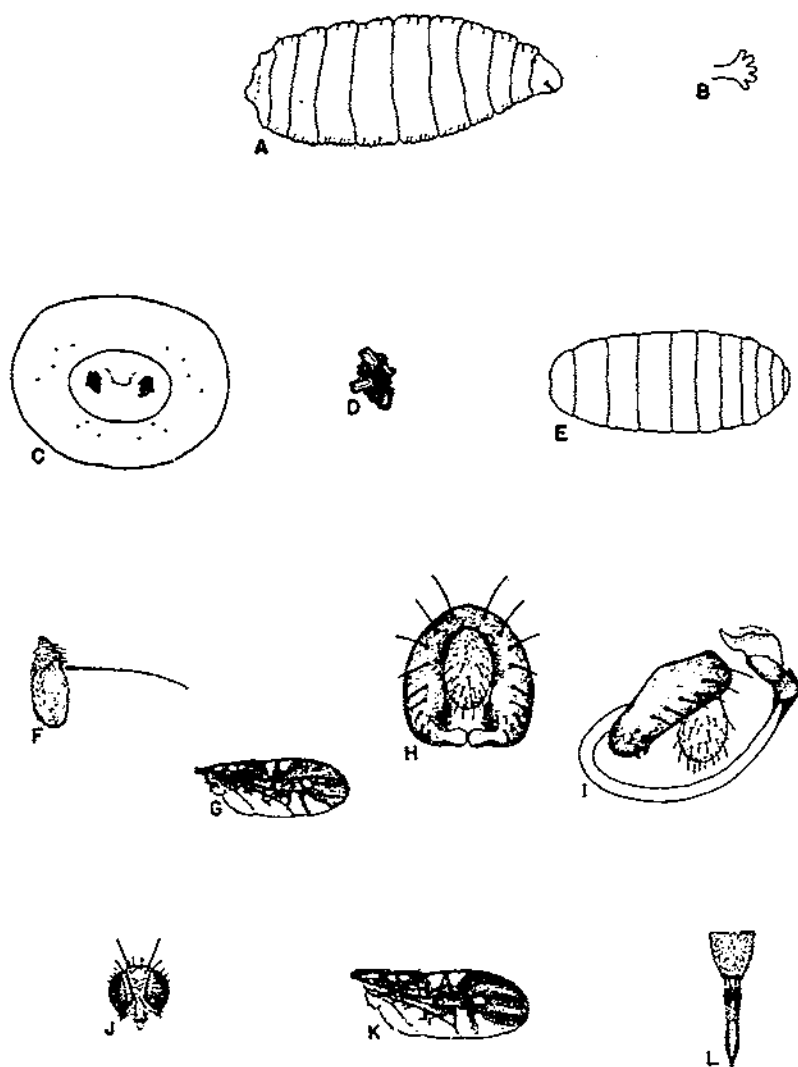


FIGURE 32.—*Xanthaciara connexionis*, new species: *A*, Larva (side view); *B*, anterior spiracle of larva; *C*, posterior segment of larva (rear view); *D*, posterior spiracle of larva; *E*, puparium (upper aspect); *F*, antenna of adult male; *G*, wing of adult male; *H*, male genitalia (from anal end); *I*, same (side view); *J*, head of adult female (front view); *K*, wing of adult female; *L*, ovipositor sheath with fully extruded ovipositor (upper aspect).

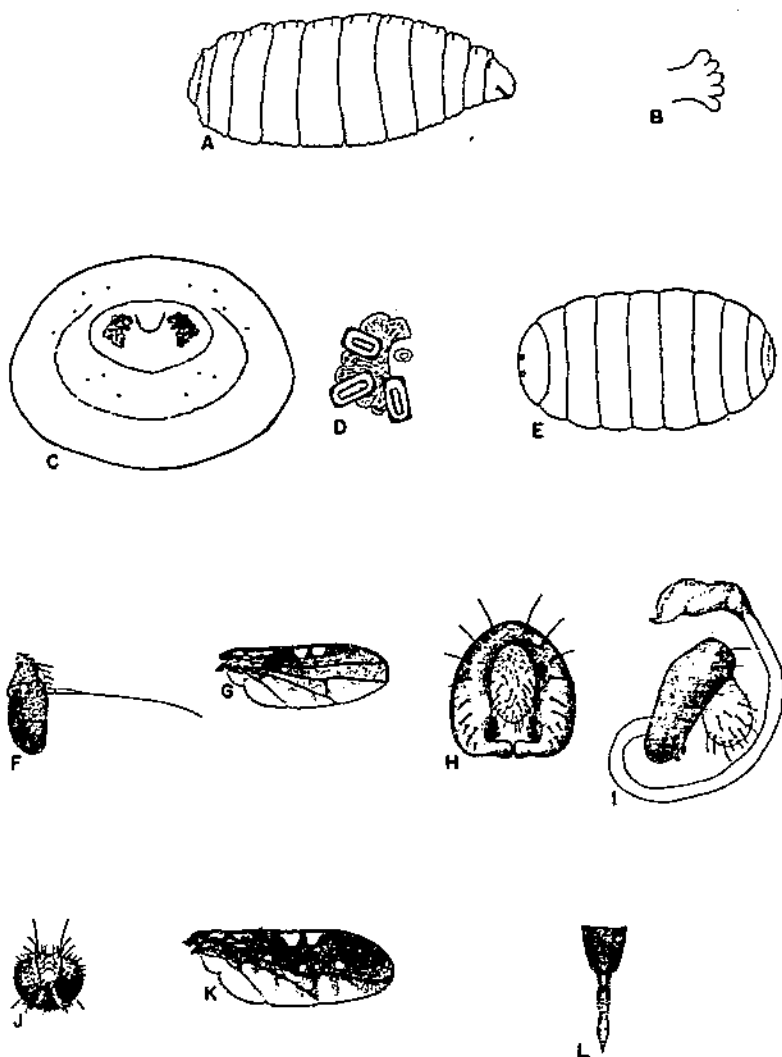


FIGURE 33.--*Xanthaciura lataspina*: A, Larva (side view); B, anterior spiracle of larva; C, posterior segment of larva (rear view); D, posterior spiracle of larva; E, puparium (upper aspect); F, antenna of adult male; G, wing of adult male; H, male genitalia (from anal end); I, same (side view); J, head of adult female (front view); K, wing of adult female; L, ovipositor sheath with fully extruded ovipositor (upper aspect).

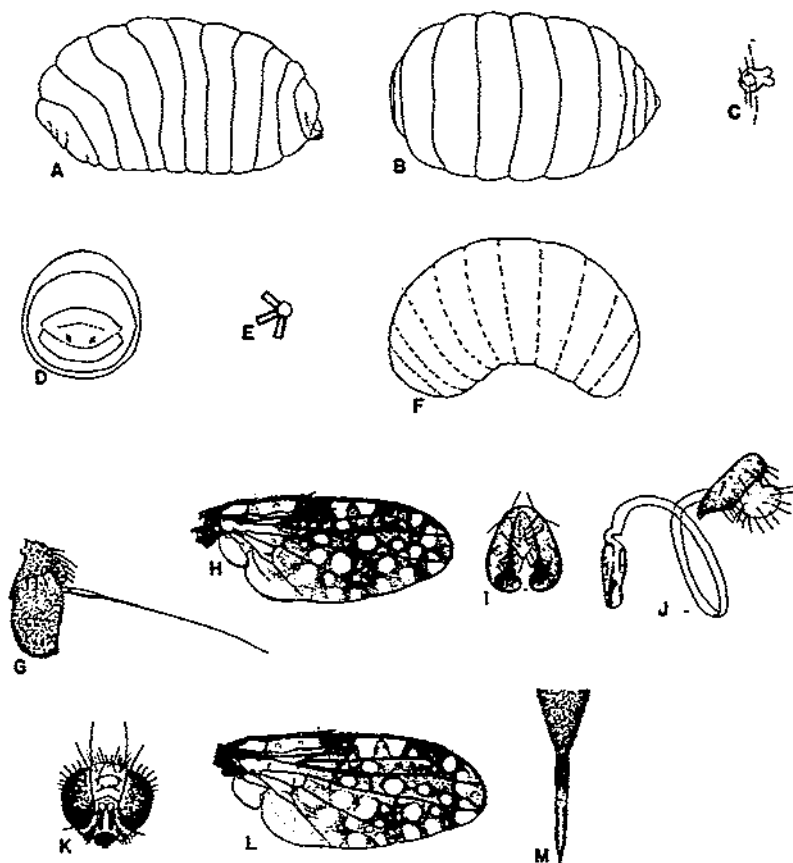


FIGURE 34.—*Acinia fucata*: A, Larva (side view); B, larva from above; C, anterior spiracle of larva; D, two posterior segments of larva (rear view); E, posterior spiracle of larva; F, puparium (side view); G, antenna of adult male; H, wing of adult male; I, male genitalia (from anal end); J, same (side view); K, head of adult female (front view); L, wing of adult female; M, ovipositor sheath and fully extruded ovipositor (upper aspect).

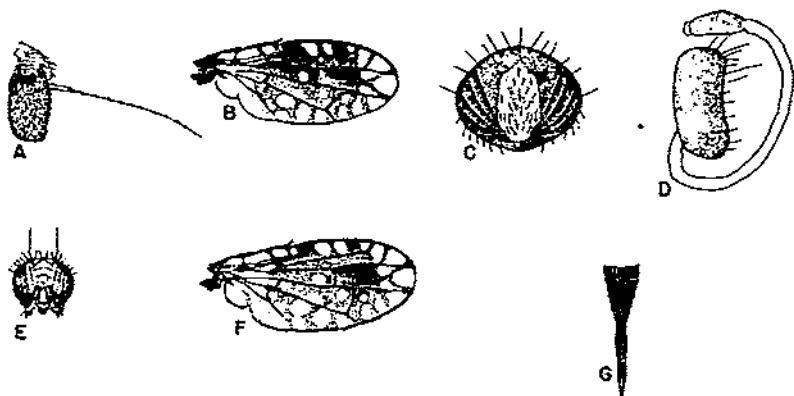


FIGURE 35.—*Euaestea bella*: A, Antenna of adult male; B, wing of adult male; C, male genitalia (from anal end); D, same (side view); E, head of adult female (front view); F, wing of adult female; G, ovipositor sheath and fully extruded ovipositor (upper aspect).

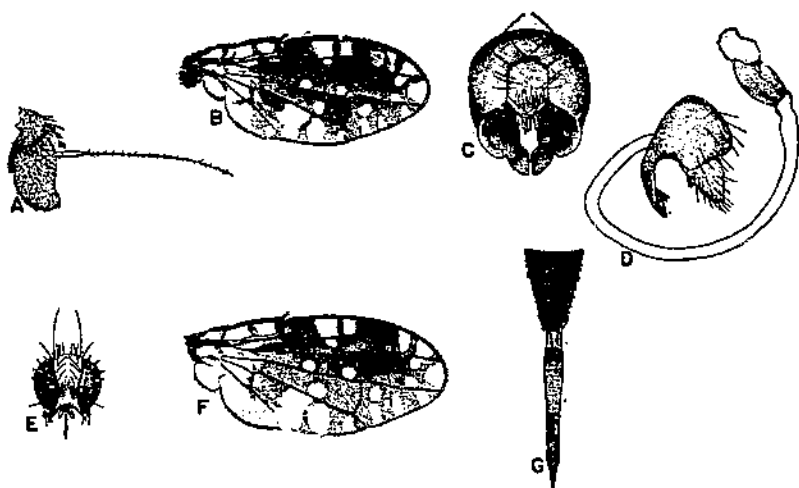


FIGURE 36.—*Dysseuaresta mexicana*: A, Antenna of adult male; B, wing of adult male; C, male genitalia (from anal end); D, same (side view); E, head of adult female (front view); F, wing of adult female; G, ovipositor sheath and fully extruded ovipositor (upper aspect).

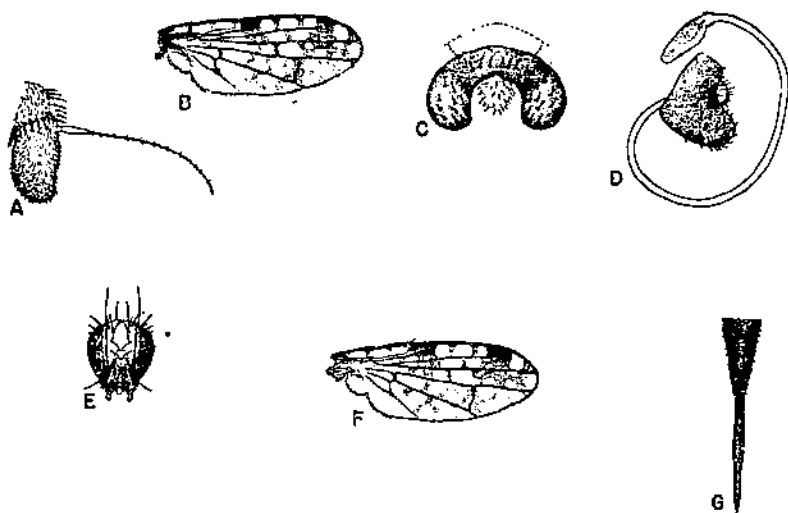


FIGURE 37.—*Paroxyna thomae*: A, Antenna of adult male; B, wing of adult male; C, male genitalia (from anal end); D, same (side view); E, head of adult female (front view); F, wing of adult female; G, ovipositor sheath and fully extruded ovipositor (upper aspect).

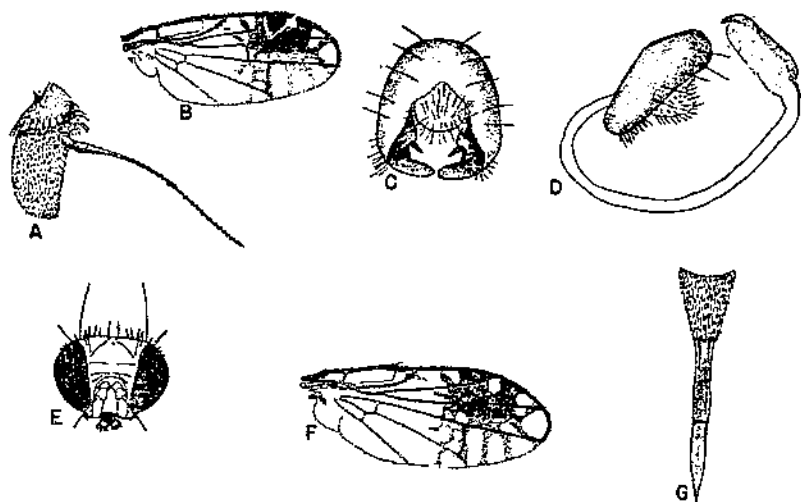


FIGURE 38.—*Trupanea (Trupanea) daceloptera*: A, Antenna of adult male; B, wing of adult male; C, male genitalia (from anal end); D, same (side view); E, head of adult female (front view); F, wing of adult female; G, ovipositor sheath and fully extruded ovipositor (upper aspect).

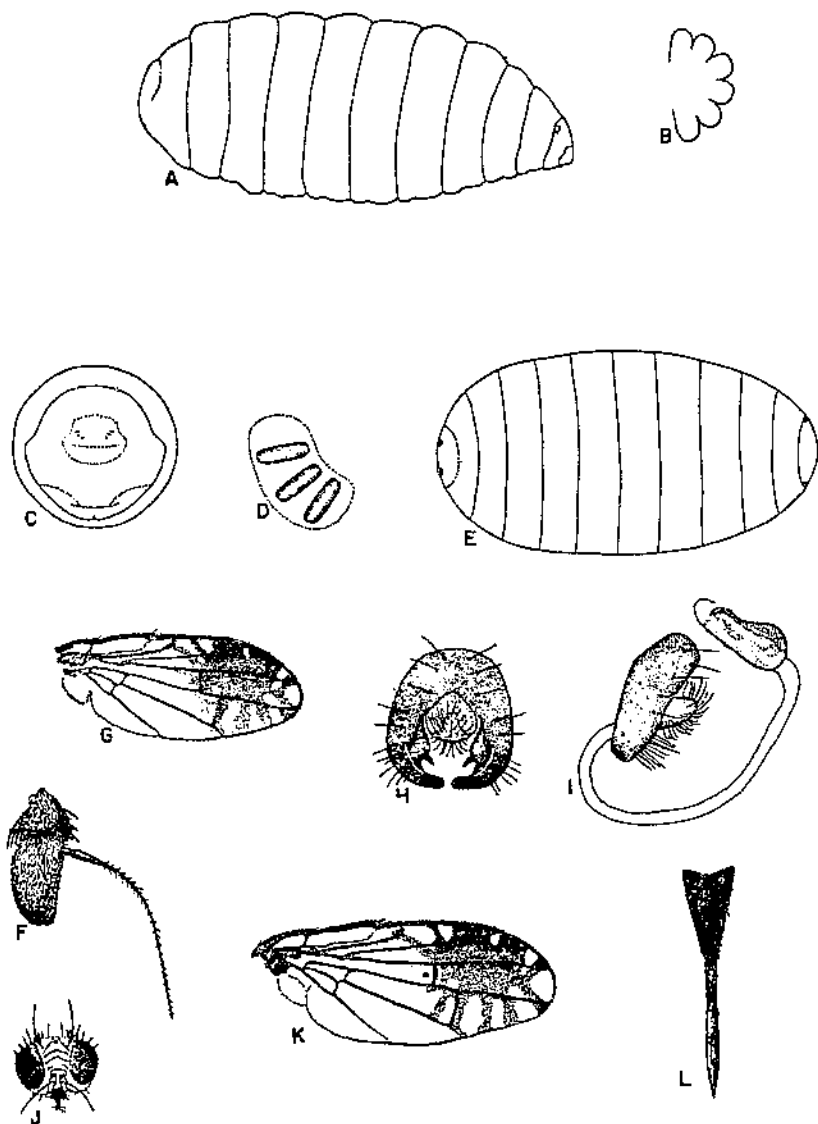


FIGURE 30.—*Trupanea (Trupanea) mevarna*: A, Larva (side view); B, anterior spiracle of larva; C, two posterior segments of larva (rear view); D, posterior spiracle of larva; E, puparium (upper aspect); F, antenna of adult male; G, wing of adult male; H, male genitalia (from anal end); I, same (side view); J, head of adult female (front view); K, wing of adult female; L, ovipositor sheath and fully extruded ovipositor (upper aspect).



FIGURE 40.—*Trupanea (Trupanea) ageratae*, new species: Wing of adult male.

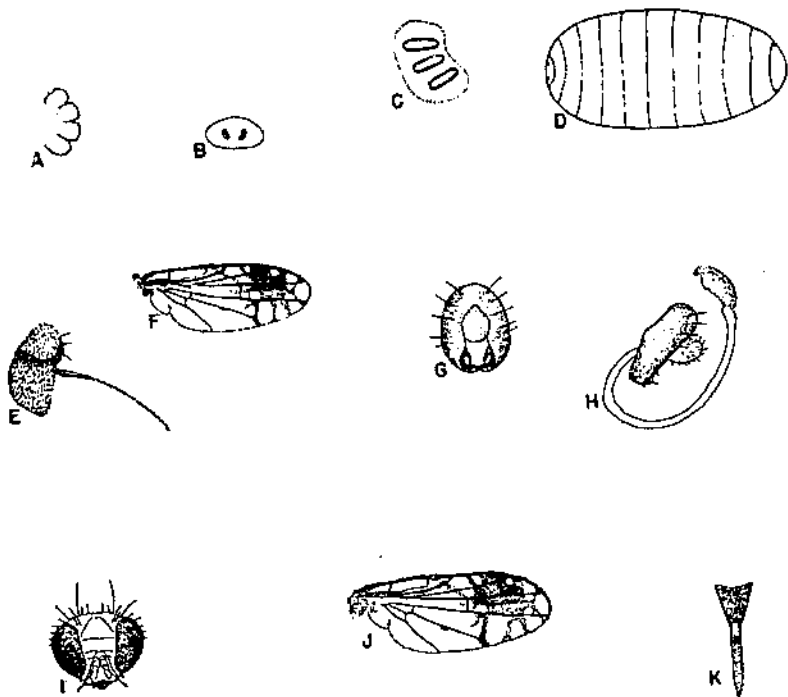


FIGURE 41.—*Trupanea (Trupanea) actinobola*: A, Anterior spiracle of puparium; B, posterior spiracular area of puparium (rear view); C, posterior spiracle of puparium; D, puparium (upper aspect); E, antenna of adult male; F, wing of adult male; G, male genitalia (from anal end); H, same (side view); I, head of adult female (front view); J, wing of adult female; K, ovipositor sheath and fully extruded ovipositor (upper aspect).

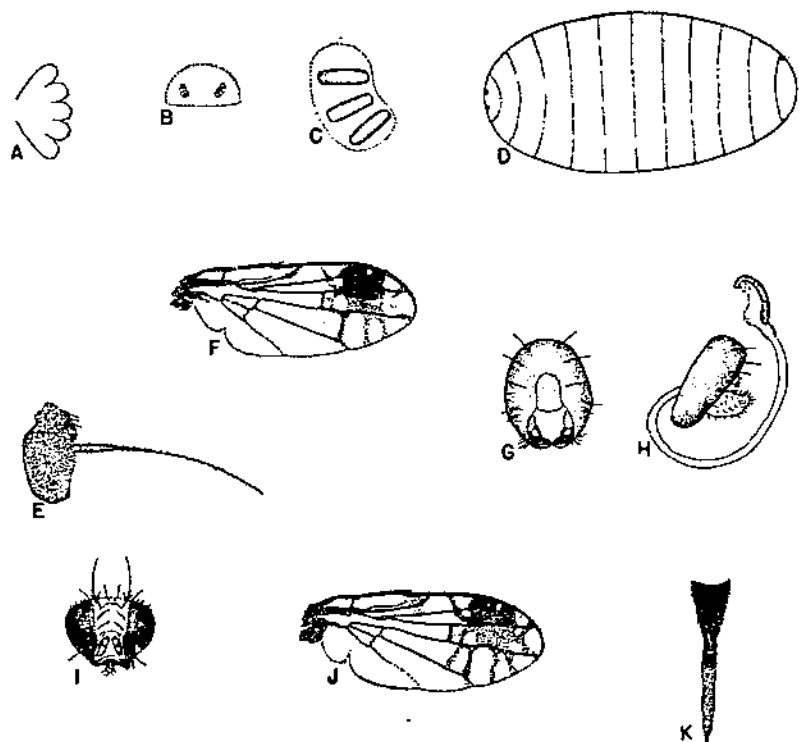


FIGURE 42.—*Trupanea (Trupanea) eclipta*, new species: A, Anterior spiracle of puparium; B, posterior spiracular area of puparium (rear view); C, posterior spiracle of puparium; D, puparium (upper aspect); E, antenna of adult male; F, wing of adult male; G, male genitalia (from anal end); H, same (side view); I, head of adult female (front view); J, wing of adult female; K, ovipositor sheath and fully extruded ovipositor (upper aspect).

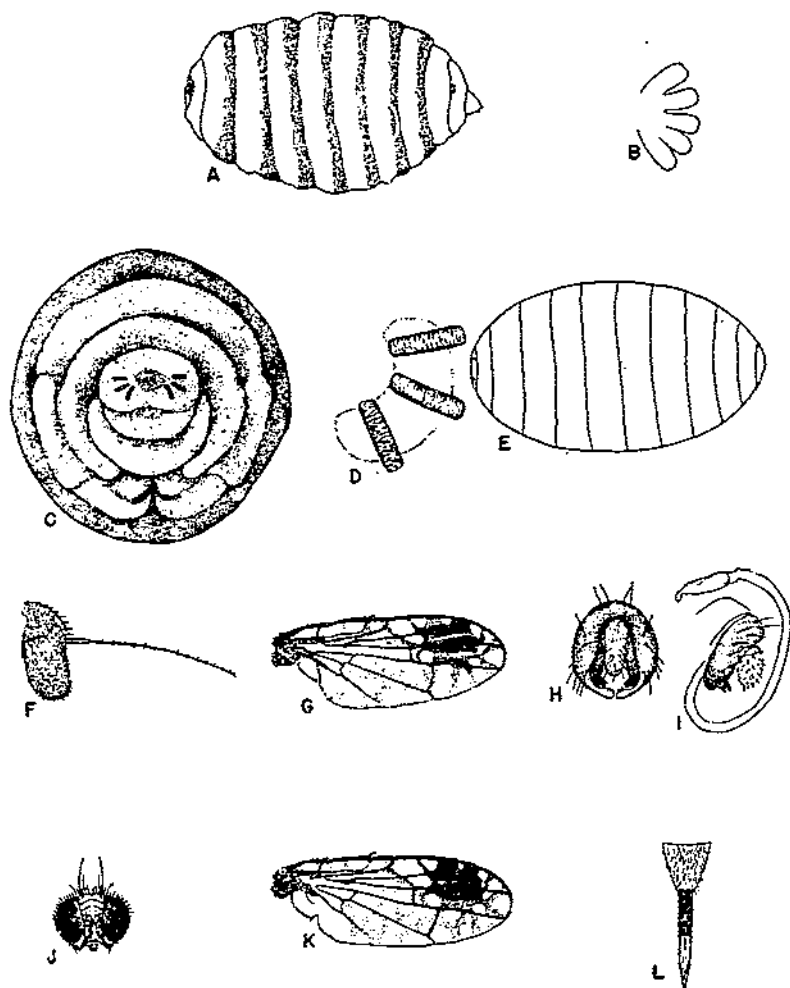


FIGURE 43.—*Trupanea* (*Euarestoides*) *abstersa*: A, Larva (side view); B, anterior spiracle of larva; C, larva (rear view); D, posterior spiracle of larva; E, puparium (upper aspect); F, antenna of adult male; G, wing of adult male; H, male genitalia (from anal end); I, same (side view); J, head of adult female (front view); K, wing of adult female; L, ovipositor sheath and fully extruded ovipositor (upper aspect).

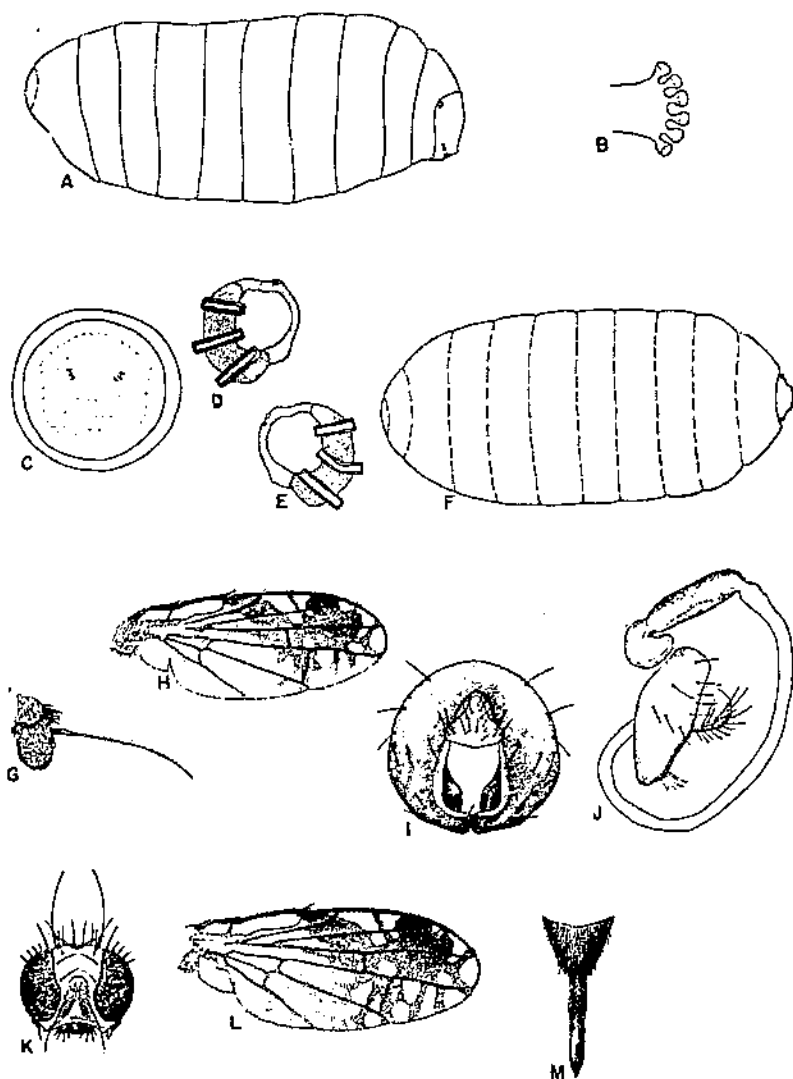


FIGURE 44.—*Trupanca (Tephritoides) subpura*: A, Larva (side view); B, anterior spiracle of larva; C, two posterior segments of larva (rear view); D, posterior spiracle of larva showing straight slits; E, same but showing one of the slits bent; F, puparium (upper aspect); G, antenna of adult male; H, wing of adult male; I, male genitalia (from anal end); J, same (side view); K, head of adult female (front view); L, wing of adult female; M, ovipositor sheath and fully extruded ovipositor (upper aspect).

LITERATURE CITED

- (1) ADAMS, C. F.
1904. NOTES ON AND DESCRIPTIONS OF NORTH AMERICAN DIPTERA. Kans. Univ. Sci. Bul. 2: 433-455.
- (2) ALDRICH, J. M.
1905. A CATALOGUE OF NORTH AMERICAN DIPTERA OR TWO-WINGED FLIES. Smithsn. Misc. Collect. 46, no. 1444, 680 p.
- (3) ———
1909. THE FRUIT-INFESTING FORMS OF THE DIPTEROUS GENUS RHAGOLETIS, WITH ONE NEW SPECIES. Canad. Ent. 41: 69-73, illus.
- (4) ———
1929. A REVISION OF THE TWO-WINGED FLIES OF THE GENUS PROCECDOCHARIS IN NORTH AMERICA, WITH AN ALLIED NEW GENUS. U.S. Natl. Mus. Proc. 76, no. 2799, 13 p.
- (5) BEZZI, M.
1913. INDIAN TRYPAEIDS (FRUIT-FLIES) IN THE COLLECTION OF THE INDIAN MUSEUM, CALCUTTA. Mem. Indian Mus. 3: [53]-175, illus.
- (6) ———
1920. SPECIES DUAE NOVAE GENERIS OEDASPIIS, S. L. (DIPT.). Brotéria 18 (fasc. 1): [5]-13, illus.
- (7) ——— and TAVARES, J. S.
1916. ALGUNS MUSCÍDEOS CECIDOGÉNICOS DO BRAZIL. Brotéria (Ser. Zool.) 14 (fasc. 3): [155]-[170].
- (8) BIGOT, J. [M. F.]
1856. DIPTEROS. ORDEN DE LOS DIPTEROS. pp. 328-349. In Sagra, D. Ramon de la., Historia Física, Política y Natural de la Isla de Cuba. pt. 2, Historia natural, v. 7—Crustaceos, arácnidos é insectos— 371 p., illus. Paris.
- (9) ———
1884. J. M. F. BIGOT COMMUNIQUE LA DESCRIPTION D'UN NOUVEAU GENRE ET D'UNE NOUVELLE ESPÈCE DE DIPTÈRES DE LA FAMILLE DES ORTALIDAE. Ann. Soc. Ent. France (1884) (6) 4: xxix-xxx.
- (10) ———
1886. DIPTÈRES NOUVEAUX OU PEU CONNUS 20^e PARTIE. Ann. Soc. Ent. France (6) 6: 287-302.
- (11) COLE, F. R.
1923. EXPEDITION OF THE CALIFORNIA ACADEMY OF SCIENCES TO THE GULF OF CALIFORNIA IN 1921. DIPTERA FROM THE ISLANDS AND ADJACENT SHORES OF THE GULF OF CALIFORNIA. II. GENERAL REPORT. Calif. Acad. Sci. Proc. (4) 12: 457-481, illus.
- (12) COQUILLETT, D. W.
1894. NEW NORTH AMERICAN TRYPETIDAE. Canad. Ent. 26: 71-75.
- (13) ———
1899. NOTES AND DESCRIPTIONS OF TRYPETIDAE. Jour. N.Y. Ent. Soc. 7: 259-268.
- (14) ———
1910. THE TYPE-SPECIES OF THE NORTH AMERICAN GENERA OF DIPTERA. U.S. Natl. Mus. Proc. 37: 499-647.
- (15) CRESSON, E. T., JR.
1907. SOME NORTH AMERICAN DIPTERA FROM THE SOUTHWEST. Amer. Ent. Soc. Trans. 33: 99-108.
- (16) ———
1914. SOME NOMENCLATORIAL NOTES ON THE DIPTEROUS FAMILY TRYPETIDAE. Ent. News 25: 275-279.
- (17) ———
1920. A REVISION OF THE NORTH AMERICAN SPECIES OF FRUIT FLIES OF THE GENUS RHAGOLETIS (DIPTERA: TRYPETIDAE). Amer. Ent. Soc. Trans. 55: 401-414, illus.
- (18) CURRAN, C. H.
1924. RHAGOLETIS POMONELLA AND TWO ALLIED SPECIES. Ent. Soc. Ontario, Ann. Rpt. (1923) 54: 56-57, illus.
- (19) ———
1924. RHAGOLETIS SYMPHORICARPI, A NEW TRYPAEID FROM BRITISH COLUMBIA (DIPT.). Canad. Ent. 56: 62-63.

- (20) CURRAN, C. H.
1928. INSECTS OF PORTO RICO AND THE VIRGIN ISLANDS. DIPTERA OR TWO-WINGED FLIES. N.Y. Acad. Sci., Sci. Survey of Porto Rico and the Virgin Islands. 11, pt. 1, 118 p., illus.
- (21) ———
1932. NEW NORTH AMERICAN DIPTERA, WITH NOTES ON OTHERS. Amer. Mus. Novitates no. 526, 13 p., illus.
- (22) ———
1932. NEW SPECIES OF TRYPAEIDAE, WITH KEY TO THE NORTH AMERICAN GENERA. Amer. Mus. Novit. no. 556, 19 p., illus.
- (23) DAECKE, E.
1910. TRYPETID GALLS AND EUSTOTA ELSA N. SP. Ent. News 21: 341-343, illus.
- (24) DOANE, R. W.
1898. A NEW TRYPETID OF ECONOMIC IMPORTANCE. Ent. News 9: 69-72.
- (25) ———
1899. NOTES ON TRYPETIDAE WITH DESCRIPTIONS OF NEW SPECIES. Jour. N.Y. Ent. Soc. 7: 177-193, illus.
- (26) FABRICIUS, J. C.
1792-94. ENTOMOLOGIA SYSTEMATICA EMENDATA ET AUCTA, SECUNDUM CLASSES, ORDINES, GENERA, SPECIES, ADJECTIS, SYNONYMIS, LOCIS, OBSERVATIONIBUS, DESCRIPTIONIBUS . . . 4v. in 5. . . . Hafniae.
- (27) ———
1805. SYSTEMA ANTLIATORUM SECUNDUM ORDINES, GENERA, SPECIES, ADJECTIS, SYNONYMIS, LOCIS, OBSERVATIONIBUS, DESCRIPTIONIBUS. 372 p. Brunsvigae.
- (28) FITCH, A.
1855. INSECTS INFESTING FRUIT TREES. I. THE APPLE. Trans. N.Y. State Agr. Soc. 14: [700]-808, illus. Also in First and Second Reports, Noxious, Beneficial, and Other Insects of the State of New York, p. [5]-104, illus. 1856.
- (29) GERSTAECKER, A.
1860. BESCHREIBUNG EINIGER AUSGEZEICHNETEN NEGEN DIPTEREN AUS DER FAMILIE MUSCARIAE. Stettin. Ent. Ztg. 21: 163-201, illus.
- (30) GLOVER, T.
1868. REPORT OF THE ENTOMOLOGIST. [U.S.] Commr. Agr. Rpt. 1867: 58-76, illus.
- (31) GUETTARD, [J. E.]
1702. OBSERVATIONS QUI PEUVENT SERVIR À FORMER QUELQUES CARACTÈRES DE COQUILLAGES. Hist. Acad. Roy. Sci. 1756 avec Mém. Math. & Phys. Tirés des Registres Acad. Mém., p. 145-183. Paris.
- (32) HALIDAY, A. H.
1838. NEW BRITISH INSECTS INDICATED IN MR. CURTIS'S GUIDE, DIPTERA. Ann. Nat. Hist. or Mag. Zool., Bot., and Geol. 2: 183-190.
- (33) HARRIS, T. W.
1835. INSECTS. In Hitchcock, E., Catalogues of the Animals and Plants in Massachusetts. p. 33-82. Also in Hitchcock, E., Report on the Geology, Mineralogy, Botany, and Zoology of Massachusetts. Ed. 2, pt. 4, no. 8, p. 553-602. Amherst.
- (34) ———
1841. A REPORT ON THE INSECTS OF MASSACHUSETTS INJURIOUS TO VEGETATION . . . 459 p. Cambridge.
- (35) HENDEL, F.
1914. DIE GATTUNGEN DER BOHRFLIEGEN. Wiener Ent. Ztg. 33 (heft 3-4): 73-98.
- (36) ———
1914. DIE BOHRFLIEGEN SÜDAMERIKAS. ÜBERSICHT UND KATALOG DER BISHER AUS DER NEOTROPISCHEN REGION BESCHRIEBENEN TEPHROTINEN. Abhandl. u. Ber. K. Zool. u. Anthr.-Ethn. Mus. Dresden (1912), v. 14, no. 3, 84 p., illus.
- (37) ———
1927. DIE FLIEGEN DER PALEAREKTISCHEN REGION. 49, TRYPETIDAE. 221 p., illus. Stuttgart.

- (38) HENDEL, F.
1928. NEUE ODER WENIGER BEKANNTE BOHRFLIEGEN (TRYPETIDAE)
MEIST AUS DEM DEUTSCHEN ENTOMOLOGISCHEN INSTITUT BERLIN-
DAHEM. Ent. Mitt. 17: 341-370.
- (39) HERRERA, A. L., BARREDA, L. DE LA, GÁNDARA, G., and TÉLLEZ, O.
1905. EL GUSANO DE LA FRUTA INSTRYPETAS LUDENS I. D. B. Bol. Com.
Parasit. Agr. 2: 385-415.
- (40) HERRERA, A. L., RANGEL, A. F., BARREDA, L. DE LA, BONANSEA, S., and
TÉLLEZ, O.
1901. EL GUSANO DE LA FRUTA INSTRYPETAS LUDENS (I. D. B.). Bol.
Com. Parasit. Agr. 1: 145-170.
- (41) ILLINOWORTH, J. F.
1912. A STUDY OF THE BIOLOGY OF THE APPLE MAGGOT (RHAGOLETIS
POMONELLA), TOGETHER WITH AN INVESTIGATION OF METHODS
OF CONTROL. N.Y. (Cornell) Agr. Expt. Sta. Bul. 324, p.
125-187, illus.
- (42) ———
1912. CHERRY FRUIT FLIES AND HOW TO CONTROL THEM. N.Y. (Cornell)
Agr. Expt. Sta. Bul. 325, p. 191-204, illus.
- (43) JOHANNSEN, O. A.
1928. ORDER DIPTERA. N.Y. (Cornell) Agr. Expt. Sta. Mem. 101:
687-869.
- (44) JOHNSON, C. W.
1895. LIST OF THE DIPTERA OF JAMAICA WITH DESCRIPTIONS OF NEW
SPECIES. Acad. Nat. Sci. Phila. Proc. 1894: 271-281.
- (45) ———
1900. INSECTS OF NEW JERSEY. DIPTERA. N.J. State Bd. Agr. Ann.
Rpt. (1899) 27: 617-699, illus.
- (46) ———
1900. SOME NOTES AND DESCRIPTIONS OF SEVEN NEW SPECIES AND ONE
NEW GENUS OF DIPTERA. Ent. News 11: 323-328, illus.
- (47) ———
1903. DIPTERA OF BEULAH, NEW MEXICO. Amer. Ent. Soc. Trans. 29:
101-106.
- (48) ———
1903. SOME REMARKS ON OUR LOCAL FAUNA. Ent. News 14: 98-100.
- (49) ———
1904. A SUPPLEMENTARY LIST OF THE DIPTERA OF NEW JERSEY. Ent.
News 15: 157-163.
- (50) ———
1909. NOTES ON THE DISTRIBUTION OF SOME TRYPETIDAE WITH DESCRIp-
TION OF A NEW SPECIES. Psyche 16: 113-114.
- (51) ———
1910. DIPTERA. Ann. Rpt. N.J. State Mus. 1909: 703-814, illus.
- (52) ———
1913. INSECTS OF FLORIDA. I. DIPTERA. Bul. Amer. Mus. Nat. Hist. 32:
37-90.
- (53) ———
1925. FAUNA OF NEW ENGLAND. 15. LIST OF THE DIPTERA OR TWO-
WINGED FLIES. Boston Soc. Nat. Hist. Occas. Papers 7, 326 p.
- (54) ———
1925. DIPTERA OF THE HARRIS COLLECTION. Boston Soc. Nat. Hist.
Proc. 38: 57-99.
- (55) KIEFFER, J. J., and JØRGENSEN, P.
1910. GALLEN UND GALLENTIERE AUS ARGENTINIEN. Centibibl. Bakt.
[etc.] (II) 27: 362-444, illus.
- (56) LOEW, H.
1861. DIPTERA AMERICAE SEPTENTRIONALIS INDIGENA. CENTURIA PRIMA.
Berlin. Ent. Ztschr. 5: 307-359.
- (57) ———
1862. MONOGRAPHS OF THE DIPTERA OF NORTH AMERICA (PART I).
Smithsn. Misc. Collect., 221 p., illus.
- (58) ———
1862. DIPTERA AMERICAE SEPTENTRIONALIS INDIGENA. CENTURIA SE-
CUNDA. Berlin. Ent. Ztschr. 6: 185-232.
- (59) ———
1862. DIE EUROPÄISCHEN BOHRFLIEGEN (TRYPETIDAE). 128 p., illus.

- (60) LOEW, H.
1873. MONOGRAPHS OF THE DIPTERA OF NORTH AMERICA (PART III).
Smithsn. Misc. Collect. no. 256, 351 p., illus.
- (61) MACQUART, J.
1843. DIPTÈRES EXOTIQUES NOUVEAUX OU PEU CONNUS. Extrait Mém.
Soc. Roy. Sci., Agr. et Arts [Lille] 2 (pt. 3): 162-460, illus.
- (62) MARLATT, C. L.
1890. ENTOMOLOGICAL SOCIETY OF WASHINGTON, OCTOBER 2, 1890.
Insect Life 3: 129. [Also in Ent. News 1: 168.]
- (63) ———
1891. THE XANTHIUM TRYPETA. TRYPETA AEQUALIS LW. Ent. Soc. Wash.
Proc. 2: 40-44, illus.
- (64) ———
1891. THE XANTHIUM TRYPETA. Insect Life 3: 312-313, illus.
- (65) OSTEN-SACKEN, C. R.
1858. CATALOGUE OF THE DESCRIBED DIPTERA OF NORTH AMERICA.
Smithsn. Misc. Collect., 92 p.
- (66) ———
1878. CATALOGUE OF THE DESCRIBED DIPTERA OF NORTH AMERICA (SECOND
EDITION). Smithsn. Misc. Collect. 270, 276 p.
- (67) PACKARD, A. S., JR.
1869. GUIDE TO THE STUDY OF INSECTS, AND A TREATISE ON THOSE
INJURIOUS AND BENEFICIAL TO CROPS, FOR THE USE OF COLLEGES,
FARM-SCHOOLS, AND AGRICULTURISTS. 702 p., illus. Salem,
Mass.
- (68) PETERSON, A.
1923. THE PEPPER MAGGOT, A NEW PEST OF PEPPERS AND EGGPLANTS.
N.J. Agr. Expt. Stn. Bul. 373, 23 p., illus.
- (69) PHILLIPS, V. T.
1923. A REVISION OF THE TRYPETIDAE OF NORTHEASTERN AMERICA. Jour.
N.Y. Ent. Soc. 31: 119-155, illus.
- (70) ROHNEAU-DESVOIDY, [A.] J. B.
1830. ESSAI SUR LES MYODAIRES. Mém. Acad. Roy. Sci. Inst. France 2,
813 p. Paris.
- (71) ROEDER, V. v.
1891. BEMERKUNGEN ZU DEM DIPTEROLOGISCHEN BEITRAGE VON PROF.
MIK IN DER WIENER ENTOMOLOGISCHEN ZEITUNG, JAHRG. 1890,
PAG. 26, ÜBER TOXOTRYPANA CURVICAUDA GERST. Wiener Ent.
Ztg. 10: 31-32.
- (72) RONDANI, C.
1856. GENERA ITALICA ORDINIS DIPTERORUM ORDINATIM DISPOSITA ET
DISTINCTA ET IN FAMILIAS ET STIRPES AGGREGATA. Dipt. Ital.
Prodr. 1, 228 p.
- (73) ———
1870. ORTALIDINAE ITALICAE COLLECTAE, DISTINCTAE ET IN ORDINEM DIS-
POSITAE. Bul. Soc. Ent. Ital. 2: [5]-31, [105]-133.
- (74) ———
1871. ORTALIDINAE ITALICAE COLLECTAE, DISTINCTAE ET IN ORDINEM DIS-
POSITAE. Bul. Soc. Ent. Ital. 3: [3]-24, [161]-188.
- (75) SAY, T.
1829-30. DESCRIPTIONS OF NORTH AMERICAN DIPTEROUS INSECTS. Jour.
Acad. Nat. Sci. Phila. 6: 149-178, 183-188. [Also The
Complete Writings of Thomas Say on the Entomology of
North America. Edited by J. L. LeConte, v. 2, 814 p.,
illus. 1883.]
- (76) SCHRANK, F. VON P.
1796 (?) NATURHISTORISCHE UND ÖKONOMISCHE BRIEFE ÜBER DAS
DONAUMOOR. illus. Mannheim, 1794. (Variously listed as
1795 and 1796.)
- (77) ———
1803. FACNA BOICA. 3 in 4. Nürnberg.
- (78) SCUDDER, S. H.
1882. NOMENCLATOR ZOOLOGICUS, SUPPLEMENTAL LIST. U.S. Natl. Mus.
Bul. 19, pt. 7, 376 p.
- (79) SHERBORN, C. D.
1926. INDEX ANIMALIUM SIVE INDEX NOMINUM QUA AB A.D. MDCCLVIII
GENERIBUS ET SPECIEBUS ANIMALIUM IMPOSITA SUNT. SECTIO
SECUNDA. pt. 9, p. 2009-2248. London.

- (80) SMITHSONIAN INSTITUTION.
1922. OPINIONS RENDERED BY THE INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE. OPINIONS 68 TO 77. Smithsn. Misc. Collect. 73, no. 1, 73 p.
- (81) SNODGRASS, R. E.
1924. ANATOMY AND METAMORPHOSIS OF THE APPLE MAGGOT, RHAGOLETIS POMONELLA WALSH. Jour. Agr. Research 28: 1-36, illus.
- (82) SNOW, F. H.
1904. LISTS OF COLEOPTERA, LEPIDOPTERA, DIPTERA AND HEMIPTERA COLLECTED IN ARIZONA BY THE ENTOMOLOGICAL EXPEDITIONS OF THE UNIVERSITY OF KANSAS IN 1902 AND 1903. Kans. Univ. Sci. Bul. 2:323-350.
- (83) SNOW, W. A.
1894. DESCRIPTIONS OF NORTH AMERICAN TRYPETIDAE, WITH NOTES. Kans. Univ. Quart. 2: [159]-174, illus.
- (84) ———
1895. ON TOXOTRYPANA OF GERSTAECKER. Kans. Univ. Quart. 4: [117]-119, illus.
- (85) STEBBINS, F. A.
1910. INSECT GALLS OF SPRINGFIELD, MASSACHUSETTS, AND VICINITY. Springfield Mus. Nat. Hist. Bul. 2, 139 p., illus.
- (86) STILES, C. W.
1905. THE INTERNATIONAL CODE OF ZOOLOGICAL NOMENCLATURE AS APPLIED TO MEDICINE. U.S. Pub. Health and Marine Hosp. Serv. Hyg. Lab. Bul. 24, 50 p.
- (87) THOMPSON, M. T.
1907. THREE GALLS MADE BY CYCLORRHAPHOCS FLIES. Psyche 14: 71-74, illus.
- (88) THOMPSON, C. G.
1868. DIPTERA, SPECIES NOVAS DESCRIPSIT. In K. Svenska Fregatten Eugenies Resa Omkring Jorden. Pt. 2, Zool. 1. Insekter, p. [443]-614, illus.
- (89) TREHERNE, R. C.
1917. POPULAR AND PRACTICAL ENTOMOLOGY. THE APPLE MAGGOT IN BRITISH COLUMBIA. Canad. Ent. 49: 329-330.
- (90) WALKER, F.
1836. DESCRIPTIONS OF THE BRITISH TEPHRITITES. Ent. Mag. 3 (art. 5): 57-85.
- (91) ———
1849. LIST OF THE SPECIMENS OF DIPTEROUS INSECTS IN THE COLLECTION OF THE BRITISH MUSEUM. Pt. 4, p. [689]-1172. London.
- (92) WALSH, B. D.
1866. ANSWERS TO CORRESPONDENTS. Pract. Ent. 2: 20-21.
- (93) ———
1867. THE APPLE-WORM AND THE APPLE-MAGGOT. CARPOCAPSA POMONELLA (LINNÆUS); TRYFETA POMONELLA (NEW SPECIES). Amer. Jour. Hort. 2: 338-343, illus.
- (94) ———
1868. THE APPLE MAGGOT FLY. (TRYFETA POMONELLA, WALSH.) In Annual Report of the Noxious Insects of the State of Illinois, p. 29-33, illus.
- (95) ——— and RILEY, C. V.
1868. ANSWERS TO CORRESPONDENTS. Amer. Ent. 1: 59.
- (96) WESTWOOD, J. O.
1840. SYNOPSIS OF THE GENERA OF BRITISH INSECTS. Introd. Mod. Classif. Insects 2: 1-158. (Separately pagged.)
- (97) WIEDEMANN, C. R. W.
1830. AENSEREUROPÄISCHE ZWEIFLÜGELIGE INSEKTEN. v. 2, 684 p., illus. Hamm.
- (98) WILLISTON, S. W.
1896. ON THE DIPTERA OF ST. VINCENT (WEST INDIES). Ent. Soc. London, Trans. 1896 (pt. 3): 308, 346-435, 439-446.
- (99) ———
1908. MANUAL OF NORTH AMERICAN DIPTERA. Ed. 3, 405 p., illus. New Haven.
- (100) WULP, F. M. VAN DER.
1903. BIOLOGIA CENTRALI-AMERICANA. INSECTA. DIPTERA. v. 2, 489 p., illus. London.

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