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**A REVISION OF THE FLIES OF THE GENUS RIVELLIA
(OTITIDAE, DIPTERA) OF AMERICA NORTH OF MÉXICO ¹**

By Ryoji Namba ²

The genus *Rivellia* was established in 1830 by Robineau Desvoidy to include three species, *R. herbarum*, *R. viridulans*, and *R. boscii*. Since then, as far as I know, papers by Loew (1873), Hendel (1914a), and Cresson (1924) are the only ones of an extensive nature on the *Rivellia* of America north of México.

The few papers mentioned above include no consideration of male genitalia, which have proved to be exceedingly useful systematically in other Diptera. Furthermore, these papers appear to be based on a very limited amount of material. The group, therefore, seemed to be in need of revision.

Study of the male genitalia, wing banding, chaetotaxy, pruinosity, color, and other characters has enabled me to recognize 30 species from the above-mentioned geographical area. Of these, 13 are described as new. Since the previously described species have been inadequately described in regard to the characters which were found to be most useful, they are redescribed more fully here.

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² University of Hawaii, Hawaii Agricultural Experimental Station, Honolulu, Hawaii.

In the course of this study, the types of nine species (*Rivellia melliginis*, *R. brevifasciata*, *R. cognata*, *R. micans*, *R. floridana*, *R. variabilis*, *R. pallida*, *R. flavimana*, and *R. severini*) and a total of approximately 3,500 specimens were examined. I am unable to recognize *R. atriventris* Hendel.³

Very little is known of the biology of this genus. Fitch (1885) recorded his observations of the activities of the adults of *R. melliginis* on apple trees. Piersol's (1907) paper is the only other published biological note that has appeared. Herein are recorded biological notes on six species: *Rivellia flavimana*, *R. metallica*, *R. melliginis*, *R. coquilletti*, *R. pallida*, and *R. winifredae*. These notes will be found in the discussions of the respective species.

The readily discernible differences between the male aedeagi of most of the species offer good characters for the identification of species in this group. In most specimens the aedeagus is retracted and thus concealed within the abdomen. To expose the aedeagus, which is located terminally on the long phallosheca, it is first necessary to relax a dried specimen for a day. The phallosheca is usually looped beneath the fifth tergite on the right side of the abdomen. By using a No. 00 insect pin, which is hooked at the tip, the phallosheca can be pulled out from beneath the tergite. Further pulling of the phallosheca will expose the aedeagus. Sometimes the phallosheca will break before the aedeagus is exposed, in which case the tip of the abdomen is cut off at about the middle of the fourth segment with a pair of fine scissors. The severed part is then boiled or soaked in 10 percent KOH to get rid of noncuticular material which obscures the aedeagus. In fresh material the aedeagus should be exerted before flexibility is lost.

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³ The combination of "rotgelbe" thorax, "Derobere Hinterkopfst istleth etwas blau," "Der Hinterleib ist ganz und gar metallisch blauschwarz, glänzend," and "die Kostalzele hyalin" is not present in any of the species available.

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The following abbreviations are used in the distribution data: Snow Entomological Collection, University of Kansas, SEC; Division of Entomology, North Carolina Department of Agriculture, NC; Iowa State College, ISC; Cornell University, CU; U. S. National Museum, USNM; Illinois Natural History Survey, INHS; California Academy of Sciences, CAS; Emory University, EU; Academy of Natural Sciences of Philadelphia, ANSP; Agricultural and Mechanical College of Texas, TAM; Canadian National Collection, CAN; R. R. Dreisbach Collection, RRD; C. W. Sabrosky Collection, CWS; G. Steyskal Collection, GS; University of Minnesota, UM; American Museum of Natural History, AMNH; State College of Washington, SCW; GSMNP, Great Smoky Mountains National Park.

Genus *Rivellia* Robineau Desvoidy

Rivellia Robineau Desvoidy, 1830, p. 729.—Rondani, 1856, p. 111; 1869, p. 28.—Schiner, 1864, p. 80.—Loew, 1873, p. 87.—Van Der Wulp, 1896, p. 179.—Williston, 1896, p. 116; 1908, p. 275.—Aldrich, 1905, p. 588.—Becker, 1905, p. 104.—Wingate, 1906, p. 326.—Hendel, 1914a, p. 152; 1914b, p. 85.—Curran, 1934, p. 281.—Hennig, 1945, p. 6.

TYPE SPECIES: *Musca syngenesiae* Fabricius (= *Rivellia herbarum* Robineau Desvoidy). Type designation by Rondani (1856).

The characters possessed by all *Rivellia* species considered in this paper are as follows:

HEAD: Frons dull, covered with short black setae; a narrow pruinose strip on each side on orbits. Upper fronto-orbital plates and ocellar triangle shining; upper fronto-orbital plates with two short reclinate setae on each side, the uppermost pair shorter, sometimes very much so; ocellar setae small, divergent, proclinate. Vertical setae long; inner verticals convergent, outer verticals divergent. Face concave from lateral view; with dorsal portion pruinose, ventral portion shining. Antenna with third segment elongated, almost reaching or surpassing oral margin; arista very short-plumose. Palpi with scattered black setae. Check with a strong seta on each side ventral to eye. Postcranium convex from lateral view, somewhat flattened dorsal to neck; with scattered black setae.

THORAX: Mesonotum with many black setae; pruinose except for border next to head which is shining; two notopleural, one supra-alar, one postalar, and one intra-alar setae always present on each side. Scutellum pruinose except for shining apex; with a pair of long black apical setae, a shorter pair of black lateral setae, and a few short, black, submarginal setae. Postscutellum pruinose laterally, shining along the midline. Propleuron with cluster of pale, weak setae on disc, pruinose next to front coxa. Mesopleuron pruinose next to coxa and ventral to anterior spiracle; a long black seta on dorsal posterior corner. Pteropleuron with a narrow pruinose strip on posterior margin. Prosternum lightly pruinose; with weak, pale setae.

THORACIC APPENDAGES: Front legs: Coxa with comblike row of black setae at tip on inside; femur with long setae on outside; tibia with comblike row of setae at tip. Middle legs: Tibia with one long spur at tip. Hind legs: Coxa with two long setae on outside; tibia with comblike row of setae at tip.

Wing banding may be reduced as in *R. brevifasciata*, but banding in general is as follows: First band extends along costal margin from base of wing to just proximad of tip of auxiliary vein, where it turns posteriorly toward and usually into discal cell proximad of anterior crossvein. Second band originates on costal margin just proximad of tip of first vein and extends posteriorly over anterior crossvein and usually into discal cell. Third band originates on costal margin proximad of tip of second vein and extends over posterior crossvein. Fourth band extends along costal margin from tip of second vein to tip of fourth vein. Discal cell elongate, broadened apically. Anterior crossvein meets the fourth vein distad of center of discal cell. First vein with many short, black setae on its entire length dorsally. Third vein sparsely covered with short, black setae dorsally. Costa covered with short, black setae.

ABDOMEN: First five tergites with short, reclinate, black setae. Ninth tergite and cerci of males covered with setae.

Pruinosity on the various parts of body white.

Key to the species of *Rivellia* of America north of México

1. Strong humeral setae present 2
- Strong humeral setae absent 25
- 2 (1). Posterior dorsocentral setae absent *R. variabilis* Loew
- Posterior dorsocentral setae present 3
- 3 (2). The part of first basal cell contiguous to second basal cell completely banded; tip of first band joined to second band or very nearly so . . 4
- That part of first basal cell not completely banded; either not banded at all or partly banded; tip of first band distinctly separated from second band 9
- 4 (3). Front and middle femora yellowish 5
- Front and middle femora dark brown or black 7
- 5 (4). Second basal cell completely banded or nearly so; second and third bands converging, joined in the discal cell *R. floridana* Johnson
- Second basal cell hyaline; second and third bands subparallel 6
- 6 (5). Third band broader than hyaline strip between second and third bands; no hyaline spot at junction of second and third veins.
- R. coquilletti* Hendel
- Third band narrower than hyaline strip between second and third bands; a hyaline spot surrounding junction of second and third veins.
- Males, *R. tersa*, new species
- 7 (4). Fourth band joined broadly to third band at costal margin, width of fourth band at that point is from costa to third vein; first, second, and third bands distinctly and broadly joined together at their tips.
- R. conjuncta* Loew
- Third and fourth bands joined at costal margin only between costa and second vein; first, second, and third bands not joined together at their tips, although first may be joined to second 8
- 8 (7). A pair of additional strong setae present anterolateral to posterior dorsocentrals; hyaline spot at junction of second and third veins large, covering junction and extending distad.
- Females, *R. tersa*, new species
- No such setae present; hyaline spot small, not covering junction, confined to anterior and proximad of junction. . *R. australis*, new species
- 9 (3). Costal cell hyaline, at most very faintly banded (see alternate) but not darker than rest of the bands; body dark brown to black, not yellowish 10
- Costal cell definitely banded, if faintly so, then body yellowish . . . 13
- 10 (9). Wing bands obsolete, consisting of faint spots 11
- Wing bands distinct 12
- 11 (10). Anterior and posterior wing margins subparallel; anal angle prominent.
- R. brevifasciata* Johnson
- Wings narrowed toward base; anal angle nearly obsolete.
- R. maculosa*, new species
- 12 (10). Second band with section in discal cell dislocated distally; prominent seta present ventral to subalar; prosternum yellowish.
- R. occulta* Van Der Wulp
- Second band continuous; no prominent seta present ventral to subalar; prosternum blackish *R. metallica* Van Der Wulp

- 13 (9). Thorax yellowish in color 14
 Thorax not yellowish in color 16
- 14 (13). First and second bands faintly joined at costal margin.
R. munda, new species
 First and second bands widely separated at costal margin 15
- 15 (14). Apical part of aedeagus little shorter than basal part; apical part with definite neck, not appressed to basal part. **R. imitabilis**, new species
 Apical part of aedeagus longer than basal part; apical part with no apparent neck, appressed to basal part **R. pallida** Loew
- 16 (13). The part of first basal cell contiguous to second basal cell with hyaline area sharply wedgelike toward base of second basal cell.
R. winifredae, new species
 That part of first basal cell with hyaline area not sharply wedgelike, either rounded toward base or completely hyaline 17
- 17 (16). All femora yellowish 18
 At least middle and hind femora blackish 22
- 18 (17). Second and third bands definitely converging toward their tips; fourth band not conspicuously broadened at tip of third vein; the part of first basal cell contiguous to second basal cell completely hyaline or at most very faintly banded at base **R. cognata** Cresson
 Not with above combination of characters 19
- 19 (18). Pruinosity on posterior dorsal corner of mesopleuron in the form of a rectangle; the part of first basal cell contiguous to second basal cell at most faintly banded basally 20
 Pruinosity on posterior dorsal corner of mesopleuron in the form of a right triangle; the part of first basal cell contiguous to second basal cell usually darkly banded basally 21
- 20 (19). Apical part of aedeagus with lateral finlike structure on each side; fourth band usually widely separated from third band at costal margin **R. texana**, new species
 Apical part of aedeagus with no lateral finlike structure; fourth band usually narrowly joined to third band at costal margin. **R. vaga**, new species
- 21 (19). Width of fourth band at tip of third vein equal to or longer than length of posterior crossvein **R. severini** Blanton
 Width of fourth band shorter than length of posterior crossvein.
R. micans Loew
- 22 (17). Front legs with coxae, tibiae, and femora of uniform yellowish color; the part of first basal cell contiguous to second basal cell hyaline, at most faintly banded basally 23
 Front legs with coxae, tibiae, and femora blackish; the part of first basal cell contiguous to second basal cell darkly banded basally 24
- 23 (22). Third antennal segment obtusely rounded at tip; width of fourth band at tip of third vein as long as length of posterior crossvein.
R. michiganensis, new species
 Third antennal segment pointed at the anterior end of tip; width of fourth band at tip of third vein shorter than length of posterior crossvein **R. flavimana** Loew
- 24 (22). Cerci of males extend beyond the proctiger by at least the length of the proctiger **R. melliginis** (Fitch)
 Cerci of males do not extend beyond the proctiger or do so only slightly.
R. viridulans Robineau Desvoidy
- 25 (1). Thorax yellowish. 26
 Thorax dark brown or blackish 27

- 26 (25). Second band as broad as or narrower than hyaline strip between first and second bands; second basal and anal cells not banded.
R. inacquata, new species
 Second band much broader than hyaline strip between first and second bands; second basal and anal cells banded. **R. succinata** (Wiedemann)
- 27 (25). Femora of front legs blackish **R. socialis**, new species
 Femora of front legs uniformly yellowish 28
- 28 (27). Posterior dorsocentral setae absent; abdominal tergites distinctly pruinose; head directed anteriorly . . . **R. boscii** Robineau Desvoidy
 Posterior dorsocentral setae present; abdominal tergites not pruinose; head directed ventrally 29
- 29 (28). Thorax and abdomen usually unicolorous, dark brown or black.
R. stcyskali, new species
 Thorax dark brown, black, or blackish green; abdomen yellowish . . . 30
- 30 (29). Males with setae on fourth abdominal sternite directed posteriorly; aedeagus with apical part consisting of a long cylindrical neck, a small spherical head, and two long terminal tubes . . . **R. colei**, new species
 Males with setae on fourth abdominal sternite radially directed; aedeagus with apical part consisting of a bulbous base and two relatively short, slender, terminal tubes **R. quadrifasciata** (Macquart)

Rivellia floridana JohnsonFIGURE 2,*d**Rivellia floridana* Johnson, 1900b, p. 247.—Hendel, 1914a, p. 175.

TYPE LOCALITY: Dayton Island, Lake George, Fla. (ANSP).

FEMALES: Body length about 5.0 mm.

Head: Frons brownish yellow or yellow; ocellar triangle blackened, upper fronto-orbital plates concolorous with frons. Face with dorsal half pruinose, ventral half shining, smooth, yellow; parafacials and part of orbits ventral to each eye yellow. Antenna with first and second segments yellow; third segment with outside and anterior two-thirds of inside, or outside, only faintly blackened, remainder yellow, the tip pointed anteriorly. Anteclypeus concolorous with ventral portion of face. Palpi yellow. Posteranium yellow, lightly pruinose.

Thorax: Mesonotum yellow; strong humeral and posterior dorso-central setae present. Scutellum and postscutellum concolorous with mesonotum. Pleura yellow, mostly shining, pruinosity obscure except on laterotergite. Mesopleuron with posterior half rather densely covered with black setae; sternopleuron with black setae on disc; pteropleuron with black setae ventral to subalar. Laterotergite completely pruinose. Prosternum yellow.

Thoracic appendages: All legs yellow except for front and hind tarsi, which are very slightly blackened from third segment.

Wing (fig. 2,*d*) lengths of the two specimens examined are 3.7 and 4.1 mm. Bands brownish yellow, broad. First band broad at base, covers second basal cell and extends beyond discal cell where it faintly

joins second band. Second band separated from first band at costal margin, joined distinctly to third band in discal cell. Third and fourth bands narrowly joined at costal margin. Small whitish spot present on fourth vein just proximad of apex of second basal cell. Section of fourth vein proximad of anterior crossvein with deep bend. Halteres yellow toward base, remainder brownish.

Abdomen: Tergites shining, smooth; first two tergites and part of third yellow, remaining segments dark brown. Disc of first tergite with pale setae. Ovipositor sheath brownish yellow or brown.

SPECIMENS EXAMINED: FLORIDA: 2♀♀, Drayton Island, May 7-9.

REMARKS: The wing banding of this species distinguishes it from the other *Rivellia*.

Rivellia coquilletti Hendel

FIGURE 1, g-j

Rivellia basilaris Coquillett, 1900, p. 21 (not *Trypeta basilaris* Wiedemann, 1830).—Cresson, 1924, p. 225.

Rivellia coquilletti Hendel, 1914a, p. 180, pl. 1, fig. 26; 1914b, pl. 2, fig. 26.

LECTOTYPE: I hereby select as lectotype a male specimen bearing the labels "Type No. 4469, USNM," "Col.," "*Rivellia coquilletti* Hend.," and "*Rivellia basilaris* Coq."

TYPE LOCALITY: Southern Colorado.

MALES: Body length 3.7-5.0 mm.

Head: Frons yellowish brown; upper fronto-orbital plates and ocellar triangle black. Face with dorsal two-thirds pruinose, ventral one-third shining, of milky light gray color; parafacials and part of orbits ventral to each eye brownish yellow. Antenna with first and second segments brownish yellow; third segment with tip and outside blackened, remainder yellow, the tip pointed anteriorly. Anteclypeus dark brown or black. Palpi yellow. Posteranium dark brown or blackish green, pruinose.

Thorax: Mesonotum dark brown or blackish green; strong humeral and posterior dorsocentral setae present. Scutellum and post-scutellum concolorous with mesonotum. Pleura dark brown or blackish green, mostly shining. Mesopleuron with scattered pale setae on posterior half; pruinose area at dorsal posterior corner in form of a marginal strip which extends from midpoint between anterior spiracle and dorsal posterior corner to dorsal posterior corner, then ventral to a point slightly past midpoint between dorsal posterior and ventral posterior corners. Sternopleuron with ventral corner and a very narrow strip on posterior margin pruinose; disc with scattered pale setae. Disc of pteropleuron with scattered pale setae, black setae present or absent ventral to subalar. Hypopleuron with

shining disc, borders narrowly pruinose. Laterotergite completely and densely pruinose. Prosternum black.

Thoracic appendages: Front legs: Coxae and femora yellow; tibiae wholly yellow, yellow at base and gradually blackened toward tip, wholly dark brown, or wholly black; tarsi unicolorous, varying from yellow to dark brown, never darker than tibiae. Middle legs: Coxae dark brown; femora yellow; tibiae yellow at extreme base, remainder dark brown or black; tarsi wholly yellow. Hind legs: Coxae with brown spot at base on outside, remainder yellow; femora yellowish brown at tip, remainder yellow; tibiae dark brown or black; tarsi blackened from third segment, remaining segments yellow.

Wing (fig. 1,*g*) length 2.9–3.7 mm. Bands black, very broad. First and second bands widely separated at costal margin, joined broadly posterior to third vein; third and fourth bands broadly joined at costal margin. Second and third bands appear perpendicular to costal margin. First basal cell completely banded. Section of fourth vein proximad of anterior crossvein almost straight. I have seen one specimen with second and third bands joined in the discal cell. Halteres brownish yellow or brown.

Abdomen: Tergites shining, rugose. The color pattern varies somewhat. Usually with a dark brown transverse band at base next to thorax, remainder of first, and the second and third tergites yellowish except for a dark brown median longitudinal band on third tergite. Remaining tergites dark brown or blackish green. Basal transverse band sometimes absent, median longitudinal band on third tergite sometimes absent, both sometimes absent. Disc of first tergite with pale setae. Genitalia (fig. 1,*i,j*) with apical part of aedeagus conical in shape, the two filamentous terminal tubes little shorter than base of apical part.

FEMALES: Body length 3.8–5.0 mm.; wing length 3.1–4.0 mm. Ovipositor sheath black. Otherwise similar to males.

SPECIMENS EXAMINED: IOWA (10♀♀, 13♂♂): Amana, Clinton, Counties 3, 34, Pleasant Valley; June 22–Aug. 12. MANITOBA (1♀): Winnipeg; Aug. 21. MINNESOTA (86♀♀, 54♂♂): Big Stone County, Madison, Olmsted County, Mine dump on north bank of Snake River 4 miles east of Pine City, Mouth of Snake River (Pine County), St. Anthony Park (Ramsey County), Rock County, Sherburn; May 19–Aug. 16. MONTANA (1♀, 3♂♂): No data. NEBRASKA (1♀, 1♂): Valentine; June 11. NORTH DAKOTA (2♂♂): White, Winner; July 4–12.

REMARKS: The banding of the wings distinguishes this species from other *Rivellia*. Numerous specimens of this species were caught along a riverbank on *Carex aquatilis* Wahlenb.

Rivellia conjuncta Loew

FIGURE 6,g-j

Rivellia conjuncta Loew, 1873, p. 88, pl. 8, fig. 3 (not *Rivellia conjuncta* Loew of Van Der Wulp, 1898).—Hendel, 1914a, p. 176.

The species thought to be *R. conjuncta* by Van Der Wulp in 1898 was recognized by Hendel (1914a) and by Cresson (1924) to be another species. Hendel names the species *R. wulpiana*, and Cresson, who apparently had no knowledge of Hendel's paper, named the same species *R. vanderwulpi*. *R. vanderwulpi* Cresson, is, therefore, a junior synonym of *R. wulpiana* Hendel.

TYPE: The type of this species has been destroyed. It was collected in Maryland and was formerly deposited in the Museum of Comparative Zoology.

MALES: Body length 3.5–5.0 mm.

Head: Frons yellowish brown or reddish brown; upper fronto-orbital plates and ocellar triangle blackened; pruinose strip on frontal orbits perceptibly broader than those of other *Rivellia*. Face with little more than dorsal half pruinose, remainder shining, smooth, dark brown or black medioventrally with brownish yellow lateral strip on each side terminating just before the oral margin; parafacials and part of orbits ventral to each eye brownish yellow. Antenna with first and second segments yellow; third segment with tip, outside, and anterior side of inside blackened, remainder yellow, the tip pointed anteriorly. Anteclypeus concolorous with medioventral portion of face. Palpi yellow. Postcranium black, pruinose.

Thorax: Mesonotum dark brown or black; strong humeral and posterior dorsocentral setae present. Scutellum and postscutellum concolorous with mesonotum. Pleura dark brown or black, mostly shining. Mesopleuron with scattered black setae on posterior half; pruinosity at dorsal posterior corner absent. Sternopleuron with narrow pruinose strip on ventral margin; disc with scattered black setae. Hypopleuron with shining disc, borders narrowly pruinose. Laterotergite completely and densely pruinose. Prosternum black.

Thoracic appendages: All legs with coxae, femora, and tibiae dark brown or black; front tarsi blackened from third segment, remaining segments yellow; middle and hind tarsi blackened from fourth segment, remaining segments yellow.

Wing (fig. 6,g) length 3.1–3.7 mm. Bands dark brown, very broad. First and second bands widely separated at costal margin, joined broadly posterior to third vein; third and fourth bands broadly joined at costal margin. First basal cell almost completely banded; the apex of the hyaline triangle between first and second bands ends anywhere between third and fourth veins. Second basal cell completely banded. Discal cell completely banded at base. First and

second bands joined broadly to third band posterior to fifth vein. Section of fourth vein proximad of anterior crossvein with definite bend. Halteres with dark brown capitulum, pedicel brownish yellow.

Abdomen: Tergites shining, rugose, black. Disc of first tergite with no pale setae evident. Genitalia (fig. 6, *i, j*) with apical part of aedeagus consisting of a bulbous base and two filamentous terminal tubes which are subequal in length to bulbous base.

FEMALES: Body length 3.5–5.4 mm; wing length 3.0–4.0 mm. Ovipositor sheath black. Otherwise similar to males.

SPECIMENS EXAMINED: CONNECTICUT (1♀): Willington; no date. KANSAS (2♀♀, 1♂): Baldwin, Douglas County, Medora (Sand Dunes); May 26–July. MASSACHUSETTS (4♂♂): Atco, Brown Mills, Buena; June 11–25. NEW YORK (4♀♀, 5♂♂): Farmingdale (Long Island); June 5–14. NORTH CAROLINA (2♀♀, 1♂): Pinebluff, Raleigh, Toxaway; May 24–29. OKLAHOMA (1♀): Afton; May 16. VIRGINIA (2♀♀): Falls Church, Veitch; June 9. TEXAS (10♀♀, 1♂): College Station, Liberty, Walker County; March 25–April 21.

REMARKS: The salient character of this species is the wing banding. The absence of pruinosity on the posterior part of the mesopleuron and the rather broad pruinose strip on each side on frontal orbits are also peculiar to this species.

Rivellia tersa, new species

FIGURE 8, *a-c*

HOLOTYPE: Male. Body length about 4.6 mm.

Head: Frons yellowish brown; ocellar triangle black; upper fronto-orbital plates concolorous with frons. Face with dorsal half pruinose, ventral half shining, rugulose, yellow; parafacials and part of orbits ventral to each eye brownish yellow. Antenna with first and second segments brownish yellow; third segment with outside and anterior part of inside blackened, remainder yellow, the tip pointed anteriorly. Anteclypeus concolorous with ventral portion of face. Palpi yellow. Posteranium yellowish brown, lightly pruinose.

Thorax: Mesonotum pale brownish yellow, with black and brown blotches which are probably due to contents of thorax; strong humeral and posterior dorsocentral setae present, in addition a pair of setae anterolateral to posterior dorsocentral setae present. Scutellum and postscutellum unicolorous, pale brownish yellow. Mesopleuron with pruinose area at dorsal posterior corner in form of right triangle, one side reaching half way to ventral posterior corner, the other side reaching half way to anterior spiracle. Sternopleuron with ventral corner and narrow strip on posterior margin pruinose; disc with scattered pale setae. Disc of pteropleuron with scattered pale setae,

few black setae present ventral to subalar. Hypopleuron with shining central spot, remainder pruinose. Laterotergite completely pruinose. Prosternum brownish yellow.

Thoracic appendages: Front and middle legs yellow, except for tarsi which are slightly blackened from fourth segment. Hind legs with coxae and femora yellow; tibiae yellowish brown; tarsi very slightly blackened from fourth segment, remaining segments yellow.

Wing (fig. 8,*a*) length 3.0 mm., width 1.5 mm. Bands brown. First and second bands separated at costal margin, joined in discal cell; third and fourth bands distinctly joined at costal margin. Second and third bands appear perpendicular to costal margin. The part of first basal cell contiguous to second basal cell completely banded. Section of fourth vein proximad of anterior crossvein with very slight bend. A hyaline spot present around junction of second and third veins. Halteres brownish yellow toward base, remainder brown.

Abdomen: Tergites shining, rugose, dark brown, somewhat lighter toward base of abdomen. Disc of first tergite with pale setae. Genitalia (fig. 8,*c*) with apical part of aedeagus consisting of an apically tapered base and two long filamentous terminal tubes about nine times the length of basal part of aedeagus.

ALLOTYPE: Female. Body length about 4.7 mm. Frons reddish brown; posteranium dark brown. Thorax dark brown; pruinose triangle on mesopleuron more extensive, one side reaches the ventral posterior corner and the other side reaches the anterior spiracle. Front legs: Coxae, femora, and tibiae yellowish brown; tarsi blackened slightly from second segment, remaining segments yellow. Middle legs: Coxae yellowish brown; femora yellowish toward tip, remainder brown; tibiae brown; tarsi slightly blackened from third segment, remaining segments yellow. Hind legs: Coxae and tibiae brown; femora yellowish at tip, remainder brown; tarsi slightly blackened from third segment, remaining segments yellow. Abdominal tergites black; ovipositor sheath black. Otherwise similar to holotype.

SPECIMENS: Holotype, ♂, Mountain Park, N. Mex., June 27, 1940, R. H. Beamer (SEC); allotype, ♀, Ruby, Ariz., July 27, 1941, E. L. Todd (SEC).

REMARKS: The important diagnostic characters of this species are the peculiar banding of the wings, the additional pair of strong setae anterolateral to the posterior dorsocentral setae, and the male genitalia.

Rivellia australis, new species

FIGURE 7,*e-g*

HOLOTYPE: Female. Body length about 3.5 mm.

Head: Frons reddish brown; upper fronto-orbital plates and ocellar triangle blackened. Face with dorsal half pruinose, ventral half

shining, rugulose, brown; parafacials and part of orbits ventral to each eye brownish yellow. Antenna with first and second segments blackened on outside, yellow inside; third segment brownish yellow only on the posterior one-third of inside, remainder blackened, the tip pointed anteriorly. Anteclypeus dark brown. Palpi yellow. Postcranium black, lightly pruinose.

Thorax: Mesonotum black; strong humeral and posterior dorso-central setae present. Scutellum and postscutellum concolorous with mesonotum. Pleura dark brown, mostly shining. Mesopleuron with scattered pale setae on posterior half; pruinose area at dorsal posterior corner in form of right triangle, one side reaching almost to ventral posterior corner, the other almost to anterior spiracle. Sternopleuron with a narrow pruinose strip on ventral margin and a much narrower strip on posterior margin; disc with few scattered pale setae. Disc of pteropleuron with scattered pale setae, one black seta present ventral to subalar. Hypopleuron with shining central spot, remainder pruinose. Laterotergite with shining spot on dorsal posterior corner, remainder densely pruinose. Prosternum dark brown.

Thoracic appendages: Legs with coxae, femora, and tibiae dark brown; front and hind tarsi blackened from third segment, remaining segments yellow; middle tarsi wholly yellow.

Wing (fig. 7, *e*) length 2.9 mm., width 1.2 mm. Bands dark brown. First and second bands separated at costal margin, very narrowly separated in discal cell; third and fourth bands very narrowly joined at costal margin. Second and third bands appear perpendicular to costal margin. The part of first basal cell contiguous to second basal cell completely banded. Section of fourth vein proximad of anterior crossvein with very slight bend. A very narrow hyaline slit present anterior and basad of junction of second and third veins. Halteres with pedicel brownish yellow, capitulum dark brown.

Abdomen: Tergites shining, rugose, black. Disc of first tergite with pale setae. Ovipositor sheath black.

ALLOTYPE: Male. Body length about 2.7 mm.; wing length 2.2 mm., width 1.0 mm.; first and second antennal segments not blackened on outside; genitalia (fig. 7, *g*) with apical part of aedeagus consisting of a small bulbous base and two long filamentous terminal tubes about four times the length of basal part of aedeagus. Otherwise similar to holotype.

PARATYPES: Three females. Body length 3.3–4.2 mm.; wing length 2.5–4.0 mm. In one specimen the front coxae yellowish brown on inside. In two specimens the first and second bands of wing definitely joined in discal cell and third and fourth bands broadly joined at costal margin. Otherwise essentially similar to holotype.

SPECIMENS: Holotype, ♀, Tumicacari Mts., Ariz., July 22, 1938,

R. H. Beamer (SEC). Allotype, ♂, same data as holotype. Paratypes: ARIZONA: Mud Springs Station, Catalinas (2♀♀, July 17–20, 1916, "share with Clark and A. N. S. P."), Sunnyside Canyon, Huachuca Mts. (1♀, July 9, 1940, D. E. Hardy). (In SEC, AMNH.)

REMARKS: This species appears to be related to *R. tersa*, from which it can be distinguished by its smaller size, the smaller hyaline spot at the junction of the second and third veins as stated in key, and the male genitalia. It also appears to be related to *R. longicornis* Van Der Wulp (1898, p. 384, pl. 10, fig. 15), from which it can be distinguished by its lack of hyalinity between second and third veins at their junction and the joining or very narrow separation of first and second bands in the discal cell.

Rivellia brevifasciata Johnson

FIGURE 9, h-k

Rivellia brevifasciata Johnson, 1900a, p. 326.—Hendel, 1914a, p. 177.—Cresson, 1924, p. 229.

TYPE LOCALITY: Atco, N. J. (ANSP).

MALES: Body length 3.0–5.2 mm.

Head: Frons yellowish brown; upper fronto-orbital plates and ocellar triangle blackened. Face with dorsal half pruinose, ventral half shining, smooth, dark brown or black; parafacials and part of orbits ventral to each eye brownish yellow. Antenna with first and second segments yellow; third segment with tip, outside, and sometimes anterior side of inside blackened, remainder yellow, the tip pointed anteriorly. Anteclypeus concolorous with ventral portion of face. Palpi dark brown. Posteranium black, pruinose.

Thorax: Mesonotum dark brown or black with blue-green reflections; strong humeral and posterior dorsocentral setae present. Scutellum and postscutellum concolorous with mesonotum. Pleura concolorous with mesonotum, mostly shining. Mesopleuron with scattered pale setae on posterior half; pruinose area at dorsal posterior corner in form of right triangle, one side reaching two-thirds distance to ventral posterior corner and the other reaching two-thirds distance to anterior spiracle. Sternopleuron with ventral corner pruinose; disc with few scattered pale setae. Disc of pteropleuron with scattered pale setae, few black setae present ventral to subalar. Hypopleuron with shining central spot, remainder pruinose. Laterotergite completely and densely pruinose. Prosternum black.

Thoracic appendages: Front legs: Coxae yellow, sometimes with brown spot on outside at base; femora yellow; tibiae yellow or brownish yellow; tarsi wholly yellow or slightly blackened from second segment. Middle legs: Coxae dark brown on outside at base, re-

mainder yellow; femora and tibiae yellow; tarsi wholly yellow or slightly blackened from third segment. Hind legs: Coxae yellow to yellowish brown; femora yellow; tibiae yellow to yellowish brown; tarsi wholly yellow or slightly blackened from third segment.

Wing (fig. 9, *h*) length 2.2–3.3 mm. Bands brown; much reduced, somewhat similar to those of *R. vaga*. First band consists of spot at junction of second and third veins. Second band extends from proximad of tip of first vein to fourth vein over the anterior crossvein, faint between second and third veins. Third band extends from proximad of tip of second vein toward posterior crossvein but not surpassing fourth vein. Fourth band extends from about half way between tips of second and third veins to tip of fourth vein. Sometimes all bands obsolete. Section of fourth vein proximad of anterior crossvein straight or with very slight bend. The part of first basal cell contiguous to second basal cell completely hyaline. Anal angle prominent. Halteres yellow.

Abdomen: Tergites shining, rugose, dark brown or black with blue-green reflections. Disc of first tergite with pale setae. Genitalia (fig. 9, *j, k*) with apical part of the aedeagus flattened dorsoventrally, shaped like an elongated lyre from dorsal view.

FEMALES: Body length 3.5–4.5 mm.; wing length 2.6–3.3 mm. Ovipositor sheath concolorous with abdominal tergites. Otherwise similar to males.

SPECIMENS EXAMINED: GEORGIA (3♀♀, 1♂♂): Augusta, Tybee Island; June 4–July 26. ILLINOIS (1♀): Bishop; June 23. KANSAS (1♀, 2♂♂): Saline County, Medora (sand dunes); June 7–8. MARYLAND (2♀♀): Bladensburg; June 23. MICHIGAN (2♀♀): St. Joseph; June 23. MISSISSIPPI (1♂): Oxford; May. NORTH CAROLINA (8♀♀, 3♂♂): Raleigh; April 16–June 28. NEW YORK (6♀♀, 5♂♂): Farmingdale (Long Island); June 6.

REMARKS: This species can be distinguished from other *Rivellia* by the shape and banding of the wings and the male genitalia.

Rivellia maculosa, new species

FIGURE 5, *j-l*

HOLOTYPE: Male. Body length about 2.7 mm.

Head: Frons reddish brown; upper fronto-orbital plates and ocellar triangle blackened. Face with dorsal half pruinose, ventral half shining, smooth, brown; parafacials and part of orbits ventral to each eye brownish yellow. Antenna with first and second segments yellow; third segment blackened at tip and on outside, remainder yellow, the tip pointed anteriorly. Anteclypeus brown. Palpi brown. Post-cranium black, pruinose.

Thorax: Mesonotum black; strong humeral and posterior dorso-central setae present. Scutellum and postscutellum concolorous with mesonotum. Pleura dark brown, mostly shining. Mesopleuron with scattered pale setae on posterior half; pruinose area at dorsal posterior corner in form of rectangle, one side extending two-thirds distance to ventral posterior corner, the other side extending about half way to anterior spiracle. Sternopleuron with ventral corner pruinose, a broken medial pruinose band extending from pruinose corner to dorsal margin of sternopleuron; disc with few scattered pale setae. Disc of pteropleuron with few scattered pale setae, no black seta evident ventral to subalar. Hypopleuron with small shining central spot, remainder pruinose. Laterotergite pruinose on anterior half, remainder shining. Prosternum black.

Thoracic appendages: Front and middle legs wholly yellow. Hind legs with coxae, femora, and tarsi yellow, tibiae faintly brownish toward base, yellow toward tip.

Wing (fig. 5,*j*) length 2.0 mm., width 0.8 mm. Bands brown, much reduced. First band consists of spot at junction of second and third veins. Second band extends from proximad of tip of first vein to fourth vein over the anterior crossvein, faint between second and third veins. Third band extends from proximad of tip of second vein toward posterior crossvein but not passing third vein. Fourth band consists of relatively large spot at tip of third vein. The part of first basal cell contiguous to second basal cell completely hyaline. Section of fourth vein proximad of anterior crossvein with very slight bend. Anal angle obsolete. Halteres with yellow pedicel and brown capitulum.

Abdomen: Tergites shining, slightly rugose, black. Disc of first tergite with pale setae. Genitalia (fig. 5,*k*) with apical part of aedeagus consisting of a base bearing a sharp-pointed dorsal horn and two filamentous terminal tubes, which are little shorter than basal part of aedeagus.

ALLOTYPE: Female. Body length about 3.1 mm.; wing length 2.2 mm., width 1.0 mm. Ovipositor sheath black. Otherwise similar to holotype.

PARATYPES: 19 females, 19 males. Body length, males 2.8–3.5 mm., females 2.5–3.7 mm.; wing length, males 1.8–2.5 mm., females 2.0–2.5 mm. Both sexes sometimes having pteropleuron with one or two black setae ventral to subalar; halteres and palpi variable in color, from brownish yellow to brown. One male specimen with scutellum, postscutellum, laterotergite, pteropleuron, and mesopleuron brownish yellow, remainder of thorax dark brown.

SPECIMENS: Holotype, ♂, Perry, Ga., Aug. 12, 1939, D. E. Hardy (SEC). Allotype, ♀, same data as holotype. Paratypes: ALABAMA: Garden City (3♀♀, July 7, 1939, R. H. Beamer; 2♀♀, July 7, 1939,

D. E. Hardy; 1 ♂, July 7, 1939, P. B. Lawson). CANADA: Watertown Lake Park, Alberta (1♀, 1♂, July 26, 1946, C. E. Mickel). FLORIDA: Lacoochee (1♂, Aug. 9, 1939, D. E. Hardy); Wakulla (1♂, July 10, 1939, D. E. Hardy). GEORGIA: Adel (1♀, Aug. 11, 1939, J. D. Beamer); Austell (1♂, Aug. 27, 1910); Billy's Island, Okfeenokee Swamp (1♂, June, 1912); Griffin (2♀♀, 2♂♂, Aug. 12, 1939, R. H. Beamer; 1♀, 2♂♂, Aug. 12, 1939, E. G. Wegenck; 2♀♀, Aug. 12, 1939, A. T. Hardy; 1♂, Aug. 12, 1939, J. D. Beamer); Perry (5♀♀, 5♂♂, Aug. 12, 1939, D. E. Hardy); Tifton (1♀, Aug. 11, 1939, R. H. Beamer); Waycross (1♂, May 8, 1911). NORTH CAROLINA: Goldsboro (1♂, July 20, 1946, M. W. Wing); Raleigh (1♂, early July, Metcalf; 1♀, July 8, 1938, Wilson). (Deposited in SEC, UM, NC, USNM, and CU.)

REMARKS: The members of this species are among the smallest *Rivellia* of America north of México. *R. maculosa* can be distinguished from the other species by the reduced wing banding, obsolete anal angle of wing, and the male genitalia.

Rivellia occulta Van Der Wulp

FIGURE 8, *d-g*

Rivellia occulta Van Der Wulp, 1898, p. 382, pl. 10, fig. 8.—Hendel, 1914a, p. 178, pl. 2, fig. 33; 1914b, pl. 2, fig. 33.—Cresson, 1924, p. 229.

TYPE LOCALITY: Chilpancingo (4,600 ft.) and Omilteme (8,000 ft.), both in Guerrero, México. Location of type unknown.

MALE: Body length about 2.7 mm.

Head: Frons yellow toward antenna, brown toward vertex; upper fronto-orbital plates and ocellar triangle blackened. Face with dorsal half pruinose, ventral half shining, rugulose, pale yellowish gray; parafacials and part of orbits ventral to each eye concolorous with face. Antenna with first and second segments yellow; third slightly blackened outside, remainder yellow, the tip pointed anteriorly. Anteclypeus concolorous with ventral portion of face, rugulose. Palpi yellow. Posteranium dark brown, rather densely pruinose.

Thorax: Mesonotum dark brown; strong humeral and posterior dorsocentral setae present. Scutellum and postscutellum concolorous with mesonotum. Pleura dark brown, mostly shining. Mesopleuron with scattered pale setae on posterior half; posterior half pruinose. Sternopleuron with broad medial pruinose band which extends from the ventral corner to the dorsal margin where it becomes continuous with pruinose band on mesopleuron; disc with scattered pale setae. Disc of pteropleuron with scattered pale setae and one prominent black seta ventral to subalar. Hypopleuron with shining central spot, remainder pruinose. Laterotergite completely and densely pruinose. Prosternum pale yellow.

Thoracic appendages: Front and middle legs completely yellow. Hind legs: Coxae and femora yellow; tibiae yellowish brown; tarsi very slightly blackened from fourth segment, remaining segments yellow.

Wing (fig. 8,*d*) length 2.3 mm., width 0.9 mm. Bands light brown. Base of wing completely hyaline. First and second bands subparallel, slightly oblique to costal margin, joined at costal margin; sections of both bands in discal cell dislocated distally. Third band appears perpendicular to costal margin. Fourth band consists of large spot at apex of third vein. Section of fourth vein proximad of anterior crossvein with very slight bend. The part of first basal cell contiguous to second basal cell very faintly banded. Second basal cell banded at apex. Halteres brownish yellow.

Abdomen: Tergites dull, smooth, black. Disc of first tergite with pale setae. Genitalia (fig. 8,*f,g*) with apical part of aedeagus consisting of a slender base with two long, filamentous, randomly twisted, terminal tubes and an apparently colorless, elongated, membranous, vesicalike structure attached to the base of apical part.

FEMALES: Body length 3.1–3.7 mm.; wing length 2.2–3.2 mm.; frons yellowish brown or reddish brown; ovipositor sheath dark brown. Otherwise similar to the male.

SPECIMENS EXAMINED: ARIZONA (3♀♀, 1♂): Huachuca Mts. (Sunnyside Canyon), Ruby; July 13. NEW MEXICO (1♀): Silver City; July 22.

REMARKS: This species is easily distinguished from other *Rivellia* by the banding of the wings, the presence of a prominent seta ventral to the subalar, a broad pruinose band on the pleuron which extends from the ventral corner of the sternopleuron to the dorsal margin of the mesopleuron, and the male genitalia.

The presence of the elongated, membranous vesica on the apical part of the aedeagus is unique in this species. The location of the gonopore is uncertain. In view of the randomly twisted terminal tubes, it is suggested that the gonopore is located on the vesica.

Rivellia metallica (Van Der Wulp)

FIGURE 4,*e-h*

Herina metallica Van Der Wulp, 1867, p. 154, pl. 5, fig. 10.

Rivellia metallica (Van Der Wulp) Hendel, 1914a, p. 178, pl. 2, fig. 34; 1914b, pl. 2, fig. 34.—Cresson, 1924, p. 229.

TYPE LOCALITY: Unknown.

MALES: Body length 2.7–4.2 mm.

Head: Frons reddish brown or dark brown; upper fronto-orbital plates and ocellar triangle, blackened. Face with dorsal half pruinose, ventral half shining, smooth, dark brown or black medioventrally

with yellowish brown lateral strip on each side which terminates just before oral margin; parafacials and part of orbits ventral to each eye brownish yellow. Antenna with first and second segments brownish yellow; third segment with tip, outside, and anterior side of inside blackened, remainder yellow, sometimes almost wholly blackened, the tip pointed anteriorly. Anteclypeus concolorous with medioventral portion of face. Palpi brown. Posteranium black, pruinose.

Thorax: Mesonotum black or dark brown; strong humeral and posterior dorsocentral setae present. Scutellum and postscutellum concolorous with mesonotum. Pleura dark brown or black, mostly shining. Mesopleuron with scattered pale setae on posterior half; pruinose area at dorsal posterior corner in form of a right triangle, one side reaching two-thirds distance to ventral posterior corner and the other reaching two-thirds distance to anterior spiracle. Sternopleuron with narrow pruinose strip on ventral margin and a narrower strip on posterior margin; disc with scattered pale setae. Disc of pteropleuron with scattered pale setae, black setae present or absent ventral to subalar. Hypopleuron with disc shining, borders narrowly pruinose. Laterotergite completely and densely pruinose. Prosteronum black.

Thoracic appendages: Front legs: Coxae, femora, and tibiae yellow; tarsi with fifth segment slightly blackened, remaining segments yellow. Middle legs: Wholly yellow. Hind legs: Coxae yellow; femora wholly yellow or brown at tip on inside, sometimes on outside also; tibiae yellow at tip, remainder brownish yellow or brown; tarsi wholly yellow or fifth segment slightly blackened.

Wing (fig. 4, *e*) length 2.1–3.0 mm. Bands dark brown or black, narrow. First and second bands widely separated at costal margin; third and fourth bands definitely separated at costal margin. Costal cell and the part of first basal cell contiguous to second basal cell completely hyaline or at most very faintly banded basally. Section of fourth vein proximad of anterior crossvein with slight bend. Halteres with pedicel brownish yellow, capitulum dark brown.

Abdomen: Tergites shining, smooth, black or dark brown. Disc of first tergite with pale setae. Genitalia (fig. 4, *g, h*) with apical part of aedeagus somewhat conical in shape; the two filamentous terminal tubes little longer than base of apical part. The apical part appressed at base to basal part of aedeagus.

SPECIMENS EXAMINED: ILLINOIS (1 ♂): Savanna; June 12. MARYLAND (2 ♀♀, 2 ♂♂): Cabin John, Forest Glen.; May 16–July 29. MICHIGAN (1 ♀): Detroit; June 24. MINNESOTA (279 ♀♀, 174 ♂♂): St. Paul Water Works (Anoka County), Hennepin County, Mississippi Bluff one-half mile north of state line (Houston County), Lake

Vadnais, Oak Forest (Ramsey County), Snail Lake, St. Anthony Park, Sucker Lake, University Farm; May 23–July 18. MISSOURI (1♀): Parkville; May 25. NEW YORK (13♀♀, 5♂♂): Centereach (Long Island), Flatbush (Long Island), Gowanda, Ithaca, Pocantico Hills, Tuxedo (Station for Study of Insects); May 26–July 9. ONTARIO (1♀, 1♂): Simcoe, Toronto; May 5–July 1. PENNSYLVANIA (1♀): Delaware County; July 7. VIRGINIA (1♀, 4♂♂): Great Falls, Rosslyn; May 2–13.

REMARKS: This species can be distinguished from other *Rivellia* by the banding of the wings, smooth abdomen, male genitalia, and the general body color.

This species, as with *R. flavimana* and *R. pallida*, is found abundantly on hogpeanut, *Amphicarpa bracteata* (L.) Fernald. I had the opportunity to observe the increase and decrease of the population densities of these three species in a patch of *A. bracteata* about three yards square in 1951 and 1952. Although actual counts were not made, these changes in population were very evident. *R. flavimana* was first to appear in the spring. After its population reached a peak and began to dwindle *R. metallica* made its appearance. By the time the population of *R. metallica* reached its peak there were few or no *R. flavimana* found. *R. pallida* appeared when the *R. metallica* population began to decrease, and, as with the previous sequence, there were few or no *R. metallica* left when the *R. pallida* population was at its peak.

Rivellia munda, new species

FIGURE 7, a-d

HOLOTYPE: Male. Body length about 5.0 mm.

Head: Frons yellow; ocellar triangle slightly blackened; upper fronto-orbital plates concolorous with frons. Face with dorsal half pruinose, ventral half shining, pale yellow, smooth; parafacials and part of orbits ventral to each eye yellow. Antenna wholly yellow; tip of third segment pointed anteriorly. Anteclypeus yellow. Palpi yellow. Posteranium pale yellow, pruinose.

Thorax: Mesonotum yellow; strong humeral and posterior dorso-central setae present. Scutellum and postscutellum concolorous with mesonotum. Pleura yellow, mostly shining; pruinosity obscure except on sternopleuron and laterotergite. Mesopleuron with scattered pale and black setae on posterior one-third; sternopleuron with narrow pruinose strip on ventral margin and much narrower strip on posterior margin, center of disc with cluster of black setae; pteropleuron with scattered pale setae, few black setae present ventral to subalar. Laterotergite completely pruinose. Prosternum yellow.

Thoracic appendages: Legs yellow except for tarsi of front and hind legs which are blackened from the third segment and tarsi of middle legs which are blackened from the fourth segment.

Wing (fig. 7,*a*) length 3.3 mm., width 1.5 mm. Bands yellowish brown. First and second bands faintly joined at costal margin; third and fourth bands narrowly joined at costal margin; second and third bands not joined in discal cell. The part of first basal cell contiguous to second basal cell banded at base, with semicircular hyaline spot anterior to apex of second basal cell. Section of fourth vein proximad of anterior crossvein with definite bend. Halteres yellow.

Abdomen: Tergites shining, smooth, yellowish brown. Disc of first tergite with pale setae. Genitalia (fig. 7,*c,d*) with apical part of aedeagus consisting of a flattened base and two long terminal tubes, one somewhat shorter than the other. The tips of the tubes are rather peculiar. Each is excavated at the tip with a central cone arising from the bottom of the pit. From the apex of each cone a tiny tube protrudes. The gonopores are apparently located at the apices of these tubes.

ALLOTYPE: Female. Body length about 5.0 mm.; wing length 4.0 mm., width 1.7 mm.; ovipositor sheath yellow on basal half, blackened on apical half. Otherwise similar to holotype.

PARATYPES: 7 males, 14 females. Body length of males 4.7–5.5 mm., of females 4.2–5.7 mm.; wing length of males 3.2–4.2 mm., of females 3.2–4.0 mm. Both sexes with third segment of antenna sometimes blackened at tip and outside; second and third bands of wing often definitely joined in discal cell. Otherwise essentially similar to holotype and allotype.

SPECIMENS: Holotype, ♂, Manhattan, Kans., June 15, 1932, C. W. Sabrosky (USNM 61857). Allotype, ♀, Manhattan, Kans., June 8, 1932, C. W. Sabrosky (USNM). Paratypes: IOWA: County 3 (1♀, June 22, 1936, D. Millspaugh; 1♀, 1♂, June 27, 1936, on same pin, D. Millspaugh; 1♀, June 26, 1936, Mabel Jaques; 1♀, June 27, 1936, D. Millspaugh; 2♀♀, 1♂, July 1, 1936, D. Millspaugh; 2♀♀, 2♂♂, July 1, 1936, M. E. Barnes). KANSAS: Clark County (1♀, June, "1,962 ft.," F. H. Snow); Saline County (1♀, June 7, 1933, C. W. Sabrosky). MINNESOTA: (1♂, Univ. Minn., No. 18, sub. 10); Olmsted County (1♀, 1♂, July 1904, on same pin. C. N. Ainslie). SOUTH DAKOTA: Brookings (1♀). TEXAS: Admore (1♀, Apr. 11, 1907, "on Salix," F. C. Bishopp); Harris County (1♀, Aug. 13, 1928, L. D. Beam); Victoria (1♀, Apr. 16, 1907, W. A. Hooker; 1♀, June 24, J. D. Mitchell). No data, 1♂. (In UM, ISC, CU, USNM, SEC, and CWS.)

REMARKS: The yellowish body color, the wing banding, and the male genitalia separate this species from other *Rivellia*.

Rivellia pallida Loew

FIGURE 3, e-h

Rivellia pallida Loew, 1873, p. 95, pl. 8, fig. 8.—Hendel, 1914a, p. 181.

TYPE LOCALITY: Washington, D. C. (MCZ).

MALES: Body length 3.5–4.5 mm.

Head: Frons yellow to brownish yellow; upper fronto-orbital plates concolorous with frons, ocellar triangle blackened. Face with dorsal half pruinose, ventral half shining, smooth, yellow to brownish yellow; parafacials and part of orbits ventral to each eye yellow to brownish yellow. Antenna with first and second segments yellow to brownish yellow; third segment blackened anteriorly or on outside, remainder yellow, the tip pointed anteriorly. Anteclypeus concolorous with ventral portion of face. Palpi yellow. Posteranium yellow to brownish yellow, pruinose.

Thorax: Mesonotum yellow to brownish yellow; strong humeral and posterior dorsocentral setae present. Scutellum and postscutellum concolorous with mesonotum. Pleura yellow to brownish yellow, mostly shining, pruinosity obscure except on laterotergite. Mesopleuron with scattered pale and black setae on posterior one-third; sternopleuron with few scattered pale setae on disc; pteropleuron with few scattered pale setae on disc, few black setae present ventral to subalar. Laterotergite completely pruinose. Prosternum yellow.

Thoracic appendages: All legs with coxae and femora yellow. All tibiae yellow or sometimes brownish. Front and hind tarsi wholly yellow or blackened from third or fourth segment; middle tarsi wholly yellow, blackened from third or fourth segment, or only fifth segment blackened.

Wing (fig. 3, e) length 2.5–3.5 mm. Bands black. First and second bands separated at costal margin; third and fourth bands narrowly joined at costal margin; second and third bands sometimes almost joined in discal cell. The part of first basal cell contiguous to second basal cell completely hyaline or faintly banded at base. Section of fourth vein proximad of anterior crossvein with slight bend. Halteres brownish yellow to brown.

Abdomen: Tergites shining, smooth, yellow, brownish yellow, or yellowish brown, sometimes with reddish or blackish blotches. Disc of first tergite with pale setae. Genitalia (fig. 3, g, h) with apical part of aedeagus longer than basal part, appearing appressed to basal part at base. From dorsal view, lateral margins of apical part rounded basally and gradually converging apically.

FEMALES: Since I cannot distinguish between the females of this species and *R. imitabilis*, only females collected by me in the same local population at the same time with the males of this species are considered: Body length 3.2–3.7 mm.; wing length 2.6–2.8 mm.; ovipositor sheath yellow at base, blackish toward apex. Otherwise similar to males.

SPECIMENS EXAMINED: MINNESOTA (28♀, 21♂♂): Sucker Lake (Ramsey County); June 24–July 24.

REMARKS: The males of this species can be separated from the other species by the wing banding, genitalia, and yellowish body color. Members of this species have been collected on *Amphicarpa bracteata* (L.) Fernald.

Rivellia imitabilis, new species

FIGURE 3, a-d

HOLOTYPE: Male. Body length about 3.9 mm.

Head: Frons yellowish brown; upper fronto-orbital plates concolorous with frons, ocellar triangle slightly blackened. Face with dorsal half pruinose, ventral half shining, smooth, pale yellow; parafacials and part of orbits ventral to each eye yellow. Antenna with first and second segments yellow; third segment blackened anteriorly, remainder yellow, the tip pointed anteriorly. Anteclypeus yellow. Palpi yellow. Postcranium pale brownish yellow, pruinose.

Thorax: Mesonotum brownish yellow; strong humeral and posterior dorsocentral setae present. Scutellum and postscutellum concolorous with mesonotum. Pleura brownish yellow, mostly shining, pruinosity obscure except on laterotergite. Mesopleuron with scattered pale and black setae on posterior one-third; sternopleuron with few scattered pale setae on disc; pteropleuron with few scattered pale setae, few black setae present ventral to subalar. Laterotergite completely pruinose. Prosternum yellow.

Thoracic appendages: Coxae and femora of all legs yellow; front and middle tibiae yellow, hind tibiae brownish yellow; front tarsi blackened from fourth segment, remaining segments yellow, middle and hind tarsi with fifth segment blackened, remaining segments yellow.

Wing (fig. 3, a) length 3.1 mm., width 1.4 mm. Bands brown. First and second bands separated at costal margin; third and fourth bands narrowly joined at costal margin. The part of first basal cell contiguous to second basal cell completely hyaline. Section of fourth vein proximad of anterior crossvein with slight bend. Halteres light brown.

Abdomen: Tergites shining, smooth, yellowish brown toward base of abdomen, blackish toward tip. Disc of first tergite with pale setae. Genitalia (fig. 3,c,d) with apical part of aedeagus little shorter than basal part. From dorsal view apical part with lateral margins subparallel basally, converging apically.

PARATYPE: One male; body length about 3.2 mm.; wing length 3.0 mm., width 1.4 mm.; halteres with pedicel yellow, capitulum brown; fore tarsi blackened from third segment, middle tarsi with fifth segment blackened, hind tarsi blackened from fourth segment; first basal cell faintly banded at base; second and third bands joined in discal cell. Otherwise similar to holotype.

SPECIMENS: Holotype, ♂, Atlanta, Ga., June 27, 1933, P. W. Fattig (USNM 61919). Paratype: MICHIGAN: Marble Lake, Quincy (1 ♂, May 31, 1942, C. W. Sabrosky, CWS).

REMARKS: This species is very closely related to *R. pallida*. I cannot separate the females of the two species. The males can be separated by the genitalia. In *R. imitabilis* the apical part of the aedeagus is little shorter than the basal part and is not appressed to the basal part. In *R. pallida* the apical part is longer than the basal part and is appressed to the basal part at its base. *R. imitabilis* can be distinguished from other species by the wing banding, male genitalia, and the yellowish color of the body.

Rivellia winifredae, new species

FIGURE 9,c-g

HOLOTYPE: Male. Body length 5.2 mm.

Head: Frons reddish brown; upper fronto-orbital plates and ocellar triangle blackened. Face with little less than dorsal half pruinose; remainder shining, smooth, dark brown medioventrally, with yellowish brown lateral strip on each side which terminates just before oral margin; parafacials and part of orbits ventral to each eye brownish yellow. Antenna with first and second segments blackened on outside, inside yellow; third segment with tip and outside blackened, remainder yellow, tip pointed anteriorly. Anteclypeus concolorous with medioventral portion of face. Palpi yellowish brown. Postcranium black, pruinose.

Thorax: Mesonotum black; strong humeral and posterior dorso-central setae present. Scutellum and postscutellum concolorous with mesonotum. Pleura black, mostly shining. Mesopleuron with scattered, weak, pale setae on posterior half; pruinose area at dorsal posterior corner in form of right triangle, one side reaching half way to ventral posterior corner, the other side reaching half way to anterior spiracle. Sternopleuron with narrow pruinose strip

on ventral margin and a narrower strip on posterior margin; disc with scattered, weak, pale setae. Disc of pteropleuron with scattered, weak, pale setae, few black setae present ventral to subalar. Hypopleuron with shining disc, borders narrowly pruinose. Laterotergite completely and densely pruinose. Prosternum black.

Thoracic appendages: Front legs: Coxae with black spot on outside at base, remainder yellowish brown; femora with distal one-third of inside brownish yellow, remainder black; tibiae brownish yellow; tarsi blackened from second segment, first segment yellow. Middle legs: Coxae black; femora with distal one-third of outside brownish yellow, remainder black; tibiae yellowish at extreme tip, remainder black; tarsi slightly blackened from third segment, remaining segments yellow. Hind legs: Coxae, femora, and tibiae black; tarsi blackened from second segment, remaining segments yellow.

Wing (fig. 9,e) length 3.7 mm., width 1.6 mm. Bands dark brown. First and second bands narrowly separated at costal margin; third and fourth bands narrowly joined at costal margin. The part of first basal cell contiguous to second basal cell banded at base anteriorly, the hyaline area contiguous to fourth vein sharply wedgelike to base of second basal cell. Section of fourth vein proximad of anterior crossvein with definite bend. Halteres dark brown.

Abdomen: Tergites shining, rugose, black. Disc of first tergite with pale setae. Genitalia (fig. 9,g) with apical part of aedeagus consisting of a laterally flattened base bearing on the dorsum a sharp-pointed, curved, apically directed horn and two filamentous terminal tubes which are little longer than length of basal part of aedeagus.

ALLOTYPE: Female. Body length 5.5 mm.; wing length 4.2 mm., width 1.7 mm. Front femora with inside almost wholly brownish yellow; middle tibiae wholly brownish yellow. Ovipositor sheath black. Otherwise similar to holotype.

PARATYPES: 128 males, 166 females. Body length of males 4.3–6.2 mm., of females 4.5–6.3 mm.; wing length of males 3.5–4.3 mm., of females 3.7–4.5 mm. In both sexes general body color varies from brown to black; also in both sexes sometimes all legs wholly yellow or brownish yellow. Otherwise similar to holotype or allotype.

SPECIMENS: Holotype, ♂, Sucker Lake, Ramsey County, Minn., June 18, R. Namba (UM). Allotype, ♀, same data as the holotype. Paratypes: GEORGIA: Atlanta (1 ♀, Aug. 10, 1932, P. W. Fattig); Hiawassee (1 ♂, June 16, 1945, P. W. Fattig). ILLINOIS: Champaign (1 ♀, June 22, 1888, Marten-Hart, "14505"; 2 ♀♀, July 2, 1890, Marten-Hart, "15784"); Galena (1 ♀, June 29, 1892, Hart-Shiga, "18377"); Monticello (1 ♀, July 2, 1914); Parker (1 ♀, June 4, 1913). IOWA: Boone County, Ledges State Park (1 ♀, July 17, 1951, Jean

Laffoon); Lake Amana (1 ♂, June 23, 1928, G. O. Hendrickson); Linn County, Palisades-Kepler State Park (1 ♀, July 7, 1950, Laffoon, Slater, Hicks). KANSAS: Douglas County (1 ♂, "900 ft.," May); Lawrence (3 ♂♂, 1 ♀) (1 ♀, 1 ♂, J. M. Aldrich). MICHIGAN: Detroit (1 ♂, June 11, 1938, G. Steyskal). MINNESOTA: Mississippi Bluff, one-half mile north of state line, Houston County (1 ♂, May 30, 1941); Ramsey County (1 ♂, June 16, 1951; 85 ♀♀, 70 ♂♂, June 20, 1951; 1 ♀, 1 ♂, June 20, 1951, on same pin; 2 ♀♀, 1 ♂, June 25, 1951; 2 ♀♀, 3 ♂♂, June 29, 1951; 2 ♀♀, 1 ♂, July 2, 1951; 2 ♀♀, 1 ♂, July 18, 1951, all collected by R. Namba); St. Anthony Park, Ramsey County (49 ♀♀, 34 ♂♂, June 18, 1952, R. Namba; 8 ♀♀, 4 ♂♂, June 26, 1952); University Farm, Ramsey County (1 ♂, July 4, 1951, R. Namba); South Minneiska, John Latsch State Park (1 ♀, May 31, 1951, R. Namba). MISSISSIPPI: Utica (1 ♂, Aug.). NEW YORK: Ithaca (2 ♀♀, 1 ♂, July 9, 1904); Lancaster (1 ♀, June 4, 1911, and 1 ♂, June 8, 1912, M. C. Van Duzee). QUEBEC: Abbotsford (1 ♀, June 11, 1936, and 1 ♀, Aug. 24, 1936, G. Shewell); Farnham (1 ♂, July 16, 1935, G. Shewell). (In UM, GS, CU, USNM, SEC, CAS, AMNH, ISC, INHS, EU, and SCW.)

REMARKS: This species can be distinguished from the other *Rivellia* by the presence of strong humeral and posterior dorsocentral setae, the sharp wedgelike hyaline area in the first basal cell, and the male genitalia.

The members of this species were found abundantly on *Apios americana* Medic.

This species is affectionately dedicated to my wife Winifred.

Rivellia variabilis Loew

FIGURE 9,a-d

Rivellia variabilis Loew, 1873, p. 91, pl. 8, fig. 6.—Hendel, 1914a, p. 181.—Cresson, 1924, p. 226.

TYPE LOCALITY: District of Columbia (MCZ).

MALES: Body length 4.2–6.0 mm., wing length 3.2–4.3 mm. Strong humeral setae present, posterior dorsocentral setae absent. Genitalia (fig. 9,c,d) with apical part of aedeagus consisting of an oblong base which from dorsal view has subparallel margins basally, converging little apically, from lateral view with dorsal margin angular, ventral margin relatively straight, and with two filamentous terminal tubes which are subequal in length to base. Otherwise, except for coloration, essentially similar to *R. winifredae*.

FEMALES: Body length 4.3–6.0 mm., wing length 3.5–4.6 mm.

VARIATIONS: As suggested by its name, this species is quite variable. The variation in general coloration is from yellow to pitch black.

Four general color forms can be separated. However, these categories are by no means distinctly delimited and individuals do exist which may be considered as intergrades between categories. Furthermore, there is no correlation between the color forms and their geographical distribution. The four color forms will be described separately here.

YELLOW FORM: Postcranium and thorax wholly yellowish. Legs yellow except for middle and hind tibiae which are sometimes brownish toward tip. Abdominal tergites vary from almost wholly yellow to almost wholly black.

SPECIMENS EXAMINED: GEORGIA (6 ♀ ♀, 2 ♂ ♂): Billy's Island (Okefenokee Swamp), Tifton; May 28–Aug. 11. FLORIDA (3 ♀ ♀, 1 ♂): Hillsborough County (Little Mantee River, U. S. Highway 41), Bradenton, Fort Myers; March 11–July 14. NORTH CAROLINA (2 ♀ ♀, 1 ♂): Raleigh, Everetts; June 11–Early August. NEW JERSEY (4 ♀ ♀, 1 ♂): Westfield, Anglesea, Elizabeth, Clementon; May 21–July 22. NEW YORK (1 ♀): Flushing; June 15. ILLINOIS (1 ♀): Cabin Boat (INHS); July 1.

YELLOW-BROWN FORM: Postcranium brown or dark brown. Mesonotum dark brown or black; pleura yellowish, sternopleuron sometimes brown. Legs yellowish except for middle and hind tibiae, which are brownish, and all tarsi, which are blackened toward tips. Abdominal tergites usually dark brown or black.

SPECIMENS EXAMINED: VIRGINIA (1 ♂): Great Falls; June 12. NEW YORK (8 ♀ ♀, 9 ♂ ♂): Babylon, Bronx, Maspeth, Riverhead, Mosholu, East Aurora, Orient, Oakdale; June 6–Aug. 12. MICHIGAN (1 ♀): Nottawa; Aug. 26.

BROWN FORM: Postcranium, thorax, and abdominal tergites concolorous, dark brown or black. Legs yellowish except for middle and hind tibiae which are brownish and all tarsi which are blackened toward tips.

SPECIMENS EXAMINED: GEORGIA (1 ♀, 1 ♂): Griffin; Aug. 12. NEW YORK (5 ♀ ♀, 2 ♂ ♂): Flushing, Babylon, East Aurora, Oakdale; June 3–July 22. NEW JERSEY (1 ♀): West Orange; Sept. MICHIGAN (1 ♀): Gratiot County; June 17.

BLACK FORM: Postcranium, thorax, and abdominal tergites concolorous, dark brown or black. Front legs: Coxae wholly yellow or with brown spot on outside at base; femora wholly yellow or yellow inside and black outside; tibiae blackish toward base, yellowish toward tip; tarsi yellow toward base, blackened toward tip. Middle and hind legs: Coxae, femora, and tibiae black; tarsi yellow toward base, blackened toward tip.

SPECIMENS EXAMINED: GEORGIA (2 ♀ ♀, 9 ♂ ♂): Atlanta, Griffin, Adel; May 21–Aug. 12. NORTH CAROLINA (4 ♀ ♀, 1 ♂): Raleigh,

Swannanoa; July 10–Aug. 16. VIRGINIA (2 ♀ ♀, 1 ♂): Great Falls; June 12. NEW JERSEY (1 ♀, 1 ♂): Westfield, West Orange; June 18–Sept. OHIO (1 ♀, 1 ♂): Summit County; June 19–28. PENNSYLVANIA (1 ♀): Lehigh Gap; July 9. NEW YORK (16 ♀ ♀, 12 ♂ ♂): Ithaca, Babylon, Mosholu, Bronx, Pocantico Hills, Flushing, Oleott, Buffalo; June 9–Aug. 5. MASSACHUSETTS (2 ♀ ♀, 5 ♂ ♂): East Gloucester, Boston, Woods Hole; June–Aug. 3. QUEBEC (2 ♀ ♀, 3 ♂ ♂): Abbotsford; Aug. 24. MICHIGAN (21 ♀ ♀, 15 ♂ ♂): East Lansing, Huron County, Ionia County, Midland County, Cheboygan County, Genesee County, Gratiot County, Deerfield Township (Lapeer County), Detroit, Hamburg, Douglas Lake, Mecosta County, Montcalm County, Muskegon County, Oakland County, Wexford County; June 11–July 15. ONTARIO (2 ♀ ♀, 1 ♂): Britannia, Leamington; June 10–July 23. MINNESOTA (1 ♀, 3 ♂ ♂): Sucker Lake, Ramsey County; June 18–20.

One character which separates this species from all other *Rivellia* is the presence of strong humeral setae and the absence of the posterior dorsocentral setae.

Rivellia cognata Cresson

FIGURE 10, *i-l*

Rivellia cognata Cresson, 1919, p. 191; 1924, p. 228.

TYPE LOCALITY: Swarthmore, Pa. (ANSP).

MALES: Body length 2.8–4.5 mm.

Head: Frons reddish brown or brown; upper fronto-orbital plates and ocellar triangle blackened. Face with dorsal half pruinose, ventral half shining, smooth, dark brown or almost black; parafacials and part of orbits ventral to each eye brownish yellow. Antenna with first and second segments brownish yellow; third segment with tip, outside, and anterior side of inside blackened, remainder yellow, the tip pointed anteriorly. Anteclypeus concolorous with ventral portion of face. Palpi brownish yellow or brown. Posteranium dark brown or black, pruinose.

Thorax: Mesonotum dark brown or blackish blue; strong humeral and posterior dorsocentral setae present. Scutellum and postscutellum concolorous with mesonotum. Pleura dark brown or black, mostly shining. Mesopleuron with scattered pale setae on posterior half; pruinose area at dorsal posterior corner in form of a right triangle, one side reaching two-thirds distance to ventral posterior corner and the other side reaching two-thirds distance to anterior spiracle. Sternopleuron with a narrow pruinose strip on ventral corner and a narrower strip on posterior margin; disc with few scattered pale setae. Disc of pteropleuron with scattered pale setae, black setae present or absent ventral to subalar. Hypopleuron with shining central spot, remainder

pruinose. Laterotergite completely and densely pruinose. Prosternum dark brown or black.

Thoracic appendages: Front legs: Coxae, femora, and tibiae yellow; tarsi blackened from fourth segment, remaining segments yellow. Middle legs: Coxae with brown spot on outside at base; femora and tibiae yellow; tarsi with fifth segment blackened, remaining segments yellow. Hind legs: Coxae and femora yellow; tibiae vary from brownish yellow to almost black; tarsi slightly blackened from fourth segment, remaining segments yellow.

Wing (fig. 10,*i*) length 2.4–3.4 mm. Bands black. First and second bands widely separated at costal margin; third and fourth bands joined at costal margin. Second band definitely oblique to costal margin. The part of first basal cell contiguous to second basal cell entirely hyaline or at most faintly banded basally. Section of fourth vein proximad of anterior crossvein with slight bend. Halteres yellowish brown or dark brown.

Abdomen: Tergites shining, rugose, brown or black. Disc of first tergite with pale setae. Genitalia (fig. 10,*k,l*) with apical part of aedeagus wedge-shaped, the two terminal tubes little longer than the base of apical part.

FEMALES: Body length 3.0–5.1 mm.; wing length 2.4–3.2 mm. Ovipositor sheath concolorous with abdomen. Otherwise similar to males.

SPECIMENS EXAMINED: DISTRICT OF COLUMBIA (2♀♀): Rock Creek; June 15. GEORGIA (1♀): Atlanta; June 8. ILLINOIS (4♀♀, 8♂♂): Algonquin; no date. INDIANA (3♀♀): La Fayette; July 3–12. IOWA (19♀♀, 10♂♂): Ames, County 3, County 64, County 76, Des Moines, Ledges State Park, Palisades-Kepler State Park, Sioux City; May 25–July 31. KANSAS (1♀): Douglas County; June. MARYLAND (4♀♀): Cabin John Br.; June 14–28. MICHIGAN (2♀♀, 1♂): Ionia County, Monroe; July 4–12. MINNESOTA (52♀♀, 29♂♂): St. Paul Water Works (Anoka County), Gray Cloud Island, Hammond, Mississippi Bluff one-half mile north of state line (Houston County), Owatonna, St. Anthony Park (Ramsey County), Sucker Lake, University Farm, Winona County; June 1–Aug. 3. MISSOURI (1♀): Shrewsbury (?); Aug. 6. NEBRASKA (1♀): No data. NEW JERSEY (2♀♀): Trenton; July 6. NEW YORK (9♀♀, 7♂♂): East Aurora, Flatbush, Irving, Ithaca, Lancaster, Rome; May 27–Aug. 19. NORTH CAROLINA (2♀♀): Valley of Black Mountains; July 10. OHIO (4♀♀, 1♂): Summit County; July 29–Aug. 11. PENNSYLVANIA (15♀♀, 7♂♂): Delaware County, Kempton, Manayunk, Philadelphia, Swarthmore; May 21–Aug. 13. RHODE ISLAND (1♂): Westerly; June 29. SOUTH DAKOTA (1♂): Brookings; no date. TENNESSEE (1♀): Clarksville; July 4. VIRGINIA (3♀♀): Great Falls, Rosslyn; June 3–25.

Rivellia vaga, new speciesFIGURE 1, *d-f*

HOLOTYPE: Male. Body length about 3.3 mm.

Head: Frons yellowish brown; upper fronto-orbital plates and ocellar triangle blackened. Face with dorsal half pruinose, ventral half shining, smooth, yellowish brown; parafacials and part of orbits ventral to each eye brownish yellow. Antenna with first and second segments yellow inside, blackened outside; third segment blackened at tip and on outside, remainder yellow, the tip pointed anteriorly. Anteclypeus dark brown. Palpi yellow. Posteranium black, pruinose.

Thorax: Mesonotum black; strong humeral and posterior dorso-central setae present. Scutellum and postscutellum concolorous with mesonotum. Pleura dark brown, mostly shining. Mesopleuron with scattered pale setae on posterior half; pruinose spot at dorsal posterior corner in form of rectangle, one side extending two-thirds distance to ventral posterior corner, the other side extending about half way to anterior spiracle. Sternopleuron with ventral corner pruinose; disc with few scattered pale setae. Disc of pteropleuron with few scattered pale setae, one black seta present ventral to subalar. Hypopleuron with small shining central spot, remainder pruinose. Laterotergite pruinose. Prosternum black.

Thoracic appendages: Legs wholly yellow except for fore tarsi which are blackened from third segment.

Wing (fig. 1, *d*) length 2.2 mm., width 0.9 mm. Bands dark brown. First and second bands separated at costal margin, slightly oblique to costal margin; first band does not enter discal cell, ends at fourth vein. Third band perpendicular to costal margin. Third and fourth bands very narrowly joined at costal margin; fourth band greatly broadened at tip of third vein. The part of first basal cell contiguous to second basal cell faintly banded at basal half. Section of fourth vein proximad of anterior crossvein with very slight bend. Halteres brownish yellow.

Abdomen: Tergites shining, slightly rugose; first three tergites brownish, remainder black. Disc of dorsum of first tergite with pale setae. Genitalia (fig. 1, *f*) with apical part of aedeagus consisting of a cone-shaped base bearing on the dorsum a blunt horn, and two filamentous terminal tubes which are subequal in length to basal part of aedeagus.

ALLOTYPE: Female. Body length about 3.6 mm.; wing length 2.5 mm., width 1.0 mm. Legs wholly yellow. Abdominal tergites dark brown except for two large yellowish lateral spots on second tergite and two smaller yellowish lateral spots on third tergite; ovipositor sheath dark brown. Otherwise similar to holotype.

PARATYPES: 73 males, 107 females. Body length of males 2.5–3.7 mm., of females 2.7–3.2 mm.; wing length of males 2.0–2.4 mm., of females 2.0–3.2 mm. Both sexes with thorax and abdominal tergites sometimes brown; tarsi of front legs sometimes wholly yellow; fourth band sometimes separated from third band at costal margin. Abdomen of males usually with first three tergites, sometimes fourth also, brownish yellow or yellowish brown; in females usually unicolorous, dark brown or black. Otherwise essentially similar to holotype or allotype.

SPECIMENS: Holotype, ♂, Elfers, Fla., July 14, 1939, D. E. Hardy (SEC). Allotype, ♀, same data as holotype. Paratypes: ALABAMA: Cowarts (1 ♀, Aug. 1–3, 1916, No. "Ac. 4898"); Elgin (1 ♀, July 6, 1939, A. T. Hardy; 1 ♀, July 6, 1939, D. E. Hardy); Garden City (1 ♀, July 7, 1939, A. T. Hardy; 2 ♂♂, July 7, 1939, R. H. Beamer; 1 ♂, July 7, 1939, P. B. Lawson); Montgomery (1 ♀, July 7, 1939, D. E. Hardy). CANADA: Watertown Lake Park, Alberta (2 ♂♂, July 26, 1946, C. E. Mickel). FLORIDA: Branford (1 ♀, Aug. 4, 1939, A. T. Hardy; 1 ♀, 1 ♂, Aug. 4, 1939, D. E. Hardy); Cedar Keys (2 ♀♀, 1 ♂, July 12, 1939, Oman; 1 ♀, July 12, 1939, R. H. Beamer; 5 ♀♀, 8 ♂♂, July 12, 1939, A. T. Hardy; 8 ♀♀, 4 ♂♂, July 12, 1939, J. D. Beamer; 3 ♀♀, July 12, 1939, P. B. Lawson; 3 ♀♀, 4 ♂♂, July 12, 1939, D. E. Hardy; 6 ♀♀, 1 ♂, Aug. 10, 1939, A. T. Hardy; 1 ♀, Aug. 10, 1939, D. E. Hardy); Coconut Grove (1 ♀, Aug. 9, 1930, J. Nottingham); Dunnellon (1 ♀, July 12, 1939, P. B. Lawson); Elfers (3 ♀♀, 1 ♂, July 14, 1939, D. E. Hardy); Gainesville (1 ♀, Sept. 26–Oct. 2, 1914); Hilliard (1 ♂, Aug. 19, 1930, R. H. Beamer; 1 ♂, July 24, 1939, D. E. Hardy; 1 ♀, 2 ♂♂, Aug. 6, 1939, R. H. Beamer); Hobe Sound (1 ♀, July 21, 1939, D. E. Hardy); Hudson (1 ♂, July 13, 1939, R. H. Beamer; 2 ♂♂, July 13, 1939, D. E. Hardy); Labelle (1 ♀, July 16, 1939, P. B. Lawson; 1 ♂, July 16, 1939, D. E. Hardy); Lacooshee (1 ♀, Aug. 9, 1939, D. E. Hardy); Marianna (1 ♀, Aug. 11–18, 1938, "Bishopp lot, Sabrosky No. B 959"); Miami (1 ♂, Nov. 5, 1911); Monticello (1 ♀, Oct. 4–8, 1914); New Smyrna Beach (2 ♀♀, June 6, 1942, D. G. Denning); Old Town (2 ♂♂, July 11, 1939, D. E. Hardy); Sanford (1 ♀, 1 ♂, Aug. 4, 1930, J. Nottingham; 5 ♀♀, Aug. 8, 1939, R. B. Beamer; 4 ♂♂, Aug. 8, 1939, A. T. Hardy); Suwanee Springs (1 ♀, 1 ♂, July 29, 1930, J. Nottingham; 1 ♀, Aug. 2–3, 1939, D. E. Hardy); Waldo (1 ♀, Aug. 18, 1930, J. Nottingham; 1 ♀, 1 ♂, Aug. 18, 1930, R. H. Beamer); Wakulla (1 ♀, July 10, 1939, R. H. Beamer; 5 ♀♀, 3 ♂♂, July 10, 1939, D. E. Hardy); Winter Park (1 ♂, May 26, 1937, R. Dow); Zolfo Springs (2 ♀♀, 2 ♂♂, July 15, 1939, D. E. Hardy; 2 ♀♀, July 15, 1939, A. T. Hardy). GEORGIA: (2 ♀♀, Cornell Univ. Lot 60, Sub. 31); Southern Georgia (1 ♂, Morrison); Adel

(2♂♂, Aug. 11, 1939, J. D. Beamer); Billy's Island, Okefenokee Swamp (1♂, June, 1912); Griffin (14♀♀, 8♂♂, Aug. 12, 1939, A. T. Hardy; 3♀♀, Aug. 12, 1939, J. D. Beamer; 3♀♀, 2♂♂, Aug. 12, 1939, R. H. Beamer; 4♀♀, 4♂♂, Aug. 12, 1939, E. G. Wegenek); Perry (1♂, Aug. 12, 1939, R. H. Beamer; 1♂, Aug. 12, 1939, D. E. Hardy); Tifton (1♀, Sept. 3, 1896, W. M. Wheeler; 1♀, Aug. 11, 1939, D. E. Hardy). IOWA: Mount Pleasant (1♀, June 5, 1940, H. Knutson). KANSAS: Lawrence (1♂, Aug. 22, 1939, D. E. Hardy); Sedgwick County (1♂, 1916, "1,291 ft.," R. H. Beamer). LOUISIANA: Red River Park (1♀, Aug. 17, 1928, E. I. Beamer). NORTH CAROLINA: Asheville (1♀, Aug. 1, 1933, Wray); Franklin (2♀♀, Aug. 17, 1939, D. E. Hardy); Goldsboro (1♂, July 20, 1946, M. W. Wing); Lumberton (1♂, June 22, 1928, T. B. Mitchell); Raleigh (1♀, early August, 1912, C. L. Metcalf). SOUTH CAROLINA: Fairfax (1♀, June 5, 1933, E. W. Howe). TEXAS: Galveston (2♀♀, June 5, 1900, W. M. Wheeler). (In SEC, NC, UM, USNM, AMNH, CU, and CWS.)

REMARKS: This species is closely related to *R. maculosa*, from which it can be distinguished by the male genitalia and full banding of the wings. Frequently in this species (especially males) the anterior tergites of the abdomen are yellowish, whereas in *R. maculosa* the abdominal tergites are wholly dark brown or black.

Rivellia texana, new species

FIGURE 5, f-i

HOLOTYPE: Male. Body length about 3.6 mm.

Head: Frons brown, somewhat yellowish toward antenna; upper fronto-orbital plates and ocellar triangle little darker than frons. Face with dorsal half pruinose, ventral half shining, smooth, brown; parafacials and part of orbits ventral to each eye brownish yellow. Antenna with first and second segments yellow; third segment blackened at tip and on outside, remainder yellow, the tip pointed anteriorly. Anteclypeus concolorous with ventral portion of face. Palpi yellow. Posteranium dark brown, pruinose.

Thorax: Mesonotum dark brown; strong humeral and posterior dorsocentral setae present. Scutellum and postscutellum concolorous with mesonotum. Pleura dark brown, mostly shining. Mesopleuron with scattered pale setae on posterior half; pruinose area at dorsal posterior corner in form of rectangle, one side extending two-thirds distance to ventral posterior corner, the other extending about half way to anterior spiracle. Sternopleuron with pruinose spot covering

ventral corner, a pruinose medial band extending from this spot to dorsal margin of sternopleuron; disc with few scattered pale setae. Disc of pteropleuron with few scattered pale setae, one black seta present ventral to subalar. Hypopleuron with small shining central spot, remainder pruinose. Laterotergite completely and densely pruinose. Prosternum dark brown.

Thoracic appendages: Legs wholly yellow.

Wing (fig. 5,f) length 2.4 mm. Bands dark brown. First and second bands separated at costal margin, slightly oblique to costal margin; first band does not enter discal cell, ends at fourth vein. Third band perpendicular to costal margin, broadened at third vein. Fourth band consists of spot at tip of third vein, not connected to third band. The part of first basal cell contiguous to second basal cell very faintly banded at basal half. Section of fourth vein proximad of anterior crossvein with very slight bend. Halteres brown.

Abdomen: Tergites shining, slightly rugose, black. Disc of first tergite with pale setae. Genitalia (fig. 5,h,i) with apical part of aedeagus bearing a horn on dorsum of base, a flattened finlike structure laterally on each side of base, and two short filamentous terminal tubes.

ALLOTYPE: Female. Body length about 3.9 mm.; wing length 3.0 mm., width 1.7 mm. Frons brownish yellow. Hind tibiae brownish yellow. Front tarsi blackened slightly from third segment, hind tarsi with fifth segment slightly blackened. Third band of wing not broadened conspicuously at third vein. Abdominal tergites and ovipositor sheath dark brown. Otherwise similar to holotype.

PARATYPES: 24 males, 14 females. Body length, males and females, 3.2–4.2 mm.; wing length, males 2.4–3.0 mm., females 2.4–3.3 mm. In both sexes thorax and abdominal tergites sometimes black; sternopleuron sometimes without medial pruinose band; fourth band sometimes narrowly joined to third band at costal margin. Otherwise essentially similar to holotype or allotype.

SPECIMENS: Holotype, ♂, College Station, Tex., Apr. 21, 1943, H. J. Reinhard (TAM). Allotype, ♀, same data as holotype. Paratypes: ARKANSAS: Fayetteville (1 ♂, June 22, 1907). TEXAS: College Station (2 ♂♂, May 14, 1923; 1 ♂, May 3, 1931; 4 ♀♀, 4 ♂♂, Apr. 21, 1932; 2 ♀♀, 5 ♂♂, May 1, 1932; 1 ♂, Apr. 13, 1943; 5 ♀♀, 6 ♂♂, Apr. 21, 1943; 1 ♂, Apr. 30, 1943; 1 ♀, May 1, 1947; 1 ♀, May 7, 1947; 2 ♂♂, May 15, 1947; 1 ♀, 1 ♂, May 11, 1947, on same pin; all collected by H. J. Reinhard). (Deposited in TAM, CU, USNM, and UM.)

REMARKS: This species appears to be related to *R. maculosa* and *R. vaga*. Its full wing banding, which is similar to that of *R. vaga*,

easily distinguishes it from *R. maculosa*. The males of *R. texana* can be easily distinguished from those of *R. vaga* by the genitalia. The notable difference is the presence in *R. texana* and the absence in *R. vaga* of lateral finlike structures on the apical part of the aedeagus. I am not able to separate the females of these two species in all cases. *R. texana* females are generally larger, the fourth band of the wings usually is not connected to the third band at the costal margin, the sternopleuron usually with a medial pruinose band, and the abdominal tergites are dark brown or black. *R. vaga* females are usually smaller, the fourth band of wing is usually narrowly connected to the third band at costal margin, sternopleuron without medial pruinose band, and abdominal tergites sometimes yellowish anteriorly.

Rivellia micans Loew

FIGURE 10, a-d

Rivellia micans Loew, 1873, p. 94—Van Der Wulp, 1898, p. 382, pl. 10, fig. 9.—Hendel, 1914a, p. 181.—Cresson, 1924, p. 228.

TYPE LOCALITY: Texas (MCZ).

MALES: Body length 3.1–5.0 mm.

Head: Frons reddish brown or yellowish brown; upper fronto-orbital plates and ocellar triangle blackened. Face with dorsal half pruinose, ventral half shining, smooth, brown or dark brown medioventrally, with brownish yellow lateral strip on each side which terminates just before oral margin; parafacials and part of orbits ventral to each eye brownish yellow. Antenna with first and second segments yellow; third segment with tip, outside, and anterior side of inside blackened, remainder yellow, the tip pointed anteriorly. Anteclypeus concolorous with medioventral portion of face. Palpi brown with yellow borders or wholly brownish yellow. Posteranium blackish green, pruinose.

Thorax: Mesonotum blackish green; strong humeral and posterior dorsocentral setae present. Scutellum and postscutellum concolorous with mesonotum. Pleura dark brown or blackish green, mostly shining. Mesopleuron with scattered pale setae on posterior half; pruinose area at dorsal posterior corner in form of a right triangle, one side reaching halfway to ventral posterior corner and the other side reaching halfway to anterior spiracle. Sternopleuron with ventral corner and very narrow strip on posterior margin pruinose; disc with scattered pale setae. Disc of pteropleuron with scattered pale setae, black setae present or absent ventral to subalar. Hypopleuron with shining central spot, remainder pruinose. Laterotergite completely and densely pruinose. Prosternum black.

Thoracic appendages: Front Legs: Coxae, femora, and tibiae yellow; tarsi slightly blackened from second segment or from tip of first segment, remaining segments yellow. Middle legs: Coxae brown; femora and tibiae yellow; tarsi wholly yellow or slightly blackened from fourth segment. Hind legs: Coxae yellowish brown; femora yellow; tibiae yellow or brown; tarsi wholly yellow or blackened from third segment.

Wing (fig. 10,*a*) length 2.6–3.6 mm. Bands dark brown. First and second bands widely separated at costal margin; third and fourth bands joined at costal margin, fourth band narrow, about as broad as third band. Second band appears almost perpendicular to costal margin. The part of first basal cell contiguous to second basal cell wholly banded, with semicircular hyaline spot anterior to apex of second basal cell, or faintly banded at base. Section of fourth vein proximad of anterior crossvein with bend. Halteres yellowish brown or brown.

Abdomen: Tergites shining, rugose, wholly blackish green, wholly brownish yellow, or anterior tergites yellowish and posterior tergites blackish, the extent of each color rather variable. Disc of first tergite with pale setae. Genitalia (fig. 10,*c,d*) with apical part of aedeagus consisting of a bulbous base and two filamentous terminal tubes which are at least as long as the bulbous base.

FEMALES: Body length 3.5–5.0 mm.; wing length 2.5–3.8 mm. Pruinose triangle on mesopleuron more distinct. Abdominal tergites usually unicolorous, blackish green; if bicolorous, yellowish color extends to posterior margin of third tergite. Otherwise similar to males.

SPECIMENS EXAMINED: ARIZONA (25♀♀, 25♂♂): Chiricahua Mts. (Rustler Park), Huachuca Mts. (Sunnyside Canyon), Lakeside, Santa Rita Mts.; Apr. 7–Aug. 7. CALIFORNIA (9♀♀, 13♂♂): Bishop, Boulevard, Jacumba; July 5–28. COLORADO (1♂): Lyons; July 9. ILLINOIS (2♂♂): Metropolis, Olney; May 29–Aug. 5. IOWA (1♀, 8♂♂): Ames, 8 miles southeast of Britt, County 3, Des Moines (Polk County), 7 miles northwest of Thompson, Sioux City (South Ravine), 5 miles south of Stanhope; June 15–Aug. 25. KANSAS (12♀♀, 39♂♂): Clark County, Coffey County, Cowley County, Douglas County, Cove County, Harper County, Hodgeman County, Inman, Lyons County, Manhattan, McPherson County, Medora Sand Dunes, Miami County, Montgomery County, Ottawa County, Saline County, Sedgwick County, Stark; May 22–Aug. 31. MONTANA (1♀): No data. NEBRASKA (1♀): No data. NEW MEXICO (1♀, 3♂♂): Albuquerque, Las Cruces; June 4–July 3. SOUTH

DAKOTA (1♀, 1♂): Elk Point, 3 miles south of Jefferson; June 11-20. TEXAS (1♂): Glen Rose; May 19.

REMARKS: This species is closely related to *R. severini*.

Rivellia severini Blanton

FIGURE 10,c-h

Rivellia severini Blanton, 1937, p. 139, fig. 1.

TYPE LOCALITY: Winner, S. Dak. (USNM 51444).

MALES: Body length 3.5-5.0 mm. Wing (fig. 10,e) length 2.6-3.5 mm. Fourth band broad, width at tip of third vein equal to or longer than length of posterior crossvein. Hind tibiae brown to almost black. Genitalia (fig. 10,g,h) with apical part of aedeagus consisting of a bulbous base and two filamentous terminal tubes which are definitely shorter than length of bulbous base. Otherwise similar to *R. micans*.

FEMALES: Body length 3.8-4.7 mm., wing length 2.8-3.5 mm.

SPECIMENS EXAMINED: COLORADO (7♀♀, 13♂♂): Las Animas, Lyons, Maybell, Valmont (White Rocks); June 17-July 9. IDAHO (2♀♀, 3♂♂): Bliss, Burley; June 6-July 7. IOWA (13♀♀, 5♂♂): County 3; June 15-July 3. KANSAS (1♀, 1♂): Douglas County, Hamilton County; no date. MANITOBA (8♀♀, 4♂♂): Aweme; July 1-28. NEBRASKA (4♀♀, 2♂♂): Valentine; June 9-11. SOUTH DAKOTA (5♀♀, 8♂♂): Brookings, Canton, Elk Point, Lake Andes, Newell, Winner; June 12-July 4. UTAH (2♀♀, 4♂♂): Antimony, Hooper, Midvale, Provo, Spanish Fork, Woods Cross; June 10-Aug. 1. WYOMING (4♀♀, 8♂♂): Bull Lake, Laramie, Little Wing, Lusk, Sage Creek; July-Sept. 4.

REMARKS: This species is closely related to *R. micans*, from which it can be distinguished by the broader fourth band, usually darker hind tibiae, and the shorter terminal tubes of the apical part of the aedeagus.

Rivellia flavimana Loew

FIGURE 4,i,j

Rivellia flavimana Loew, 1873, p. 92, pl. 8, fig. 7.—Hendel, 1914a, p. 177.—Cresson, 1924, p. 227.

TYPE LOCALITY: Nebraska (MCZ).

Body length, males, 3.0-4.8 mm.; females, 3.5-5.0 mm.

Head and thorax: Similar to *R. metallica*.

Thoracic appendages: Front legs: Coxae, femora, and tibiae yellow; tarsi blackened from third or fourth segment, remaining segments yellow. Middle legs: Coxae black; femora yellowish at extreme tip, remainder black; tibiae slightly blackened at base, yellowish toward tip; tarsi wholly yellow or only fifth segment slightly

blackened. Hind legs: Coxae black; femora and tibiae yellowish at extreme tip, remainder black; tarsi blackened from fourth segment, remaining segments yellow.

Wing (fig. 4,*i*) length: Males 2.5–3.4 mm., females 2.6–3.4 mm. Bands dark brown or black, not as narrow as those of *R. metallica*. First and second bands narrowly separated at costal margin; third and fourth bands narrowly joined at costal margin. Costal cell banded; the part of first basal cell contiguous to second basal cell completely hyaline or at most very faintly banded basally. Section of fourth vein proximad of anterior crossvein with slight bend.

Abdomen: Tergites rugose; otherwise similar to those of *R. metallica*. Aedeagus similar to that of *R. metallica*; however, apices of surstyli (fig. 4,*j*) different in shape from lateral view. Ovipositor sheath concolorous with abdominal tergites.

SPECIMENS EXAMINED: CONNECTICUT (1♂): AVON; June 21. ILLINOIS (4♀♀, 7♂♂): ALGONQUIN, no date; Monticello, June 21. IOWA (5♀♀): AMES, Britt, County 3; May 31–June 19. MANITOBA (1♀, 2♂♂): AWEME, Dauphin, Holland; June 18–July 14. MICHIGAN (36♀♀, 26♂♂): Bay County, Cheboygan County, Clinton County, Detroit, East Lansing, Grand Rapids, Gratiot County, Ionia County, Lapeer County, Midland County, Monroe, Nottawa, Rose Lake, Saginaw County; May 21–Aug. 13. MINNESOTA (388♀♀, 223♂♂): ANOKA County, Chisago County, Cushing (Fish Trap Lake), Fort Snelling, Highway 26, 3 miles northeast of Eitzen (Houston County), Highway 26, 3 miles north of Hokah (Houston County), Mississippi Bluff, one-half mile north of state line (Houston County), Itasca State Park, Kanabec County, Kittson County, Lake Minnetonka, Lake Vadnais, Laporte, Middle River, Norman County, Olmstead County, mouth of Snake River (Pine County), Plummer, Oak Forest, Snail Lake, St. Anthony Park, Sucker Lake, University Farm, Washington County, White Bear; Mar. 9–Aug. 9. NEW HAMPSHIRE (1♂): Center Harbor; July. NEW JERSEY (4♀♀): Brookside (Morris County), Newfoundland, Ramsey; May 28–July 6. NEW YORK (19♀♀, 10♂♂): Canajoharie, Charlotte, Flatbush (Long Island), Ithaca, Jamaica (Long Island), Lancaster, Mosholu, Pocantico Hills, Rome, Tuxedo (Station for Study of Insects); May 30–July 15. OHIO (1♂): Summit County; June 9. ONTARIO (27♀♀, 21♂♂): Ancaster, Centreville, Gananoque, Jordan, Normandale, Orillia, Ottawa, Simcoe, Tillsonburg, Toronto, Vineland; June 7–July 22. QUEBEC (42♀♀, 22♂♂): Abbotsford, Aylmer (Queens Park), Chambly County, Fairy Lake, Hull, Ile de Montreal, Missisquoi Bay, Rouville County, St. Johns County, Wakefield; May 1–Aug. 24. SOUTH DAKOTA (1♂): Brookings.

REMARKS: Members of this species are abundantly found on hog-peanut (*Amphicarpa bracteata* (L.) Fernald).

Rivellia michiganensis, new species

FIGURE 4,*a-d*

HOLOTYPE: Male. Body length about 4.0 mm.

Head: Frons dark reddish brown; upper fronto-orbital plates and ocellar triangle black. Face with dorsal half pruinose, ventral half shining, smooth, black; parafacials and part of orbits ventral to each eye brownish yellow. Antenna long, definitely surpassing oral margin; with first and second segments yellowish brown; third segment almost entirely black, only a narrow posterior strip on inside brownish yellow, the tip rounded, from lateral view somewhat constricted before tip. Anteclypeus black. Palpi brown. Postcranium black, pruinose.

Thorax: Mesonotum black; strong humeral and posterior dorsocentral setae present. Scutellum and postscutellum concolorous with mesonotum. Pleura black, mostly shining. Mesopleuron with scattered pale setae on posterior half; pruinose area at dorsal posterior corner in form of right triangle, one side reaching two-thirds distance to ventral posterior corner and the other side reaching two-thirds distance to anterior spiracle. Sternopleuron with narrow pruinose strip on ventral margin and a narrower strip on posterior margin; disc with scattered pale setae. Disc of pteropleuron with scattered pale setae, one black seta present ventral to subalar. Hypopleuron with disc shining, borders narrowly pruinose. Laterotergite completely and densely pruinose. The prosternum cannot be seen in the type.

Thoracic appendages: Front legs: Wholly yellow. Middle legs: Coxae and femora black; tibiae with somewhat less than basal half black, remainder yellowish; tarsi yellow. Hind legs: Coxae, femora, and tibiae black; tarsi yellow.

Wing (fig. 4,*a*) length 2.9 mm., width 1.4 mm. Bands black. First and second bands widely separated at costal margin; third and fourth bands definitely separated at costal margin. Fourth band broad, width at tip of third vein subequal to length of posterior crossvein. The part of first basal cell contiguous to second basal cell completely hyaline. Section of fourth vein proximad of anterior crossvein with slight bend. Halteres with pedicel brownish yellow, capitulum dark brown.

Abdomen: Tergites shining, rugose, black. Disc of first tergite with pale setae. Genitalia (fig. 4,*c,d*) with apical part of aedeagus consisting of, from lateral view, a heart-shaped base and two filamentous terminal tubes which are subequal in length to length of basal

part of aedeagus. The apical part not appressed to basal part of aedeagus.

PARATYPE: Male. Body length about 3.5 mm.; wing length 2.5 mm. This specimen is covered with glue, but enough can be seen (including aedeagus) to show that it is conspecific with the holotype.

SPECIMENS: Holotype, ♂, Midland County, Mich., June 23, 1950, R. R. Dreisbach (USNM 61918). Paratype: MICHIGAN: Midland County (1 ♂, June 25, 1950, R. R. Dreisbach, RRD).

REMARKS: This species appears to be related to *R. flavimana*, from which the males can be distinguished by the elongated and round-tipped third segment of the antenna, broad fourth band of the wings, and the male genitalia.

Rivellia melliginis (Fitch)

FIGURE 5, a-c

Tephritis melliginis Fitch, 1855, p. 65.

TYPE LOCALITY: New York (USNM).

MALES: Body length 4.0–6.0 mm.

Head: Frons brown to reddish brown; upper fronto-orbital plates and ocellar triangle blackened. Face with dorsal half pruinose, ventral half shining, smooth, dark brown or black medioventrally, with brownish yellow lateral strip on each side which terminates just before oral margin; parafacials and part of orbits ventral to each eye brownish yellow. Antenna with first and second segments yellow or brownish yellow; third segment with tip and outside blackened, remainder yellow, the tip pointed anteriorly. Anteclypeus concolorous with medioventral portion of face. Palpi brown or black, sometimes yellowish at base. Posteranium blackish blue, pruinose.

Thorax: Mesonotum blackish blue; strong humeral and posterior dorsocentral setae present. Scutellum and postscutellum concolorous with mesonotum. Pleura blackish blue, mostly shining. Mesopleuron with scattered pale setae on posterior half; pruinose area at dorsal posterior corner in form of right triangle, one side reaching half way to ventral posterior corner and the other side reaching half way to anterior spiracle. Sternopleuron with narrow pruinose strip on ventral margin and a much narrower strip on posterior margin; disc with few scattered pale setae. Disc of pteropleuron with scattered pale setae, one or two black setae present ventral to subalar. Hypopleuron with shining central spot, remainder pruinose. Laterotergite completely and densely pruinose. Prosternum black.

Thoracic appendages: Front legs: Coxae dark brown or black, sometimes yellowish toward tip; femora black with extreme tip yel-

lowish; tibiae black basally, yellowish toward tip; tarsi blackened from second segment, remaining segments yellow. Middle legs: Coxae black; femora black, extreme tip sometimes yellowish; tibiae black, sometimes yellowish toward tip; tarsi blackened from third segment, remaining segments yellow. Hind legs: Coxae, femora, and tibiae black; tarsi blackened from third segment, remaining segments yellow.

Wing (fig. 5,*a*) length 3.4–4.0 mm. Bands black. First and second bands separated at costal margin; third and fourth bands narrowly joined at costal margin. The part of first basal cell contiguous to second basal cell with basal two-thirds banded, with semi-circular hyaline spot anterior to apex of second basal cell. Section of fourth vein proximad of anterior crossvein with definite bend. Halteres yellowish brown.

Abdomen: Tergites shining, rugose, blackish blue. Disc of first tergite with pale setae. Genitalia (fig. 5,*c*) with apical part of aedeagus consisting of a bulbous base and two long filamentous terminal tubes about three times the length of basal part of aedeagus; cerci extend beyond proctiger by about the length of proctiger.

FEMALES: Since I cannot distinguish between the females of this species and *R. viridulans*, only females collected by me in the same local population at the same time with the males of this species are considered: Body length 4.0–5.5 mm.; wing length 3.6–4.4 mm.; ovipositor sheath black. Otherwise similar to males.

SPECIMENS EXAMINED: DISTRICT OF COLUMBIA (1♂): Anacostia; May 13. GEORGIA (2♂♂): Neel Gap (Yonah Mountain); June 5–10. ILLINOIS (2♂♂): Meredosia; May 28. IOWA (2♂♂): Ames, Ledges State Park; May 26–June 19. MICHIGAN (1♀, 3♂♂): Mendon, Nottawa, northwestern Branch County, Leelanau County, Muskegon County; May 28–Aug. 2. MINNESOTA (12♀♀, 13♂♂): Olmsted County, St. Paul (University Farm); May 26–June 29. NEW JERSEY (5♂♂): Alpine, Trenton, Wenonah; June 8–24. NEW YORK (42♂♂): Babylon (Long Island), Cold Spring Harbor (Long Island), Gowanda, Ithaca, Pelham; May 27–June 30. OHIO (2♂♂): Summit County; June 23–28. ONTARIO (2♂♂): Prescott, Walsh; July 1–6. PENNSYLVANIA (1♂): Benvenuto; June 4. SOUTH CAROLINA (1♂): Rocky Bottom (Pickens County); June 1. WISCONSIN (1♂): Madison; July 27.

REMARKS: Asa Fitch (1855) vividly described the activity of the adults of this species on apple, particularly its feeding activity on the "honey dew" exuded by the "apple plant lice."

All specimens of this species collected by me were found on black locust (*Robinia pseudo-acacia* L.). One female was observed ovi-

positing in a dried-up flower. The eggs are milky white in color and oblong (length about 1.4 mm., width 0.5 mm.) with round ends. Subsequent investigations disclosed no further ovipositing activity and no eggs. No larvae were discovered.

Rivellia viridulans Robineau Desvoidy

FIGURE 5,*d,e*

Rivellia viridulans Robineau Desvoidy, 1830, p. 729.—Loew, 1873, p. 88, pl. 8. fig. 4.—Hendel, 1914a, p. 181.—Cresson, 1924, p. 226.

TYPE LOCALITY: North America. (The type "détruits définitivement," according to E. Séguy, in litt.)

MALES: Body length 3.6–5.7 mm.; wing length 2.6–4.0 mm. Genitalia (fig. 5,*e*) with apical part of aedeagus consisting of a bulbous base and two long filamentous terminal tubes which are about one and a half times the length of basal part of aedeagus; cerci barely extend beyond proctiger. Otherwise similar to *R. melliginis*.

SPECIMENS EXAMINED: GEORGIA (1 ♂): Yonah Mountain; June 10. ILLINOIS (1 ♂): Algonquin; no date. IOWA (1 ♂): Polk City (4 miles northeast of Alleman); June. MASSACHUSETTS (1 ♂): Woods Hole; July 12. MISSISSIPPI (1 ♂): Oxford; May. MISSOURI (1 ♂): Parkville; June 25. NEW JERSEY (1 ♂): Ramsey; July 6. NEW YORK (64 ♂♂): Babylon (Long Island), Cold Spring Harbor (Long Island), Dix Hills (Long Island), East Queens, Farmingdale (Long Island), Flushing, Islip (Long Island); May 15–Aug. 15. NORTH CAROLINA (5 ♂♂): Fayetteville, Hendersonville, Raleigh, Valley of Black Mountains; June 12–July 17. OHIO (6 ♂♂): Summit County; June 19–28. VIRGINIA (2 ♂♂): Dixie Landing, Shenandoah National Park; May 25–June 20.

REMARKS: This species is very closely related to *R. melliginis*. The males of the two species can be separated by the difference in lengths of the terminal tubes of the aedeagus, and the extent by which the cerci extend beyond the proctiger. The terminal tubes in *R. viridulans* are about one and a half times and in *R. melliginis* about three times the length of the basal part of the aedeagus. In *R. viridulans* the cerci barely extend beyond the proctiger, whereas in *R. melliginis* they extend beyond the proctiger by about the length of the proctiger. I am unable to separate the females of these species.

In the past *R. melliginis* has been confused with this species. I have seen the type of *R. melliginis* and consider it a distinct species. Mr. E. Séguy has kindly informed me that the type of *R. viridulans* is "détruits définitivement." The original description of *R. viridulans* offers no information which will permit separation of these two species. Since, however, the species considered here is more common than

R. melliginis, it will be regarded as *R. viridulans*. Moreover, inasmuch as these two species cannot be separated, as far as I can determine, without examination of the male genitalia and since there is no indication of such examination, previous citations of *R. viridulans* other than the original may be referable to either *R. melliginis* or *R. viridulans*.

Ortalis otroeda Walker, *O. quadrifasciata* Walker, *O. bipars* Walker, and *Herina rufitarsis* Macquart have been considered synonyms of *R. viridulans* by previous workers. I have not seen the types of the aforementioned species and therefore cannot validate these synonyms.

***Rivellia inaequata*, new species**

FIGURE 3,*i-l*

HOLOTYPE: Male. Body length 5.0 mm.

Head: Frons yellowish brown; upper fronto-orbital plates concolorous with frons, ocellar triangle slightly blackened. Face with little less than dorsal half pruinose, remainder shining, smooth, pale brownish yellow; parafacials and part of orbits ventral to each eye brownish yellow. Antenna with first and second segments yellow; third segment with base yellow, remainder slightly blackened, the tip pointed anteriorly. Anteclypeus concolorous with ventral portion of face. Palpi yellow. Posteranium brownish yellow, lightly pruinose.

Thorax: Mesonotum brownish yellow; strong humeral setae absent, posterior dorsocentral setae present. Scutellum and post-scutellum concolorous with mesonotum. Pleura concolorous with mesonotum, mostly shining, pruinosity obscure except on sternopleuron and laterotergite. Mesopleuron with scattered pale setae on posterior half. Sternopleuron with narrow pruinose strip on ventral margin, a narrower strip on posterior margin; disc with scattered pale setae. Pteropleuron with scattered pale setae on disc, few black setae present ventral to subalar. Laterotergite pruinose on ventral one-third. Prosternum yellow.

Thoracic appendages: Front legs: Coxae, femora, and tibiae yellow; tarsi blackened from tip of first segment, remainder of first segment yellow. Middle legs: Coxae brownish yellow; femora and tibiae yellow; tarsi blackened from third segment, remaining segments yellow. Hind legs: Coxae yellow; femora yellow; tibiae brownish yellow; tarsi blackened from second segment, remaining segments yellow.

Wing (fig. 3,*i*) length 3.2 mm., width 1.2 mm. Bands dark brown. First and second bands joined at costal margin; third and fourth bands joined at costal margin. The part of first basal cell contiguous

to second basal cell banded on about basal two-thirds, apical one-third hyaline, this hyaline area wedgelike basally. Section of fourth vein proximad of anterior crossvein with definite bend. Halteres yellowish brown.

Abdomen: Tergites shining, rugose. First, second, and third tergites brownish yellow, remaining tergites reddish black. Disc of first tergite with pale setae. Genitalia (fig. 3,*k,l*) with apical part of aedeagus with a bulbous base, which bears on the dorsum a stout horn on the left and a nodule on the right side. Attached terminally to this bulbous base is a dorsoventrally flattened oblong plate which bears at the apex two short diverging tubes.

ALLOTYPE: Female. Body length 5.0 mm.; wing length 3.5 mm., width 1.5 mm. Middle and hind coxae yellow. First two tergites of abdomen yellowish brown, except for posterior border of second tergite, remaining tergites reddish black; ovipositor sheath reddish black. Otherwise similar to holotype.

PARATYPES: 41 males, 33 females. Body length of males 4.3–5.4 mm., of females 4.0–6.0 mm.; wing length of males 3.0–3.5 mm., of females 3.2–4.0 mm. Sometimes abdominal tergites wholly brownish yellow. Otherwise essentially similar to holotype or allotype.

SPECIMENS: Holotype, ♂, Cedar Keys, Fla., Aug. 10, 1939, A. T. Hardy (SEC). Allotype, ♀, Labelle, Fla., July 16, 1939, A. T. Hardy (SEC). Paratypes: FLORIDA: (1 ♀, 1 ♂; 1 ♀ July 1882, Witfeld); Biscayne Bay (1 ♀); Bradenton (2 ♀ ♀, 2 ♂ ♂, March, M. C. Van Duzee); Cedar Keys (2 ♀ ♀, 2 ♂ ♂, July 12, 1939, D. E. Hardy; 1 ♀, 3 ♂ ♂, July 12, 1939, A. T. Hardy; 1 ♂, July 12, 1939, P. B. Lawson; 1 ♀, July 12, 1939, J. D. Beamer; 2 ♀ ♀, July 12, 1939, R. H. Beamer; 1 ♀, Aug. 10, 1939, A. T. Hardy; 1 ♂, Aug. 10, 1939, J. D. Beamer); Clearwater (1 ♀, Apr. 29, 1908, M. C. Van Duzee); De Land (1 ♀, 1 ♂, Aug. 8, 1939, D. E. Hardy); Elfers (2 ♂ ♂, July 14, 1939, D. E. Hardy); Labelle (2 ♀ ♀, July 16, 1939, D. E. Hardy); Miami (1 ♂, May 18, 1924, and 1 ♂, Aug. 2, 1924, S. Graenicher); New Smyrna Beach (1 ♀ June 6, 1942, D. G. Denning); Orange City (1 ♀, Apr. 22, 1928, C. O. Bare); Sanford (1 ♀, 1 ♂, April, 1926); South Miami (1 ♂, Aug. 29, 1949, Link-McPhail; 1 ♀, 5 ♂ ♂, Aug. 29, 1949, Link-Calkins); St. Petersburg (5 ♀ ♀, 2 ♂ ♂, Apr. 28, 1908, M. C. Van Duzee); West Palm Beach (1 ♂, June 11, 1941, L. W. Hepner); 25 miles west of Miami (2 ♂ ♂, July 22, 1934, R. H. Beamer). GEORGIA: (1 ♀; 3 ♀ ♀, CU Lot 35); Southern Georgia (2 ♀ ♀, 3 ♂ ♂, Morrison); Tybee Island (1 ♀, 2 ♂ ♂, July 26, 1913). LOUISIANA: Opelousas (1 ♀, April 1897). NEW JERSEY: Cape May (1 ♀, Sept. 8, 1932; 1 ♀, 1 ♂, July 24, 1936; 1 ♂, June 24, 1933; 1 ♂, Aug. 30, 1933; 3 ♂ ♂, July 13, 1933; 1 ♂, Aug. 24, 1932; 1 ♂, Aug. 12, 1935; 1 ♂, Aug.

16, 1938; 1 ♂, Aug. 9, 1933; 1 ♂, July 27, 1933; 2 ♂♂, Aug. 14, 1934; all collected by W. Stone). SOUTH CAROLINA: Manning (1 ♀, May 29, 1930, W. Stone). TEXAS: Victoria (1 ♀, June 1924, J. D. Mitchell). VIRGINIA: (1 ♂, Aug. 20, 1882). (In SEC, NC, CU, CAS, AMNH, USNM, CAN, UM, and ANSP.)

REMARKS: This species can be distinguished from the other *Rivellia* by the absence of the humeral setae, yellowish color of the head and thorax, and the male genitalia.

Rivellia steyskali, new species

FIGURE 4, *k-n*

HOLOTYPE: Male: Body length about 4.2 mm.

Head: Frons brown, upper fronto-orbital plates and ocellar triangle black. Face with dorsal half pruinose, ventral half shining, smooth, dark brown; parafacials and part of orbits ventral to each eye brownish yellow. Antenna with first and second segments yellow; third segment with tip and outside blackened, remainder yellow, the tip pointed anteriorly. Anteclypeus concolorous with ventral portion of face. Palpi dark brown. Postcranium black, pruinose.

Thorax: Mesonotum black; strong humeral setae absent, posterior dorsocentral setae present. Scutellum and postscutellum concolorous with mesonotum. Pleura black, mostly shining. Mesopleuron with scattered pale setae on posterior half; pruinose area at dorsal posterior corner in form of right triangle, one side reaching ventral posterior corner, the other side almost attaining anterior spiracle. Sternopleuron with narrow pruinose strip on ventral margin and a much narrower pruinose strip on posterior margin; disc with scattered pale setae. Disc of pteropleuron with scattered pale setae, one black seta present ventral to subalar. Hypopleuron mostly shining, borders narrowly pruinose. Laterotergite completely and densely pruinose. Prosternum black.

Thoracic appendages: Front legs: Coxae, femora, and tibiae yellow; tarsi slightly blackened from third segment, remaining segments yellow. Middle legs: Coxae brown; femora and tibiae yellow; tarsi blackened from third segment, remaining segments yellow. Hind legs: Coxae brown; femora yellow; tibiae brownish yellow, tarsi yellow, blackened from third segment, remaining segments yellow.

Wing (fig. 4, *k*) length 3.3 mm., width 1.3 mm. Bands black. First and second bands definitely joined at costal margin; third and fourth bands joined at costal margin. The part of first basal cell contiguous to second basal cell banded on about basal two-thirds, apical one-third hyaline, this hyaline area wedgelike basally. Section

of fourth vein proximad of anterior crossvein with definite bend. Halteres yellowish brown.

Abdomen: Tergites shining, rugose, black. Disc of first tergite with pale setae. Genitalia (fig. 4,*m,n*) with apical part of aedeagus from dorsal view shaped like the sound box of a guitar; from lateral view, base bulbous, apex flattened.

ALLOTYPE: Female. Body length about 4.1 mm.; wing length 3.3 mm., width 1.4 mm. Middle and hind femora brownish toward base; hind tibiae dark brown. Ovipositor sheath black. Otherwise similar to holotype.

PARATYPES: 31 males, 71 females. Body length of males 3.3–4.9 mm., of females 3.6–5.3 mm.; wing length of males 2.5–3.5 mm., of females 2.8–3.7 mm. Both sexes with body color sometimes almost wholly black or brown. I have seen two males with dark brown thorax and yellowish brown abdominal tergites. Otherwise essentially similar to holotype or allotype.

SPECIMENS: Holotype, ♂, St. Joseph, Mich., July 2, 1942, C. W. Sabrosky (USNM 61858). Allotype, ♀, same data as holotype (USNM). Paratypes: ARKANSAS: Fayetteville (1♂, Aug. 15, 1907). ALABAMA: Garden City (1♀, 1♂, July 7, 1939, R. H. Beamer). GEORGIA: (1♂); Atlanta (1♀, June 27, 1933; 1♀, June 7, 1935; 1♀, June 8, 1935; 1♀, June 13, 1935; 1♀, May 20, 1937; 1♀, May 30, 1941; 1♀, July 15, 1942; 2♀♀, July 21, 1942; 1♀, July 28, 1942; 1♀, June 14, 1935, all collected by P. W. Fattig); Billy's Island, Okefenokee Swamp (1♂, June 1912; 1♂, June 15, 1912); Calhoun (1♀, Aug. 20, 1949); Ellaville (2♀♀, 1♂, May 18, 1937, P. W. Fattig); Griffin (3♀♀, 1♂, Aug. 12, 1939, R. H. Beamer; 1♂, Aug. 12, 1939, J. D. Beamer; 5♀♀, Aug. 12, 1939, A. T. Hardy; 1♀, Aug. 12, 1939, D. E. Hardy); Hiawasee (1♂, June 16, 1945, P. W. Fattig). IOWA: 1 mile south of Amana (1♂, June 23, 1928, G. Hendrickson); 10 miles southwest of Kelso (1♀, July 30, 1928, G. Hendrickson). KANSAS: Douglas County (1♀, June "900 ft."). KENTUCKY: Bardstown (1♀, May 29, 1942, D. G. Denning); Cumberland Gap (1♀, G. Dimmock). MARYLAND: Cabin John Br. (1♀, June 14, 1913, R. C. Shannon); Linnieville (1♀, July 7, 1913, R. C. Shannon); Plummers Island (1♀, R. P. Currie; 1♀, 1♂, June 29, 1913, R. C. Shannon). MICHIGAN: East Lansing (5♀♀, 4♂♂, July 15, 1948, R. Namba); Midland County (2♂♂, June 10, 1941, R. R. Dreisbach); Nottawa (1♀, May 30, 1941, R. R. Dreisbach); St. Joseph (1♀, July 2, 1942, C. W. Sabrosky). MINNESOTA: (1♂, Univ. of Minn., No. 13 sub 68); Carlos Avery Game Refuge, Anoka County (1♂, June 24, 1951, R. Namba); Ramsey County (1♀, June 29, 1951, R. Namba); University Farm, St. Paul, Minn. (3♀♀, 1♂,

June 29, 1951, R. Namba; 1 ♀, July 17, 1951, R. Namba). NEW JERSEY: Newark (1 ♀, June 18, 1892). NEW YORK: Babylon, Long Island (2 ♀ ♀, June 25, 1934, Blanton and Borders); Farmingdale, Long Island (2 ♀ ♀, 1 ♂, June 5, 1935, Blanton and Borders); Gowanda (1 ♀, June 13, 1913, M. C. Van Duzee); Mosholu (1 ♂, June 18); Station for Study of Insects, Tuxedo (1 ♂, July 10, 1928, C. H. Curran; 1 ♂, July 6, 1928, C. H. Curran). NORTH CAROLINA: (1 ♂); Black Mts. (1 ♀, "VI"); Valley of Black Mts. (2 ♀ ♀, June 24-30, 1906, W. Beutenmeller); Fayetteville (1 ♀, early June, 1921, C. S. Brimley); Goldsboro (1 ♀, July 20, 1946, M. W. Wing); Grimesland (1 ♀, May, 1919); Raleigh (1 ♂, June 11, 1924; 1 ♀, Aug. 13, 1925; 1 ♀, July 12, 1927; 1 ♂, Sept. 4, 1925; 1 ♂, July 28, 1926, all collected by C. S. Brimley; 1 ♀, June 21, 1947, G. S. Fichter; 1 ♀, July 5, 1948, "at light," M. W. Wing; 1 ♀, early August, C. L. Metcalf); Smokemont, GSMNP (1 ♂, Aug. 15, 1947, Bullock-R. R. Dreisbach). OHIO: Summit County (1 ♂, July 13, 1936; 1 ♀, June 16, 1937; 2 ♀ ♀, June 19, 1937; 1 ♂, June 28, 1937, all collected by Louis J. Lipovsky). PENNSYLVANIA: Fern Rock (1 ♂, June 9, 1905; 1 ♀, June 29, 1905); Manayunk (1 ♀, 1 ♂); Montgomery County (1 ♀, July 4, 1892). TENNESSEE: Elkmont, GSMNP (3 ♀ ♀, June 15, 1946, R. R. Dreisbach; 1 ♀, Aug. 11, 1947, Bullock-R. R. Dreisbach); Headquarters, GSMNP (1 ♀, Aug. 15, 1947, 1,600 ft., Bullock-R. R. Dreisbach); The Chimneys, GSMNP (1 ♀, June 11, 1946). TEXAS: Kerrville (1 ♀, May 30, 1906, F. C. Pratt). VIRGINIA: Great Falls (1 ♀, June 12, 1949, C. W. Sabrosky); Mount Airy (1 ♂, July 17, 1941, Olson). DISTRICT OF COLUMBIA (1 ♀, F. C. Pratt). (In CSW, UM, USNM, SEC, EU, CU, AMNH, NC, ISC, RRD, GS, and ANSP.)

REMARKS: This species can be separated from the other *Rivellia* by the absence of the strong humeral setae and presence of posterior dorsocentral setae, and by the yellow front legs, male genitalia, wings, and the usual unicolorous black or dark brown body color.

This species is named in honor of Mr. George C. Steyskal, who has aided me in the study of Diptera.

Rivellia boscii Robineau Desvoidy

FIGURE 2, a-c

Rivellia boscii Robineau Desvoidy, 1830, p. 730.—Piersol, 1907, pp. 465-467 (on mating habit).

TYPE LOCALITY: "La Caroline." (The type "détruits définitivement," according to E. Sèguy, in litt.)

MALE: Body length about 7.0 mm.; with neat slender appearance.

Head: Frons reddish brown; upper fronto-orbital plates and ocellar triangle slightly blackened. Face with dorsal one-third pruinose,

remainder shining, slightly rugulose, brown; parafacials and part of orbits ventral to each eye yellow. Antenna somewhat cylindrical in general appearance, little tapered toward rounded tip; first and second segments yellow; third segment with tip and outside slightly blackened, remainder yellow. Anteclypeus concolorous with ventral portion of face. Palpi yellow. Postcranium strongly convex; shining black, not pruinose. Head directed anteriorly instead of ventrally as is the case in other *Rivellia*.

Thorax: Mesonotum black; strong humeral and posterior dorso-central setae absent, relatively strong anterior dorsocentral setae present. Scutellum and postscutellum concolorous with mesonotum; lateral pair of scutellar setae very weak, about one-fifth the length of apical pair; shining area on postscutellum confined to medioposterior spot. Pleura dark brown. Mesopleuron with scattered pale setae on posterior two-thirds; posterior two-thirds pruinose. Sternopleuron almost wholly pruinose, only anterior and posterior corners shining; disc with scattered pale setae. Disc of pteropleuron with scattered pale setae, few black setae present ventral to subalar. Hypopleuron with shining central spot, remainder pruinose. Laterotergite completely and densely pruinose. Prosternum black.

Thoracic appendages: All legs with coxae and femora yellow. Front and middle tibiae yellow; hind tibiae brownish yellow. Fore tarsi and middle tarsi slightly blackened from second segment, remaining segments yellow; hind tarsi blackened from fourth segment, remaining segments yellow.

Wing (fig. 2,*a*) length 4.3 mm., width 1.6 mm. Bands dark brown, narrow. First and second bands definitely joined at costal margin; third and fourth bands joined at costal margin. The part of first basal cell contiguous to second basal cell banded at base anteriorly; the hyaline area contiguous to fourth vein sharply wedgelike to base of second basal cell. Section of fourth vein proximad of anterior crossvein with very slight bend. Halteres yellowish brown.

Abdomen: Tergites black, definitely pruinose except for shining medial transverse band on first-second syntergite, this band broadened laterally. Disc of first tergite with pale setae. Genitalia (fig. 2,*c*) with apical part of the aedeagus consisting of two stout apically directed hooks which are joined at base.

FEMALES: Body length 6.2–7.5 mm.; wing length 4.0–4.6 mm. Prosternum yellow; abdomen with yellow lateral spot on each side at base on dorsum; ovipositor sheath black. Otherwise similar to male.

SPECIMENS EXAMINED: FLORIDA: Jacksonville (1 ♀, collection of Mrs. A. T. Slosson); Suwanee Springs (1 ♀, 1 ♂, July 29, 1939, R. H. Beamer). GEORGIA: Perry (1 ♀, Aug. 12, 1939, R. H. Beamer). NORTH CAROLINA: Fayetteville (1 ♀, early June, 1921, C. S. Brimley).

REMARKS: According to Mr. E. Sèguy, the type of this species is "détruits définitivement."

This species stands apart from the rest of the *Rivellia* species. The neat, slender appearance of body, anteriorly protruding head, absence of both strong humeral and posterior dorsocentral setae, and the presence of a pair of strong anterior dorsocentral setae, weak lateral scutellar setae, and the definitely pruinose abdominal tergites make this species unique among the *Rivellia*.

Rivellia socialis, new species

FIGURE 10,*m*

HOLOTYPE: Male. Body length about 5.2 mm.

Head: Frons reddish brown; ocellar triangle blackened, upper fronto-orbital plates concolorous with frons. Face with dorsal half pruinose, ventral half shining, smooth, dark brown; parafacials and part of orbits ventral to each eye brownish yellow. Antenna with first and second segments brownish yellow; third segment brown, yellow only on inside at base, the tip pointed anteriorly. Anteclypeus black. Palpi brown. Postcranium black, pruinose; more convex than other *Rivellia* except *R. boscii*.

Thorax: Mesonotum black; strong humeral and posterior dorsocentral setae absent. Scutellum and postscutellum concolorous with mesonotum. Pleura black, mostly shining. Mesopleuron with scattered pale setae on posterior half; pruinosity reduced to small spot at dorsal posterior corner. Sternopleuron with narrow pruinose strip on ventral margin and a much narrower strip on posterior margin; disc with scattered pale setae. Disc of pteropleuron with scattered pale setae, few black setae present ventral to subalar. Hypopleuron with shining central spot, remainder pruinose. Laterotergite completely and densely pruinose. Prosternum black.

Thoracic appendages: Coxae, femora, and tibiae of all legs black; all tarsi gradually blackened toward tip after first segment, first segment yellow.

Wing (fig. 10,*m*) length 3.5 mm., width 1.3 mm. Bands black. First and second bands definitely joined at costal margin; third and fourth bands joined at costal margin. The part of first basal cell contiguous to second basal cell banded on about basal two-thirds, apical one-third hyaline, this hyaline area wedgelike basally. Section of fourth vein proximad of anterior crossvein with definite bend. Halteres brown.

Abdomen: Tergites black, appear pruinose, except for shining medial transverse band on first-second syntergite, this band broadened laterally. Disc of first tergite with pale setae. Genitalia similar to that of *R. steyskali*.

ALLOTYPE: Female. Body length about 5.0 mm.; wing length 3.2 mm., width 1.2 mm. Thorax dark brown; ovipositor sheath dark brown. Otherwise similar to holotype.

PARATYPES: 7 males, 3 females. Body length of males 5.0–5.2 mm., of females 4.7–5.4 mm.; wing length of males 3.4–3.6 mm., of females 3.3–3.6 mm. I have seen one female with one posterior dorsocentral seta on the right side. Otherwise similar to holotype or allotype.

SPECIMENS: Holotype, ♂, Buffalo Center, Iowa, July 7, 1928, G. O. Hendrickson (ISC). Allotype, ♀, Ames, Iowa, June 18, 1926, G. O. Hendrickson (ISC). Paratypes: ILLINOIS: (2 ♀ ♀, 1 ♂); Champaign (1 ♀, 3 ♂ ♂, May 27, 1889, Marten, "15005"). IOWA: Ames "e" (1 ♂, July 10, 1925, and 1 ♂, May 31, 1926, G. O. Hendrickson); 7 miles northwest of Thompson (1 ♂, June 30, 1928, G. O. Hendrickson). (In ISC, SEC, and INHS.)

REMARKS: The pronounced convexity of the posteranium, the absence of both strong humeral and posterior dorsocentral setae, and the pruinose abdominal tergites indicate affinity of this species to *R. boscii*. It can be distinguished from *R. boscii* by the ventrally directed head, the presence of strong lateral scutellar setae, the lesser amount of pruinosity on the sternopleuron and mesopleuron, the male genitalia, and the presence of a complete shining median band on the postscutellum.

Rivellia succinata (Wiedemann)

FIGURE 1, a-c

Dacus succinatus Wiedemann, 1830, p. 526.

Rivellia succinata (Wiedemann). Hensel, 1914a, p. 173, pl. 1, fig. 19; 1914b, pl. 1, fig. 18.

TYPE LOCALITY: "Väterland?" (Wiedemann, 1830). Types deposited "Im Wiener Musseum und in meiner Sammlung" (Wiedemann, 1830).

MALES: Body length about 4.5 mm.

Head: Frons yellow; upper fronto-orbital plates and ocellar triangle yellow; inner vertical setae absent. Face with dorsal half pruinose, ventral half shining, smooth, yellow; parafacials and part of orbits ventral to each eye brownish yellow. Antenna completely yellow, tip of third segment pointed anteriorly. Anteclypeus yellow. Palpi yellow. Posteranium yellow, lightly pruinose.

Thorax: Mesonotum yellow; strong humeral setae absent, posterior dorsocentral setae present. Scutellum yellow, somewhat brownish at apex. Postscutellum concolorous with mesonotum. Pleura yellow, mostly shining, pruinosity obscure except on laterotergite. Meso-

pleuron with scattered pale and black setae on posterior half; sternopleuron with scattered pale and black setae on disc; pteropleuron with scattered pale setae, few black setae present ventral to subalar. Laterotergite completely pruinose. Prosternum yellow.

Thoracic appendages: Front and middle legs: Coxae, femora, and tibiae completely yellow; tarsi very slightly blackened from third segment, remaining segments yellow. Hind legs: Coxae and femora yellow; tibiae light brownish yellow; tarsi blackened from third segment, remaining segments yellow.

Wing (fig. 1,*a*) length 3.7 and 4.0 mm., width 1.7 mm. Bands light brown, broad. First band covers most of the base of the wing although faintly in the axillary lobe and anal and axillary cells. Second band joined faintly to first band at costal margin, joined distinctly to third band in discal cell. Third and fourth bands broadly joined at costal margin. Section of fourth vein proximad of anterior crossvein with deep bend. Halteres yellow, capitulum somewhat brownish.

Abdomen: Tergites shining yellow, slightly rugose, with scattered brownish blotches. Disc of first tergite with pale setae. Genitalia (fig. 1,*c*) with apical part of aedeagus consisting of a slender neck, bulbous head, and two long terminal tubes each bearing a horn at basal one-third.

FEMALE: Body length 5.0 mm.; wing length 4.2 mm., width 2.0 mm.; ovipositor sheath brownish yellow, blackened laterally at tip. Otherwise similar to holotype.

SPECIMENS EXAMINED: FLORIDA: Hilliard (2♂♂, Aug. 19, 1930, and 1♀, Aug. 31, 1930, R. H. Beamer).

This species can be easily distinguished from the other *Rivellia* by the wing banding, the absence of inner verticals and strong humeral setae, the general yellowish color, and the male genitalia.

Rivellia quadrifasciata (Macquart)

FIGURE 6,*a-c*

Herina quadrifasciata Macquart, 1835, p. 433.

Rivellia quadrifasciata (Macquart). Loew, 1873, p. 90, pl. 8, fig. 5.—Hendel, 1914a, p. 180.—Cresson, 1924, p. 227.

TYPE LOCALITY: North America. (The type "très certainement détruits," according to E. Séguy, in litt.)

MALES: Body length 3.6–6.4 mm.; wing length 3.0–4.0 mm. Genitalia (fig. 6,*b,c*) with apical part of aedeagus from lateral view consisting of a somewhat hemispherical base and two filamentous terminal tubes which are subequal in length to basal part of aedeagus. Fourth sternite of abdomen with radially directed setae. Otherwise similar to *R. colei*.

SPECIMENS EXAMINED: ALABAMA (21 ♂♂): Atmore, Decatur; July 6-11. COLORADO (2 ♂♂): Wray; Aug. 23. FLORIDA (64 ♂♂): Bratt, Hibernia; July 10-Aug. 29. GEORGIA (7 ♂♂): Atlanta, Billy's Island (Okefenokee Swamp), Dewitt, Ellaville, Griffin, Roberta, Statham; May 19-Sept. 8. ILLINOIS (2 ♂♂): Dubois, Meredosia; May 24-29. INDIANA (2 ♂♂): LaFayette, Logansport; June 21-Aug. 10. IOWA (2 ♂♂): Pleasant Valley, Sioux City; June 10-July 5. KANSAS (3 ♂♂): Douglas County, Montgomery County, Wichita; June 21-Aug. 26. MARYLAND (3 ♂♂): Chesapeake Beach; May 24-Aug. 19. MONTANA (1 ♂): No date. NEBRASKA (1 ♂): Valentine; June 8. NORTH CAROLINA (3 ♂♂): Beaufort, Lake Waccamaw, Raleigh; April 14-June 7. NORTH DAKOTA (2 ♂♂): Bismarek; June 14. NEW JERSEY (8 ♂♂): Atlantic City, Cape May, Clementon, Lakehurst, Stone Harbor, Wildwood; July 5-Sept. 2. NEW YORK (2 ♂♂): Mosholu, Peru; June 24. OKLAHOMA (1 ♂): Norman; May 4. QUEBEC (1 ♂) Abbotsford; April 14. SOUTH CAROLINA (12 ♂♂): Clemson College, Fairfax, Manning; May 29-Aug. 23. SOUTH DAKOTA (1 ♂): Elk Point; no date. TEXAS (1 ♂): Galveston; May. VIRGINIA (2 ♂♂): Smithfield; no date.

REMARKS: Mr. E. Séguy of the Muséum National d'Histoire Naturelle, Paris, has informed me (in litt.) that the types of *Herina quadrifasciata* Macquart and another species "ont disparu et sont très certainement détruits." In view of this statement and the inadequacy of the original description of *Herina quadrifasciata*, I have no way to ascertain whether *R. colei* or the species now under consideration is *R. quadrifasciata* (Macquart). However, since the species here described is more common (especially in the eastern United States) and more widespread than *R. colei*, I am regarding it as *R. quadrifasciata*.

Inasmuch as these two species cannot be separated, as far as I can determine, without examination of the male genitalia and since there is no indication of such examination, previous citations of *R. quadrifasciata* other than the original may be referable to either *R. quadrifasciata* or *R. colei*.

Rivellia colei, new species

FIGURE 6, d-f

Not *Rivellia viridulans* Robineau Desvoidy.—Cole, 1927, p. 443, fig. 252.

HOLOTYPE: Male. Body length about 4.7 mm.

Head: Frons reddish brown; upper fronto-orbital plates and ocellar triangle blackened. Face with dorsal half pruinose, ventral half shining, pale brownish yellow; parafacials and part of orbits ventral to each eye brownish yellow. Antenna with first and second segments

yellow; third segment blackened at tip and on outside, remainder yellow, the tip pointed anteriorly. Anteclypeus pale brownish yellow. Palpi yellow. Postcranium black, pruinose.

Thorax: Mesonotum black; strong humeral setae absent, posterior dorsocentral setae present. Scutellum and postscutellum concolorous with mesonotum. Pleura black, mostly shining. Mesopleuron with scattered pale setae on posterior half; pruinose area at dorsal posterior corner in form of right triangle, one side reaching ventral posterior corner, the other, the anterior spiracle. Sternopleuron with ventral margin broadly pruinose and with irregular band which extends from ventral corner to dorsal margin of sternopleuron; disc with scattered pale setae. Disc of pteropleuron with scattered pale setae, no black setae evident ventral to subalar. Hypopleuron with shining central spot, remainder pruinose. Laterotergite densely pruinose. Prosternum brown medially, with yellow borders.

Thoracic appendages: All legs with coxae and femora wholly yellow. Front and middle tibiae yellow, hind tibiae black. Front and hind tarsi slightly blackened from second segment, first segment yellow. Middle tarsi wholly yellow.

Wing (fig. 6,*d*) length 3.5 mm., width 1.5 mm. Bands black. First and second bands joined at costal margin; third and fourth bands joined at costal margin. The part of first basal cell contiguous to second basal cell banded on about basal two-thirds; apical one-third hyaline, this hyaline area wedgelike basally. Section of fourth vein proximad of anterior crossvein with definite bend. Halteres yellow.

Abdomen: Tergites shining, rugose, brownish yellow. Disc of first tergite with pale setae. Genitalia (fig. 6,*f*) with apical part of aedeagus consisting of a long cylindrical neck, a small spherical head, and two long terminal tubes which are about twice as long as the neck.

ALLOTYPE: Female (collected with holotype). Body length about 4.4 mm., wing length 3.3 mm., width 1.4 mm. Middle tarsi blackened from third segment. Ovipositor sheath black. Otherwise similar to holotype.

PARATYPES: 34 males. Body length 4.0–4.9 mm.; wing length 3.1–3.5 mm. Frons sometimes yellowish brown; postcranium sometimes blackish green. Thorax sometimes dark brown or blackish green; medial pruinose band on sternopleuron frequently absent. Hind tibiae brownish yellow to dark brown. Prosternum sometimes wholly yellow. One male with abdominal tergites almost wholly dark brown; this may be owing to contents of abdomen. Otherwise similar to holotype.

SPECIMENS: Holotype, ♂, Mississippi Bluff, one-half mile north of state line, Houston County, Minn., June 1, 1951, R. Namba (UM).

Allotype, ♀, same data as holotype. Paratypes: CONNECTICUT: Avon Old Farms, Avon (1♂, June 20, 1929, C. H. Curran). ILLINOIS: Champaign (1♂, May 15, 1889, "481"); Meredosia (1♂, May 29, 1917; 1♂, Aug. 20, 1917, "sand pit"); Normal (1♂, July 1-10, 1883, "3478"; 1♂, August 1883, "3531"); Savanna (1♂, July 26, 1892, McElfresh, "18530"); Urbana (1♂, Sept. 1, 1889, "580"). IOWA: 10 miles southwest of Kelso (2♂♂, July 30, 1928, G. O. Hendrickson); Sioux City (1♂, June 3, 1931, C. N. Ainslie). LOUISIANA: Opelousas (1♂, April 1897). MISSOURI: Shrewsbury (?) (1♂, July 10, 1949, and 5♂♂, Aug. 6, 1949, W. Downes). NEBRASKA: Fullerton (1♂, Aug. 19, 1949, R. K. Schwab-R. R. Dreisbach). NEW JERSEY: Cape May (1♂, June 24, 1933, Witmer Stone); Stone Harbor (1♂, Aug. 6, 1935, E. T. Cresson Jr.); Van Cortland (1♂, July 11, 1895, J. L. Zabriskie); Whitehorse (2♂♂, June 20, 1933, F. S. Blanton). NEW YORK: N. Tarrytown (4♂♂, Aug. 10, 1935, Blanton and Borders); Yonkers (1♂). NORTH CAROLINA: Hendersonville (2♂♂, June, 1907, F. Sherman). PENNSYLVANIA: Glenside (1♂, July 5, 1909, G. M. Greene). TENNESSEE: Knoxville (1♂, July 2, 1891, H. E. Summers). VIRGINIA: Boykins (1♂, June 10, 1895). (In INHS, NC, CU, CAS, SEC, and USNM.)

REMARKS: This species is very closely related to *R. quadrifasciata*. The males of these species can be easily differentiated by the genitalia. However, no diagnostic character could be found to separate the females. From other *Rivellia*, *R. colei* can be distinguished by the male genitalia, blackish thorax and yellowish abdominal tergites, and the wing banding.

Literature cited

ALDRICH, J. M.

1905. A catalogue of North American Diptera (or two-winged flies). Smithsonian Misc. Coll. vol. 46, No. 1444, 680 pp.

BECKER, T.

1905. Katalog der paläarktischen Dipteren, vol. 4, 328 pp.

BLANTON, F. S.

1937. A new North American fly belonging to the genus *Rivellia* (Otitidae). Can. Ent., vol. 69, pp. 139-141, 1 fig.

COLE, F. R.

1927. A study of the terminal abdominal structures of male Diptera (two-winged flies). Proc. California Acad. Sci., ser. 4, vol. 16, No. 14, pp. 397-499, figs. 1-287.

COQUILLET, D. W.

1900. Notes and descriptions of Ortalidae. Journ. New York Ent. Soc., vol. 8, pp. 21-25.

CRESSON, E. T., JR.

1919. Dipterological notes and descriptions. Proc. Acad. Nat. Sci. Philadelphia, vol. 71, pp. 171-194.
1924. Studies in the dipterous family Ortalidae, with descriptions of new species, mostly from North America. Trans. Amer. Ent. Soc., vol. 50, pp. 225-241.

CURRAN, C. H.

1934. The families and genera of North American Diptera, 512 pp., illus.

FITCH, A.

1855. Insects infesting fruit trees. I. The Apple. First report on the noxious, beneficial and other insects of the State of New York, pp. 5-104.

HENDEL, F.

1914a. Die Arten der Platystominien. Abhandl. Zool.-Bot. Ges. Wien, vol. 8, No. 1, pp. 1-409, 4 pls.

1914b. Fam. Muscaridae. Subfam. Platystominae. *In* Genera Insectorum, Fasc. 157, Diptera, 179 pp., 15 pls., 287 figs.

HENNIG, W.

1945. Die Fliegen der paläarktischen Region. 48. Platystomidae. Lief. 155. 56 pp., 10 figs., 3 pls., 36 figs.

JOHNSON, C. W.

1900a. Some notes and descriptions of seven new species and one new genus of Diptera. *Ent. News*, vol. 11, pp. 323-328, 3 figs.

1900b. New North American Ortalidae. *Can. Ent.*, vol. 32, pp. 246-247.

LOEW, H.

1873. Monographs of the Diptera of North America. Part 3. Smithsonian Misc. Coll., vol. 11, art. 3, 351 pp., pls. 8-11, 116 figs.

MACQUART, M.

1835. Histoire naturelle des insectes. Diptères, II. 701 pp., pls. 13-24.

PIERSOL, W. H.

1907. The curious mating habit of the fly *Rivellia boscii*. *Amer. Nat.*, vol. 41, pp. 465-467.

ROBINEAU DESVOIDY, J. B.

1830. Essai sur les Myodaires. *Mem. Prés. Acad. Sci. Paris*, vol. 2, 813 pp.

RONDANI, A. C.

1856. Genera Italica ordinis Dipterorum ordinatim disposita et distincta et in familias et stirpes aggregata. *Dipterological Italicae prodromus*, vol. 1, 226 pp.

1869. Ortalidinae Italicae collectae, distinctae et in ordinem dispositae. *Dipterological Italicae prodromus*, vol. 7, fasc. 3, pp. 5-37.

SCHINER, J. R.

1864. Fauna Austriaca. Die Fliegen (Diptera). Theil 2, 658 pp.

VAN DER WULP, F. M.

1867. Eenige Noord-Ameriaansche Diptera. *Tijdschr. Ent.*, vol. 10, pp. 125-164, 5 pls.

1896. Catalogue of the described Diptera from South Asia, 219 pp.

1898. *In* Biologia Centrali-Americana. Insecta. Diptera, vol. 2, 489 pp., illus.

WIEDEMANN, C. R. W.

1830. Aussereuropäische zweiflügelige Insekten. Theil 2, 684 pp., illus.

WILLISTON, S. W.

1896. Manual of the families and genera of North-American Diptera. Ed. 2, liv+167 pp.

1908. Manual of North American Diptera. Ed. 3, 405 pp., illus.

WINGATE, W. J.

1906. A preliminary list of Durham Diptera, with analytical tables. *Trans. Nat. Hist. Soc. Northumberland, Durham, Newcastle-Upon-Tyne*, new ser., vol. 2, 416 pp., 7 pls.

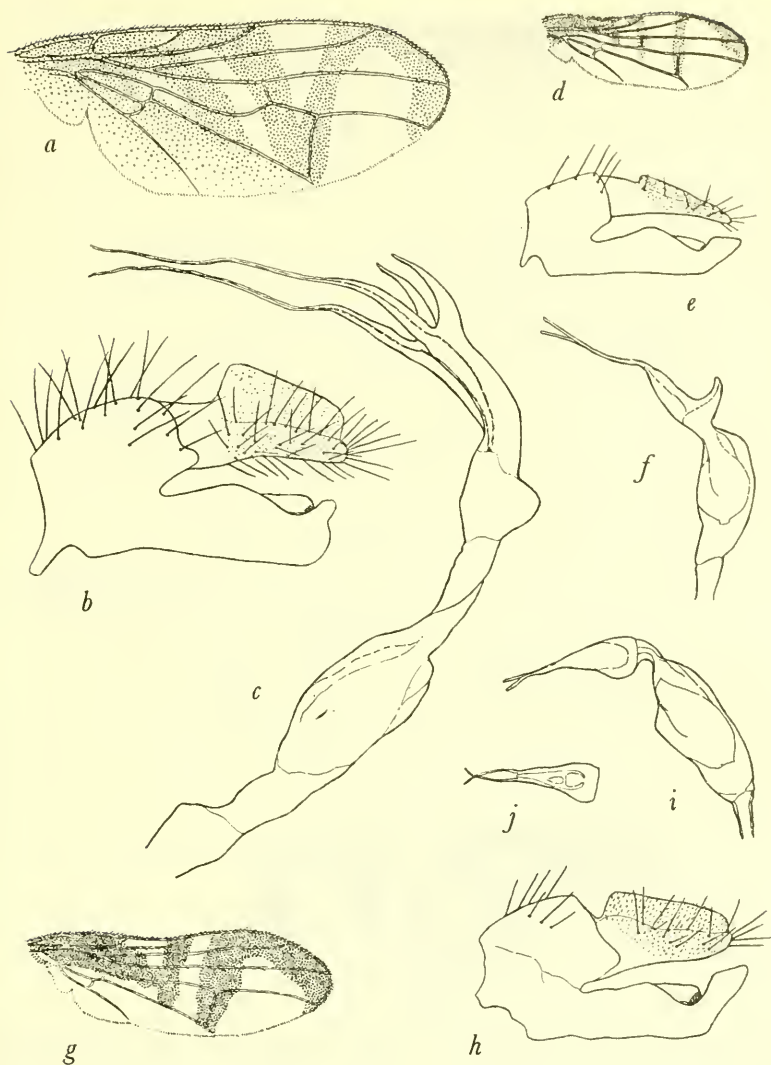


FIGURE 1.—*a-c*, *Rivellia succinata* Wiedemann: *a*, wing; *b*, lateral aspect of ninth tergite and proctiger of male; *c*, lateral aspect of aedeagus. *d-f*, *R. vaga*, new species: *d*, wing, *e*, lateral aspect of ninth tergite and proctiger of male; *f*, lateral aspect of aedeagus. *g-j*, *R. coquilletti* Hendel: *g*, wing; *h*, lateral aspect of ninth tergite and proctiger of male; *i*, lateral aspect of aedeagus; *j*, dorsal aspect of aedeagus.

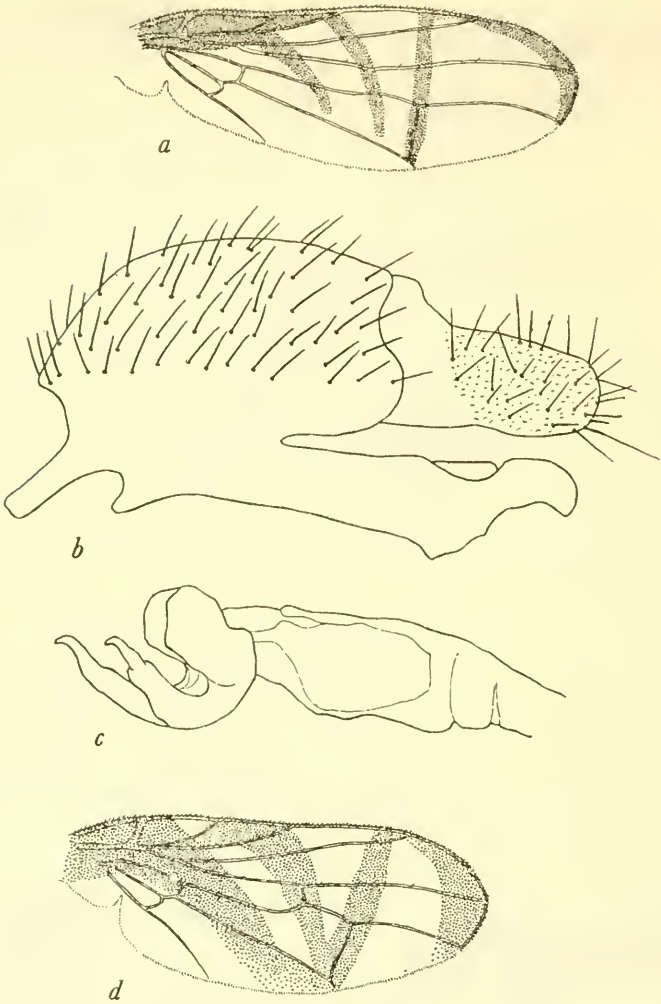


FIGURE 2.—*a-c*, *Rivellia boscii* Robineau Desvoidy: *a*, wing; *b*, lateral aspect of ninth tergite and proctiger of male; *c*, lateral aspect of aedeagus. *d*, *R. floridana* Johnson: wing.

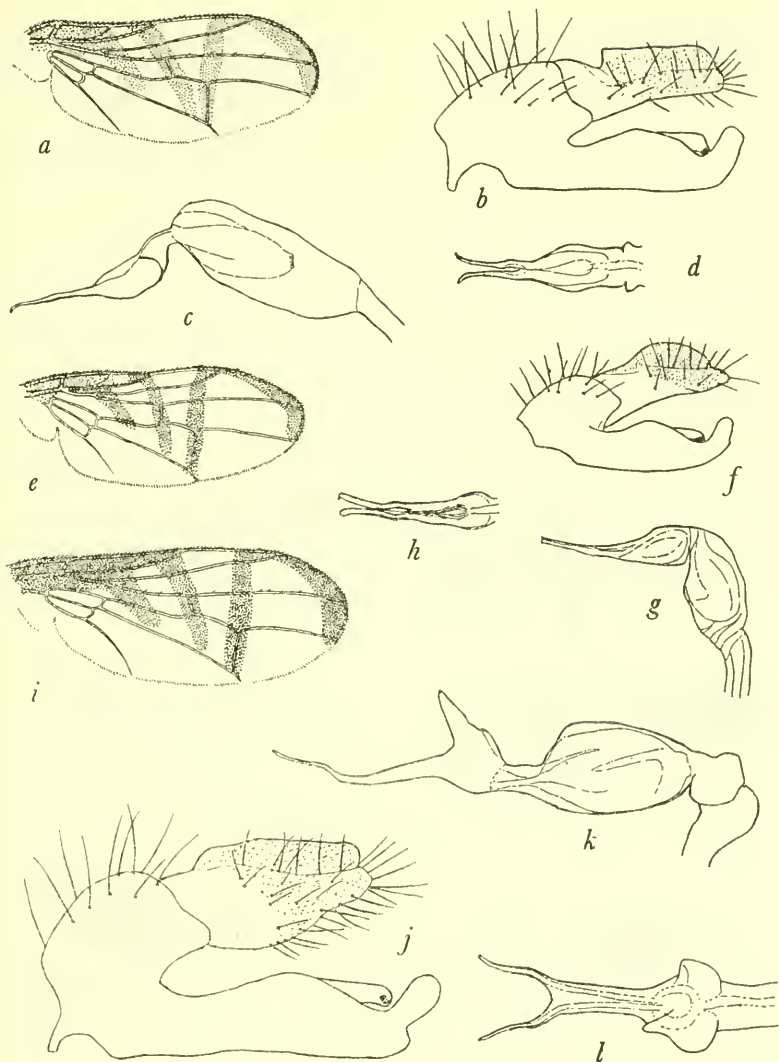


FIGURE 3.—*a-d*, *Rivellia imitabilis*, new species: *a*, wing; *b*, lateral aspect of ninth tergite and proctiger of male; *c*, lateral aspect of aedeagus; *d*, dorsal aspect of aedeagus. *e-h*, *R. pallida* Loew: *e*, wing; *f*, lateral aspect of ninth tergite and proctiger of male; *g*, lateral aspect of aedeagus; *h*, dorsal aspect of aedeagus. *i-l*, *R. inaequata*, new species: *i*, wing; *j*, lateral aspect of ninth tergite and proctiger of male; *k*, lateral aspect of aedeagus; *l*, dorsal aspect of aedeagus.

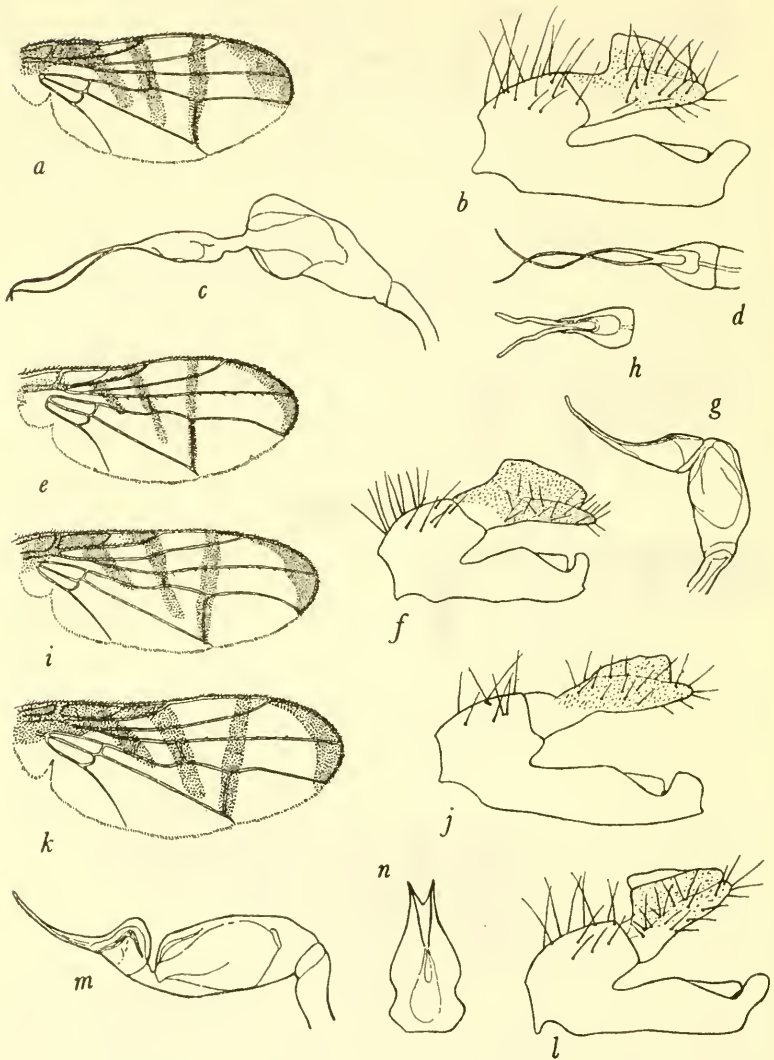


FIGURE 4.—*a-d*, *Rivellia michiganensis*, new species: *a*, wing; *b*, lateral aspect of ninth tergite and proctiger of male; *c*, lateral aspect of aedeagus; *d*, dorsal aspect of aedeagus. *e-h*, *R. metallica* Van Der Wulp: *e*, wing; *f*, lateral aspect of ninth tergite and proctiger of male; *g*, lateral aspect of aedeagus; *h*, dorsal aspect of aedeagus. *i, j*, *R. flavimana* Loew: *i*, wing; *j*, lateral aspect of ninth tergite and proctiger of male. *k-n*, *R. steyskali*, new species: *k*, wing; *l*, lateral aspect of ninth tergite and proctiger of male; *m*, lateral aspect of aedeagus; *n*, dorsal aspect of aedeagus.

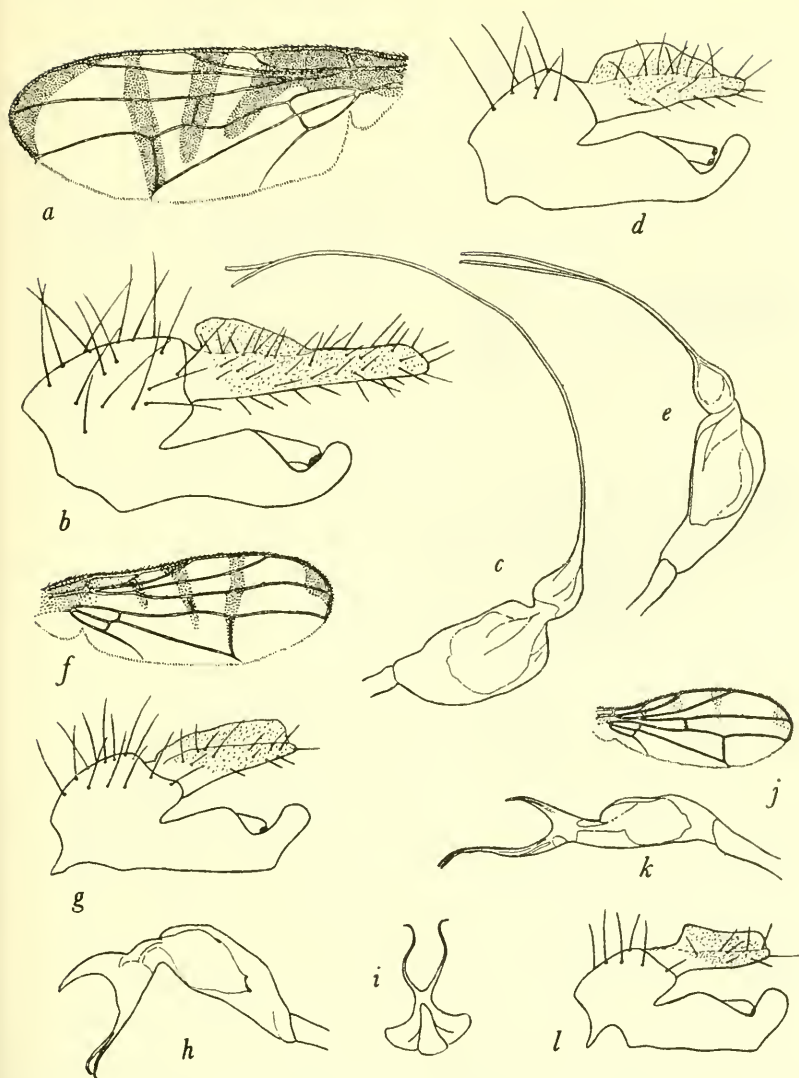


FIGURE 5.—*a-c*, *Rivellia melliginis* (Fitch): *a*, wing; *b*, lateral aspect of ninth tergite and proctiger of male; *c*, lateral aspect of aedeagus. *d, e*, *R. viridulans* Robineau Desvoidy: *d*, lateral aspect of ninth tergite and proctiger of male; *e*, lateral aspect of aedeagus. *f-i*, *R. texana*, new species: *f*, wing; *g*, lateral aspect of ninth tergite and proctiger of male; *h*, lateral aspect of aedeagus; *i*, dorsal aspect of aedeagus. *j-l*, *R. maculosa*, new species: *j*, wing; *k*, lateral aspect of aedeagus; *l*, lateral aspect of ninth tergite and proctiger of male.

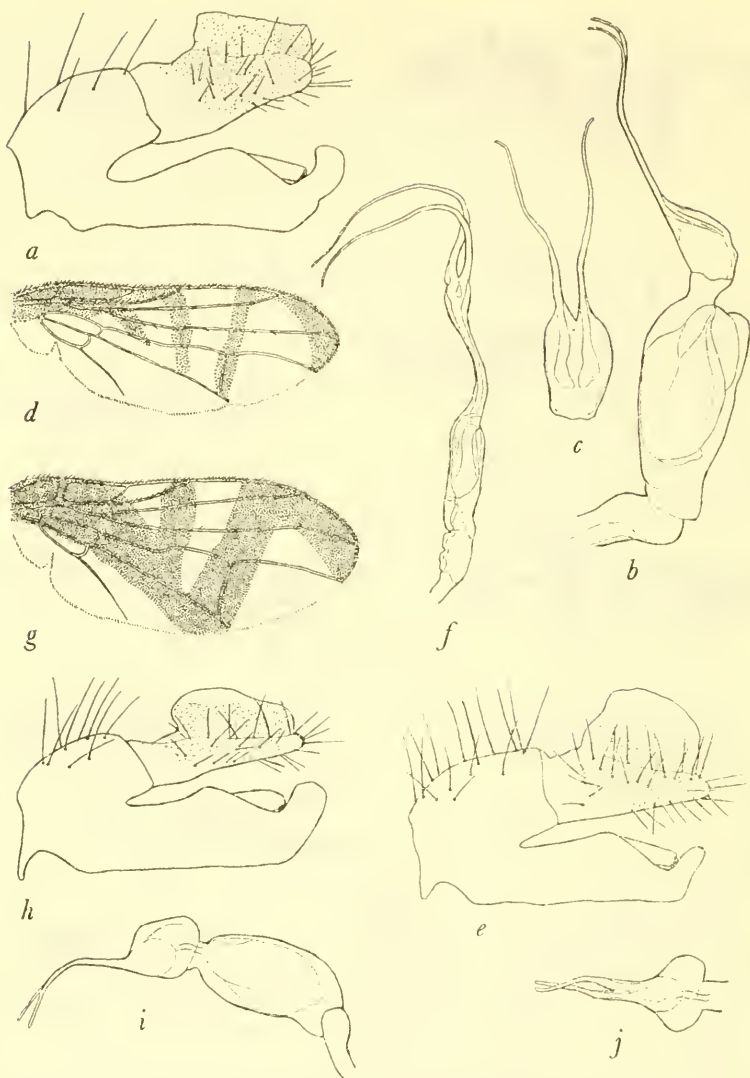


FIGURE 6.—*a-c*, *Rivellia quadrifasciata* Macquart: *a*, lateral aspect of ninth tergite and proctiger of male; *b*, lateral aspect of aedeagus; *c*, dorsal aspect of aedeagus. *d-f*, *R. colei*, new species: *d*, wing; *e*, lateral aspect of ninth tergite and proctiger of male; *f*, lateral aspect of aedeagus. *g-j*, *R. conjuncta* Loew: *g*, wing; *h*, lateral aspect of ninth tergite and proctiger of male; *i*, lateral aspect of aedeagus; *j*, dorsal aspect of aedeagus.

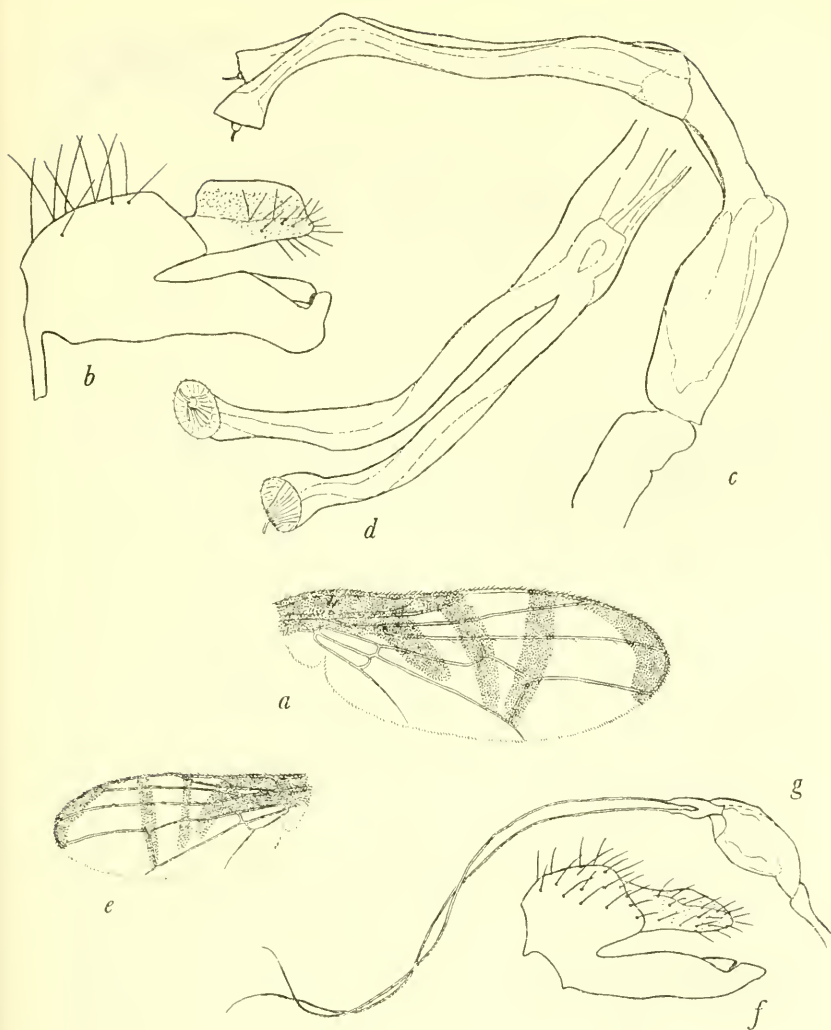


FIGURE 7.—*a-d*, *Rivellia munda*, new species: *a*, wing; *b*, lateral aspect of ninth tergite and proctiger of male; *c*, lateral aspect of aedeagus; *d*, dorsal aspect of aedeagus. *e-g*, *R. australis*, new species: *e*, wing; *f*, lateral aspect of ninth tergite and proctiger of male; *g*, lateral aspect of aedeagus.

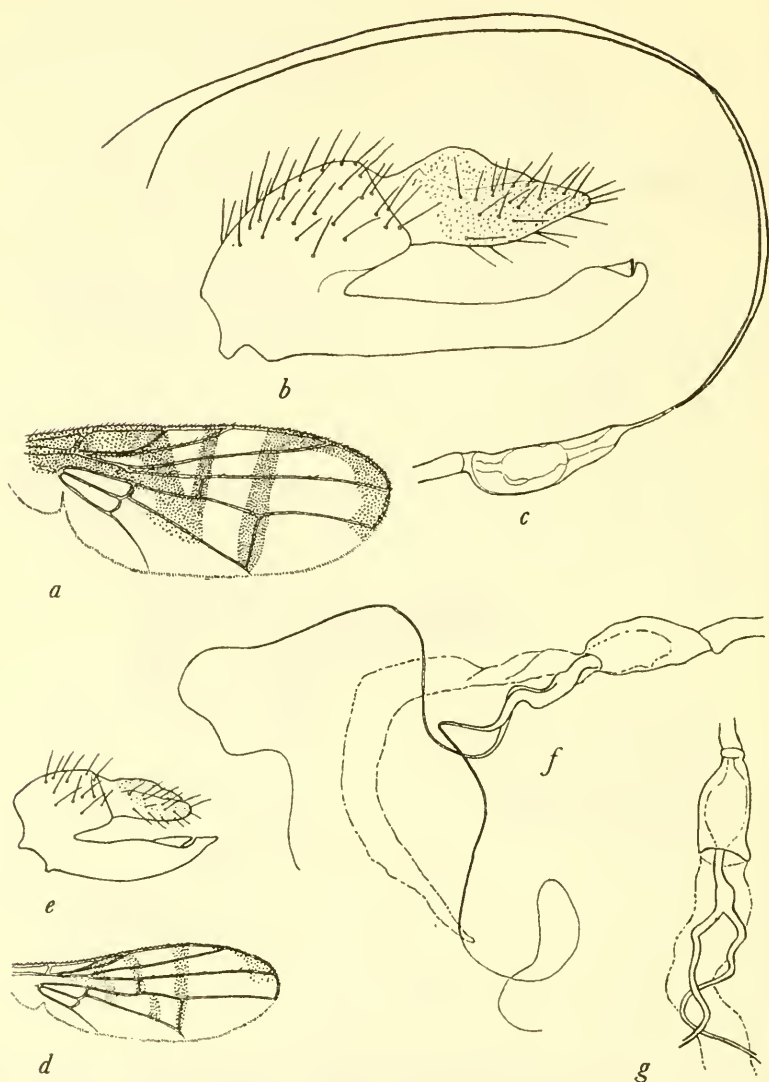


FIGURE 8.—*a-c*, *Rivellia tersa*, new species: *a*, wing; *b*, lateral aspect of ninth tergite and proctiger of male; *c*, lateral aspect of aedeagus. *d-g*, *R. occulta* Van Der Wulp: *d*, wing; *e*, lateral aspect of ninth tergite and proctiger of male; *f*, lateral aspect of aedeagus; *g*, dorsal aspect of aedeagus.

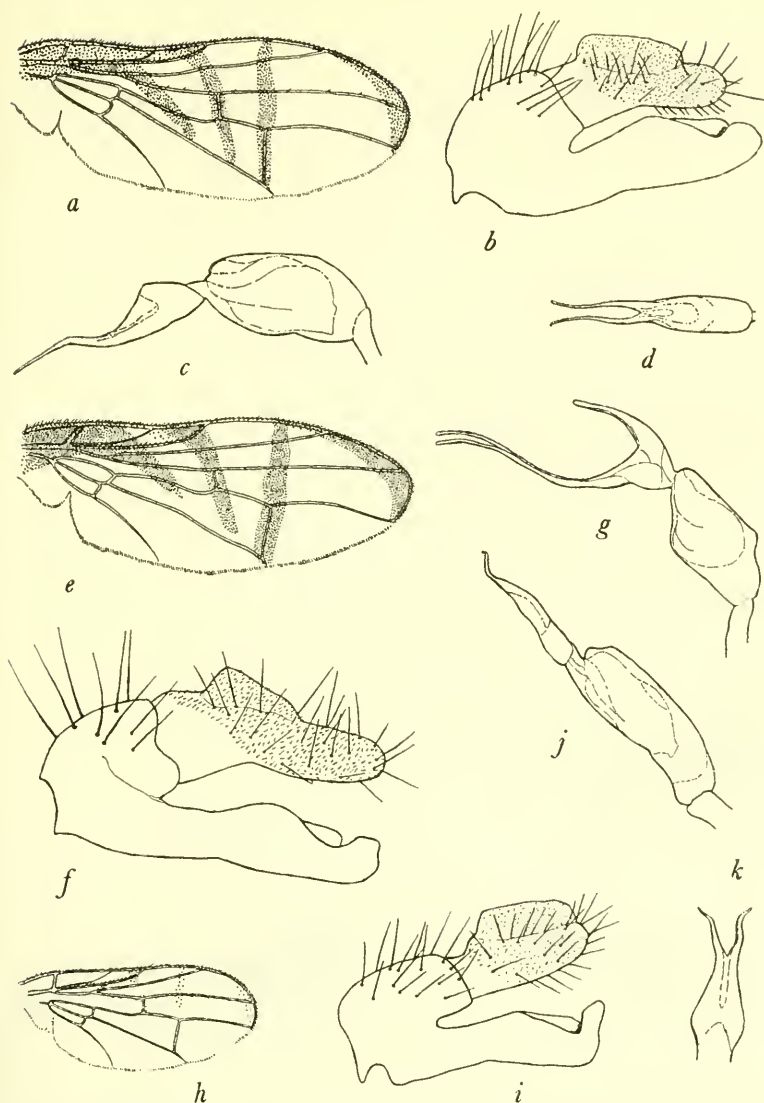


FIGURE 9.—*a-d*, *Rivellia variabilis* Loew: *a*, wing; *b*, lateral aspect of ninth tergite and proctiger of male; *c*, lateral aspect of aedeagus; *d*, dorsal aspect of aedeagus. *e-g*, *R. winifredae*, new species: *e*, wing; *f*, lateral aspect of ninth tergite and proctiger of male; *g*, lateral aspect of aedeagus. *h-k*, *R. brevifasciata* Johnson: *h*, wing; *i*, lateral aspect of ninth tergite and proctiger of male; *j*, lateral aspect of aedeagus; *k*, dorsal aspect of aedeagus.

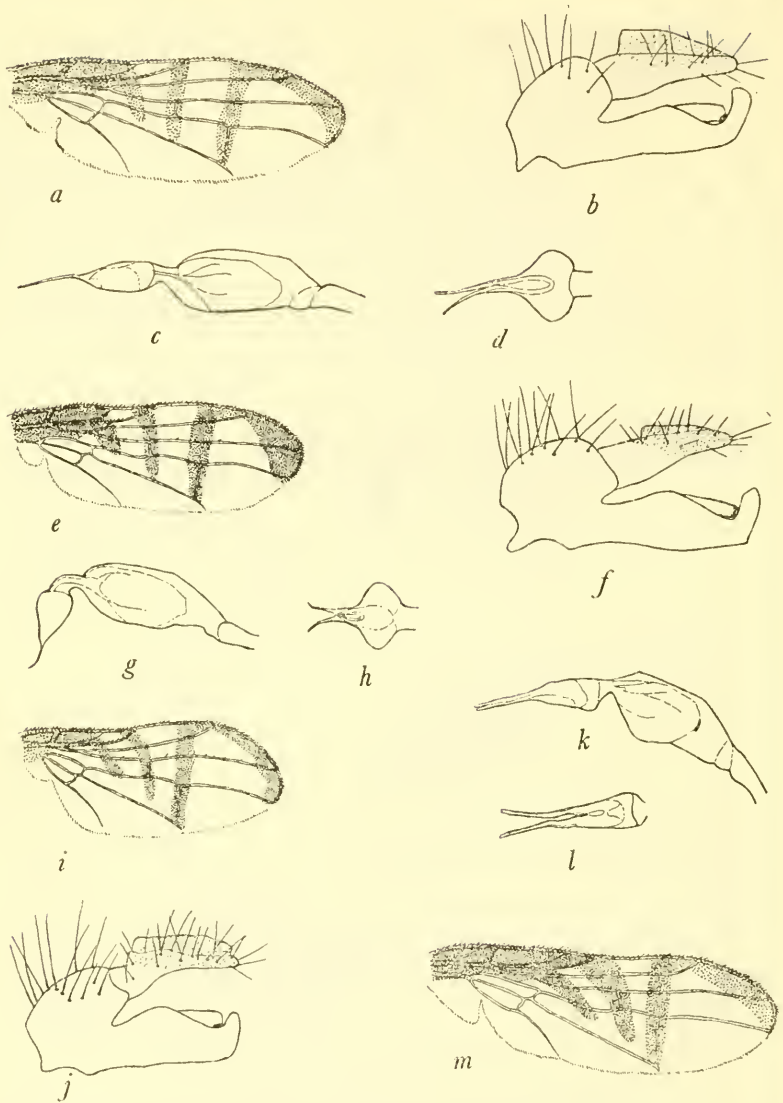


FIGURE 10.—*a-d*, *Rivellia micans* Loew: *a*, wing; *b*, lateral aspect of ninth tergite and proctiger of male; *c*, lateral aspect of aedeagus; *d*, dorsal aspect of aedeagus. *e-h*, *R. severini* Blanton: *e*, wing; *f*, lateral aspect of ninth tergite and proctiger of male; *g*, lateral aspect of aedeagus; *h*, dorsal aspect of aedeagus. *i-l*, *R. cognata* Cresson: *i*, wing; *j*, lateral aspect of ninth tergite and proctiger of male; *k*, lateral aspect of aedeagus; *l*, dorsal aspect of aedeagus. *m*, *R. socialis*, new species: wing.