Keys to the Planthoppers, or Fulgoroidea, of Illinois (Homoptera)[1]

S. W. Wilson[2] and J. E. McPherson
Department of Zoology
Southern Illinois University
Carbondale, Illinois 62901

ABSTRACT

Keys to the 9 families, 51 genera and 150 species of Illinois planthoppers, with accompanying illustrations, are presented. Included is a synopsis of the systematic literature of each of the Illinois families and genera.

INTRODUCTION

The superfamily Fulgoroidea contains ca. 7800 species in 20 families (Metcalf 1951). More than 600 species in 11 families occur in America north of Mexico (Metcalf 1936; 1943; 1945; 1946; 1947a,b; 1954a,b; 1957; 1958; hereafter referred to collectively as "Metcalf's catalogs"); all species studied are phytophagous. The North American planthoppers (the vernacular name was suggested by Metcalf (1920)) can be separated from other adult Homoptera by the location of the antennae ventral to the compound eyes (except in *Bothriocera),* and the presence on the clavus of the forewing of a Y-shaped vein (except in some brachypterous forms (e.g., *Bruchomorpha*)) formed by a combination of the postcubital and first anal veins (Fennah 1944). In other Homoptera, the antennae are anterior to the compound eyes and the clavus does not bear a Y-shaped vein.

Literature on the systematics of North American planthoppers is extensive (e.g., Metcalf's catalogs), and includes taxonomic studies of families (e.g., Doering 1932), tribes (e.g., O'Brien 1971), allied genera (e.g., McDermott 1952), and genera (e.g., Kramer 1973). The majority of studies, however, are scattered descriptions of new species (e.g., Beamer 1947).

Faunal surveys include both keys for identification and/or lists of the fulgoroids occurring in states, Canadian provinces or local regions (see Metcalf's catalogs). Only the accounts of Metcalf (1923) for the eastern United States, Dozier (1928) for Mississippi, Osborn (1938) for Ohio, and Van Duzee (1923) for Connecticut provide keys.

No detailed studies of the Illinois planthopper fauna, except for that of Wilson and McPherson (1980), have been published although several systematic studies have included scattered Illinois records (e.g., Mead 1968). Metcalf (1923) presumably included Illinois in his treatment of the planthoppers of eastern North America although this was not stated. His keys, however, are outdated due to subsequent taxonomic revisions, synonymies, and additions of new species (e.g., Beamer 1946a). Many revisions have relied on extensive use of genitalic characters (e.g., Kramer 1977) making correct identification of many species, using available keys, difficult or impossible.

MATERIALS AND METHODS

Construction of keys was facilitated by the examination of ca. 7700 specimens borrowed from the following Illinois institutions; Illinois Natural History Survey (INHS), Urbana; Field Museum of Natural History, Chicago; Eastern Illinois University, Charleston; Illinois State University, Normal; Illinois State Museum, Springfield; Western Illinois University, Macomb; Northern Illinois University, DeKalb; and Loyola University, Chicago. Additional Illinois specimens deposited in the National Museum of Natural History (NMNH) collection (ca. 300 specimens), and the Insect Collection, Zoology Research Museum, Southern Illinois University at Carbondale (ca. 200 specimens), augmented by local field collecting (ca. 2800 specimens), were also examined. The collection in which specimens are deposited is indicated for those species represented by only 1 or 2 specimens.

[1]Part of a dissertation submitted to Southern Illinois University by the senior author in partial fulfillment of the requirements of the Ph. D. degree in Zoology.

[2]Present address: Dept. of Biological Sciences, California State University, Chico, California 95929.

Use of male genitalic features was necessary to identify species in several families. This generally required removal and clearing of the genitalia in the following manner; 1) the abdomen of a specimen was removed by gently grasping it near the base with a pair of fine jeweler's forceps. If the abdomen was securely attached, the specimen was placed in a syracuse dish of warm water for ca. 30 minutes and the abdomen removed while the specimen was immersed; 2) the abdomen was cleared overnight in a KOH solution by placing it in a well of a 24-cup plastic Falcon MultiWell® plate containing a KOH pellet dissolved in distilled water; 3) after sufficient clearing (generally 12-16 hrs.), the abdomen was placed in distilled water for ca. 10 minutes. For examination, the abdomen was placed in a syracuse dish of glycerine to decrease movement. To examine the aedeagus, it often was necessary to gently push the connectives (of the aedeagus and styles) posteriorly with the tine of a sharp pair of forceps, thus forcing the aedeagus out of the pygofer and into view. The genitalia were positioned for illustrating by placing them on sand grains added to the syracuse dish of glycerine. After examination, the genitalia were placed in a small, plastic genitalia capsule containing a drop of glycerine. The capsule was then closed with a plastic stopper.

Drawings of taxonomic characters were made on tracing paper with the aid of a camera lucida.

RESULTS AND DISCUSSION

Specimens of 9 families, 51 genera and 150 species from Illinois were found in the collections examined. An Illinois distribution map for each species is provided by Wilson (1980).

Keys to most (Ashmead 1889; Dozier 1928; Metcalf 1923; Muir 1923; Osborn 1938; Van Duzee 1907, 1923) or all (Borror et al. 1976, Muir 1930) of the North American fulgoroid families are available and adequate for the majority of Illinois planthoppers. However, some groups are difficult or impossible to identify to family using those keys. For example, derbids are identified in most family keys by the presence of a row of apical spines on the 2nd segment of the metatarsi. Fennah (1952) reported that 2 foreign genera have only 2 apical spines on this segment. We found several Illinois derbids which also have only 2 apical spines on this segment.

Planthopper characters used in the present keys are defined as follows: the vertex or dorsum of the head is bordered anteriorly by the anterior margin, posteriorly by the back of the head, and laterally by the eyes (Muir 1915). The frons extends from the vertex ventrally to the frontoclypeal suture and is bordered laterally by carinate margins, and the clypeus extends from the frons to the beak. The vertex and frons (e.g., *A. conica*), the frons (e.g., *Scolops*), or the frons and clypeus (e.g., *Bruchomorpha*) may be anteriorly produced. Each antenna consists of a 2-segmented base and a distal flagellum. Spines or spine-like processes are elongate, spike-like or needle-like extensions of the tibia (Fig. 90), anal tube (e.g., Fig. 32), or aedeagus (Fig. 65). Teeth in delphacids are minute structures on the metatibial spur (Fig 1) or aedeagus (e.g., Fig. 32). As a matter of preference, we used forewings rather than elytra (Van Duzee 1923) or tegmina (Fennah 1944), hindwings rather than wings (Fennah 1944) and, except for "claval suture" by Metcalf (1913), Fennah's (1944) venation terminology.

Several terms have been used to describe male genitalia. The following are used here because they have been recently or frequently used in the literature. These include pygofer (e.g., Kramer 1979) rather than segment IX (Marks 1951); anal tube (e.g., Flynn 1967), rather than anal flap (e.g., Kramer 1979), anal segment (e.g., Giffard 1921) or segment X (e.g., DuBose 1960); anal style (e.g., Metcalf 1949) rather than segment XI (e.g., DuBose 1960); styles (e.g., Kramer 1979) rather than parameres (e.g., Flynn 1967) or gonoforceps (Marks 1951); and aedeagus (e.g., Kramer 1979) rather than phallobase (e.g., O'Brien 1971). In systematic studies of North American species, female genitalia have either not been used or have been used only to a limited extent (e.g., Doering 1932). In some groups (e.g., *Myndus;* see Kramer 1979), female genitalia apparently lack distinguishing characters.

Characters which pertain only to a particular family or genus are discussed with that taxon.

The discussion of families and genera follows the sequence of the occurrence of each in the keys.

Key to Families

1. Metatibia with a large moveable spur present at the distal end (Fig. 1) . . . . . Delphacidae
1'. Metatibia without a moveable spur at the distal end 2
2. Second segment of metatarsi with a distal row of 3 or more spines 3
2'. Second segment of metatarsi with 2 or fewer distal spines 7
3. Transverse sulcus present near juncture of vertex and frons (Figs. 57, 58); anal area of hindwings with reticulate venation; length over 10 mm . . . . . Fulgoridae
3'. Transverse sulcus lacking at juncture of vertex and frons; anal area of hindwings without reticulate venation; size variable 4
4. Forewings overlapping distally (Fig. 2), resting position almost horizontal . . . . . Achilidae
4'. Forewings not overlapping distally, resting position variable 5
5. Clavus with or without a row of pustules (Fig. 68); if pustules absent, either each antenna partially surrounded by well-developed ventral shelf-like extension on side of head (Fig. 76) or the head is compressed laterally (e.g., Figs. 71-75) . . . . . Derbidae
5'. Clavus without a row of pustules; each antenna partially surrounded by a weakly developed ventral shelf-like extension, or extension absent; head not compressed laterally 6
6. Vertex produced with median length 2 or more times length of eye, or not produced; if not produced, profemora foliaceous . . . . . Dictyopharidae
6'. Vertex not produced, median length less than 2 times length of eye; profemora not foliaceous . . . . . Cixiidae
7. Head compressed laterally; antennal appendages present (Figs. 71-74) . . . . . Derbidae
7'. Head not compressed laterally; antennal appendages absent 8
8. Macropterous; clavus with pustules (pustules may be hidden by waxy powder); forewings with many costal crossveins between costal and subcostal veins (Figs. 105, 106) . . . . . Flatidae

8'. Brachypterous or macropterous; clavus without pustules; forewings with few or no costal crossveins, and lacking subcostal vein 9

9. Macropterous; forewings with reticulate venation . . . . . Acanaloniidae

9'. Brachypterous or macropterous; forewings without reticulate venation . . . . . Issidae

Family Delphacidae Leach

The family Delphacidae is easily separated from other families by the presence of a moveable spur or calcar (Fig. 1) at the apex of each metatibia (Metcalf 1923); this spur is flattened or spike-like and if flattened, may have lateral teeth. It is represented in Illinois by 16 genera and 65 species.

Keys for separating delphacid genera are given by Ashmead (1889), Crawford (1914), Metcalf (1923), Muir (1915), Muir and Giffard (1924), Osborn (1938) and Van Duzee (1897, 1907, 1923). Use of those keys may result in misidentifications because they fail to account for variability in some genera, or because of subsequent taxonomic revisions. The following keys have been designed to handle both problem areas.

Most of the characters used in our keys have been adapted from previous works (e.g., the antennae of *Copicerus*). New characters include the number of teeth on the metatibial spur, and the length of the vertex anterior and posterior to the M-shaped carina.

Key to Genera

1. Antennae elongate, reaching beyond mesonotum; segments laterally flattened and foliaceous . . . . . *Copicerus*

1'. Antennae not elongate, not reaching beyond mesonotum; segments usually cylindrical or subclylindrical but if flattened, then not foliaceous 2

2. Frons with 2 median carinae extending from near clypeal border onto vertex (Fig. 3) 3

2'. Frons with 1 median carina (Fig. 5), sometimes forking in dorsal ⅓ and then continuing onto vertex as 2 carinae (Fig. 6) 4

3. Metatibial spur with a longitudinal row of black-tipped teeth; mesonotum with 3 carinae . . . . . *Macrotomella*

3'. Metatibial spur without a row of teeth; mesonotum with 5 carinae . . . . . *Pentagramma*

4. Metatibial spur with a continuous row of black-tipped teeth 5

4'. Metatibial spur without a continuous row of black-tipped teeth although 3 or 4 scattered, minute black-tipped teeth may occasionally be present 17

5. First antennal segment distinctly flattened (Fig. 4) . . . . . *Stobaera*

5'. First antennal segment cylindrical or subcylindrical but if slightly flattened, then median carina of frons forked in dorsal ⅓ — ¼ (Fig. 6) 6

6. Pronotal lateral carinae extending to, or almost to, posterior border of pronotum (Figs. 7, 9, 10); carinae straight or curved so that apices become parallel to midline 7

6'. Pronotal lateral carinae not extending to posterior border of pronotum, apices well separated from border (Figs. 8, 11); carinae straight or divergently curved with apices curved away from midline 14

7. Metatibial spur with 15 or more black-tipped teeth 8

7'. Metatibial spur with fewer than 15 black-tipped teeth 12

8. Length of vertex subequal to width across base; median carina of frons forked at dorsal ⅓ — ¼, each branch of fork sinuate (Fig. 6) . . . . . *Peregrinus*

8'. Length of vertex greater than width across base (subequal in *Prokelisia*); median carina of frons usually forked at apex but if forked below apex, then each branch of fork not sinuate 9

9. Second antennal segment 3 or more times length of first; lateral borders of ventral ½ of frons subparallel (Fig. 5) . . . . . *Stenocranus*

9'. Second antennal segment less than 3 times length of first; lateral borders of ventral ½ of frons generally outwardly convex 10

10. Each mesonotal lateral carina, at base, closer to apex of pronotal lateral carina than to pronotal median carina (Fig. 7) . . . . . *Megamelus*

10'. Each mesonotal lateral carina, at base ca. midway between the apex of pronotal lateral carina and pronotal median carina, or closer to median carina (Fig. 9) 11

11. Vertex with area anterior to M-shaped carina greater than, or equal to, area posterior to carina (e.g., Fig. 8) . . . . . *Pissonotus* (in part)

11'. Vertex with area anterior to M-shaped carina less than area posterior to carina (Fig. 9) . . . . . *Prokelisia*

12. Vertex with area anterior to M-shaped carina greater than, or equal to, area posterior to carina (e.g., Fig. 8.) . . . . . *Pissonotus* (in part)

12'. Vertex with area anterior to M-shaped carina less than area posterior to carina (Fig. 10); occasionally obscure M-shaped carina located just posterior to apex of inverted V-shaped carinae 13

13. Median length of vertex ca. ¾ that of mesonotum (Fig. 10) . . . . . *Kelisia*

13'. Median length of vertex ca. ½ that of mesonotum . . . . . *Prokelisoidea*

14. Metatibial spur with 15 or more black-tipped teeth 15

14'. Metatibial spur with fewer than 15 black-tipped teeth 16

15. Genital styles of males with 2 or 3 processes (Figs. 30B, 31B) . . . . . *Euides*

15'. Genital styles of males with 1 process or processes lacking (Fig. 33B) . . . . . *Delphacodes* (in part)

16. Pro- and mesofemora distinctly flattened, each 2 times width of tarsi; or head and thorax brown with markedly contrasting yellow carinae . . . . . *Pissonotus* (in part)

16'. Pro- and mesofemora not distinctly flattened, each less than 2 times width of tarsi; head and thorax yellow or brown without markedly contrasting carinae . . . . . *Delphacodes* (in part)

17. Pro- and mesofemora and tibiae distinctly flattened, each at least 2 times width of tarsal segments . . . . . *Phyllodinus*

17'. Pro- and mesofemora and tibiae not distinctly flattened, each less than 2 times width of tarsal segments 18

18. Frons, pronotum, and abdominal tergites with many prominent pits . . . . . *Laccocera*

18'. Frons, pronotum, and abdominal tergites with few or no pits 19

19. Vertex with oblique carinae extending from near midline to lateral or posterior borders (Fig. 11) 20

19'. Vertex without oblique carinae (Fig. 12) . . . . . *Liburniella*

20. Frons ovoid, approximately as wide as long . . . . . *Bakerella*

20'. Frons subrectangular, longer than wide 21

21. Anal tube of male, in lateral view, with posteroventral margin behind spine concave; aedeagus straight or curved (e.g., Figs. 37, 45, 46) . . . . . *Delphacodes* (in part)

21'. Anal tube of male, in lateral view, with posteroventral margin behind spine convex or sharply angled; aedeagus straight (Fig. 54) . . . . . *Chloriona*

Genus *Copicerus* Swartz

Copicerus can be separated from other Illinois delphacids by the large oar-like antennae. *C. irroratus* Swartz, the only Illinois representative of the genus, occurs in the central part of the state; it has been recorded from the eastern U. S. (Metcalf 1943).

Genus *Macrotomella* Van Duzee

Macrotomella can be distinguished from other Illinois delphacids by the 2 median carinae on the frons, 3 carinae on the mesonotum, and the flattened metatibial spur with lateral teeth. *M. carinata* Van Duzee, the only species in the genus (Metcalf 1943), has been recorded from the southeastern U. S. (Metcalf 1943). Only one Illinois specimen was found, and is deposited in the INHS collection.

Genus *Pentagramma* Van Duzee

Pentagramma can be separated from other Illinois delphacides by the 2 median carinae on the frons (Fig. 3), 5 carinae on the mesonotum, and the spike-like metatibial spur which lacks lateral teeth. *P. variegata* Penner, the only Illinois representative of the genus, occurs in the northern part of the state; it has been recorded primarily from the northern U. S. (Penner 1947). A key to species is given by Penner (1947).

Genus *Stobaera* Stål

Stobaera can be separated from other Illinois delphacids by the shape of the 1st antennal segment, which is subtriangle in dorsal view and distinctly flattened in cross-section (Fig. 4), and the thickened metatibial spur which bears lateral teeth. *S. tricarinata* (Say), the only Illinois representative of this genus, occurs statewide; it has been recorded from New York to Florida, and west to California and Oregon (Kramer 1973). A key to species is given by Kramer (1973).

Genus *Peregrinus* Kirkaldy

Peregrinus can be distinguished from other Illinois delphacids by the median carina which is forked at the dorsal ⅓ — ¼ with each branch sinuate (Fig. 6). *P. maidis* (Ashmead), the only species in the genus, occurs worldwide except in Europe (Metcalf 1943) and has been found in central Illinois. The only Illinois specimens found during this study are deposited in the INHS collection, and are brachypterous. All had been collected "on corn in greenhouse". It is not known if these specimens had been imported into Illinois for research or had invaded the greenhouse on their own. However, its reported range includes the eastern U. S. (Metcalf 1943) and, thus, it may occur here naturally.

This species is listed as a pest of corn (*Zea mays* Linnaeus) (Ashmead 1890, Barber and Pepper 1942, Forbes 1905, Muir 1917, Quaintance 1898, Thomas 1914), causing feeding damage and serving as a vector of Yellow Stripe Disease (App 1941).

Genus *Stenocranus* Fieber

Stenocranus can be separated from other Illinois delphacids by the short 1st antennal segment, generally subparallel lateral margins of the frons (Fig. 5), and slender elongate body. Eight species apparently occur in Illinois, but 1 of these, *S. dorsalis* (Fitch), is of questionable occurrence. Three Illinois specimens identified as *S. dorsalis* (1 male, 2 females) are deposited in the NMNH collection. Only males can be identified to species, and the Illinois specimen proved to be *S. sandersoni* Beamer. No additional specimen was found. *S. felti* Van Duzee, which has not been recorded from Illinois, is included in the present key because it has been found in Wisconsin and New Hampshire (Beamer 1946a) and, thus, may occur in Illinois.

Genitalic characters are used to separate the 9 species because features used in earlier keys, such as color patterns (e.g., Beamer 1946a), were found to be too variable. Dozier (1922), whose study is outdated, and Beamer (1946a,b) reviewed the North American species.

Key to Species

1. Spine-like processes on anal tube bifid (Fig. 13) . . . . . *S. felti* Van Duzee
1'. Spine-like processes on anal tube not bifid (Figs. 14-20) 2
2. Spine-like processes on anal tube subequal in length 3
2'. Spine-like processes on anal tube distinctly unequal in length 6
3. Each style usually with a median spine (Fig. 14B); aedeagal process, in lateral view, bent ventrally at apex, much broader in basal ⅓ than at apex (Fig. 14A) . . . . . *S. pallidus* Beamer
3'. Each style without a median spine; aedeagal process, in lateral view, usually not bent ventrally at apex but if bent ventrally then process slender, almost same width throughout its length (Figs. 15-17) 4
4. Spine-like processes on anal tube short and broadly rounded posteriorly at base (Fig. 15) . . . . . *S. sandersoni* Beamer
4'. Spine-like processes on anal tube elongate, not broadly rounded posteriorly at base (Figs. 16, 17) 5
5. Styles broadest in apical ½ (Fig. 16B); aedeagus, in lateral view, straight or slightly sinuate (Fig. 16A); aedeagal process, in ventral view, trifid . . . . . *S. similis* Crawford
5'. Styles broadest in basal ½; aedeagus, in lateral view, dorsally arcuate in basal ½ (Fig. 17); aedeagal process, in ventral view, bifid . . . . . *S. delicatus* Beamer
6. Aedeagal process, in lateral view, broadest in basal ⅔ (e.g., Fig. 18) 7
6'. Aedeagal process, in lateral view, subequal in width throughout its length (Figs. 19, 20) 8
7. Aedeagus, in lateral view, abruptly curved dorsally in basal ½; aedeagal process with apex slightly curved (Fig. 18) . . . . . *S. brunneus* Beamer
7'. Aedeagus, in lateral view, straight, not abruptly curved in basal ½; aedeagal process with apex sharply curved ventrally . . . . . *S. dorsalis* (Fitch)
8. Aedeagal process bifid apically (Fig. 19) sometimes apparent only in ventral view . . . . . *S. unipunctatus* Provancher
8'. Aedeagel process not bifid apically (Fig. 20) . . . . . *S. lautus* Van Duzee

Genus *Megamelus* Fieber

Megamelus can be separated from other Illinois delphacids by the closely aligned pronotal and mesonotal lateral carinae, and the head which is usually anteriorly produced. The males are distinguished by the bulbous appearance of the sides of the pygofer (Figs. 21-25). Five species occur in Illinois; records of *M. palaetus* (Van Duzee) are from Wilson and McPherson (1979a). The following key is adapted from Beamer (1955). Scudder (1964) reviewed the Canadian species.

Key to Species

1. Anal tube, in caudal view, with processes (Figs. 21, 22) 2
1'. Anal tube, in caudal view, without processes (Figs. 23-25.) 3
2. Anal processes, in caudal view, arise from basal ½ of anal tube (Fig. 21) . . . . . *M. davisi* Van Duzee
2'. Anal processes, in caudal view, arise from apical ½ of anal tube (Fig. 22) . . . . . *M. lunatus* Beamer
3. Pygofer, in caudal view, with a prominent knob-like process between styles (Fig. 23A); aedeagus bifid at apex (Fig. 23B) . . . . . *M. metzaria* Crawford
3'. Pygofer, in caudal view, with knob-like process between styles absent or very small; aedeagus not bifid at apex (Figs. 24, 25) 4
4. Aedeagus, in lateral view, long and slender, without processes near apex (Fig. 24B) . . . . . *M. distinctus* Metcalf
4'. Aedeagus, in lateral view, short and thick, with a slender, short process at apex. (Fig. 25B) . . . . . *M. palaetus* (Van Duzee)

Genus *Pissonotus* Van Duzee

Pissonotus is difficult to separate from some other Illinois delphacids because of variation within the genus. The head is narrower than the body and the vertex usually subquadrate (Fig. 8). Most species are glossy with the pronotal carinae usually reaching the hind margin. Nine species occur in Illinois. *P. aphidioides* Van Duzee has been recorded from New York and Manitoba, and *P. dorsalis* Van Duzee from New York and Wisconsin (Morgan and Beamer 1949); thus, both may occur in Illinois.

Color patterns, as used by Morgan and Beamer (1949), correlate well with the genitalic characters except in *P. delicatus* Van Duzee and *P. marginatus* Van Duzee. Morgan and Beamer (1949) reviewed the North American species.

Key to Species

1. First antennal segment black 2
1'. First antennal segment brown 4
2. Forewings with dark brown veins . . . . . *P. niger* Morgan and Beamer
2'. Forewings with yellowish veins 3
3. Frons, on dorsal half, brown with pale yellow spots and partial crossbands; on ventral half, pale yellow . . . . . *P. albovenosus* Osborn
3'. Frons brown, without pale markings . . . . . *P. brunneus* Van Duzee
4. Frons marked with yellow spots and/or partial crossbands 5

4'. Frons not marked with yellow spots and/or partial crossbands 6

5. Apex of forewings with a pale transverse stripe . . . . . *P. flabellatus* (Ball)

5'. Apex of forewings without a pale transverse stripe . . . . . *P. aphidioides* (Van Duzee)

6. Dorsal ½ of frons, entire vertex, and usually anterior portion of pronotum black, markedly contrasting with remainder of light body . . . . . *P. guttatus* Spooner

6'. Frons, vertex, and pronotum usually brown but if black, then remainder of body is also black 7

7. Posterior ½ of pronotum white . . . . . *P. aquilonius* Morgan and Beamer

7'. Posterior ½ of pronotum usually brown or black but if white, then white band less than ½ width of pronotum 8

8. Forewings with a granulate row of seta bearing tubercles on each vein . . . . . *P. piceus* (Van Duzee)

8'. Forewings without a granulate row of seta bearing tubercles on each vein although very fine setae may be present 9

9. Abdomen with a broad, pale longitudinal stripe ca. ½ — ⅔ width of abdomen . . . . . *P. dorsalis* Van Duzee

9'. Abdomen without a broad, pale longitudinal stripe 10

10. Aedeagus, in caudal view, with apical process bifid (Fig. 26) . . . . . *P. delicatus* Van Duzee

10'. Aedeagus, in caudal view, with apical process not bifid . . . . . *P. marginatus* Van Duzee

Genus *Prokelisia* Osborn

Prokelisia can be distinguished from most other Illinois delphacids by its subtriangular vertex. It is similar to *Prokelisoidea salina* (Ball) but can be distinguished by the yellow-gold body, different ratio of vertex to mesonotal length (see key to delphacid genera), and distinctive genitalia (Fig. 55). *P. crocea* (Van Duzee), the only Illinois representative of this genus, occurs in the northern part of the state; it has been recorded from Maine south to Connecticut, and west to North Dakota and New Mexico (Metcalf 1943).

This genus appears in need of revision; there are no keys that adequately separate the 4 North American species.

Genus *Kelisia* Fieber

Kelisia can be separated from other Illinois delphacids by the elongate narrow vertex (Fig. 10), relatively broad head and narrow elongate body. Five species occur in Illinois. Two of these, *K. hyalina* Beamer and *K. retrorsa* Beamer, each represented by 1 female specimen deposited in the INHS and NMNH collections, respectively, and identified by R. H. Beamer, are of doubtful occurrence because positive identification relies on characters of the male genitalia. We found that external characters given in Beamer's keys (1945a, 1951b) do not correlate well with the genitalic features; thus, only genitalic characters were used in the following key. Beamer (1945a, 1951b) included descriptions and illustrations of genitalia in his review of the North American species.

Key to Species

1. Anal tube, in lateral view, with a basal spine-like projection on posterior margin (Fig. 27) . . . . . *K. spinosa* Beamer
1'. Anal tube, in lateral view, without a basal spine-like projection on posterior margin (Figs. 28, 29) 2
2. Aedeagus, in lateral view, with ventral lobe subdivided into several finger-like processes (Fig. 28) . . . . . *K. pectinata* Beamer
2'. Aedeagus, in lateral view, with ventral lobe not subdivided into several finger-like processes but consisting of, at most, 2 processes (Fig. 29) 3
3. Aedeagus, in lateral view, with ventral lobe subdivided into 2 processes (Fig. 29) . . . . . *K. curvata* Beamer
3'. Aedeagus, in lateral view, with ventral lobe not subdivided . . . . . *K. hyalina* Beamer
K. retrorsa Beamer

Genus *Prokelisoidea* McDermontt

Prokelisoidea can be separated from most other Illinois delphacids by the subtriangular vertex. It is similar to *Prokelisia crocea* but can be recognized by the greenish yellow body, different ratio of vertex to mesonotal length (see key to delphacid genera), and distinctive genitalia (Fig. 56). This genus is represented in Illinois by *P. salina,* which occurs in the northern part of the state; it has been recorded heretofore only from the western U. S. (McDermott 1952). *Prokelisoidea* and allied genera were reviewed by McDermott (1952).

Genus *Euides* Fieber

Euides can be separated from other Illinois delphacids by the distinctive genitalia (Figs. 30, 31). Two species occur in Illinois.

The term "diaphragm armature" has been used in the following key to refer to any extension of the rim of the diaphragm opening as in *E. weedi* (Van Duzee) (Fig. 30) and some *Delphacodes* spp. (p. 49, Figs. 52, 53). The genitalia of *E. gerhardi* (Metcalf) appear identical to the genitalia of *Nilaparvata wolcotti* Muir and Giffard as illustrated by Muir and Giffard (1924). If examination of the types reveals that they are the same species, the name *gerhardi* Metcalf (1923, 1949) would have priority over *wolcotti* Muir and Giffard (1924). There are no keys that include all of the 5 North American species.

Key to Species

1. Pygofer, in lateral view, with a prominent, hook-like diaphragm armature beneath aedeagal opening (Fig. 30) . . . . . *E. weedi* (Van Duzee)
1'. Pygofer, in lateral view, without a diaphragm armature beneath aedeagal opening (Fig. 31) . . . . . *E. gerhardi* (Metcalf)

Genus *Delphacodes* Fieber

Delphacodes can be separated from other Illinois delphacids by the small size, stout shape and distinctive genitalia (Figs. 32-53). Twenty-four species occur in Illinois. Because data on the distribution of the members of this genus are extremely limited, no attempt has been made to determine which additional species may occur in Illinois. Thus, users of the following key are cautioned to carefully compare the genitalia of their specimens with Figs. 32-53. If there is doubt as to the identity of a specimen, the descriptions and illustrations of Beamer (1946c; 1947; 1948a,b,c; 1950a; 1951a), DuBose (1960), Metcalf (1949), and Muir and Giffard (1924) should be consulted.

Beamer (1946c; 1947; 1948a,b,c; 1950a; 1951a), described ca. ½ of the 116 North American species but did not provide keys. None of the available keys (e.g., Metcalf 1923) use genitalic characters except for that of DuBose (1960) to the North Carolina *Delphacodes*.

We identified several Illinois specimens, deposited in the Eastern Illinois University collection, as *D. mcateei* Muir and Giffard on the basis of the illustration of the aedeagus provided by Muir and Giffard (1924). The genitalia of another specimen, deposited in the INHS collection and identified by Beamer as *D. sagae* Beamer, were also similar to the *D. mcateei* illustration of Muir and Giffard (1924). If examination of the types reveals that they are the same species, the name *mcateei* Muir and Giffard (1924) would have priority over *sagae* Beamer (1946c, 1947).

Three Illinois specimens, deposited in the INHS collection, were identified by Beamer as *D. magna* (Crawford). However, their genitalia (Fig. 48) did not resemble the illustration of *D. magna* given in Muir and Giffard (1924) and we found Muir and Giffard's illustrations of genitalia to be accurate. Furthermore, the genitalia of the 3 specimens did not resemble those of any species of *Delphacodes* illustrated by Beamer (1946c; 1947; 1948a,b,c; 1950a; 1951a), DuBose (1960), Metcalf (1949) or Muir and Giffard (1924). Thus, those specimens may represent an undescribed species. Nevertheless, since no other name was available, we have use *D. magna* in the key to refer to them.

One Illinois female specimen, deposited in the INHS collection, was identified by Beamer as *D. trimaculata* Beamer. Male genitalia were illustrated by Beamer (1948a).

The genitalia of *D. parvula* (Ball) and *D. rotundata* (Crawford) are similar. The shape of the diaphragm armature (defined in the discussion of *Euides*) appears to be the most obvious difference and is used here to separate the 2 species (Figs. 51, 52). Several male *D. parvula* were examined. However, only 1 male *D. rotundata,* deposited in the Eastern Illinois University collection, was found and, thus, variability of the armature shape in this species is unknown.

Key to Species

1. Anal tube with paired spine-like or knob-like processes visible in lateral view (Figs. 32-46) 2
1'. Anal tube without paired spine-like or knob-like processes visible in lateral view (Figs. 47-53) although a small tooth or medially directed spine-like processes may be visible in caudal view (Fig. 48B) 16
2. Anal tube with elongate, dorsally directed spine-like processes originating from posteroventral margin (Fig. 32) . . . . . *D. andromeda* (Van Duzee)
2'. Anal tube without elongate, dorsally directed spine-like processes originating from posteroventral margin (Figs. 33-46) 3
3. Style, in ventral view, with a median spine at base (Fig. 33B) . . . . . *D. basivitta* (Van Duzee)

3'. Style, in ventral view, without a median spine at base although a tubercle may be present or inner angle at base may be acute 4

4. Aedeagus, in lateral view, with a pair of anterodorsally directed processes apically (Fig. 34); aedeagus without teeth . . . . . *D. analis* (Crawford)

4'. Aedeagus, in lateral view, without anterodorsally directed processes apically; aedeagus with or without teeth (Figs. 35-46) 5

5. Aedeagus, in lateral view, constricted in apical ⅓ — ¼ (Fig. 35) . . . . . *D. atrata* Osborn

5'. Aedeagus, in lateral view, not constricted in apical ⅓ — ¼ (Figs. 36-46) although may be hook-like at apex (Fig. 43) 6

6. Aedeagus, in lateral view, markedly curved ventrally, almost forming a right angle (Fig. 36) . . . . . *D. pellucida* (Fabricius)

6'. Aedeagus, in lateral view, usually straight or S-shaped but if curved ventrally, then forming greater than a right angle (Figs. 37-46) 7

7. Aedeagus, in lateral view, with lateral teeth (Figs. 37-43) 8

7'. Aedeagus, in lateral view, without lateral teeth although dorsal or ventral teeth may be present (with ventrolateral teeth in *D. foveata)* (Figs. 44-46) 14

8. Aedeagus, in lateral view, straight or slightly sinuate (Figs. 37-39) 9

8'. Aedeagus, in lateral view, curved ventrally or S-shaped (Figs. 40-43) 11

9. Aedeagus, in lateral view, with basal portion expanded into a large, dorsal granulate lobe (Fig. 37) . . . . . *D. hyalina* Beamer

9'. Aedeagus, in lateral view, with basal portion not expanded into a large, dorsal granulate lobe (Figs. 38, 39) 10

10. Anal tube, in lateral view, with spine-like process elongate, reaching level of ventral margin of anal tube (Fig. 38) . . . . . *D. puella* (Van Duzee)

10'. Anal tube, in lateral view, with spine-like process short, less than ½ the distance to the level of ventral margin of anal tube (Fig. 39) . . . . . *D. pacifica* (Crawford)

11. Aedeagus, in lateral view, S-shaped (Fig. 40) . . . . . *D. alexanderi* (Metcalf)

11'. Aedeagus, in lateral view, curved ventrally (Figs. 41-43) 12

12. Aedeagus, in lateral view, with a lobe on the ventral margin in basal ½ (Fig. 41) . . . . . *D. mcateei* Muir and Giffard
D. sagae Beamer

12'. Aedeagus, in lateral view, without a lobe on the ventral margin in basal ½ although a small tubercle may be present (Figs. 42, 43) 13

13. Aedeagus, in lateral view, with a lateral keel bearing teeth (Fig. 42) . . . . . *D. nitens* Muir and Giffard

13'. Aedeagus, in lateral view, without a lateral keel bearing teeth (Fig. 43) . . . . . *D. perusta* Beamer

14. Aedeagus, in lateral view, curved ventrally, teeth restricted to ventral margin (Fig. 44) . . . . . *D. dolera* (Spooner)

14'. Aedeagus, in lateral view, straight or slightly sinuate, teeth restricted to ventrolateral and/or dorsal margins (Figs. 45, 46.) 15

15. Anal tube, in lateral view, with process short and claw-like, less than 2 times as long as wide (Fig. 45) . . . . . *D. foveata* (Van Duzee)

15'. Anal tube, in lateral view, with process elongate and spine-like, more than 4 times as long as wide (Fig. 46) . . . . . *D. propinqua* (Fieber)

16. Aedeagus, in lateral view, with 1 or 2 large, dorsally directed process or processes (Figs. 47, 48A) 17

16'. Aedeagus, in lateral view, without dorsally directed processes (Figs. 49-53) 18

17. Aedeagus, in lateral view, with 2 dorsally directed processes; aedeagal teeth absent (Fig. 47) . . . . . *D. laminalis* (Van Duzee)

17'. Aedeagus, in lateral view, with 1 dorsally directed process; aedeagal teeth present or absent (Fig. 48A) . . . . . *D. magna* (Crawford)

18. Aedeagal teeth present (Figs. 49-52) 19

18'. Aedeagal teeth absent (Fig. 53) 22

19. Aedeagus, in lateral view, with basal ½ much wider than apical ¼ — ½ (Figs. 49, 50) 20

19'. Aedeagus, in lateral view, with basal ½ ca. as wide as apical ½ (Figs. 51, 52) 21

20. Aedeagus, in lateral view, with at least apical ⅓ narrower than basal ½; apex rounded or pointed (Fig. 49) . . . . . *D. campestris* (Van Duzee)

20'. Aedeagus, in lateral view, with at most apical ¼ narrower than basal ½; apex subtruncate (Fig. 50) . . . . . *D. lutea* Beamer

21. Pygofer, in lateral view, with posterior margin of diaphragm armature almost vertical (Fig. 51) . . . . . *D. parvula* (Ball)

21'. Pygofer, in lateral view, with posterior margin of diaphragm armature sloping posteroventrally (Fig. 52) . . . . . *D. rotundata* (Crawford)

22. Aedeagus, in lateral view, curved ventrally (Fig. 53) . . . . . *D. lutulenta* (Van Duzee)

22'. Aedeagus, in lateral view, almost straight . . . . . *D. trimaculata* Beamer

Genus *Phyllodinus* Van Duzee

Phyllodinus can be separated from other delphacids by the foliaceous pro-and mesofemora and tibiae, and the metatibial spur which lacks lateral teeth. *P. nervatus* (Van Duzee) which has not been recorded from Illinois, is included in the key because it has been found in New York, Michigan and South Dakota (Morgan and Beamer 1949) and, thus, may occur in Illinois. Morgan and Beamer (1949) included *Phyllodinus* in their revision of *Pissonotus* and allied genera.

Genus *Laccocera* Van Duzee

Laccocera can be separated from other delphacids by the many large circular pits on the head, thorax and abdomen. *L. vittipennis* Van Duzee, which has not been recorded from Illinois, is included in the key because it has been found in 13 states, including New York, Michigan and Minnesota (Penner 1945), and, thus, may occur in Illinois. A key to species is provided by Penner (1945) and Scudder (1963).

Genus *Liburniella* Crawford

Liburniella can be separated from other Illinois delphacids by the white mid-dorsal stripe on the head and thorax, the dark patterned forewings, and the lack of oblique carinae on the vertex (Fig. 12). *L. ornata* (Stål), the only Illinois representative of this genus, occurs statewide; it has been found throughout the eastern U. S. (Metcalf 1943).

Genus *Bakerella* Crawford

Bakerella can be separated from other Illinois delphacids by the ovoid frons. This genus is apparently represented in Illinois by *B. muscotana* Beamer and B. *rotundifrons* Beamer, but we were unable to confirm the presence of either species. Two Illinois specimens which had been identified by Beamer as *B. muscotana* and deposited in the INHS collection, were missing from their points. An Illinois female specimen identified as *B. rotundifrons* by Beamer is deposited in the INHS collection; however, only males can be positively identified to species (Beamer 1945b, 1946b, 1950b). No other Illinois specimen of either species was found. The North American species were reviewed by Beamer (1945b, 1946b, 1950b).

Genus *Chloriona* Fieber

Chloriona can be separated from the other Illinois delphacids by the distinctive genitalia (Fig. 54). *C. slossoni* (Ball) is the only Illinois representative of the genus. The only specimen seen during this study was collected in east central Illinois and is deposited in the INHS collection. *C. slossoni* has previously been recorded from the southeastern U. S. (Metcalf 1943).

Family Fulgoridae Dumeril

The family Fulgoridae can be distinguished from other Illinois families by the presence of the transverse sulcus at the juncture of the vertex and frons (Figs. 57, 58), reticulate anal area of the hindwing, and the large size of the various species (>10 mm). It is represented in Illinois by 2 genera with 1 species each.

Key to Genera

1. Vertex produced anteriorly, anterior margin broadly rounded, median length subequal to that of pronotum (Fig. 57) . . . . . *Cyrpoptus*

1'. Vertex not produced anteriorly, anterior margin subtruncate, median length less than that of pronotum (Fig. 58) . . . . . *Poblicia*

Genus *Cyrpoptus* Stål

Cyrpoptus can be separated from *Poblicia* by the characters given in the key. *C. belfragei* Stal, the only Illinois representative of the genus, occurs in the southern part of the state; it has been recorded from the southeastern and south central U. S. (Kramer 1978). A key to the species of *Cyrpoptus* is provided by Kramer (1978).

Genus *Poblicia* Stål

Poblicia can be separated from *Cyrpoptus* by the characters given in the key. *P. fuliginosa* Olivier, the only Illinois representative of this genus, occurs in the southern part of the state; it has been most frequently recorded from the southern U. S. (Metcalf 1947a).

Family Achilidae Stål

The family Achilidae can be distinguished from other Illinois families by the greatly overlapping forewings (Figs. 2, 59-61). It is represented in Illinois by 3 genera and 8 species. Fennah (1950) revised the world genera. The following key is adapted from O'Brien (1971).

Key to Genera

1. Costal cell greater than ¼ width of forewing (Fig. 59); pronotum with lateral area adjacent to eye at least as wide as eye . . . . . *Epiptera*

1'. Costal cell less than ¼ width of forewing (Figs. 60, 61); pronotum with lateral area adjacent to eye, if visible, much narrower than eye 2

2. Forewing with subcostal cell widened posteriorly (Fig. 60) . . . . . *Catonia*

2'. Forewing with subcostal cell narrow throughout its length (Fig. 61) . . . . . *Synecdoche*

Genus *Epiptera* Metcalf

Epiptera can be separated from other Illinois achilids by the relatively wide costal cell of the forewing (Fig. 59) and by the large and flattened appearance of the body. The genus is represented in Illinois by 2 species. *E. pallida* (Say) has been recorded from New York south to Florida, and west to California and Alberta (Metcalf 1947b) and, thus, may occur in Illinois. The Canadian species were reviewed by Beirne (1950b).

Key to Species

1. Face (frons and clypeus) and thoracic pleura with a continuous, pale wide band; forewings very dark brown; costal margin of forewings and

posterior tip of mesonotum with yellow markings . . . . . *E. opaca* (Say)

1'. Face (frons and clypeus) with pale band absent; costal margin of forewings and posterior tip of mesonotum without yellow markings 2

2. Frons and clypeus brown with pale mottling . . . . . *E. variegata* (Van Duzee)

2'. Frons and clypeus brown but without pale mottling . . . . . *E. pallida* (Say)

Genus *Catonia* Uhler

Catonia can be separated from other Illinois achilids by the relatively narrow costal cell and posteriorly broadened subcostal cell of the forewing (Fig. 60). This genus is represented in Illinois by 4 species. *C. bicinctura* Van Duzee has been recorded from Michigan south to Florida and Texas, and *C. lunata* Metcalf from New Jersey south to Florida and west to Texas and Kansas (O'Brien 1971); thus, both may occur in Illinois. The following key is modified from that of O'Brien (1971) who provided keys to the species in America north of Mexico.

Key to Species

1. Frons with 2 dark bands, dorsal band mottled and lighter than ventral band (Fig. 62) . . . . . *C. nava* (Say)

1'. Frons with or without 2 dark bands but if bands present, then dorsal band not mottled (Figs. 63, 64) 2

2. Frons with ventral dark band reaching and extending along frontoclypeal suture for its entire length (Fig. 63) . . . . . *C. bicinctura* Van Duzee

2'. Frons with ventral dark band either not reaching or, if reaching, not extending along frontoclypeal suture for its entire length, or frons unbanded (Fig. 64) 3

3. Frons with pale band at frontoclypeal suture extending to lateral margins of frons (Fig. 64), or frons unbanded; aedeagus without a dorsally extending lobe on dorsal margin (Figs. 65, 66) 4

3'. Frons with pale band at frontoclypeal suture short, not extending to lateral margins of frons, or frons unbanded; aedeagus with dorsally extending lobe on dorsal margin (Fig. 67) 5

4. Frons with pale brown bands or unbanded; aedeagus with 2nd pair of spines subequal in length to 1st (Fig. 65) . . . . . *C. pumila* Van Duzee

4'. Frons usually with very dark brown bands (Fig. 64); aedeagus with 2nd pair of spines much shorter than 1st (Fig. 66) . . . . . *C. cinctifrons* (Fitch)

5. Aedeagus with 2nd pair of spines weakly developed and much shorter than 1st (Fig. 67) . . . . . *C. carolina* Metcalf

5'. Aeadeagus with 2nd pair of spines subequal in length to 1st . . . . . *C. lunata* Metcalf

Genus *Synecdoche* O'Brien

Synecoche can be separated from other Illinois achilids by the relatively narrow costal and subcostal cells. This genus is represented in Illinois by 2 species. *S. dimidiata* (Van Duzee), which has not been recorded from Illinois, is included in the following key because it is found from Ontario south to Florida, and west to Ohio (O'Brien 1971). The following key is modified from that of O'Brien (1971) who provided keys to the species in America north of Mexico.

Key to Species

1. Forewings with many incomplete crossveins, giving wings a pustulate appearance; frons and clypeus pale, frons mottled at level of compound eyes . . . . . *S. grisea* (Van Duzee)
1'. Forewings without incomplete crossveins; frons with large dark spots or bands or completely dark 2
2. Frons completely dark . . . . . *S. dimidiata* (Van Duzee)
2'. Frons pale with 4 subrectangular dark areas . . . . . *S. impunctata* (Fitch)

Family Derbidae Spinola

The family Derbidae can be distinguished from other Illinois families by either a row of pustules on the clavus of the forewing (e.g., Fig. 68), extensions of the side of the head beneath the antennae (e.g., Fig. 76), or a laterally flattened head (e.g., Figs. 71-75). It is represented in Illinois by 11 genera and 29 species.

Keys to the subfamilies, tribes and some genera are given by Metcalf (1938) and Dozier (1928). Keys to genera are given by Fennah (1952), Metcalf (1923) and Osborn (1938).

Key to Genera

1. Hindwings less than ½ length of forewings and barely extending beyond abdomen . . . . . *Euklastus*
1'. Hindwings more than ⅔ length of forewings and extending at least ½ their length beyond abdomen 2
2. Pronotum with an anterolateral, scroll-like extension partially surrounding base of each antenna 3
2'. Pronotum without an anterolateral, scroll-like extension partially surrounding base of each antenna although an extension of the head beneath each antenna may be present (Fig. 76) 4
3. Forewings white; length from head to apex of forewings 7 mm or more . . . . . *Neocenchrea*
3'. Forewings light brownish with brown stripe along basal ⅓ — ½ of costal margin; length from head to apex of forewings 6 mm or less . . . . . *Syntames*
4. Claval suture usually extending to wing margin but if fading distally, then

not separated from margin by an elongate cell (Fig. 68) 5

4'. Claval suture not extending to wing margin, separated from margin by an elongate cell (Figs. 69, 70) 6

5. Head with a large, laterally produced extension beneath each antenna (Fig. 76) . . . . . *Cedusa*

5'. Head without a laterally produced extension beneath each antenna . . . . . *Patara*

6. Antennae with appendages (Figs. 71-74) 7

6'. Antennae without appendages 9

7. Head, in lateral view, broadly rounded anteriorly (Figs. 71, 72) . . . . . *Shellenius*

7'. Head, in lateral view, angulate anteriorly (Figs. 73, 74) 8

8. Head, in lateral view, with dorsal margin sinuate (Fig. 73) . . . . . *Apache*

8'. Head, in lateral view, with dorsal margin nearly straight (Fig. 74) . . . . . *Otiocerus*

9. Forewings with a flap-like extension of costa near base (Fig. 75) . . . . . *Sayiana*

9'. Forewings without a flap-like extension of costa near base 10

10. Forewings with an apical row of 8 or more similarily-sized adjacent cells (Fig. 69) (*Amalopota fitchi* with variable number of cells) . . . . . *Amalopota*

10'. Forewings with an apical row of 5 or fewer similarly-sized adjacent cells (Fig. 70) . . . . . *Anotia*

Genus *Euklastus* Metcalf

Euklastus can be separated from other Illinois derbids by the short hindwings and recurved venation of the forewings (Metcalf 1923). *E. harti* Metcalf, the only species in the genus, occurs in southern Illinois; it has also been recorded from North Carolina (Ball 1928). We have included this species in *Euklastus* even though some authors (e.g., Ball 1928, Fennah 1952) feel that it may belong in *Sikaiana;* to our knowledge, the genotypes have not been compared.

Genus *Neocenchrea* Metcalf

Neocenchrea can be separated from most other Illinois derbids by the scroll-like extension of the pronotum, which surrounds the base of each antenna, and from *Syntames* by the white forewings. *N. heidemanni* (Ball), the only Illinois representative of the genus, occurs in the southern part of the state; it has been recorded from the eastern U. S. (Metcalf 1945). A key to species is given by Metcalf (1938).

Genus *Syntames* Fowler

Syntames can be separated from most other Illinois derbids by the scroll-like extension of the pronotum and from *Neocenchrea* by the brownish forewings. The only Illinois representive of the genus, *S. uhleri* (Ball), occurs in the southern part of the state; it has been recorded from the eastern U. S. (Metcalf 1945). A key to species is given by Metcalf (1938).

Genus *Cedusa* Fowler

Cedusa can be separated from other Illinois derbids by the generally purple to brownish coloration and the lateral extension of the head beneath each antenna (Fig. 76). Eight species occur in Illinois. In addition, a specimen of *C. redusa* McAtee from Kentucky was found in the INHS collection and is included in the following key. Otherwise, no attempt was made to determine which species may occur in Illinois.

The 9 species included in the key are similar in external characters, except for *C. maculata* (Van Duzee) (see following key), thus necessitating use of male genitalia. The aedeagus (e.g., Fig. 80) consists of a basal shaft and apical flagellum which is folded back upon the shaft. The asymmetrical flagellum often bears spines useful in identification.

The genus has been reviewed by Caldwell (1944a), McAtee (1924), Muir (1913) and Flynn (1967). The following key is adapted from Flynn (1967).

Key to Species

1. Forewings pale with distinct light brown markings in cells. . . . . *C. maculata* (Van Duzee)
1'. Forewings usually dark but if pale, then without markings in cells 2
2. Shaft of aedeagus with projections originating in basal ½ (Fig. 77) . . . . . *C. bedusa* McAtee
2'. Shaft of aedeagus without projections originating in basal ½ (Figs. 78-84). 3
3. Styles, in ventral view, with a deep indentation on median margin in basal ½ (Fig. 79B) 4
3'. Styles, in ventral view, without a deep indention on median margin in basal ½ although margin may be sinuate (Figs. 80B, 82B) 5
4. Aedeagal flagellum, in lateral view of right side, with horizontal process bearing teeth (Fig. 78) . . . . . *C. kedusa* McAtee
4'. Aedeagal flagellum, in lateral view of right side, with horizontal process lacking teeth (Fig. 79A) . . . . . *C. incisa* (Metcalf)
5. Aedeagal flagellum, in lateral view of right side, with a bifid process at base (Figs. 80A, 81) 6
5'. Aedeagal flagellum, in lateral view of right side, without a bifid process at base (Figs. 82-84.) 7
6. Aedeagal flagellum, in lateral view of right side, with 3 dorsally directed processes, 2 of which originate from apex of flagellum (Fig. 80A) . . . . . *C. australis* (Metcalf)
6'. Aedeagal flagellum, in lateral view of right side, with 2 dorsally directed processes, neither of which originates from apex of flagellum (Fig. 81) . . . . . *C. redusa* McAtee
7. Styles with apical hook (e.g., Fig. 80B) 8
7'. Styles without apical hook (Fig. 82B) . . . . . *C. edentula* (Van Duzee)
8. Aedeagal flagellum, in lateral view of right side, with a dorsoanteriorly

directed scrool-like process, a slender, curved horizontal process arising from middle of flagellum, and a shorter straight process arising from apex (Fig. 83) . . . . . *C. vulgaris* (Fitch)

8'. Aedeagal flagellum, in lateral view of right side, without either a dorso-anteriorly directed scroll-like process or a horizontal process arising from middle of flagellum, but with a slender elongate curved process arising from apex (Fig. 84) . . . . . *C. obscura* (Ball)

Genus *Patara* Westwood

Patara can be separated from other Illinois derbids by its dark reddish color and the presence of 4 cells between the media and cubitus of the forewing (Fig. 68). *P. vanduzei* Ball, the only Illinois respresentative of this genus, occurs in the southern part of the state; it has been recorded from the eastern U. S. (Metcalf 1945).

Genus *Shellenius* Ball

Shellenius can be separated from other Illinois derbids by the broadly rounded, laterally flattened head and presence of antennal appendages (Figs. 71, 72). Two species occur in Illinois. Keys to species are provided by Ball (1928) and McAtee (1923).

Key to Species

1. Head, in lateral view, curved dorsally (Fig. 71) . . . . . *S. schellenbergii* (Kirby)

1'. Head, in lateral view, not curved dorsally (Fig. 72) . . . . . *S. ballii* (McAtee)

Genus *Apache* Kirkaldy

Apache can be separated from other Illinois derbids by the acuminate, laterally flattened head which is sinuate dorsally, the presence of antennal appendages (Fig. 73), and its large size and reddish color. *A. degeerii* (Kirby), the only Illinois representative of this genus, occurs statewide; it has been recorded from the eastern and central U. S. (Metcalf 1945).

Genus *Otiocerus* Kirby

Otiocerus can be separated from other Illinois derbids by the angulate apex of the head and the presence of antennal appendages (Fig. 74). Six species occur in Illinois. The species are presently separated by the color patterns on the head and forewings (Ball 1928, McAtee 1923), but these characters seem to be unreliable. For example, specimens identified as *O. signoretii* Fitch, deposited in the Eastern Illinois University and INHS collections, proved to be females of *O. stollii* Kirby. This genus is apparently in need of revision.

Key to Species

1. Forewings whitish, almost all cells containing a brown spot or spots 2

1'. Forewings yellowish or reddish, usually few cells with spots 3

2. Forewings with a discontinuous brown stripe extending from apex of clavus obliquely across wing . . . . . *O. francilloni* Kirby

2'. Forewings without a discontinous stripe . . . . . *O. abbotii* Kirby
3. Forewings with 6 or more apical cells with a spot near outer margin 4
3'. Forewings with 5 or fewer apical cells with a spot near outer margin 5
4. Head, in lateral view, with a black mark at or near apex (Fig. 74) . . . . . *O. wolfii* Kirby
4'. Head, in lateral view, without a black mark at or near apex . . . . . *O. amyotii* Fitch
5. Forewings with several spots, color dark red without a stripe (males) or yellowish with a dull brownish stripe extending from along clavus and branching posteriorly (females) . . . . . *O. stollii* Kirby
5'. Forewings without spots, color pale yellow with a bright reddish stripe extending along clavus and then branching posteriorly . . . . . *O. coquebertii* Kirby

Genus *Sayiana* Ball

Sayiana can be separated from other Illinois derbids by the whitish color, costal extension on the forewings, and large antennae (Fig. 75). *S. sayi* (Ball), the only species in the genus (Metcalf 1945), occurs in the southern and central parts of Illinois; it has been recorded from the eastern U. S. (Metcalf 1945).

Genus *Amalopota* Van Duzee

Amalopota can be separated from other Illinois derbids by the laterally flattened head, the absence of antennal appendages, and, in *A. mcateei* Dozier and *A. uhleri* Van Duzee, by an apical row of 8 or more similarly-sized adjacent cells on the forewing (Fig. 69). *A. fitchi* Van Duzee, in which the number of adjacent cells appears to be variable, is similar in general appearance to some *Anotia* spp. but can be separated from them and other species of *Amalopota* by the dark brown patterned forewings (illustrated by Metcalf (1923)). Three species occur in Illinois. Keys for separating the species of *Amalopota* are given by Dozier (1928) and Metcalf (1923). Fennah (1952) believed that *Amalopota* and *Anotia* are synonymous. Both appear in need of revision.

Key to Species

1. Forewings with brown or red in apical ½ 2
1'. Forewings without brown or red in apical ½ . . . . . *A. mcateei* Dozier
2. Forewings with a broad, pale transverse band in middle . . . . . *A. uhleri* Van Duzee
2'. Forewings without a broad, pale transverse band in middle . . . . . *A. fitchi* Van Duzee

Genus *Anotia* Kirby

Anotia can be separated from other derbids by the laterally flattened head, absence of antennal appendages, and presence of an apical row of 5 or fewer similarly-sized adjacent cells on the forewing (Fig. 70) (except for *A. fitchi;* see discussion under *Amalopota).* Four species occur in Illinois.

The species of *Anotia* are presently separated by color patterns on the abdomen and forewings (e.g., Metcalf 1923, 1938). However, specimens we identified as *A. burnetii* Fitch, on the basis of dark markings on the abdomen, have differently shaped styles indicating that at least 2 species may have a dark abdomen.

Key to Species

1. Abdomen with dark markings dorsally . . . . . *A. burnetti* Fitch
1'. Abdomen without dark markings dorsally 2
2. Apical border of forewings with distinct dark spots in cells . . . . . *A. bonnetii* Kirby
2'. Apical border of forewings without distinct dark spots in cells 3
3. Forewings with some dark veins . . . . . *A. kirkaldyi* Ball
3'. Forewings without dark veins, although veins may be bordered by dark brown . . . . . *A. westwoodii* Fitch

Family Dictyopharidae Spinola

The family Dictyopharidae can be distinguished from other Illinois families by the prolongation of the head, except for *Phylloscelis* which is characterized by foliaceous profemora. It is represented in Illinois by 4 genera and 8 species. Keys for separating the genera are given by Dozier (1928), Metcalf (1923) and Osborn (1938); Gibson's (1917) review of the genus *Dictyophara* included species in several currently recognized dictyopharid genera.

Key to Genera

1. Profemora foliaceous; vertex not produced anteriorly, median length less than 2 times length of eye . . . . . *Phylloscelis*
1'. Profemora not foliaceous; vertex greatly produced anteriorly, median length 2 or more times length of eye 2
2. Forewings opaque, brownish or grayish; body brown . . . . . *Scolops*
2'. Forewings translucent, green-hyaline; body green 3
3. Vertex with median length ca. 2 times length of eye . . . . . *Nersia*
3'. Vertex with median length at least 4 times length of eye . . . . . *Rhynchomitra*

Genus *Phylloscelis* Germar

Phylloscelis can be separated from other Illinois dictyopharids by the foliaceous profemora and beetle-like appearance. Only *P. atra* Germar and *P. pallescens* Germar occur in Illinois. *P. atra* has 2 color forms, 1 of which is all black; the other, 'var. *albovenosa*' (Metcalf 1945), is black except for the yellow pronotum and yellowish veins. The genus was reviewed by Ball (1930). The cranberry toadbug, *P. rubra* Ball, which occurs in the eastern U.S., causes feeding damage to cranberries (*Vaccinium macrocarpon* Aiton) (Ball 1930, Scammell 1917, Sirrene and Fulton 1914).

Key to Species

1. Forewings with 3 or 4 longitudinal veins that may fork distally, color black or with black and yellow stripes . . . . . *P. atra* Germar
1'. Forewings with 8 or more longitudinal veins, color brown with yellow mottling along veins . . . . . *P. pallescens* Germar

Genus *Scolops* Schaum

Scolops can be separated from other Illinois dictyopharids by the brownish forewings and slender, elongate frontal process. Four species occur in Illinois. The genus was reviewed by Breakey (1929) and Uhler (1900). The characters used in the following key are adapted from Breakey (1929).

Key to Species

1. Forewings with many crossveins in apical ⅓ — ¼ (Fig. 85) . . . . . *S. sulcipes* (Say)
1'. Forewings with few crossveins in apical ⅓ — ¼ (Figs. 86, 87) 2
2. Costal vein and cell white without fuscous markings . . . . . *S. angustatus* Uhler
2'. Costal vein and cell spotted with fuscous or gray 3
3. Forewings usually with fork on clavus and forks of media and cubitus nearly equidistant from each other (Fig. 86); aedeagus, in lateral view, with a heavily sclerotized ventral process; anal tube, in lateral view, with length of segment XI less than or equal to ⅔ length of anal style (Fig. 88) . . . . . *S. pungens* (Germar)
3'. Forewings usually with fork of cubitus closer to fork on clavus then to fork of media (Fig. 87); aedeagus, in lateral view, with a weakly sclerotized ventral process; anal tube, in lateral view, with length of segment XI subequal to length of anal style (Fig. 89) . . . . . *S. perdix* Uhler

Genus *Nersia* Stål

Nersia can be separated from other Illinois dictyopharids by the green body, clear forewings, and relatively short frontal process. *N. florens* Stål, which was included in Gibson's (1917) key as *Dictyophara florens,* is the only Illinois representative of the genus and occurs in the southern part of the state; it has been recorded from the southeastern and south central U. S. south to Central and South America (Metcalf 1946).

Genus *Rhynchomitra* Fennah

Rhynchomitra can be separated from other Illinois dictyopharids by the green body, clear forewings, and relatively long frontal process. *R. microrhina* (Walker), which was included in Gibson's (1917) key as *Dictyophara microrhina,* is the only Illinois representative of this genus and occurs in the southern part of the state; it has been recorded from the southeastern U. S. (Metcalf 1945).

Family Cixiidae Spinola

Most members of the family Cixiidae have no striking characteristics that easily distinguish them from other Illinois families, but can be separated from them by characters given in the key to families. This family is represented in Illinois by 7 genera and 22 species. The following key is adapted from Mead (1979).

Key to Genera

1. Antennae anterior to eyes and sunk in ear-like cavities . . . . . *Bothriocera*
1'. Antennae below eyes and not sunk in cavities 2
2. Forewings barely extending beyond apex of abdomen . . . . . *Monorachis*
2'. Forewings extending at least ¼ of their length beyond abdomen 3
3. Metatibiae with spines on lateral margin (Fig. 90) 4
3'. Metatibiae without spines on lateral margin 6
4. Wings strongly sloping downward laterally, almost vertical; forewings brown throughout and almost opaque . . . . . *Pintalia*
4'. Wings not strongly sloping downward laterally, roof-like or tent-like; forewings with some dark markings and usually translucent 5
5. Vertex with posterior margin angulate . . . . . *Oliarus*
5'. Vertex with posterior margin broadly rounded . . . . . *Cixius*
6. Vertex broadened posteriorly, width greater than ½ width of eye; pronotum with 3 longitudinal carinae . . . . . *Myndus*
6'. Vertex subparallel or narrowed posteriorly, width less than ½ width of eye; pronotum with 5 longitudinal carinae . . . . . *Oecleus*

Genus *Bothriocera* Burmeister

Bothriocera can be separated from other Illinois cixiids by the location of the antennae in ear-like cavities anterior to the eyes, and the superficial resemblance to psychodid flies. *B. signoreti* Stål, the only Illinois representative of this genus, occurs in the southern part of the state; it has been recorded from the southeastern U. S. (Metcalf 1936). The identification of Illinois specimens was based on external characters. However, the genitalia of these specimens do not resemble the illustrations given by Caldwell (1943). The genus appears in need of revision.

Genus *Monorachis* Uhler

Monorachis can be separated from other Illinois cixiids by the stout body and short forewings. *M. sordulentus* Uhler, the only species in the genus (Metcalf 1936), occurs in the southern part of Illinois; it has been recorded from the southeastern U. S. (Metcalf 1936). The only specimen from Illinois is deposited in the INHS collection.

Genus *Pintalia* Stål

Pintalia can be separated from other Illinois cixiids by the deeply sloping forewings, the superficial resemblance to derbids, and the spines on the lateral margin of the metatibiae which are relatively small and may be obscured by setae. *P. dorsovittatus* (Van Duzee), the only Illinois representative in the genus, occurs in the southern part of the state; it has been recorded from the southeastern U. S. (Metcalf 1936). The genus was reviewed by Caldwell (1944b) and Muir (1934) but appears in need of revision.

Genus *Oliarus* Stål

Oliarus can be separated from other Illinois cixiids by the angulate posterior margin of the vertex and generally hyaline, tent-like forewings. Seven species occur in Illinois. Since little distributional data are available, no attempt was made to include species of possible occurrence in Illinois. Thus, users of the key are cautioned to carefully compare the genitalia with the illustrations (Figs. 91-97). If there is any doubt as to the identify of a specimen, the descriptions and illustrations of Mead (1968) should be consulted. The genus was reviewed by Ball (1934), now outdated, and revised by Mead (1968). The following key was adapted from Mead (1968).

Key to Species

1. Forewings with apical ⅓ uniformly brown; aedeagus, in ventral view, with 1 median and 2 lateral spines (Fig. 91.) . . . . . *O. humilis* (Say)

1'. Forewings with apical ⅓ clear or with brown markings; aedeagus not as above (Figs. 92-97) 2

2. Aedeagus, in ventral view, with a single, large posteriorly directed process bearing many small spines (Fig. 92) . . . . . *O. quinquelineatus* (Say)

2'. Aedeagus, in ventral view, with several posteriorly directed processes, none bearing small spines (Figs. 93-97) 3

3. Aedeagus, in ventral view, with a loop curved to the left (Fig. 93) . . . . . *O. aridus* (Ball)

3'. Aedeagus, in ventral view, without a loop (Figs. 94-97) 4

4. Pygofer, in ventral view, with median process broadly expanded; aedeagus, in ventral view, with 2 large bifid processes (Fig. 94) . . . . . *O. placitus* Van Duzee

4'. Pygofer, in ventral view, with median process not broadly expanded; aedeagus, in ventral view, without 2 large bifid processes (Figs. 95-97) 5

5. Aedeagus, in ventral view, with a large bifid process at base of flagellum and a long dorsal sinuate spine on right (Fig. 95) . . . . . *O. ecologus* Caldwell

5'. Aeadeagus, in ventral view, without a large bifid process at base of flagellum and a long dorsal sinuate spine on right (Figs. 96, 97) 6

6. Aedeagus, in ventral view, with flagellum spinose apically (Fig. 96) . . . . . *O. sablensis* Caldwell

6'. Aedeagus, in ventral view, with flagellum subtriangular apically (Fig. 97) . . . . . *O. chuliotus* Ball

Genus *Cixius* Latreille

Cixius can be separated from other Illinois cixiids by the boadly rounded, posterior margin of the vertex and the generally hyaline, tent-like forewings. Four species occur in Illinois. Our identifications were based on comparisons of genitalia with the illustrations given by Osborn (1938). Color pattern characters, as in the keys of Beirne (1950a) and Metcalf (1923), are generally unreliable (Kramer, pers. comm.). The following key is adapted from Beirne (1950a). J. P. Kramer is currently revising the group (pers. comm.).

Key to Species

1. Vertex with length subequal to width, and triangularly shaped . . . . . *C. stigmata* (Say)
1'. Vertex with length much less than width, and not triangularly shaped 2
2. Forewings almost opaque, entirely brown . . . . . *C. pini* Fitch
2'. Forewings hyaline, often with brown markings 3
3. Forewings usually with a dark basal transverse band; length from head to apex >5.5 mm . . . . . *C. basalis* Van Duzee
3;. Forewings without a dark basal transverse band; length from head to apex <5 mm . . . . . *C. coloepeum* Fitch

Genus *Myndus* Stål

Myndus can be separated from other Illinois cixiids by the vertex which widens posteriorly, and by the lack of spines on the lateral margin of the metatibiae. Four species occur in Illinois. *M. ovatus* Ball has been recorded from Georgia, Iowa, Kansas, Maryland, Massachusetts, New Jersey and Virginia (Kramer 1979) and, thus, may occur in Illinois. The following key, adapted from Kramer (1979), separates 3 of the 5 species on the basis of characters of the aedeagus; however, the aedeagus of *M. pictifrons* Stål (Fig. 100) is quite variable (Kramer 1979). This genus was reviewed by Ball (1933), now outdated, and revised by Kramer (1979).

Key to Species

1. Frons with dark transverse bands 2
1'. Frons without dark transverse bands 4
2. Aedeagus, in lateral view, with a large dorsoposteriorly directed process (Fig. 98) . . . . . *M. truncatus* Metcalf
2'. Aedeagus, in lateral view, without a dorsoposteriorly directed process (Figs. 99, 100) 3
3. Aedeagus, in lateral view, with the ventroanteriorly directed process on left side spatulate or subtruncate (Fig. 99) . . . . . *M. radicis* Osborn (in part)
3'. Aedeagus, in lateral view, with the ventroanteriorly directed process on left side tapered, not spatulate (Fig. 100) . . . . . *M. pictifrons* Stål
4. Anal tube with large lobe on ventral margin in basal ½ . . . . . *M. ovatus* Ball
4'. Anal tube without lobe on ventral margin in basal ½ (Fig. 99) 5

5. Vertex broad, interocular space ca. as wide as eye or wider . . . . . *M. fulvus* Osborn

5'. Vertex narrow, interocular space much narrower than eye . . . . . *M. radicis* Osborn (in part)

Genus *Oecleus* Stal

Oecleus may be separated from other Illinois cixiids by the narrow vertex and small size. Four species occur in Illinois. The Illinois records of *O. chrisjohni* Kramer and *O. epetrion* Kramer are from Wilson and McPherson (1979b). The genus was reviewed by Ball and Klingenberg (1935) and Caldwell (1944c), and revised by Kramer (1977).

Key to Species

1. Pygofer with a narrow and spatulate median lobe; aedeagus, in ventral view, with 2 short processes on left (Fig. 101) . . . . . *O. chrisjohni* Kramer

1'. Pygofer with a broad and triangular or subtriangular median lobe; aedeagus not as above (Figs. 102-104) 2

2. Aedeagus, in ventral view, with 2 long slender processes on left (Fig. 102) . . . . . *O. borealis* Van Duzee

2'. Aedeagus, in ventral view, with 1 short process on left and 1 short median process (Figs. 103, 104) 3

3. Aedeagus, in ventral view, with left process needle-like (Fig. 103) . . . . . *O. epetrion* Kramer

3'. Aedeagus, in ventral view, with left process stout, not needle-like (Fig. 104) . . . . . *O. productus* Metcalf

Family Flatidae Spinola

The family Flatidae can be separated from other Illinois families by the presence of a row of many crossveins between the costal and subcostal veins, and by the granulate appearance of the clavus (Figs. 105, 106). It is represented in Illinois by 4 genera and 4 species. Keys to the flatid genera and species are given in Dozier (1928), Metcalf (1923), Osborn (1938) and Van Duzee (1923).

Key to Genera

1. Forewings, in lateral view, greatly narrowed posteriorly . . . . . *Cyarda*

1'. Forewings, in lateral view, subequal in width for most of their length or broader posteriorly 2

2. Body dark bluish gray or brown (may be obscured by white waxy powder) . . . . . *Metcalfa*

2'. Body bluish green or pale green (may be obscured by white waxy powder) 3

3. Forewings broadly rounded posteriorly and with 1 subapical crossvein (Fig. 105) . . . . . *Ormenoides*

3'. Forewings truncate posteriorly and with 2 subapical crossveins (Fig. 106) . . . . . *Anormenis*

Genus *Cyarda* Walker

Cyarda can be separated from other Illinois flatids by the forewings which are greatly narrowed posteriorly. *C. melichari* Van Duzee, the only Illinois representative of this genus, occurs in the southern part of the state; it has been recorded from the southeastern U. S. and West Indies (Metcalf 1957).

Genus *Metcalfa* Caldwell and Martorell

Metcalfa can be separated from other Illinois flatids by the forewings which are bluish gray to brown, and subequal in width for most of their length. *M. pruinosa* (Say), the only representative of this genus in America north of Mexico (Metcalf 1957), occurs throughout Illinois; it has been recorded from Quebec south to Florida, and west to Minnesota and California, as well as Bermuda, Cuba, Jamaica, Puerto Rico, Mexico, Central America and Brasil (Metcalf 1957).

Genus *Ormenoides* Melichar

Ormenoides can be separated from other Illinois flatids by the forewings which are bluish green to pale green, subequal in width, and have 1 subapical crossvein (Fig. 105). *O. venusta* (Melichar), the only Illinois representative of this genus, occurs in the southern part of the state; it has been recorded from Maryland south to Florida, and west to Missouri and Texas (Metcalf 1957).

Genus *Anormenis* Melichar

Anormenis can be separated from other Illinois flatids by the forewings which are bluish green to pale green, broaden posteriorly, and have 2 subapical crossveins (Fig. 106). *A. septentrionalis* (Spinola), the only Illinois representative of this genus, occurs throughout the state; it has been recorded from Connecticut south to Florida, and west to Iowa and Arizona (Metcalf 1957).

Family Acanaloniidae Amyot and Serville

The family Acanaloniidae can be separated from other Illinois families by the generally green body color, and the reticulate venation of the vertically held forewings. It is represented in Illinois by 1 genus, *Acanalonia,* and 2 species. Fennah (1954) included this family as a subfamily of Issidae. However, we have followed Metcalf (1954b) in treating the Acanaloniidae as a separate family.

Genus *Acanalonia* Spinola

Two species of *Acanalonia, A. bivittata* (Say) and *A. conica* (Say), occur in Illinois. *A. bivittata* has 2 color forms, 1 of which is green, the other, 'var. *rubra'* (Metcalf 1954b), which is reddish. Keys to species are given in Dozier (1928), Metcalf (1923) and Osborn (1938). The genus was reviewed by Doering (1932).

Key to Species

1. Forewings with hind margin broadly rounded; 2 dorsal longitudinal brown stripes extending from pronotum onto forewings; vertex slightly produced beyond eyes (Fig. 107) . . . . . *A. bivittata* (Say)

1'. Forewings with hind margin subtruncate; dorsal stripes lacking; vertex conical produced markedly beyond eyes (Fig. 108) . . . . . *A. conica* (Say)

Family Issidae Spinola

The family Issidae has no striking characteristics that easily distinguish it from other families, but can be recognized by those characters given in the key to families. It is represented in Illinois by 3 genera and 10 species. The subfamilies of the world were revised by Fennah (1954). The Issidae in America north of Mexico were reviewed by Doering (1936, 1938, 1940, 1941).

Key to Genera

1. Pronotum and mesonotum with many distinct circular pits; pronotum with a median carina 2
1'. Pronotum and mesonotum with, at most, a few obscure circular pits; pronotum without a median carina . . . . . *Thionia*
2. Frons, in lateral view, usually with margin sharply concave but if margin nearly straight, then pro- and mesotibiae flattened and expanded . . . . . *Fitchiella*
2'. Frons, in lateral view, with margin nearly straight or slightly convex; pro- and mesotibiae not flattened and expanded 3
3. Frons with 15 or fewer pits between lateral margin and each lateral carina 4
3'. Frons with 20 or more pits between lateral margin and each lateral carina . . . . . *Aphelonema* (in part)
4. Frons, in lateral view, sloping posteroventrally . . . . . *Aphelonema* (in part)
4'. Frons, in lateral view, sloping anteroventrally . . . . . *Bruchomorpha*

Genus *Thionia* Stål

Thionia can be separated from other Illinois issids by the lack of pits on the thorax, and the relatively large size and robust appearance. Three species occur in Illinois. The species in America north of Mexico were reviewed by Doering (1938).

Key to Species

1. Frons impunctate; body light brown with few or no dark markings . . . . . *T. simplex* (Germar)
1'. Frons punctate, at least along lateral margins; body medium to dark brown, heavily marked with dark brown to black 2
2. Frons with 1 carina (Fig. 109) . . . . . *T. elliptica* (Germar)
2'. Frons with 3 carinae (Fig. 110) . . . . . *T. bullata* (Say)

Genus *Fitchiella* Van Duzee

Fitchiella can be separated from other Illinois issids by the concave shape of the dorsal margin of the frons (*F. robertsonii* (Fitch)) or, if the margin is straight, by the flattened and expanded pro- and mesotibiae (Doering 1941). *F. robertsonii* was listed by Metcalf (1958) as occurring in Illinois.

However, no Illinois specimens were found in any of the collections examined and thus, the record is questionable. Keys to the species of *Fitchiella* were provided by Doering (1941) and Lawson (1933).

Genus *Aphelonema* Uhler

Aphelonema can be separated from other Illinois issids by the short frontal process and weevil-like appearance. Two species occur in Illinois. The species in America north of Mexico were reviewed by Bunn (1930) and Doering (1941).

Key to Species

1. Pronotum with median length subequal to that of vertex; forewings with black and yellow longitudinal dorsal stripes . . . . . *A. histrionica* (Stål)
1'. Pronotum with median length ca. 2 times that of vertex; body uniformly reddish brown . . . . . *A. simplex* Uhler

Genus *Bruchomorpha* Newman

Bruchomorpha can be separated from other Illinois issids by the generally elongate frontal process, the brownish to black body which may be marked with yellow, and the weevil-like appearance. Five species occur in Illinois. The species in America north of Mexico were reviewed by Ball (1935) and Doering (1940).

Key to Species

1. Frons, in dorsal view, with median length greater than length of eye; body black with a dorsal yellowish stripe that is usually restricted to head and thorax . . . . . *B. oculata* Newman
1'. Frons, in dorsal view, with median length less than length of eye; body black, brown or yellowish with length of dorsal stripe, if present, variable 2
2. Legs dark brown to black . . . . . *B. tristis* Stål
2'. Legs yellow, with or without brown markings 3
3. Body black with a dorsal yellow stripe that is restricted to head, or head and thorax . . . . . *B. pallidipes* Stål
3'. Body black, brown, or reddish brown, with a dorsal yellow stripe that extends from head onto abdomen, or body yellowish 4
4. Body black or brown with a dorsal yellow stripe that extends from head onto abdomen, often to apex . . . . . *B. dorsata* Fitch
4'. Body reddish brown or yellowish with a brown spot on clypeus; males with dark areas on forewings . . . . . *B. jocosa* Stål

ACKNOWLEDGMENTS

We wish to thank the following faculty members of Southern Illinois University (SIUC), Carbondale, for their critical reviews of the manuscript: Drs. R. A. Brandon, B. M. Burr, W. G. Dyer, Department of Zoology and R. H. Mohlenbrock, Department of Botany.

We would also like to thank the following individuals for the loan of specimens from the collections of their respective institutions: Drs. E. D. Cashatt, Illinois State Museum, Springfield; W. A. Garthe, Northern Illinois University, DeKalb; R. W. Hamilton, Loyola University, Chicago; E. L. Mockford, Illinois State University, Normal; G. T. Riegel, Eastern Illinois University, Charleston; Y. S. Sedman, Western Illinois University, Macomb; E. H. Smith, Field Museum of Natural History, Chicago; and Mr. D. W. Webb, Illinois Natural History Survey, Urbana. We are indebted to Dr. J. P. Kramer, National Museum of Natural History, Smithsonian Instituition, Washington, D. C., for his valuable suggestions and for the loan of specimens.

We are grateful for funds provided to the senior author by the following institutions for a visit to the National Museum of Natural History, Washington, D. C.: Smithsonian Institution, Washington, D. C.; Sigma Xi; and the Graduate School and the College of Science, SIUC.

This research was partially funded by the U.S.D.A. Forest Service (Cooperative Research Agreement No. 13-495).

LITERATURE CITED

APP, B. A. 1941. A report of some investigations on the corn insects of Puerto Rico. J. Agric. Univ. Puerto Rico 25: 21-31.

ASHMEAD, W. H. 1889. A generic synopsis of the Fulgoridae. Entomol. Americana 5: 1-6, 21-28.

_____. 1890. The corn Delphacid, *Delphax maidis* Psyche 5: 321-324.

BALL, E. D. 1928. Some new genera and species of N. A. Derbidae with notes on others (Fulgoridae). Can. Entomol. 60: 196-201.

_____. 1930. The toadhoppers of the genus *Phylloscelis* Germ. Can. Entomol. 62:192-195.

_____. 1933. The genus *Myndus* Stål in North America. J. Wash. Acad. Sci. 23: 478-484.

_____. 1934. The genus *Oliarus* and its allies in North America. J. Wash. Acad. Sci. 24: 268-276.

_____. 1935. The genus *Bruchomorpha* Newman (Homoptera-Fulgoridae). Bull. Brooklyn Entomol. Soc. 30: 197-203.

_____ and P. KLINGENBERG. 1935. The genus *Oecleus* in the United States (Homoptera:Fulgoridae). Ann. Entomol. Soc. Amer. 28: 193-213.

BARBER, G. W. and B. B. PEPPER. 1942. The corn lanternfly in New Jersey (Homoptera:Fulgoridae). Entomol. News 53: 22.

BEAMER, R. H. 1945a. The genus *Kelisia* in America north of Mexico (Homoptera-Fulgoridae-Delphacinae). J. Kansas Entomol. Soc. 18: 100-108.

_____. 1945b. Four new species in the genus *Bakerella* (Homoptera-Fulgoridae-Delphacinae). J. Kansas Entomol. Soc. 18: 149-154.

_____. 1946a. The genus *Stenocranus* in America north of Mexico (Homoptera-Delphacinae). J. Kansas Entomol. Soc. 19: 1-11.

_____. 1946b. A new species of *Stenocranus* and notes on a *Bakerella* (Homoptera-Fulgoridae-Delphacinae). J. Kansas Entomol. Soc. 19: 137-138.

_____. 1946c. Some new species of *Delphacodes* (Homoptera, Fulgoridae, Delphacinae). J. Kansas Entomol. Soc. 19: 139-144.

_____. 1947. Some new species of *Delphacodes* (continued) with two old ones (Homoptera, Fulgoridae, Delphacinae). J. Kansas Entomol. Soc. 20: 58-71.

_____. 1948a. Some new species of *Delphacodes* (continued) (Homoptera, Fulgoridae, Delphacinae). Part III. J. Kansas Entomol. Soc. 21: 1-10.

_____. 1948b. Some new species of *Delphacodes* (Homoptera, Fulgoridae, Delphacinae). Part IV. J. Kansas Entomol. Soc. 21: 96-110.
_____. 1948c. Some new species of *Delphacodes* (Homoptera, Fulgoridae, Delphacinae). Part V. J. Kansas Entomol. Soc. 21: 111-119.
_____. 1950a. *Delphacodes detecta* (Van D.) and a new closely related species (Homoptera-Fulgoridae-Delphacinae). J. Kansas Entomol. Soc. 23: 68-70.
_____. 1950b. The genus *Bakerella* in North America north of Mexico (Homoptera-Fulgoridae-Delphacinae). J. Kansas Entomol. Soc. 23: 102-109.
_____. 1951a. Some species of *Delphacodes,* new and old (Homoptera-Fulgoridae-Delphacinae). J. Kansas Entomol. Soc. 24: 11-15.
_____. 1951b. A review of the genus *Kelisia* in America north of Mexico with four new species (Homoptera-Fulgoridae-Delphacinae). J. Kansas Entomol. Soc. 24: 117-121.
_____. 1955. A revision of the genus *Megamelus* in America north of Mexico (Homoptera, Fulgoridae, Delphacinae). J. Kansas Entomol. Soc. 28: 29-40, 41-46.
BEIRNE, B. P. 1950a. The Canadian Cixiidae (Homoptera: Fulgoroidea). Can. Entomol. 82: 93-101.
_____. 1950b. The Canadian species of *Epiptera* (Homoptera: Achilidae). Can. Entomol. 82: 186-190.
BORROR, D. J., D. M. DeLONG, and C. A. TRIPLEHORN. 1976. An introduction to the study of insects. Holt, Rinehart and Winston, N.Y. 852 p.
BREAKLEY, E. P. 1929. The genus *Scolops* (Homoptera, Fulgoridae). Univ. Kansas Sci. Bull. 18: 417-455.
BUNN, R. W. 1930. Notes on the genus *Alphelonema* Uhler with descriptions of new species Homoptera, Fulgoridae). J. Kansas Entomol. Soc. 3: 73-77.
CALDWELL, J. S. 1943. Notes on the genus *Bothriocera* Burmeister (Homoptera: Cixiidae). Lloydia 6: 318-325.
_____. 1944a. The genus *Cedusa* in Mexico and Central America (Hem. Fulg.). Anales Escuela Nacional Ciencias Biol. Mexico 3: 445-462.
_____. 1944b. *Pintalia* Stål with special reference to Mexico (Homoptera, Cixiidae). Pan-Pacific Entomol. 20: 154-160.
_____. 1944c. Notes on *Oecleus* Stål (Homoptera: Cixiidae). Entomol. News 8: 174-176, 198-202.
CRAWFORD, D. L. 1914. A contribution toward a monograph of the homopterous insects of the family Delphacidae of North and South America. Proc. U. S. Nat. Mus. 46: 557-640.
DOERING, K. C. 1932. The genus *Acanalonia* in America north of Mexico (Homoptera). Ann. Entomol. Soc. Amer. 25: 758-786.
_____. 1936. A contribution to the taxonomy of the subfamily Issinae in America north of Mexico (Fulgoridae, Homoptera). Part I. Univ. Kansas Sci. Bull. 24: 421-467.
_____. 1938. A contribution to the taxonomy of the subfamily Issinae in America, north of Mexico. (Fulgoridae, Homoptera). Part II. Univ. Kansas Sci. Bull. 25: 447-576.
_____. 1940. A contribution to the taxonomy of the subfamily Issinae in America, north of Mexico. (Fulgoridae, Homoptera). Part III. Univ. Kansas Sci. Bull. 26: 83-167.
_____. 1941. A contribution to the taxonomy of the subfamily Issinae in America, north of Mexico. (Fulgoridae, Homoptera). Part IV. Univ. Kansas Sci. Bull. 27: 185-233.
DOZIER, H. L. 1922. A synopsis of the genus *Stenocranus,* and a new species of *Mysidia* (Homoptera). Ohio J. Sci. 22: 69-82.
_____. 1928. The Fulgoridae or planthoppers of Mississippi, including those of possible occurrence. A taxonomic, biological, ecological, and economic study. Tech. Bull. Mississippi Agric. Exp. Sta. 14: 1-152.
DuBOSE, W. P. 1960. The genus *Delphacodes* Fieber in North Carolina (Homoptera:Delphacidae). J. Elisha Mitchell Sci. Soc. 76: 36-63.

FENNAH, R.G. 1944. The morphology of the tegmina and wings in Fulgoroidea. Proc. Entomol. Soc. Wash. 46: 185-199.

_____. 1950. A generic revision of the Achilidae (Homoptera: Fulgoroidea) with descriptions of new species. Bull. British Mus. (Nat. Hist.): Entomology 1(1): 1-170.

_____. 1952. On the generic classification of Derbidae (Fulgoroidea), with descriptions of new neotropical species. Trans. Royal Entomol. Soc. London 103: 109-170.

_____. 1954. The higher classification of the family Issidae (Homoptera: Fulgoroidea) with descriptions of new species. Trans. Royal Entomol. Soc. London 105: 455-474.

FLYNN, J. E. 1967. A taxonomic study of the genus *Cedusa* in the New World (Homoptera: Derbidae). Ph. D. Thesis. North Carolina State Univ. at Raleigh, 279 p.

FORBES, S. A. 1905. A monograph of insect injuries to Indian corn. Part II. The more important insect injuries to Indian corn. Rep. State Entomol. Illinois 23: 1-273.

GIBSON, E. H. 1917. A key to the species of *Dictyophara* Germ. Bull. Brooklyn Entomol. Soc. 12: 69-71.

GIFFARD, W. M. 1921. The systematic value of the male genitalia of Delphacidae (Homoptera). Ann. Entomol Soc. Amer. 14: 135-140.

KRAMER, J. P. 1973. Revision of the American planthoppers of the genus *Stobaera* (Homoptera: Delphacidae) with new distributional data and host plant records. Proc. Entomol. Soc Wash. 75: 379-402.

_____. 1977. Taxonomic study of the planthopper genus *Oecleus* in the United States (Homoptera: Fulgoroidea: Cixiidae). Trans. Amer. Entomol. Soc. 103: 379-449.

_____. 1978. Taxonomic study of the American planthopper genus *Cyrpoptus* (Homoptera: Fulgoroidea: Fulgoridae). Proc. Biol. Soc. Wash. 91: 303-335.

_____. 1979. Taxonomic study of the planthopper genus *Myndus* in the Americas (Homoptera: Fulgoroidea: Cixiidae). Trans. Amer. Entomol. Soc. 105: 301-389.

LAWSON, P. B. 1933. The genus *Fitchiella* (Homoptera: Fulgoridae). Bull. Brooklyn Entomol. Soc. 28: 194-198.

MARKS, E. P. 1951. Comparative studies of the male genitalia of the Hemiptera (Homoptera-Heteroptera). J. Kansas Entomol. Soc. 24: 134-141.

McATEE, W. L. 1923. A new species of *Otiocerus* (Homoptera: Fulgoridae). Proc. Biol. Soc. Wash. 36: 45-47.

_____. 1924. Notes on *Cenchrea* Westwood and *Cedusa* Fowler in America (Homoptera: Fulgoroidea). Ann. Entomol. Soc. Amer. 17: 175-186.

McDERMOTT, B. T. 1952. A revision of the genus *Megamelanus* and its allies (Homoptera, Fulgoridae, Delphacinae). J. Kansas Entomol. Soc. 25: 41-59.

MEAD, F. W. 1968. A revision of the genus *Oliarus* in North America, north of Mexico (Homoptera: Cixiidae). Ph. D. Thesis. North Carolina State U. at Raleigh, 398 p.

_____. 1979. Key to the genera of Cixiidae in Florida (Homoptera: Fulgoroidea). Florida Dep. Agric. Entomol. Circ. 198.

METCALF, Z. P. 1913. The wing venation of the Fulgoridae. Ann Entomol. Soc. Amer. 6: 341-352.

_____. 1920. A suggestion for a better popular name for the Fulgoridae. Entomol. News 31: 57-58.

_____. 1923. A key to the Fulgoridae of eastern North America. J. Elisha Mitchell Sci. Soc. 38: 139-230.

_____. 1936. General catalogue of the Hemiptera. Fasc. IV. Fulgoroidea, Part 2. Cixiidae, 274 p.

_____. 1938. The Fulgorina of Barro Colorado and other parts of Panama. Bull. Mus. Comp. Zool. Harvard 82: 277-423.

_____. 1943. General catalogue of the Hemiptera. Fasc. IV. Fulgoroidea, Part 3. Araeopidae (Delphacidae), 556 p.

_____. 1945. General catalogue of the Hemiptera. Fasc. IV. Fulgoroidea, Parts 4. Derbidae, 5. Achilixiidae, 6. Meenoplidae, and 7. Kinnaridae, 256 p.

_____. 1946. General catalogue of the Hemiptera. Fasc. IV. Fulgoroidea. Part 8. Dictyopharidae, 250 p.
_____. 1947a. General catalogue of the Hemiptera. Fasc. IV. Fulgoroidea, Part 9. Fulgoridae. 280 p.
_____. 1947b. General catalogue of the Hemiptera. Fasc. IV. Fulgoroidea, Part 10. Achilidae, 85 p.
_____. 1949. The redescription of twenty-one species of Araeopidae described in 1923. J. Elisha Mitchell Sci. Soc. 65: 48-60.
_____. 1951. Phylogeny of the Homoptera Auchenorhyncha. Soc. Sci. Fenn., Comm. Biol. 12: 1-14.
_____. 1954a. General catalogue of the Homoptera. Fasc. IV. Fulgoroidea, Part 11. Tropiduchidae, 176 p.
_____. 1954b. General catalogue of the Homoptera. Fasc. IV. Fulgoroidea, Part 14. Acanaloniidae. 64 p.
_____. 1957. General catalogue of the Homoptera. Fasc. IV. Fulgoroidea, Part 13. Flatidae and Hypochthonellidae, 574 p.
_____. 1958. General catalogue of the Homoptera. Fasc. IV. Fulgoroidea, Part 15. Issidae. 570 p.
MORGAN, L. W. and R. H. BEAMER. 1949. A revision of three genera of delphacine fulgorids from America north of Mexico (Homoptera-Fulgoridae-Delphacinae). J. Kansas Entomol. Soc. 22: 97-120, 121-142.
MUIR, F. A. G. 1913. On the genus *Lamenia* Stål. Can. Entomol. 45: 112.
_____. 1915. A contribution towards the taxonomy of the Delphacidae. Can. Entomol. 47: 208-212, 261-270, 296-302, 317-320.
_____. 1917. On the synonymy of *Delphax maidis* Ashm. Can. Entomol. 49: 147.
_____. 1923. On the classification of the Fulgoroidea (Homoptera). Proc. Hawaiian Entomol. Soc. 5: 205-247.
_____. 1930. On the classification of the Fulgoroidea. Ann. Mag. Natur. Hist. (10) 6: 461-478.
_____. 1934. The genus *Pintalia* Stål (Homoptera, Cixiidae). Trans. Entomol. Soc. London 82: 421-441.
_____ and W. M. GIFFARD. 1924. Studies in North American Delphacidae. Bull. Hawaiian Sugar Planters Assoc. Div. Entomol. 15: 1-53.
O'BRIEN, L. B. 1971. The systematics of the tribe Plectoderini in America north of Mexico (Homoptera: Fulgoroidea, Achilidae). Univ. California Publ. Entomol. 64: 1-79.
OSBORN, H. 1938. The Fulgoridae of Ohio. Bull. Ohio Biol. Surv. 6: 283-349.
PENNER, L. R. 1945. The genus *Laccocera* Van Duzee (Homoptera: Delphacidae). J. Kansas Entomol. Soc. 18: 30-47.
_____. 1947. Some notes on the genus *Pentagramma* and four new species (Homoptera-Delphacidae-Asiracinae). J. Kansas Entomol. Soc. 20: 30-39.
QUAINTANCE, A. L. 1898. The corn *Delphax (Delphax maidis,* Ashmead). Bull. Florida Agric. Exp. Sta. 45: 61-67.
SCAMMELL, H. B. 1917. Cranberry insect problems and suggestions for solving them. Farmers' Bull. U. S. Dep. Agric. 860: 1-45.
SCUDDER, G. G. E. 1963. Studies on the Canadian and Alaskan Fulgoromorpha (Hemiptera). I. The genera *Achorotile* Fieber and *Laccocera* Van Duzee (Delphacidae). Can. Entomol 95: 167-177.
_____. 1964. Studies on the Canadian and Alaskan Fulgoromorpha (Hemiptera). II. The genus *Megamelus* Fieber (Delphacidae). Can. Entomol. 96: 813-820.
SIRRINE, F. A. and B. B. FULTON. 1914. The cranberry toad bug. Bull. New York Agric. Exp. Sta., Geneva 377: 91-112.
THOMAS, W. A. 1914. A little known lantern fly injuring corn. *(Peregrinus maidis,* Ashm.). Bull. South Carolina Agric. Exp. Sta. 174: 3-7.

UHLER, P. R. 1900. Aids to a recognition of some North American genera and species of the old family Fulgoridae. Trans. Maryland Acad. Sci. 1: 401-408.

VAN DUZEE, E. P. 1897. A preliminary review of the North American Delphacidae. Bull. Buffalo Soc. Natur. Sci. 5: 225-261.

_____. 1907. Studies in North American Fulgoridae. Proc. Acad. Natur. Sci. Philadelphia 59: 467-498.

_____. 1923. Family Fulgoridae. *In:* Britton, W. E. 1923. Part IV: The Hemiptera or sucking insects of Connecticut. Guide to the insects of Connecticut. Bull. Connecticut. Geol. Natur. Hist. Surv. 34: 1-807.

WILSON, S. W. 1980. The planthoppers, or Fulgoroidea, of Illinois with information on the biology of selected species. Ph. D. Thesis. Southern Illinois U. at Carbondale, 446 p.

_____and J. E. McPHERSON. 1979a. The first record of *Megamelus palaetus* in Illinois (Homoptera: Fulgoroidea: Delphacidae). Great Lakes Entomol. 12: 227.

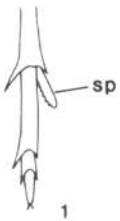
_____. 1979b. The first report of the occurrence of *Oecleus chrisjohni* and *O. epetrion* in Illinois (Homoptera: Fulgoroidea: Cixiidae). Great Lakes Entomol. 12: 227-228.

_____. 1980. A list of the Fulgoroidea (Homoptera) of southern Illinois. Great Lakes Entomol. 13: 25-30.

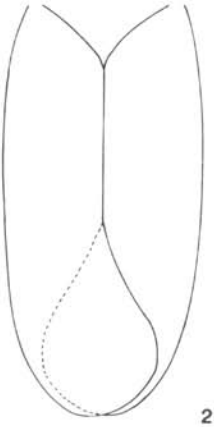
FIGURES

Figure

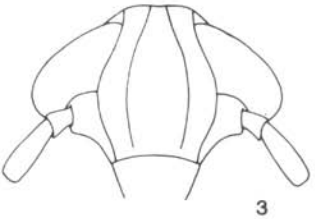
1. Generalized delphacid hind tibia and tarsus; sp = spur
2. Generalized achilid forewings
3. Frontal view of head of *Pentagramma vittatifrons*
4. Cross-section of first antennal segment of *Stobaera tricarinata*
5. Frontal view of head of *Stenocranus lautus*
6. Frontal view of head of *Peregrinus maidis*
7. Dorsal view of head and thorax of *Megamelus davisi*
8. Dorsal view of head and thorax of *Pissonotus brunneus;* m = m-shaped carina
9. Dorsal view of head and thorax of *Prokelisia crocea;* m = m-shaped carina
10. Dorsal view of head and thorax of *Kelisia curvata;* m = m-shaped carina
11. Dorsal view of head and prothorax of *Delphacodes campestris*
12. Dorsal view of head of *Liburniella ornata*



1

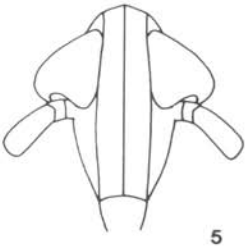


2

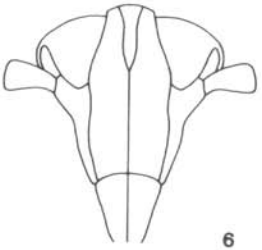


3

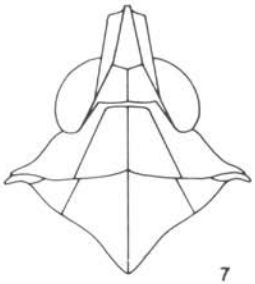
4



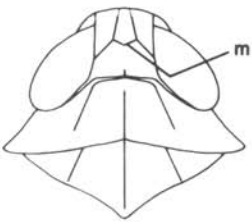
5



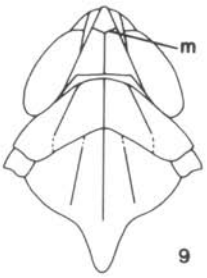
6



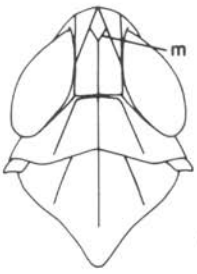
7



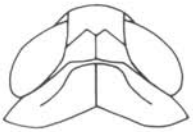
8



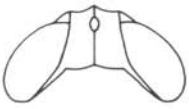
9



10



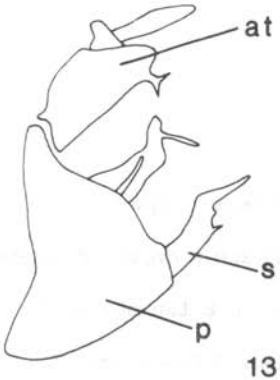
11



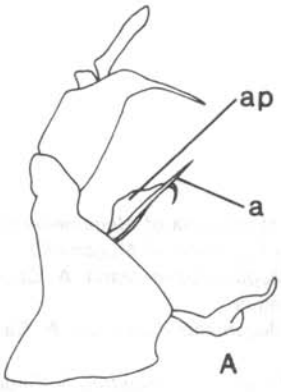
12

Figure

13. Lateral view of genitalia of *Stenocranus felti;* at = anal tube, p = pygofer, s = style
14. Genitalia of *Stenocranus pallidus.* A. Lateral view of genitalia; a = aedeagus, ap = aedeagal process. B. Ventral view of styles
15. Lateral view of genitalia of *Stenocranus sandersoni*
16. Genitalia of *Stenocranus similis.* A. Lateral view of genitalia. B. Ventral view of styles
17. Lateral view of genitalia of *Stenocranus delicatus*
18. Lateral view of genitalia of *Stenocranus brunneus*
19. Lateral view of genitalia of *Stenocranus unipunctatus*
20. Lateral view of genitalia of *Stenocranus lautus*

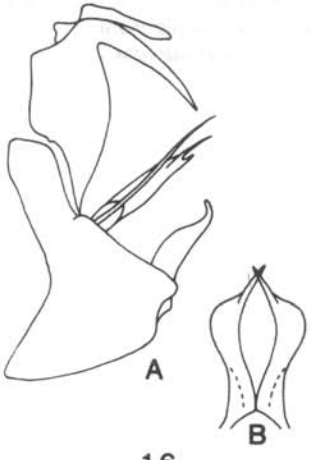


13



14

15



16

17

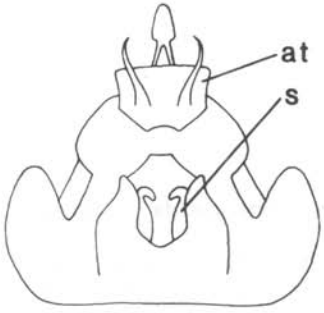
18

19

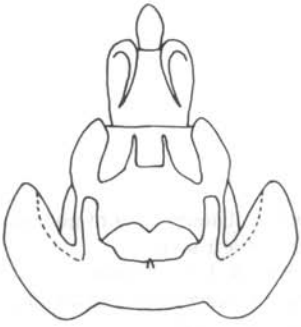
20

Figure

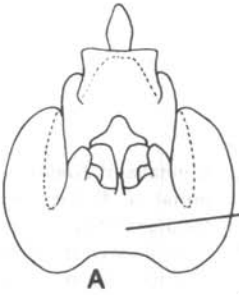
21. Caudal view of genitalia of *Megamelus davisi;* at = anal tube, s = style
22. Caudal view of genitalia of *Megamelus lunatus*
23. Genitalia of *Megamelus metzaria.* A. Caudal view of genitalia; p = pygofer. B. Lateral view of aedeagus
24. Genitalia of *Megamelus distinctus.* A. Caudal view of genitalia. B. Lateral view of aedeagus
25. Genitalia of *Megamelus palaetus.* A. Caudal view of genitalia. B. Lateral view of aedeagus
26. Caudal view of apex of aedeagus of *Pissonotus delicatus*
27. Lateral view of genitalia of *Kelisia spinosa;* ats = anal tube spine
28. Lateral view of genitalia of *Kelisia pectinata*
29. Lateral view of genitalia of *Kelisia curvata*



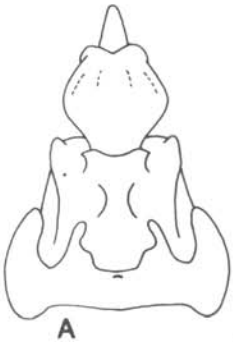
21



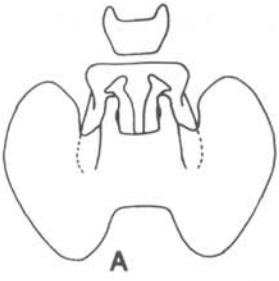
22



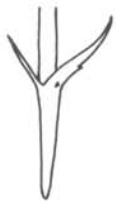
23



24

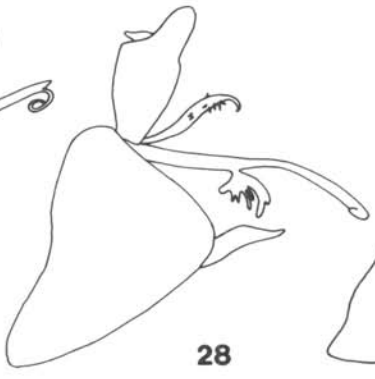


25

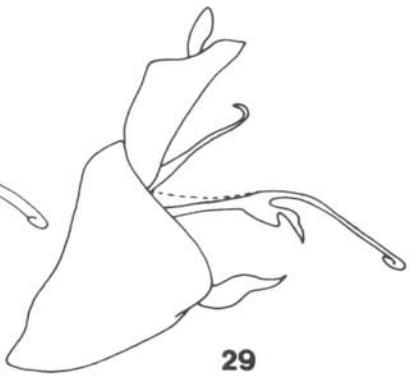


26

27



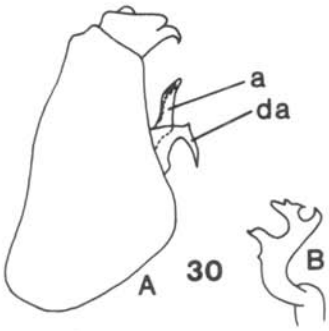
28

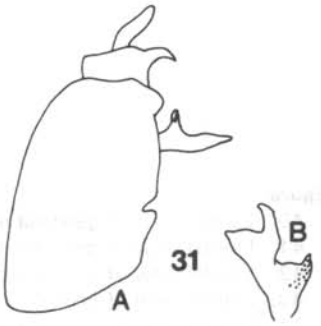


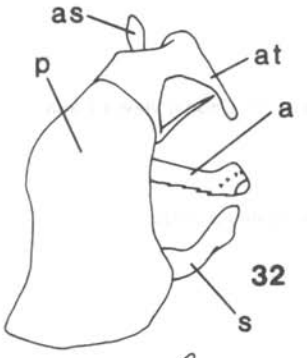
29

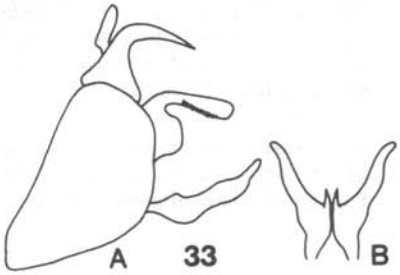
Figure

30. Genitalia of *Euides weedi.* A. Lateral view of genitalia; a = aedeagus, da = diaphragm armature. B. Ventral view of left style
31. Genitalia of *Euides gerhardi.* A. Lateral view of genitalia. B. Ventral view of left style
32. Lateral view of genitalia of *Delphacodes andromeda;* a = aedeagus, as = anal style, at = anal tube, p = pygofer, s = style
33. Genitalia of *Delphacodes basivitta.* A. Lateral view of genitalia. B. Ventral view of styles
34. Lateral view of genitalia of *Delphacodes analis*
35. Lateral view of genitalia of *Delphacodes atrata*
36. Lateral view of genitalia of *Delphacodes pellucida*
37. Lateral view of genitalia of *Delphacodes hyalina*
38. Lateral view of genitalia of *Delphacodes puella*
39. Lateral view of genitalia of *Delphacodes pacifica*

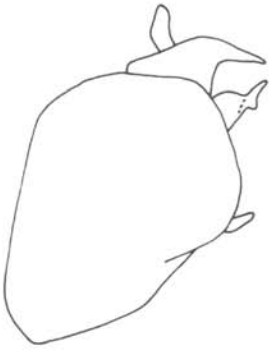

a
da
A
30
B


A
31
B


as
p
at
a
32
s

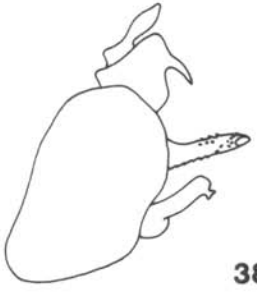

A
33
B


34


35


36

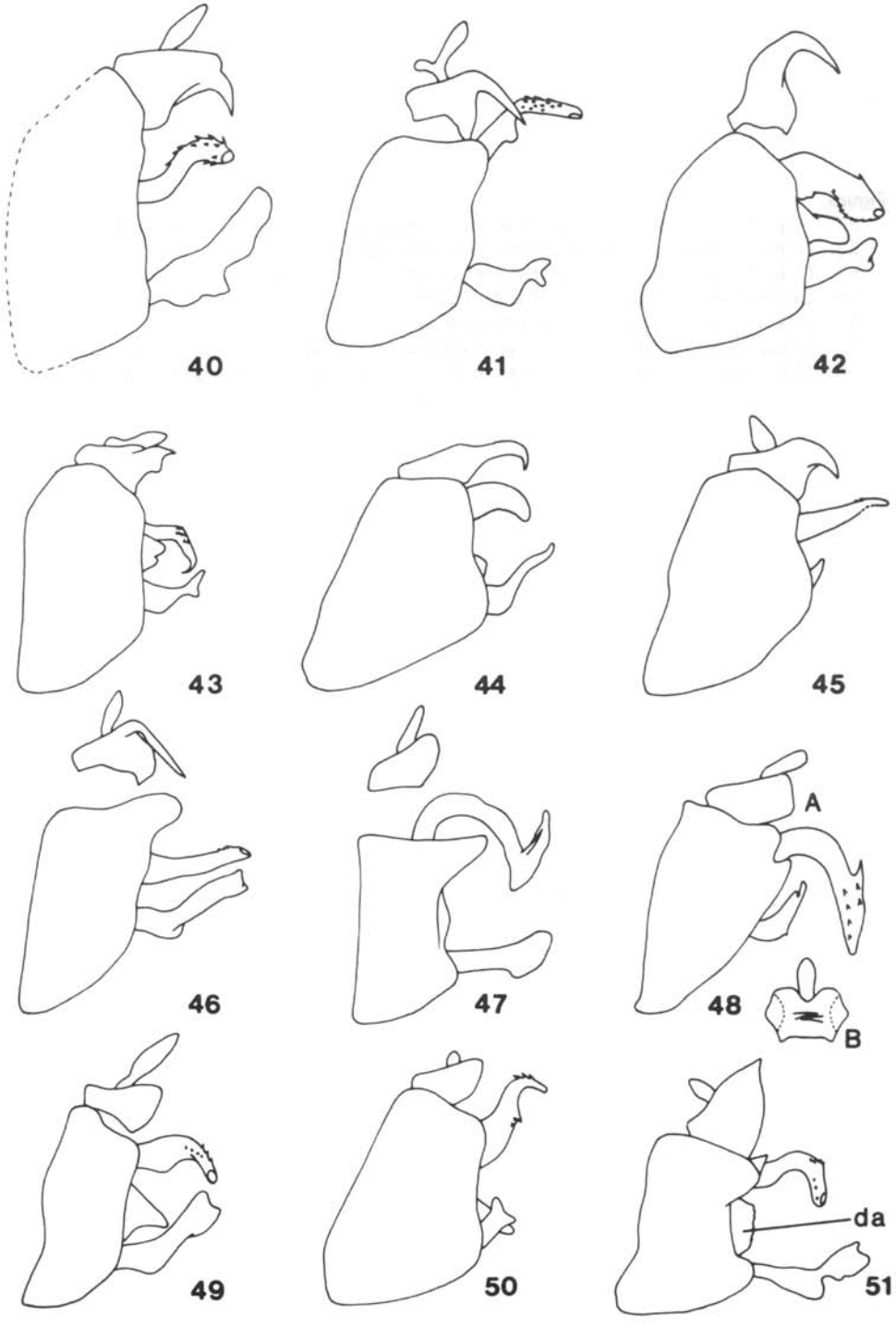

37


38


39

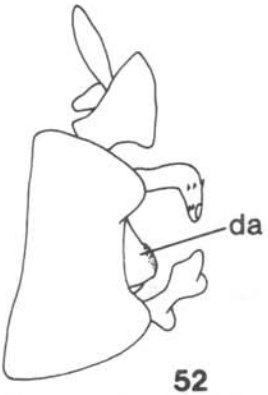
Figure

40. Lateral view of genitalia of *Delphacodes alexanderi*
41. Lateral view of genitalia of *Delphacodes mcateei*
42. Lateral view of genitalia of *Delphacodes nitens*
43. Lateral view of genitalia of *Delphacodes perusta*
44. Lateral view of genitalia of *Delphacodes dolera*
45. Lateral view of genitalia of *Delphacodes foveata*
46. Lateral view of genitalia of *Delphacodes propinqua*
47. Lateral view of genitalia of *Delphacodes laminalis*
48. Genitalia of *Delphacodes magna*. A. Lateral view of genitalia. B. Caudal view of anal tube.
49. Lateral view of genitalia of *Delphacodes campestris*
50. Lateral view of genitalia of *Delphacodes lutea*
51. Lateral view of genitalia of *Delphacodes parvula;* da = diaphragm armature


40
41
42
43
44
45
46
47
A
48
B
49
50
da
51

Figure

52. Lateral view of genitalia of *Delphacodes rotundata;* da = diaphragm armature
53. Lateral view of genitalia of *Delphacodes lutulenta*
54. Lateral view of genitalia of *Chloriona slossoni*
55. Lateral view of genitalia of *Prokelisia crocea*
56. Lateral view of genitalia of *Prokelisoidea salina*
57. Dorsal view of head and prothorax of *Cyrpoptus belfragei;* ts = transverse sulcus
58. Dorsal view of head and prothorax of *Poblicia fuliginosa;* ts = transverse sulcus

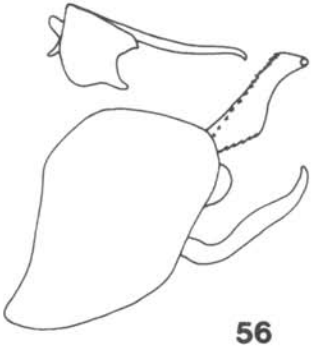


52

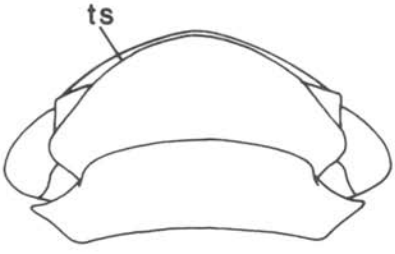
53

54

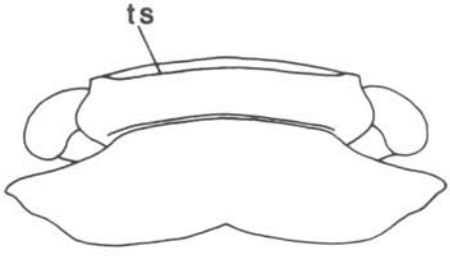
55



56



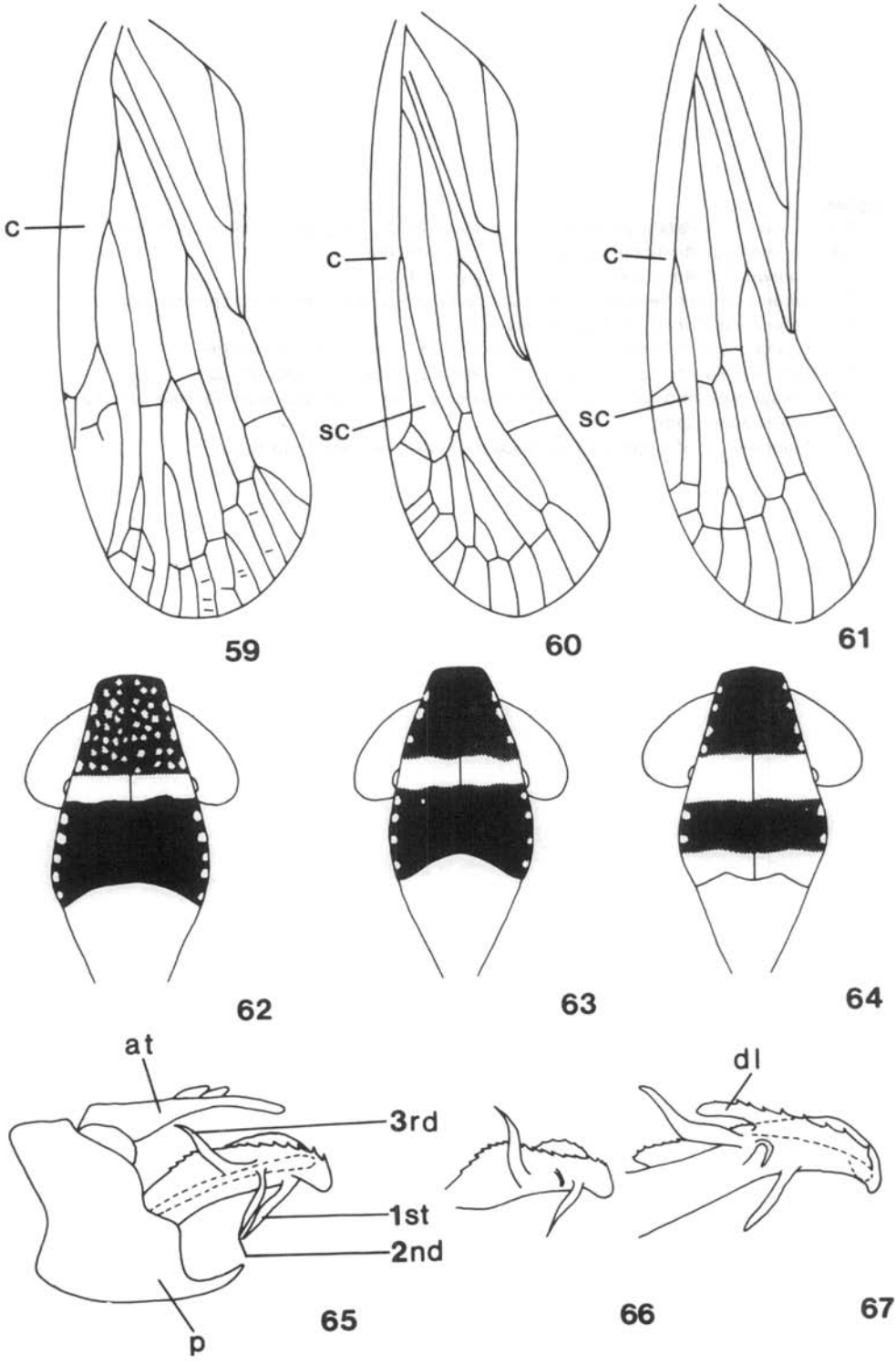
57



58

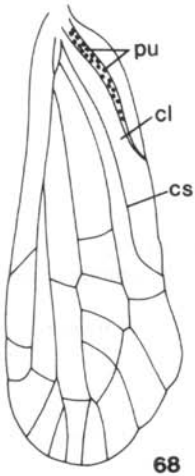
Figure

59. Forewing of *Epiptera opaca;* c = costal cell
60. Forewing of *Catonia nava;* c = costal cell, sc = subcostal cell
61. Forewing of *Synecdoche impunctata;* c = costal cell, sc = subcostal cell
62. Frontal view of head of *Catonia nava*
63. Frontal view of head of *Catonia bicinctura*
64. Frontal view of head of *Catonia cinctifrons*
65. Lateral view of genitalia of *Catonia pumila;* at = anal tube, p = pygofer, 1st = 1st pair of spines, 2nd = 2nd pair of spines, 3rd = 3rd pair of spines
66. Lateral view of aedeagus of *Catonia cinctifrons*
67. Lateral view of aedeagus of *Catonia carolina;* dl = dorsally extending lobe

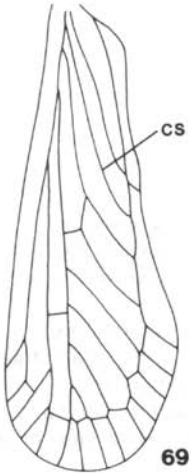

c
c
sc
c
sc
59
60
61
62
63
64
at
3rd
1st
2nd
p
65
dl
66
67

Figure

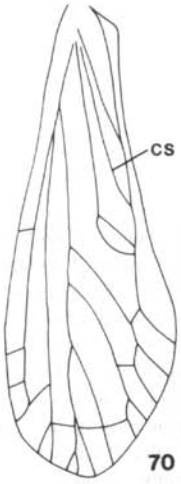
68. Forewing of *Patara vanduzei;* cl = clavus, cs = claval suture, pu = pustules
69. Forewing of *Amalopota uhleri;* cs = claval suture
70. Forewing of *Antotia burnetii;* cs = claval suture
71. Lateral view of head of *Shellenius schellenbergii;* aa = antennal appendage
72. Lateral view of head of *Shellenius ballii*
73. Lateral view of head of *Apache degeerii;* aa = antennal appendage
74. Lateral view of head of *Otiocerus wolfii;* aa = antennal appendage
75. Dorsal view of head, thorax and anterior portion of forewings of *Sayiana sayi;* ca = costal appendage
76. Frontal view of head of *Cedusa australis;* ex = extension of head



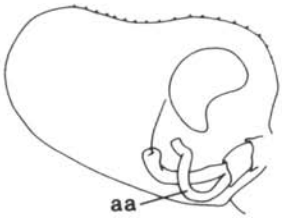
68



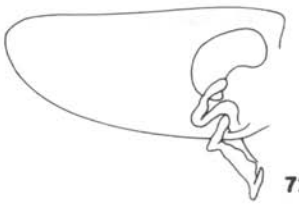
69



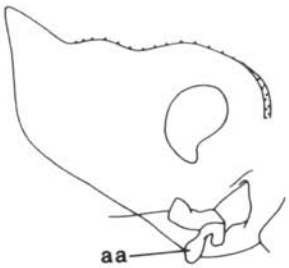
70



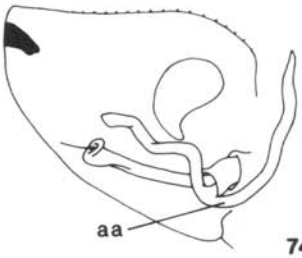
71



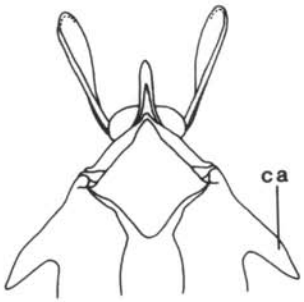
72



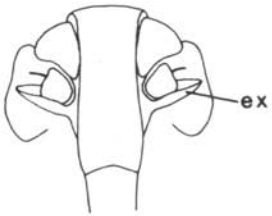
73



74



75



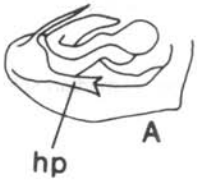
76

Figure

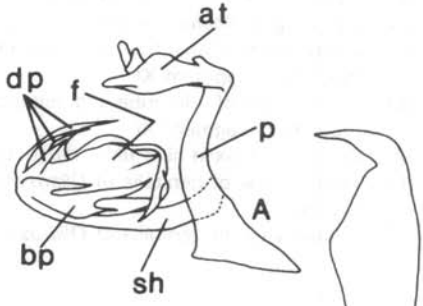
77. Lateral view of aedeagus of *Cedusa bedusa*
78. Lateral view of aedeagus of *Cedusa kedusa;* hp = horizontal process
79. Genitalia of *Cedusa incisa.* A. Lateral view of aedeagus; hp = horizontal process. B. Ventral view of right style
80. Genitalia of *Cedusa australis.* A. Lateral view of genitalia; at = anal tube, bp = bifid process, dp = dorsal process, f = flagellum of aedeagus, p = pygofer, sh = shaft of aedeagus. B. Ventral view of right style
81. Lateral view of genitalia of *Cedusa redusa;* bp = bifid process
82. Genitalia of *Cedusa edentula.* A. Lateral view of aedeagus; sl = scoop-like lobe. B. Ventral view of right style
83. Lateral view of aedeagus of *Cedusa vulgaris;* hp = horizontal process, spr = scroll-like process
84. Lateral view of aedeagus of *Cedusa obscura*

77

78

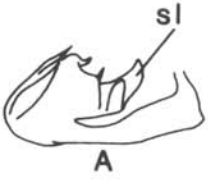


79

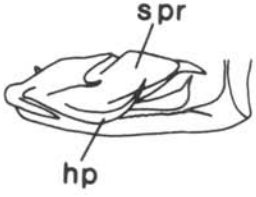


80

81



82

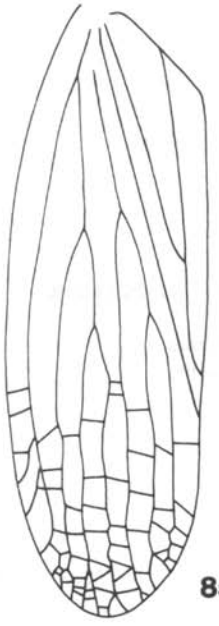


83

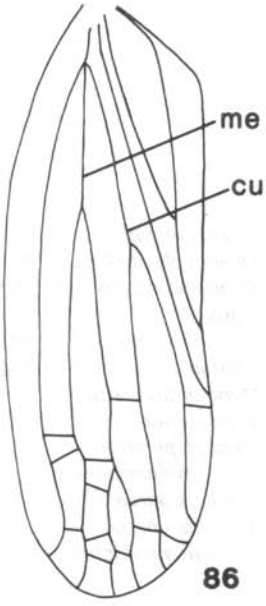
84

Figure

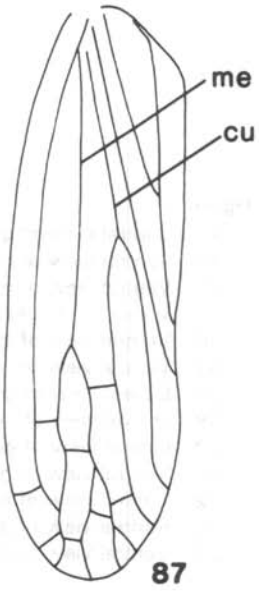
85. Forewing of *Scolops sulcipes*
86. Forewing of *Scolops pungens;* cu = cubitis, me = media
87. Forewing of *Scolops perdix;* cu = cubitus, me = media
88. Lateral view of anal tube and aedeagus of *Scolops pungens;* as = anal style, at = anal tube, XI = segment XI
89. Lateral view of anal tube and aedeagus of *Scolops perdix;* as = anal style, at = anal tube, XI = segment XI
90. Generalized cixiid hind tibia; tsp = tibial spines
91. Ventral view of genitalia of *Oliarus humilis;* ls = lateral spine, ms = median spine, p = pygofer
92. Ventral view of genitalia of *Oliarus quinquelineatus*



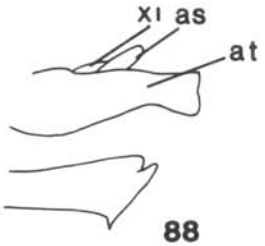
85



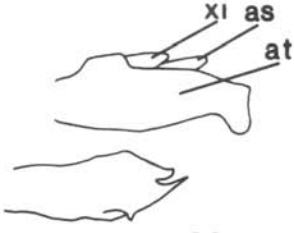
86



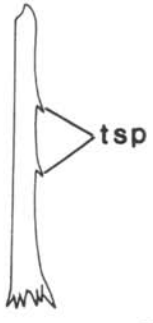
87



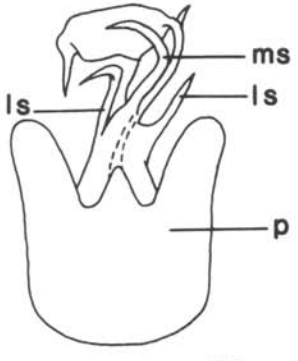
88



89



90

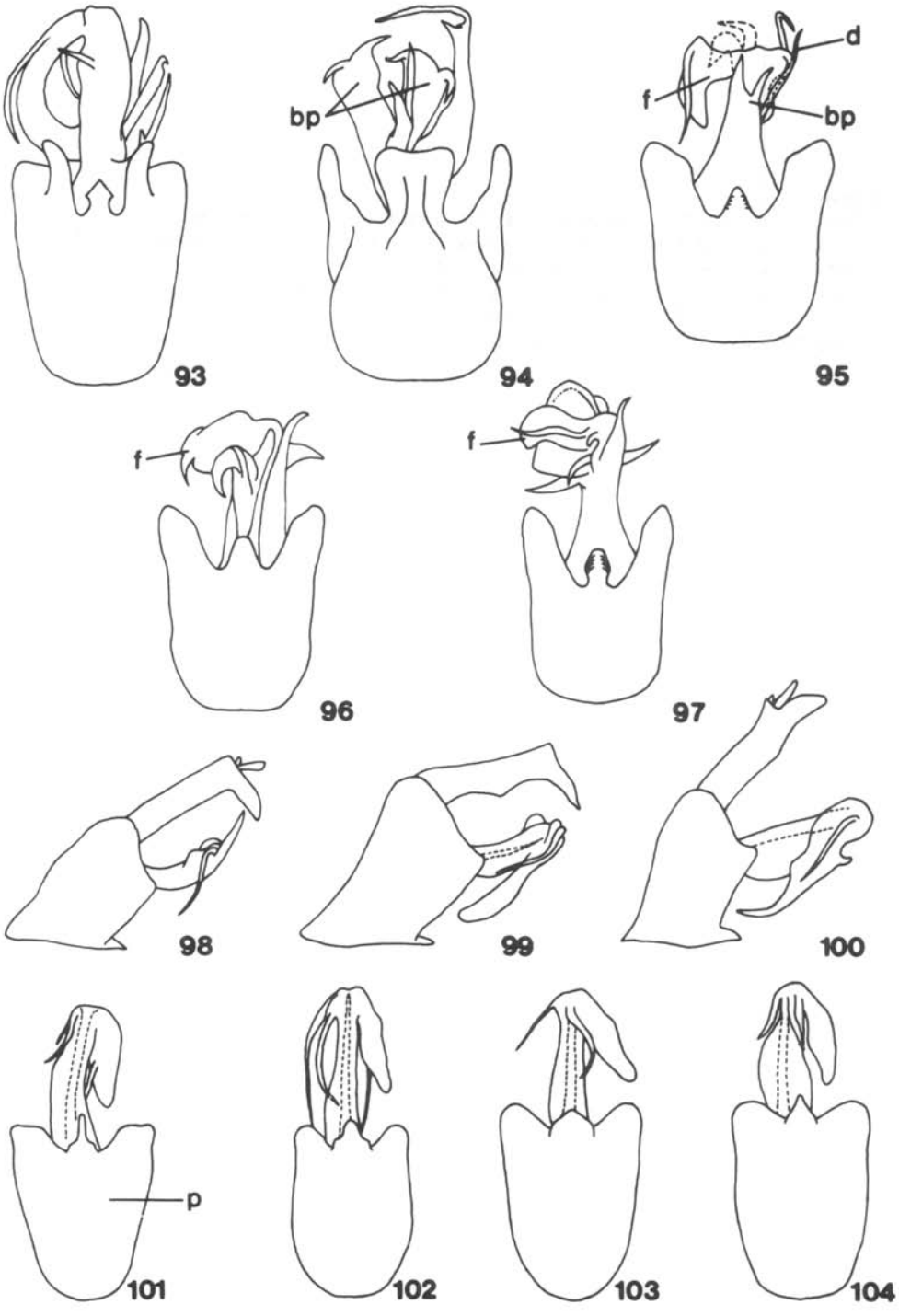


91

92

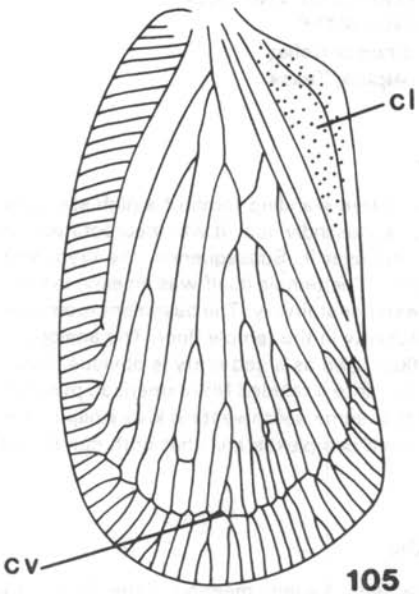
Figure

93. Ventral view of genitalia of *Oliarus aridus*
94. Ventral view of genitalia of *Oliarus placitus;* bp = bifid process
95. Ventral view of genitalia of *Oliarus ecologus;* bp = bifid process, d = dorsal sinuate spine, f = flagellum of aedeagus
96. Ventral view of genitalia of *Oliarus sablensis;* f = flagellum of aedeagus
97. Ventral view of genitalia of *Oliarus chuliotus;* f = flagellum of aedeagus
98. Lateral view of genitalia of *Myndus truncatus*
99. Lateral view of genitalia of *Myndus radicis*
100. Lateral view of genitalia of *Myndus pictifrons*
101. Ventral view of genitalia of *Oecleus chrisjohni;* p = pygofer
102. Ventral view of genitalia of *Oecleus borealis*
103. Ventral view of genitalia of *Oecleus epetrion*
104. Ventral view of genitalia of *Oecleus productus*

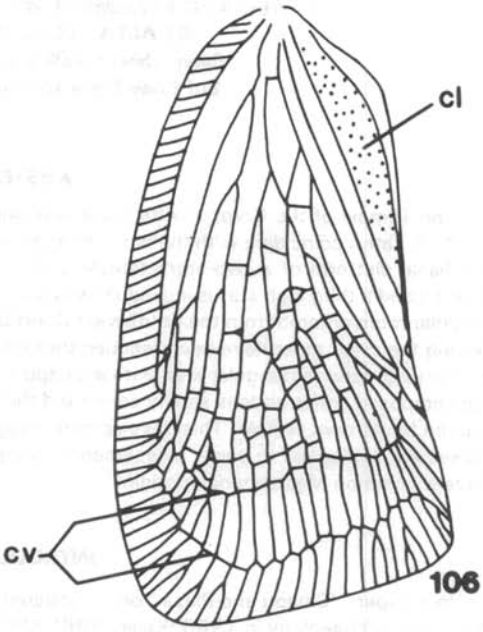

bp
d
f
bp
93
94
95
f
f
96
97
98
99
100
p
101
102
103
104

Figure

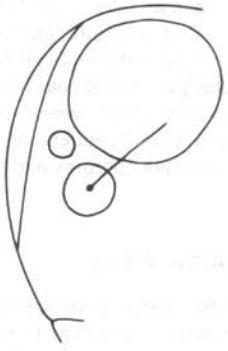
105. Forewing of *Ormenoides venusta;* cl = clavus, cv = subapical crossvein
106. Forewing of *Anormenis septentrionalis;* cl = clavus, cv = subapical crossvein
107. Lateral veiw of head of *Acanalonia bivittata*
108. Lateral view of head of *Acanalonia conica*
109. Frontal view of head of *Thionia elliptica*
110. Frontal view of head of *Thionia bullata*

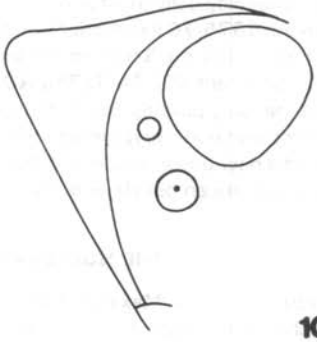


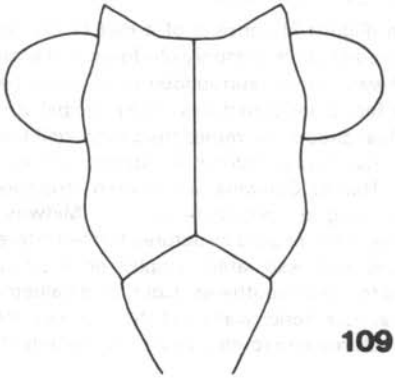
105

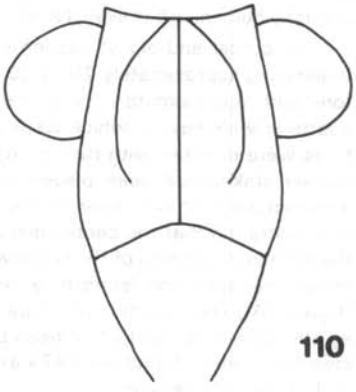


106


107


108


109


110