

TAXONOMIC STUDY OF THE PLANTHOPPER GENUS
MYNDUS IN THE AMERICAS
(HOMOPTERA: FULGOROIDEA: CIXIIDAE)

JAMES P. KRAMER

*Systematic Entomology Laboratory, IIBIII,
Agricultural Research, Sci. & Educ. Admin., USDA¹
U.S. National Museum of Natural History
Washington, D.C. 20560*

ABSTRACT

This study presents the first taxonomic revision of the planthopper genus *Myndus* Stål with keys to species for all of the Americas. *Haplaxius* Fowler and *Paramyndus* Fennah are synonymized with *Myndus*. Sixty-three species are recognized. Thirty-four are described as n. spp.: *balli* (Ariz.), *crena* (Ariz.), *dozieri* (Miss.), *flocki* (Ariz.), *glyphis* (N.Y.), *lophion* (Ariz.), *neopusillus* (Fla.), *nevadensis* (Nevada), *texensis* (Texas), *xyron* (N.Y), akko (British Honduras), *brimosis* (Bolivia), *caldwelli* (Mexico), *deleter* (Panama), *delta* (Guatemala), *dolon* (Brazil), *fennahi* (Peru), *gnophos* (Brazil), *gomphos* (Mexico), *jamaicae* (Jamaica), *lyssa* (Peru), *meadi* (Mexico), *mokos* (Peru), *nimbus* (Venezuela), *phylax* (Costa Rica), *sillos* (Peru), *skarpion* (Panama), *spanglerorum* (Peru), *sparagma* (Guatemala), *synavei* (Venezuela), *tekmar* (Mexico), *tektion* (Peru), *thryligma* (Brazil), and *vilbastei* (Argentina). One new subspecies, *lophion alpha* (Colo.), is described. *Paramyndus cocois* Fennah and *Haplaxius pallidus* Caldwell are synonymized with *Myndus crudus* Van Duzee; *sordidipennis* Stål with *pictifrons* Stål; *delicatus* Van Duzee with *radicis* Osborn; and *perrinei* Caldwell with *pusillus* Van Duzee. New combinations with *Myndus* are: *M. gabrielensis* (Flock) *M. simplicatus* (Caldwell), *M. Serratus* (Caldwell), *M. laevis* (Fowler), and *M. frontalis* (Fowler). The distribution of the genus includes most of the Nearctic and Neotropical Regions. Plant associations are recorded. All critical diagnostic features are illustrated, and many new distributional records are included.

INTRODUCTION

The impetus for this study of the genus *Myndus* Stål was provided, in part, by the recent interest of plant pathologists and economic entomologists in the species associated with coconut and other palms in Florida, Jamaica, and other countries in tropical America. At least one of the included species, *M. crudus* Van

Duzee, is the prime suspected vector of a mycoplasmalike organism which causes a devastating disease of palms. In the course of this research, it was discovered that *M. crudus* was described three times from three localities, Jamaica, Trinidad, and Florida, by three workers each of whom placed his new species in a different genus.

Ball (1933) provided the only previous taxonomic treatment of the genus in the United States; no previous worker has attempted to study systematically all of the species from Mexico and the Neotropics. Ball's work can be best appreciated by the title he used above his key, "Provisional Key to the Available Species." He employed few structural features, included no illustrations, and depended heavily upon the often chancy coloration for key characters. He did suggest that *Haplaxius* Fowler was likely a synonym of *Myndus*; this is a view with which I agree. On the basis of the figures alone published by Fowler (1904:Pl. 10, Figs. 20, 21-22) to accompany descriptions of *Oliarus chiriquensis* Fowler and *O. insignior* Fowler, Ball surmised that these two species properly belonged in *Myndus*. He was in error; Dr. R.G. Fennah, an authority on the classification of the Fulgoroidea at the British Museum (Nat. Hist.), kindly examined Fowler's types for me and concluded that their placement in *Oliarus* was correct.

Generic limits are often troublesome, and the group of species treated here presents a good case in point. I have taken the more conservative view which reflects a broader definition of the genus *Myndus* than that with which some other taxonomists might agree. *Myndus* could be subdivided into a series of genera or subgenera; these divisions would be based primarily upon structural features or variations in the pattern of the male genitalia, especially the aedeagus. The species groups or clusters thus formed are fairly numerous and contain a varying number of species. Most of the clusters are linked to each other by annectant species or themselves form links between other clusters of species. A few species seem somewhat distant from the others, but it seems likely that as yet undiscovered species will fill in these gaps. For these reasons, I believe it is unwise and not in the best interest of cixiid systematics to propose or recognize any taxa other than *Myndus* and its included species, both old and new.

Genus MYNDUS Stål

Myndus Stål 1862:307. Type-species *Flata musiva* Germar, by subsequent designation of Oshanin 1912:117.

Haplaxius Fowler 1904:97. Type-species *Haplaxius laevis* Fowler, by subsequent designation of Caldwell 1946:203. New synonymy.

Paramyndus Fennah 1945:424. Type-species *Paramyndus cocois* Fennah, by original designation and monotypy. New synonymy.

Small to average size cixiids (3.2-6.4 mm); head in dorsal view (fig. 1) much narrower than pronotum with eyes large; vertex moderately broad, broadest basally and narrowing toward apex, sides and apex carinate, sometimes with variably distinct transverse carina between anterior portions of eyes, apical portion variably produced beyond eyes; in lateral view, apex of head bluntly angled, lateral edges of vertex not more than slightly elevated above upper margins of eyes, ocellus under eye; in facial view, sides of frons flared and carinate on margins, carinate midline of frons interrupted near base by variably distinct ocellus, carinate midline sometimes indistinct, frons broadest just above base and narrowest at apex, clypeus subtriangular with lateral margins and midline at least partly carinate; antenna originating from large socket, scape reduced, pedicel rounded but without obvious sensoria, flagellum beadlike basally and filamentous distally; pronotum with irregular ridges, length shortest on midline, posterior margin indented, lateral portions declivant; mesonotum strongly or weakly tricarinate; hind tibiae without spines before apex; forewing with typical cixiid venation, hyaline or transparent, sometimes with fairly extensive color patterns, veins usually with small pustules that bear setae, pustules often obscure, setae usually abraded. Male genitalia: pygofer usually longest on ventral margin, hind margin variably produced; anal flap symmetrical or asymmetrical, with processes from one or both ventral margins, with projections originating between ventral margins, or simple; styles symmetrical and usually simple; aedeagus asymmetrical and elaborated with various projections and processes, vertical connective articulating base of aedeagus with styles.

Generic diagnosis. — The genus *Myndus* can be separated from other American cixiid genera by the following combinations of positive and negative characters: vertex not narrowed for entire length, lateral coronal margins not strongly elevated, frons no wider than long, antennae not in earlike cavities, mesonotum tricarinate, no spines on hind tibia before apex, and forewings not tectiform.

Biology. — Even though we know somewhat imperfectly the life cycle of but two species, *M. crudus* Van Duzee and *M. radialis* Osborn (See notes under these species.), we can reasonably assume that all of the included species follow a similar pattern. The nymphs feed and develop on the rootlets of various plants, especially grasses. The adults feed on the undersides of leaves or in partly concealed portions of various plants above ground. The food plants of the adults are often different from those of the nymphs.

Notes on the keys. — The structural modifications of the male genitalia provide consistent and unambiguous features for the delineation of species. Figs. 2-4 depict the generalized male genitalia with the terminology of the parts as used in this study. To use the key successfully one should become completely familiar with these terms.

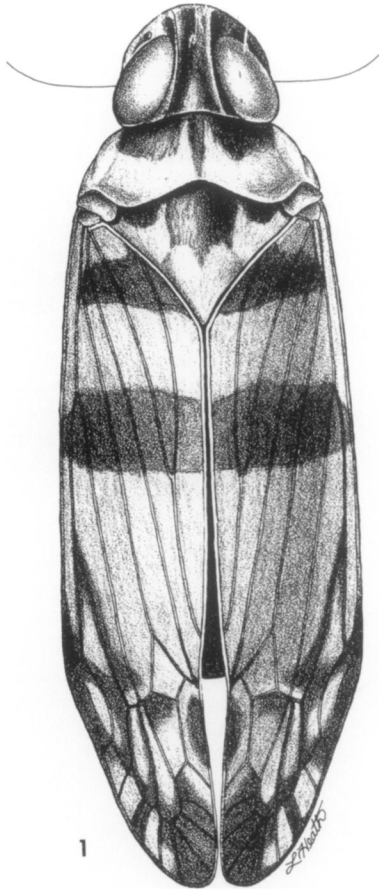


FIGURE 1. — Dorsal habitus view of *Myndus gabrielensis* (Flock).

M. musivus (Germar), the Old World type-species of *Myndus*, is not included in the key; but it is the only *Myndus* in Europe, and it seemed advisable to include illustrations of the male genitalia (figs. 5-9). If *M. musivus* should ever appear in the Americas, the features for its recognition are here. Two keys are presented, the first for those species found in the United States, and the second for the fauna of Mexico and the Neotropics. Satisfactory characters for separating females have not been found.

KEY TO UNITED STATES SPECIES OF *MYNDUS*
(Males Only)

1. Frons with distinct transverse black or brown markings at both base and apex 2
 Frons unmarked or not marked as above 9
2. Apex of aedeagus prolonged and acute (figs. 10, 11) *truncatus* Metcalf
 Apex of aedeagus neither prolonged nor acute 3
3. Left apical appendage of aedeagus subdivided distally into blades (fig. 13)
 or with acute, posteriorly directed tooth on ventral margin near base
 (figs. 16, 23) 4
 Left apical appendage of aedeagus not so modified 6
4. Left apical appendage of aedeagus without posteriorly directed tooth (figs.
 13, 14) *glyphis*, n. sp.
 Left apical appendage of aedeagus with acute posteriorly directed tooth on
 ventral margin near base 5
5. Left apical appendage of aedeagus distally subdivided into two acute portions
 (figs. 16, 17) *xyron*, n. sp.
 Left apical appendage of aedeagus not subdivided as above (figs. 22, 23)
 *pictifrons* Stål
6. Left apical appendage of aedeagus broadly rounded distally (fig. 29) or dorsal
 margin of aedeagus strongly excavated in basal half (fig. 27) 7
 Left apical appendage of aedeagus produced and tapered distally (fig. 36);
 dorsal margin of aedeagus not excavated 8
7. Left apical appendage of aedeagus produced as blunt finger distally, dorsal
 aedeagal margin strongly excavated (figs. 27, 28) *impiger* Ball
 Left apical appendage of aedeagus broadly rounded distally, dorsal aedeagal
 margin not excavated (figs. 29, 30) *crena*, n. sp.
8. Anal flap slender and almost J-shaped (fig. 32); left apical appendage of aede-
 agus quadrate or subquadrate basally (figs. 32, 35-37); posterior margin
 of pygofer obtusely angled (fig. 32) *radicis* Osborn (in part)
 Anal flap moderately stout and not at all J-shaped (fig. 38); left apical append-
 age of aedeagus oval or suboval basally (fig. 38); posterior margin of
 pygofer broadly rounded (fig. 38) *collinus* Ball
9. Anal flap long with distal portion broadly downturned (fig. 32); left apical
 appendage of aedeagus quadrate or subquadrate basally and extended as
 blunt fingerlike lobe distally (figs. 32, 35-37)
 *radicis* Osborn (in part)
 Anal flap and left apical appendage not shaped as above 10
10. Anal flap strongly asymmetrical, left margin with subapical lobe and right
 margin with decurved process (fig. 41); ventral margin of aedeagus with
 two basally directed subtriangular processes (fig. 42) (known only from
 Florida) *lunatus* Van D.
 Male genitalia without either of the above features 11
11. Aedeagus in lateral view tending to roundness, its ventral margin produced
 as spine directed obliquely ventrocephalad (figs. 44, 66) (exception *nigri-*

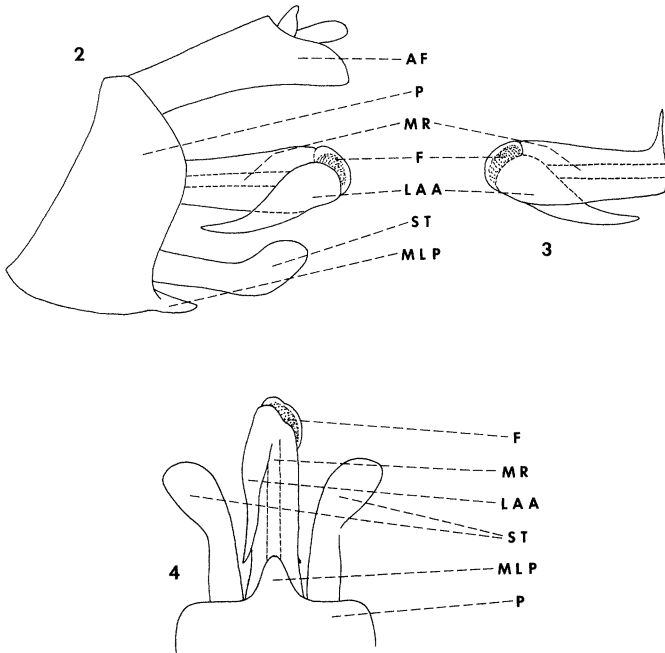


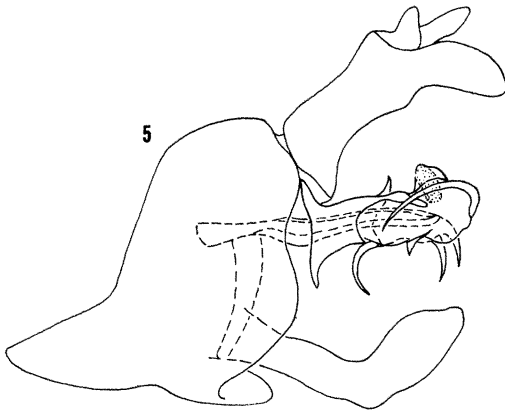
FIGURE 2-4. — Generalized male genitalia. 2, Pygofer, anal flap, style, and aedeagus in left lateral view. 3, aedeagus in right lateral view. 4, apical portion of pygofer, styles, and aedeagus in ventral view. AF=anal flap, F=flagellum, LAA=left apical appendage of aedeagus, MLP=median lobe of pygofer, MR=middle rod of shaft, P=pygofer, ST=style. Not shown is the left apical process, a usually slender and elongate structure whose basal portion is concealed by the LAA. See figure 27 for typical example of the left apical process.

- frons* where spine directed caudad, fig. 61); right side of aedeagus with two curved or partly curved contiguous or nearly contiguous processes originating near apex (figs. 52, 64, 70) (Southwestern) 12
- Aedeagus in lateral view not tending to roundness, its ventral margin simple or not modified as above; right side of aedeagus with zero to two processes, their features not as above 21
- 12. Both pro- and mesonotum unicolorous dark fuscus to black 13
- Both pro- and mesonotum not as above 15
- 13. Claval areas of forewings entirely dark *beameri* Ball
- Claval areas of forewings clear hyaline except at extreme bases 14

14. Forewings with discal embrowning not reaching claval vein; ventral margin of aedeagus strongly convex (fig. 48); left aedeagal process short and simple (fig. 47) *nevadensis*, n. sp.
Forewing with discal embrowning reaching claval vein at least in distal half; ventral margin of aedeagus not convex (fig. 50); left aedeagal process elongate with surface scabrose (fig. 49) *balli*, n. sp.
15. Frons and clypeus concolorous honey brown, neither with distinct markings 16
Frons and clypeus either not concolorous or frons with darker or lighter linear markings 17
16. Clavus without dark markings; ventral margin of aedeagus unlobed with spine small (figs. 51, 52) *nolinus* Ball
Clavus with dark markings; ventral margin of aedeagus bilobed and with spine large (figs. 54, 55) *yuccandus* Ball
17. Clavus with transverse or round dark markings; line formed by anterior edge of ventral aedeagal spine and aedeagus not concave (figs. 57, 58) *gabrielensis* (Flock)
Clavus either unmarked or with only longitudinal embrowning along commissural margin; line formed by anterior edge of ventral aedeagal spine and aedeagus concave 18
18. Frons and clypeus black or dark fuscus, frons with pale stripe on each side originating at lateroventral margin and obliquely extended toward median carina; left ventral margin of anal tube lobed in lateral view (fig. 60), right ventral margin simple; ventral aedeagal spine directed caudad in lateral view (figs. 60, 61) *nigrifrons* Ball
Frons lighter in color than clypeus, frons with dark stripe on each side originating at apex of frons and extended ventrally inside of lateral frontal margin; both margins of anal tube the same, ventral aedeagal spine directed cephalad in lateral view 19
19. Posterior tip of mesonotum black; forewings usually narrowly embrowned either in part or entirely along commissural margin; aedeagus in left lateral view with well-developed lobe near ventral margin distally (fig. 63); ventral aedeagal spine with base broadly triangular and apex comparatively blunt (fig. 64) *catalinus* Ball
Posterior tip of mesonotum pale; forewings neither embrowned nor darkened along commissural margin; aedeagus in left lateral view with poorly developed lobe or no lobe near ventral margin distally; ventral aedeagal spine with base less or not broadly triangular and apex acute 20
20. Crossveins at level of stigma to claval apex entirely pale or white; ventral aedeagal spine with base broad (figs. 66, 67); ventral margin of anal flap straight or slightly concave (fig. 66) *mojavensis* Ball
Crossveins at level of stigma to claval apex only partly pale or white; ventral aedeagal spine with base narrow (fig. 70); ventral margin of anal flap convex beyond middle (fig. 69) *texensis*, n. sp.
21. Aedeagus slender, in lateral view with pair of long processes originating near apex and extending cephalad; aedeagus in right lateral view with acute

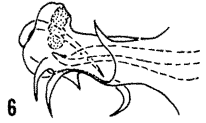
- process near apex projecting distally; each forewing distinctly paler along costal margin 22
- Aedeagus without three processes as above; each forewing not paler along costal margin 23
22. Forewings transparent stramineous to pale brown; paired dorsal processes of aedeagus about equal in length and stoutness (figs. 72, 73); anal flap subquadrate in lateral view (fig. 72)..... *enotatus* Van D.
- Forewings transparent fuscus at least basally and apically; paired dorsal processes of aedeagus clearly unequal in length and stoutness (figs. 75, 76); anal flap apically decurved in lateral view (fig. 75) *slossonae* Ball
23. Aedeagus in right lateral view with single upright or slightly curved process originating below dorsal margin, dorsal margin with or without short tooth (figs. 79, 82, 85, 91, 94) 24
- Aedeagus in right lateral view without process or processes as above, dorsal margin with long tooth (fig. 97), basally directed process (fig. 103), or simple 29
24. Pygofer in lateral view with posterior margin strongly triangular 25
- Pygofer in lateral view with posterior margin not strongly triangular, usually roundly produced 26
25. Single process from right side of aedeagus projecting much beyond dorsal edge of aedeagus (fig. 79), process not originating from flange (fig. 79) *pusillus* Van D.
- Single process from right side of aedeagus not reaching dorsal edge of aedeagus (fig. 82), process originating from flange (fig. 82) *neopusillus*, n. sp.
26. Toothlike projection on dorsal margin of aedeagus in lateral view either positioned close to apex or absent 27
- Toothlike projection on dorsal margin of aedeagus in lateral view near middle 28
27. Without toothlike projection on dorsal margin of aedeagus (figs. 84, 85); posterior lateral angles of pregenital ventral abdominal segments almost always marked with black (extremely common in Calif. and other western states)..... *occidentalis* Van D.
- With toothlike projection on dorsal margin of aedeagus near apex (figs. 87, 88); ventral abdominal segments unicolorous (known only from Miss.) *dozieri*, n. sp.

FIGURES 5-12. — Male genitalia. 5-9, *Myndus musivus* (Germar), from Ujpest, Hungary. 10-12, *M. truncatus* Metcalf, from holotype. 5, 10, complete lateral view. 7, 12, apex of pygofer, styles, and aedeagus in ventral view. 6, 11, aedeagus in right lateral view. 8, aedeagus in dorsal view. 9, apex of pygofer and styles in ventral view.

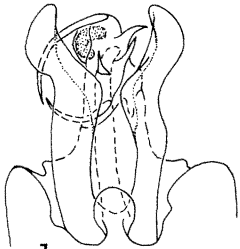


5

musivus



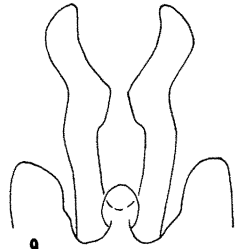
6



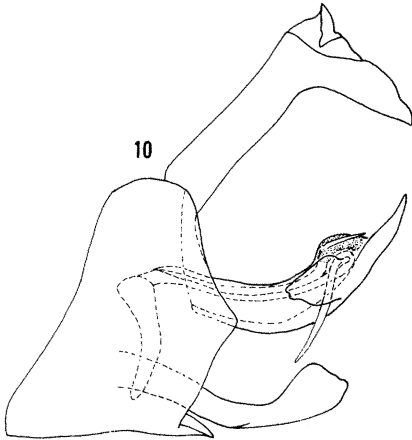
7



8

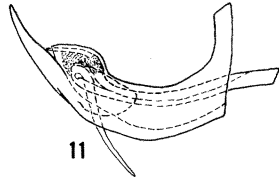


9

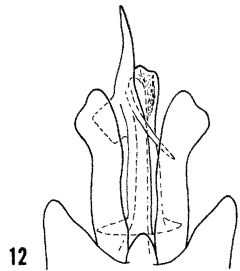


10

truncatus



11



12

28. Single process on right side of aedeagus upright and slender (fig. 91); triangular projection from venter of anal flap in basal half (fig. 90) *viridis* Ball
 Single process on right sides of aedeagus tilting distally and broader (fig. 94); triangular projection from venter of anal flap at or slightly beyond middle (fig. 93) *flocki*, n. sp.
29. Dorsal margin of aedeagus with moderately long, toothlike, posteriorly directed projection at or near apex (figs. 96, 97) *viridicatus* Ball
 Dorsal margin of aedeagus without such a projection 30
30. Anal flap with process originating between ventral margins 31
 Anal flap without process or process originating from ventral margin or margins 32
31. Longer aedeagal process directed cephalad and parallel or nearly parallel with long axis of aedeagus (figs. 100, 103); ventral process of anal flap irregularly rounded or blunt distally (figs. 99, 102) *ovatus* Ball
 Longer aedeagal process directed ventrocephalad and projecting beyond ventral margin of aedeagus (figs. 106, 108, 109); ventral process of anal flap subtriangular (fig. 105) *crudus* Van D.
32. Aedeagus with two short processes on right side (figs. 111, 112); anal flap quadrate (fig. 110) *fulvus* Osborn
 Aedeagus without processes on right side; anal flap not quadrate 33
33. Anal flap with long triangular process at middle of right ventral margin (fig. 113); apex of aedeagal process footshaped in ventral view (fig. 115) *rubidus* Ball
 Anal flap with right margin at most broadly angular (fig. 116) or rounded; apex of aedeagal process tapered to acute tip (fig. 118) *lophion*, n. sp.

Myndus truncatus Metcalf

(Figs. 10-12)

Myndus truncatus Metcalf, 1923:184.

Haplaxius truncatus (Metcalf), Caldwell 1946:203.

Salient features. — Length of males 5.0-5.2 mm, females 5.3-5.6 mm. Ground color of head and thorax pale yellowish brown; face ivory to pale stramineous; crown, pronotum, and mesonotum usually slightly darker except for pale lateral and posterior angles of mesonotum; frons marked with dark brown to black transverse band at base and apex; forewings hyaline or nearly so with veins and each stigma brown.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 12) bluntly subtriangular with apices of styles obliquely subtruncate; genital capsule in lateral view (fig. 10) with posterior margin of pygofer triangularly produced, style apically subtruncate, anal flap slender with nearly right angle bend in distal third; aedeagus in left lateral view (fig. 10) acutely prolonged apically with small subquadrate apical appendage, single subapical process, and weakly developed flagellum; aedeagus in right lateral view (fig. 11) without modifications originating on this side.

Type. — Holotype male, Elizabeth, Illinois, 6 July 1917 in collection of Illinois State Natural History Survey, Urbana, Illinois.

Specimens studied. — ILLINOIS, Elizabeth; IOWA, Lansing; WISCONSIN, Lynxville, Victory. Collection dates 6 July to 19 August. Total specimens studied 2 males and 4 females.

Notes. — This is one of several species in *Myndus* with dark transverse bands on the frons. The acute apical prolongation of the aedeagus provides the distinguishing feature of the species. All of the localities from which the species is known are close to the Mississippi River in northwestern Illinois, southwestern Wisconsin, and northeastern Iowa. No plant associations are recorded.

***Myndus glyphis* Kramer, n. sp.**

(Figs. 13-15)

Salient features. — Length of males 4.8-5.5 mm, females 5.0-6.0 mm. Ground color of head and thorax pale stramineous to pale brown with venter lighter than dorsum; pronotum with dark cloud just behind eyes; areas laterad of mesonotal carinae without shading to heavily darkened; frons marked with dark brown to black transverse band at base and apex; forewings hyaline or nearly so with veins and each stigma yellowish brown.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 15) roundly produced with apices of styles rounded; genital capsule in lateral view (fig. 13) with posterior margin of pygofer strongly and triangularly produced at middle, style apically rounded, anal flap slender with distal third narrowed and obliquely directed ventrally, with variably developed acute convexity on ventral margin of anal flap beyond middle; aedeagus in left lateral view (fig. 13) with apical appendage divided into long dorsal and short ventral blades, both directed ventrocephalad, with or without short acute convexity distally on dorsal margin of apical appendage, single subapical process, and weakly developed flagellum; aedeagus in right lateral view (fig. 14) with broad finlike structure on anterior half near dorsal margin.

Type. — Holotype male (USNM 75913) and allotype female, Salem, New York, June 1926, E.D. Ball, on aspen.

Paratypes. — 5 males and 2 females with same data as holotype; male, Chicopee, Mass., 21 June 1896, C.F. Baker; 2 males, Colden, N.Y., 4 July 1886, E.P. Van Duzee; 2 males and female, Montreal, Canada, 18 July 1920, Ouellet. Male and female, Great Smoky Mountains National Park, Tenn. at 5-6000 ft., 21 June 1942, D.J. and J.N. Knull. 3 males, Hamburg, N.Y., 21 June 1908, 3 July 1904, 1 July 1906, 4 females, Colden, N.Y., 15 July 1906, all E.P. Van Duzee.

Specimens studied. — MASSACHUSETTS, Chicopee; NEW YORK, Colden, Hamburg, Salem; TENNESSEE, Great Smoky Mountains National Park. CANADA, Montreal. Collection dates 21 June to 18 July. Total specimens studied 16 males and 9 females.

Notes. — The pair of dark transverse bands on the frons and the double-bladed left apical appendage of the aedeagus provide the distinguishing features of this species. As noted in the description, there is some minor variation in the male genital capsule; the projection from the ventral margin of the anal flap may be reduced or absent, and the acute projection on the dorsal margin of the apical ap-

pendage may be similarly reduced or absent. These differences are considered to represent intraspecific variation. A puzzle of longstanding has been the figure 20E in Osborn 1938. I have studied the specimen from which this figure was prepared; it is badly mangled and highly distorted example of *glyphis* from Hamburg, N.Y. and is misidentified as *delicatus* Van Duzee in Osborn's work.

Except for the Tennessee specimens taken at 5,000 to 6,000 ft., all of the records are from our northeastern states and adjacent Canada. The only sample with host data is the series taken by E.D. Ball at Salem, N.Y., on aspen. If this means bigtooth aspen and if this is the major food plant, then the insect will likely be largely restricted to the northeast as is the tree upon which it feeds. The specific name, a Greek noun in apposition, means penknife.

Myndus xyron Kramer, n. sp.

(Figs. 16-18)

Salient features. — Length of males 4.8-5.2 mm, females 5.5 mm. Ground color of head and thorax stramineous to tawny with venter usually paler than dorsum; pronotum darkened behind eyes; areas laterad of mesonotal disk shaded with black to brown; in heavily pigmented specimens, intercarinal areas of mesonotal disc similarly darkened; frons marked with dark brown to black transverse band at base and apex; forewings hyaline to brownish hyaline, often with apical edges slightly darker, veins and part of each stigma brown.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 18) roundly produced with apices of styles irregularly rounded; genital capsule in lateral view (fig. 16) with posterior margin of pygofer bluntly triangular, style irregularly rounded apically, anal flap elongate with distal portion narrowed and obliquely directed ventrally; aedeagus in left lateral view (fig. 16) with apical appendage dorsally crested, ventrally divided into broad upper and narrow lower blades, lower blade with acute and posteriorly directed projection near base, single subapical process, and poorly developed flagellum; aedeagus in right lateral view (fig. 17) without modifications originating on this side.

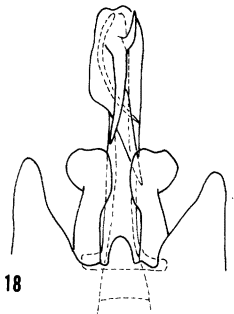
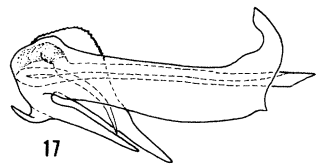
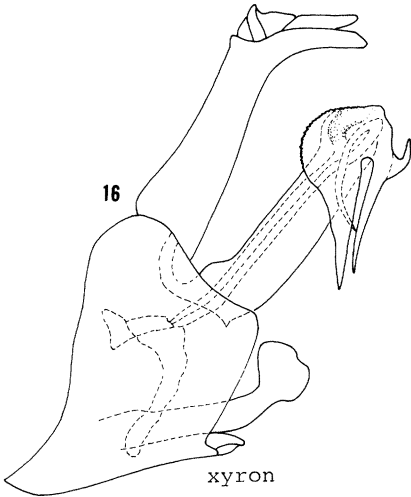
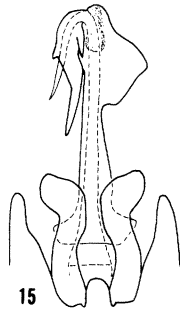
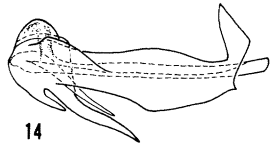
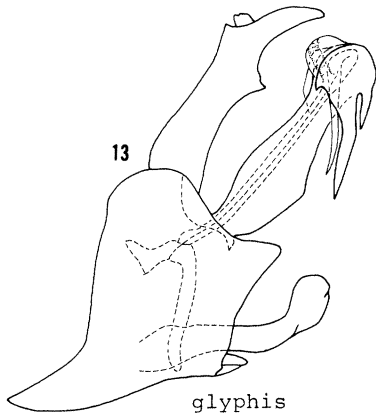
Type. — Holotype male (USNM 75914) and allotype female, Pine Island, New York, 7 June 1914, collector not recorded.

Paratypes. — 3 males with same data as holotype; male, Rigaud, Quebec, Canada, 5 July 1921, J. Ouellet.

Specimens studied. — MICHIGAN, Midland County; NEW YORK, Pine Island. CANADA: QUEBEC; La Trappe, Rigaud. Collection dates 7 June to 10 July. Total specimens studied 6 males and 5 females.

Notes. — The posteriorly directed projection on the lower blade of the left apical appendage of the aedeagus and the pair of dark transverse bands on the frons distinguish *xyron* from all of its congeners. The distribution is apparently north-

FIGURES 13-18. — Male genitalia. 13-15, *M. glyphis* n. sp., from holotype. 16-18, *M. xyron* n. sp., from holotype. 13, 16, complete lateral view. 14, 17, aedeagus in right lateral view. 15, 18, apex of pygofer, styles, and aedeagus in ventral view.



eastern United States and adjacent Canada, but the plant relationships are not known. The specific name, a Greek noun in apposition, means razor.

Myndus pictifrons Stål

(Figs. 19-26)

Myndus pictifrons Stål, 1862:307.

Haplaxius pictifrons (Stål), Caldwell 1946:203.

Myndus sordidipennis Stål, 1862:308. N. Syn.

Haplaxius sordidipennis (Stål), Caldwell 1946:203. N. Syn.

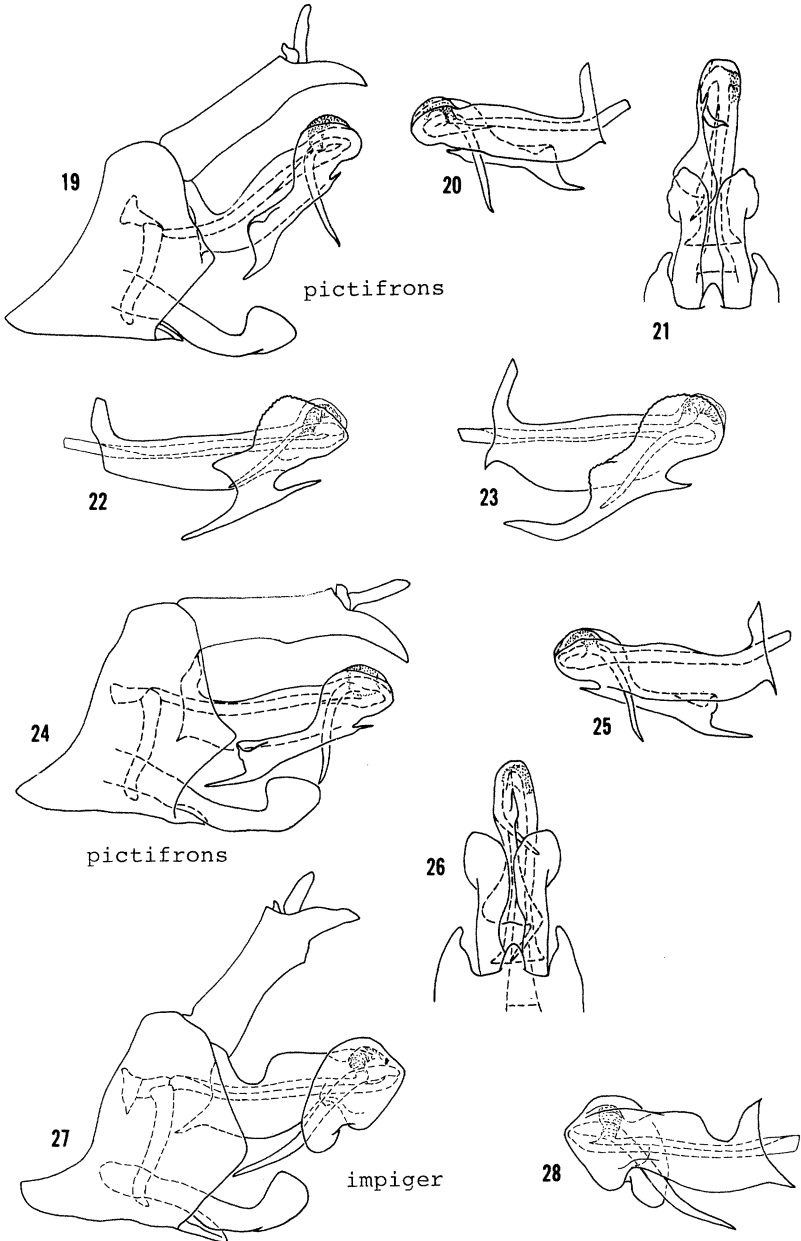
Salient features. — Length of males 4.2-5.4 mm, females, 5.0-6.2 mm. Ground color of head and thorax pale yellowish brown with venter lighter than dorsum; pronotum darkened behind eyes; areas laterad of mesonotal carinae without shading to heavily darkened, at times areas mesad of lateral carinae also darkened; frons marked with dark brown to black transverse band at base and apex; forewings hyaline or nearly so with veins and part of each stigma yellowish brown, with or without elongate brownish patch on each forewing in area distad of claval apex.

Male genitalia. — Median lobe of pygofer in ventral view (figs. 21, 26) more or less roundly produced with apices of styles variably rounded; genital capsule in lateral view (figs. 19, 24) with posterior margin of pygofer triangularly produced, style near apex subtruncate on dorsal margin, anal flap elongate with distal third slightly bent downward and apex acute; aedeagus in left lateral view (figs. 19, 22-24) with apical appendage long, its dorsal margin rounded near base with distal convexity, its ventral margin produced as acute process near base and at apex, single subapical process, and weakly developed flagellum; aedeagus in right lateral view (figs. 20, 25) without processes originating on this side.

Type. — Lectotype male here selected with labels: "N. Yersey" (sic) and "Belfrage" and "Typus" (red paper) and "152 77" (red paper) and "Riksmuseum Stockholm" (green paper). There is also a sixth label which is an illegible handwritten note on the pin with the lectotype. The female mentioned in the original description has labels like the male lectotype except for "Allotypus" (red paper) and "154 77" (red paper); it is not conspecific and represents an example of *radicis* Osborn. The holotype of *sordidipennis* is a female with labels "Pennsylvania" and "Belfrage" and "Typus" (red paper) and "155 77" (red paper) and Riksmuseum Stockholm" (green paper). All of the three types are in the Riksmuseum, Stockholm.

Specimens studied. — CONNECTICUT, Gaylordsville; GEORGIA, Atlanta, Cuthbert; ILLINOIS, Clay City, Tamms; INDIANA, Noblesville; IOWA, Ames; KANSAS, Garnett, Topeka; LOUISIANA, Opelousas; MARYLAND, Annapolis, Beltsville, Glen Echo, Odenton, Oxon Hill, Plum Point, Plummers Island; MASSACHUSETTS, Chicopee, Woods Hole; MISSISSIPPI, Dorsey, Kosciusko,

FIGURES 19-28. — Male genitalia. 19-26, *M. pictifrons* Stål. 19-21, from Dorsey, Miss.; 22, from Page, Okla.; 23, from Columbus, Ohio; 24-26, from Tamms, Ill. 27-28, *M. impiger* Ball, from Colorado Springs, Colo. 19, 24, 27, complete lateral view. 20, 25, 28, aedeagus in right lateral view. 21, 26, apex of pygofer, styles, and aedeagus in ventral view. 22, 23, aedeagus in left lateral view.



Leland, Pachuta; MISSOURI, St. Louis, Roaring River State Park; NEBRASKA, Valley; NEW JERSEY, Budd's Lake, Point Pleasant, Westfield; NEW YORK, Babylon, Buffalo, Hamburg, Ithaca; NORTH CAROLINA, Balsam, Lake Tahoma, Raleigh; OHIO, Apple Grove, Columbus, Gallipolis, Indian Lake, Vinton, Worthington, counties only — Champaign, Delaware, Hancock, Hocking, Jackson, Pickaway; OKLAHOMA, Page; PENNSYLVANIA, Harrisburg, Philadelphia; TENNESSEE, Great Smoky Mts. National Park, Sullivan County; VIRGINIA, Alexandria, Arlington, Black Pond, Lake Drummond, Scotts Run. Collection dates 16 May to 12 August. Total specimens studied 160 males and 183 females.

Notes. — *M. pictifrons* is by far our most common species with the twice darkly banded frons. Even though there is some variation in the details of the left apical appendage of the aedeagus, this structure provides the critical features for species identification. The left apical appendage is moderately long, rounded basally and has a convexity on its dorsal margin; it bears a short acute projection on its ventral margin near the base and terminates distally with a long slender acute projection. The brownish vitta at the inner apex of each forewing, long used to separate *pictifrons* and *sordidipennis*, is of no taxonomic value. In a long series of specimens, the vitta appears in all degrees of distinctness from bold to scarcely discernible to absent. The lectotype of *pictifrons* displays a well-developed dark vitta; the conspecific holotype of *sordidipennis* lacks all but a vague trace of one.

Despite the extensive distribution, Connecticut south to Georgia and west to Oklahoma and Nebraska, and the large number of specimens available for study, few plant associations are recorded for *pictifrons*. A few of the specimens were taken on cottonwood in Ohio and on willow in Mississippi.

Myndus impiger Ball

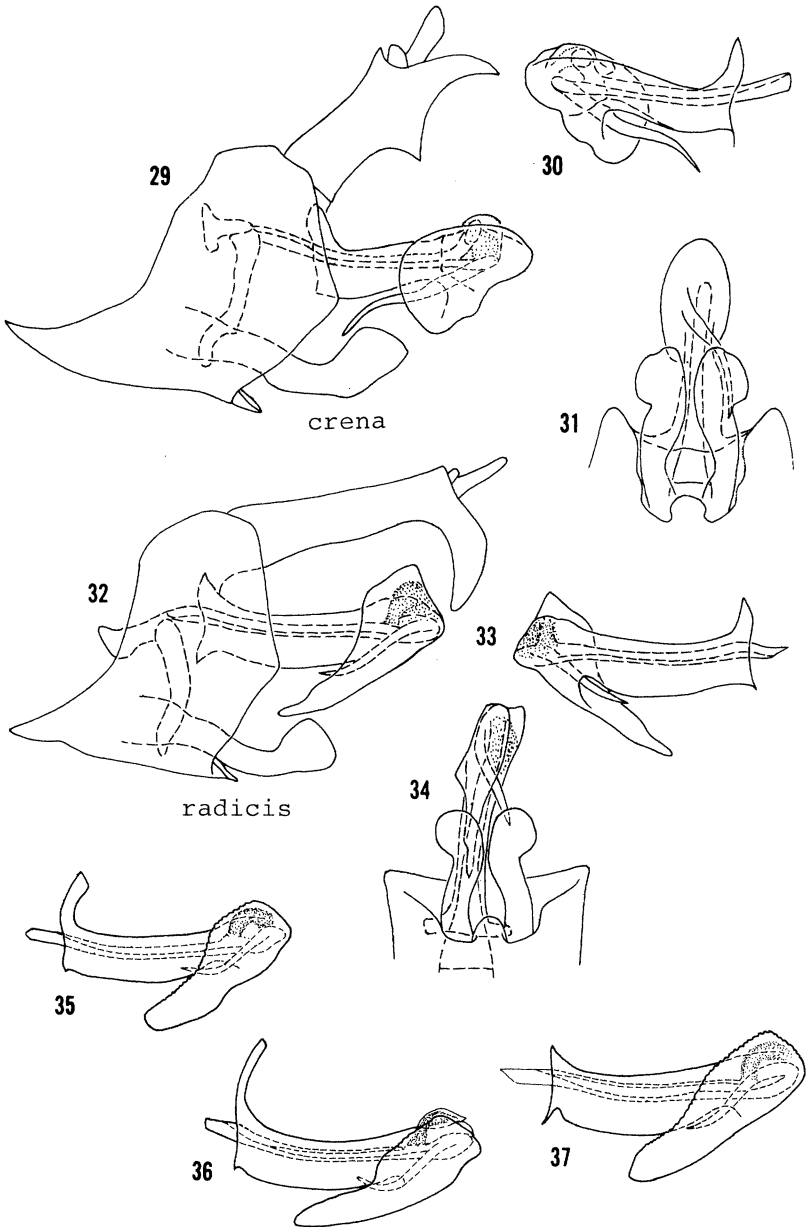
(Figs. 27-28)

Myndus impiger Ball, 1902:153.

Haplaxius impiger (Ball), Caldwell 1946:203.

Salient features. — Length of males 4.7-4.9 mm, females 4.5-5.4 mm. Ground color of head and thorax pale yellowish brown to tan; pronotum heavily infuscated behind eyes; mesonotum, except for posterior and lateral angles, lightly to heavily infuscated, but carinae pale; frons with dorsally convex brown to almost black transverse band at base and ventrally concave brown to almost black transverse band at apex; lateral portions of pronotum with dark brown to black transverse band below carina; forewings essentially hyaline with veins and part of each stigma brown, area near and beyond each claval apex with variably developed brownish cloud.

FIGURES 29-37. — Male genitalia. 29-31, *M. crena* n. sp., from holotype. 32-37, *M. radialis* Osborn; 32-34, from Bowie, Md.; 35, from Garnett, Kansas; 36, 37, from Columbus, Ohio. 29, 32, complete lateral view. 30, 33, aedeagus in right lateral view. 31, 34, apex of pygofer, styles, and aedeagus in ventral view. 35, 36, 37, aedeagus in left lateral view.



Male genitalia. — Median lobe of pygofer in ventral view subtriangularly produced, apices of styles rounded; genital capsule in lateral view (fig. 27) with posterior margin of pygofer bluntly triangular, style distally subtruncate, anal flap slightly asymmetrical with irregular toothlike modification on ventral margin before acute apex; aedeagus in left lateral view (fig. 27) with broad apical appendage indented ventrally and concealing basal portion of long apical process, dorsal margin of shaft with deep concavity in basal half; aedeagus in right lateral view (fig. 28) without modifications on this side.

Type. — Lectotype female here selected with label Palmer Lake, Colorado, 23 July 1900, [E.D. Ball]. This is the only specimen found in the USNM from the original series which included "eight females from Palmer Lake, Ridgeway, and Fort Collins, Colo. All taken in the mountains."

Specimens studied. — COLORADO, Colorado Springs, Manitou, Palmer Lake; NEW MEXICO, Sacramento Mt. Collection dates 19-29 July. Total specimens studied 2 males and 6 females.

Notes. — The broad apical appendage and the deep concavity on the dorsal margin of the aedeagal shaft in lateral view provide the distinctive features of *impiger*. No plant associations are recorded; the distribution is likely limited to the higher elevations in the Southwest.

Myndus crena Kramer, n. sp.

(Figs. 29-31)

Salient features. — Length of males 4.3-4.8 mm, females 4.6-5.0 mm. Ground color of head and thorax pale yellowish brown; pronotum broadly darkened behind eyes; lateral and intercarinal portions of mesonotum usually heavily darkened or shaded; frons with dorsally convex dark brown to black transverse band at base and ventrally concave dark brown to black transverse band at apex; lateral portion of pronotum with dark brown to black transverse band below carina; forewings essentially hyaline with veins and part of each stigma yellowish brown, area near and beyond each claval apex with variably developed brownish cloud.

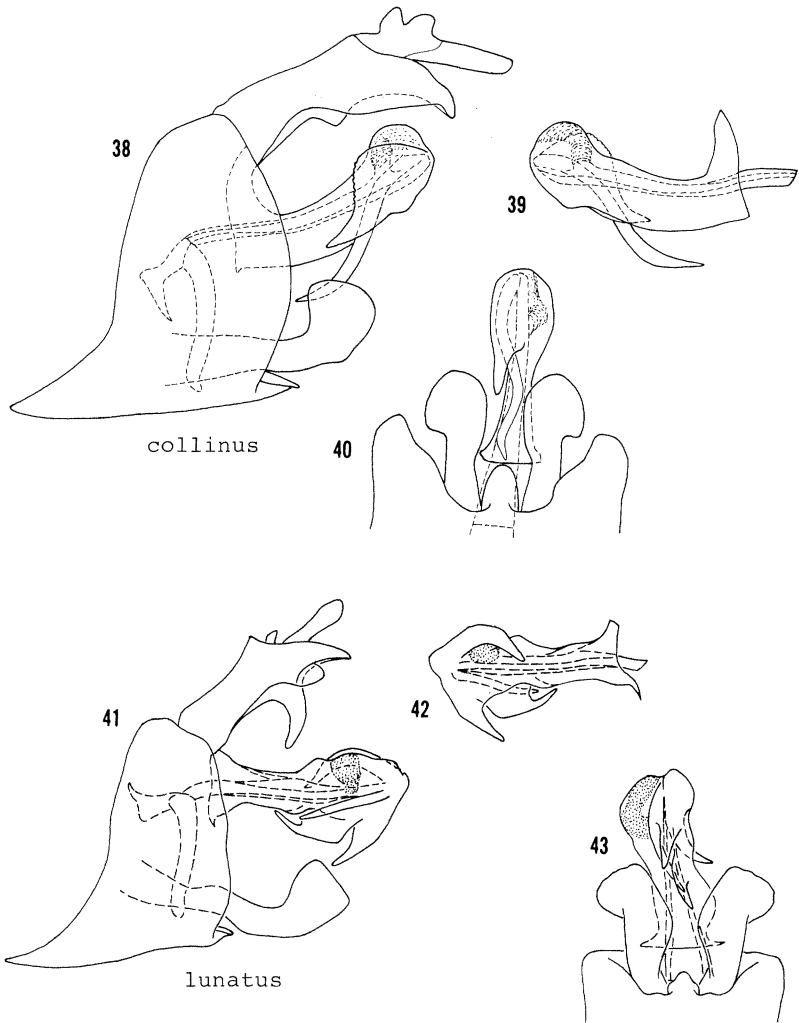
Male genitalia. — Median lobe of pygofer in ventral view (fig. 31) broadly and roundly produced with apices of styles somewhat irregularly rounded; genital capsule in lateral view (fig. 29) with posterior margin of pygofer triangular, style distally subtruncate, anal flap moderately stout with sharp triangular projection on both sides just beyond middle of ventral margin and terminating with sharp prolonged apex; aedeagus in left lateral view (fig. 29) with ventrally irregular and hemispherical apical appendage, single long subapical process, and weakly developed flagellum; aedeagus in right lateral view (fig. 30) without processes originating on this side.

Type. — Holotype male (USNM 75915), White Mountains, Musgrave's Black River at 7,800 ft., Arizona, 15 June 1936, E.D. Ball.

Paratypes. — 10 males and 2 females with same data as holotype. Male and female, Wolf Creek Pass, Colorado, 21 July 1938, D.J. and J.N. Knull.

Specimens studied. — ARIZONA, Chiricahua Mts., White Mts.; COLORADO, Wolf Creek Pass. Collection dates 15 June to 21 July. Total specimens studied 12 males and 3 females.

Notes. — Because the ventral or basal dark band on the frons is dorsally convex



FIGURES 38-43. — Male genitalia. 38-40, *M. collinus* Ball, from Poplar, Mont. 41-43, *M. lunatus* Van Duzee, from New Port Ritchey, Fla. 38, 41, complete lateral view. 39, 42, aedeagus in right lateral view. 40, 43, apex of pygofer, styles, and aedeagus in ventral view.

and the dorsal or upper band is ventrally concave, the pale portion between them appears as an inverted and broadly "V" or "U" shaped area. The claw-shaped anal flap and the hemispherical left apical appendage of the aedeagus provide the distinctive features of the species. *M. crena* is likely restricted to the higher elevations of the Southwest; no plant associations are recorded, Ball misidentified this species as his *collinus*. The specific name, a Latin noun in apposition, means rounded projection.

Myndus radialis Osborn

(Figs. 32-37)

Myndus radialis Osborn, 1903a:42.

Haplaxius radialis (Osborn), Caldwell 1946:203.

Myndus delicatus Van Duzee, 1908:492. N. Syn.

Haplaxius delicatus (Van Duzee), Caldwell 1946:203. N. Syn.

Salient features. — Length of males 4.4-5.6 mm, females 4.9-5.9 mm. Ground color of head and thorax varying from pale yellowish green to dark tawny; crown, pronotum, and mesonotum varying from unmarked to heavily marked with various shades of brown; markings of frons highly variable, ranging from lemon or pale orange upper and lower transverse bands to pair of dark spots at upper margin with pale band at lower margin to dark brown or black at both upper and lower margins; forewings essentially hyaline with veins and each stigma uncolored to brownish, at times with brownish cloud on each forewing near to and distad of claval apex.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 34) roundly produced with apices of styles rounded; genital capsule in lateral view (fig. 32) with posterior margin of pygofer triangular, style apically subtruncate, anal flap slender with distal portion turned ventrad; aedeagus in left lateral view (figs. 32, 35-37) with apical appendage quadrate or subquadrate basally then tapered distally to usually blunt, fingerlike apical portion, dorsal edge of apical appendage with variable fine serrations, single subapical process, and weakly developed flagellum; aedeagus in right lateral view (fig. 33) without processes originating on this side.

Type. — Lectotype male here selected with labels: "Columbus, Ohio, 25 May 1903" and "Cotype" (red paper) and "Herbert Osborn Coll'n". Other specimens labeled cotype examined include: 2 males and 2 females with data identical to lectotype and 2 males and 2 females with same data except date 3 June 1903. The lectotype and all of the cotypes are in the Ohio State University Collection. Lectotype male of *Myndus delicatus* here selected with labels: "Hot Springs, N.C." and "Lectotype *delicatus*" (red paper) and "E.P. Van Duzee Collection" (yellow paper) and "Cal Acad Sci. Type No. 2241". This lectotype is in the California Academy of Sciences.

Specimens studied. — ILLINOIS, Charleston, Vienna; INDIANA, Lafayette; KANSAS, Douglas Co., Garnett; MARYLAND, Bowie, Glen Echo, Lakeland, Plummers Island; MISSISSIPPI, Dorsey, Durant, Meridian; NEW YORK, Colden, Ithaca; NORTH CAROLINA, Hot Springs; OHIO, Columbus, Ironton, Vinton, counties only — Adams, Delaware, Hocking, Lawrence, Pickaway, Ross, Union; VIRGINIA, Mount Vernon. Collection dates 25 May to 9 August. Total specimens studied 53 males and 57 females.

Notes. — The coloration and markings of *radialis* are the most variable of any

species in the genus. Osborn's original series had the dorsal band of the frons reduced to a pair of dark spots. Van Duzee's *delicatus* represents more heavily marked specimens with both upper and lower bands of the frons dark. Specimens in collections with pale lemon or orange bands on the frons were variously misdetermined as other species, most often as *viridis* or *viridicatus*. All of these color forms are united by features of the male genitalia. The left apical appendage with its quadrate basal portion and blunt fingerlike distal portion plus the slender and distally downturned anal flap provide the unique features of the species.

The distribution of *radicis* is extensive in the eastern United States with records from upper New York south to North Carolina and west to Kansas and Mississippi. Plant associations are few, but specimens have been collected on American sycamore, *Platanus occidentalis* L., in both Kansas and Mississippi. Osborn (1903:42 & 1938:310) provided some interesting biological observations on his species. The nymphs feed on the roots of nettles and grasses in subterranean galleries and cavities which were found at depths of less than 2 inches. He surmised that 2 generations per year were likely in Central Ohio.

Myndus collinus Ball

(Figs. 38-40)

Myndus collinus Ball 1933:482.

Salient features. — Length of males 5.2-5.7 mm, females 5.5-6.0 mm. Ground color of head and thorax creamy ivory to tan; pronotum strongly darkened behind eyes, below lateral carinae, and sometimes just anterior to wing bases; mesonotum marked with pale to moderately dark brown longitudinal stripe on each side of central carina, areas outside of lateral carinae darkened with same hue except for lateral angles; frons with dorsally convex dark brown to black transverse band at base and ventrally concave dark brown to black transverse band at apex; forewings essentially hyaline with veins irregularly darkened, Sc + R and their fork usually brown as far as stigma, other veins most often pale except for some beyond claval apex, these variably darkened with brown.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 40) broadly and roundly produced with apices of styles irregularly rounded; genital capsule in lateral view (fig. 38) with posterior margin of pygofer convexly rounded, style distally rounded, anal flap slightly asymmetrical with left ventral margin narrowed before middle and right ventral margin subtriangularly produced near middle; aedeagus in left lateral view (fig. 38) with suboval apical appendage, its distal ventral portion terminating with stout triangular projection, single long subapical process, and weakly developed flagellum; aedeagus in right lateral view (fig. 39) without processes originating on this side.

Type. — Holotype female, Fort Collins, Colorado, 7 July 1898, [E.D. Ball]. Allotype male with same data. Both in USNM Collection.

Specimens studied. — COLORADO, Ft. Collins; MONTANA, Poplar. Collection dates 28 June to 17 July. Total specimens studied 4 males and 2 females.

Notes. — The darkly twice-banded frons, the convexly rounded posterior margin of the pygofer, the asymmetrical anal flap, the suboval left apical appendage of the

aedeagus with the stout triangular projection of the distal ventral margin, and the long subapical aedeagal process together provide the distinctive features of *collinus*. This species is probably confined to our Rocky Mountain and adjacent states, but no plant associations are recorded except "general sweeping." *M. collinus* provides the northernmost record for the genus; Poplar, Montana is near the Missouri River just above the 48th parallel in northeastern Montana.

Myndus lunatus Van Duzee

(Figs. 41-43)

Myndus lunatus Van Duzee, 1909:189.

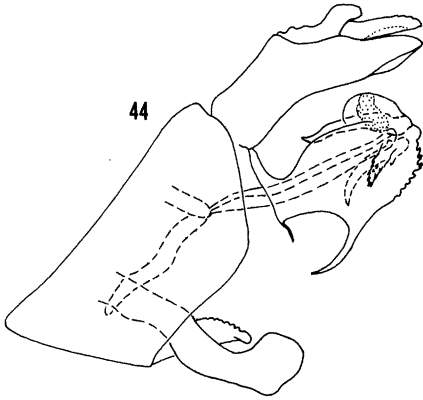
Haplaxius lunatus (Van Duzee), Caldwell 1946:203.

Salient features. — Length of males 3.3-4.0 mm, females 3.4-4.0 mm. Ground color of head and thorax stramineous to pale tawny, head and pronotum usually lightly tinged with pale green, greenish color most often apparent on face; males typically with slight orange shading on mesonotum, frons with middle half touching frontoclypeal suture with pale orange cloud and subapically with similar but smaller and less distinct cloud, these clouds sometimes blending, forewings essentially hyaline with veins pale, dark mark in stigma and 2 or 3 darkened or clouded veins at or near margin behind claval apices; females typically with darkened cloud behind each eye and dark area laterally below pleural carinae on pronotum, mesonotum with variable brownish shading, frontoclypeal suture bordered variably with dark brown to black with dark color usually more extensive on frons, upper portion of frons with small orange or pale orange cloud, forewings hyaline with veins and sometimes cells partly pale and partly dark producing somewhat streaked appearance, each stigma partly darkened.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 43) irregularly triangular with apices of styles subtruncate; genital capsule in lateral view (fig. 41) with posterior margin of pygofer slightly irregular but vertical, apex of style truncate, anal flap highly asymmetrical with left ventral margin lobed before acute apex and right ventral margin modified to form blunt hook; aedeagus in left lateral view (fig. 41) without apical appendage but with subapical process, ventral margin modified with two apically acute and roughly triangular extensions, these obliquely directed cephalad; aedeagus in right lateral view (fig. 42) with large acute process originating near apex of dorsal margin, process broadly curved cephalad.

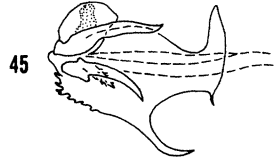
Type. — Lectotype male here selected with labels: "Sevenoaks, Florida, 1 May 1908, Van Duzee" and "Lectotype *lunatus*" (red paper) and "E.P. Van Duzee Collection" (yellow paper) and "Cal. Acad. Sci. Type No. 2246." The lectotype is in the collection of the California Academy of Sciences.

FIGURES 44-50. — Male genitalia. 44-46, *M. beameri* Ball, from Chiricahua Mts., Ariz. 47-48, *M. nevadensis*, n. sp., from holotype. 49-50, *M. balli* n. sp., from holotype. 44, 47, 49, complete lateral view. 45, 48, 50, aedeagus in right lateral view. 46, apex of pygofer, styles, and aedeagus in ventral view.

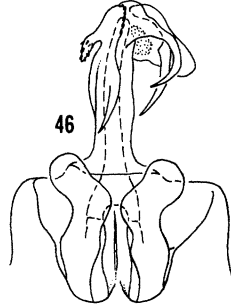


44

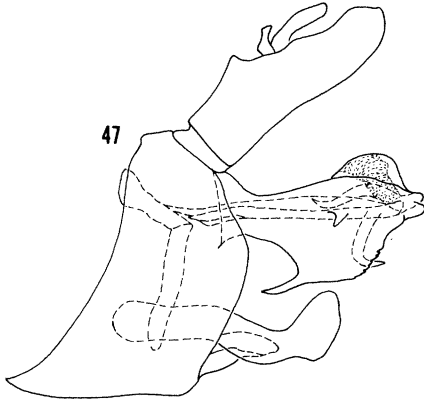
beameri



45

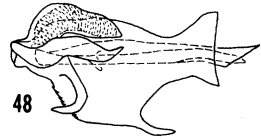


46

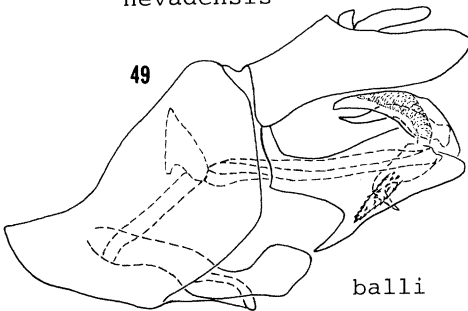


47

nevadensis

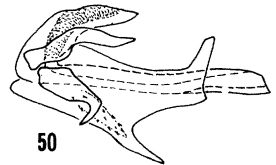


48



49

balli



50

Specimens studied. — FLORIDA, Big Pine Key, Estero, Ft. Myers, Highlands Hammock St. Park, Key West, La Belle, New Port Richey, Sanford, Sebring, Sevenoaks, Tampa. Collection dates 27 April to 22 September. Total specimens studied 42 males and 46 females.

Notes. — *M. lunatus* is readily distinguished from its congeners by the strongly asymmetrical anal flap and by the two subtriangular projections on the ventral margin of the aedeagus. As noted above, *lunatus* is sexually dimorphic. The males are less elaborately patterned generally and lack the dark transverse band at the frontoclypeal suture which is found in the females. The distribution of the species is limited to Florida; Van Duzee (1909:189) reported sweeping numerous specimens from low huckleberry bushes and unidentified weeds and grasses on various dry pine barrens in that state.

Myndus beameri Ball

(Figs. 44-46)

Myndus beameri Ball, 1933:480.

Haplaxius beameri (Ball), Caldwell 1946:203.

Salient features. — Length of males 3.8-4.1 mm, females 4.2-4.9 mm. Ground color of head and thorax dark fuscus to black and unmarked, beak pale and legs irregularly pale; each forewing black superficially but actually transparent dark brown with 7-9 variously shaped small white or hyaline patches in distal area at and beyond clavus and stigma, these patches most obvious at costal margin on stigma and pair posterior to stigma.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 46) elongately produced with apices of styles rounded; genital capsule in lateral view (fig. 44) with posterior margin of pygofer bluntly triangular, style apically subtruncate or rounded, anal flap simple and narrowed distally; aedeagus in left lateral view (fig. 44) generally oval, without apical appendage, with short scabrose subapical process, ventral margin near apex dentate or serrate, middle of ventral margin produced as slender acute process directed ventrocephalad, and with well-developed flagellum; aedeagus in right lateral view (fig. 45) with pair of simple but long processes originating at or near apex and directed cephalad.

Type. — Holotype female, Santa Rita Mts., Arizona, 17 July 1932, R.H. Beamer. Allotype male, Huachuca Mts., Arizona, 14 June 1928, A.A. Nichol. Both are in the collection of the USNM.

Specimens studied. — ARIZONA, Chiricahua Mts., Huachuca Mts., Nogales, Santa Rita Mts. Collection dates 9 June to 17 July. Total specimens studied 11 males and 8 females.

Notes. — The entirely dark forewings with the small white or hyaline patches on the distal portions distinguish this species from all of its congeners in the United States. The structural features of the male genital capsule also provide differentiating characters. *M. beameri* is known only from Arizona where specimens have been taken on *Agave americana* L. or century-plant and on *Yucca* sp.

Myndus nevadensis Kramer, n. sp. (Figs. 47-48)

Salient features. — Length of males 4.2-4.9 mm., females 4.5-5.0 mm. Ground color of head and thorax black, lateral carina of crown in small part pale on basal half; beak pale and legs distally pale; each forewing transparent with pale veins on all of claval area except extreme base and adjacent portions of discal area; rest of forewing and most veins mainly transparent dark brown; antepical and distal cells in part, few crossveins, and part of stigma pale.

Male genitalia. — Genital capsule in ventral view not distinguishable from that of *beameri* (fig. 46); genital capsule in lateral view (fig. 47) with posterior margin of pygofer convex, style capitate, anal flap simple; aedeagus in left lateral view (fig. 47) generally oval, without apical appendages, with short smooth subapical process, ventral margin near apex in part finely dentate, middle of ventral margin produced as slender acute process directed ventrocephalad, flagellum well developed; aedeagus in right lateral view (fig. 48) with pair of processes originating at or near apex, dorsal one undulate, ventral one decurved distally.

Type. — Holotype male and allotype female, Dixie National Forest, Nevada, 1 July 1937, D.J. and J.N. Knull in collection of Ohio State University.

Paratypes. — 2 males and 2 females with data same as holotype; male and female, 2 mi W. Lida, Esmeralda Co., Nevada, 8 June 1966, L.B. and C.W. O'Brien; female, Hualpai Mts., Arizona, 4 July 1937, D.J. and J.N. Knull.

Specimens studied. — ARIZONA, Hualpai Mts.; NEVADA, Dixie National Forest, Lida. Collection dates 8 June to 4 July. Total specimens studied 4 males and 5 females.

Notes. — The black thoracic dorsum and face, the discal embrowning of the forewing not reaching the claval vein, the almost entirely clear hyaline clavus, and the features of the male genitalia provide the distinctive features of this species which is known only from Nevada and Arizona without recorded plant associations.

Myndus balli Kramer, n. sp. (Figs. 49-50)

Salient features. — Length of males 3.3-3.5 mm, females unknown. Ground color of head and thorax black, lateral carinae of crown in small part pale on basal half, beak pale, legs irregularly pale; each forewing transparent brown with colorless hyaline patch on most of clavus, except extreme base, and extending narrowly to costal margin just postbasally; antepical and distal cells in part, few crossveins, and part of stigma pale or whitish.

Male genitalia. — Genital capsule in ventral view not distinguishable from that of *beameri* (fig. 46); genital capsule in lateral view (fig. 49) with posterior margin of pygofer convex, style capitate, anal flap simple; aedeagus in left lateral view (fig. 49) with moderately long scabrose subapical process closer to ventral than to dorsal margin, ventral margin smooth, middle of ventral margin produced as acute process directed ventrocephalad; flagellum well developed; aedeagus in right lateral view (fig. 50) with pair of processes originating at or near apex, dorsal one concave ventrally, ventral one hooked apically.

Type. — Holotype male (USNM 75916), Payson, Arizona, 3 August 1929, E.D. Ball.

Paratype. — Male, Pinal Mts., Arizona, 18 July 1935, E.D. Ball.

Specimens studied. — ARIZONA, Payson, Pinal Mts. Collection dates 18 July and 3 August. Total specimens studied 2 males and 0 females.

Notes. — The black thoracic dorsum and face, the discal embrowning of the forewing reaching the claval vein, and the features of the male genitalia provide the distinguishing features of this small species. It is known only from two localities in Arizona without recorded plant data and is named for the collector, Elmer Darwin Ball.

Myndus nolinus Ball

(Figs. 51-53)

Myndus nolinus Ball, 1933:481.

Haplaxius nolinus (Ball), Caldwell 1946:203.

Salient features. — Length of males 3.6-4.1 mm, females 4.0-4.6 mm. Ground color of head and thorax pale brown or tawny, mesonotum sometimes washed with pale orange-brown, pronotum narrowly behind eyes and sometimes with anterior portion of mesonotum blackened; frons unmarked; forewings hyaline with veins in basal two-thirds light brown to brown, those in distal third variably white or brown; in well marked specimens, distinct brown stripe running from posterior portion of stigma obliquely across to and through outer apical cell, other apical cells with various degrees of embrowning, each stigma usually white with anterior and posterior margins brown.

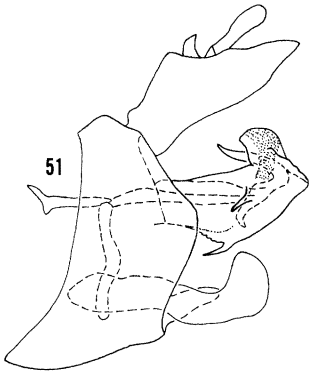
Male genitalia. — Median lobe of pygofer in ventral view (fig. 53) elongately produced with apices of styles narrowly rounded; genital capsule in lateral view (fig. 51) with posterior margin of pygofer bluntly triangular, style narrowly rounded apically, anal flap subtriangular; aedeagus in left lateral view (fig. 51) suboval, without apical appendage, with short subapical process, middle of ventral margin produced as short acute process directed ventrocephalad, flagellum well developed; aedeagus in right lateral view (fig. 52) with pair of processes arising subapically near dorsal margin, processes variably directed cephalad.

Type. — Holotype female, Williams, Arizona, 13 July 1929, E.D. Ball. Allotype male with same data. Both are in the collection of the USNM.

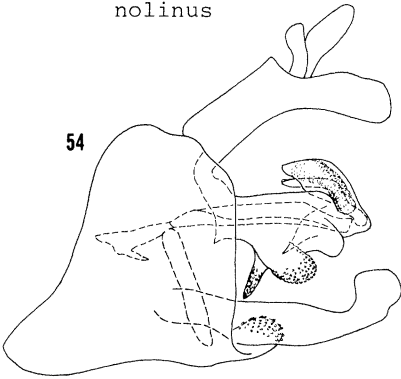
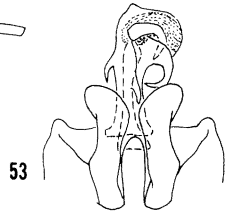
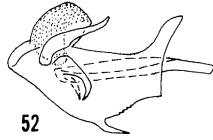
Specimens. — ARIZONA, Baboquivari Mts., Black River, Chiricahua Mts., Granite Dells, Hualpai Mts., Naco, Tombstone, Williams, Yarnell Heights. Collection dates 30 May to 6 August. Total specimens studied 8 males and 11 females.

Notes. — The color pattern found only in the apical third of each forewing and the unmarked frons provide the distinctive features of this species. The structural features of the male genital capsule also provide differentiating characters. *M. nolinus* is known only from Arizona where it has been collected on *Nolina microcarpa* or beargrass and *Dasyochloa pulchella* Willd. (now *Triodia pulchella* H.B.K.) or fluffgrass.

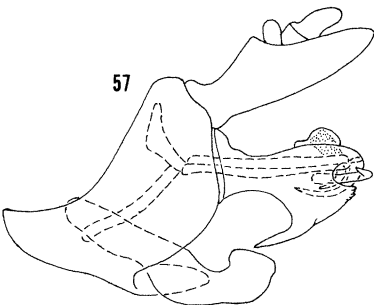
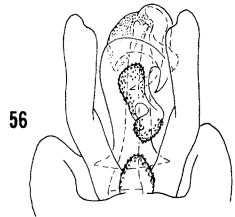
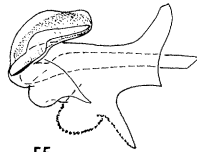
FIGURES 51-59. — Male genitalia. 51-53, *M. nolinus* Ball, from allotype. 54-56, *M. yuccandus* Ball, from paratype. 57-59, *M. gabrielensis* (Flock), from paratype. 51, 54, 57, complete lateral view. 52, 55, 58, aedeagus in right lateral view. 53, 56, 59, apex of pygofer, styles, and aedeagus in ventral view.



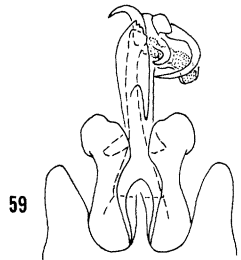
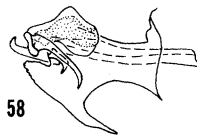
nolinus



yuccandus



gabrielensis



Myndus yuccandus Ball

(Figs. 54-56)

Myndus yuccandus Ball, 1933:482.*Haplaxius yuccandus* (Ball), Caldwell, 1946:203.

Salient features. — Length of males 3.2 mm, females unknown. Ground color of head and pronotum tawny to pale tawny, intercarinal portions of crown blackened at least in part, pronotum without markings except for vague narrow dark strip on anterior margin just behind each eye, frons unmarked; mesonotum black except for pale spot near apical angle and pale dash behind each lateral angle on posterior margin; forewings hyaline, each with basal portion of clavus bordering mesonotum broadly blackened or embrowned, with well developed transcommissural spot of same color near middle of clavi, veins of corium anterior to stigma pale or light brown, distal longitudinal veins mainly pale brown, distal crossveins brown, proximal crossveins at level of stigma white, vague brownish cloud in areas across proximal crossveins and vague interrupted one across distal cells, stigma white and bordered anteriorly and posteriorly with brown.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 56) roundly produced with apices of styles rounded; genital capsule in lateral view (fig. 54) with posterior margin of pygofer straight and vertical, style apically subtruncate, anal flap simple; aedeagus in left lateral view (fig. 54) suboval, without apical appendage, ventral margin bilobed, posterior lobe with acute process, flagellum well developed and moderately long; aedeagus in right lateral view (fig. 55) with pair of processes arising subapically near dorsal margin, processes variably directed cephalad.

Type. — Holotype male, Grand Canyon, Arizona, 4 August 1930, E.D. Ball. The information published with the original description is slightly different from that on the labels of the holotype; this is probably due to a lapsus by Ball. The previously published locality was given as "Grand Canyon Bridge" and the date of collection "30 August 1930". One paratype male with same data. Both are in the collection of the USNM.

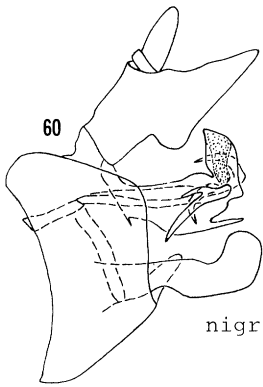
Specimens studied. — ARIZONA, Grand Canyon. Collection date 4 August 1930. Total specimens studied 2 males.

Notes. — The small size, the color pattern, and the ventrally bilobed aedeagus with the posterior lobe bearing an acute projection make this species most distinctive. The only two known examples were taken on *Yucca* sp. in Arizona.

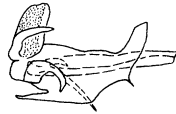
Myndus gabrielensis (Flock), new combination (Figs. 57-59)*Haplaxius gabrielensis* Flock, 1951:169.

Salient features. — Length of males 3.9-4.2 mm, females 4.1-4.4 mm. Ground color of head and thorax pale yellowish brown; intercarinal portions of crown darkened distally; clypeus embrowned except on central portion; frons much paler

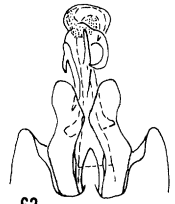
FIGURES 60-68. — Male genitalia. 60-62, *M. nigrifrons* Ball, from allotype. 63-65, *M. catalinus* Ball, from Portal, Ariz. 66-68, *M. mojavensis* Ball, from paratype. 60, 63, 66, complete lateral view. 61, 64, 67, aedeagus in right lateral view. 62, 65, 68, apex of pygofer, styles, and aedeagus in ventral view.



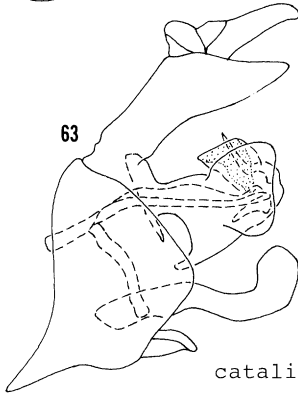
nigrifrons



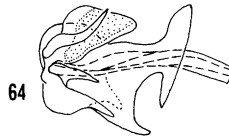
61



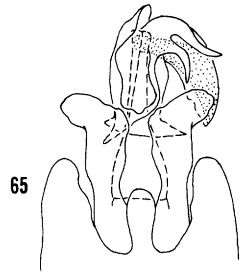
62



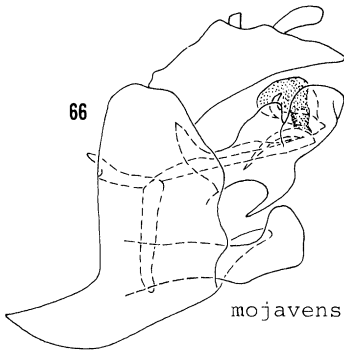
catalinus



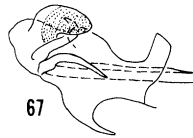
64



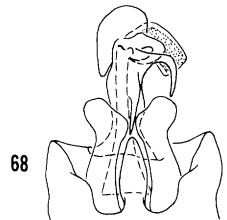
65



mojavensis



67



68

in color than clypeus, sometimes with poorly delimited brownish stripe on each side of frontal apex, stripe following and just mesad of lateral margin; pronotum with distinct but irregular dark brown to black patch just behind each eye; mesonotum with central anterior portion blackened, sometimes with lateral anterior portions similarly darkened; forewings hyaline with two brown transverse bands, first near base and interrupted by apex of mesonotum, second posterior to first and transcommissural, distinctness of bands variable, often not reaching costal margins; distal third of forewings with veins and cells variously and variably embrowned to form color pattern, proximal crossveins largely white, each stigma brown with central area white.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 59) elongately produced with apices of styles irregularly rounded; genital capsule in lateral view (fig. 57) with posterior margin of pygofer convexly rounded, styles apically subtruncate, anal flap simple and suboval; aedeagus in left lateral view (fig. 57) suboval with ventral margin produced near middle to form slender process directed ventrocephalad, without apical appendage, with subapical process and well-developed flagellum; aedeagus in right lateral view (fig. 58) with pair of slender processes arising subapically near dorsal margin, processes variably directed cephalad.

Type. — Holotype, female, San Gabriel Mts., California, 10 July 1950, R.A. Flock. Holotype not studied but in collection of Dr. R.A. Flock.

Specimens studied. — CALIFORNIA, San Antonio Canyon, San Gabriel Mts. Collection dates 10 July to 14 August. Total specimens studied 2 males and 2 females.

Notes. — This species can be recognized by the bicolored face, the pair of brown transverse bands on the anterior portions of the forewings, and the patterned distal third of each forewing. The structural features of the male genital capsule also provide differentiating characters. *M. gabrielensis* is known to me from paratypic specimens with the same data as the holotype. The type series was collected on *Yucca whipplei* Torr. or Our Lord's Candle; specimens have been taken on sedges, also. California provides our only state record.

Myndus nigrifrons Ball

(Figs. 60-62)

Myndus nigrifrons Ball, 1937:179.

Haplaxius nigrifrons (Ball), Caldwell 1946:203.

Salient features. — Length of males 3.5-3.9 mm, females 4.5-4.9 mm. Ground color of crown, pronotum, and mesonotum pale tawny; intercarinal portions of crown blackened distally and along edges basally; middle half of pronotum blackened except for pale posterior margin with dark patch in each lateral angle, females more heavily marked than males; mesonotum in females entirely dark fuscus to black except for narrow and irregular pale areas along posterior margin; mesonotum in males shaded with orange-brown, lateral portions sometimes darker than discal portions; frons and clypeus darkly fuscus to black, frons with pale stripe on each side originating at lateroventral margin and obliquely extended toward median carina; forewings hyaline, each with all veins anterior to stigma pale brown or brown, more distal veins variably dark brown or whitish, with oblique dark brown

stripe from stigma to inner apical cell, here forming brown cloud over several distal cells and veins, stigma white and bordered anteriorly and posteriorly with brown.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 62) elongately produced with apices of styles narrowly rounded; genital capsule in lateral view (fig. 60) with posterior margin of pygofer bluntly produced at middle, style apically rounded, anal flap subtriangular with lobe on left ventral margin but not on right one; aedeagus in left lateral view (fig. 60) suboval, without apical appendage, with forked subapical process, ventral margin subapically produced to form posteriorly directed process, flagellum well developed; aedeagus in right lateral view (fig. 61) with pair of curved processes arising apically or subapically and directed cephalad or ventrocephalad.

Type. — Holotype female, Alpine, Texas, 2 September 1936, E.D. Ball. Allotype male with same data. Both are in the collection of the USNM.

Specimens studied. — TEXAS, Alpine, Chisos Mts. Collection dates 9 July to 2 September. Total specimens studied 2 males and 2 females.

Notes. — The oblique pale stripes on the dark frons, the color pattern of the forewings limited to the distal portions, and the posteriorly directed spine on the aedeagal venter provide the distinctive features of this species. *M. nigrifrons* is known only from western Texas where it was collected by E.D. Ball on "Bear grass (*Nolina*)."

Myndus catalinus Ball

(Figs. 63-65)

Myndus catalinus Ball, 1933:481.

Haplaxius catalinus (Ball), Caldwell 1946:203.

Salient features. — Length of males 3.8-4.5 mm, females 4.0-4.8 mm. Ground color of crown and pronotum ivory to pale tan; intercarinal portion of crown black with midline in basal half variably pale; pronotum in females blackened on middle half to or nearly to hind margin, in males blackened area usually limited to irregular band on anterior margin; mesonotum in females entirely black except for irregular pale areas at or near lateral angles, in males only the intercarinal portions of disc blackened with lateral portions partly or entirely washed with orange or orange-brown; frons ivory with base blackened and with black stripe on each side originating at apex and extending ventrally inside lateral margin for about half frontal length; clypeus tawny and blackened entirely or all except discal portion; forewings hyaline with veins anterior to claval apices mainly white but in females Sc + R usually at least in part brown, commissural margin at least in part brown, with variably distinct oblique brown stripe running from outer 2 or 3 apical cells to darkened stigma, distal veins variably white or brown.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 65) elongately produced with apices of styles rounded; genital capsule in lateral view (fig. 63) with posterior margin of pygofer bluntly produced near middle, style simple, anal flap simple and subtriangular; aedeagus in left lateral view (fig. 63) with large irregular rounded appendage on distal half, ventral margin produced to form anteriorly directed spine; aedeagus in right lateral view (fig. 64) with pair of processes near apex and well developed flagellum.

Type. — Holotype female Sabino Canyon near Tucson, Arizona, 28 June 1930, E.D. Ball and allotype male Patagonia, Arizona, 20 September 1930, E.D. Ball in collection of USNM.

Specimens studied. — ARIZONA, Chiricahua Mts., Douglas, Fairbank, Patagonia, Portal, Tumacacori Mt., Sabino Canyon, Tucson, Wickenburg, Yarnell Heights; NEW MEXICO, Hidalgo Co., Rodeo; TEXAS, Big Bend Nat. Park, Chisos Mts., San Antonio, counties only — Brewster, Culberson, Val Verde. Collection dates 14 April to 20 September. Total specimens studied 110 males and 86 females.

Notes. — The large and irregularly rounded lobe near the apex on the left side of the aedeagus and the anteriorly directed spine on the aedeagal venter provide the distinguishing features of this species. Color pattern is also useful to recognize *catalinus* as noted in the key to species. Most of the specimens studied were taken on *Yucca* sp., and yucca is likely the major food plant of the adults. This southwestern species has been taken in Arizona, New Mexico, and Texas.

Myndus mojavensis Ball

(Figs. 66-68)

Myndus mojavensis Ball, 1933:480.

Haplaxius mojavensis (Ball), Caldwell 1946:203.

Salient features. — Length of males 3.9-4.7 mm, females 4.3-4.9 mm. Ground color of crown and pronotum ivory to pale tan; intercarinal portion of crown blackened at least distally with midline in basal half always pale; pronotum with black quadrangular patch behind each eye and narrow black stripe on midline, patches sometimes reduced or paler in males; mesonotum washed at least in part with orange or orange-brown, intercarinal portions of disc variably blackened but never to tip of posterior angle, lateral portions blackened on anterior half in females and usually for much less than half in males; frons ivory to pale tan, base darkened, sometimes vaguely washed with orange on middle, with black stripe on each side originating at apex and extending ventrally inside lateral margin for about half frontal length; clypeus tawny and varying from entirely blackened to only lateral portions darkened; forewings hyaline with veins anterior to claval apex white to pale tan, proximal crossveins and stigma white and at least in large part bordered with brown, with variably distinct pair of oblique brown stripes running from outer 3 or 4 darkened apical cells to stigma, distal veins variably white or brown; in well marked specimens, 4th preapical cell margined with brown distally and laterally and white crossvein anteriorly.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 68) ovals produced with apices of styles rounded; genital capsule in lateral view (fig. 66) with posterior margin of pygofer undulate, style simple, anal flap narrowed and angularly produced distally; aedeagus in left lateral view (fig. 66) with poorly developed lobe near apex, ventral margin produced to form anteriorly directed spine; aedeagus in right lateral view (fig. 67) with pair of processes near apex and well developed flagellum.

Type. — Holotype female and allotype male, Mojave, California, 15 June 1909, E.D. Ball in collection of USNM.

Specimens studied. — ARIZONA, Gold Canyon, Tucson; CALIFORNIA, Deep Canyon Desert Research Station in Riverside Co., Mojave, San Jacinto Mts.; NEVADA, Dixie Nat. Forest. Collection dates 15 March to 29 September. Total specimens studied 20 males and 11 females.

Notes. — The partly undulated posterior margin of the pygofer in lateral view and the anteriorly directed spine on the aedeagal venter provide the distinguishing features of this species. As noted in the key to species, coloration is also useful in recognizing *mojavensis*. Ball's original series was "beaten from tip "branches" of the Joshua tree, *Yucca brevifolia*." This southwestern species is known only from California, Nevada, and Arizona.

***Myndus texensis* Kramer, n. sp.**

(Figs. 69-71)

Salient features. — Length of males 3.5-3.9 mm, females 3.9-4.2 mm. Ground color of crown, pronotum, and mesonotum ivory to pale tan; intercarinal portion of crown, except basal half of midline, blackened; pronotum with subquadrate black patch just behind each eye, patches fuse at middle of anterior margin; mesonotum with intercarinal portions of disc blackened but not to apex of posterior angle, lateral portions blackened except for variable pale strip on posterior margin; frons ivory to pale tan, base darkened, black stripe on each side originating at apex and extending ventrally inside lateral margin for about half frontal length; clypeus usually entirely darkened; forewings hyaline, each with veins anterior to claval apex pale tan, proximal crossveins and stigma white and at least in large part bordered with brown, with variably distinct oblique brown stripe running from outer 3 or 4 darkened apical cells to stigma, distal veins variably white or brown; in well marked specimens, 4th preapical cell margined with brown distally and laterally and white crossvein anteriorly.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 71) elongate and subtriangular with apices of styles rounded; genital capsule in lateral view (fig. 69) with posterior margin of pygofer roundly convex, style simple, anal flap subtriangular with ventral margin convex in distal half; aedeagus in left lateral view (fig. 69) without lobe or apical appendage, with single subapical process, ventral margin produced to form anteroventrally directed spine; aedeagus in right lateral view (fig. 70) with pair of processes near apex and well developed flagellum.

Type. — Holotype male (USNM 75917) and allotype female, Pine Springs, Culberson Co., Texas, 25 July 1970, C.W. O'Brien.

Paratypes. — 218 males and 65 females with same data as holotype or same with date 26 July 1970 or 3 July 1971 and collectors C.W. O'Brien and G.B. Marshall.

Specimens studied. — TEXAS, Pine Springs. Collection dates 3 July to 26 July. Total specimens studied 219 males and 66 females.

Notes. — This species is most similar to *mojavensis*, but is readily separated from that species by the features used in the key. All of the nearly 300 specimens studied were taken on *Yucca thompsoniana* Trel. in western Texas.

Myndus enotatus Van Duzee

(Figs. 72-74)

Myndus enotatus Van Duzee 1909:188.*Haplaxius enotatus* (Van Duzee), Caldwell 1946:203.

Salient features. — Length of males 3.8-4.3 mm, females 4.1-5.0 mm. Ground color of head and thorax stramineous to yellowish brown, basal half of frons and clypeus sometimes washed with orange or orange-brown, crown and thoracic dorsum without definite darker markings; forewings and veins transparent pale yellowish brown, each costal margin distinctly ivory or whitish through stigma.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 74) roundly produced with apices of styles rounded; genital capsule in lateral view (fig. 72) with posterior margin of pygofer slightly concave in just more than lower half, style capitate at apex, anal flap subrectangular with vague tooth on ventral margin distally; aedeagus in left lateral view (fig. 72) with pair of long, slender, and subequal processes arising near apex and directed cephalad; aedeagus in right lateral view (fig. 73) with short but acute process arising, near apex and directed caudad, flagellum short.

Type. — Lectotype male here selected with labels "Estero, Fla. (Haw Creek)" and "May 6-12, 1908, Van Duzee" and "Lectotype *enotatus*" (red paper) and "E.P. Van Duzee Collection" and "Cal. Acad. Sci. Type No. 2239". This specimen was labeled by Van Duzee, but the lectotype selection was never published. The lectotype is in the collection of California Academy of Sciences.

Specimens studied. — FLORIDA, Big Pine Key, Cortez, Crescent City, Daytona, Dunedin, Estero, Ft. Myers, Key West, Longboat Key, Merritt Island, Ochopee, Punta Gorda, St. Petersburg, Sanford, Venice; GEORGIA, St. Catherine's Island; LOUISIANA, Grande Isle; MARYLAND, Bay Ridge, Piney Point; MISSISSIPPI, Biloxi, Pascagoula, Tupelo; NORTH CAROLINA, Southport; SOUTH CAROLINA, McClellansville; VIRGINIA, Revel's Island. Collection dates 24 January to 13 November. Total specimens studied 285 males and 370 females.

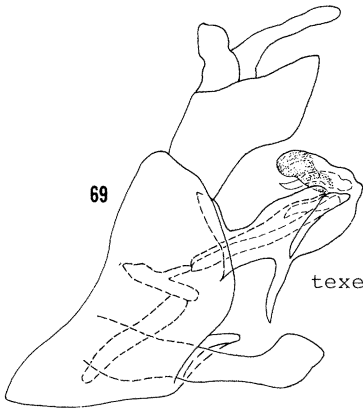
Notes. — The slender aedeagal shaft which bears three subapical processes, one of these is short and projects posteriorly, and the other two are longer and project anteriorly, and the almost quadrate anal flap provide the distinguishing feature of *M. enotatus*. This is primarily a coastal species which is found from Maryland south to Florida and west to Louisiana. Van Duzee reported it in "untold thousands" on the prairies at Haw Creek near Crescent City, Florida. Other recorded associations are *Juncus* sp., coarse grasses on tidal flats, and salt marsh grasses.

Myndus slossonae Ball, emended name

(Figs. 75-77)

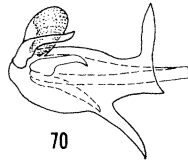
Myndus slossoni Ball, 1902:154.*Haplaxius slossoni* (Ball), Caldwell 1946:203.

FIGURES 69-77. — Male genitalia. 69-71, *M. texensis* n. sp., from holotype. 72-74, *M. enotatus* Van Duzee, from Sanford, Fla. 75-77, *M. slossonae* Ball, from Sanford, Fla. 69, 72, 75, complete lateral view. 70, 73, 76, aedeagus in right lateral view. 71, 74, 77, apex of pygofer, styles, and aedeagus in ventral view.

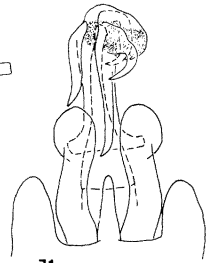


69

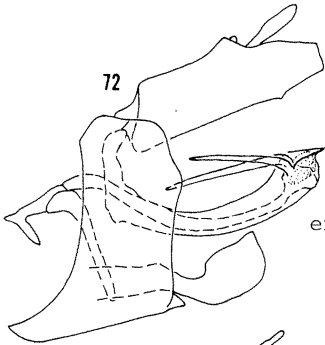
texensis



70

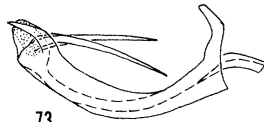


71

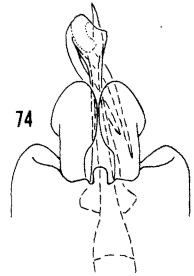


72

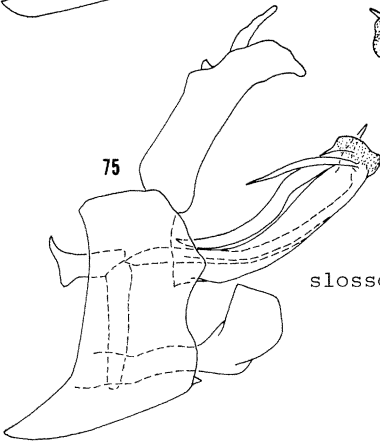
enotatus



73

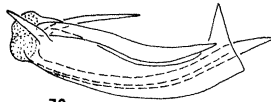


74

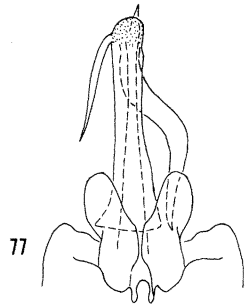


75

slossonae



76



77

Salient features. — Length of males 3.6-4.3 mm, females 4.0-5.0 mm. Ground color of crown and thoracic dorsum stramineous to deeply fuscus, crown sometimes paler; face reddish brown, without distinct markings; forewings largely transparent brown to dark brown, with variable pale area covering both clavi and adjacent portions of coria, each costal margins through stigma distinctly ivory or whitish.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 77) roundly produced with apices of styles rounded; genital capsule in lateral view (fig. 75) with posterior margin of pygofer distinctly concave in lower half, style apically capitate, anal flap distally downturned with apex blunt; aedeagus left lateral view (fig. 75) with pair of unequal apical or subapical processes directed basad, shorter process about half length and width of longer one; aedeagus in right lateral view (fig. 76) with short, acute process directed distad near apex, flagellum short.

Type. — Lectotype male here selected with labels "Bisc. Bay, Fla." and "Type" and Ball's determination label. According to Ball's original description, it was collected by Mrs. Slosson together with a female which was not found during this study. The lectotype is in the collection of the USNM.

Specimens studied. — FLORIDA, Belle Glade, Biscayne Bay, Clearwater, Dunedin, Gainesville, Haw Creek, Lake Worth, Parish, Sanford, Tampa; GEORGIA, Waycross; KANSAS, Montgomery Co.; MISSISSIPPI, Woodville; OKLAHOMA, Kiowa (Indian Territory), Pitcher; TEXAS, Brazos Co. Collection dates 29 March to 1 November. Total specimens studied 83 males and 79 females.

Notes. — In well marked specimens, the pale saddlelike marking on the dark wings at rest provides an instant character for identification of this species. The distally downturned anal flap and the pair of unequal subapical or apical aedeagal processes, one of which is about twice as long and stout as the other, provide the unique features of this species. Host records are limited to grass, coarse grass, and *Juncus* sp. The species name is emended to have a feminine ending to agree as a patronym for Mrs. Annie T. Slosson. *M. slossonae* appears to be most abundant in Florida, but the distribution extends westward to Texas and Oklahoma and northward to Kansas.

Myndus pusillus Van Duzee

(Figs. 78-80)

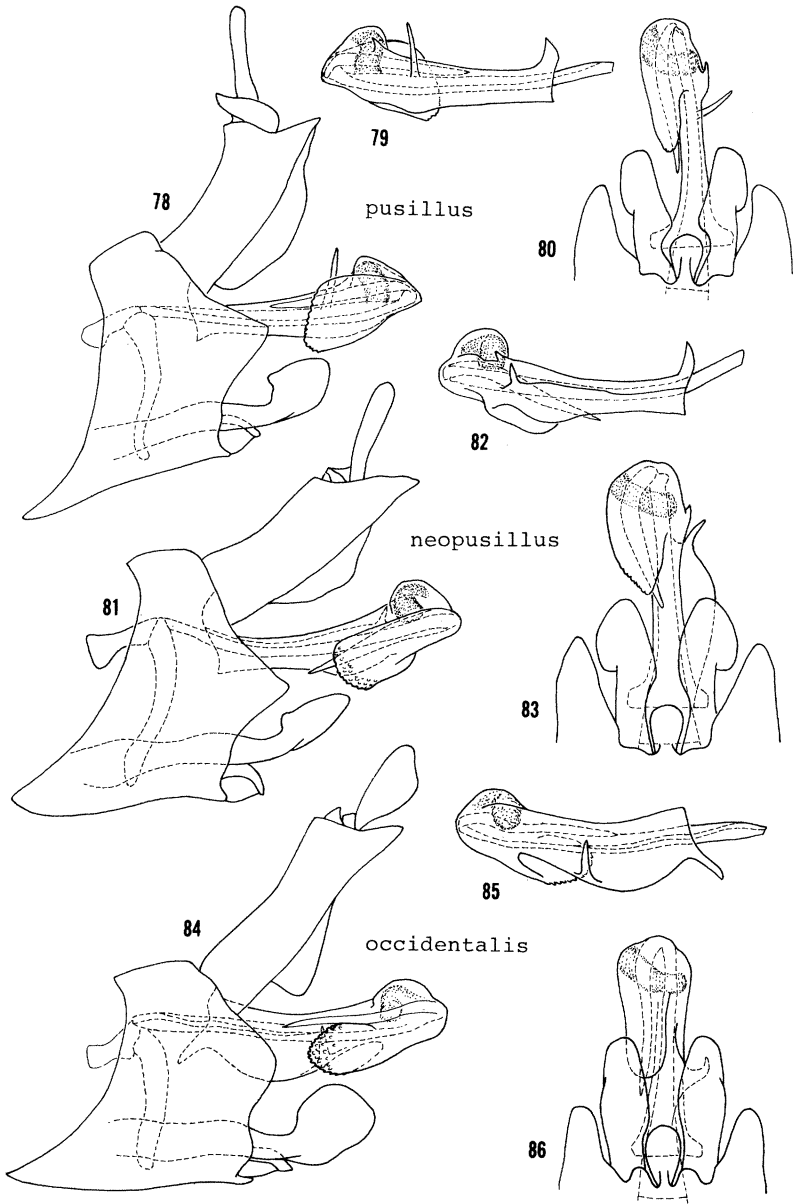
Myndus pusillus Van Duzee, 1909:190.

Haplaxius pusillus (Van Duzee), Caldwell 1946:203.

Haplaxius perrinei Caldwell, 1951:34. N. Syn.

Salient features. — Length of males 3.5-4.0 mm, females 3.7-4.3 mm. Ground color of head and thorax pale sordid stramineous to pale yellowish brown; face, crown, and pronotum often tinged with greenish; mesonotum almost always shade

FIGURES 78-86. — Male genitalia. 78-80, *M. pusillus* Van Duzee, from Royal Palm Park, Fla. 81-83, *M. neopusillus* n. sp., from holotype. 84-86, *M. occidentalis* Van Duzee, from Buhl, Idaho. 78, 81, 84, complete lateral view. 79, 82, 85, aedeagus in right lateral view. 80, 83, 86, apex of pygofer, styles, and aedeagus in ventral view.



darker than crown or pronotum; forewings hyaline with veins and each stigma pale, sometimes veins at apex darkened.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 80) produced but narrow at base, apices of styles bluntly rounded; genital capsule in lateral view (fig. 78) with posterior margin of pygofer strongly triangular, style capitate, anal flap with distoventral margin acute and either with or without membrane projecting between ventral margins; aedeagus in left lateral view (fig. 78) with large apical appendage concealing most of anteriorly directed apical process; aedeagus in right lateral view (fig. 79) with small tooth near apex of dorsal margin and slender upright process closely behind it, flagellum weakly developed.

Type. — Lectotype male here selected with labels: "7-oaks, Fla., 1 May 1908, Van Duzee" and "Lectotype *pusillus*" (red paper) and "E.P. Van Duzee Collection" (yellow paper) and "Cal. Acad. Sci. Type No. 2244". This specimen was apparently labeled by Van Duzee, but the lectotype selection was never published. The lectotype is in the California Academy of Sciences. The holotype male of *H. perrinei* from Cape Sable, Florida is in the collection of the USNM.

Specimens studied. — CONNECTICUT, Rowayton; FLORIDA, Cape Sable, Everglades, Ft. Myers, Hilliard, Homestead, Palm Beach, Royal Palm Park, Sanford, Sevenoaks; GEORGIA, Okefenokee Swamp, Thomasville, Waycross; MASSACHUSETTS, Ipswich; NEW HAMPSHIRE, Webster; NEW JERSEY, W. Tomlinson; NORTH CAROLINA, Southern Pines, Wilmington; VIRGINIA, Emporia. Collection dates 15 February to 11 December. Total specimens studied 105 males and 130 females.

Notes. — The sharply triangular posterior margin of the pygofer and the slender, upright process which extends beyond the dorsal margin of the shaft in lateral view provide the best distinguishing features of *pusillus*. The species is widely distributed in our eastern states with records from Florida northward to New Hampshire. Except for general sweeping of vegetation, nothing is known about its plant relationships.

***Myndus neopusillus* Kramer, n. sp.**

(Figs. 81-83)

Salient features. — Size and coloration falling within range given for *pusillus*.

Male genitalia. — Genital capsule in ventral (fig. 83) and lateral (fig. 81) views not much different from *pusillus*; aedeagus in left lateral view (fig. 81) similar to *pusillus*; aedeagus in right lateral view (fig. 82) with flange extending almost entire length of shaft, short upright process at or near dorsodistal edge of flange, small-subapical tooth on dorsal margin of shaft, flagellum weakly developed.

Type. — Holotype male (USNM 75918), Archbold Biological Station, Highlands Co., Florida, 12 March 1962, S.W. Frost. Allotype female with same data except 11 January 1965.

Paratypes. — 4 males with same data as holotype except dates: 2 taken 13 March 1962; and one each 13 March 1963 and 24 March 1965.

Specimens studied. — FLORIDA, Archbold Biological Station in Highlands Co., Clearwater, Daytona, Homestead, Jacksonville, Sanford. Collection dates 1 March to 17 June. Total specimens studied 15 males and 9 females.

Notes. — Except for the long flange on the right side of the aedeagal shaft with the slender but short upright process which does not extend as far as the dorsal margin of the shaft, the species does not differ from *pusillus*. As minor as the differences for separating *pusillus* from *neopusillus* may appear to be, I have found no intermediates and so prefer to recognize the differing form as an undescribed species. *M. neopusillus* is known only from Florida without recorded plant associations.

***Myndus occidentalis* Van Duzee**

(Figs. 84-86)

Myndus occidentalis Van Duzee, 1914:39.

Haplaxius occidentalis (Van Duzee), Caldwell 1946:203.

Salient features. — Length of males 4.8-5.9 mm, females 5.0-6.0 mm. Ground color of head and thorax stramineous to tan, without definite markings, mesonotum sometimes shade darker; each posterior lateral angle of last two ventral abdominal segments before genitalia with dark spot; forewings essentially hyaline with veins brown, each stigma usually pale.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 86) produced but narrowed at base, apices of styles rounded; genital capsule in lateral view (fig. 84) with posterior margin of pygofer convex, style capitate, anal flap slender with pair of broadly triangular projections originating between ventral margins; aedeagus in left lateral view (fig. 84) with large apical appendage and long apical process, flagellum small; aedeagus in right lateral view (fig. 85) with perpendicular elongate tooth originating near middle of ventral margin.

Type. — Lectotype male here selected with labels "San Diego Co., Cal., 7 May 1913, E.P. Van Duzee" and "Lectotype *occidentalis*" (red paper) and "E.P. Van Duzee Collection" (yellow paper) and "Cal. Acad. Sci. Type No. 2242". This specimen was apparently labeled by Van Duzee, but the lectotype selection was never published. The lectotype is in the collection of California Academy of Sciences.

Specimens studied. — ARIZONA, Granite Dell; CALIFORNIA, Angels Camp, Bakersfield, Banner Glade, Big Pine, Bishop, Bradley, Chino, Compton, Hopland, Los Angeles, Moraga Valley, Nicolaus, Oxnard, Palm Canyon, Pine Valley, Prado Dam, Riverside, Sacramento, San Bernardino, San Diego, San Juan Capistrano, San Luis Obispo, Santa Rosa, Sequoia National Forest, Soboba Springs, Stockton; IDAHO, Buhl; UTAH, Corinne, Logan, Mantua, Richfield, Riverdale. Collection dates 11 April to 21 October. Total specimens studied 79 males and 105 females.

Notes. — This is the most common western U.S. species of *Myndus* without an obvious color pattern. The vast majority of specimens can be distinguished by the four dark spots which are found before the genital segments on the abdominal venter near the lateral margins. The modifications of the aedeagus and anal flap, as noted in the key, provide the structural characters which distinguish this species. Specimens have been collected on *Juncus* spp., rushes, at Banner Glade, California and on Washington Palm, *Washingtonia filifera* Wendl., in Anza-Borrego State Park, California.

Myndus dozieri Kramer, n. sp. (Figs. 87-89)

Salient features. — Length of males 4.6-5.0 mm, females 4.8-5.1 mm. Ground color of head and thorax yellow to orange-yellow, without markings; forewings essentially hyaline with veins yellow to orange-yellow, each stigma pale.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 89) subspatulate with apices of styles broadly rounded; genital capsule in lateral view (fig. 87) with posterior margin of pygofer roundly convex, style capitate, anal flap elongate with unpaired projection originating between ventral margins near apex; aedeagus in left lateral view (fig. 87) with suboval apical appendage and slender apical process, flagellum small; aedeagus in right lateral view (fig. 88) with nearly perpendicular elongate tooth originating near middle of ventral margin, short tooth near apex of dorsal margin.

Type. — Holotype male (USNM 75919) and allotype female, Okolona, Mississippi, 14 June 1934, D.W. Grimes.

Paratypes. — Male and female with same data as holotype; 4 males and 2 females, Dorsey, Mississippi, 5 June, D.W. Grimes.

Specimens studied. — MISSISSIPPI, Dorsey, Egypt, Okolona. Collection dates 5 June to 14 June. Total specimens studied 6 males and 5 females.

Notes. — The structural features of the male genitalia, as noted in the key, will distinguish this unmarked yellow or orange-yellow species from all of its congeners. The holotype and allotype were collected on "papaw"; none of the other specimens studied were recorded with plant data. The species is named for Dr. Herbert L. Dozier who was much interested in the planthopper fauna of Mississippi and who published a well known survey report for that state in 1928.

Myndus viridis Ball (Figs. 90-92)

Myndus viridis Ball 1902:153.

Haplaxius viridis (Ball), Caldwell 1946:203.

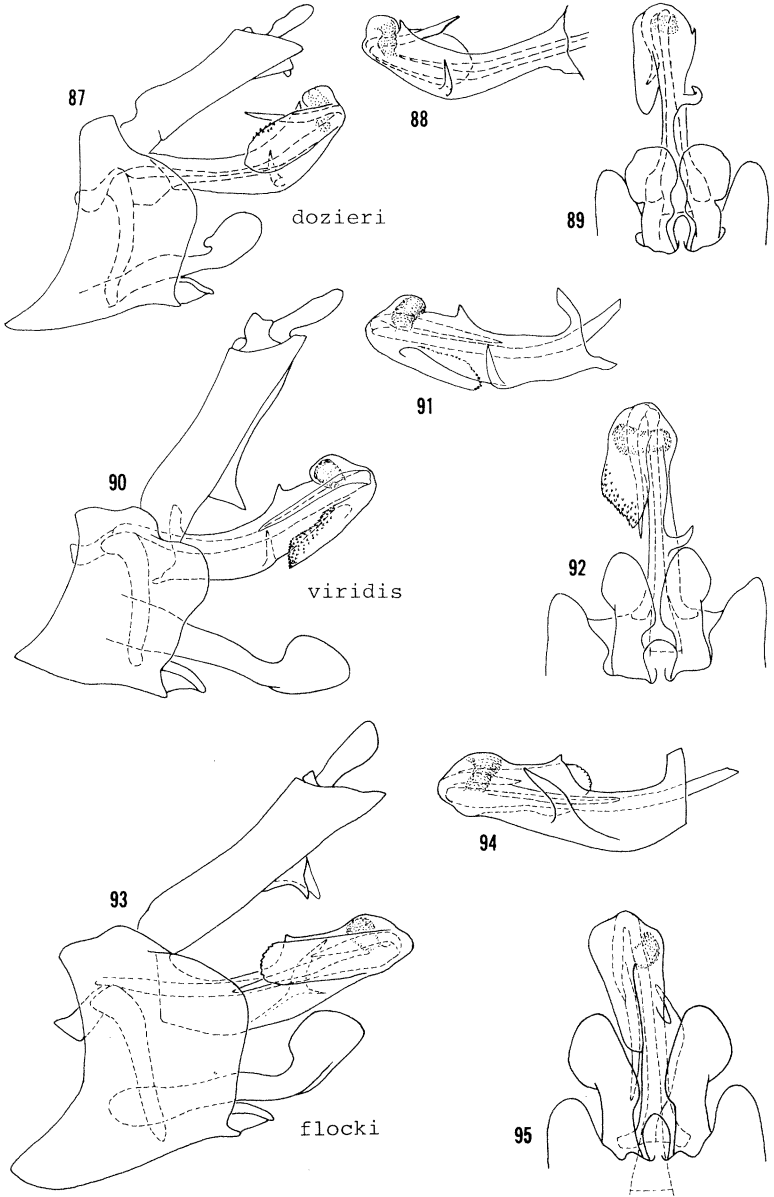
Myndus auratus Ball 1933:484.

Haplaxius auratus (Ball), Caldwell 1946:203.

Salient features. — Length of males 4.5-5.0 mm, females 4.9-5.4 mm. Ground color pale green to golden yellow, without markings; forewings essentially hyaline with veins and each stigma pale.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 92) subspatulate but narrow at base, apices of styles rounded; genital capsule in lateral view (fig. 90) with upper portion of posterior margin of pygofer strongly convex, style capitate, anal flap elongate with pair of triangular projections originating between ventral

FIGURES 87-95. — Male genitalia. 87-89, *M. dozieri* n. sp., from holotype. 90-92, *M. viridis* Ball, from Grand Junction, Colo. 93-95, *M. flocki* n. sp., from holotype. 87, 90, 93, complete lateral view. 88, 91, 94, aedeagus in right lateral view. 89, 92, 95, apex of pygofer, styles, and aedeagus in ventral view.



margins in basal half; aedeagus in left lateral view (fig. 90) with large apical appendage and long apical process, flagellum small; aedeagus in right lateral view (fig. 91) with nearly perpendicular elongate tooth originating near middle of ventral margin, short tooth on dorsal margin slightly anterior to middle.

Type. — Holotype female, Grand Junction, Colorado, 28 July 1900, E.D. Ball in collection of USNM. Ball did not mention a holotype with his original description, but later he (Ball 1933:484) named and labeled this female from the original series. To be correct, this female should be considered a lectotype.

Specimens studied. — ARIZONA, Baboquivari Mts., Chiricahua Mts., Huachuca Mts., Portal, Santa Rita Mts.; CALIFORNIA, Saratoga Springs in Death Valley; COLORADO, Grand Junction. Collection dates 11 June to 28 July. Total specimens studied 25 males and 28 females.

Notes. — The features of the male genitalia as presented in the key provide the distinctive features of this green to golden species. The Southwest provides our only state records; no plant associations are recorded.

Myndus flocki Kramer, n. sp.

(Figs. 93-95)

Salient features. — Length of males 4.8-5.3 mm, females 5.0-5.8 mm. Ground color of head and thorax yellowish to tan, without dark markings; forewings essentially hyaline with veins and each stigma pale.

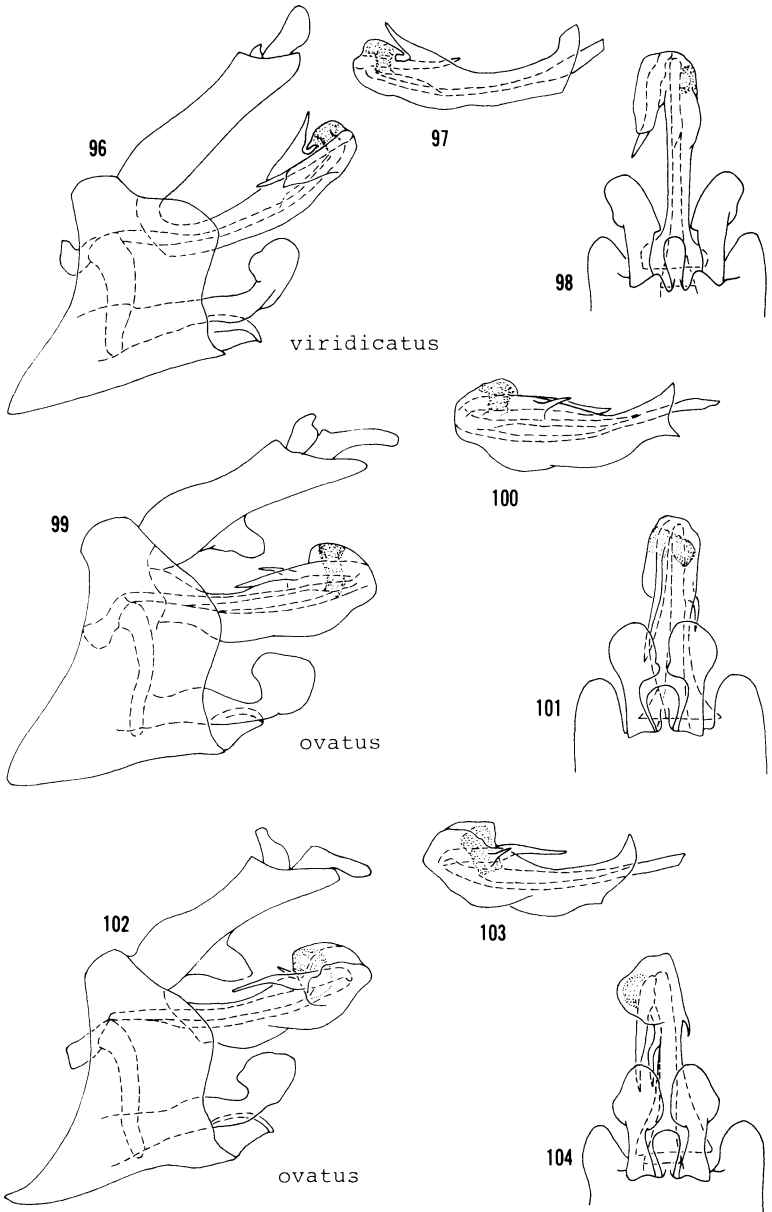
Male genitalia. — Median lobe of pygofer in ventral view (fig. 95) ovably produced, apices of styles rounded; genital capsule in lateral view (fig. 93) with posterior margin of pygofer convex, style capitate, anal flap elongate with pair of triangular projections originating between ventral margins at or slightly beyond middle; aedeagus in left lateral view (fig. 93) with large apical appendage and long apical process, flagellum small; aedeagus in right lateral view (fig. 94) with elongate tooth originating near middle of ventral margin and directed dorso-anteriorly, sub-triangular convexity on dorsal margin slightly anterior to middle.

Type. — Holotype male (USNM 75920), Patagonia, Arizona, 24 June 1933, P.W. Oman.

Paratypes. — All single males. Murrietta Hot Springs, Cal., 21 Nov. 1951, R.A. Flock; Soboba Springs, Cal., 3 June 1917, E.P. Van Duzee; same except 30 May 1917; Saratoga Springs, Death Valley, N. Mon., Cal., 6 April 1963, L.B. O'Brien; Tempe, Ariz., 17 May 1926, A.A. Nichol; Palm Springs, Cal., 17 Feb. (no year); Phoenix, Ariz., 21 August 1929, E.D. Ball.

Specimens studied. — ARIZONA, Patagonia, Phoenix, Santa Cruz River, Tempe, Tucson; CALIFORNIA, Angles Bay, Murrietta Hot Springs, Palm Canyon, Palm Springs, Saratoga Springs in Death Valley, Soboba Springs. Collection dates 17 February to 21 November. Total specimens studied 8 males and 18 females.

FIGURES 96-104. — Male genitalia. 96-98, *M. viridicatus* Ball, from Santa Catalina Mts., Ariz. 99-104, *M. ovatus* Ball, both from Deal Island, Md. 96, 99, 102, complete lateral view. 97, 100, 103, aedeagus in right lateral view. 98, 101, 104, apex of pygofer, styles, and aedeagus in ventral view.



Notes. — The features of the male genitalia as presented in the key provide the distinctive features of this yellowish to tan species. Arizona and southern California provide our only state records. The only plant association is "sedge" and is based on the data with the paratype male from Murrietta Hot Springs, California. The species is named for Dr. R.A. Flock in recognition of his long-time interest in the Fulgoroidea.

Myndus viridicatus Ball

(Figs. 96-98)

Myndus viridicatus Ball, 1933:483.

Haplaxius viridicatus (Ball); Caldwell 1946:203.

Salient features. — Length of males 4.4-5.3 mm, females 4.9-5.5 mm. Ground color of head and thorax stramineous, tan, or these shades washed variably with pale green; without darker markings; forewings essentially hyaline with veins and each stigma pale.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 98) spatulately produced, apices of styles rounded; genital capsule in lateral view (fig. 96) with posterior margin of pygofer roundly produced, style capitate, anal flap elongate and simple sometimes with membraneous projection near apex of ventral margin; aedeagus in left lateral view (fig. 96) with moderately large apical appendage and apical process, flagellum small; aedeagus in right lateral view (fig. 97) simple, but with dorsal margin of shaft produced distally to form acute and subtriangular projection directed distad.

Type. — Holotype female and allotype male, Huachuca Mts., Arizona, 2 August 1931, E.D. Ball in collection of USNM.

Specimens studied. — ARIZONA, Baboquivari Mts., Huachuca Mts., Portal, Sabino Canyon, Santa Catalina Mts., Santa Rita Mts., Tucson, Tumacacori Mts.; CALIFORNIA, Santa Rosa Mts. Collection dates 23 April to 8 August. Total specimens studied 45 males and 73 females.

Notes. — The elongate but simple anal flap, the subtriangularly produced dorso-dorsal margin of the aedeagal shaft, and the usually greenish coloration provided the distinctive features of this species. No plant associations are recorded for this species which is known only from Arizona and southern California.

Myndus ovatus Ball

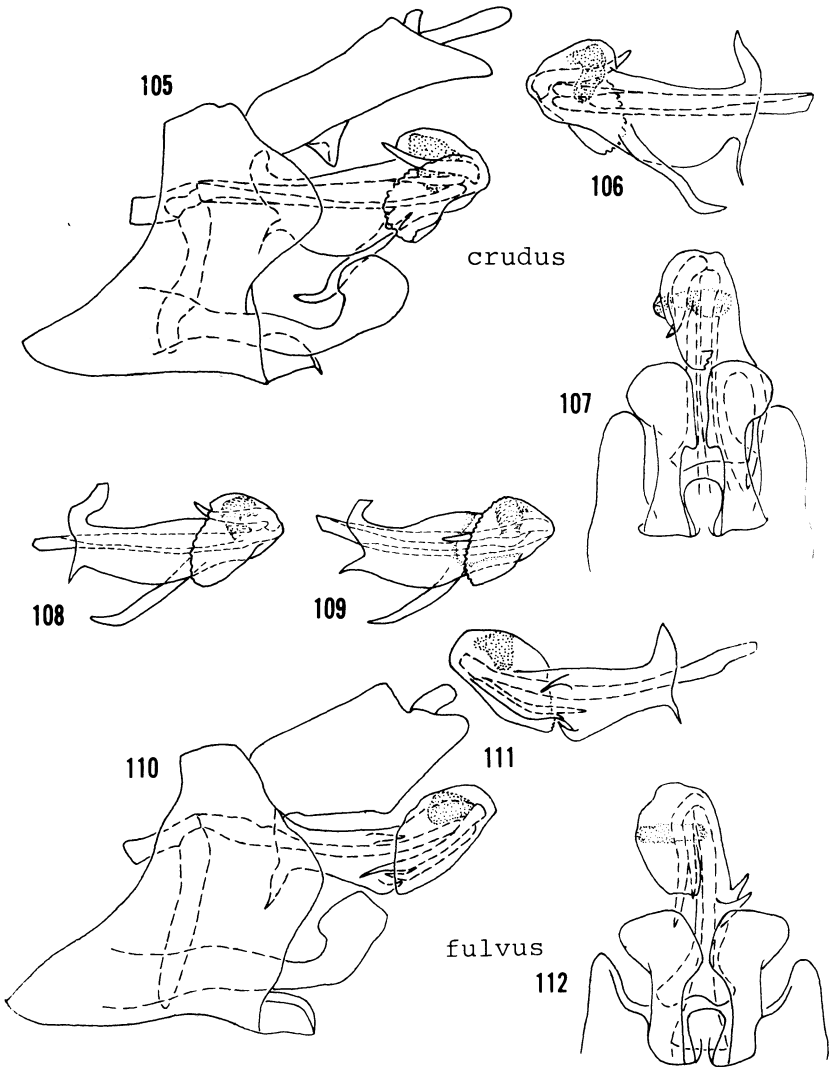
(Figs. 99-104)

Myndus ovatus Ball, 1933:483.

Haplaxius ovatus (Ball), Caldwell 1946:203.

Salient features. — Length of males 4.1-4.9 mm, females 4.6-5.5 mm. Ground color of head and thorax stramineous, pale tan, or vaguely greenish; without dark markings; forewings essentially hyaline with veins and each stigma pale.

Male genitalia. — Median lobe of pygofer in ventral view (figs. 101, 104) ovally produced with base narrow, apices of styles rounded; genital capsule in lateral view (figs. 99, 102) with posterior margin of pygofer convex on middle half, style apically capitate, anal flap slender with stout projection originating between ventral margins in basal half; aedeagus in left lateral view (figs. 99, 102) with poorly defined apical



FIGURES 105-112. — Male genitalia. 105-109, *M. crudus* Van Duzee; 105-107, from Jamaica; 108, from Fla.; 109, from Venezuela. 110-112, *M. fulvus* Osborn, from Babylon, N.Y. 105, 110, complete lateral view. 106, 111, aedeagus in right lateral view. 107, 112, apex of pygofer, styles, and aedeagus in ventral view. 108, 109, aedeagus in left lateral view.

appendage and long apical process directed cephalad, flagellum small; aedeagus in right lateral view (figs. 100, 103) with acute tooth directed cephalad near dorsal margin on distal half.

Type. — Holotype female, Ames, Iowa, 14 July 1894, E.D. Ball. Allotype male with same data except 28 June 1894. Both in collection of USNM.

Specimens studied. — GEORGIA, Peach Co.; IOWA, Ames; KANSAS, Delphos; MARYLAND, Deal Island; MASSACHUSETTS, Woods Hole; NEW JERSEY, Lakehurst; VIRGINIA, Mayo Beach. Collection dates 31 May to 30 August. Total specimens studied 17 males and 21 females.

Notes. — The modifications of the male genitalia, as presented in the key, provide the distinctive features of *ovatus*, an unmarked tan to greenish species. The distributional data at hand show that the species occurs from the New England States south to Virginia and westward to Kansas and Iowa. Osborn's record of *viridis* in Ohio (Osborn 1938:310) quite likely refers to *ovatus*. Other than "grasses", no host data are recorded.

Myndus crudus Van Duzee

(Figs. 105-109)

Myndus crudus Van Duzee 1907:33.

Haplaxius crudis (sic) (Van Duzee), Caldwell 1946:203.

Paramyndus coccois Fennah, 1945:424. N. Syn.

Haplaxius pallidus Caldwell, 1946:204. N. Syn.

Salient features. — Length of males 4.2-5.1 mm, females 4.3-5.1 mm. Ground color of head and thorax stramineous to light brown, without distinct color pattern; abdomen often greenish in paler forms; forewings essentially hyaline with veins pale to light brownish, each stigma pale.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 107) ovals produced with base narrow, apices of styles rounded; genital capsule in lateral view (fig. 105) with lower half of hind margin of pygofer strongly excavated, style capitate, anal flap simple but with pair of subtriangular projections originating between ventral margins in basal half; aedeagus in left lateral view (figs. 105, 108, 109) with broad and distally serrate apical appendage concealing most of apical process, flagellum small, ventral margin of shaft variably convex; aedeagus in left lateral view (fig. 106) with long process originating in distal half and directed ventrocephalad.

Type. — According to the original publication, *crudus* was "described from two examples taken at Hope Bay [Jamaica], April 13th [1906], and one from Troja taken the next day." The three extant specimens from the Van Duzee collection in the California Academy of Sciences are from another locality, Pt. Antonio, Jamaica, and thus are not eligible for lectotype selection. These three specimens, two missing abdomens and one female with dermestid damage, bear Van Duzee's determination labels and were undoubtedly collected by him as was the now lost type series. To fix the identity of *crudus*, a neotype male, Kensworth, Jamaica, 18 Feb. 1937, Chapin and Blackwelder is here selected for deposit in the collection of the California Academy of Sciences.

The holotype male of *P. cocois* Fennah from St. Augustine, Trinidad and the holotype male of *H. pallidus* Caldwell from Miami, Florida were found to be conspecific with *crudus*. Both the Fennah and Caldwell types are in the collection of the U.S. National Museum.

Specimens studied. — FLORIDA, Belle Glade, Bonefish Key, Cape Sable, Childs, Coral Gables, Islamorada, Lake Worth, Miami, Palm Beach. Collection dates 14 February to 20 August. Total specimens studied 95 males and 115 females.

Notes. — The structural features of the male genitalia, as used in the key, provide the critical characteristics for species recognition, *M. crudus* is widely distributed in the Neotropics, but United States records are limited to Florida. The nymphs develop on the roots of many kinds of grasses and sedges; and the adults utilize palms, especially coconut palms, as good plants.

M. crudus, as of this writing, is the likely but as yet unproved vector of a mycoplasma-like organism which produces "lethal yellowing" of coconut palms, *Cocos nucifera* L., and other palms. According to Reinert (1977) more than a third of the coconut palms in Florida have been killed by this disease since its discovery on mainland North America in 1971. He also lists seven other species of palms from which *crudus* has been taken. Tsai et al. (1976) developed a highly successful technique for mass rearing this species using St. Augustinegrass grown in a nutrient solution. Tsai and Kirsch (1978), reporting on the bionomics of *crudus*, found nymphs developing in the thatch layer and on the roots of nine different species of grasses and sedges in Florida. Under controlled conditions, complete life cycles or mean generation times on St. Augustinegrass were 52.6 days at 30°C and 80.8 days at 24°C.

Myndus fulvus Osborn

(Figs. 110-112)

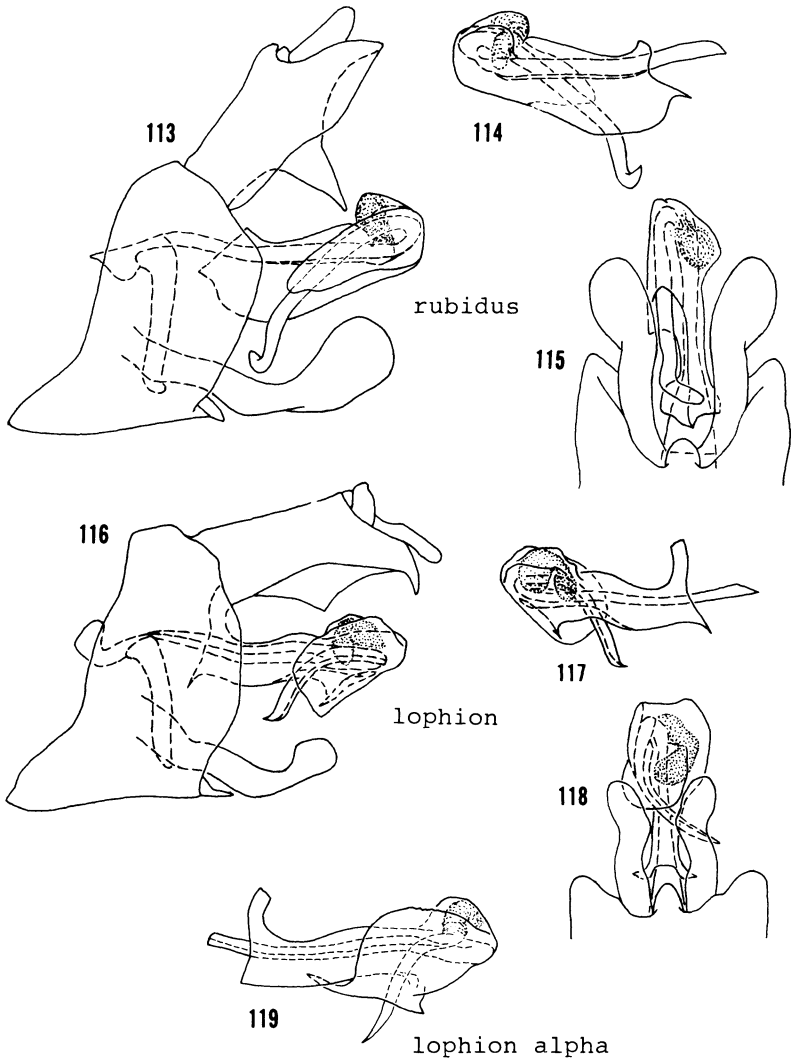
Myndus fulvus Osborn, 1903b:46.

Haplaxius fulvus (Osborn), Caldwell 1946:203.

Salient features. — Length of males 3.5-4.0 mm, females 4.0-4.6 mm. Ground color of head and thorax orange-yellow, pale orange, or tawny without darker markings; forewings hyaline with veins same shade as ground color of head and thorax, each stigma usually pale.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 112) rounded apically and narrowed basally, stylar apices broad, aedeagal shaft with pair of acute projections near middle of right side; genital capsule in lateral view (fig. 110) with posterior margin of pygofer convex, stylar apex blunt, anal flap unusually stout and broadest across middle; aedeagus in left lateral view (fig. 110) with broad apical appendage concealing slender apical process; aedeagus in right lateral view (fig. 111) with pair of acute processes, one above the other, near middle of shaft.

Type. — Lectotype male here selected with labels: "Castalia, Ohio, 25 July 1900" and "Type" and "Cotype" and "Herbert Osborn Colln." The lectotype and an additional male and three females with identical data are in the collection of Ohio State University.



FIGURES 113-119. — Male genitalia. 113-115, *M. rubidus* Ball, from type locality. 116-118, *M. lophion* n. sp., from holotype. 119, *M. lophion alpha* n. subsp., from holotype. 113, 116, complete lateral view. 114, 117, aedeagus in right lateral view. 115, 118, apex of pygofer, styles, and aedeagus in ventral view. 119, aedeagus in left lateral view.

Specimens studied. — KANSAS, Sumner Co.; KENTUCKY, Rock Haven; NEW YORK, Babylon; OHIO, Castalia, Columbus, Sandusky, counties only — Hocking, Lawrence, Richland, Ross, Scioto; TENNESSEE, Covington, Great Smoky Mt. Nat. Park, Lebanon, Sullivan Co. Collection dates 9 June to 5 August. Total specimens studied 12 males and 22 females.

Notes. — The unusually stout anal flap in lateral view and the pair of acute projections near the middle of the right margin of the aedeagus in ventral view provide the distinguishing features of this orange-yellow to pale orange species. The distribution of *fulvus* ranges from eastern New York south to Tennessee and west to Kansas. No host data are recorded.

Myndus rubidus Ball

(Figs. 113-115)

Myndus rubidus Ball, 1933:483.

Haplaxius rubidus (Ball), Caldwell 1946:203.

Salient features. — Length of males 4.2-5.2 mm, females 4.5-5.8 mm. Ground color of head and thorax stramineous to tan, sometimes vaguely washed with pale green, lateral carinae of crown and pronotal areas behind eyes brown, mesonotum variably suffused with pale orange to brown, central carina of frons narrowly or broadly red-orange on slightly more than basal half; pectus dark; forewings transparent with most veins pale, crossveins variably darkened, distal portion of M3 and fork of SC + R before stigma usually distinctly dark brown, each stigma at least in part embrowned.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 115) roundly produced, apices of styles oval; genital capsule in lateral view (fig. 113) with posterior margin of pygofer convex, style roundly capitate, anal flap strongly asymmetrical with large triangular projection at middle of right margin; aedeagus in left lateral view (fig. 113) with suboval apical appendage concealing part of unusually long apical process, process variably hooked at apex; aedeagus in right lateral view (fig. 114) without modification on this side.

Type. — Holotype female, Brownsville, Texas, 4 January 1932, E.D. Ball in collection of USNM.

Specimens studied. — TEXAS, Brownsville. Collection dates 3 January to 8 August. Total specimens studied 22 males and 22 females.

Notes. — The distally hooked apical process of the aedeagus, the asymmetrical anal flap bearing a large triangular projection at the middle of the right margin, and the orange-red marking on the median carina of the frons provide the distinctive features of this species. Caldwell (1946:206) reported *rubidus* as occurring in large numbers on the undersides of palmetto leaves at Brownsville, Texas. *M. rubidus* is only known from southernmost Texas.

Myndus lophion Kramer, n. sp.

(Figs. 116-118)

Salient features. — Length of males 4.0-4.5 mm, females 3.8-4.8 mm. Ground color of head and thorax tawny to dark honey brown; pronotum infuscated behind eyes and with its ground color paler than that of crown or mesonotum; frons mark-

ed vaguely or distinctly with orange or orange-brown in form of triangle at base and broad arc at apex; forewings hyaline with veins and at least part of each stigma brown to reddish brown, veins darker in females than in males, distal portion of forewings behind clavi sometimes lightly embrowned.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 118) bluntly subtriangular, apices of styles rounded; genital capsule in lateral view (fig. 116) with posterior margin of pygofer convex, style roundly capitate, anal flap asymmetrical with right margin broader than left margin and sharply or bluntly convex at middle, extreme apical portion of anal flap narrow and acute; aedeagus in left lateral view (fig. 116) with subquadrate appendage partly concealing decurved apical process, flagellum small; aedeagus in right lateral view (fig. 117) with shaft slightly undulate.

Type. — Holotype male (USNM 75921) and allotype female, Oak Creek Canyon, Arizona, 18 August 1933, E.D. Ball.

Paratypes. — Male, Santa Catalina Mts., Arizona, 1 July 1933, E.D. Ball; male, White Mts., Arizona, 15 June 1936, E.D. Ball.

Specimens studied. — ARIZONA, Chiricahua Mts., Flagstaff, Long Valley, Mormon Lake, Oak Creek Canyon, Prescott, Santa Catalina Mts., Santa Rita Mts., Sierra Ancha, White Mts.; COLORADO, Palmer Lake, Rist Canyon. Collection dates 15 June to 23 August. Total specimens studied 3 males and 23 females.

Notes. — The decurved apical process of the aedeagus, the asymmetrical anal flap which has the right margin broader than the left margin in lateral view, and the variable orange to orange-brown markings on the frons provide the distinctive features of this species. No plant associations are recorded; Arizona and Colorado provide the only state records. The specific name, a Greek noun in apposition, means little crest.

Myndus lophion alpha Kramer, n. subsp. (Fig. 119)

Differs from nominate subspecies only in tending to darker color and with the markings on frons obsolete or absent; left apical appendage of aedeagus in lateral view (fig. 119) produced both anteriorly and posteriorly on ventral margin.

Type. — Holotype male (USNM 75922) and allotype female, 8 mi. N. Stonewall, 11,890', Las Animas Co., Colorado, 27 July 1971, O'Briens and Marshall.

Paratypes. — All with same data as holotype: 75 males and 97 females.

Specimens studied. — COLORADO, Stonewall. Collection date 27 July. Total specimens studied 76 males and 98 females.

Notes. — The broad apical appendage of the aedeagus with its ventral margin produced both anteriorly and posteriorly provides the distinctive features of this subspecies. It is only known from one locality in Colorado with the entire series having been taken on *Pinus* sp.

DISTRIBUTIONAL NOTES ON THE UNITED STATES SPECIES

Of the 34 species and subspecies discussed in this report, 20 are western or southwestern and 14 are eastern or southeastern. Thir-

teen species are known from Arizona; 6 from California and Florida; and 5 from New York, Virginia, Georgia, Kansas, Texas, and Colorado. Of the remaining 26 states from which records are at hand, all have 4 or less species. The northernmost record (Poplar, Montana) belongs to *M. collinus* Ball. *M. crudus* Van Duzee, known in the U.S. from Florida alone, is widespread in the circum-Caribbean area. Its northern limits are the same as those of the adult food plants, coconut and other tropical palms.

Checklist of United States species of *Myndus* with state records

1. *balli* Kramer, n. sp. Ariz.
2. *beameri* Ball, 1933:480. Ariz.
3. *catalinus* Ball, 1933:481. Ariz., N.M., Tex.
4. *collinus* Ball, 1933:482. Colo., Mont.
5. *crena* Kramer, n. sp. Ariz., Colo.
6. *crudus* Van Duzee, 1907:33. Fla.
 cocois Fennah, 1945:424. n. syn.
 pallidus Caldwell, 1946:204. n. syn.
7. *dozieri* Kramer, n. sp. Miss.
8. *enotatus* Van Duzee, 1909:188. Fla., Ga., La., Md., Miss., N.C., S.C., Va.
9. *flocki* Kramer, n. sp. Ariz., Cal.
10. *fulvus* Osborn, 1903b:46. Kans., Kent., N.Y., Ohio, Tenn.
11. *gabrielensis* (Flock), 1951:169. Cal.
12. *glyphis* Kramer, n. sp. Mass., N.Y., Tenn.
13. *impiger* Ball, 1902:153. Colo., N.M.
14. *lophion* Kramer, n. sp. Ariz., Colo.
15. *lophion alpha* Kramer, n. subsp. Colo.
16. *lunatus* Van Duzee, 1909:189. Fla.
17. *mojavenis* Ball, 1933:480. Ariz., Cal., Nev.
18. *neopusillus* Kramer, n. sp. Fla.
19. *nevadensis* Kramer, n. sp. Ariz., Nev.
20. *nigrifrons* Ball, 1937:179. Tex.
21. *nolinus* Ball, 1933:481. Ariz.
22. *occidentalis* Van Duzee, 1914:39. Ariz., Cal., Ida., Utah.
23. *ovatus* Ball, 1933:483. Ga., Iowa, Kans., Md., Mass., N.J., Va.
24. *pictifrons* Stål, 1862:307. Conn., Ga., Ill., Ind., Iowa, Kans., La., Md., Mass., Miss., Mo., Nebr., N.J., N.Y., N.C., Ohio, Okla., Pa., Tenn., Va.
 sordidipennis Stål, 1862:308. n. syn.
25. *pusillus* Van Duzee, 1909:190. Conn., Fla., Ga., Mass., N.H., N.J., N.C., Va.
 perrinei Caldwell, 1951:34. n. syn.

26. *radicis* Osborn, 1903a:42. Ill., Ind., Kans., Md., Miss., N.Y., N.C., Ohio, Va.
delicatus Van Duzee 1908:492. n. syn.
27. *rubidus* Ball, 1933:483. Tex.
28. *slossonae* Ball, 1902:154. Fla., Ga., Kans., Miss., Okla., Tex.
29. *texensis* Kramer, n. sp. Tex.
30. *truncatus* Metcalf, 1923:184. Ill., Iowa, Wisc.
31. *viridicatus* Ball, 1933:483. Ariz., Cal.
32. *viridis* Ball, 1902:153. Ariz., Cal., Colo.
auratus Ball, 1933:484.
33. *xyron* Kramer, n. sp. Mich., N.Y.
34. *yuccandus* Ball, 1933:482. Ariz.

Notes on the key to Mexican and Neotropical species of Myndus.

The vast majority of the species (24 out of 29) treated here are described as new. There seems to be little reason to believe that these represent more than a fraction of the total fauna south of the United States. These insects are quite small and generally lack any striking features when compared with many of the other large and elaborately colored tropical plant-hoppers.

KEY TO MEXICAN AND NEOTROPICAL SPECIES OF MYNDUS
(Males Only)

1. Anal flap in lateral view with single or paired lobelike projection or processes originating between ventral margins 2
Anal flap in lateral view either simple or process or processes originating directly from one or both ventral margins 7
2. Aedeagus with three processes 3
Aedeagus with two processes 4
3. Projection from anal flap single and almost at apex of ventral margin (fig. 120); all aedeagal processes with slender bases (figs. 121-122)
..... *jamaicae*, n. sp.
Projection from anal flap paired and before middle of ventral margin (fig. 123); at least dominant aedeagal process with extremely broad base (figs. 123-124) *meadi*, n. sp.
4. Both aedeagal processes projecting to or above dorsal margin of aedeagus in lateral view 5
Only one or neither aedeagal process projecting to or above dorsal margin of aedeagus in lateral view 6
5. Apex of proximal aedeagal process much basad of apex of distal aedeagal process (fig. 127); ventral margin of aedeagus smooth distally (fig. 126); frons unicolorous *simplicatus* (Caldwell)

- Apices of aedeagal processes in alignment (figs. 129-130); ventral margin of aedeagus shagreened distally (figs. 129-130); frons laterally bordered with scarlet *caldwelli*, n. sp.
6. Aedeagus smooth with ventral margin simple and longer aedeagal process obliquely directed ventrobasally (figs. 106, 108-109)
 *crudus* Van Duzee
 Aedeagus at least in part shagreened with ventral margin produced to form slender, ventrally projecting process and longer aedeagal process not as above (figs. 132-133) *serratus* (Caldwell)
7. Aedeagal flagellum well developed, nearly as long as aedeagus in lateral view (figs. 136, 142); anal flap in left lateral view with part of right margin exposed distally and ventrally (figs. 138, 141) 8
 Without the above combination of characters 12
8. With no aedeagal process more than half length of flagellum; frons with narrow dark brown stripe slightly mesad of and following each lateral margin for entire length 9
 With one or more aedeagal processes more than half length of flagellum; frons not marked as above 10
9. Aedeagal flagellum with slender process near middle on right side (fig. 136); mesonotum predominantly yellow or yellowish brown (Costa Rica)
 *phylax*, n. sp.
 Aedeagal flagellum without process on right side (fig. 139); mesonotum predominantly black (Peru) *mokos*, n. sp.
10. Aedeagus in right lateral view with ventral-most process originating from ventral margin (fig. 142) *sillos*, n. sp.
 Aedeagus in right lateral view with ventral-most process originating above ventral margin 11
11. Aedeagus in lateral view indented on ventral margin and with small finlike structure only on right side (figs. 144-145) *lyssa*, n. sp.
 Aedeagus in lateral view not indented on ventral margin and with small finlike structure on both right and left sides (figs. 147-148)
 *brimosis*, n. sp.
12. Forewings or face or both predominantly or entirely darkly fuscous to black 13
 Forewings and face lighter in color and either unmarked or with variable markings 15
13. Entirely dark species except for hyaline patch on stigmal area of each forewing; two longer aedeagal processes, one directed dorsocephalad and the other caudad (figs. 150-151) *gnophos*, n. sp.
 Without both of above features 14
14. Forewings dark except for pale costal margin, claval veins, and Cu-1; aedeagus broadly U-shaped with major process originating in basal half and directed posteriorly at or along dorsal margin (figs. 153-154)
 *nimbus*, n. sp.

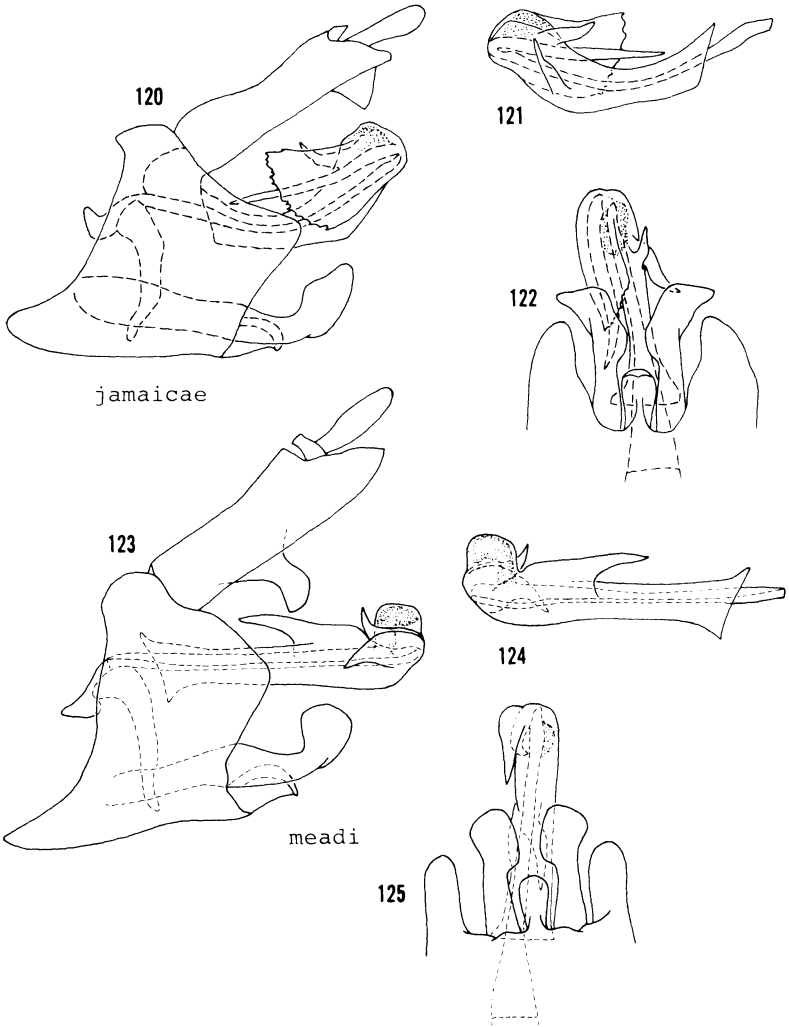
- Forewings hyaline and only darkly marked in distal third; aedeagus suboval with no processes in basal half (figs. 156-157) *tekmar*, n. sp.
15. Anal flap with paired, sharply acute processes subapically on ventral margin 16
 Anal flap simple, with blunt fingerlike processes, or other wise different 17
16. Processes on ventral margin of anal flap broadly triangular (fig. 159); aedeagus with no processes on or projecting above dorsal margin in lateral view (fig. 162); frons with transverse black markings *laevis* (Fowler)
 Processes on ventral margin of anal flap narrow and stiletlike (fig. 163); aedeagus with three processes on or projecting above dorsal margin in lateral view (figs. 164); frons unicolorous *akko*, n. sp.
17. Aedeagus with well developed left apical appendage, as wide as and concealing much of associated left process in lateral view (figs. 166, 169, 172) 18
 Aedeagus without well developed left apical appendage as above 20
18. Left apical appendage of aedeagus with distal margins entirely serrate (fig. 166); aedeagus in right lateral view with broad, subapically rounded, apically pointed process directed cephalad (fig. 167); frons greenish with midline red or orange-red *thryligma*, n. sp.
 Left apical appendage of aedeagus with distal margin only partly or not at all serrate; aedeagus in right lateral view without process; frons not colored as above 19
19. Left apical appendage of aedeagus bluntly oval in left lateral view, with ventral margin of anal flap convex and not exposing right ventral margin (fig. 169) *gomphos*, n. sp.
 Left apical appendage of aedeagus tapered and produced distally in left lateral view, with left ventral margin of anal flap concave and exposing strongly convex right ventral margin (fig. 172) *sparagma*, n. sp.
20. Aedeagus in lateral view subtriangular, nearly twice broader apically than basally (figs. 175-176); flagellum well developed with two processes at or near apex (fig. 177) *delta*, n. sp.
 Without either of the above features 21
21. Ventral margin of anal flap with lobe, fin, or other type of modification before apex in left lateral view 22
 Ventral margin of anal flap simple before apex in left lateral view 25
22. Anal flap stalklike in basal half with broad lobe just before apex in left lateral view (fig. 178); aedeagus in lateral view subquadrangular and almost uniform in width (fig. 179) *synavei*, n. sp.
 Anal flap broad in basal half with ventral modification at or before middle in left lateral view (figs. 181, 184, 187); aedeagus in lateral view not of uniform width 23

23. Aedeagus with long, broadly based, upright process near middle of left side in lateral view (fig. 181); ventral margin of aedeagus with short, caudally projecting process near apex (fig. 182) *vilbastei*, n. sp.
Without either of the above features 24
24. Anal flap with ventral modification subquadrate in left lateral view (fig. 184); aedeagus in lateral view with two long processes originating in basal half and directed caudad (fig. 185); style with two projections on dorsal margin in distal area (fig. 184) *deleter*, n. sp.
Anal flap with ventral modification not subquadrate in left lateral view (fig. 187); aedeagus in lateral view without processes originating in basal half (fig. 188); style without projections in distal area (fig. 187)
. *spanglerorum*, n. sp.
25. With free anteriorly projecting process on ventral margin at or near apex of aedeagus 26
Without process as above 28
26. Aedeagal flagellum well developed, broad, and half aedeagal length (figs. 191) *fennahi*, n. sp.
Aedeagal flagellum poorly developed, narrow, and less than half aedeagal length 27
27. Aedeagus in lateral view with large ventral keel and three long processes anteriorly directed on or near dorsal margin (figs. 193-194)
. *tektion*, n. sp.
Aedeagus in lateral view with only ventral process and no long processes on dorsal margin (figs. 196-197) *frontalis* (Fowler)
28. Aedeagus prolonged distally by acute, sharp, ventral projection (figs. 199-200); posterodorsal angle of pygofer simple (fig. 199); aedeagus with one anteriorly directed process (fig. 199) *dolon*, n. sp.
Aedeagus not prolonged distally (figs. 202-203); posterodorsal angle of pygofer with short, distinct lobe (fig. 202); aedeagus with three anteriorly directed processes (figs. 202-203) *skarphion*, n. sp.

Myndus jamaicae Kramer, n. sp. (Figs. 120-122)

Salient features. — Length of male 4.2 mm, female unknown. Ground color of head and thorax tawny, without additional color pattern; forewings essentially hyaline, veins pale with small setae-bearing brown dots, stigma whitish.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 122) elongate and apically rounded, apices of styles directed laterad, two processes crossing on right side of aedeagus; genital capsule in lateral view (fig. 120) with posterior margin of pygofer triangularly produced, style apically subtruncate, anal flap elongate with single triangular process originating between ventral margins near apex; aedeagus in left lateral view (fig. 120) with apical appendage flared and its distal margin irregularly serrate, with long subapical process, and poorly developed flagellum; aedeagus in right lateral view (fig. 121) with process directed cephalad near anterodorsal margin and process directed dorsocaudally near middle of ventral margin.



FIGURES 120-125. — Male genitalia. 120-122, *M. jamaicae* n. sp., from holotype. 123-125, *M. meadi* n. sp., from holotype. 120, 123, complete lateral view. 121, 124, aedeagus in right lateral view. 122, 125, apex of pygofer, styles, and aedeagus in ventral view.

Type. — Holotype male (USNM 75923), Kensworth, Jamaica, 18 February 1937, Chapin and Blackwelder. Kensworth is an estate located 2 miles SE of Newport or 10 miles south of Mandeville by road.

Specimens studied. — Known only from holotype.

Notes. — The single triangular projection or process which originates between the ventral margins of the anal flap near the apex, the flared and distally serrate left apical appendage of the aedeagus, and the pair of processes on the right side of the aedeagus provide the distinctive features of this species. No host data are recorded, and the species is named for the island on which it was collected.

Myndus meadi Kramer, n. sp. (Figs. 123-125)

Salient features. — Length of males 4.0-4.2 mm, females 4.5-4.8 mm. Ground color of head and thorax yellowish tawny, without additional color pattern; forewings essentially hyaline with veins pale, each stigma sometimes whitish on outer half.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 125) elongate and apically rounded, apices of styles subtruncate, without processes visible on right side of aedeagus; genital capsule in lateral view (fig. 123) with posterior margin of pygofer bluntly triangular, style apically rounded, anal flap with pair of subquadrate projections or processes originating between ventral margins near middle; aedeagus in left lateral view (fig. 123) without apical appendage, with pair of stout apical processes and single broad-based subapical process, these processes directed cephalad, flagellum well developed but short; aedeagus in right lateral view (fig. 124) with broad-based process originating subapically on this side near dorsal margin.

Type. — Holotype male (USNM 75924) and allotype female, ex Mexico, taken in hold of ship with banana cargo at Philadelphia, Pa., 17 September 1935. Collector not given.

Paratypes. — Male with same data as holotype, male with same data except 22 August 1935.

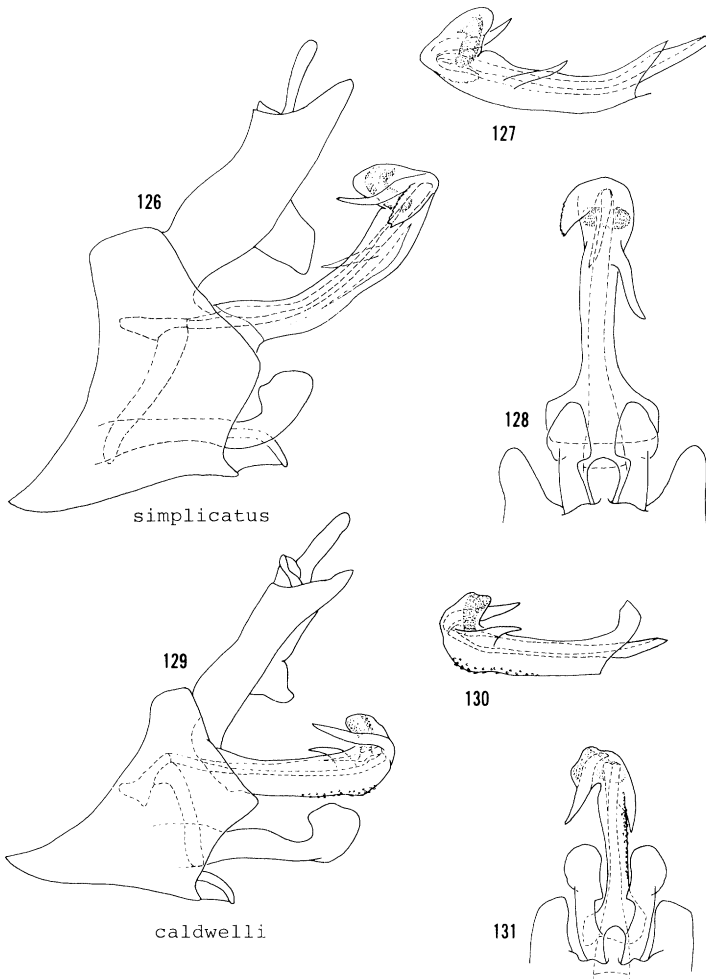
Specimens studied. — MEXICO, hold of ship with banana cargo at Philadelphia, Pa. Collection dates 22 August to 17 September. Total specimens studied 3 males and 6 females.

Notes. — The paired subquadrangular projections or processes which originate between the ventral margins of the anal flap near the middle (only one shown in fig. 123) and the three stout processes on the aedeagus provide the distinctive features of this species. All of the specimens studied were collected in association with bunches of cut bananas from Mexico. The species is named for Dr. Frank W. Mead, insect taxonomist with the Florida Department of Agriculture.

Myndus simplicatus (Caldwell), new combination (Figs. 126-128)

Haplaxius simplicatus Caldwell, 1946:204.

Salient features. — Length of males 4.0-4.9 mm, females 4.4-5.0 mm. Ground



FIGURES 126-131. — Male genitalia. 126-128, *M. simplicatus* (Caldwell), from holotype. 129-131, *M. caldwelli* n. sp., from holotype. 126, 129, complete lateral view. 127, 130, aedeagus in right lateral view. 128, 131, apex of pygofer styles, and aedeagus in ventral view.

color of head and thorax pale yellowish brown variably and irregularly washed with light green, greenish color usually more prominent ventrally than dorsally, without dark color pattern; forewings hyaline with veins pale or light brown, each stigma largely or entirely pale.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 128) roundly produced but narrowed basally, apices of styles narrowly rounded, one process visible on right side of aedeagus; genital capsule in lateral view (fig. 126) with posterior margin of pygofer bluntly triangular, style rounded apically, anal flap elongate with paired subquadrate processes originating between ventral margins just before or near middle; aedeagus in left lateral view (fig. 126) with small apical appendage, single apical or subapical process, and well developed flagellum; aedeagus in right lateral view (fig. 127) with dorsocephally projecting process nearer dorsal margin and on distal half of shaft.

Type. — Holotype male and allotype female, San Miguel, El Salvador, 19 March 1942, C.C. Plummer in collection of USNM.

Specimens studied. — COSTA RICA, Brasil; EL SALVADOR, San Miguel, San Salvador; PANAMA, Tabernilla. Collection dates 19 March to 1 October. Total specimens studied 6 males and 3 females.

Notes. — The paired subquadrate projections or processes which originate between the ventral margins of the anal flap just before the middle (only one shown in fig. 126), the small left apical appendage of the aedeagus, and the pair of widely separated processes which project above the dorsal margin of the aedeagus in lateral view provide the distinctive features of this species. The only recorded plant association for this Central American species is *Panicum barbinode* Trin.

Myndus caldwelli Kramer, n. sp. (Figs. 129-131)

Salient features. — Length of males 5.0-5.5 mm, females 5.5-5.9 mm. Ground color of head and thorax sordid stramineous to tawny, frons and often clypeus with lateral margins scarlet, forewings essentially hyaline with veins pale brown, each stigma largely or entirely pale.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 131) produced and rounded apically, apices of styles rounded, one process visible on right side of aedeagus; genital capsule in lateral view (fig. 129) with posterior margin of pygofer strongly triangular, style apically rounded, anal flap elongate with subtriangular process originating between ventral margins at or just before middle; aedeagus in left lateral view (fig. 129) without apical appendage, with apical process, distal half of ventral margin roughened with fine spicules, and flagellum well developed; aedeagus in right lateral (fig. 130) with broad-based process directed cephalad near upper margin in distal half.

Type. — Holotype male (USNM 75925) and allotype female, Mexico, taken in hold of ship with banana cargo in Philadelphia, Pa., 21 June 1934. Collector not given.

Paratypes. — 2 males with same data as holotype; 2 males with same data except 5 September 1934 and male 22 August 1935; 5 females with same data as holotype.

Specimens studied. — All taken at Philadelphia, Pa. on ships with banana cargo with points of origin MEXICO, HONDURAS, and GUATEMALA. Collection dates 21 June to 27 August. Total specimens studied 6 males and 11 females.

Notes. — The scarlet margined frons and the roughened distal half of the ventral margin of the aedeagus in lateral view immediately distinguish this species from its congeners. All of the specimens studied were taken in association with bunches of cut bananas from Central America or Mexico. The species is named for Dr. John S. Caldwell in recognition of his preliminary work with this genus.

Myndus crudus Van Duzee

(Figs. 105-109)

Myndus crudus Van Duzee 1907:33.

See previous discussion of Synonymy, Salient features, Male genitalia, and Type as treated with the United States records.

Specimens studied. — BRITISH HONDURAS, Punta Gorda; COLOMBIA, Fusagasuga, Medellin, Puerto Wilches; COSTA RICA, San Jose; CUBA, Acueducto, Cayamas, Jaronu, Paso Real, Preston; JAMAICA, Buff Bay, Caenwood, Cedar Valley, Fair Prospect, Green Island, Kingston, Little Springs Gardens, Negril, Portland, Woodstock; MEXICO, Cuernavaca, Todos Santos, Veracruz; PANAMA, Chiriqui, El Real, Garachine, Tocumen; TRINIDAD, La Brea, Manzanilla Bay, Montserrat, Port-of-Spain, St. Augustine; VENEZUELA, Maracay. Total specimens studied 270 males and 145 females. Collection dates 6 January to 21 December.

Notes. — *M. crudus* can be distinguished from all of its congeners by the distally serrate and transparent left apical appendage of the aedeagus, the two unequal but simple processes on the shaft, and the simple projection which originates between the ventral margins of the anal flap in the proximal half. The longer of the aedeagal processes typically is directed ventrocephalad beyond the ventral margin of the aedeagus in lateral view.

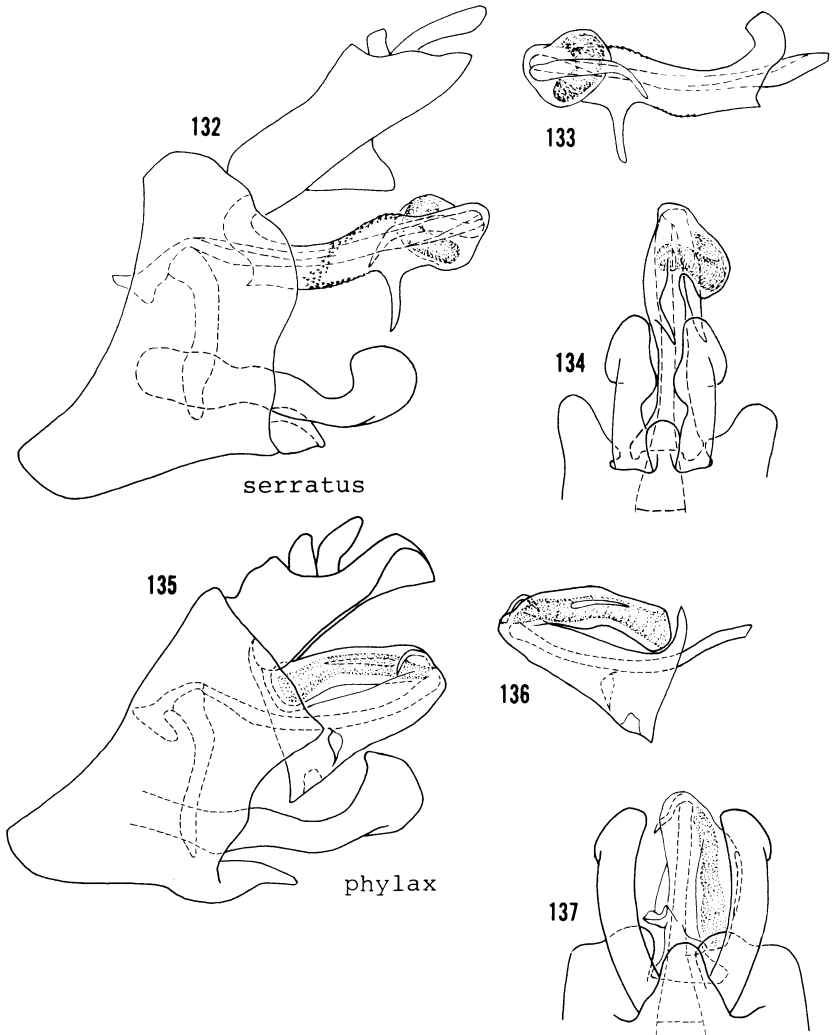
The distribution of *crudus* is extensive in the Neotropics and includes the West Indies, Mexico, Central America, and northern South America. Perhaps the most interesting new record is based on a single male taken by H. B. Leech in southernmost Baja California at San Pedro, 4 miles south of Todo Santos, 13 January 1959. Most specimens were collected without plant data; but those from Cuba were taken on "coarse grass", and a fair number of the specimens from Colombia, Jamaica, and Trinidad were collected on coconut palm, *Cocos nucifera* L. The series from Maracay, Venezuela was taken on "fan palm". *M. crudus* is considered to be the prime, but as yet unproved, vector of the agent which causes lethal yellowing of coconut in tropical America.

Myndus serratus (Caldwell), new combination

(Figs. 132-134)

Haplaxius serratus Caldwell 1946:204.

Salient features. — Length of males 4.3-4.7 mm, females 4.7-5.1 mm. Ground color of head and thorax light brown to tawny with venter paler than dorsum, pronotum variably shaded with brown behind eyes, mesonotum lightly to heavily shaded with brown; forewings hyaline, veins brown, each stigma pale.



FIGURES 132-137. - Male genitalia. 132-134, *M. serratus* (Caldwell), ex banana cargo from Mexico. 135-137, *M. phylax* n. sp., from holotype. 132, 135, complete lateral view. 133, 136, aedeagus in right lateral view. 134, 137, apex of pygofer, styles, and aedeagus in ventral view.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 134) roundly produced with base narrowed, apices of styles narrowly rounded, one process visible on right side of aedeagus; genital capsule in lateral view (fig. 132) with posterior margin of pygofer roundly produced in upper half, style apically rounded, anal flap with pair of triangular processes originating between ventral margins near middle; aedeagus in left lateral view (fig. 132) without either apical appendage or subapical process, with almost vertical projection from ventral margin in distal half, approximately middle half of dorsal margin, ventral margin behind projection, and part of lateral portion covered with fine spicules, flagellum distinct; aedeagus in right lateral view (fig. 133) with moderately long process directed ventrocephalad in its distal third.

Type. — Holotype male and allotype female, Orizaba, Veracruz, Mexico, 8 October 1941, DeLong, Good, Caldwell, and Plummer in collection of USNM.

Specimens studied. — MEXICO: SAN LUIS POTOSI, Tamazunchale; TABASCO, Jonuta; VERACRUZ, Orizaba. Collection dates 18 July to 1 November. Total specimens studied 8 males and 10 females.

Notes. — The almost vertical and slender projection from the ventral margin of the aedeagus in lateral view and the spicules on the shaft provide the diagnostic features of this species. Seven of the specimens studied were collected in the hold of a ship with banana cargo from Mexico.

Myndus phylax Kramer, n. sp.

(Figs. 135-137)

Salient features. — Length of males 3.3 mm, female unknown. Crown yellow-orange, face pale yellow, frons marked on each side with black line inside lateral margin, lateral portions of clypeus and portions of head behind antennae blackened, with black arc through ocelli anterior to antennae, black spot on carina near dorsal and posterior edge of each eye; pronotum pale stramineous with transverse black patch on anterior margin as wide as head; mesonotum yellow-orange fading to pale stramineous laterally and posteriorly, sometimes with pair of black spots at middle of anterior margin and at posterior angle, with small black spot on each side of posterior margin just before distal angulation; forewings subhyaline with basal two-fifths clouded with dark brown, crossveins and each stigma largely dark brown or black, other veins mainly yellowish brown.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 137) bluntly triangular, apices of styles narrowly rounded; genital capsule in lateral view (fig. 135) with upper half of posterior margin of pygofer triangular, style produced as blunt beak on dorsal margin distally, anal flap narrowed distally and exposing part of right ventral margin near apex; aedeagus in left lateral view (fig. 135) with slender short apical process, oval fin near angular basoventral margin, flagellum large and nearly as long as shaft; aedeagus in right lateral view (fig. 135) with quadrate fin near basoventral angle, flagellum with slender process directed cephalad near middle.

Type. — Holotype male (USNM 75926), El Limon, Costa Rica, 16 August 1972, J. Maldonado-Capriles.

Specimens studied. — COSTA RICA, El Limon, Puntarenas Monteverde area. Collection dates 6 June and 16 August. Total specimens studied 2 males.

Notes. — This is the only known Central American species of *Myndus* with a comparatively elaborate color pattern and exceptionally long and well developed aedeagal flagellum. Costa Rica provides our only records; the plant associations are not known. The specific name, a Greek noun in apposition, means guard.

Myndus mokos Kramer, n. sp. (Figs. 138-140)

Salient features. — Length of male 3.4 mm, female unknown. Head tawny, crown blackened prebasally, frons marked on each side with black line inside lateral margin, lateral portions of clypeus and genae to ventral margin of antennal socket blackened, with black arc through ocelli anterior to antennae, black spot on carina near dorsal and posterior edge of each eye; pronotum pale stramineous with large irregularly quadrangular black patch, it with same width as head and nearly reaching posterior margin; mesonotum black except for pale elongate patch on each margin just behind lateral angles, distal third of each lateral carina, anterior two-thirds of central carina, and posterior angle; forewings subhyaline, each with brownish cloud on basal two-fifths, crossveins and each stigma brown, other veins mainly pale or light brown.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 140) bluntly triangular, apices of styles directed mesally; genital capsule in lateral view (fig. 138) with posterior margin of pygofer triangular, style produced at dorsal and distal margin, anal flap shortened distally and exposing part of right ventral margin near apex; aedeagus in left lateral view (fig. 138) with projection on ventral margin in basal half, flagellum large and nearly as long as shaft, with slender basally projecting process at or near base of flagellum; aedeagus in right lateral view (fig. 139) without process on flagellum near middle.

Type. — Holotype male, 30 miles NE Huanuco, Peru at 2,500 m, 17 September 1954, E.I. Schlinger and E.S. Ross, in collection of California Academy of Sciences.

Specimens studied. — Known only from type.

Notes. — The largely black mesonotum, the large and well developed aedeagal flagellum, and the absence of long aedeagal processes distinguish this species from its South American congeners with a comparatively elaborate color pattern. Nothing is known about the biology of this Peruvian species. The specific name, a Greek noun in apposition, means mocker.

Myndus sillos Kramer, n. sp. (Figs. 141-143)

Salient features. — Length of male 3.3 mm, female unknown. Head tawny, crown unmarked, frons with orange spot at middle of apex and larger orange patch near and on each lateral margin in basal three-fourths; pronotum yellow-orange fading to stramineous laterally and posteriorly, with embrowning behind each eye on anterior margin; mesonotum mainly yellow-orange; forewings hyaline, veins anterior to claval apex yellow, more distal veins at least in part brown, each stigma and tangential spot before it brown, pustules more prominent than usual.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 143) triangularly produced, apices of styles rounded; genital capsule in lateral view (fig. 141) with dorsodistal angle of pygofer produced as angular tooth, style apically rounded, anal flap narrowed distally and exposing part of right ventral margin near apex; aedeagus in left lateral view (fig. 141) with bluntly triangular projection near middle of dorsal margin, slender subapical process near apex on dorsal margin, and similar process on ventral margin; aedeagus in right lateral view (fig. 142) with long slender process originating near base of large and well developed flagellum.

Type. — Holotype male, Monzon Valley, Tingo Maria, Peru, 21 September 1954, E.I. Schlinger and E.S. Ross, in collection of California Academy of Sciences.

Specimens studied. — Known only from holotype.

Notes. — The bluntly triangular projection near the middle of the dorsal margin of the aedeagus in lateral view and the two moderately long processes projecting beyond the ventral margin, also in lateral view, distinguish this species from those with similar markings. Nothing is known about the biology of this Peruvian species. The specific name, a Greek noun in apposition, means lampoon.

Myndus lyssa Kramer, n. sp.

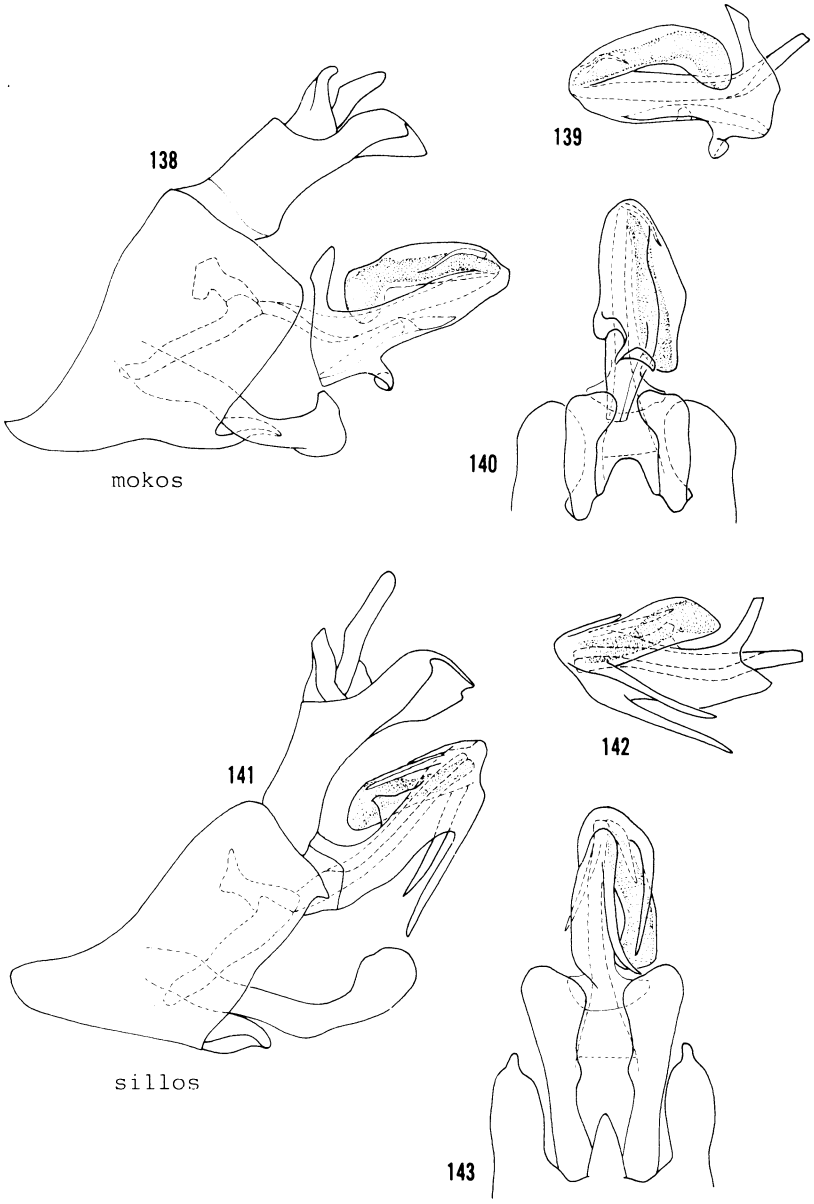
(Figs. 144-146)

Salient features. — Length of male 3.3 mm, female 3.4 mm. Head pale tawny, crown with vague orange patch anteriorly, frons with small orange patch at middle of apex and larger embrowned orange patch on and near middle of each lateral margin; pronotum pale tawny, fading to lighter shade near margins, with large black patch behind each eye; mesonotum mainly yellow-orange with small black patch on both sides of median carina near anterior margin and posterior angle; forewings hyaline, veins mainly pale; each stigma broadly, some proximal crossveins, and some veins behind claval apex brown; distal cells lightly and variably clouded with pale brown, clouding darker in area behind each claval apex; pustules more prominent than usual.

Male genitalia. — Median lobe of pygofer on ventral view (fig. 146) triangular, apices of styles rounded; genital capsule in lateral view (fig. 144) with dorsoposterior angle of pygofer produced as blunt tooth, style rounded apically, anal flap narrowed distally and exposing part of right ventral margin near apex; aedeagus in left lateral view (fig. 144) with ventral margin concave near middle to produce two convexities, flagellum large and nearly as long as shaft, with two slender and basally projecting processes at or near base of flagellum; aedeagus in right lateral view (fig. 145) with slender process projecting basally from base of flagellum, with dorsally projecting fin near middle of ventral margin.

Type. — Holotype male and allotype female, Colonia Perene, Rio Perene, 18 mi.

FIGURES 138-143. — Male genitalia. 138-140, *M. mokos* n. sp., from holotype. 141-143, *M. sillos*, n. sp., from holotype. 138, 141, complete lateral view. 139, 142, aedeagus in right lateral view. 140, 143, apex of pygofer, styles, and aedeagus in ventral view.



NE La Merced, Junin, Peru, 3 January 1955, E.I. Schlinger and E.S. Ross, in collection of California Academy of Sciences.

Specimens studied. — Known only from holo- and allotype.

Notes. — This species is very similar to *sillos* but is immediately separated from that species by the concavity on the ventral margin of the aedeagus as seen in lateral view. The biology of this Peruvian species is unknown. The specific name, a Greek noun in apposition, means rage or fury.

Myndus brimosis Kramer, n. sp. (Figs. 147-149)

Salient features. — Length of male 3.3 mm, female unknown. External features not differing from those of *lyssa* in any significant degree.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 149) triangular with apices of styles rounded; genital capsule in lateral view (fig. 147) with dorso-posterior angle of pygofer produced as moderately long tooth, style apically rounded, anal flap somewhat elongated with left margin shortened distally to expose part of right margin at apex; aedeagus in left lateral view (fig. 147) with ventral margin straight, subtriangular fin near middle, flagellum large and well developed, two slender and basally projecting processes near base of flagellum; aedeagus in right lateral view (fig. 148) with slender process projecting basally from or near apex, subtriangular fin at or near ventroposterior angle.

Type. — Holotype male (USNM 75927) La Paz, Bolivia, N. Yungus Prov., Corico Experiment Station, 4 May 1976, C.R. Ward.

Specimens studied. — Known only from holotype.

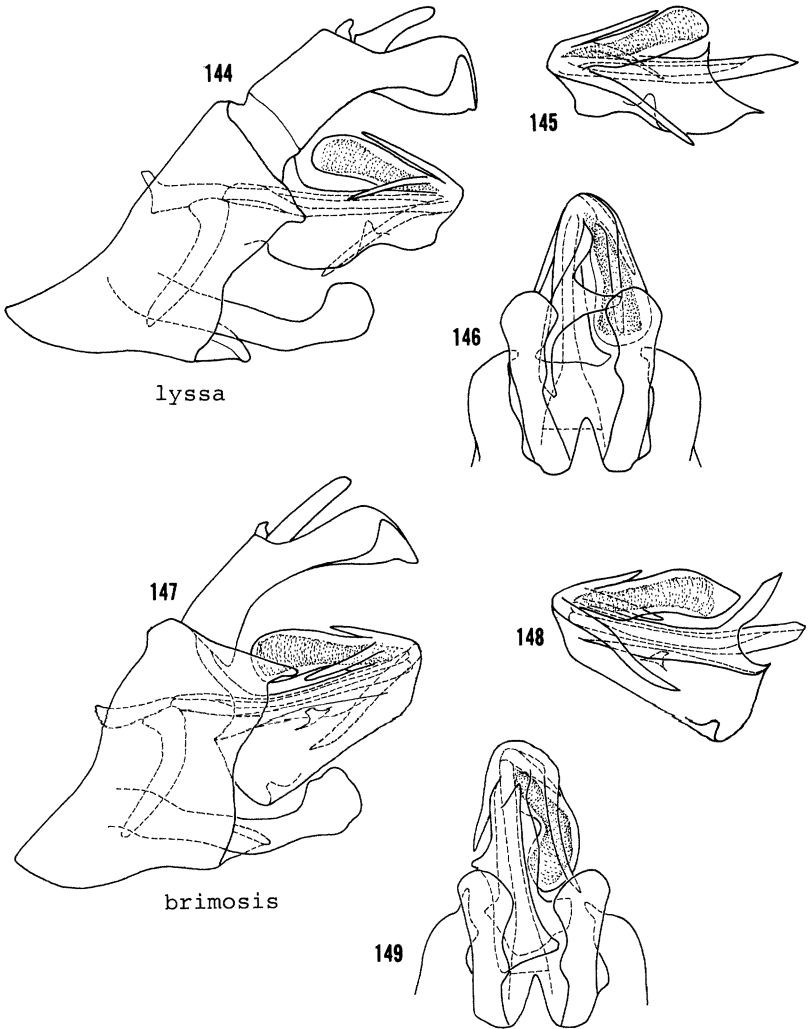
Notes. — This species is very close to *lyssa* and is not distinguishable from it on any characters except those found in the male genital capsule. The straight ventral margin of the aedeagus in lateral view and the fin near the ventroposterior angle of the aedeagus in right lateral view provide these characters. No plant associations are recorded for this Bolivian species. The specific name, a Greek noun in apposition, means indignation.

Myndus gnophos Kramer, n. sp. (Figs. 150-152)

Salient features. — Length of male 5.7 mm, female unknown. Head and thorax dark fuscus, unmarked; forewings transparent and entirely dark fuscus except for pale patch on each stigmal area.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 152) ovably produced, distal portions of styles bluntly triangular, aedeagus strongly asymmetrical; genital capsule in left lateral view (fig. 150) with posterior margin of pygofer sharply triangular at middle, style irregular on dorsal margin distally, anal flap slender and bent downward distally; aedeagus in left lateral view (fig. 150) with one short and one long preapical process, much longer process behind triangular projection on dorsal margin directed cephalad, flagellum not strongly developed; aedeagus in right lateral view (fig. 151) with process on dorsal margin projecting posteriorly beyond flagellar area.

Type. — Holotype male (USNM 75928), Rio Grande do Sul, Brazil, no other data.



FIGURES 144-149. — Male genitalia. 144-146, *M. lyssa*, n. sp., from holotype. 147-149, *M. brimosis* n. sp., from holotype. 144, 147, complete lateral view. 145, 148, aedeagus in right lateral view. 146, 149, apex of pygofer, styles, and aedeagus in ventral view.

Specimens studied. — Known only from holotype.

Notes. — The entirely dark fuscus color with the pale patch on each stigmal area immediately distinguishes this species from all other known to me. The four slender processes on the strongly asymmetrical aedeagus, the slender and distally downturned anal flap, and the sharply triangular middle portion of the posterior margin of the pygofer provide the unique structural features of this south Brazilian species. The specific name, a Greek noun in apposition, means darkness or dusk.

Myndus nimbus Kramer, n. sp. (Figs. 153-155)

Salient features. — Length of male 4.3 mm, female unknown. Dorsum of head, pronotum, and mesonotum fuscus or dark brown, central carina of mesonotum pale, lateral portions of crown somewhat lightened; face dark honey brown, paler laterally; forewings transparent dark brown, each with costal margin posteriorly through stigma, Cu-1, and claval veins stramineous.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 155) elongate and rounded apically, each style with blunt projection on outer margin near middle; genital capsule in lateral view (fig. 153) with posterior margin of pygofer bluntly triangular, style with projection on dorsal margin, anal flap slender with distal portion sharply downturned; aedeagus in left lateral view (fig. 153) U-shaped, without distinct processes, flagellum poorly developed; aedeagus in right lateral view (fig. 154) with posteriorly directed process originating in basal third.

Type. — Holotype male, Guanare, estado Portuguesa, Venezuela, 10-13 September 1957, Borys Malkin, in collection of California Academy of Sciences.

Specimens studied. — Known only from holotype.

Notes. — The partly stramineous veins on the otherwise dark forewings and the U-shaped aedeagus with the single conspicuous process provide the distinguishing features of this Venezuelan species. No biological data are available. The specific name, a Latin noun in apposition, means rain-cloud.

Myndus tekmar Kramer, n. sp. (Figs. 156-158)

Salient features. — Length of males 4.3-5.1 mm, females 4.7-5.3 mm. Crown with carinae stramineous, rest black; face with clypeus black, frons black with pale oblique stripe on each side from ventrolateral angle to near apex of pale middle carina, lateral carinae pale; side of head with antennal socket partly ringed with black and surface above eye black, rest pale; pronotum stramineous with portion behind head black nearly to posterior margin, extreme lateroventral portions black; mesonotum orange-brown with discal carinae pale, in males intercarinal portions of disc black or mainly black with black line flanking each lateral carina, females similarly marked but usually with area flanking lateral carina nearly entirely black; forewings hyaline and unmarked on basal three quarters except on costal margin anterior to each stigma, veins in anterior area mainly light brown or pale, distal quarter of each forewing with most cells and veins darkly embrowned, whitish or hyaline areas on stigma, 2-3 apical cells posterior to stigma, 1-2 preapical cells, and area behind claval apex.

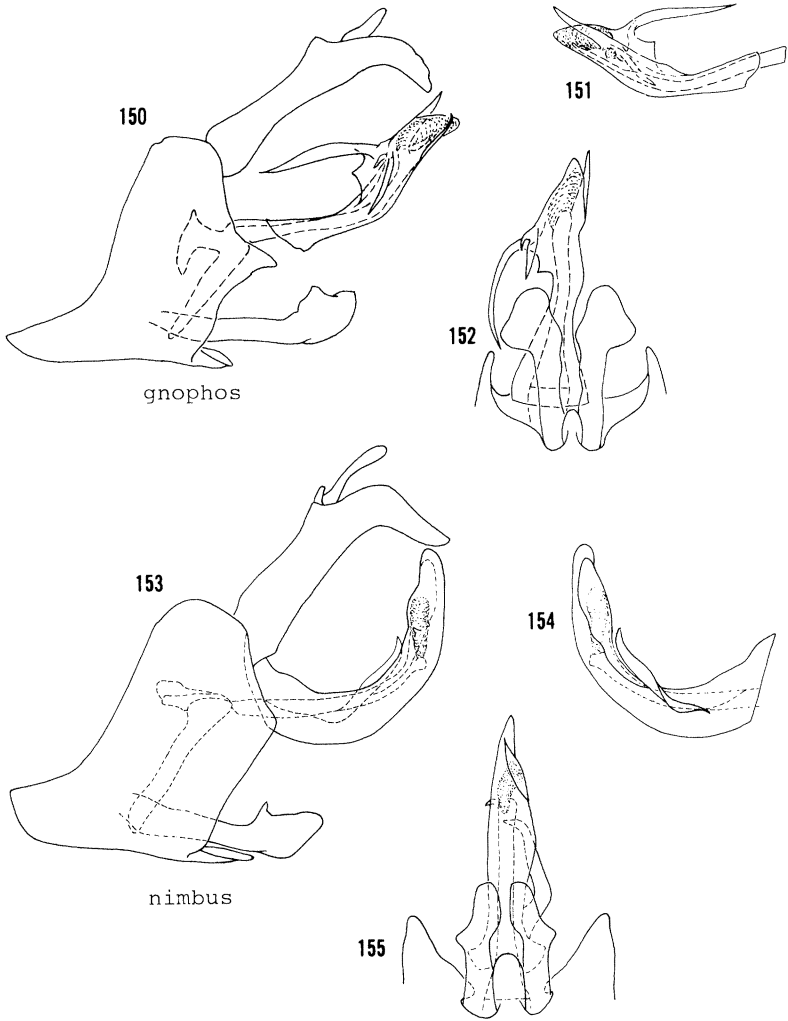


FIGURE 150-155. — Male genitalia. 150-152, *M. gnophos*, n. sp., from holotype. 153-155, *M. nimbus* n. sp., from holotype. 150, 153, complete lateral view. 151, 154, aedeagus in right lateral view. 152, 155, apex of pygofer, styles, and aedeagus in ventral view.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 158) elongate and apically rounded, apices of styles rounded; genital capsule in lateral view (fig. 156) with posterior margin of pygofer roundly convex, style apically rounded, anal flap subtriangular; aedeagus in left lateral view (fig. 156) without apical appendage, with subapical process, ventral margin broadly convex, flagellum well developed but short; aedeagus in right lateral view (fig. 157) with pair of curved processes at or near apex.

Type. — Holotype male (USNM 75929) and allotype female, 10 mi. N. Zimapan, Hidalgo, Mexico, 18 August 1971, C. & L. O'Brien and Marshall.

Paratypes. — 200 males and females with same data as holotype or the same except 10 mi. N. of Zimapan, 27 May 1974, O'Briens and Marshall.

Specimens studied. — Known only from type series.

Notes. — The oblique stripes on the frons, the patterned distal portion of each forewing, the convex ventral margin of the aedeagus in lateral view, and the three apical or subapical processes on the aedeagus provide the distinctive features of the species. All of the type series was collected on *Agave* sp., and this is no doubt the food plant of the adults of *tekmar*. Even though all of our records are from Zimapan, Hidalgo, Mexico, the species is unlikely to be that limited in distribution. The specific name, a Greek noun in apposition, means a fixed mark or boundary.

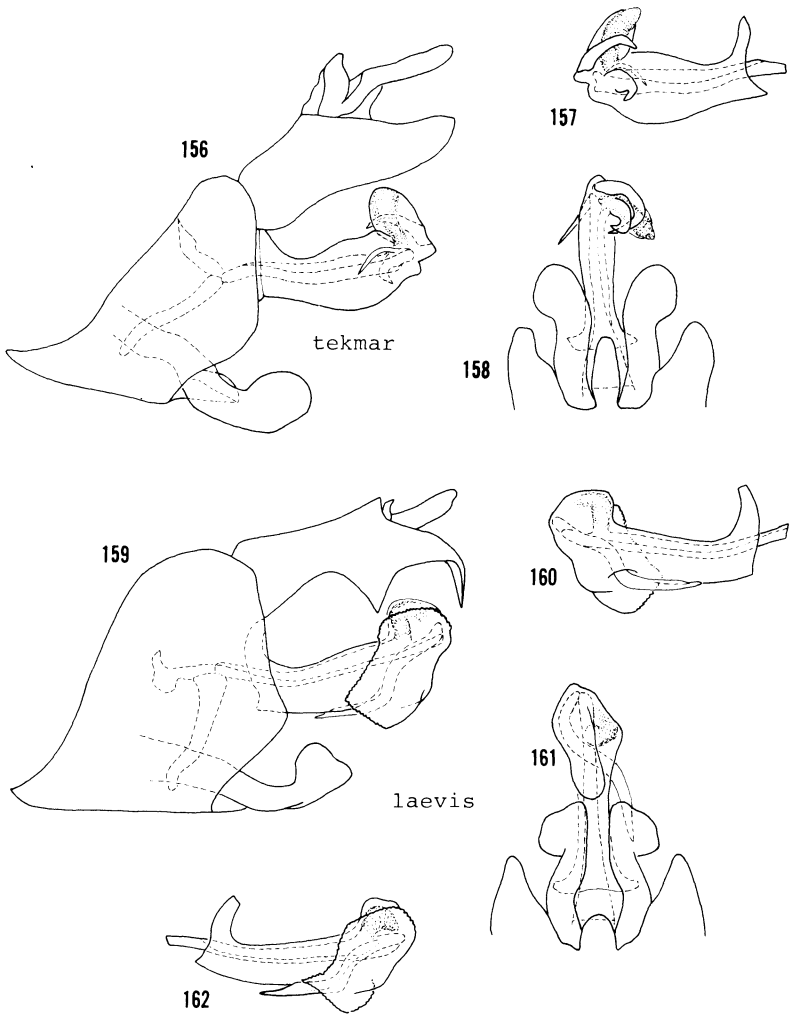
Myndus laevis (Fowler), new combination (Figs. 159-162)

Haplaxius laevis Fowler 1904:98, Pl. 10, Figs. 29-30.

Salient features. — Length of males 4.9-5.5 mm, females 5.5-6.0 mm. Ground color of head and thorax tawny; pronotum darkened on anterior margin and with pair of dark patches on each pleural portion; mesonotum suffused with various shades of brown, suffusions sometimes almost linear; face ivory to pale tan; frons marked with dark brown transverse band at base and apex; forewings hyaline with veins variably pale or dark brown, well marked specimens with brownish cloud in area near and behind claval apex, stigma mainly hyaline.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 161) roundly produced with apical portions of styles broadened; genital capsule in lateral view (fig. 159) with posterior margin of pygofer bluntly triangular, style apically subtruncate, anal flap with sharply acute triangular expansion near middle on both sides of ventral margin, extreme apex narrowed and sharply acute; aedeagus in left lateral view (fig. 162) with apical appendage broadly suboval and margins at least in part finely serrate with apex variably produced, most of long subapical process concealed by apical appendage, weakly developed flagellum; aedeagus in right lateral view (fig. 160) with subapical process exiting apical appendage near middle of lower half.

Type. — Lectotype male here selected with labels: "♂" and "H. H. S., City of Mexico" and "B. C. A. Homopt. 1. *Haplaxius laevis* Fowler" (machine printed) and "*Haplaxius laevis* Fowler, Type ♂" (handwritten). The lectotype is mounted on a cardboard rectangle with a teneral male which lacks both left wings. In addition, there are 2 males and 3 females with identical data. The lectotype and the other 6 specimens are in the British Museum (Nat. Hist.).



FIGURES 156-162. — Male genitalia. 156-158, *M. tekmar*, n. sp., from holotype. 159-162, *M. laevis* (Fowler), Chapingo, D.F., Mexico. 156, 159, complete lateral view. 157, 160, aedeagus in right lateral view. 158, 161, apex of pygofer, styles, and aedeagus in ventral view. 162, aedeagus in left lateral view.

Specimens studied. — MEXICO: FEDERAL DISTRICT, Chapingo, Mexico City. Collection dates 24-30 May. Total specimens studied 6 males and 4 females.

Notes. — The twice darkly banded frons will separate *laevis* at once from all other species of *Myndus* known from Mexico. Structurally, it is closest to *M. crena*, n. sp., a western U.S. species. The two are, at least for now, readily separated by the shape of the left apical appendage of the aedeagus in lateral view; compare fig. 159 with fig. 29. No plant associations are recorded for this species.

***Myndus akko* Kramer, n. sp.**

(Figs. 163-165)

Salient features. — Length of males 3.5-4.2 mm, females 4.0-4.5 mm. Ground color of head and thorax sordid stramineous to pale brown, without distinct markings, sometimes mesonotum vaguely shaded; forewings essentially hyaline, veins and each stigma pale.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 165) produced and acute or subacute at apex, each style with slight concavity near middle of inner margin; genital capsule in lateral view (fig. 163) with posterior margin of pygofer convex just above middle, style with cleft or deep notch at apex, anal flap with stilet-like process on both sides of ventral margin beyond middle; aedeagus in left lateral view (fig. 163) with apical appendage near ventral margin and not extending to apex, apical process directed anteriorly and usually upturned distally, flagellum poorly developed; aedeagus in right lateral view (fig. 164) with long process originating near base and following dorsal margin of shaft to flagellar area, with subtriangular fin near middle of ventral margin and acute tooth on shaft just above posterior portion of subtriangular fin.

Type. — Holotype male (USNM 75930) Belize, British Honduras, September, 1959, N. L. H. Krauss.

Paratypes. — (all males) 1 same data as holotype, 1 Vera Cruz, Mexico, May, 1956, N. L. H. Krauss; 2 Punta Arenas, Costa Rica, 12 August 1972, J. Maldonado; 1 Mata de Limon, Costa Rica, August 1972, J. Maldonado; 2 Canal Zone, Panama, 23 April 1907, August Busck; 1 Corinto, Nicaragua, 26 January 1930, T.O. Zshokke.

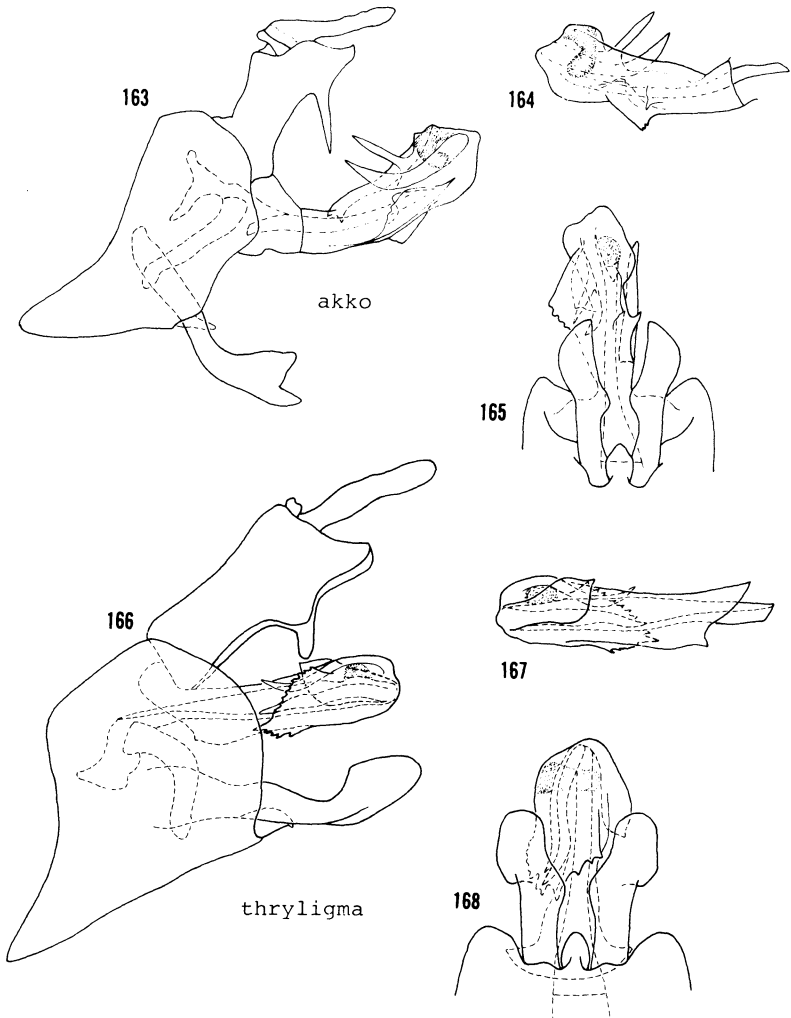
Specimens studied. — BRITISH HONDURAS, Belize; COSTA RICA, Mata de Limon, Punta Arenas; MEXICO, Vera Cruz; NICARAGUA, Corinto; PANAMA, Canal Zone. Collection dates 23 April to September. Total specimens studied 9 males and 3 females.

Notes. — The features of the male genital capsule provide many distinguishing characters; either the stiletlike projection on each side of the ventral margin of the anal flap or the cleft apex of each style separate this species at once from all of its congeners. The plant associations are unrecorded for this Mexican and Central American species. The specific name, a Greek noun in apposition, means bugbear.

***Myndus thryligma* Kramer, n. sp.**

(Figs. 166-168)

Salient features. — Length of male 6.3 mm, female unknown. Ground color of head and thorax pale yellow-orange, lateral carina of crown and posterior margin of



FIGURES 163-168. — Male genitalia. 163-165, *M. akko* n. sp., from holotype. 166-168, *M. thryligma* n. sp., from holotype. 163, 166, complete lateral view. 164, 167, aedeagus in right lateral view. 165, 168, apex of pygofer, styles, and aedeagus in ventral view.

pronotum vaguely greenish, crown vaguely washed with red-orange, face distinctly greenish with midline of frons red-orange, this longitudinal stripe broader near base than at apex of frons, forewings hyaline with veins and each stigma pale.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 168) subovally produced, apices of styles rounded; genital capsule in lateral view (fig. 166) with posterior margin of pygofer broadly rounded, style narrowly rounded apically, anal flap quadrate with left ventral margin roundly convex beyond middle and right ventral margin produced as narrow lobe beyond middle; aedeagus in left lateral view (fig. 166) with broad apical appendage serrated distally, long and basally directed apical process, flagellum poorly developed; aedeagus in right lateral view (fig. 167) with broad, subapically rounded, apically pointed process directed basally.

Type. — Holotype male (USNM 75931), Sao Paulo, Brazil, E.J. Hambleton.

Specimens studied. — Known only from holotype.

Notes. — The asymmetrical right and left ventral margins of the anal flap and the broad, subapically rounded, and apically pointed process on the right side of the aedeagus provide the distinguishing features of this Brazilian species. Nothing is known about its biology. The specific name, a Greek noun in apposition, means a fragment.

Myndus gomphos Kramer, n. sp. (Figs. 169-171)

Salient features. — Length of male 5.0 mm, female unknown. Ground color of head and pronotum stramineous to sordid whitish, distal portion of crown and upper portion of frons washed with pale orange, poorly delimited quadrate pale orange patch at base of frons, anterior margin of pronotum blackened behind head; mesonotum, except for narrowly blackened anterior margin, orange; forewings hyaline with veins distinctly brown only beyond claval apex, each stigma pale brown.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 171) produced and narrowly rounded apically, distal portion of each style obliquely directed laterally and distally; genital capsule in lateral view (fig. 169) with posterior margin of pygofer bluntly triangular, style simple, anal flap stout but simple; aedeagus in left lateral view (fig. 169) with apical appendage suboval and covering shaft and flagellum, subapical process concealed by apical appendage except for distal portion; aedeagus in right lateral view (fig. 170) simple, but broadest in distal half.

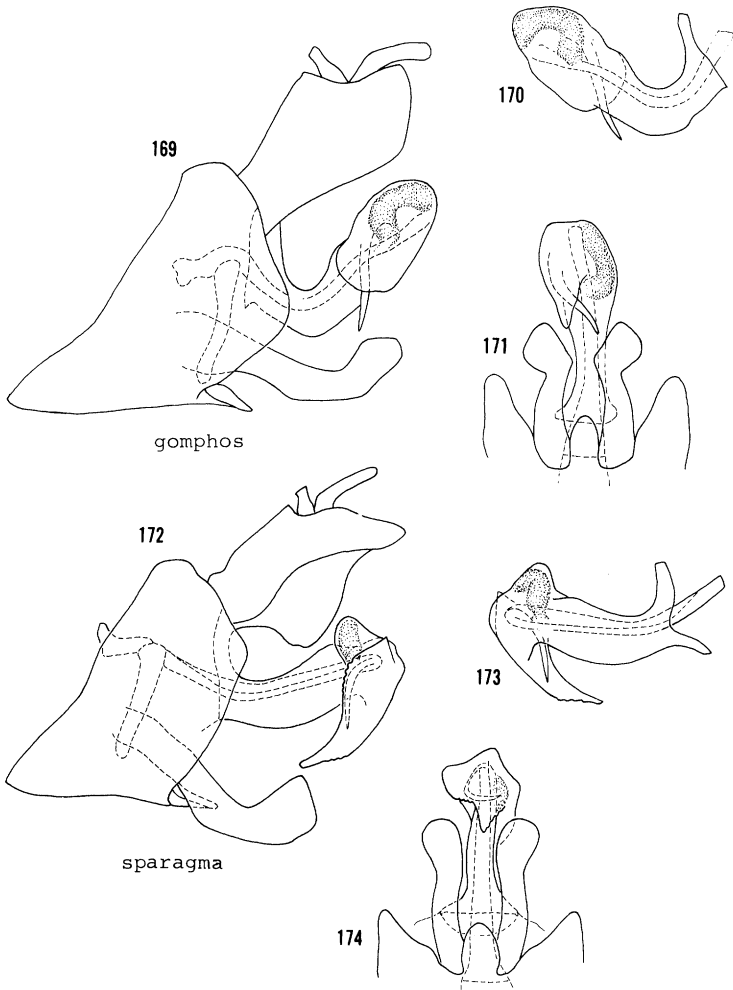
Type. — Holotype male (USNM 75932), Quiroga, Michoacan, Mexico, 15 July 1956, R. & K. Dreisbach.

Specimens studied. — Known only from holotype.

Notes. — The unusually stout but simple anal flap, the large and oval or suboval left apical appendage of the aedeagus, and the single aedeagal process provide the unique features of this Mexican species. No plant associations are recorded. The specific name, a Greek noun in apposition, means nail or peg.

Myndus sparagma Kramer, n. sp. (Figs. 172-174)

Salient features. — Length of male 3.5 mm, female 4.5 mm. Ground color of head and thorax tawny, pronotum darkened on anterior margin behind eyes,



FIGURES 169-174. — Male genitalia. 169-171, *M. gomphos* n. sp., from holotype. 172-174, *M. sparagma* n. sp., from holotype. 169, 172, complete lateral view. 170, 173, aedeagus in right lateral view. 171, 174, apex of pygofer, styles, and aedeagus in ventral view.

mesonotum with poorly defined pair of longitudinal brown stripes on each side of discal portion; ground color of face lighter than dorsum, frons with poorly defined red-orange triangle at base and stripe of same color on each side just inside lateral carina on upper half; forewings hyaline, veins mainly pale, dark spot at fork of claval veins, veins posterior to claval apex variably darkened, each stigma darkened but distinctly paler anteriorly and posteriorly.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 174) broadly oval, distal portion of each style broadly rounded; genital capsule in lateral view (fig. 172) with posterior margin of pygofer obliquely subtruncate, style truncate or subtruncate at apex, anal flap strongly asymmetrical with right ventral margin produced to form large convexity; aedeagus in left lateral view (fig. 172) with apical appendage tapered to narrow apex and projecting below ventral margin of aedeagus, single subapical process, flagellum well defined but short; aedeagus in right lateral view (fig. 173) without processes originating on this side.

Type. — Holotype male (USNM 75933), Cuyotenango, Dept. Suchitepequez, Guatemala, 10-20 June 1966, Flint & Ortiz and allotype female Lake Peten, Guatemala, 17 November 1925, J.S. Caldwell Collection.

Specimens studied. — Known only from holotype and allotype.

Notes. — The strongly asymmetrical anal flap without processes, the tapered left apical appendage of the aedeagus, and the single aedeagal process provide the distinctive features of this Guatemalan species. The allotype female is associated with the holotype on subtle features of coloration and locality. Its biology is unknown. The specific name, a Greek noun in apposition, means a piece or shred.

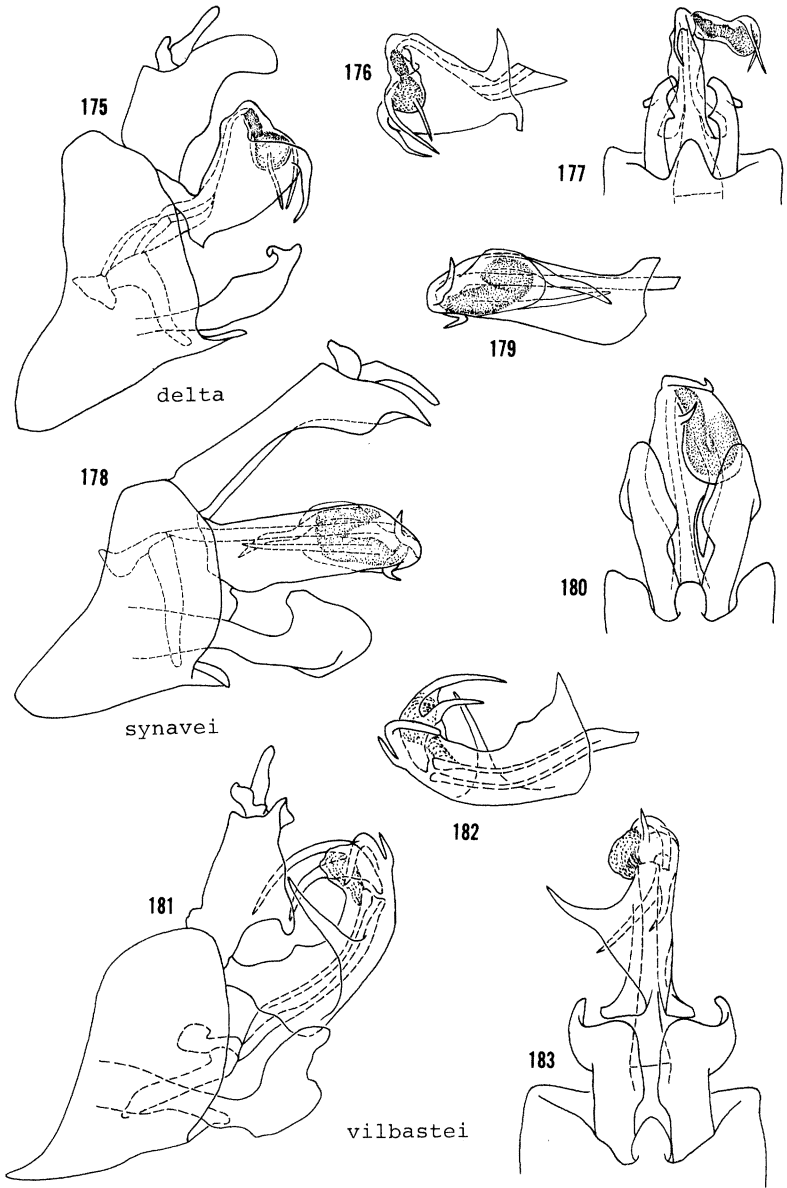
Myndus delta Kramer, n. sp.

(Figs. 175-177)

Salient features. — Length of males 5.0-5.5 mm, females 6.0 mm. Ground color of head and thorax stramineous or yellow, anterior portion of crown sometimes weakly washed with orange, face paler, almost whitish, frons marked with orange or red orange elongate patch on midline at or near base, forewings hyaline with veins and each stigma pale or yellowish.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 177) bluntly triangular, each style with subapical projection on inner and outer margins, flagellum with two slender processes on apical region; genital capsule in lateral view (fig. 175) with posterior margin of pygofer not produced, style with slender preapical projection just before apex on dorsal margin, anal flap moderately stout with small convexity on ventral margin near middle and distal portion broadly downturned; aedeagus in left lateral view (fig. 175) subtriangular, with ventrally

FIGURES 175-183. — Male genitalia. 175-177, *M. delta* n. sp., from holotype. 178-180, *M. synavei* n. sp., from holotype. 181-183, *M. vilbastei* n. sp., from holotype. 175, 178, 181, complete lateral view. 176, 179, 182, aedeagus in right lateral view. 177, 180, 183, apex of pygofer, styles, and aedeagus in ventral view.



directed apical process; aedeagus in right lateral view (fig. 176) with flagellum well developed and bearing two slender apical processes.

Type. — Holotype male (USNM 75934), Guatemala, taken in hold of ship with banana cargo at Philadelphia, Pa., 2 March 1936; allotype female, Punta Gorda, British Honduras, March 1931, White.

Paratypes. — Male with same data as allotype; female, Paraiso, Canal Zone, Panama, 29 January 1911, August Busck.

Specimens studied. — BRITISH HONDURAS, Punta Gorda; GUATEMALA; PANAMA, Canal Zone, Paraiso. Collection dates 29 January to 2 March. Total specimens studied 2 males and 2 females.

Notes. — The subtriangular aedeagus and the well developed flagellum bearing two slender processes distally make this an easily recognized species. The shape of the anal flap in lateral view is remarkably like that of the type-species of the genus; compare fig. 175 and fig. 5. The two species are also similar in possessing a more or less clearly defined transverse carina on the crown near the anterior margins of the eyes. Other than the holotype's association with cut bananas, nothing is known about the plant relationships of this Central American species. The specific name, a noun and fourth letter of the Greek alphabet, is an illusion to the shape of the aedeagus.

Myndus synavei Kramer, n. sp.

(Figs. 178-180)

Salient features. — Length of male 4.4 mm, females 4.4-4.8 mm. Ground color of head and thorax tawny, carinae of crown and face slightly darker, without additional color pattern; forewings essentially hyaline, veins and each stigma pale.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 180) roundly produced, style with apices narrowly rounded, each with convexity near middle of inner margin; genital capsule in lateral view (fig. 178) with posterior margin of pygofer roundly convex, style with convexity on dorsal margin before apex and narrow finlike modification of ventral margin before apex, anal flap elongate with subapical lobe on ventral margin and extreme apical portion slender and acute; aedeagus in left lateral view (fig. 178) stout and subquadrate, with short acute process near apex of ventral margin; aedeagus in right lateral view (fig. 179) with large suboval apical appendage concealing well developed flagellum and bases of two slender processes directed cephalad, short process at middle of apex directed dorsad.

Type. — Holotype male (USNM 75935) and allotype female, Barinas, Venezuela, P. Anduze.

Paratypes. — 3 females with same data as holotype.

Specimens studied. — Known only from type series.

Notes. — The shape of the slightly asymmetrical anal flap and the subquadrate outline of the aedeagus in left lateral view immediately distinguish this species from all of its congeners. No biological data accompany the specimens at hand. The species is named for H. Synave of the Belgian Royal Institute of Natural Sciences in Brussels in recognition of his many contributions to our knowledge of the African Cixiidae.

Myndus vilbastei Kramer, n. sp. (Figs. 181-183)

Salient features. — Length of males 4.4-4.8 mm, females 4.8 mm. Ground color of head and thorax stramineous, coronal carinae sometimes washed with orange, longitudinal stripe of orange on each side of mesonotum tangent with outer discal carina, clypeus and frons variably washed with orange, orange wash usually somewhat stronger on lateral margins of frons; forewings essentially hyaline with veins and each stigma pale, all marginal cells beyond each claval apex and stigma at least partly fumose.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 183) subtriangularly produced, styles strongly produced laterad in distal portion, aedeagus with large triangular projection on left margin; genital capsule in lateral view (fig. 181) with posterior margin of pygofer broadly rounded, style blunt and fingerlike distally with ventral margin lobed in about basal half, anal flap with blunt hook near middle of ventral margin; aedeagus in left lateral view (fig. 181) with acutely triangular process near middle of lateral margin directed above dorsal margin, short and acute process near apex of ventral margin directed distally, flagellum short but distinct; aedeagus in right lateral view (fig. 182) with three slender recurved processes originating near apex and directed cephalad.

Type. — Holotype male (USNM 75936), Loreto, Misiones, Argentina, 6 December 1931, A.A. Ogloblin; allotype female with same data except 3 December.

Paratypes. — Male with same data as holotype, male same except 25 November, and female same except 29 November.

Specimens studied. — ARGENTINA, Loreto, Misiones, Collection dates 25 November to 6 December. Total specimens studied 3 males and 2 females.

Notes. — This species is immediately recognized by the narrow and acutely triangular projection near the middle on the left side of the shaft and by the three slender and recurved processes near the apex on the right side of the aedeagus. Nothing is recorded about the biology of this Argentinian species, named for J. Vilbaste of the Estonian Academy of Sciences.

Myndus deleter Kramer, n. sp. (Figs. 184-186)

Salient features. — Length of male 5.0 mm, female unknown. Ground color of head and pronotum pale chalky green, anterior portion of crown lightly washed with orange, face unmarked, antennae orange; ground color of mesonotum stramineous, lightly washed with pale greenish at angles, area on each side of outer discal carinae broadly pale orange; forewings hyaline with veins and each stigma pale, each forewing with vague brownish cloud beyond claval apex.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 186) roundly produced, each style with apical and preapical angulation on outer margin; genital capsule in lateral view (fig. 184) with posterior margin of pygofer broadly rounded, dorsal margin of style with projection near middle and at apex, anal flap with subquadrate expansion near middle of ventral margin on left but not on right side; aedeagus in left lateral view (fig. 184) with two partly undulated and asymmetrical processes originating in basal half and directed distad, shorter subapical process

directed dorsad, flagellum well defined; aedeagus in right lateral view (fig. 185) without processes originating on this side.

Type. — Holotype male (USNM 75937), El Real, Panama, 19 March 1953, F.S. Blanton.

Specimens studied. — Known only from holotype.

Notes. — The asymmetrical anal flap and the two processes originating from the basal half of the aedeagus and directed distally make this species unique. Nothing is known about the biology of this Panamanian species. The specific name, a Greek noun in apposition, means destroyer.

Myndus spanglerorum Kramer, n. sp. (Figs. 187-189)

Salient features. — Length of males 4.8-5.1 mm, female unknown. Ground color of head and thorax pale green or greenish white, coronal carinae narrowly orange, pronotum without distinct markings, mesonotum broadly orange on each side of outer discal carinae, lateral margins of frons narrowly orange above level of antennae, central carina of frons orange in basal half, clypeus unmarked; forewings essentially hyaline with veins and each stigma pale.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 189) roundly produced, each style expanded on outer margin beyond middle; genital capsule in lateral view (fig. 187) with posterior margin of pygofer almost perpendicular, style expanded on both dorsal and ventral margins beyond middle, anal flap with convexity on both ventral margins in basal half; aedeagus in left lateral view (fig. 187) with preapical sigmoid process directed distad and subapical process on ventral margin directed basad, flagellum well defined; aedeagus in right lateral view (fig. 188) with two partly recurved processes in dorsoapical area, single process originating in ventroapical area directed basad and concealed by flange.

Type. — Holotype male (USNM 75938), Tingo Maria, Huanuco, Peru, 19-24 April 1969, P. & P. Spangler.

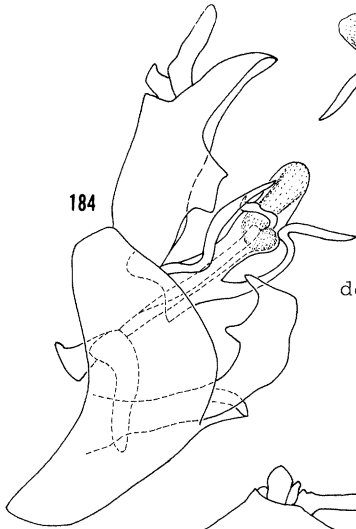
Paratype. — Male with same data as holotype.

Specimens studied. — Known only from type and paratype.

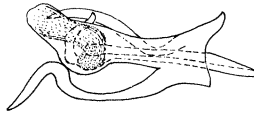
Notes. — The sigmoid process on the left side of the aedeagus and the partly concealed ventral process which originates near the apex and extends toward the base on or near the ventral margin of the aedeagus provide the distinguishing features of this Peruvian species. No biological data are known. The species is named for the collectors, Paul and Phyllis Spangler.

FIGURES 184-192. — Male genitalia. 184-186, *M. deleter* n. sp., from holotype. 187-189, *M. spanglerorum* n. sp., from holotype. 190-192, *M. fennahi* n. sp., from holotype. 184, 187, 190, complete lateral view. 185, 188, 191, aedeagus in right lateral view. 186, 189, 192, apex of pygofer, styles, and aedeagus in ventral view.

184

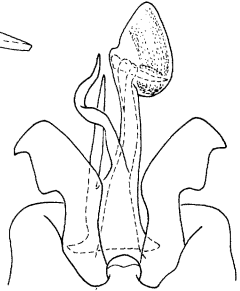


185

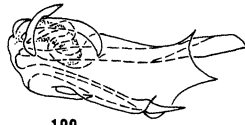


deleter

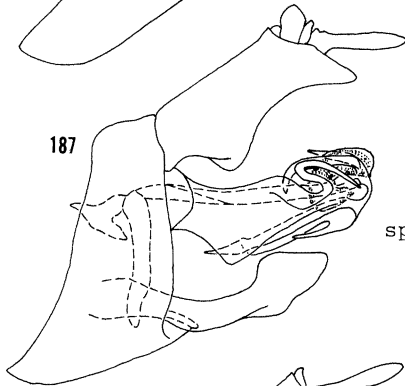
186



188

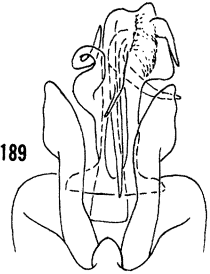


187

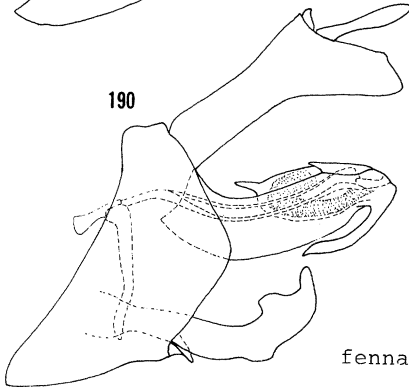


spanglerorum

189

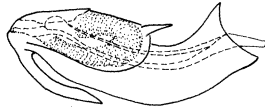


190

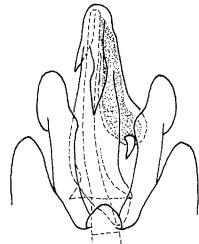


fennahi

191



192



Myndus fennahi Kramer, n. sp.

(Figs. 190-192)

Salient features. — Length of male 4.6 mm, female unknown. Ground color of head and pronotum pale green or greenish white, coronal carinae orange to orange-brown, anterior half of crown lightly washed with orange, pronotum lightly embrowned behind eyes, frons with upper half of lateral margins and lower half of central carina orange, clypeus unmarked, mesonotum light honey color except for paler angles; forewings hyaline with veins and each stigma pale, slight embrowning along commissural margin.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 192) roundly produced, styles simple; genital capsule in lateral view (fig. 190) with posterior margin of pygofer bluntly triangular, dorsal margin of style with short fingerlike extension at apex and subquadrate expansion beyond middle, anal flap simple; aedeagus in left lateral view (fig. 190) with short process near apex on dorsal margin and longer process near apex on ventral margin, both processes directed cephalad; aedeagus in right lateral view (fig. 191) with broad apical appendage concealing flagellum and bearing acute tooth near apex.

Type. — Holotype male, 24 mi. E. Yurac, Huanuco, Peru, 4 November 1954, E.I. Schlinger and E.S. Ross, in collection of the California Acad. of Sciences.

Specimens studied. — Known only from holotype.

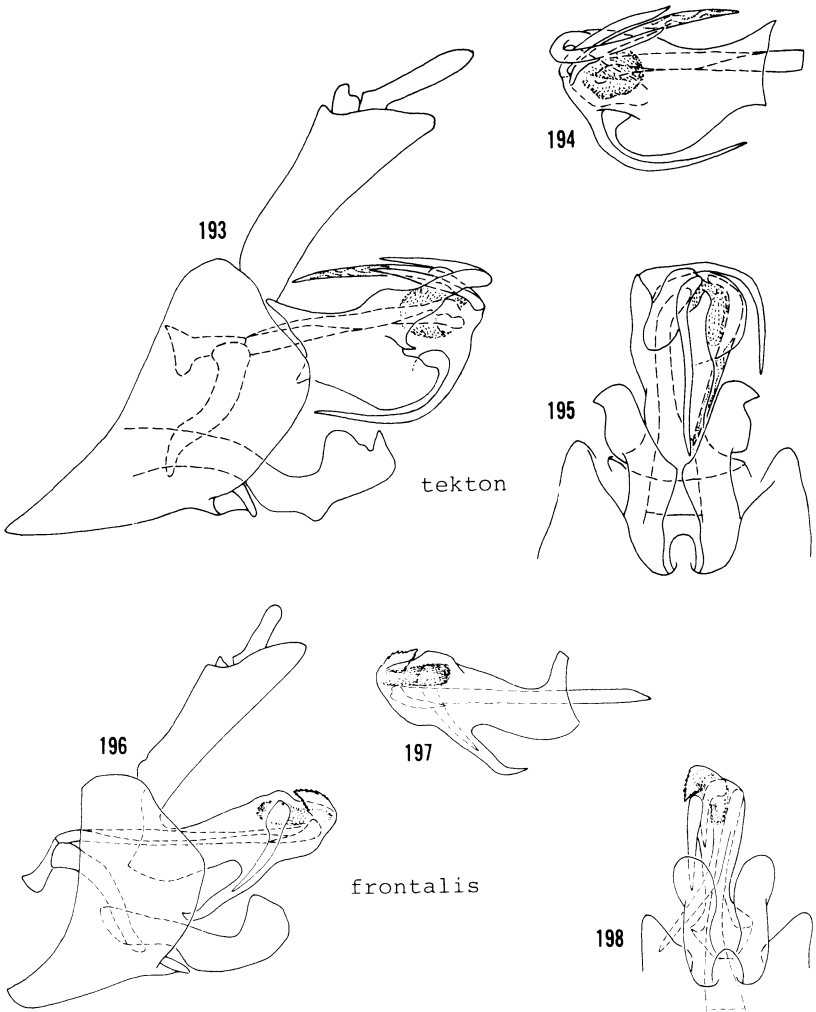
Notes. — The large apical appendage on the right side of the aedeagus which bears an apical tooth and the simple anal flap distinguish this Peruvian species. No biological data are recorded. This species is named for R.G. Fennah, a long-time specialist in the taxonomy of the Fulgoroidea.

Myndus tekton Kramer, n. sp.

(Figs. 193-195)

Salient features. — Length of males 5.5-6.0 mm, females 6.0-6.4 mm. Ground color of head and pronotum pale green or greenish white, coronal carinae brown to orange-brown; pronotum heavily embrowned behind eyes in females, but much less so in males; frons with upper half of lateral margins and lower half of central carina orange, clypeus unmarked; mesonotum heavily embrowned on both sides of central carina and on most of outer portions laterad of outer carina of disc in females; same pattern of color but orange or dark orange in males; forewings hyaline with veins mainly pale, each stigma pale; base of wing adjacent to mesonotum, much of commissural margin, and crescentic patch from area near claval apex and following hind margin of wing to middle of posterior margin clouded with brown; pattern on wings darker in females than in males.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 195) roundly produced, each style with preapical convexity and apical beak on outer margin; genital capsule in lateral view (fig. 193) with posterior margin of pygofer roundly convex, style with strong preapical convexity and acute apical projection on dorsal margin, anal flap simple; aedeagus in left lateral view (fig. 193) with large keel and long subapical process directed cephalad on ventral margin, three slender processes directed cephalad on or near apex of dorsal margin; aedeagus in right lateral view (fig. 194) with well developed flagellum.



FIGURES 193-198. — Male genitalia. 193-195, *M. tekton* n. sp., from holotype. 196-198, *M. frontalis* (Fowler). 193, 196, complete lateral view. 194, 197, aedeagus in right lateral view. 195, 198, apex of pygofer, styles, and aedeagus in ventral view.

Type. — Holotype male (USNM 75939) and allotype female, Tingo Maria, Huancayo, Peru, 19-24 April 1969, P. & P. Spangler.

Paratypes. — 4 males and 3 females with same data as holotype.

Specimens studied. — Known only from type series with identical data.

Notes. — This species is distinguished by the large keel on the ventral margin of the aedeagus, the three processes originating from the apicodorsal portion of the shaft, and the simple anal flap. The plant associations of this Peruvian species are unknown. The species name, a Greek noun in apposition, means joiner or builder.

Myndus frontalis (Fowler), new combination (Figs. 196-198)

Haplaxius frontalis Fowler 1904:98, pl. 10, fig. 31.

Salient features. — Length of males 5.1-5.3 mm, females 5.5 mm. Ground color of head and thorax stramineous to pale tawny, coronal carinae darkened, frons marked with red-orange stripe on each side of upper lateral margins and sub-triangular patch at base, clypeus unmarked, pronotum darkened behind eyes, mesonotum broadly orange-brown to dark brown on each side of outer discal carinae; forewings essentially hyaline with veins brown, stigma and costal vein in female often reddish but paler in male, commissural margin and claval apex with variable brownish cloud, each forewing with variably developed brownish crescentic cloud behind claval apex and following curvature of wing.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 198) subovally produced, apices of styles simple; genital capsule in lateral view (fig. 196) with posterior margin of pygofer bluntly triangular, style and anal flap simple; aedeagus in left lateral view (fig. 196) with small shagreened apical appendage and longer subapical process, flagellum small; aedeagus in right lateral view (fig. 197) with ventral margin produced in distal half to form oblique process, simple process concealed by flange.

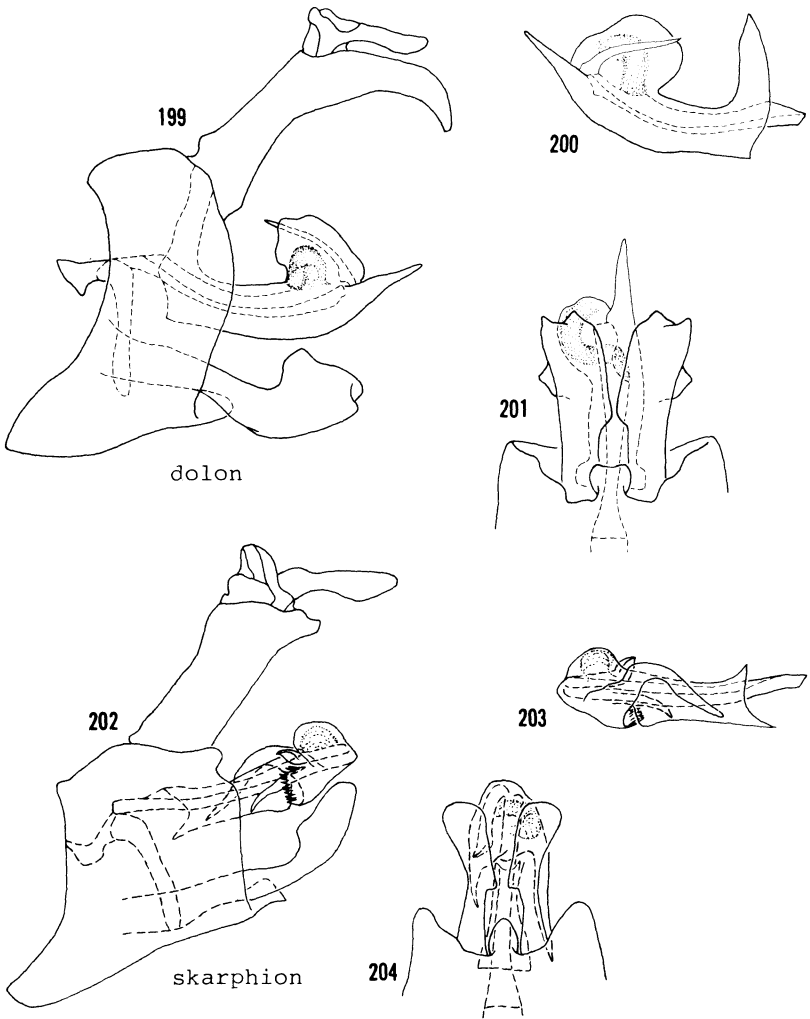
Type. — Lectotype here selected with labels "♀" and "type" and "Omiteme, Guerrero, 8000 ft., July, H.H. Smith" and "B.C.A. Hompt. I, *Haplaxius frontalis* Fowl." (machine printed) and "*Haplaxius frontalis* Fowl. TYPE" (hand printed) and illegible penciled label. The lectotype appears to be the specimen figured with the original description, but the abdomen is missing. The lectotype is in the Brit. Mus. (Nat. Hist.).

Specimens studied. — MEXICO: GUERRERO, Omiteme; MORELOS, Cuernavaca. Collection dates 15 March to July. Total specimens studied 2 males and 4 females.

Notes. — The simple anal flap and styles, the small and shagreened left apical appendage of the aedeagus, and the moderately long process which projects from the ventral margin of the aedeagus in lateral view distinguish this species. Three of the specimens studied from Cuernavaca were taken on the foliage of *Eupatorium adenophorum* Spreng. *M. frontalis* is known only from Mexico.

Myndus dolon Kramer, n. sp. (Figs. 199-201)

Salient features. — Length of males 6.0-6.3 mm, females 6.0 mm. Ground color of head and thorax stramineous, coronal carinae shade darker, pronotum at times



FIGURES 199-204. — Male genitalia. 199-201, *M. dolon* n. sp., from holotype. 202-204, *M. skarphion* n. sp., from holotype. 199, 202, complete lateral view. 200, 203, aedeagus in right lateral view. 201, 204, apex of pygofer, styles, and aedeagus in ventral view.

with vague orange cloud at middle, outer discal carina of mesonotum variably orange or red-orange, face unmarked except for broad orange to red-orange stripe on each lateral margin of frons; forewings essentially hyaline with each stigma and most veins pale, at times several veins near claval apices distinctly brownish.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 201) distinctly produced, styles subquadrate with distal edges bidentate; genital capsule in lateral view (fig. 199) with posterior margin of pygofer rounded, style irregular apically, anal flap long and decurved toward acute apex; aedeagus in left lateral view (fig. 199) tapered to acute apex and with irregular lobe on dorsal margin concealing flagellum; aedeagus in right lateral view (fig. 200) with slender process originating near apex and projecting dorsocephalad.

Type. — Holotype male (USNM 75940), Pelotas, Rio Grande do Sul, Brazil, 14 January 1956, C. Biezanko.

Paratypes. — 2 males with same data as holotype, male with same data except 15 January 1956; 2 females, Montevideo, Uruguay to Salto, Argentina, 6-14 March 1940, H.L. Parker.

Specimens studied. — Known only from type series.

Notes. — The tapered and acute aedeagal apex, the single simple process on the right side of the aedeagus, and the slender and distally decurved anal flap provide the distinguishing features of this species. No plant relationships are recorded, but *dolon* appears to be widely distributed in Uruguay and adjacent portions of Brazil and Argentina. The species name, a Greek noun in apposition, means dagger or pike.

Myndus skarphion Kramer, n. sp.

(Figs. 202-204)

Salient features. — Length of males 4.8-5.3 mm, females 4.9-5.4 mm. Ground color of head and thorax stramineous to pale yellowish green, crown and thoracic dorsum unmarked, face unmarked except for orange stripe on each side of central carina of frons, each stripe widest at base and gradually narrowed toward apex of frons where orange color broadly joins lateral margin; forewings hyaline with veins and each stigma pale.

Male genitalia. — Median lobe of pygofer in ventral view (fig. 204) ovally produced, apices of styles bluntly rounded; genital capsule in lateral view (fig. 202) with posterior margin of pygofer almost vertical but with distinct lobe or knob at posterior angle, apical portion of style capitate, anal flap subquadrate with ventral posterior portion bluntly produced; aedeagus in left lateral view (fig. 202) with distally dentate flange near ventral margin in distal half, two unequal apical processes directed cephalad, their basal portions concealed by flange, flagellum short but well defined; aedeagus in right lateral view (fig. 203) with large process originating near ventral margin in distal half, process directed dorsad to or beyond dorsal margin, then bent ventrocephalad.

Type. — Holotype male (USNM 75941) and allotype female, Mojinga Swamp, Canal Zone, Panama, 8 January 1953, F.S. Blanton.

Paratypes. — 15 males and 2 females with same data as holotype; 6 males and 5

females same except 9 January 1953; 10 males and 4 females same except 13 January 1953.

Specimens studied. — BRITISH HONDURAS, Punta Corda; GUATEMALA; HONDURAS; MEXICO, Mexico City; PANAMA-CANAL ZONE, Fort Davis, Galeta Point, Mindi Dairy, Mojinga Swamp. Collection dates 8 January to 3 December. Total specimens studied 36 males and 20 females.

Notes. — The lobe or knob at the dorsal and distal angle of the male pygofer in lateral view immediately distinguishes this Central American and Mexican species from its congeners. Another useful character for species recognition is the moderate number of white hairs found on the styles and pygofer; these hairs are best observed on an uncleared specimen. Nothing is known about the biology of this species, although three of the specimens from Guatemala and Honduras were taken in a hold aboard ship in association with cut bananas. The species name, a Greek noun in apposition, means fragment or splinter.

DISTRIBUTIONAL NOTES ON THE MEXICAN AND NEOTROPICAL SPECIES

The data are fragmentary, but species of *Myndus* are known from 17 countries of the Caribbean, Central, and South America. Ten species are recorded from Mexico, and 6 from Panama and Peru. The rest of the countries have 4 or less species known at this time. The southernmost records are in the northern half of Argentina. *M. akko* n. sp. and *M. skarphion* n. sp. have distributions which include all of Central America. The most widespread species is *M. crudus* Van Duzee; it is known from the islands of Cuba, Jamaica, and Trinidad in the Caribbean; from Venezuela and Colombia in South America; and from Panama, Costa Rica, and British Honduras (Belize) in Central America. It is also known from Baja California, Mexico. Because *M. crudus* appears to favor coconut palm as an adult food plant, it seems likely that additional collecting will show its distribution coincides in large part with that of this plant, at least in the Western Hemisphere.

Checklist of Mexican and Neotropical *Myndus* with country records

1. *akko* Kramer, n. sp. British Honduras, Costa Rica, Mexico, Nicaragua, Panama.
2. *brimosis* Kramer, n. sp. Bolivia.
3. *caldwelli* Kramer, n. sp. Guatemala, Honduras, Mexico.
4. *crudus* Van Duzee, 1907:33. British Honduras, Colombia, Costa Rica, Cuba, Jamaica, Mexico, Panama, Trinidad, Venezuela.
5. *deleter* Kramer, n. sp. Panama.
6. *delta* Kramer, n. sp. British Honduras, Guatemala, Panama.

7. *dolon* Kramer, n. sp. Argentina, Brazil, Uruguay.
8. *fennahi* Kramer, n. sp. Peru.
9. *frontalis* (Fowler), 1904:98. Mexico.
10. *gnophos* Kramer, n. sp. Brazil.
11. *gomphos* Kramer, n. sp. Mexico.
12. *jamaicae* Kramer, n. sp. Jamaica.
13. *laevis* (Fowler), 1904:98. Mexico.
14. *lyssa* Kramer, n. sp. Peru.
15. *meadi* Kramer, n. sp. Mexico.
16. *mokos* Kramer, n. sp. Peru.
17. *nimbus* Kramer, n. sp. Venezuela.
18. *phylax* Kramer, n. sp. Costa Rica.
19. *serratus* (Caldwell), 1946:204. Mexico.
20. *sillos* Kramer, n. sp. Peru.
21. *simplicatus* (Caldwell), 1946:204. Costa Rica, El Salvador, Panama.
22. *skarphion* Kramer, n. sp. British Honduras, Guatemala, Honduras, Mexico, Panama.
23. *spanglerorum* Kramer, n. sp. Peru.
24. *sparagma* Kramer, n. sp. Guatemala.
25. *synavei* Kramer, n. sp. Venezuela.
26. *tekmar* Kramer, n. sp. Mexico.
27. *tektion* Kramer, n. sp. Peru.
28. *thryligma* Kramer, n. sp. Brazil.
29. *vilbastei* Kramer, n. sp. Argentina.

ACKNOWLEDGEMENTS

Without the most generous cooperation of the persons and their institutions listed here, this study would not have been possible. To all of them I express my sincere thanks and deep gratitude for loans of types, other specimens, and information vital to this study: Dr. P.H. Arnaud, California Academy of Sciences, San Francisco; Dr. R.A. Flock, El Centro, California; Dr. W.J. Knight, British Museum (Nat. Hist.), London; Dr. L.B. O'Brien, Florida A & M, Tallahassee; Dr. P.I. Persson, Swedish Museum of Natural History, Stockholm; Dr. C. Triplehorn, Ohio State Univ., Columbus; and Dr. D.W. Webb, Illinois State Natural History Survey, Urbana. Mrs. Linda Heath Lawrence deserves special recognition for her fine illustrations which appear throughout this study.

LITERATURE CITED

- BALL, E.D. 1902. Some new North American Fulgoridae. Canadian Ent. 34:147-157.
- _____. 1933. The genus *Myndus* Stål in North America (Homoptera: Fulgoridae). Jour. Washington Acad. Sci. 23:478-484.
- _____. 1937. Some new Fulgoridae from the Western United States. Bull. Brooklyn Ent. Soc. 32:171-183.
- CALDWELL, J.S. 1946. Notes on *Haplaxius* Fowler with descriptions of new species (Homoptera:Cixiidae). Proc. Ent. Soc. Washington 48:203-206.
- _____. 1951. New Cixiidae from southern North America with notes on others. Ohio Jour. Sci. 51:34-36.
- FENNAH, R.G. 1945. The Fulgoroidea, or lanternflies, of Trinidad and adjacent parts of South America. Proc. U.S. Nat. Mus. 95(3184):411-520.
- FLOCK, R.A. 1951. A new species of *Haplaxius*, with a key to California species (Homoptera:Cixiidae). Pan-Pacific Ent. 27:169-171.
- FOWLER, W.E. 1904. Order Rhyncota. Suborder Hemiptera-Homoptera (Continued). Biologia Centrali-Americana 1:85-108.
- METCALF, Z.P. 1923. A key to the Fulgoridae of Eastern North America with descriptions of new species. Jour. Elisha Mitchell Soc. 38:139-230.
- OSBORN, H. 1903a. A subterranean root-infesting Fulgorid (*Myndus radialis*, n. sp.). Ohio Nat. 4:42-44.
- _____. 1903b. New species of Ohio Fulgoridae. Ohio Nat. 4:44-46.
- _____. 1938. The Fulgoridae of Ohio. Bull. Ohio Biol. Surv. 6:283-349.
- OSHANIN, V.T. 1912. Katalog der paläarktischen Hemipteren (Heteroptera, Homoptera-Auchenorrhyncha und Psylloidea) 1912:1-197.
- REINERT, J.A. 1977. Field biology and control of *Haplaxius crudus* on St. Augustine-grass and Christmas Palm. Jour. Econ. Ent. 70:54-56.
- STÅL, C. 1862. Novae vel minus cognitae Homopterorum formae et species. Berliner Ent. Zeit. 6:303-315.
- TSAI, J.H., WOODIEL, N.L. & KIRSCH, O.H. 1976. Rearing techniques for *Haplaxius crudus* (Homoptera:Cixiidae). Florida Ent. 59:41-43.
- _____. AND KIRSCH, O.H. 1978. Bionomics of *Haplaxius crudus* (Homoptera:Cixiidae). Environmental Ent. 7:305-308.
- VAN DUZEE, E.P. 1907. Notes on Jamaican Hemiptera: A report on a collection of Hemiptera made on the island of Jamaica in the spring of 1906. Bull. Buffalo Soc. Nat. Sci. 8:3-79.
- _____. 1908. Studies in North American Fulgoridae. Proc. Acad. Nat. Sci. Philadelphia 1907:467-498.
- _____. 1909. Observations on some Hemiptera taken in Florida in the spring of 1908. Bull. Buffalo Soc. Nat. Sci. 9:149-203.
- _____. 1914. A preliminary list of the Hemiptera of San Diego County, California. Trans. San Diego Soc. Nat. Hist. 2:1-57.