# REVISION OF THE NEW GENUS *DIPLOSCHIZIA* (LEPIDOPTERA: GLYPHIPTERIGIDAE) FOR NORTH AMERICA[1]

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ABSTRACT

*Diploschizia*, new genus, is described, along with 4 new species: *D. minimella* n. sp., *D. habecki*, n. sp., *D. regia*, n. sp., and *D. kimballi*, n. sp. The North American species newly combined in *Diploschizia* include *D. lanista* (Meyrick) and *D. impigritella* (Clemens). Three Neotropical species are also newly combined in the genus: *Diploschizia glaucophanes* (Meyrick), *D. tetratoma* (Meyrick), and *D. urophora* (Walsingham).

RESUMEN

*Diploschizia*, nuevo genero, describir con 4 especies nueva: *D. minimella* n. esp., *D. habecki* n. esp., *D. regia* n. esp., y *D. kimballi* n. es. Los especies de America de Norte combinarse nuevo dentro de *Diploschizia* incluir *D. lanista* (Meyrick) y *D. impigritella* (Clemens). Tres especies neotropicales combinir en la genero tambien: *Diploschizia glaucophanes* (Meyrick), *D. tetratoma* (Meyrick), and *D. urophora* (Walsingham).

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A revision of the Glyphipterigidae of North America was recently completed (Heppner 1978b) as a partial requirement for the doctoral degree from the University of Florida. A modified version of this revision will be published in a forthcoming fascicle of the series, *Moths of America North of Mexico* (Heppner, in prep.), but since another publication requires the validation of *Diploschizia*, new genus, and its included new species, the taxa are described here ahead of schedule.

Glyphipterigids are uncommon microlepidoptera most often found near their host plants. In north temperate regions most recorded hosts are in the families Juncaceae and Cyperaceae. The worldwide distribution of Glyphipterigidae is predominately pantropical but due to more extensive faunal surveys in temperate regions, a large proportion of described species are Palearctic and Nearctic. Until 1870 only 13 species were known, mainly from Europe, but thereafter Edward Meyrick described most of the hundreds of species in the family. A significant portion of my research during the completion of the North American revision of these moths involved a segregation of these numerous Meyrick species into their proper families, mainly via a generic revision. Of the nearly 1200 species Meyrick and others at one time or another included in Glyphipterigidae (Meyrick 1914 [and later papers]), at least 25 families are represented. A forthcoming catalog of the

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generic names involved (Heppner 1981b) will present the results of the generic revision in terms of transfers to appropriate families.

Four main families have now been delimited along lines of modern Lepidoptera classification and phylogenetic studies for about 1000 of the species formerly included in Glyphipterigidae *sensu* Meyrick: Glyphipterigidae *sensu stricto* (Copromorphoidea), Immidae (Immoidea), Brachodidae [formerly Atychiidae] and Choreutidae (Sesioidea). These families represent three superfamilies: Immidae requires a separate superfamily, as described by Common (1979). A forthcoming paper (Heppner 1981a) will review Immidae. Immidae was recently described (Heppner 1977) for a group of moths usually placed in the conglomerate genus *Imma*. Choreutidae and Brachodidae have been segregated from Glyphipterigidae and placed in Sesioidea. The name Brachodidae was required as a replacement for Atychiidae due to nomenclatural problems with the genus name *Atychia* (Heppner 1979): the name was previously used as a subfamily by Agenjo (1966). A detailed family treatment of Brachodidae and Choreutidae, along with a checklist of world species, is included in a review of Sesioidea classification (Heppner and Duckworth 1981). These segregations, as well as genera belonging to 22 other families, demonstrate what an incredible conglomeration of often totally unrelated groups the Glyphipterigidae formerly comprised, primarily the result of superficial resemblance among these various groups.

The present world fauna of Glyphipterigidae entails a described fauna of 25 genera and 348 species, including the new taxa herein described and those to be described additionally in the North American revision (Heppner in prep.). Larvae of glyphipterigids are borers of seeds, terminal buds, stems or culms, and leaf axils, primarily of monocotyledonous plants and especially of Juncaceae and Cyperaceae. Adults often can be found on flowers but generally are common only near their hosts. Adults (perhaps only males) have a curious behavior whereby they push the folded wings up from the body when perching, then walk a few paces forward and repeat the movements, producing a twitching-like combination of movements. The moths are only diurnally active and generally only in full sunlight. Most glyphipterigids are in the genus *Glyphipterix* Hübner (the genus *Glyphipteryx* Curtis is unrelated and in Agonoxenidae, although *Chrysoclista* is the preferred name for this genus due to confusion with *Glyphypterix* Zeller [=emendation of *Glyphipterix* Hübner]).

The following new genus is proposed for a New World group closely related to *Glyphipterix* but all species having the character of vein M3 of the hindwings missing, among other characters.

Abbreviations used in the text refer to institutions and private collections housing the specimens examined: Andre Blanchard Collection, Houston, Texas (AB); Academy of Natural Sciences, Philadelphia (ANSP); American Museum of Natural History, New York (AMNH); Bryant Mather Collection, Clinton, Mississippi (BM); British Museum (Natural History), London (BMNH); Charles P. Kimball Collection, West Barnstable, Massachusetts (CPK); California Academy of Sciences, San Francisco (CAS); Canadian National Collection, Ottawa (CNC); Field Museum of Natural History, Chicago (FMNH); Florida State Collection of Arthropods, Gainesville (FSCA); Frost Entomological Museum, Pennsylvania State University,

University Park (FEM); Iowa State University, Ames (ISU); John B. Heppner Collection, Washington, D.C. (JBH); Los Angeles County Museum of Natural History (LACM); Mississippi State University, Starkville (MSU); Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts (MCZ); Nova Scotia Museum, Halifax (NSM); University of California, Berkeley (UCB); National Museum of Natural History, Smithsonian Institution (USNM); and Vernon A. Brou Collection, Edgard, Lousiana (VAB).

*Diploschizia* Heppner, NEW GENUS

Type-species: *Glyphipteryx* [sic] *impigritella* Clemens, 1863.

Adults small (2.2-4.5 mm forewing length). *Head* (Fig. 5-6): frons and vertex smooth-scaled; labial palpus recurved, apical 2 segments subequal, flattened dorso-ventrally, basal segment short, segments mostly smooth-scaled, sometimes roughened; maxillary palpus (Fig. 6) 2-segmented with minute apical segment and large basal segment; haustellum well-developed; pilifer moderate; ocellus moderate; eye large; antenna somewhat thickened and short. *Thorax*: smooth-scaled; forewing (Fig. 7) elongate with falcate apex more or less distinct; pterostigma present; costal margin slightly convex to apex; apex acutely rounded to falcate indentation of termen; tornus indistinct, rounded; dorsal margin straight to rounded anal angle; chorda developed; no vein in cell; Sc to costal margin before 1/2; R1-R4 to costal margin; R5 to termen; M1-M3 and CuA1 equidistant at end of cell; CuA1 and CuA2 parallel; CuP indistinct; A1+A2 with short basal stalk; hindwing with sharp convexity at 1/2; apex very acute; termen very oblique to indistinct tornus; dorsal margin straight to acute truncate anal angle; cell with vestigial vein; Sc+R1 to 3/4; Rs to margin before apex, approximate with M1 at end of cell; M2 near M1 at end of cell; M3 absent; CuA2 divergent from CuA1; A1+A2 short; A3 and A4 distinct. *Abdomen*: often strongly modified around genitalia as hood-like structure with ventral slit (Fig. 8-9); coremata usually absent, sometimes present. *Male genitalia*: tegumen usually strong, sometimes split by tuba analis; vinculum strong, fused to tegumen to form continuous ring, usually with long, thin saccus, or saccus reduced or absent, rarely broad; tuba analis prominent; valva simple or complex, often split into 2 separate parts or costal apex and saccular apex divergent, rarely with accessory appendage from tegumen base for appearance of second valva; valva usually setaceous over most of mesal surface; valval coremata absent but coremata sometimes on posterior sternite at base of ventral split; valval base projected for base of anellus, often fused with anellus or each fused to produce entire transtilla; anellus tubular, with aedeagus attached at tip, often very strongly sclerotized; aedeagus usually very long and thin, or short, rarely extremely long with ductus end spiralled; phallobase usually absent; cornutus present as round tubule or variously modified hooks or teeth, or apparently absent (possibly deciduous). *Female genitalia*: ovipositor normal; papilla analis simple, setaceous; apophyses long and thin, usually subequal; ostium attached to posterior edge of sternite 7, usually as protruded tube, sometimes a cup in a short tube, or with a large ventral sterigma, or a sclerotized edge; ductus bursa usually membranous, thin and long, sometimes sclerotized half length from ostium; ductus seminalis from near mid-point on ductus bursae; bulla seminalis small;

bursa copulatrix elongate-ovate, usually with spicules on walls; signum absent or present as row of large teeth or 2 fused spicule patches. *Larva* (Fig. 37-45: *D. habecki*): head with fronto-clypeus reaching 2/3 to epicranial notch; 2 adfrontal setae; 6 stemmata in semi-circle; prothorax with L-group bisetose; thoracic legs developed; mesothorax with single SV seta; abdominal segments with D1 closer together than D2 but segment 6 with D1 slightly more separated than D2; L1 anterodorsad of spiracle on abdominal segments; segments 9-10 with sclerotized tergal plates; tergite 10 with posterior setae very long, stout; spiracles on produced cylinders, largest on prothorax and abdominal segment 8; prolegs vestigial; crochets absent. *Pupa* (Fig. 46-50: *D. habecki*): elongate with small horn-like projection on vertex of head, with lateral projecting spiracles on prothorax; appendages to wing tips; 2 small setae on each tergite; no distinct cremaster but ventral and posterior hook-tipped setae.

*Diploschizia* is most closely related to *Glyphipterix*, with many species of both genera appearing superficially the same. The further reduction in wing venation, the unusual maxillary palpi, and the additional complexity of the genitalia in *Diploschizia* indicate an advanced derivation from *Glyphipterix*. The maxillary palpi appear to have resulted from secondary fusion of basal segments to produce the large basal segment found in the genus. The male genitalia vary considerably among different species of *Diploschizia* but the lack of M3 in the hindwings and the more coherent variation among the female genitalia of different species indicates that the genus is a cohesive unit as herein defined. *Diploschizia impigritella* is the only known species with male abdominal coremata in the genus.

Although the first 3 species described subsequently have tubular cornuti, it is possible that the last 3 species described have deciduous cornuti. Females of *Diploschizia kimballi*, new species, sometimes have long loose spines in the bursa that appear to be cornuti. Thus far all dissected males of *D. kimballi* have no visible cornuti in the aedeagi but they may all have already mated. Deciduous cornuti are not known for any other glyphipterigids besides the 3 species possibly having them in this genus.

Biological information is known only for 2 of the species from America north of Mexico. One (*D. habecki*, n. sp.) feeds inside the seeds of its host in Cyperaceae, moving from seed to seed as each is excavated and until the larva is in final instar. The larva utilizes an empty seed shell of the host as a pupal chamber and forms a simple cocoon therein after chewing a filigreed network on one side for adult eclosion. The pupa is not protruded upon adult emergence. The other known species (*D. impigritella*) has larvae boring in host stems and partially in leaf axils where the pupa is usually located. In the latter species only a thin layer of stem tissue or leaf axil is left for the adult to penetrate. The adults congregate around the host plants and are most easily collected from the host or reared, although some have been collected at blacklight.

The genus is confined to the New World with 6 species from North America and 3 described species from the Neotropics, of which the following Neotropical species are hereby transferred to *Diploschizia*:

*Diploschizia glaucophanes* (Meyrick 1922) (*Glyphipteryx* [sic]), new combination.

*Diploschizia tetratoma* (Meyrick 1913) (*Glyphipteryx* [sic]), new combination.

*Diploschizia urophora* (Walsingham 1914) (*Glyphipteryx* [sic]), new combination.

In addition to the 4 new species described hereafter, there appear to be a few more described Neotropical species currently in *Glyphipterix* which may be transferred to *Diploschizia* after further study. I have seen 4 undescribed species from Mexico that belong in this new genus, bringing the total for the genus to at least 13 species.

The name of the genus is derived from Greek for "double split", referring to the valvae that appear split in some species.

Key to *Diploschizia* Species Based on Adults

| | | |
|---|---|---|
| 1. | Forewing without dorsal margin cresent (Fig. 11) | *minimella* |
| 1′. | Forewing with large dorsal margin crescent | 2 |
| 2(1). | Forewing costal margin with 4 white marks | 3 |
| 2′. | Forewing costal margin with 5 white marks | 4 |
| 3(2). | Forewing dorsal margin crescent very broad on margin, with distad very narrow, curved extension (Fig. 12) | *habecki* |
| 3′. | Forewing dorsal margin crescent rather uniform tapered from narrow marginal base to distad point (Fig. 10) | *lanista* |
| 4(2). | Forewing with red-brown mid-apical area (Fig. 13) | *regia* |
| 4′. | Forewing fuscous, without red-brown on wing | 5 |
| 5(4). | Apical 1/4 of forewing with small fuscous area (Fig. 14) (verify determination in genitalia key) | *impigritella* |
| 5′. | Apical 1/4 of forewing with large dark fuscous area (Fig. 15) (verify determination in genitalia key) | *kimballi* |

Key to *Diploschizia* Species Based on Male Genitalia

| | | |
|---|---|---|
| 1. | Saccus reduced, appearing absent, at most very broad and short; aedeagus with distinct cornuti | 2 |
| 1′. | Saccus distinct, very narrow, usually long; aedeagus without noticeable cornuti (possibly deciduous) | 4 |
| 2(1). | Valvae narrowed distally (Fig. 20); aedeagus with 3 long, curved spine-like cornuti (Fig. 21) | *habecki* |
| 2′. | Valvae somewhat broad-oblong, not distinctly narrowed distally; aedeagus with single tubule cornutus | 3 |
| 3(2). | Accessory structure present from tegumen to abdominal sternite, appearing as secondary valvae (Fig. 18); aedeagus very short; saccus absent | *minimella* |
| 3′. | No accessory structures as described above; aedeagus long; saccus broad and flattened (Fig. 16) | *lanista* |
| 4(1). | Valvae with ventral lobe (Fig. 27); valvae fused to strongly sclerotized long anellus (Fig. 26); aedeagus very long, straight (Fig. 28) | *kimballi* |
| 4′. | Valvae without ventral lobe; valvae attached to very short anellus; aedeagus long but not straight entire length; at least some curvature on anterior end or very curved | 5 |
| 5. | Transtilla without long appendages (Fig. 22) | *regia* |

5′. Transtilla with long, setaceous dorsal appendages resembling secondary valvae (Fig. 24) ..... *impigritella*

Key to *Diploschizia* Species Based on Female Genitalia[3]

1. Ostium bursae a narrow, strongly sclerotized and extended tube from 7th sternite (Fig. 34) ..... 2
1′. Ostium bursae a membranous cup or funnel anterior to small or large 8th sternal modification (Fig. 32) ..... 3
2. Bursa copulatrix without signum (Fig. 33) ..... *impigritella*
2′. Bursa copulatrix with 2 fused spicule signa (Fig. 35) ..... *kimballi*
3(1). Sternite 8 at most with small sclerotized lobes with setae, but no large plate-like structure (Fig. 30) ..... *minimella*
3′. Sternite 8 modified as large sclerotized quadrangular plate with rounded or truncated posterior edge (Fig. 32) ..... *habecki*

*Diploschizia lanista* (Meyrick), NEW COMBINATION

*Glyphipteryx* [sic] *lanista* Meyrick, 1918: 195.
*Glyphipteryx* [sic] sp., Kimball, 1965: 287.

A small species with a large narrow white crescent on the forewing dorsal margin and 4 white marks on the apical costal margin.

MALE (Fig. 10—2.7-4.0 mm forewing length. *Head*: gray fuscous with small white postero-lateral eye margin; labial palpus white dorsally, venter with basal segment white, then 2nd and apical segments each with 2 alternating bands of black and white; antenna fuscous dorsally. *Thorax*: gray fuscous; patagia gray fuscous; venter white with fuscous; legs fuscous with white at joints. *Forewing*: gray fuscous over basal 2/3, with apical 1/3 dark fuscous and dark fuscous borders to all markings, with buff overlaid between markings near costal margin; dorsal margin with large white crescent at midwing, point directed toward apex; costal margin with white oblique bar pointed to tornus, then 3 small white marks near apex, all with mesad silver spot except 2nd from apex; apex with black spot; silver spot at falcate indentation and at base of termen; tornus with small white spot with mesad silver bar; fringe fuscous, white distally except all white at falcate indentation; venter fuscous with dorsal white marks faintly repeated except more distinct apical marks. *Hindwing*: fuscous; fringe fuscous; venter whitish fuscous. *Abdomen*: fuscous with silvery scales on posterior of each segment; venter same but mostly white on posterior of each segment; 8th abdominal segment modified with acute sclerotized point on each side of ventral split; coremata absent. *Genitalia* (Fig. 16): tuba analis moderate, broad; tegumen an elongate inverted U-shape, stout; vinculum small, merging to broad spatulate saccus; valva elongate, wider near apex, termen rounded, setaceous; short tubular anellus somewhat membranous; transtilla arms free; aedeagus (Fig. 17) short (3/4 valval length), with apical end narrower than anterior end; cornutus a long tubule; vesica with spicules; ductus ejaculatorius with small hood somewhat distant from aedeagus. (8 preparations examined).

FEMALE—3.0 mm forewing length. Similar to male. *Genitalia*: ovipositor short; papilla analis small, setaceous; apophyses very thin, long, anterior and

[3]The female of *Diploschizia regia* is unknown; the female of *D. lanista* is not known sufficiently to be included in the key.

posterior pair subequal. (1 preparation examined. The only available female specimen was received with the abdomen partially damaged by dermestids and only those parts of the genitalia noted above remained for study).

TYPE—Holotype ♂: Southern Pines, [Moore Co.], North Carolina, V-1916, Parish (BMNH).

ADDITIONAL SPECIMENS (50 ♂, 1 ♀)—FLORIDA—Alachua Co.: Gainesville, 8-VII-1966 (1 ♂), L. O'Berry (CPK). Dade Co.: Royal Palm St. Park [= Royal Palm Hammock, Everglades Natl. Park], I-1930 (1 ♂), F. M. Jones (USNM). Escambia Co.: Pensacola, 13-IX-1961 (1 ♂, CPK), 30-IX-1961 (1 ♀, FSCA), S. O. Hills. Highlands Co.: Archbold Biol. Sta., [10 mi (= 16 km) S. Lake Placid], 1-I-1965 (1 ♂), 10-I-1969 (1 ♂), 29-XII-1968 (1 ♂), S. W. Frost (FEM); 1-7-V-1964 (1 ♂), 16-22-V-1964 (1 ♂), R. W. Hodges (USNM); 4-V-1975 (1 ♂), at blacklight, J. B. Heppner (JBH). Okaloosa Co.: Shalimar, 7-XI-1966 (2 ♂), H. O. Hilton (CPK). Orange Co.: Winter Park, V-1946 (1 ♂), A. B. Klots (AMNH). LOUISIANA—Natchitoches Co.: 4 mi NW Gorum, 4-IV-1970 (1 ♂), G. Strickland (USNM). NORTH CAROLINA—Moore Co.: Southern Pines, 1918 (2 ♂, BMNH; 1 ♂, USNM), Parish; [Southern Pines?], [no date] (1 ♂, ANSP; 1 ♂, LACM: 8 ♂, USNM); V (3 ♂), 1-7-VIII (1 ♂), 8-15-VIII (2 ♂), 16-23-VIII (4 ♂), 24-31-VIII (2 ♂), 8-15-IX (1 ♂), 16-23-IX (2 ♂), (USNM).

DISTRIBUTION (Fig. 1)—Collection records are from North Carolina, Florida and Louisiana.

FLIGHT PERIOD—April to May, July to September (North Carolina); January, May, July, September, November, and December (Florida); April (Louisiana).

HOST—Unknown.

BIOLOGY—Unknown.

REMARKS—Specimens vary in the extent of forewing buff scaling and the length of the 4th white mark from the apex along the costal margin, which is sometimes reduced but then has more silver scaling.

*Diploschizia lanista* is widespread in the southeast. Virtually all available specimens are males; the single known female was damaged, as noted above, and did not provide many genital characters for comparison with females of other species. The species appears to be the least apomorphic of the genus as indicated by the simplified male genitalia but which show some similarity to the 2 species described next. It appears to be at the beginning of the progression to the more complex genitalia of the other species in the genus.

### *Diploschizia minimella* Heppner, NEW SPECIES

This is one of the smallest species of glyphipterigid and has no midwing crescent on the dorsal margin of the forewing as is common in the genus.

MALE (Fig. 11, ♀)—2.2-2.9 mm forewing length. *Head*: fuscous with bronze shine, without lateral white eye margin; labial palpus dorsally white with some fuscous on apical segment, venter same but more fuscous on 2nd and apical segments, somewhat rough-scaled; antenna dorsally dark fuscous. *Thorax*: fuscous; petagia fuscous with bronze shine; venter silvery white with some fuscous; legs fuscous with white at joints. *Forewing*: pale fuscous ground color with bronze shine, overlaid on apical 1/3 with buff except dark fuscous borders of markings; costal margin with 4 white marks from be-

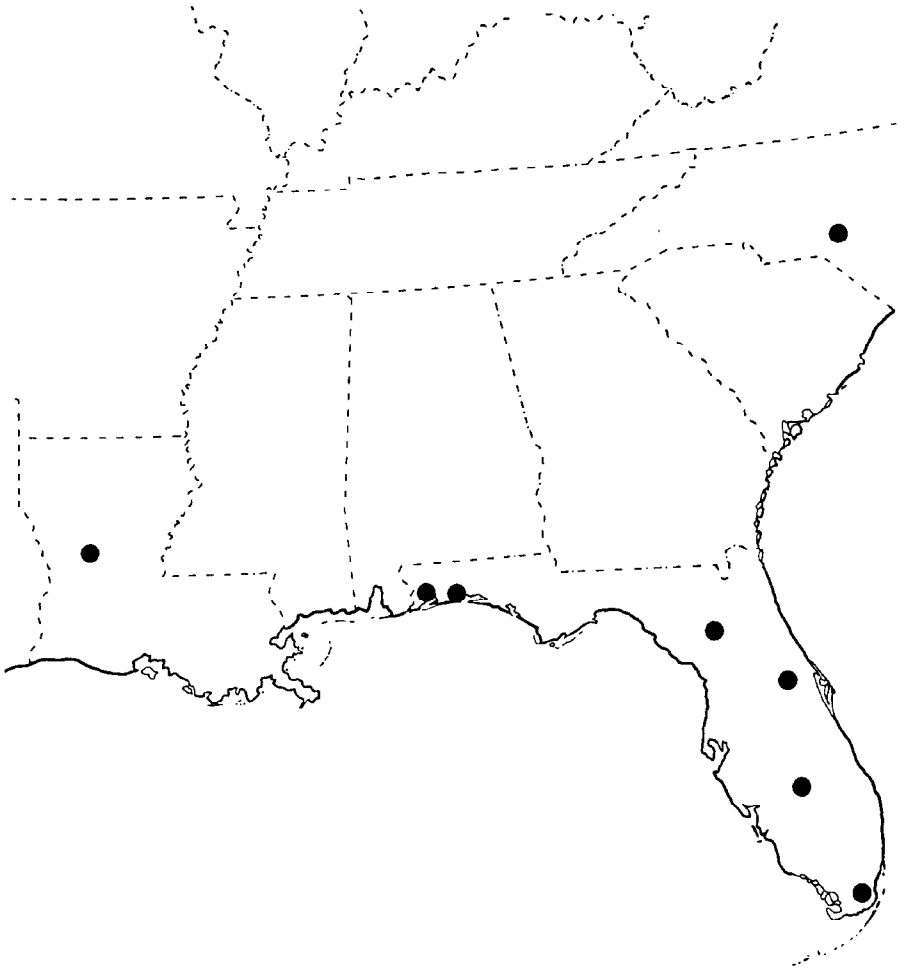

Fig. 1. Distribution map of *Diploschizia lanista* (Meyrick).

yond midwing to apex with basal mark longest and oblique, pointed to tornus, all with more or less distinct silver spot mesad; dorsal margin with white bar basad of tornus with silver spot mesad; black spot at apex; silver spot near termen and at falcate indentation; fringe fuscous, white distally with all white at falcate indentation; venter fuscous with costal marks repeated and with apical black spot. *Hindwing*: fuscous; fringe and venter fuscous. *Abdomen*: fuscous with silvery scales on posterior of each segment; venter mostly white; 8th abdominal segment modified as hood for male genitalia with ventral split and setaceous ventral ends. *Genitalia* (Fig. 18): tuba analis broad; tegumen constricted between dorsum and valval bases with fused sclerotization of intersegmental membrane convergent to transtilla from valval base; vinculum subquadrate with concave saccus edge; saccus absent; elongate setaceous process divergent from tegumen base with web-like membrane attached to tegumen and 8th abdominal pleurite and vinculum; valva elongate, setaceous, with acute termen and convex dorsal margin near base, then angled straight to apex, with saccular margin similar but concave; transtilla fused as border to short anellus; aedeagus (Fig.

19) short (2/3 valval length), narrow; phallobase absent; cornutus a large constricted tube; vesica without spicules; ductus ejaculatorius with moderate hood area near aedeagus. (Two perparations examined).

FEMALE (Fig. 11)—2.3-2.7 mm forewing length. Similar to male. *Genitalia* (Fig. 29): ovipositor stout; papilla analis small, setaceous; apophyses long, thin, subequal; 8th sternite with invaginated sclerotized edge with several setae (sometimes reduced to 2 setae); ostium bursae (Fig. 30) a membranous circle and short funnel with sclerotized ring; ductus bursae short, membranous, merging to very elongate, moderate bursa copulatrix; ductus seminalis from ductus bursae; bursa copulatrix without distinct signum but with several dozen strong short spines. (2 preparations examined).

TYPES—Holotype ♂: Archbold Biol. Sta., [10 mi (= 16 km) S.] Lake Placid, [Highlands Co.], Florida, 16-22-V-1964, R. W. Hodges (USNM). Paratypes (2 ♂, 5 ♀): FLORIDA—Highlands Co.: same locality as holotype, 29-III-1959 (1 ♀), R. W. Hodges (USNM); 15-31-VII-1948 (1 ♀), A. B. Klots (AMNH); Lake Placid, 30-IV-1964 (1 ♀), R. W. Hodges (USNM); Sebring, 13-VIII-1942 (1 ♀), 25-VIII-1942 (1 ♂), C. T. Parsons (MCZ). Orange Co.: Orlando, 18-II (1 ♂), G. G. Ainslie (USNM). Santa Rosa Co.: Munson Cpgd., 2 mi [= 3.2 km] E. Munson, 8-VI-1975 (1 ♀), K. W. Knopf (FSCA).

DISTRIBUTION (Fig. 2)—Known only from Florida.

FLIGHT PERIOD—February to May; June to August.

HOSTS—Unknown.

BIOLOGY—Unknown.

REMARKS—This species is similar to *Diploschizia lanista* but typically is smaller and has the forewing dorsal margin crescent absent. The male genitalia have a unique development of the last abdominal segment reaching from the tegumen to the end of the abdomen, forming what appear to be secondary valvae.

The specific name is derived from Latin for "smallest."

### *Diploschizia habecki* Heppner, NEW SPECIES

The very broad base of the forewing dorsal margin crescent, with the slender distal point, is characteristic of the species.

MALE—2.6-3.4 mm forewing length. *Head*: fuscous with reduced white lateral eye margin; labial palpus dorsally white with some fuscous; venter with basal segment white, 2nd segment with 2 alternating bands of black and buff-white with apex black, with buff-white laterally; antenna dark fuscous dorsally. *Thorax*: fuscous; patagia fuscous; venter white; legs fuscous with white on femur and joints. *Forewing*: ground color dark fuscous with bronze shine and brown-buff overlaid scaling on anal 1/4 and apical half except for dark fuscous borders of markings; dorsal margin with white crescent at midwing with broad semi-circular base nearer 1/3 from base and distal very slender extension curved to midwing, with some buff on mark along margin; costal margin with 4 white bars from near 2/3 to apex, with basal mark oblique and longest, all with silver spot or line mesad; small dark fuscous spot at end of cell and larger spot mid-apically; apex with black spot; siliver spot at falcate indentation; 2 silver spots along termen; tornus with small white spot with silver bar mesad followed further disto-

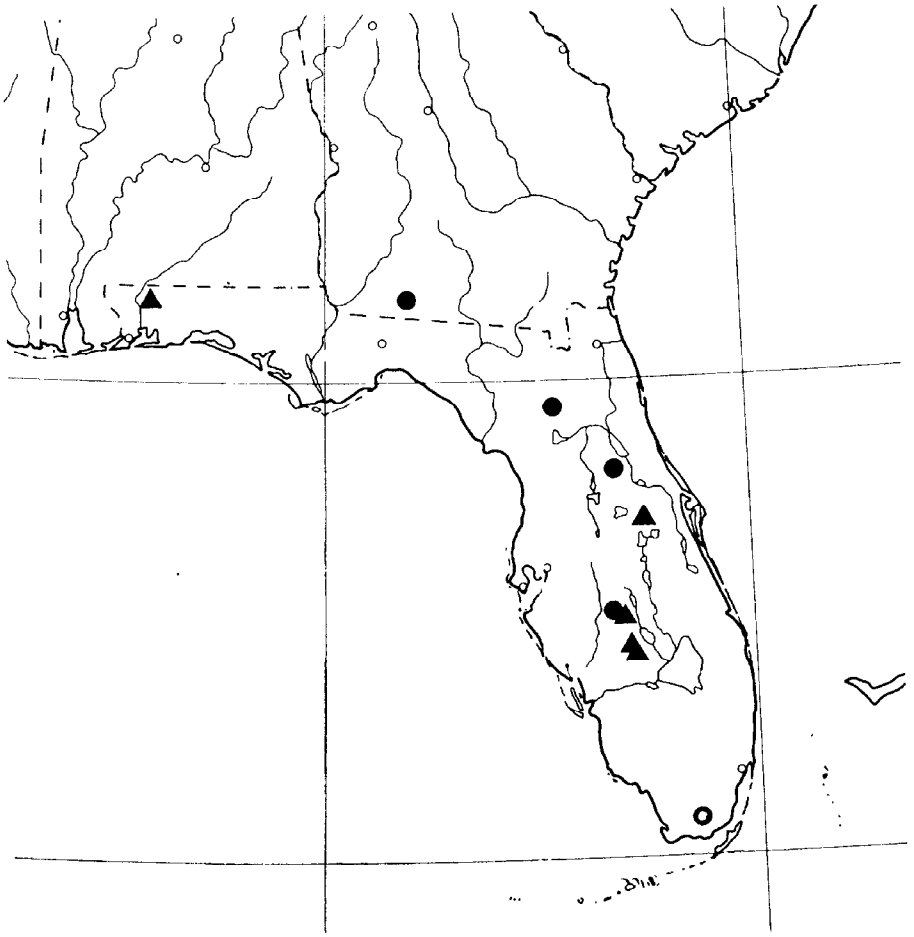

Fig. 2. Distribution map of *Diploschizia minimella* Heppner (▲), *Diploschizia habecki* Heppner (●), and *Diploschizia regia* Heppner (○).

mesad by another silver spot; fringe fuscous, white distally with all white at falcate indentation; venter fuscous with dorsal white marks faintly repeated except distinct apical marks. *Hindwing*: fuscous; fringe and venter fuscous. *Abdomen*: fuscous with silvery scales on posterior of each segment; venter mostly white; 8th segment modified as covering for male genitalia with ventral split and acute, setaceous ventral ends; coremata absent. *Genitalia* (Fig. 20): tuba analis broad, short; tegumen narrow, merging into lateral edges of subquadrate vinculum to form ovate ring-like structure; saccus very reduced; valva very elongate, with broad base tapering to truncate narrow distal end with setae and several spines; valval base extended dorsally as transtilla but ends free; anellus short, little sclerotized; aedeagus (Fig. 21) short (half valval length), narrow; cornutus as 3 very large curved, divergent spines, with 2-3 barbs apically on two and one spine smooth; vesica without spicules; ductus ejaculatorius with small hood near aedeagus; phallobase reduced. (6 preparations examined).

FEMALE (Fig. 12)—2.4-3.3 mm forewing length. Similar to male. *Genitalia* (Fig. 31): ovipositor short; papilla analis small, setaceous; apophyses long,

thin, posterior pair 1/3 longer than anterior pair; 8th sternite modified as sclerotized rectangular shield with rounded or truncate, sharp posterior edge; ostium bursae (Fig. 32) anterior to and invaginated from shield of 8th sternite, a membranous funnel; ductus bursae a short membranous tube, thin; ductus seminalis emergent from ductus bursae near bursa; bursa copulatrix moderate, elongate-ovate with numerous spicules but no distinct signum. (4 preparations examined).

LARVA (Fig. 37-45)—Integument rugose, unicolorous white with brown tergal plates and pinacula; head amber with A2 close to A3, distant to A1; prothorax with L1 approximate to L2; SV1 approximate to SV2; abdominal segment 1 with D1 closer together than D2, segment 6 with D2 slightly closer together than D1; segments 9-10 with sclerotized tergites, with 10th tergite large and with 5 very large posterior setae; spiracle on produced cylindrical structures, longest on prothorax and abdominal segment 8, the latter with produced bulbous base.

PUPA (Fig. 46-50)—Amber colored; large projecting spiracle from prothorax dorso-laterally; small pointed projection on vertex of head; abdomen slender, elongate, with pair of setae on each of the tergites; cremaster absent except as several hook-tipped setae.

TYPES—Holotype ♂: Bivens Arm Lake, 3 mi [= 4.8 km] SW Gainesville, Alachua Co., Florida, 27-X-1974, reared ex *Rhynchospora corniculata*, emerged 5-XI-1974, J. B. Heppner (FSCA). Paratypes (100 ♂, 91 ♀): FLORIDA—Alachua Co.: same locality as holotype (all reared from *Rhynchospora corniculata*), 1-VII-1974 (2 ♂, emerged 10-VII; 1 ♀, 15-VII; 9 ♂, 10 ♀, 17-VII), D. H. Habeck (FSCA); 1-VII-1976 (2 ♂, 1 ♀, emerged 10-VII), P. A. Travis (FSCA); 3-VII-1973 (1 ♂, emerged 16-VII), D. H. Habeck (FSCA); 8-VIII-1972 (1 ♂, 3 ♀, emerged 15-VIII; 1 ♂, 1 ♀, 23-VIII; 1 ♀, 24-VIII; 1 ♂, 27-VIII; 2 ♂, 28-VIII; 1 ♂, 6 ♀, 30-VIII; 9 ♂, 4 ♀, no dated emergence), D. H. Habeck (FSCA); 16-VIII-1972 (1 ♂, 1 ♀, emerged 30-VIII; 2 ♂, 1 ♀, 1-IX), D. H. Habeck (FSCA); 16-VIII-1972 (4 ♂, 3 ♀, emerged 29-VIII; 2 ♂, 3 ♀, 1-IX), J. B. Heppner (FSCA); 4-IX-1972 (3 ♂, emerged, no dated emergence), D. H. Habeck (FSCA); 12-IX-1974 (3 ♂, emerged 18-IX; 2 ♂, 4 ♀, 24-IX; 5 ♂ XI), J. B. Heppner (JBH); 2-X-1975 (14 ♂, 7 ♀, emerged 18-20-X), J. B. Heppner (JBH); 9-X-1973 (1 ♀, emerged 16-X; 1 ♂, 2 ♀, 23-X), D. H. Habeck (FSCA); 27-X-1974 (4 ♂, 1 ♀, emerged 5-XI), J. B. Heppner (JBH); Archer Road Lab, 3 mi [= 4.8 km] SW Gainesville, 30-VIII-1975 (1 ♀), J. B. Heppner (JBH); Gainesville, 24-28-XII-1975 (1 ♀), W. H. Pierce (FSCA). Highlands Co.: Highlands Hammock St. Park, 4-V-1974 (1 ♂, emerged 11-V; 1 ♂, 12-V; 1 ♂, 15-V; 1 ♂, 16-V; 2 ♀, 19-V; 3 ♀, 20-V; 6 ♂, 6 ♀, 21-V; 3 ♀, 22-V; 4 ♂, 4 ♀, 23-V; 9 ♂, 6 ♀, 24-V; 5 ♂, 5 ♀, 25-V; 3 ♂, 6 ♀, 26-V; 1 ♂, 29-V), reared ex *Rhynchospora corniculata*, J. B. Heppner (JBH). Lake Co.: Alexander Springs Cpgd., 6 mi [= 9.6 km] S. Astor Park, 21-IV-1975 (1 ♀), J. B. Heppner (JBH). GEORGIA—Thomas Co.: Ochlockonee R., 6 mi [= 9.6 km] W. Thomasville, 20-X-1975 (1 ♂, emerged 29-X; 1 ♀, 4-XI; 1 ♀, 7-XI), reared ex *Rhynchospora corniculata*, J. B. Heppner (JBH). (Holotype to FSCA; paratypes to BMNH, CNC, FSCA, UCB, USNM).

DISTRIBUTION (Fig. 2)—Southern Georgia to central Florida.

FLIGHT PERIOD—April to May; July to December (probably also June)

HOSTS—*Rhynchospora corniculata* (Lamarck) Gray (Cyperaceae).

BIOLOGY—The larvae are seed borers of the single known host plant. Larval activity can be seen by the frass deposited on the exterior of seeds with occupying larvae (one larva per seed). After several seeds are consumed, the last seed to be occupied is used as the pupal chamber by the construction of a filigreed network on one side of the seed; the larva chews the seed wall to form the filigreed network. At ecdysis the pupa is not protruded but the adult emerges through this filigreed network. The average development period from young larva to adult is about 10-14 days. Typical habitats are mainly marshy areas near creeks or ponds where the host plant is often common.

REMARKS—Variation among the available specimens mainly involves slight alterations in the size of forewing markings and in the genitalia with variations in the shape of the 8th sternal plate, either rounded, as in the female illustrated (Fig. 32), or very truncated with a straight edge. It is possible that the females use this sternal plate as a piercing organ for egg deposition, inasmuch as the ovipositor is relatively unsclerotized otherwise.

The genitalia show some relationship to both *Diploschizia lanista* and *D. minimella* but are otherwise distinct in the genus in many features, especially the very large and multiple cornuti. There are 2 species, *Diploschizia urophora* and *D. tetratoma*, both occurring in Mexico (the latter species also in Brazil), which have valvae very much like *D. habecki*. These species do not have such unusual cornuti but are otherwise similar in the type of male genitalia. Both have narrow forewing crescent marks.

The species is named in honor of Dr. Dale H. Habeck, University of Florida, who first discovered this species.

### *Diploschizia regia* Heppner, NEW SPECIES

A small light-colored species with 5 costal margin white marks, a red-brown mid-apical area, and distinctive genitalia.

MALE (Fig. 13)—2.8 mm forewing length. *Head*: gray-buff; labial palpus dorsally white, venter white with buff and fuscous apically; antenna dorsally fuscous. *Thorax*: silvery gray; patagia silvery gray; venter silvery white; legs mostly white with some fuscous between joints. *Forewing*: silvery gray ground color with buff on apical 1/3 becoming red-brown on apical center except fuscous borders to all markings; dorsal margin with large white crescent at midwing; costal margin with 5 white bars from near midwing to apex, with apical 3 small and basal 2 larger, with 4th from apex extended to tornus as curved silver fascia; apex with black spot; silver spot at tornus and at falcate indentation; fringe fuscous, distally white except all white at falcate indentation; venter fuscous with apical marks distinct and similar to dorsal marks. *Hindwing*: shining fuscous; fringe and venter fuscous. *Abdomen*: fuscous with silvery scales on posterior of each segment; venter mostly white; 8th segment modified in male with ventral split and setaceous ends; coremata absent. *Genitalia* (Fig. 22): tuba analis as broad as tegumen space; tegumen split dorsally and separated, extended from triangular vinculum; saccus long, narrow; vinculum with small stub near valval base each side; valva elongate-oblong, setaceous, with somewhat acute point, with dorsal base extended as long transtilla with ends fused; long tubular anellus with distal setaceous end, fused to valval ventral base and having ventral

stub-like projection; aedeagus (Fig. 23) very long (somewhat longer than distance from tuba analis to end of saccus), thin, relatively straight; cornutus absent (possibly deciduous); vesica without spicules; ductus ejaculatorius with hood distant from aedeagus. (1 preparation examined).

FEMALE—Unknown.

TYPE—Holotype ♂: Royal Palm St. Park [= Royal Palm Hammock, Everglades Natl. Park, Dade Co.], Florida, I-1930, F. M. Jones (USNM).

DISTRIBUTION (Fig. 2)—Known only from the type locality.

FLIGHT PERIOD—January.

HOSTS—Unknown.

BIOLOGY—Unknown.

REMARKS—This species is easily distinguished from other *Diploschizia* by its lighter coloration, the 5 costal marks, and the distinctive genitalia. This species and the following two, and similar Neotropical species, all have very long aedeagi and lack cornuti (but possibly have deciduous cornuti). The corresponding females all have a projected ostium arrangment with a sclerotized portion on the ductus bursae; thus, the female of *D. regia* probably has genitalia similar to these other females. The specific name is derived from Latin for "royal," after the type locality.

### *Diploschizia impigritella* (Clemens), NEW COMBINATION

*Glyphipteryx* [sic] *impigritella* Clemens, 1863: 9.
*Glyphipteryx* [sic] *exoptatella* Chambers, 1875: 234.
*Glyphipteryx* [sic] sp.—Frost, 1964: 153.

A widespread species distinguished by the genitalia from superficially very similar species both of the Nearctic and Neotropical regions.

MALE (Fig. 14, ♀)—2.7-4.3 mm forewing length. *Head*: fuscous with reduced white line near antennal base; labial palpus white dorsally, venter white except for medial fuscous line from mid-2nd segment of apex of apical segment; antenna dorsally fuscous. *Thorax*: fuscous; petagia fuscous; venter white and fuscous; legs fuscous with white at joints. *Forewing*: fuscous ground color overlaid with yellow-buff on apical half except for fuscous borders of markings; dorsal margin with large white crescent from basal 1/3 to midwing, pointed toward apex; costal margin with 5 white bars from 1/2 to apex with basal mark longest white and oblique to center of wing, other marks with silver spot each mesad or reduced silver; apex with black spot; large fuscous area midapically; silver spot at falcate indentation; silver spot near tornus along termen and a small white spot with silver mesad at tornus; fringe fuscous with white distally except all white at falcate indentation; venter fuscous with dorsal marks faintly repeated except distinct apical marks. *Hindwing*: fuscous; fringe fuscous; venter silvery fuscous. *Abdomen*: fuscous with silvery scale row on posterior of each segment; venter mostly white; coremata present; 8th segment (Fig. 8) of male abdomen modified as hood for genitalia with venter split and lateral posterior ends pointed somewhat and setaceous on internal edge. *Genitalia* (Fig. 24): tuba analis short, narrow; tegumen elongate, stout with wider dorsum, merging to narrow truncated vinculum; saccus very long (longer than distance from tuba analis to end of vinculum), narrow; valva short, setaceous, with broad base tapering abruptly after saccular convexity to narrower distal end with termen having several stout, short spines; dorsal

base of valva very stout, elongated as stub centrally fused as transtilla, with very long setaceous and sclerotized process divergent from transtilla with apical spines and resembling a second pair of valvae; anellus a short, strongly sclerotized tube fused to transtilla; aedeagus (Fig. 25) very long (1.25 times length of saccus), narrow, curved; phallobase absent; cornutus absent (possibly deciduous); vesica without spicules; ductus ejaculatorius with hood relatively close to aedeagus. (16 preparations examined).

FEMALE (Fig. 14)—4.0-4.5 mm forewing length. Similar to male. *Genitalia* (Fig. 33): ovipositor short; papilla analis small, setaceous; apophyses thin with posterior pair long, twice length of short anterior pair; 8th sternite unmodified; ostium bursae (Fig. 34) a small opening on a strongly sclerotized projected tube encompassing part of the sclerotized anterior of the ductus bursae, with ostium opening ventrad with two apical ventro-lateral ridges; ductus bursae thin, with anterior half membranous; ductus seminalis emergent from bursa immediately proximal to ductus bursae entrance; bursa copulatrix moderate, elongate-ovate; signum absent but with numerous spicules on posterior end. (19 preparations examined).

TYPES—Holotype ♂ (*impigritella*): "178" [Easton, Northampton Co., Pennsylvania], [no date], [B. Clemens?] (ANSP, type 7325). Holotype [no abdomen] (*exoptatella*): [Covington?, Kenton Co.], "Kentucky Chambers" (MCZ, type 1564).

ADDITIONAL SPECIMENS (141 ♂, 76 ♀)—ARKANSAS—Montgomery Co.: Fiddlers Cr., 11-VI-1975 (1 ♀), H. N. Greenbaum (JBH). Washington Co.: 4-VII-1966 (1 ♂), R. L. Brown (USNM); Devil's Den St. Park, 22-V-1966 (1 ♂, 1 ♀), 24-V-1966 (1 ♂), 28-V-1966 (1 ♀), 11-VI-1966 (1 ♂), 24-VI-1966 (1 ♂), 25-VI-1966 (5 ♂, 1 ♀), 27-VI-1966 (1 ♂), 4-VII 1966 (1 ♂), 9-VII-1966 (1 ♂), 11-VII-1966 (1 ♂), R. W. Hodges (USNM). CALIFORNIA—Siskiyou Co.: Brown's Lake, SW. Mt. Shasta City, 13-14-VI-1974 (1 ♀), J. A. Powell (UCB); Mt. Shasta City, 18-VII-1958 (2 ♂), J. A. Powell (UCB). Trinity Co.: Buttercreek Meadows, 8 mi [= 12.8 km] Hayfork, 20-V-1973 (1 ♀), 3750′ [= 1140 m], R. Dietz (UCB). DISTRICT OF COLUMBIA—Washington, 26-V-1908 (1 ♀), C. R. Ely (LACM); VI-1902 (1 ♂, LACM; 1 ♂, USNM), 2-VI-1902 (1 ♀, BMNH), A. Busck; 26-VI-1963 (1 ♂), D. C. & K. A. Rentz (CAS). FLORIDA—Alachua Co.: Archer Road Lab, 3 mi [= 4.8 km] SW Gainesville, 3-IV-1976 (1 ♂), emerged ex *Juncus?* 12 IV, J. B. Heppner (JBH); 4-IV-1976 (1 ♀), 2-V-1976 (1 ♀), 3-V-1976 (1 ♀), 3-VIII-1975 (1 ♂), at blacklight, J. B. Heppner (JBH); Austin Cary Forest, 6 mi [= 9.6 km] NE Gainesville, 14-15-IV-1975 (1 ♂, 1 ♀), ex Malaise trap, G. B. Fairchild (FSCA); Gainesville, 8-12-III-1976 (1 ♀), 20-III-1976 (1 ♂), 14-IV-1976 (1 ♂), ex Malaise trap, W. H. Pierce (FSCA); 27-III-1975 (1 ♂), ex Malaise trap, H. N. Greenbaum (JBH); Univ. Fla. Hort[iculture] Unit, 9 mi [= 14.4 km] NW Gainesville, 26-27-III-1975 (1 ♀), ex Malaise trap, G. B. Fairchild (FSCA). Baker Co.: 4 mi [= 6.4 km] SW Macclenny, 16-V-1975 (2 ♀), on flowers *Pyracantha*, J. B. Heppner (FSCA). Glades Co.: Fisheating Cr., Palmdale, 7-10-V-1964 (6 ♂, 2 ♀), R. W. Hodges (USNM). Highlands Co.: Archbold Biol. Sta., [10 mi (= 16 km) S.] Lake Placid, 10-III-1963 (1 ♂), 11-III-1970 (1 ♂), 30-III-1970 (1 ♂), 22-IV-1969 (1 ♀), 24-IV-1968 (1 ♀), 24-IV-1969 (1 ♂), S. W. Frost (FEM); 3-IV-1959 (1 ♂), 1-7-V-1964 (1 ♂, 1 ♀), R. W. Hodges (USNM); Lake Placid, 30-IV-1964 (2♀), R. W. Hodges (USNM). Manatee Co.: Gulf Coast Exp. Sta., Braden-

ton, 19-IX-1955 (1 ♂), E. G. Kelsheimer (CPK). Polk Co.: Peace R., 5 mi [= 8 km] S. Ft. Meade, 22-IV-1975 (1 ♀), at blacklight, J. B. Heppner (JBH). GEORGIA—Clarke Co.: V-1929 (1 ♂), Richards (AMNH). ILLINOIS—Putnam Co.: 15-IX-1936 (1 ♂), M. O. Glenn (USNM). IOWA—Story Co.: Ames, 28-VI-1961 (1 ♂), W. S. Craig (ISU). KANSAS—Pottawotomie Co.: Onaga, [no date] (1 ♀), (MCZ). LOUISIANA—East Baton Rouge Co.: Baton Rouge, 28-III-1971 (1 ♂), 18-IV-1971 (1 ♂), 19-IV-1971 (1 ♂), 21-IV-1971 (1 ♂), 22-IV-1970 (1 ♂), 23-IV-1971 (2 ♂), 24-IV-1971 (2 ♂), 25-IV-1971 (3 ♂, 3♀), 27-IV-1971 (3 ♂), 30-VIII-1969 (1 ♀), 23-X-1971 (1 ♀), G. Strickland (USNM). Madison Co.: Tallulah, [no date] (1 ♂), (USNM). Orleans Co.: New Orleans, 20-VIII-1974 (1 ♀), 16-IX-1974 (1 ♀), V. A. Brou (VAB). MARYLAND—Prince Georges Co.: Oxon Hill, 29-VI-1972 (2 ♂), 2-VII-1972 (3 ♂), G. F. Hevel (USNM). MICHIGAN—Midland Co.: 5-IX-1959 (1 ♂), R. R. Driesbach (CNC). MISSISSIPPI—Franklin Co.: Clear Springs Cpgd., 10 mi [= 16 km] SW Meadville, 20-IV-1976 (1 ♀), at blacklight, J. B. Heppner (JBH). Hinds Co.: Clinton, 18-V-1971 (1 ♂, 1 ♀), B. Mather (BM); Jackson, 20-VII-1974 (1 ♀), B. Mather (BM). Washington Co.: Stoneville, 29-IV-1975 (1 ♂, 1 ♀), 30-IV-1975 (1 ♂), 4-VI-1975 (1 ♂, emerged 10-VI), 6-VI-1975 (1 ♂, emerged 18-VI), 27-IX-1973 (1 ♂, emerged 13-X; 1 ♂, 16-X; 1 ♂, 18-X; 5 ♂, 1 ♀, 19-X), reared ex *Cyperus rotundus*, K. E. Frick (MSU). MISSOURI—St. Louis Co.: St. Louis, 10-VI-1905 (1 ♀), McElhose (FMNH); Webster Groves, 7-VI-1919 (1 ♂), Satterthwalt (USNM). NEVADA—Nye Co.: Currant Cr. Cpgd., 20-VII-1968 (1 ♂), Opler, Powell, & Scott (UCB). NEW HAMPSHIRE—Rockingham Co.: Hampton, 10-VI-1905 (1 ♂), S. A. Shaw (USNM). NEW JERSEY—Burlington Co.: New Lisbon, 1-VII-1936 (4 ♂), E. P. Darlington (ANSP). Cape May Co.: 5M Beach, 3-VII (1 ♀), F. Haimbach (ANSP). Middlesex Co.: New Brunswick, 3-VI-1929 (1 ♀), (AMNH). Ocean Co.: Lakehurst, 2-VI-1962 (1 ♂), R. W. Hodges (USNM). NEW YORK—"N. Y." (1 ♂), Beutenmüller

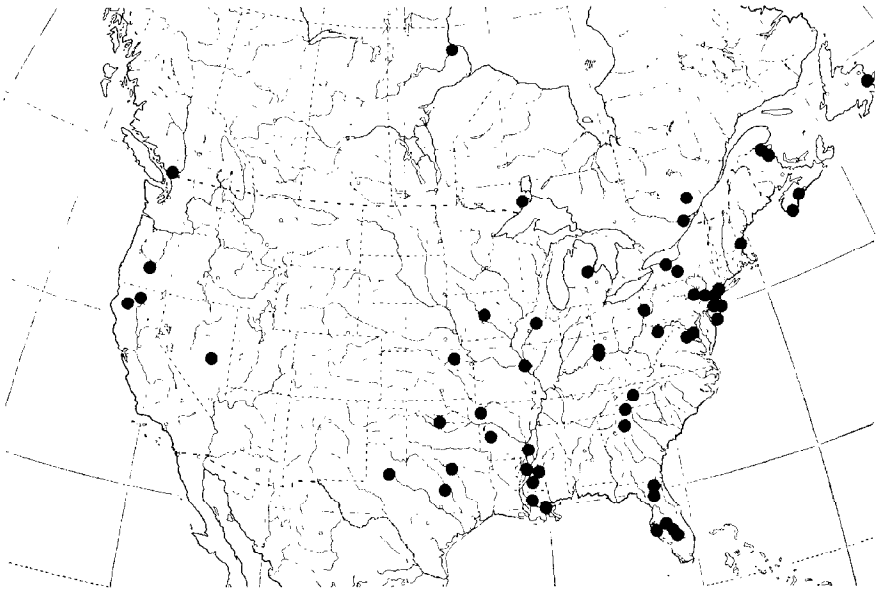

Fig. 3. Distribution map of *Diploschizia impigritella* (Clemens).

(USNM). Monroe Co.: 29-VII-1949 (1 ♀), 30-VII-1949 (1 ♂), 1-VIII-1949 (1 ♂), 2-VIII-1948 (2 ♂), 22-VIII-1949 (1 ♂), 28-VIII-1949 (2 ♂), C. P. Kimball (CPK). Tompkins Co.: Ithaca, 12-IX-1957 (1 ♀), D. R. Davis (USNM). NORTH CAROLINA—Macon Co.: Highlands, IV-V 1938 (1 ♀), 3-5000′ [= 915-1520 m], R. C. Shannon (USNM); 26-VIII-1958 (1 ♂), 3865′ [= 1180 m], R. W. Hodges (USNM). Yancey Co.: Black Mts., 25-V (1 ♂, 1 ♀, USNM), 8-VI (1 ♀, AMNH), 12-VI (1 ♂, 1 ♀, AMNH), 21-VI (1 ♀, AMNH). OHIO—Hamilton Co.: Cincinnati, 7-VI-1914 (1 ♀), 9-VI-1907 (1 ♀), 28-VI-1919 (1 ♂), 14-VII-1909 (1 ♀), 11-IX-1907 (1 ♀), A. F. Braun (USNM); 17-VII-1907 (1 ♀), 30-VII-1907 (2 ♂), 14-VIII-1907 (1 ♀), 30-VIII-1903 (1 ♂), 31-VIII-1907 (1 ♀), A. F. Braun (ANSP). OKLAHOMA—Oklahoma City, 6-VIII-1955 (1 ♂), 30-VIII-1955 (1 ♀), D. R. Davis (USNM). OREGON—Douglas Co.: 15 mi [= 24 km] SW Diamond Lake, 23-VII-1966 (1 ♀), P. Rude (UCB). PENNSYLVANIA—Beaver Co.: New Brighton, 14-VI-1907 (1 ♂), (USNM). Luzerne Co.: Hazelton, 18-VII-1895 (1 ♀), Dietz (BMNH); 6-V-1903 (1 ♂), 3-VI-1904 (1 ♂), 5-VI-1897 (1 ♂), 19-VI-1897 (1 ♂), 29-VII-1897 (1 ♂), 2-VIII-1905 (2 ♂), 27-VIII-1919 (1 ♂), Dietz (MCZ); 2-VI-1897 (1 ♂), 2-VIII-1905 (1 ♂), Dietz (USNM); 2-VI-1898 (1 ♂), 22-VII-1897 (1 ♂), Dietz (LACM). Northampton Co.: [Easton?], 1872 (1 ♂), B. Clemens (BMNH). TEXAS—[Dallas], 9-III (1 ♂), Boll (ex C. V. Riley Coll.) (USNM). Bell Co.: Belton Resv., 6-V-1970 (1 ♂), A. & M. E. Blanchard (AB). Howard Co.: 15 mi [= 24 km] NW Big Spring, 13-VI-1963 (1 ♀), D. C. & K. A. Rentz (CAS). VIRGINIA—Arlington Co.: Arlington, 13-VII-1906 (1 ♂, 1 ♀), emerged ex "chufa" (USNM). Fairfax Co.: Alexandria (Rose Hill), 21-IV-1976 (1 ♂), 17-VI-1976 (1 ♂), 29-VI-1976 (2 ♀), 30-VII-1976 (2 ♂), at blacklight, P. A. Opler (USNM); Falls Church, 6-VI-1962 (1 ♂), O. S. Flint (USNM). WEST VIRGINIA—Preston Co.: Aurora, 2-IX-1904 (1 ♀), O. Heidemann (LACM). CANADA—BRITISH COLUMBIA—Mission City, 9-VI-1953 (1 ♀), 14-VI-1953 (1 ♂), 18-VI-1953 (1 ♂), 26-VI-1953 (1 ♀), W. R. M. Mason (CNC). MANITOBA—Farnworth Lake, Churchill, 14-VII-1952 (1 ♀), J. G. Chillcott (CNC). NEW BRUNSWICK—Northumberland Co.: Tabusintac, 29-VII-1939 (1 ♀), J. H. McDunnough (CNC). Restigouche Co.: Jacquet River, 24-VI-1941 (1 ♂), J. H. McDunnough (CNC). NEWFOUNDLAND—Terra Nova Natl. Park, 6-VII-1961 (1 ♂), 7-VII-1961 (2 ♂, 1 ♀), C. P. Alexander (USNM). NOVA SCOTIA—Colchester Co.: Economy Point, 26-VI-1957 (3 ♂), D. C. Ferguson (NSM). Shelburn Co.: Sable Is. (west end), 5-VII-1967 (1 ♂) 6-VII-1967 (3 ♂, 1 ♀), 8-VII-1967 (2 ♂, 1 ♀), 11-VII-1967 (2 ♀), 13-VII-1967 (4 ♂, 2 ♀), D. M. Wood (CNC). ONTARIO—Carleton Co.: Ottawa, 27-VII-1934 (1 ♂), C. H. Young (CNC). Thunder Bay Co.: Thunder Bay, VII-1945 (1 ♀), H. S. Parish (USNM). QUEBEC—Montcalm Co.: Escalier Lk., Mt. Temblant Prov. Park, 16-VIII-1973 (2 ♀), J. B. Heppner (JBH).

DISTRIBUTION (Fig. 3)—Widely distributed in eastern North America, from Newfoundland to Florida, west to the Great Plains from Manitoba to central Texas; also from British Columbia to northern California; Nevada.

FLIGHT PERIOD—June to August (Canada and northern United States); May to September (middle latitudes of United States, including Pacific Coast); March to September (Southeast).

HOSTS—*Cyperus esculentus* Linnaeus and *Cyperus rotundus* Linnaeus (Cyperaceae). The *Juncus* record from Florida may be erroneous.

BIOLOGY—Larvae bore in the stems of the hosts and pupate in leaf axils usually (K. E. Frick, pers. comm.). Field collected late instar larvae develop to adults in 16-22 days in Mississippi (label data). The 2 known host plants in the genus *Cyperus* appear to be closely related since they are placed next to each other in floras in which both species are treated, among others. The only flower visitation record is for ornamental firethorn, *Pyracantha* sp. (Rosaceae), in Florida.

REMARKS—This is the most widespread and most commonly encountered glyphipterigid in North America. It is relatively uniform throughout its range and varies only in minor shape or size variations of forewing spots. The male genitalia are among the most complex in the genus and in the family but some development to this complexity is evident in 2 related species from Mexico, both undescribed.

*Diploschizia impigritella* has been reported from the Neotropics (Walsingham 1914) but these reports refer to undescribed species superficially almost identical but with very distinct genitalia. Our species is most closely related to the undescribed species from Mexico and beyond these is further related to *Diploschizia kimballi*, new species, described next. Relationships are also evident, especially through the female genitalia, to the Neotropical *D. tetratoma* and, thus, to its related species, including *D. habecki*. As noted earlier, there is a progressive development in the genus from the simplified genitalia of *D. lanista* to the complexity of *D. impigritella* and *D. kimballi*.

Florida specimens are very difficult to distinguish from *D. kimballi* and should be dissected to verify their identity. Generally *D. impigritella* is lighter on the apical part of the forewing than *D. kimballi*.

### *Diploschizia kimballi* Heppner, NEW SPECIES

This Floridian species is virtually identical superficially to *Diploschizia impigritella*, being on average only somewhat darker on the apical quarter of the forewing and having the midwing crescent somewhat more slender. The genitalia are very distinct.

MALE (Fig. 15)—3.0-4.0 mm forewing length. *Head*: fuscous, with small white line by antennal base; labial palpus white dorsally, venter same but with fuscous central line from middle of 2nd segment to apex of apical segment; antenna dorsally fuscous. *Thorax*: fuscous; patagia fuscous; venter white with some fuscous; legs fuscous with white on joints. *Forewing*: grayish fuscous ground color with yellow-buff overlaid on part of apical half except for dark fuscous borders to markings and large dark fuscous area mid-apically; dorsal margin with white crescent at mid-wing ending with small silver spot mesad; costal margin with 5 white bars each with silver spot mesad, with 4th and 5th from apex having longest white and silver combination and pointed oblique toward tornus; black spot on apex; silver spot at falcate indentation and along termen near tornus; tornus with small white spot with silver mesad bar; fringe fuscous, white distally except all white at falcate indentation; venter fuscous with dorsal white marks faintly repeated except distinct apical marks. *Hindwing*: fuscous; fringe fuscous; venter pale fuscous. *Abdomen*: fuscous with silvery scales on posterior of each segment; venter mostly white; 8th abdominal segment (Fig. 9) modified in male as genitalia hood with venter split, strongly sclerotized

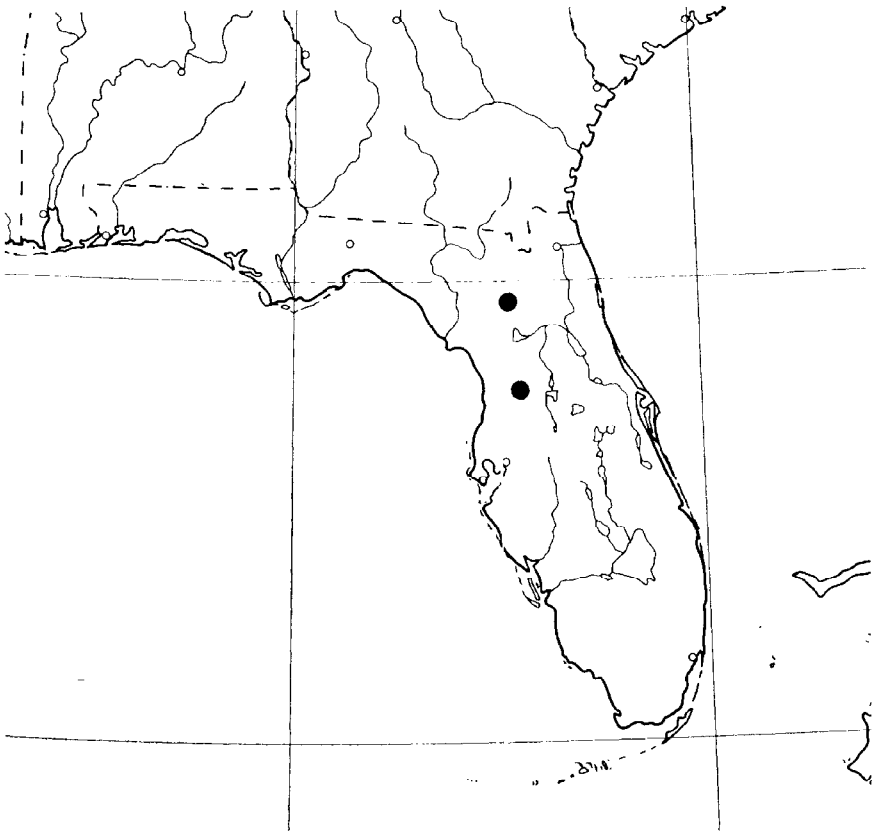

Fig. 4. Distribution map of *Diploschizia kimballi* Heppner.

and with posterior point and projected central point each side, with numerous setae dorso- and latero-posteriorly from inside margin; coremata absent. *Genitalia* (Fig. 26): tuba analis long, narrow; tegumen elongate, stout; vinculum narrow, shallow U-shaped; saccus very long (subequal to distance from tuba analis to vinculum), narrow; valva elongate, setaceous, unevenly thickened, with small ventral projection from base of sacculus (Fig. 27); valva fused to anellus, with dorsal base fused as transtilla projected anteriorly as one central fin-shaped appendage; transtilla fused to strongly sclerotized, elongated, tubular anellus with pointed distal end; aedeagus (Fig. 28) very long (1.25 times saccus length), narrow, tapering to more slender apical point, straight; phallobase absent; cornutus absent (possibly long spines and deciduous); vesica without spicules; ductus ejaculatorius with hood distant from aedeagus. (5 preparations examined).

FEMALE—3.8-4.2 mm forewing length. Similar to male. *Genitalia* (Fig. 35): ovipositor short; papilla analis small, setaceous; apophyses short, thin, posterior pair 1.25 length anterior pair; 8th sternite unmodified; ostium bursae (Fig. 36) a small opening on a stout sclerotized projection surrounding posterior part of ductus bursae and extended near very convex and pointed 7th sternite; ductus bursae thin, posterior 1/3 sclerotized, then anterior 2/3 membranous, ductus seminalis emergent from base of ductus

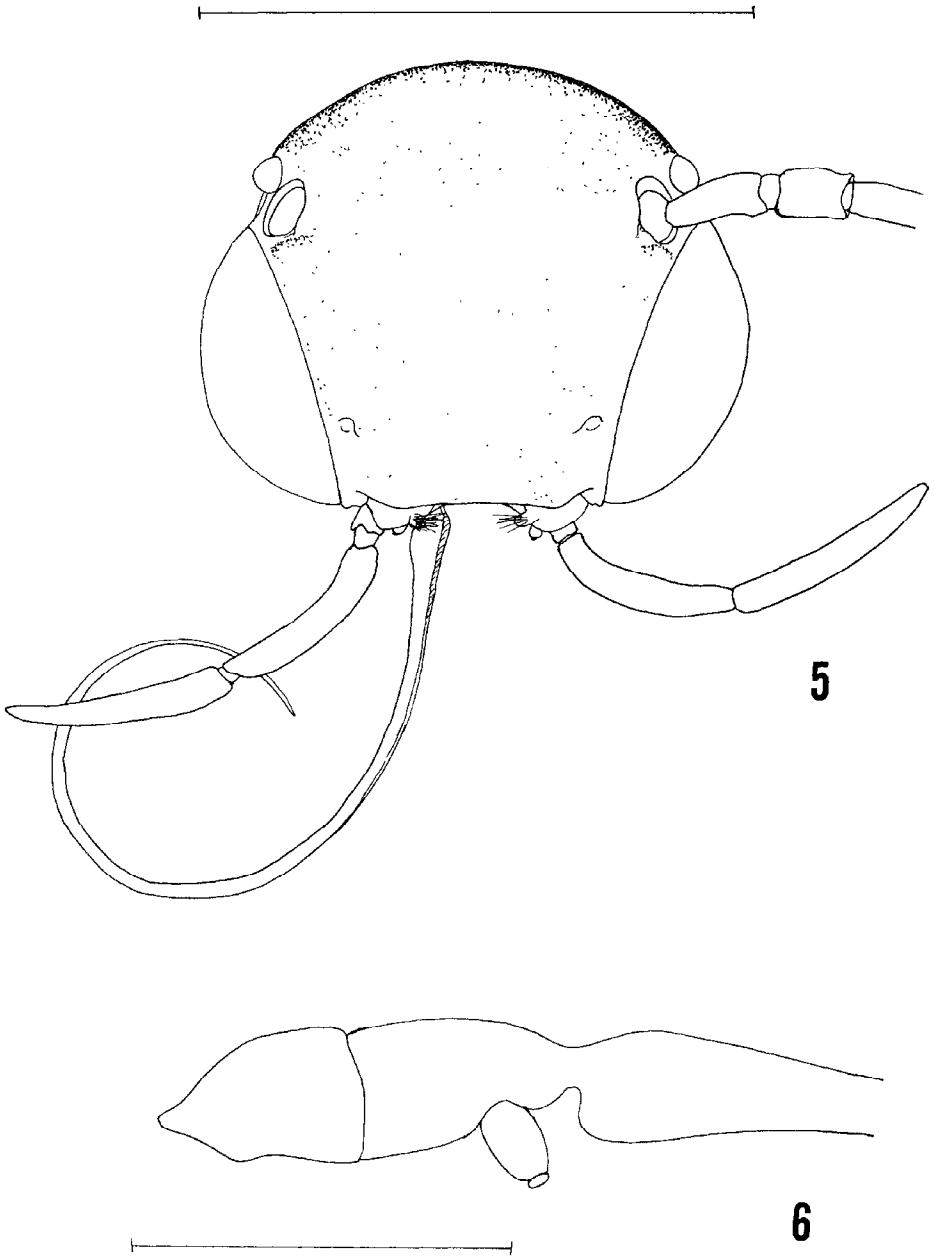


Fig. 5-6. Head morphology of *Diploschizia impigritella* (Clemens): 5, ♂ head (scale line = 0.5 mm) (slide USNM 77825); 6, detail of left maxilla (scale line = 0.1 mm).

bursae as it merges into bursa; bursa copulatrix elongate-ovate, tapering, of moderate size, with minute spicules; signum as 2 small opposed patches of fused teeth-like spines directed anteriorly. (3 preparations examined).

TYPES—Holotype ♂: Lake Panasoffkee, Sumter Co., Florida, 11-V-1974,

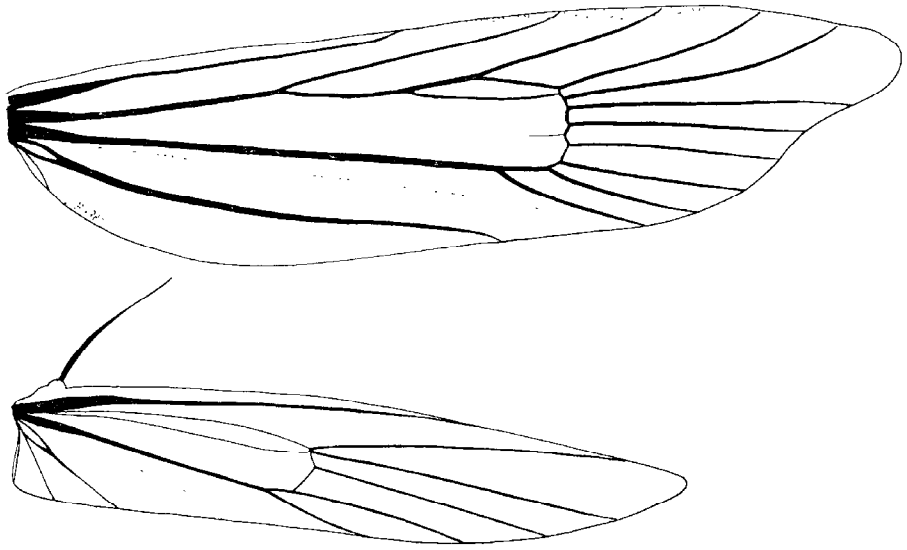

Fig. 7. Wing venation of *Diploschizia impigritella* (Clemens) ♂, (scale line = 1 mm) slide USNM 77467).

emerged 14-V-1974, K. W. Knopf (JBH). Paratypes (4 ♂, 4 ♀): FLORIDA—Alachua Co.: Archer Road Lab, 3 mi [= 4.8 km] SW Gainesville, 2-IV-1976 (2 ♂, 1 ♀), 8-IV-1975 (1 ♂), 5-V-1976 (1 ♂), 3-VIII-1975 (1 ♂), at blacklight, J. B. Heppner (JBH). Sumter Co.: Lake Panasoffkee, 11-V-1974 (2 ♀), emerged 15 & 17-V, K. W. Knopf (JBH). (Holotype to USNM: paratypes to BMNH and FSCA).

DISTRIBUTION (Fig 4)—Known only from Florida.

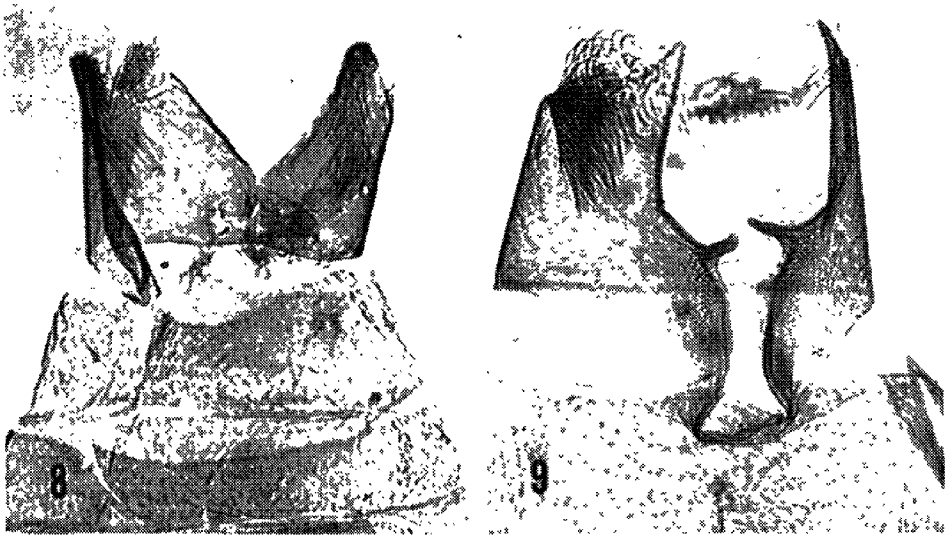


Fig. 8-9. Sternite of 8th abdominal segment (ventral view): 8, *Diploschizia impigritella* (Clemens) ♂ (slide JBH 303); 9, *Diploschizia kimballi* Heppner ♂ (slide USNM 77822).

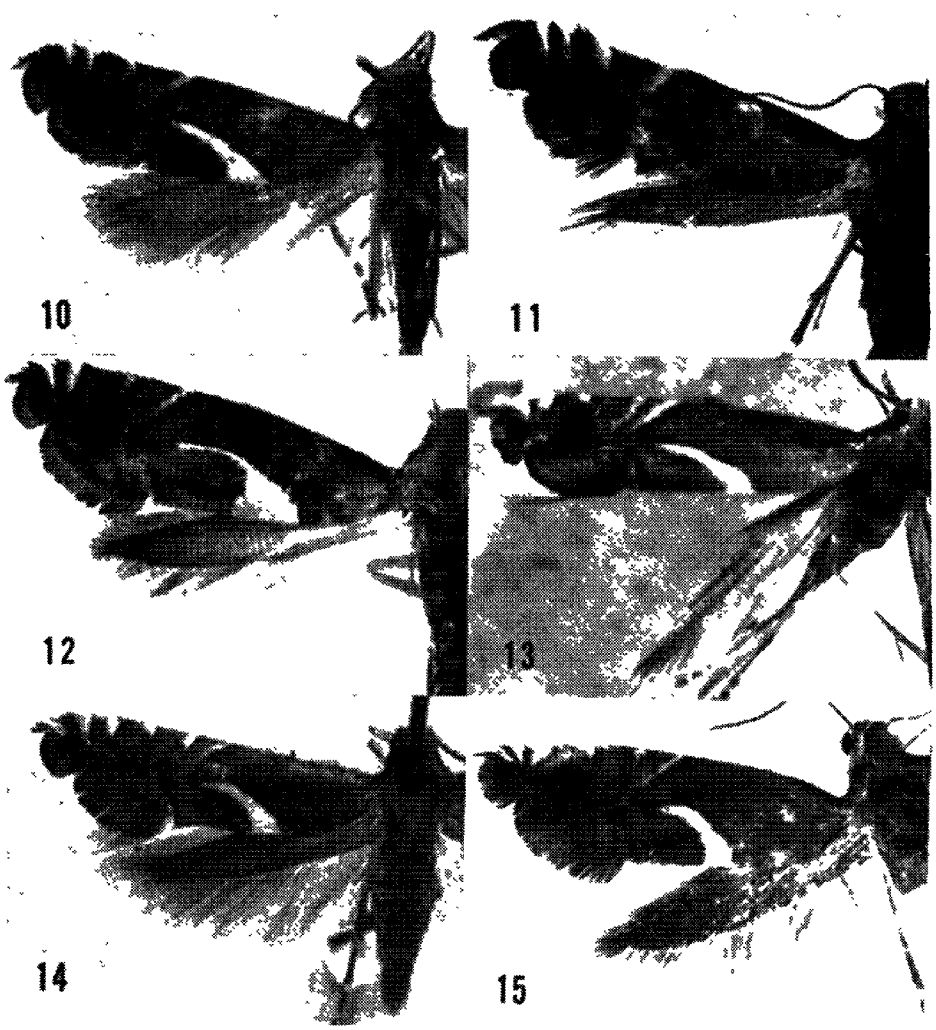


Fig. 10-15. Adults of *Diploschizia*: 10, *D. lanista* (Meyrick) ♂, Southern Pines North Carolina (USNM); 11, *D. minimella* Heppner ♀ (paratype), Archbold Biological Sta., Highlands Co., Florida, 29-III-1959, R. W. Hodges (USNM); 12, *D. habecki* Heppner ♀ (paratype), Bivens Arm Lake, 3 mi. SW. Gainesville, Alachua Co., Florida, 17-VI-1974, J. B. Heppner (USNM); 13, *D. regia* Heppner ♂ (holotype), Royal Palm State Park, Dade Co., Florida, I-1930, F. M. Jones (USNM); 14, *D. impigritella* (Clemens) ♀, Cincinnati, Ohio, 14-VIII-1907, A. F. Braun (ANSP); 15, *D. kimballi* Heppner ♂ (holotype), Lake Panasoffkee, Sumter Co., Florida, 14-V-1974, K. W. Knopf (USNM).

FLIGHT PERIOD—April to May; August.

HOSTS—Unknown. (Reared specimens emerged from a mixed sample of aquatic weeds incidental to an aquatic weed project).

BIOLOGY—Unknown.

REMARKS—Available specimens of *Diploschizia kimballi* are relatively uniform and have only minor variations of forewing markings in regard to

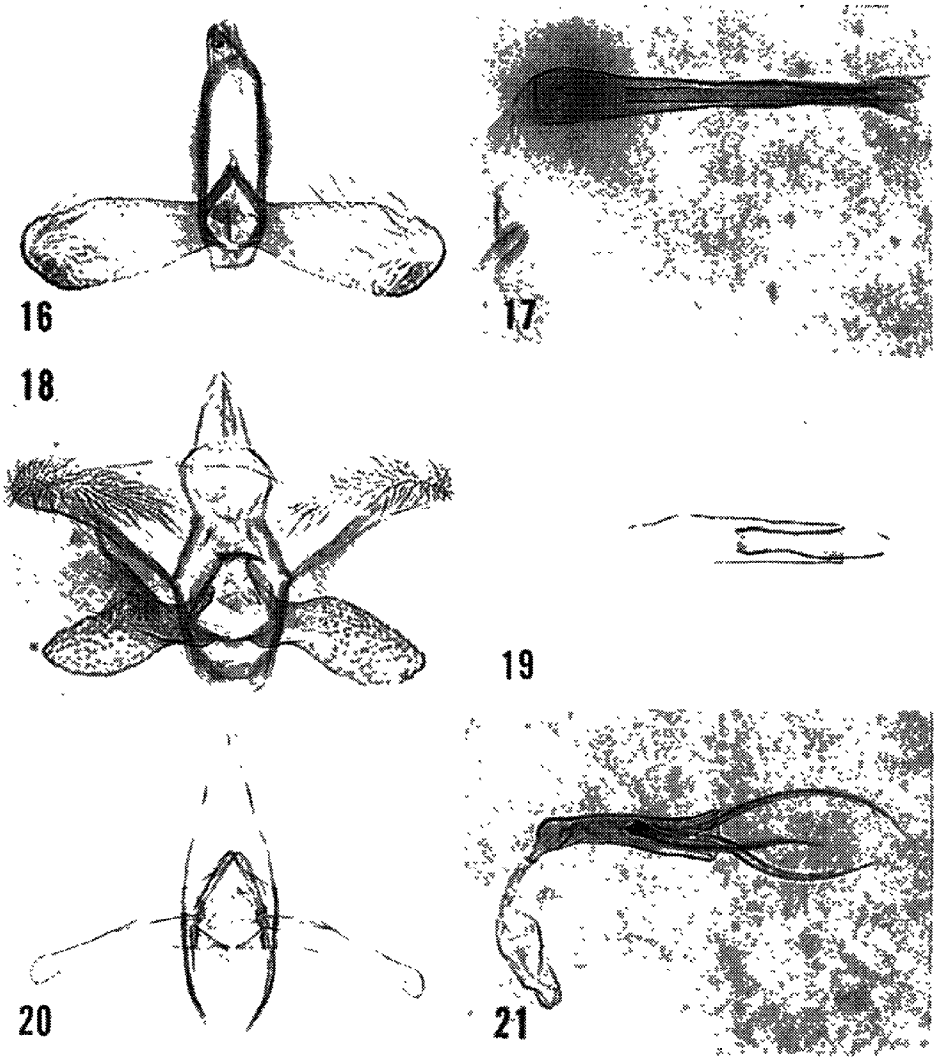


Fig. 16-21. Male genitalia of *Diploschizia*: 16, *D. lanista* (Meyrick), Archbold Biological Sta., Highlands Co., Florida, 1-7-V-1964, R. W. Hodges (USNM slide 77145); 17, ibid., aedeagus; 18, *D. minimella* Heppner (holotype), Archbold Biological Sta., Highlands Co., Florida, 16-22-V-1964, R. W. Hodges (USNM slide 77156); 19, ibid., aedeagus; 20, *D. habecki* Heppner (holotype), Bivens Arm Lake, 3 mi. SW. Gainesville, Alachua Co., Florida, 5-XI-1974, J. B. Heppner (FSCA) (slide JBH 414); 21, ibid., aedeagus.

size. As noted under *D. impigritella*, the 2 species are virtually identical and Florida specimens should be dissected to verify their identification. In viewing series of each species side by side it appears that *D. kimballi* has a slightly more slender forewing crescent mark and a darker apical quarter than *D. impigritella* specimens.

The 8th abdominal segment is the most highly modified in the genus thus far known, yet lacks the coremata found in *D. impigritella*. The females that have been dissected all show what appear to be deciduous cornuti in their bursas but thus far no male has been found with such cornuti intact.

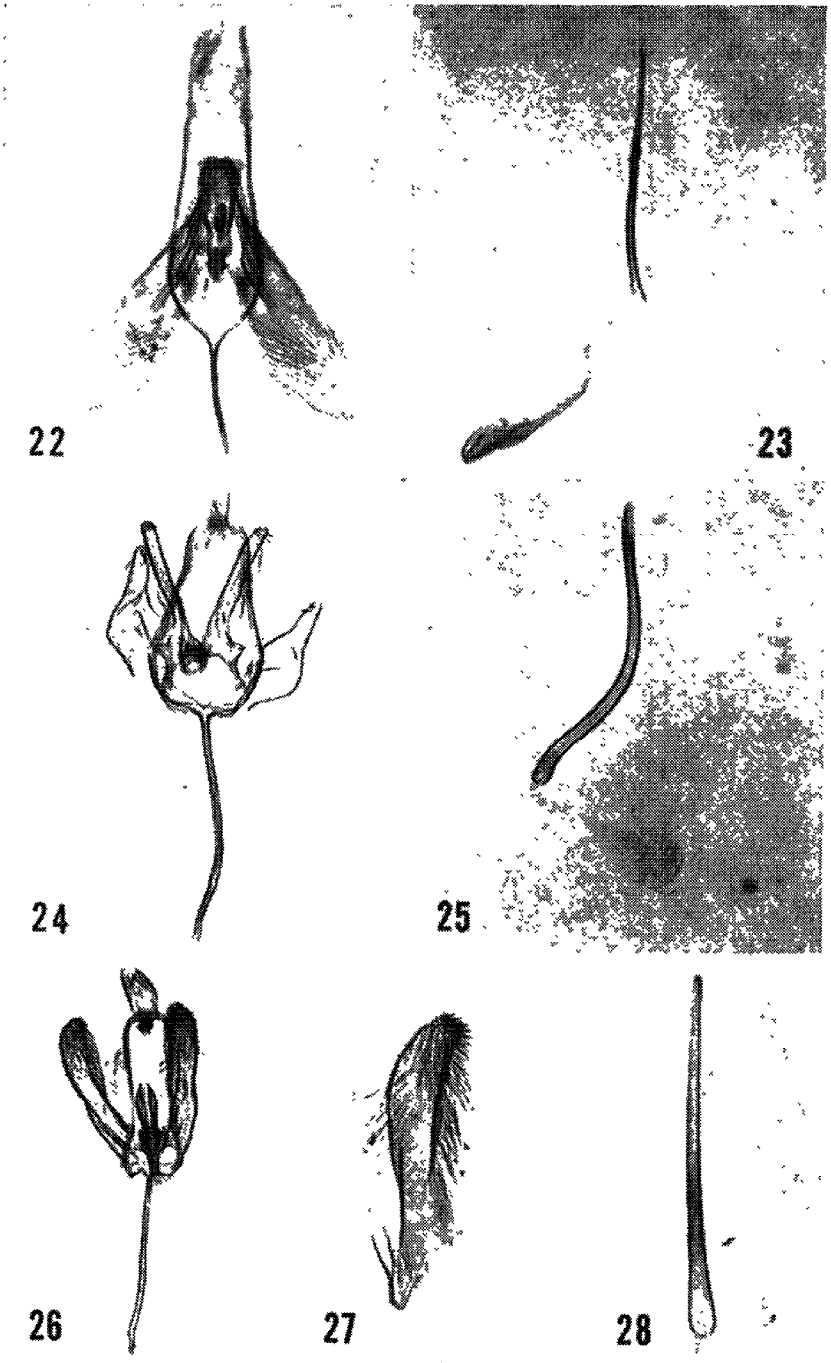


Fig. 22-28. Male genitalia of *Diploschizia*: 22, *D. regia* Heppner (holotype), Royal Palm State Park, Dade Co., Florida, I-1930, F. M. Jones (USNM slide 77810); 23, ibid., aedeagus; 24, *D. impigritella* (Clemens), Cincinnati, Ohio, 30-VII-1907, A. F. Braun (ANSP) (slide JBH 303); 25, ibid., aedeagus; 26, *D. kimballi* Heppner (holotype), Lake Panasoffkee, Sumter Co., Florida, 14-V-1974, K. W. Knopf (USNM slide 77822); 27, *D. kimballi* Heppner (paratype) left valva (meso-lateral view), Gainesville, Alachua Co., Florida, 2-IV-1976, J. B. Heppner (slide JBH 1461); 28, *D. kimballi* Heppner (holotype) aedeagus (slide USNM 77822).

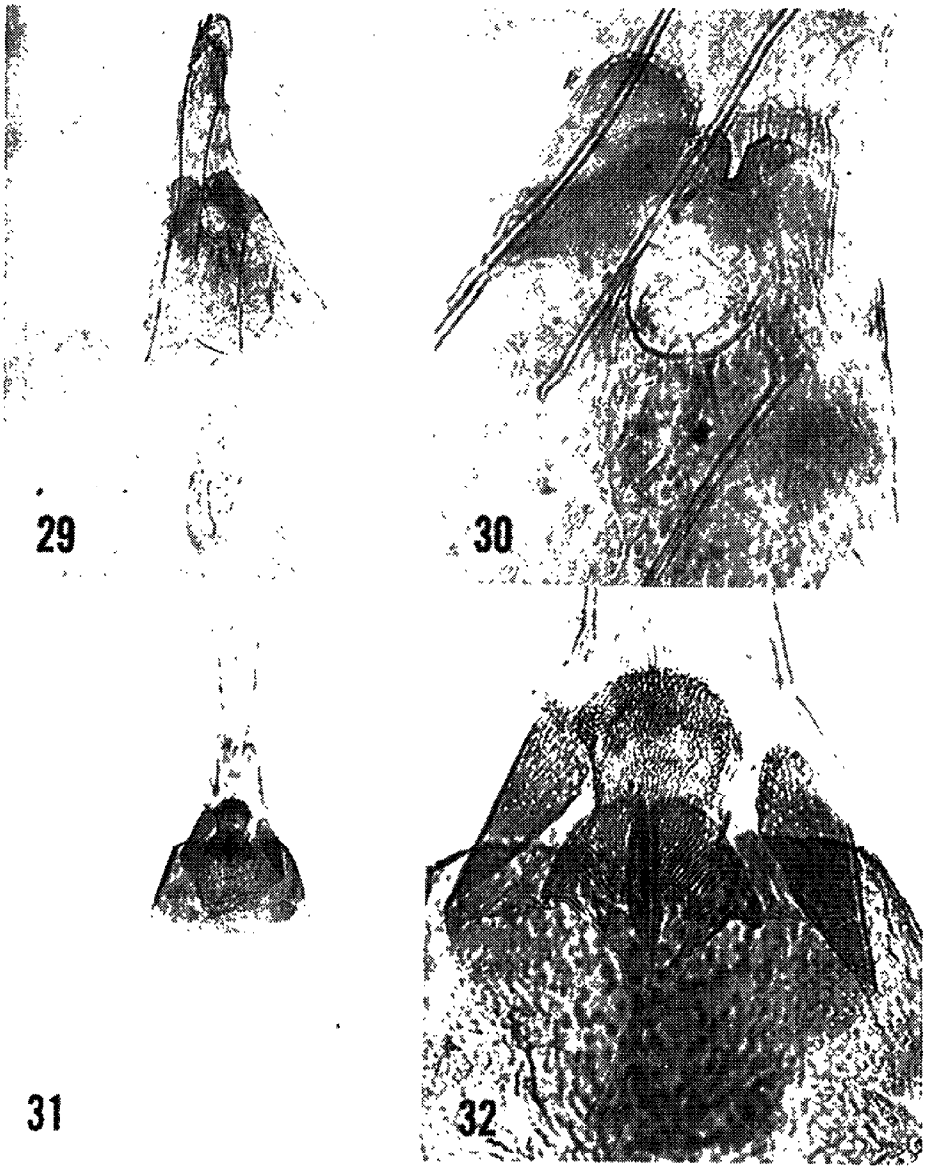


Fig. 29-32. Female genitalia of *Diploschizia*: 29, *D. minimella* Heppner (paratype), Lake Placid, Highlands Co., Florida, 30-IV-1964, R. W. Hodges (USNM slide 77157); 30, ibid., ostium detail; 31, *D. habecki* Heppner (paratype), Bivens Arm Lake, 3 mi. SW. Gainesville, Alachua Co., Florida, 17-VIII-1974, D. H. Habeck (FSCA) (slide JBH 415); 32, ibid., ostium detail.

The species is named in honor of Charles P. Kimball, longtime collector and investigator of the Florida Lepidoptera.

ACKNOWLEDGEMENTS

Detailed acknowledgments will be given in the North American revision (Heppner in prep.) but several persons should be noted at this time for the

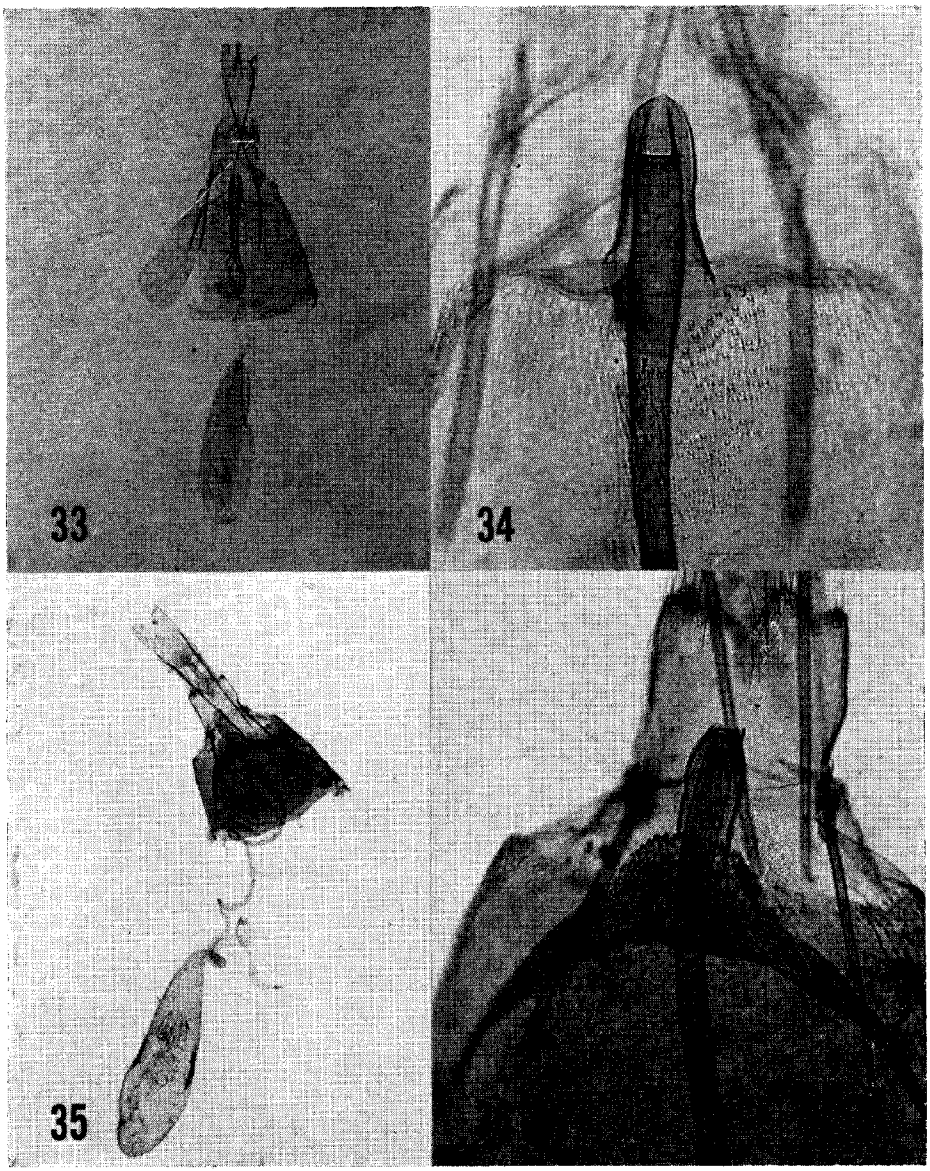


Fig. 33-36. Female genitalia of *Diploschizia*: 33, *D. impigritella* (Clemens), Cincinnati, Ohio, 9-VI-1907, A. F. Braun (USNM slide 77302); 34, ibid., ostium detail; 35, *D. kimballi* Heppner (paratype), Gainesville, Alachua Co., Florida, 2-IV-1976, J. B. Heppner (slide JBH 1472); 36, ibid., ostium detail.

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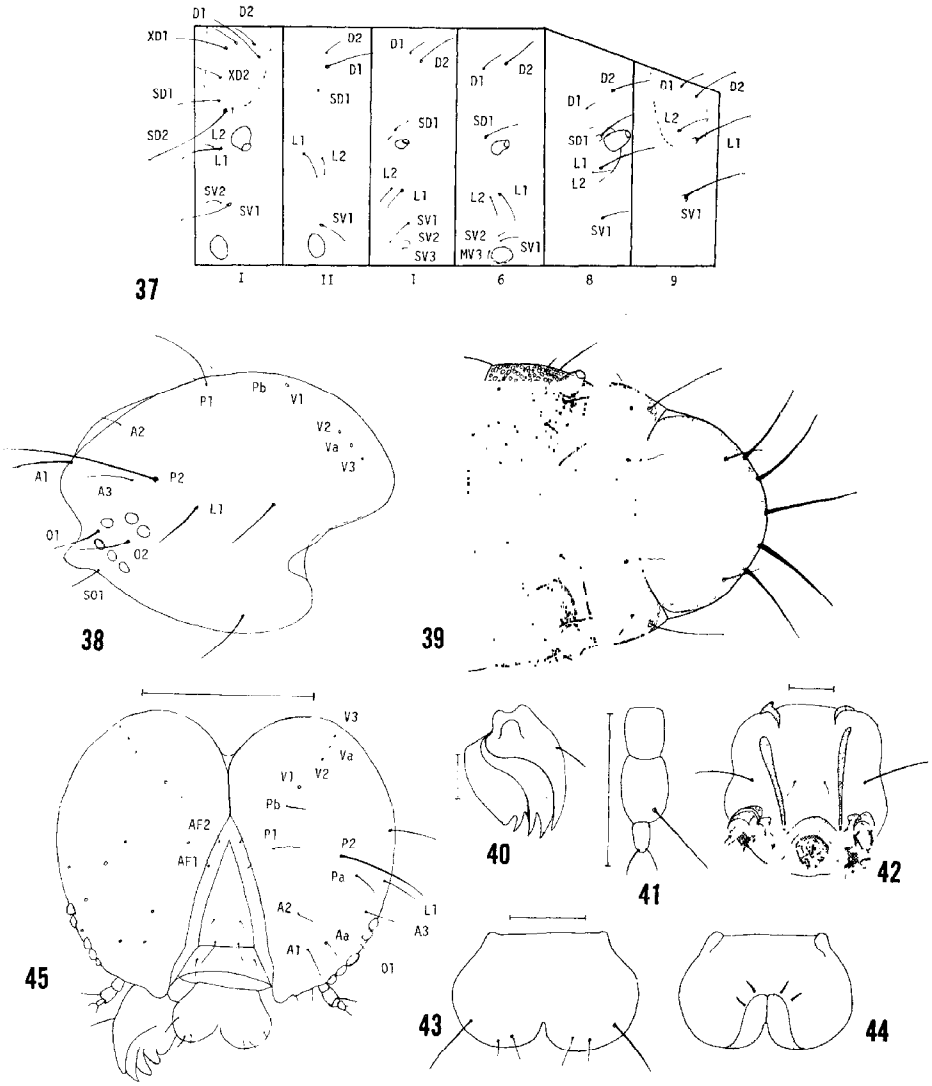


Fig. 37-45. Larva of *Diploschizia habecki* Heppner: 37, chaetotaxy; 38, head, lateral view; 39, abdominal tergites 8-10; 40, right mandible, ventral view (scale line = 0.05 mm); 41, left antenna, dorsal view (scale line = 0.05 mm); 42, submentum, ventral view (scale line = 0.05 mm); 43, labrum, dorsal view (scale line = 0.05 mm); 44, labrum, ventral view; 45, head, frontal view (scale line = 0.2 mm) (slide JBH 1389).

A grant from the National Science Foundation (DEB76-12550) allowed field research in the United States and a fellowship from the Smithsonian Institution allowed research at the National Museum of Natural History, Washington, and the British Museum (Nat. Hist.), London, in 1976-77.

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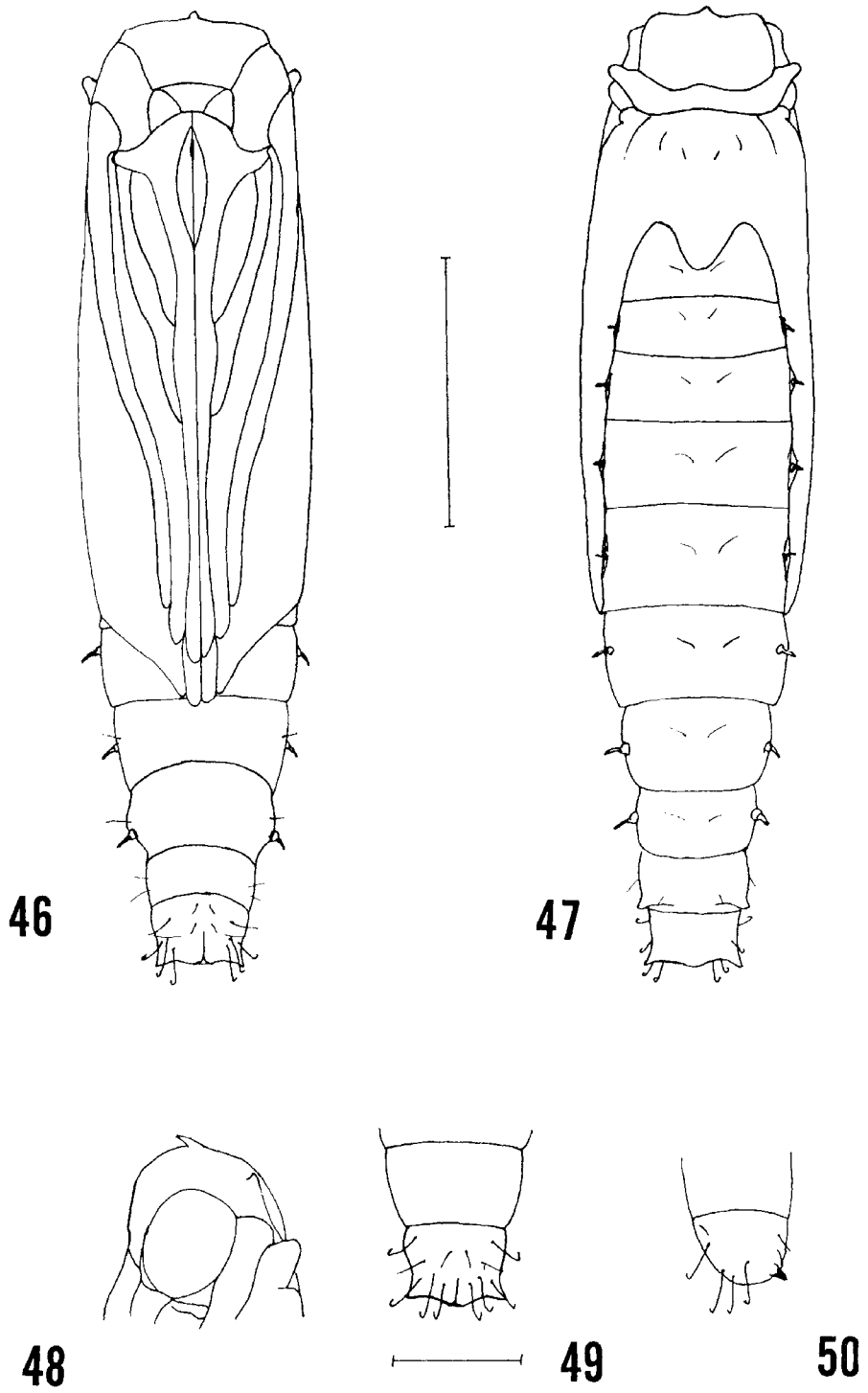


Fig. 46-50. Pupa of *Diploschizia habecki* Heppner: 46, ventral view (scale line = 1 mm); dorsal view; 48, head, lateral view (scale line = 0.05 mm); 49, posterior sternites; 50, posterior end of abdomen, lateral view.

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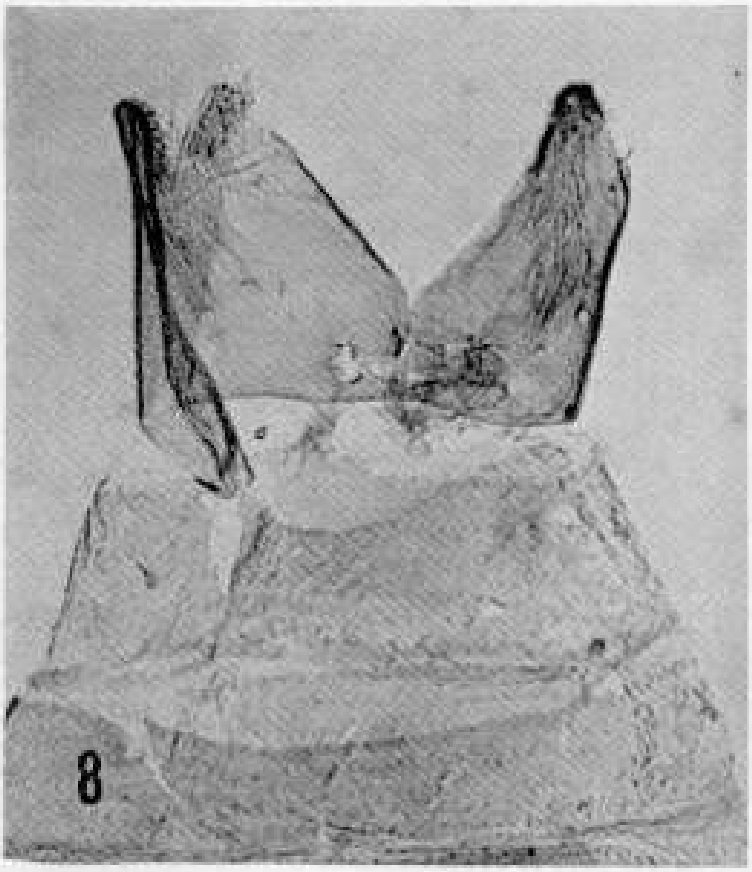
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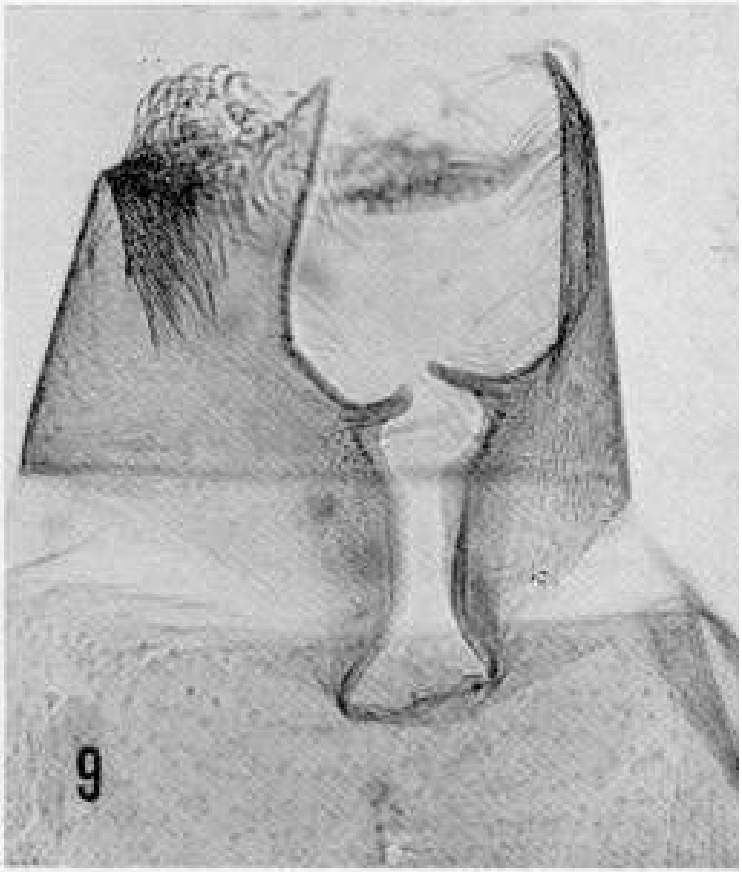
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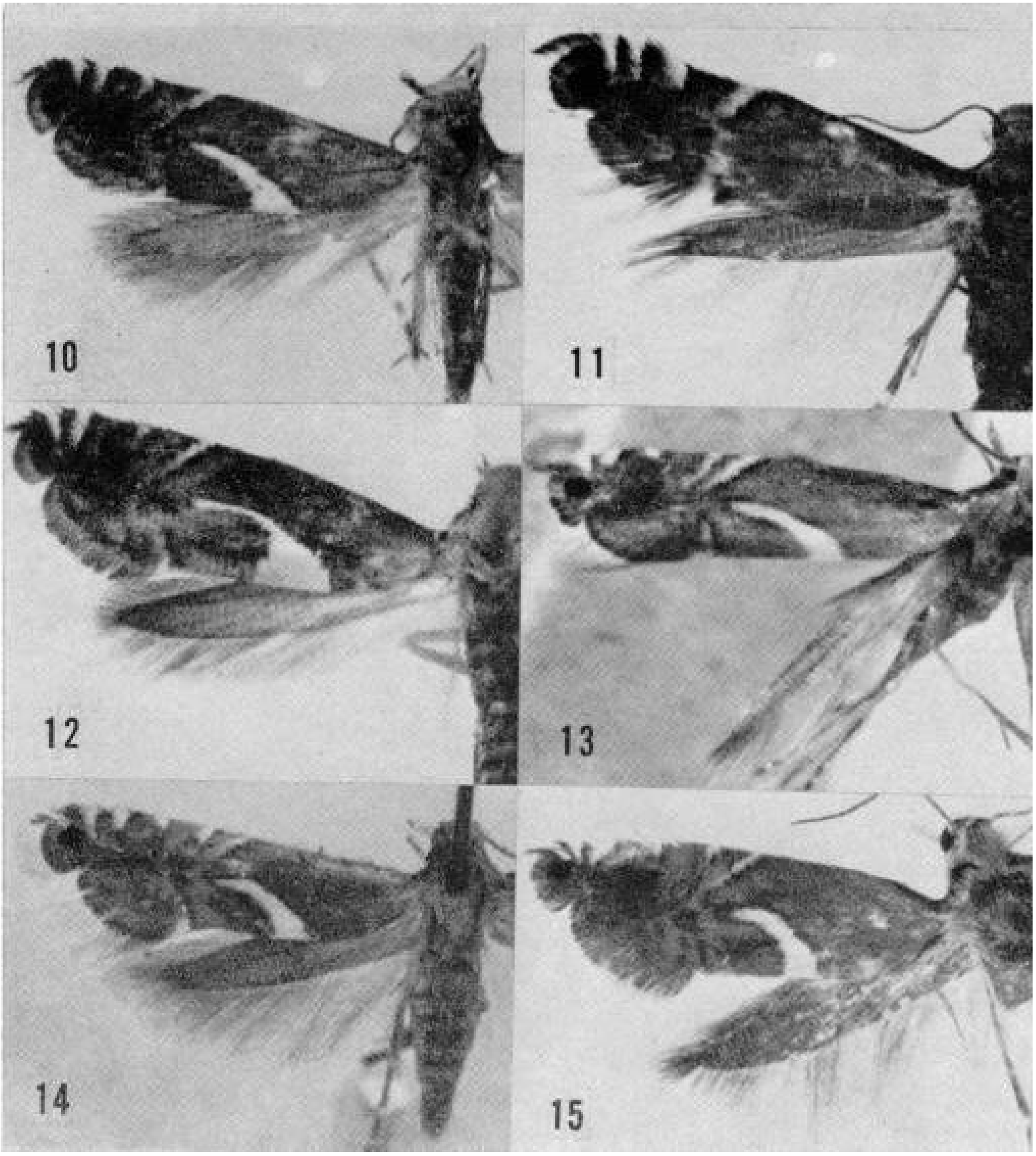
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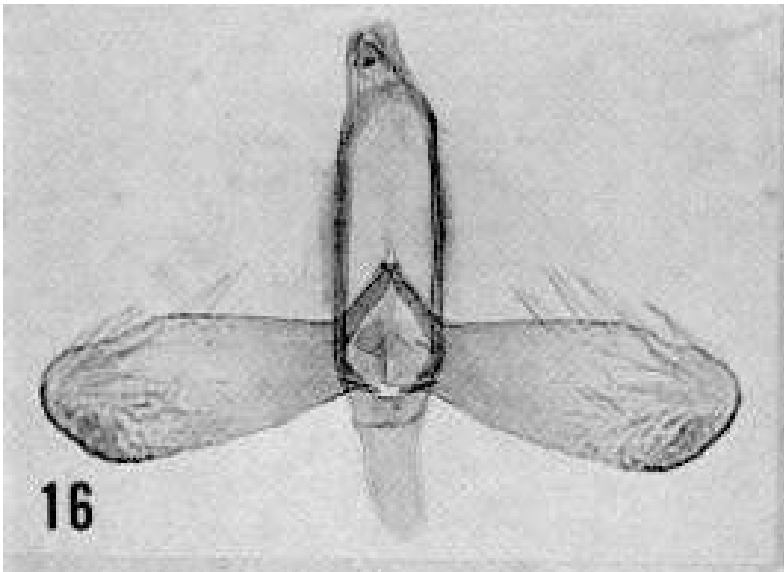

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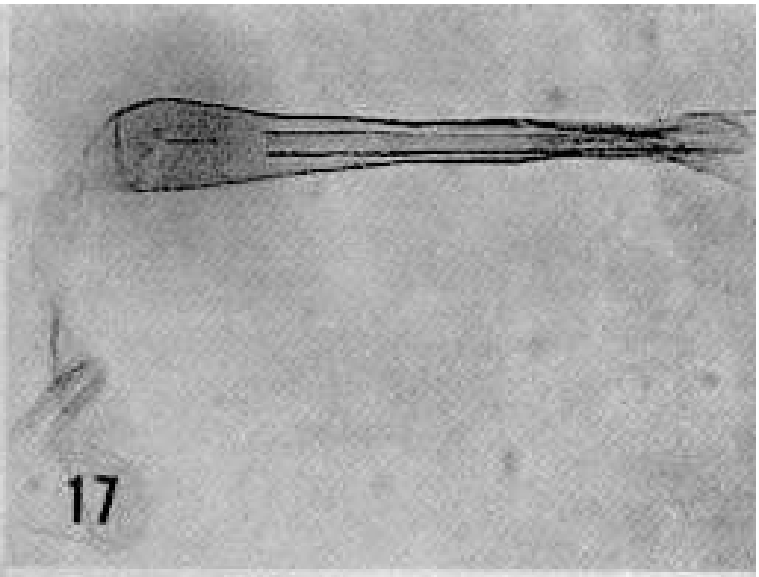

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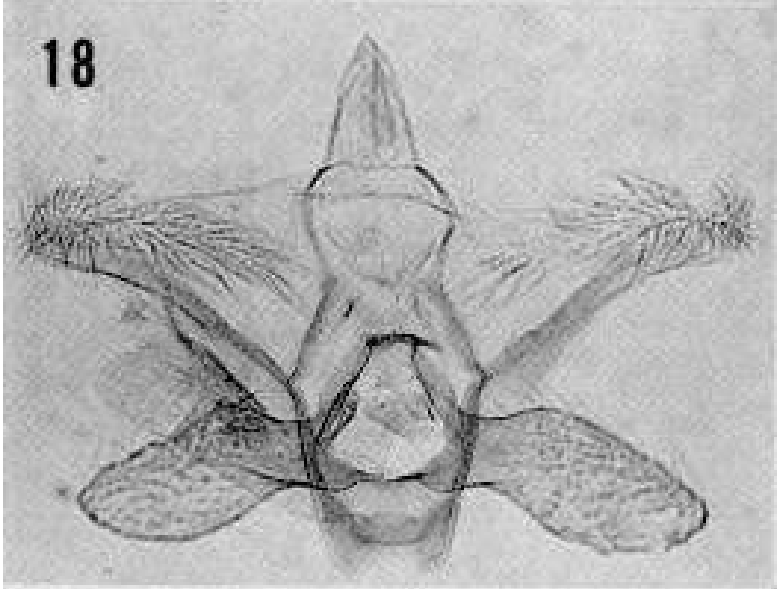

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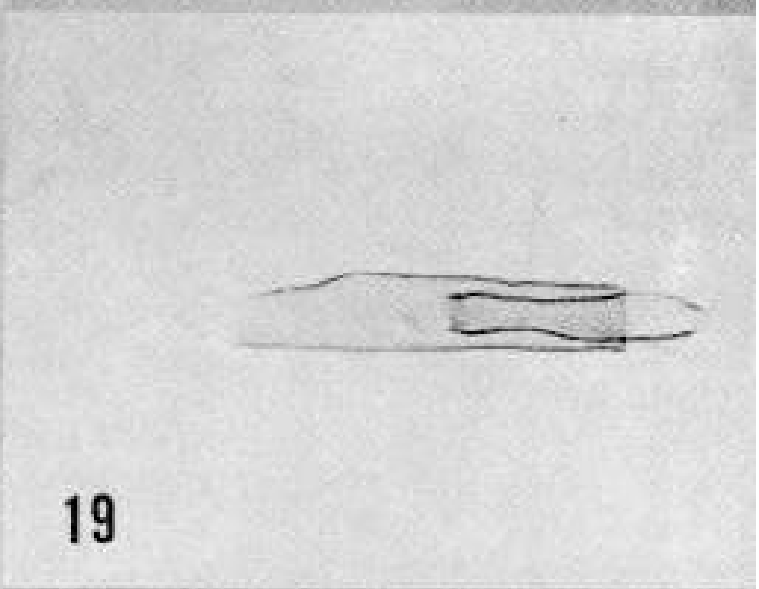

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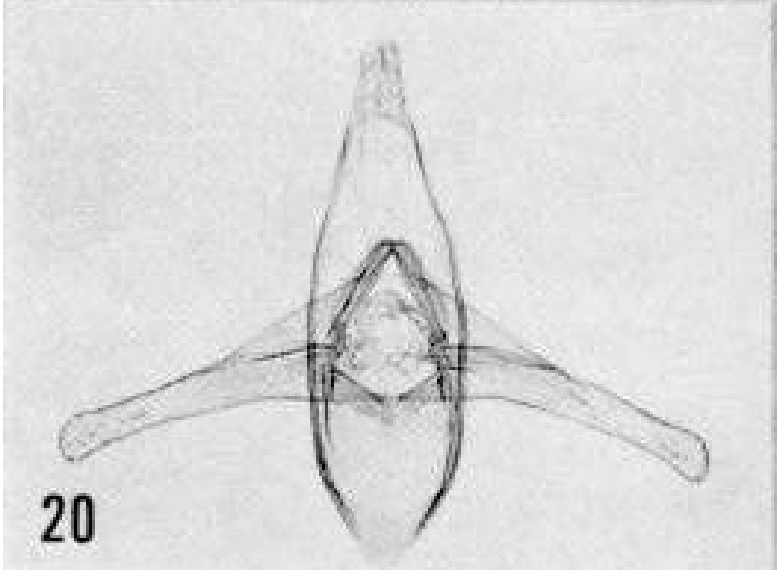

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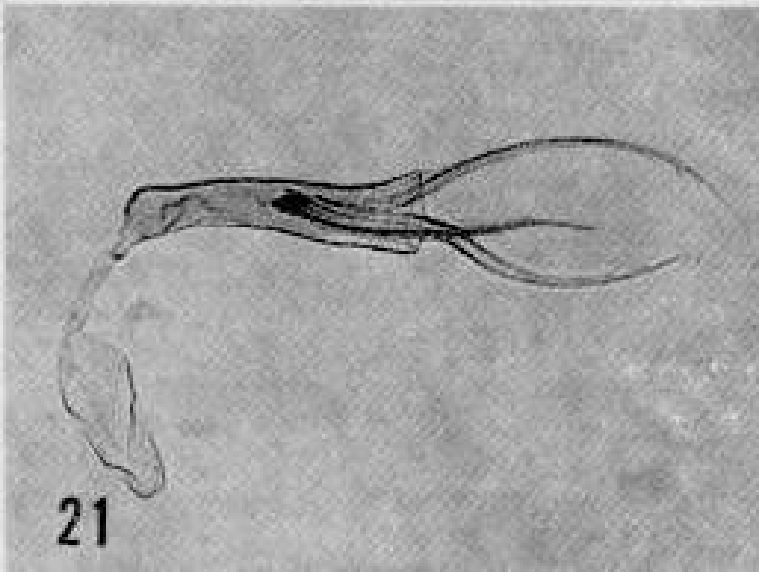

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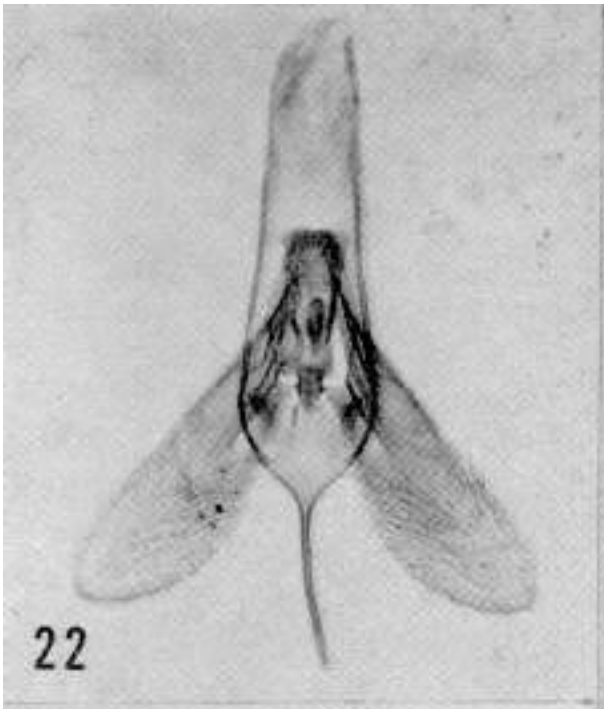
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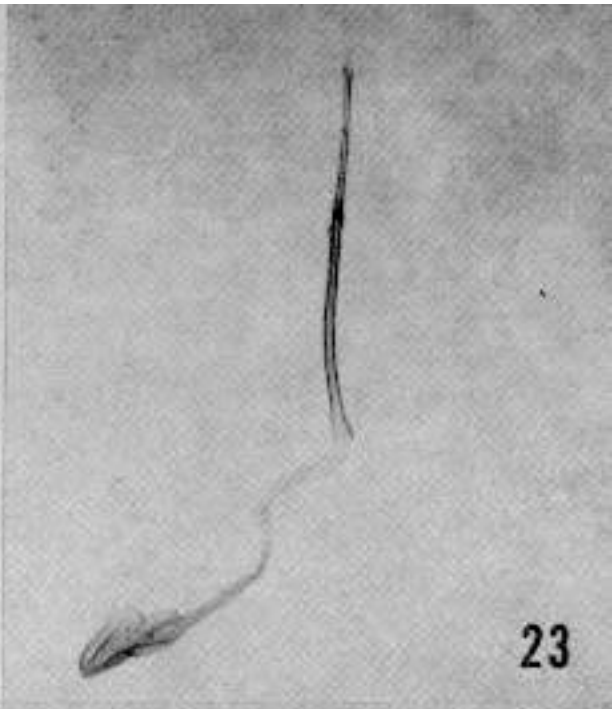
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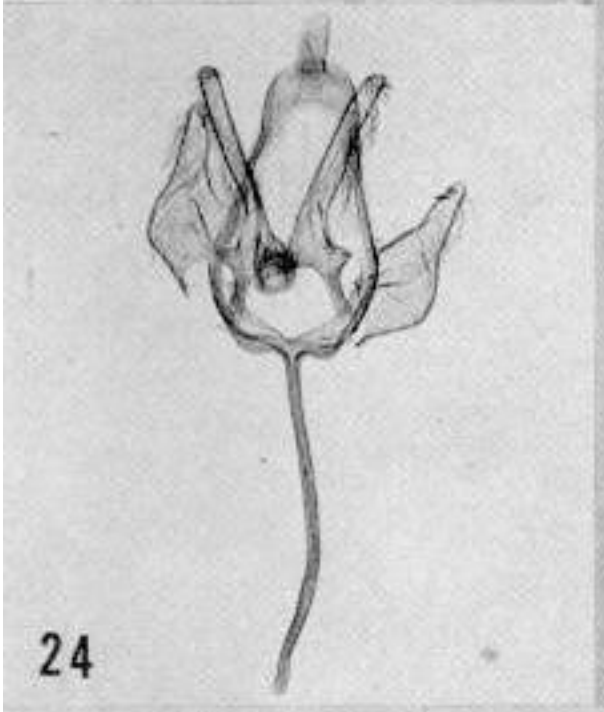
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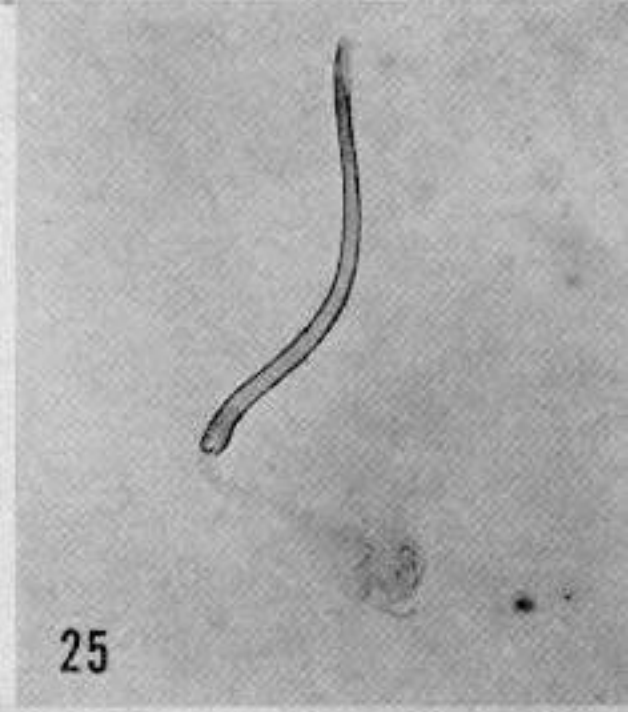
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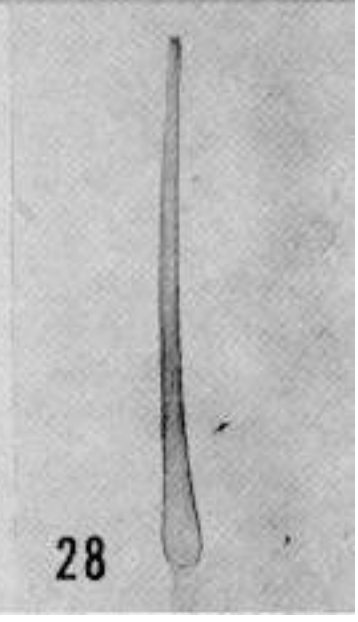
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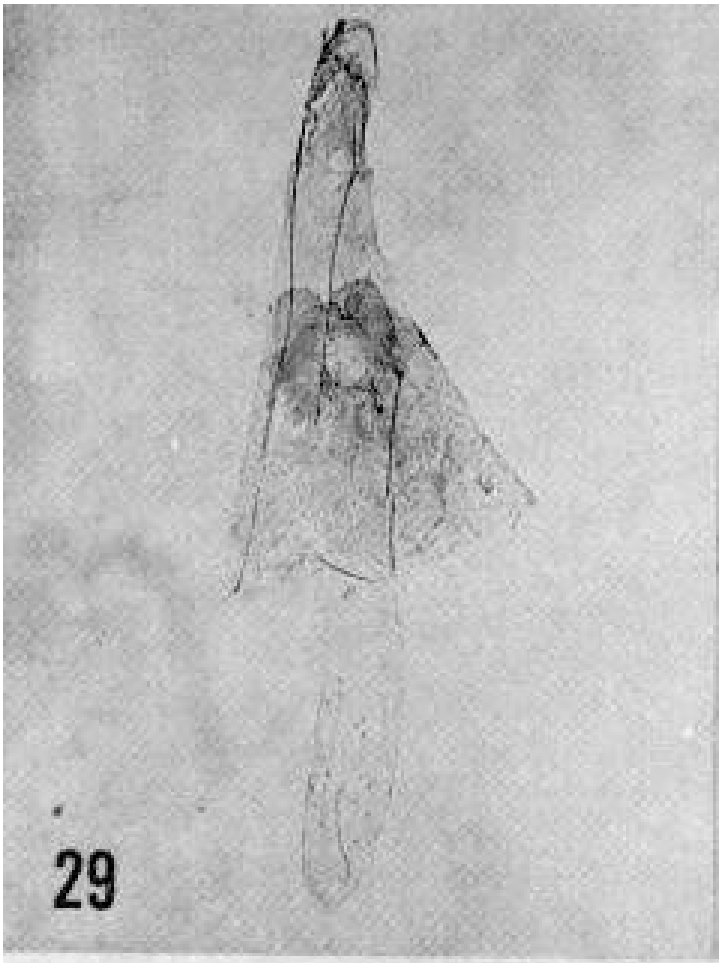

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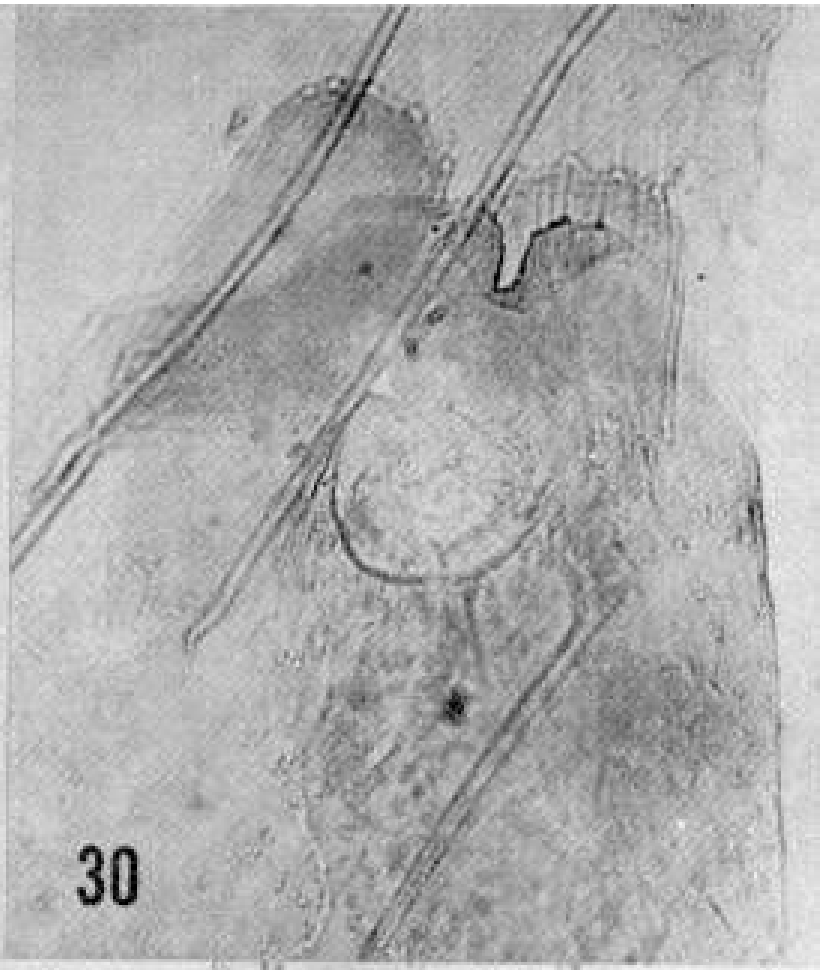

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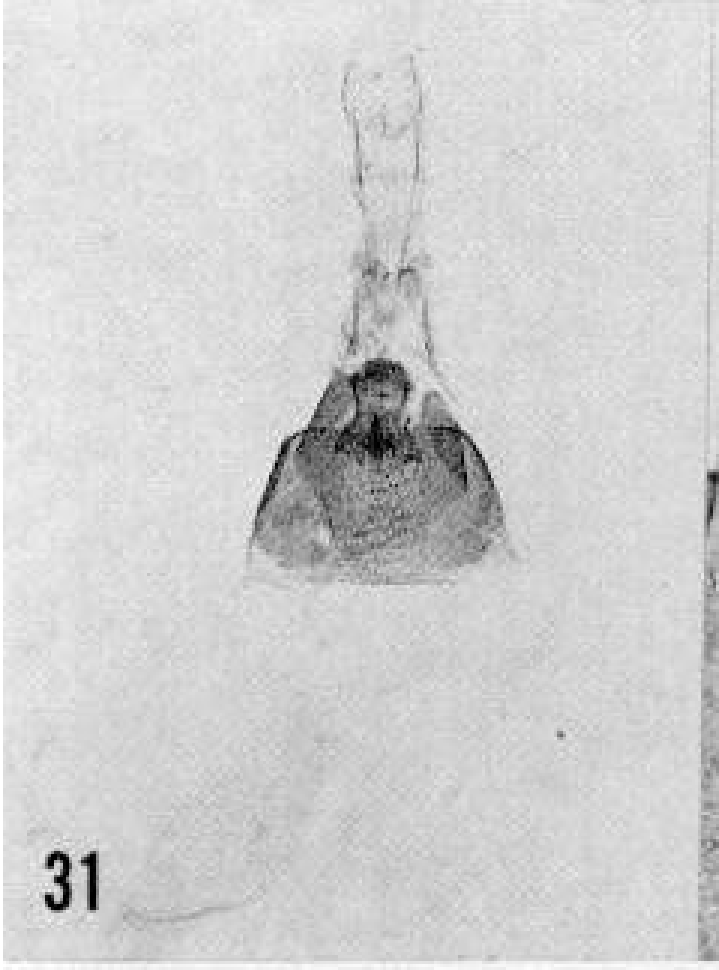

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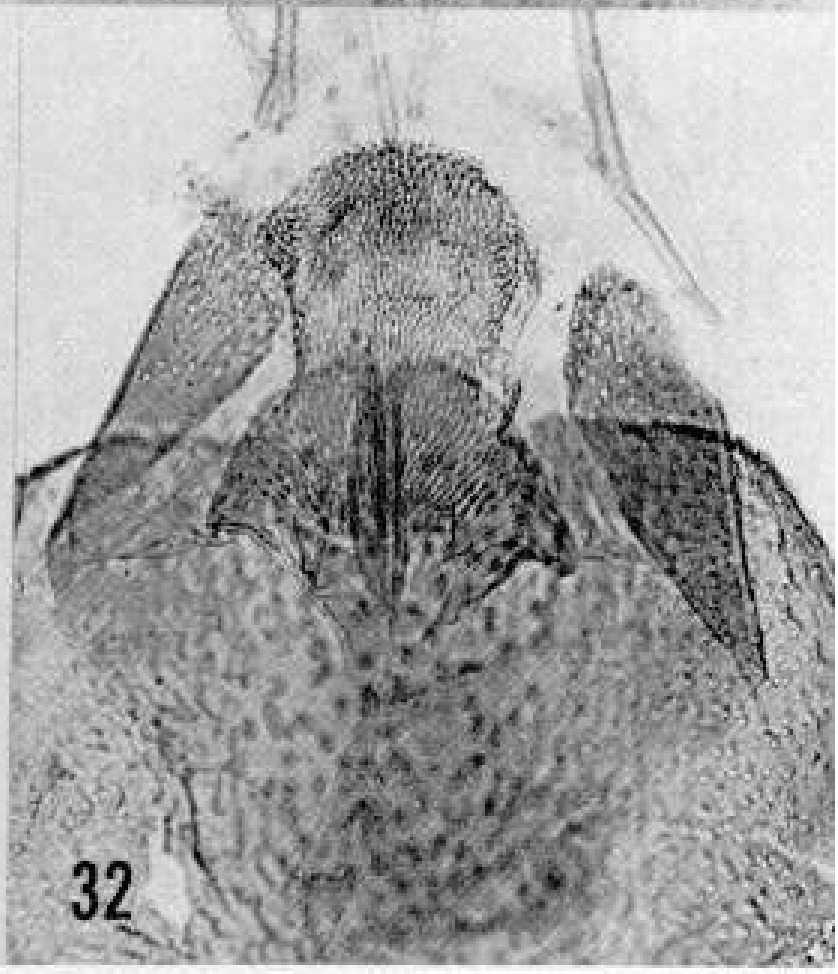

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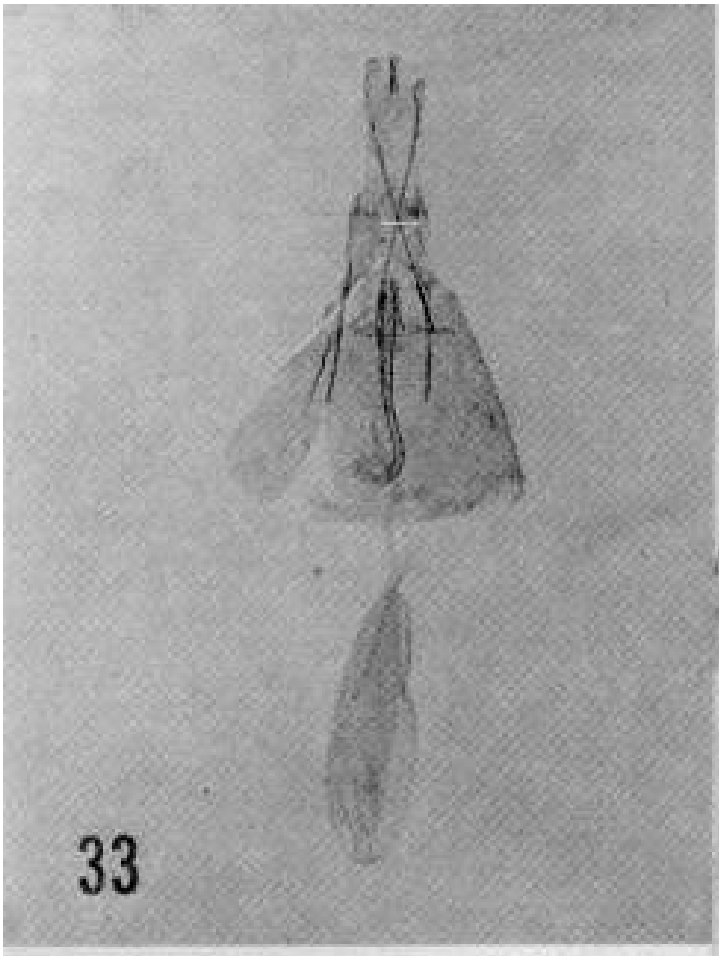
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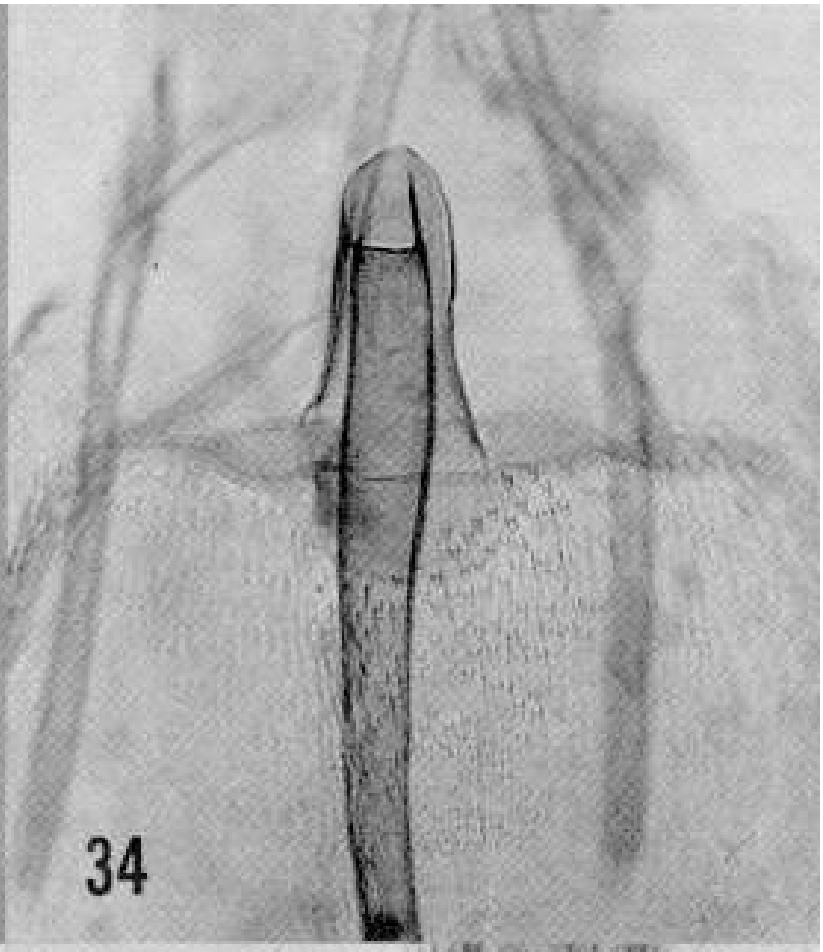
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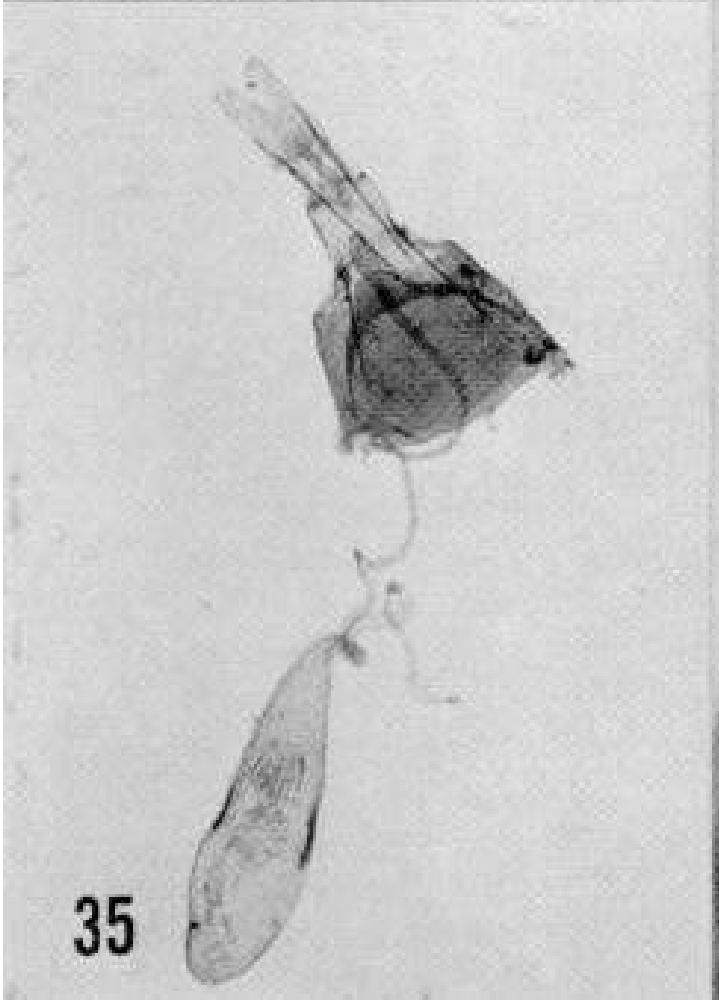
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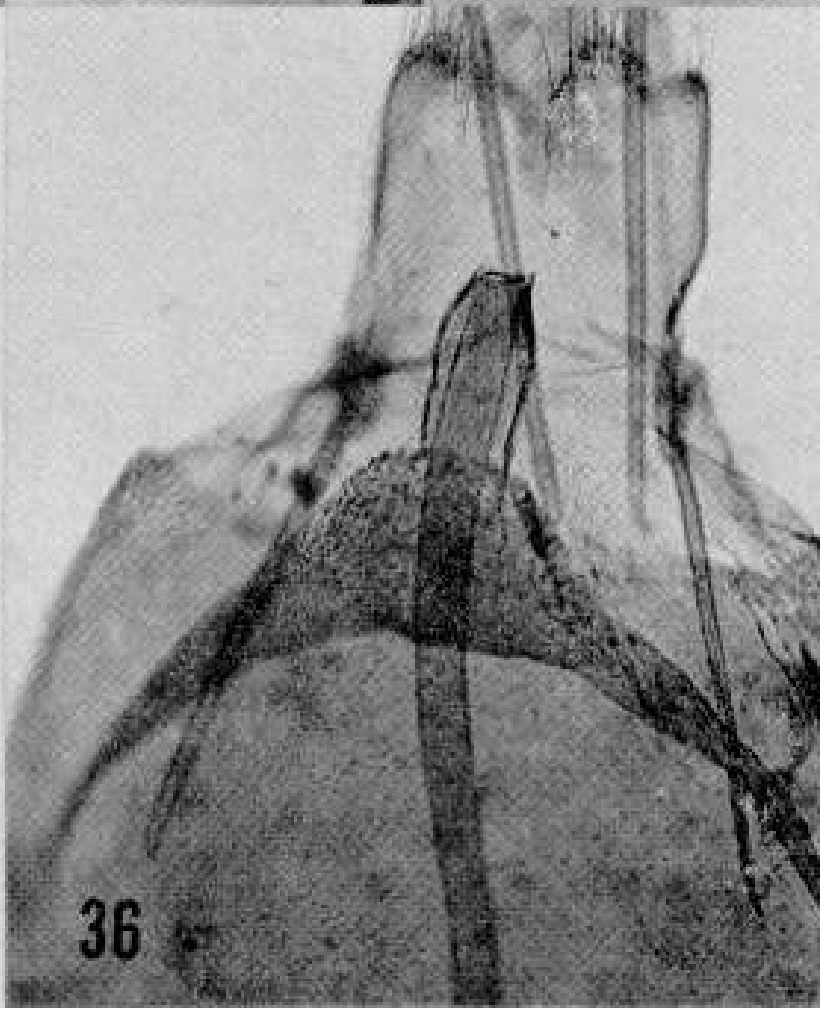
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