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CHIRONOMIDE (DIPTERA) OF FLORIDA
I. PENTANEURINI (TANYPODINAE)

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CHIRONOMIDAE (DIPTERA) OF FLORIDA:
I. PENTANEURINI (TANYPODINAE)¹

WILLIAM M. BECK, JR., AND ELISABETH C. BECK²

SYNOPSIS: The Florida Chironomidae of the tribe Pentaneurini (as defined by Fittkau, 1962) were studied from specimens collected in the wild and reared in the laboratory. The 27 species reared are placed in 11 genera; larvae, pupae, and adults are described and diagnostic characteristics defined. Information on methods and ecological data are included. The following 17 new species are described: *Ablabesmyia philosphagnos*, *A. hauberi*, *A. ornata*; *Pentaneura inculta*; *Guttipelopia currani*; *Monopelopia boliekae*, *M. tillandsia*; *Labrundinia floridana*, *L. neopilosella*, *L. johannseni*, *L. virescens*; *Paramerina anomala*; *Conchapelopia fasciata*, *C. gigas*; *Nilotanypus americanus*; *Larsia bernerri*, *L. lurida*, *L. indistincta*; and *Arctopelopia fittkai*.

The following taxonomic changes are noted: *Pentaneura janta*, *P. peleensis*, *P. aspera*, *P. auriensis*, *P. annulata*, *P. cinctipes*, *P. prudens*, *P. aequifasciata*, and *P. mallochii* are now species of the genus *Ablabesmyia*. *Pentaneura pilosella* is *Labrundinia pilosella*, and *Pentaneura carnea* (of Johannsen, not of Fabricius) is now *Zavrelimyia carneosa* Fittkau.

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INTRODUCTION

For the past four years we have made a study of the Chironomidae of Florida to delineate what species comprise the fauna, their seasonal and geographical distributions, their ecology, and life histories.

During the last two years we have emphasized collecting and rearing specimens of the tribe Pentaneurini as defined by Fittkau (1962). He divides this tribe, comprised of species formerly placed in the various groups of *Pentaneura* and some formerly in *Anatopynia*, into 18 genera. We have reared 27 species from Florida belonging to 11 of these genera, and collected as adults, but not reared, an additional three species. Of these 30 species, 19 are apparently undescribed. This paper describes the larva, pupa, and adult of all reared species, and gives ecological data on the larval habitats.

The following list includes all previously described North American species of Pentaneurini, referred as far as possible to Fittkau's genera.

Natarsia

fastuosa (Johannsen)

Macropelopia sp. 1 and sp. 2 of Roback (1957)

aclines (Sublette)

Thienamannimyia

norena (Roback)

chrysos (Sublette)

Rheopelopia

- sp. 1 (*Pentaneura* sp. 7, Roback, 1957)
 sp. 2 (spec. NA Brundin)

Conchapelopia

- americana* Fittkau (= *P. vitellina* of Johannsen, 1947)
cornuticaudata (Walley)
flavifrons (Johannsen) (or Wied. ?, see Fittkau, p. 242.)
melanops (Johannsen, 1905, = *unicolor* Walker ?)
goniodes (Sublette)

Arctopelopia, *Thienemannimyia* or *Rheopelopia*:

- alba* (Roback)
rurika (Roback)
 sp. 1 *melanops* group (Roback)
currani (Walley)
okobojii (Walley)
pilicaudatus (Walley)
senata (Walley)
inconspicua (Malloch)

Guttipelopia

- multipunctatus* (Curran)

Krenopelopia

- sp. *nordamerika* (Fittkau)

Zavreliomyia

- carneosa* Fittkau (= *P. carnea* of Johannsen and Roback)
 spec. *tetrastica* (Roback, 1957)
fluminalis (Sublette) (Sublette says this species may be what Johannsen called *carnea*; if so, it is synonymous with *carneosa*.)

Larsia

- "poss. *curticalcar*" (Roback)
pallens (Coquillett)
planensis (Johannsen) ?
decoloratus (Malloch)

Labrundinia

- pilosella* (Loew) (Fittkau synonymizes with *longipalpus* under larvae, but there are distinct differences.)

Nilotanypus

- dubius* (Meigen) (Fittkau expresses doubt that this occurs in North America.)
 spec. *amerika* (Brundin)

Ablabesmyia

- americana* Fittkau (= *P. monilis* in Johannsen)
annulata (Say)
auriensis (Roback)
basalis (Walley)
idei (Walley)
illinoiensis (Malloch)
mallochi (Walley)
janta (Roback) (= *monilis* var. # 1 of Johannsen)
johannseni (Roback) (= *monilis* var. # 2 of Johannsen)
peleensis (Walley)
aequifasciata (Dendy and Sublette)
aspera (Roback)
cinctipes (Johannsen)
gera (Roback)
prudens (Walley)
rhamphe Sublette

The following species are in Edwards' *Pentaneura* (Group E) which Fittkau has divided among *Krenopelopia*, *Telmatopelopia*, *Paramerina*, *Larsia*, *Xenopelopia*, and *Monopelopia*:

- comosa* (Sublette)
thryptica (Sublette)
lyra (Sublette)
inyoensis (Sublette)
sequoiaensis (Sublette)
smithae (Sublette)
fimbriatus (Walker)
brooksi (Gerry)
flaveola (Will.)
indecisa (Will.)

These species have not been assigned even tentatively to a new genus:

- garretti* (Walley)
aurea (Johannsen)
bifasciatus (Coquillett)
fragilis (Walley)
futilis (Wulp)
sinuosa (Coquillett)

We have found in our reared material specimens we are referring to *Paramerina*, *Pentaneura*, and *Monopelopia*, for which Fittkau

listed no North American species. As yet no species have been reared or recorded definitely referable to his genera *Trissopelopia*, *Xenopelopia*, or *Telmatopelopia*.

METHODS

During this study we took 185 collections totaling 16,566 larvae from different streams, rivers, ditches, ponds, and lakes in Florida. Most collections contained some Pentaneurini; many were almost entirely of this tribe.

Collections were made by pulling a D-frame dipnet along the bottom or through vegetation of a body of water. The contents were put into a shallow white enamel pan and flooded. Larvae were pipetted singly into small (2 dram) vials of water from the collecting site, stoppered, and placed in trays in a styrofoam ice chest to be taken to the laboratory. Records were kept on each larva, noting time until pupation, length of pupal stage, date of emergence, and any notes of interest. The adult was slide mounted or pinned, and the larval and pupal skins slide mounted for identification. Attempts to feed the larvae with artificial media were largely unsuccessful and emergence was unlikely unless pupation occurred within five days of collecting. Adults emerged from 25 to 30 percent of the larvae collected.

Holotype specimens of new species described in this paper are deposited in the United States National Museum. Paratypes, where enough good specimens are available, are in the Florida State Collection of Arthropods, in the collection of the Florida State Board of Health, and the Hydrobiologische Anstalt der Max-Planck-Gesellschaft, Plon, Germany. All reared specimens of new species listed in this paper are paratypes.

In describing adults the following abbreviations are used: WL (wing length), measured from attachment at thorax to apex of wing; AR (antennal ratio), length of two apical segments of male antenna, divided by combined length of remaining segments; LR (leg ratio), length of fore basitarsus divided by length of foretibia. In larvae AR is the length of basal segment of antenna divided by the length of the remaining segments.

COLLECTION SITES

Though collections were made at a large number of different sites, most of the collections containing Pentaneurini were made at 14 sites in 11 counties. Descriptions of stream typology for each site follow Beck (1965).

Duval County - Expressway creeks, north of junction with U.S. 1.

Several small streams were sampled at various times along a 5 to 6 mile stretch of this road. These streams have either mud or sand and organic detritus bottoms; color is high, turbidity low, velocity low to moderately swift; they range in depth from 6-18 inches and support a heavy growth of algae, *Utricularia* and *Sphagnum*.

The chironomid fauna consists of Tanytarsini, *Clinotanypus thoracicus* (Loew), *Tanypus* spp., *Procladius* spp., *Psectrocladius* sp., *Corynoneura* (C.) sp., *Cricotopus bicinctus* (Meigen), *Chironomus dorsalis* Meigen, *C. modestus* Say, *C. hirtalatus* Beck and Beck, *Conchapelopia fasciata* n. sp., *Larsia berneri* n. sp., *L. lurida* n. sp., *L. indistincta* n. sp., *Ablabesmyia aspera* (Robäck), *A. peleensis* (Walley), *Labrundinia virescens* n. sp., and *Arctopelopia fittkawi* n. sp.

Duval County - Beach Boulevard streams.

This site has two small streams running within a few hundred feet of each other. One was originally swift and clear with sand and detritus bottom and only marginal vegetation: *Azolla*, *Vallisneria*, and *Pontederia*. The other stream was canal-like, of no perceptible flow, and polluted by the effluent from a nearby sewage treatment plant; it was an opaque gray-green from dense algal and *Sphaerotilus* growths. During the period of this study the effluent was apparently diverted to the clean stream, and the two have almost reversed ecological characteristics. For this reason data from the two streams have been combined.

The following chironomids have been reared from these streams: *Cricotopus bicinctus*, Tanytarsini, *Corynoneura* (Th.) spp., *Orthocladius* spp. *Psectrocladius* spp. *Chironomus collator* (Townes), *C. casuarius* (Townes), *C. hirtalatus*, *Clinotanypus pinguis* (Loew), *Polypedium illinoense* (Malloch), *Stenochironomus cinctus* Townes, *Ablabesmyia aspera*, *A. janta* (Robäck), *A. peleensis*, *Guttipelopia currani* n. sp., and *Larsia berneri* n. sp.

Alachua County - Hatchet Creek.

This is a fairly large typical sand-bottomed stream; it is moderately swift, color is high, turbidity low. It supports a moderate to occasionally heavy growth of plants along the banks, including a few *Polygonum*.

The chironomid fauna includes: *Polypedium illinoense*, *P. parascalaenum* Beck, *Nilothauma bicornis* (Townes), *Cricotopus bicinctus*, Tanytarsini, *Psectrocladius* sp., *Orthocladius* sp., *Chironomus* (Cryp-

to.) sp., *Ablabesmyia auriensis* (Roback), *A. janta*, *A. ornata* n. sp., *Pentaneura inculta* n. sp., *Labrundinia pilosella* (Loew), and *Larsia berneri* n. sp.

Clay County - Black Creek.

This is a moderately swift sand-bottomed stream, with logs and dead brush; several prongs of the creek were worked and vegetation ranged from very few plants to moderate growths of *Vallisneria*, *Nymphaea*, *Saururus*, *Hydrocotyle*, *Polygonum*, grasses and algae. During the cooler months heavy growths of the red alga, *Batrachospermum*, were present.

The following species of chironomids have been reared from the Black Creek drainage: *Polypedilum illinoense*, *P. parascalaenum*, *P. convictum* (Walker), *P. (Pentapedilum) sp.*, *Trichocladius robacki* Beck and Beck, *Orthocladius sp.*, *Cricotopus sp.*, *Chironomus jucundus* Walker, *Chironomus sp. (near dux)*, Tanytarsini, *Corynoneura (Th.) spp.*, and *Ablabesmyia auriensis*.

Clay County - Peter's Creek.

This small sand-bottomed creek in the Black Creek drainage basin is treated separately as a collecting site because of its varied and distinctive fauna. It is moderately swift, high in color, low in turbidity, and has a moderate to dense plant growth: *Vallisneria*, red and green algae and others. We collected several species of chironomids from this little creek that we took at no other location. The following species have been reared from Peter's Creek: *Corynoneura (C.) sp.*, *C. (Th.) sp.*, Tanytarsini, *Trichocladius robacki*, *Cricotopus bicinctus*, *Metriocnemus lundbecki* Johannsen, *Polypedilum convictum*, *P. parascalaenum*, *Chironomus jucundus*, *Apsectrotanypus johnsoni* (Coquillett), *Orthocladius sp.*, *Stenochironomus* (Walker), *Ablabesmyia peleensis*, *A. hauberi* n. sp., *Nilotanypus americanus* n. sp., *Conchapelopia gigas* n. sp., *Pentaneura inculta* n. sp., *Paramerina anomala* n. sp., and *Labrundinia floridana* n. sp.

Indian River County - Bromeliads at Vero Beach.

Water accumulating at the base of the leaves of epiphytic bromeliads is known to harbor a number of insect larvae. The bromeliad, *Tillandsia utriculata* L., at the Entomological Research Center at Vero Beach was examined on three occasions for larvae. These species were found: *Metriocnemus abdomino-flavatus* Picado, Tanytarsini, and *Monopelopia tillandsia* n. sp. The water contained plant and animal detritus.

Jackson County - Waddell's Mill Creek.

This creek is a typical calcareous stream with bottom of sand, silt, plant detritus, logs, and rocks; the logs support a heavy growth of sponges during the cooler months. Color is low, turbidity low to occasionally moderate; velocity is moderately swift. Plants consist of *Vallisneria*, *Nymphaea*, *Nuphar*, and *Ludwigia*. Chironomid fauna includes: *Trichocladius* sp., *Cricotopus bicinctus*, *Orthocladius* sp., *Polypedilum halterale* (Coquillett), *P. scalaenum* (Schrank), Tanytarsini, *Ablabesmyia auriensis*, *A. mallochi*, and *Pentaneura inculta* n. sp.

Taylor County - Fenholloway River.

The Fenholloway River, physically a sand-bottomed stream, chemically a swamp-and-bog stream, receives the effluent from a kraft paper mill about 3 miles downstream from the sampling station. It is dark brown (750 ppm color in July), turbidity low, bottom of sand, rock, silt, and logs. Vegetation consists mainly of grasses, *Panicum*, *Hydrocotyle*, and a few *Eichornia crassipes*. Chironomid larvae found here include: *Polypedilum parascalaenum*, *P. convictum*, *P. illinoense*, *Trichocladius* sp., *Clinotanypus thoracicus*, *Chironomus jucundus*, *C. emorsus* (Townes), *C. near fulvus*, Tanytarsini, *Ablabesmyia janta*, and *Conchapelopia fasciata* n. sp.

Jefferson County - Lake Miccosuckee.

This senescent lake was worked at a boat launching site where the turbidity was low, color moderate, bottom sand and silt, the vegetation a rich growth. Chironomid fauna consists of *Polypedilum trigonus* Townes, *P. tritum* (Walker), *P. illinoense*, *Chironomus near abortivus*, *C. potamogeti* (Townes), Tanytarsini, *Ablabesmyia peleen-sis*, *Guttipelopia currani* n. sp., *Larsia bernerii* n. sp., and *L. lurida* n. sp.

Flagler County - Rayonier Ditch.

Rayonier Ditch, running from U.S. 1 to the Intracoastal Waterway and draining an area of pine flatwoods and swamp, presents a number of quite different habitats. Almost without velocity in certain areas, it becomes quite rapid in small falls over coquina near the Waterway. Color is high, turbidity low. Areas are densely vegetated with *Utricularia*, *Pontederia*, *Limnobium*, and algae. Chironomids reared from this ditch are: *Orthocladius* sp., Tanytarsini, *Psectrocladius* sp., *Cricotopus bicinctus*, *Corynoneura* (C.) spp., *C. (Th.)*

spp., *Polypedilum parascalaenum*, *P. halterale*, *Chironomus fulvus* Johannsen, *C. casuarius*, *C. leucoscelis* (Townes), *Paralauterborniella nigrohalterale* (Malloch), *Ablabesmyia aspera*, *A. peleensis*, *A. ornata* n. sp., *A. hauberi* n. sp., *Pentaneura inculta* n. sp. *Labrundinia floridana* n. sp., *L. neopilosella* n. sp., *L. johannseni* n. sp., and *Larsia bernerii* n. sp.

Flagler County - Little Haw Creek.

This sand-bottomed stream has a low to moderately swift current, high color, and low turbidity; the bottom is composed of sand, silt, and a few logs. Plants found here include *Hydrocotyle*, *Spirogyra*, and during the cooler months, thick growths of *Batrachospermum*. The chironomid fauna consisted of *Psectrocladius* sp., *Orthocladius* sp., *Procladius* sp., Tanytarsini, *Corynoneura* (C.) sp., *Polypedilum illinoense*, *P. tritum*, *Chironomus modestus*, *Ablabesmyia aspera*, *A. auriensis*, *A. peleensis*, *Conchapelopia fasciata* n. sp., *Guttipelopia currani* n. sp., *Labrundinia floridana* n. sp., and *L. pilosella* (Loew).

Leon County - Boliek's Pond.

This small sink-hole pond on Natural Bridge Road near Tallahassee is a watering place for cattle, much enriched; color is high, turbidity slight. The pond is weed-choked with *Ceratophyllum* and dense algae. These chironomid larvae were taken: *Chironomus incurvatus* Sublette, *C. parafulvus* Beck and Beck, *Polypedilum illinoense*, *P. trigonus*, *P. parascalaenum*, *P. convictum*, *Procladius choreus* Meigen, *Paralauterborniella subaequalis* (Malloch), *Trichocladius* sp., *Cricotopus* sp., *Pseudochironomus middlekaufi* Townes, *Guttipelopia currani* n. sp., *Labrundinia virescens* n. sp., *Larsia bernerii* n. sp., *L. lurida* n. sp., *L. indistincta* n. sp., *Ablabesmyia aspera*, *A. janta*, *A. peleensis*, *A. hauberi* n. sp., and *Monopelopia boliekiae* n. sp.

St. Johns County - Shands Bridge.

Collections were made in the St. Johns River from the bridge approach in an area where the river tides flood a cypress swamp; the bottom is sand and organic detritus, and plants are *Eichornia crassipes* and *Vallisneria*. The chironomid fauna includes: *Chironomus decorus* Johannsen, *C. neomodestus* Malloch, *C. directus* (Dendy and Sublette), *Procladius culiciformis* (Linne), *P. pulcher* Johannsen, *Tanypus* spp., *Corynoneura* (C.) sp., *Cricotopus bicinctus*, *C. trifasciatus* (Panzer), *Polypedilum halterale*, Tanytarsini, and *Ablabesmyia rhamphe* Sublette.

St. Johns County - Roadside ditch on State Road 210.

This ditch drains an area primarily composed of pine flatwoods; color is high, turbidity low, and the bottom is mud. It supports a rich growth of *Sphagnum*, algae, and grasses. There is no shade. At this location we have collected *Larsia beneri* n. sp., *L. lurida* n. sp., *Labrundinia virescens* n. sp., *Ablabesmyia aspera*, *A. hauberi* n. sp., and *A. philosphagnos* n. sp.

TAXONOMY

Fittkau (1962) revised the family Tanypodinae and divided it into five tribes:

Anatopyniini - *Anatopynia*.

Coelotanypodini - *Coelotanypus*, *Clinotanypus*.

Tanypodini - *Tanypus*.

Macropelopiini - *Procladius*, *Psilotanypus*, *Macropelopia*, *Psectrotanypus*, *Apsectrotanypus*.

Pentaneurini - *Natarsia*, *Thienemannimyia*, *Arctopelopia*, *Rheopelopia*, *Conchapelopia*, *Guttipelopia*, *Krenopelopia*, *Telmatopelopia*, *Zavrelimyia*, *Paramerina*, *Larsia*, *Trissopelopia*, *Pentaneura*, *Labrundinia*, *Xenopelopia*, *Monopelopia*, *Nilotanypus*, *Ablabesmyia*.

Key to Subfamilies of Chironomidae—Adults

- | | |
|--|-----------------|
| 1. Crossvein r-m present..... | 2 |
| Crossvein r-m lacking..... | 5 |
| 2. Second branch of R either present and forked or totally lacking..... | 3 |
| Second branch of R simple and distinct; wings usually bare..... | Diamesinae |
| 3. Second branch of R indistinct or totally lacking..... | 4 |
| Second branch of R forked..... | Tanypodinae |
| 4. C scarcely or not at all produced beyond apex of R ₄₊₅ ; space between first and third branches of R very narrow, scarcely wider than one of the branches..... | Tanypodinae |
| C usually produced well beyond apex of R ₄₊₅ ; two radial branches well separated; postnotum without median furrow..... | Podonominae |
| 5. Forebasitarsus longer than foretibia; male dististyle not folded inward; middle and hind tibial spurs modified into basally united combs..... | Chironomidae |
| Forebasitarsus shorter than foretibia; male dististyle folded inward; middle and hind tibial spurs not modified into basally united combs..... | Orthoclaadiinae |
- (Includes Corynoneurinae and Clunioninae of some authors)

Key to Subfamilies of Chironomidae—Larvae

(Adapted from Roback, 1957)

1. Antennae retractile into head; basal antennal segment usually elongate Tanypodinae
Antennae not retractile; basal antennal segment not usually elongate..... 2
2. Third antennal segment of tip of antennal flagellum annulate; nonstriate paralabial plates may be present..... 3
No annulate antennal segments present; paralabials may be striated or not.. 4
3. Entire tip of antennal flagellum annulate; premandibles absent; anal papillae 5 to 10 times long as broad..... Podonominae
Usually only the third antennal segment annulated; premandibles present; nonstriated paralabials may be present; anal papillae shorter Diamesinae
4. Paralabials, if present, nonstriated; may bear hairs; no preapical comb on mandible; maxillary palpus scarcely longer than broad.... Orthoclaudiinae
Striated paralabials present; preapical comb usually present on mandible; maxillary palpus longer..... Chironomidae

Key to Tribes of Tanypodinae—Adults

(Adapted from Fittkau, 1962)

1. Fourth tarsal segment heart-shaped COELOTANYPODINI
Fourth tarsal segment cylindrical or laterally flattened..... 2
2. F-cu stalked..... 3
F-cu not stalked..... 4
3. Stalk of f-cu less than 1/3 as long as Cu_1 ; eyes iridescent, mesonotal tubercule present..... TANYPODINI
Stalk of f-cu less than 1/2 as long as Cu_1 ; eyes black, no mesonotal tubercule present..... MACROPELOPIINI in part (*Procladius*, *Psilotanypus*)
4. C extending beyond R_{4+5} at most the length of r-m.....
..... PENTANEURINI (except *Natarsia*)
C extending beyond R_{4+5} by at least 2 times the length of r-m..... 5
5. Wings with macrotrichia only at distal end; no rows of proximal spines on tibial spurs..... ANATOPYNIINI
Wings with dense macrotrichia; tibial spurs with rows of proximal spines.... 6
6. Eyes iridescent.....
..... MACROPELOPIINI in part (*Psectrotanypus*, *Apsectrotanypus*)
Eyes not iridescent..... 7
7. Mesonotal tubercule present; claws pointed.....
..... MACROPELOPIINI in part (*Macropelopia*)
Mesonotal tubercule absent; claws much split at apex.....
..... PENTANEURINI in part (*Natarsia*)

Key to Tribes of Tanypodinae—Larvae

1. Larvae with slender abdominal segments, no hair fringe; no paralabial comb; anal gills slender..... PENTANEURINI
Larvae with broad segments, usually with hair fringe; labrium with paralabial comb or free chitin points in row..... 2
2. Antennae at least half as long as head; a row of free chitin points..... COELOTANYPODINI
Antennae at most 1/3 as long as head; paralabial comb present..... 3
3. Mandible with thick bulging basal part; six anal gills..... TANYPODINI
Mandible not as above; four anal gills..... 4
4. Lingua with four yellow teeth of equal length.....
..... MACROPELOPIINI in part (*Psectrotanypus*)
Lingua with five teeth..... 5
5. Lingua with black teeth; supralingua scale-like with toothed edge.....
.....MACROPELOPIINI in part (*Psilotanypus* and *Procladius*)
Lingua with reddish-yellow or brownish-black teeth; supralingua two-pointed..... 6
6. Mandible with large two-pointed tooth; labial plate with long pustule-like appendages latero-basally; paralabial comb 13 teeth..... ANATOPYNIINI
Mandible with two small teeth close together; no pustule-like appendages; paralabials with at most eight teeth.....
.....MACROPELOPIINI in part (*Apsectrotanypus* and *Macropelopia*)

Key to Tribes of Tanypodinae—Pupae

1. Lobes of anal fin well developed..... 2
Lobes of anal fin not well developed; not longer than male genital sac..... TANYPIINI
2. Anal fin distinctly wider than long.....ANATOPYNIINI
Anal fin as long or longer than wide..... 3
3. Two lateral filaments of anal fin near the middle of margin; outer margin bare or with tiny spines..... PENTANEURINI
Two lateral filaments of anal fin anterior to middle of anal fin; outer margin of fins hairy or dentate..... 4
4. Lobes of anal fin fringed with fine hairs..... COELOTANYPODINI
Lobes of anal fin with small prickles or dentate on outer edge.....
..... MACROPELOPIINI

Natarsia Fittkau

The genus *Natarsia* as proposed by Fittkau includes those species that Roback (1957) called *Anatopynia* (*Macropelopia*) spp. and characterized as:

Adult: No pulvilli, wing densely haired.

Larva: Paralabials lacking, scattered hair on body, mandibles with blunt mesal tooth.

Pupa: Anal fin hairs near center.

The female has 15 antennal segments. Costa extends beyond R_{4+5} about twice the length of r-m, ending beyond M, about on wing tip. R_{2+3} well formed; m-cu about its length proximal to r-m. Tarsae not bearded. Tibial spurs large, inner and outer about equal.

No larvae have been collected and reared, but adult *Natarsia fastuosa* (Johannsen) have been taken in light traps from Escambia, Calhoun, Gulf, Citrus, Hamilton, Holmes, Hardee, Lake, and Polk Counties. These were captured in February through May, October, and November.

Key to Genera of Pentaneurini (Except *Natarsia*) of Florida—Males

1. Acrostichal setae divergent, passing around, not over the prescutellar area; foretibiae with three or more dark bands; wings patterned; aedeagus well differentiated; spine of dististyle subapical..... *Ablabesmyia*
Not as above..... 2
2. Wings with numerous whitish hyaline spots on a dark background; apex of femur and base and apex of tibia with brown ring... *Guttipelopia*
Not as above..... 3
3. Lobe of basistyle strongly differentiated and 2/3 as long as basistyle..... 4
Basistyle without strongly differentiated lobe..... 5
4. A tuft of 6-10 large setae at apex of third tarsal segment of middle leg; mesonotal tubercule present..... *Conchapelopia*
No tuft of setae at apex of third tarsal segment; no mesonotal tubercule..... *Arctopelopia*
5. Very small species; eyes hairy; costa ends proximal to apex of Cu_1 *Nilotanypus*
Not as above..... 6
6. Costa ends above M; wing with two dark transverse bands..... *Zavrelimyia*
Not as above..... 7
7. Tibial spurs lyre-shaped; mesonotal tubercule present; costa beyond Cu_1 and ending somewhat proximal to M; m-cu scarcely proximal to r-m *Larsia*
No mesonotal tubercule present..... 8
8. Costa ending midway between M and Cu_1 9
Costa ending above or scarcely beyond apex of Cu_1 10
9. Costa extends beyond R_{4+5} ; m-cu about twice its length proximal to r-m; spurs nearly lyre-shaped; parameres scarcely visible..... *Pentaneura*
Costa does not extend beyond R_{4+5} ; m-cu about its length proximal to r-m; spurs slim, as long or longer than tibial diameter; parameres very dark and distinct..... *Paramerina*

10. M-cu and r-m touching; tergite IX normal, always with small setae laterally..... *Monopelopia*
 M-cu about twice its length proximal to r-m; tergite IX arched with a row of long setae across rim..... *Labrundinia*

Key to Genera of Pentaneurini (Except *Natarsia*) of Florida—Larvae

1. Only one basal palpal segment..... 2
 More than one basal palpal segment..... *Ablabesmyia*
2. Black or brown claws present on posterior prolegs..... 3
 No black or brown claws present on posterior prolegs..... 6
3. Four more or less brown claws on posterior prolegs; body with scattered hairs..... *Conchapelopia*
 Three or fewer dark claws on posterior prolegs..... 4
4. None of claws of posterior proleg toothed or spined on inner edge; one dark claw; supra-anal bristles set in distinct papillae..... *Pentaneura*
 At least one claw toothed or spined on inner edge..... 5
5. Three short dark claws; AR 5 or more..... *Guttipelopia*
 One dark claw with three teeth, two short yellow claws with long teeth on inner edge; AR less than 4..... *Monopelopia* (in part) (*boliekae*)
6. One claw bifid on posterior proleg..... 7
 No claws bifid..... 8
7. First laterals shorter than median tooth..... *Labrundinia*
 First laterals not shorter than median tooth..... *Zavrelimyia*
8. One short yellow claw with two small teeth on inner margin.....
 *Monopelopia* (in part) (*tillandsia*)
 Otherwise..... 9
9. Part of head capsule dark..... *Paramerina*
 Head capsule entirely pale..... 10
10. Median tooth longer than first laterals; very small species..... *Nilotanypus*
 Median tooth not longer than first laterals..... 11
11. First lateral tooth out-turned; body with scattered hairs.....
 *Conchapelopia*, *Arctopelopia*
 First lateral tooth not out-turned..... *Larsia*

Ablabesmyia Johannsen

This is the genus of Pentaneurini encountered most commonly in Florida, both in number of species and number of individuals. Adults are bicolored and wings are patterned, but the differences in species are subtle and often they can be separated with certainty only on the basis of the male genitalia.

Adults of this genus are differentiated by the following characteristics: the dorso-lateral (acrostichial) setae of the mesonotum are divergent around the prescutellar area; the foretibia has three or more dark rings; the base of the basistyle forms a hollow which contains strongly differentiated structures; the spine of the dististyle is subapical. The larvae have an antennal ratio of at least 4; the head and body surfaces are smooth; anal gills slender and about $\frac{1}{2}$ as long as the prolegs; proleg claws simple, usually one or more darkened. The pupae are distinguished by having round or ovate respiratory organs with a row of spines at base of each organ, not unlike that of *Guttipelopia*.

Descriptions of immature stages of North American *Ablabesmyia* are found primarily in the following publications: Malloch (1915), Johannsen (1937), Hauber (1945), Roback (1957), and Sublette (1964).

Key to *Ablabesmyia* Larvae

1. One claw of posterior proleg dark yellow, none brown; AR 5.8; all teeth of lingua dark yellow..... *philosphagnos*
At least one claw of posterior proleg brown or black..... 2
2. A large dark brown rectangle ventrally at apex of head capsule; five or six palpal segments; AR 5.1; one short dark claw, one longer claw slightly darkened..... *hauberi*
No dark brown rectangle at apex of head capsule..... 3
3. Maxillary palpus with more than three basal segments..... 7
Maxillary palpus with two or three basal segments..... 4
4. Three basal palpal segments (most basal one very small); AR 4.5:1; two dark claws, the shorter one darker..... *janta*
Only two basal palpal segments..... 5
5. Second palpal segment distinctly longer than first (20:26); AR 5.4-6; two dark claws about equally dark..... *peleensis*
Palpal segments approximately subequal; AR not over 5..... 6
6. AR 4.5; sensory pit at .62 from base of first antennal segment; anal papillae gray, two times long as wide..... *rhamphe*
AR 5; sensory pit at .50 from base of first antennal segment; anal papillae three times long as wide..... *americana*
7. All teeth of lingua dark; inner laterals distinctly shorter than outer laterals; one short dark claw, one longer claw may also appear very slightly darkened..... *aspera*
Tips of three median teeth of lingua pale; at least two distinctly darkened claws on posterior proleg..... 8
8. Inner lateral teeth of lingua almost as long as outers, median smaller; two dark claws, one of which is longer..... *auriensis*

Clay County - Black Creek in February 1962, and Peter's Creek in February 1963.

Jackson County - Waddell's Mill Creek in March 1963.

Jefferson County - swamp-and-bog stream in December 1961.

Ablabesmyia peleensis (Walley)

(Plate 13, figs. 1-5; Plate 17, figs. 6, 13)

Tanytus peleensis Walley, 1926, Canad. Ent. 58:64.

MALE: WL 1.8 mm. (range 1.80 - 2.2); AR 1.8; LR 0.82. Creamy white with medium brown head, pedicel of antenna, sternum, coxae, markings on pleurae; abdominal segments 1-5 pale, 6-8 brown. Male genitalia pale, darkened on apical third and at inner corners of base. Median band of foretibia about 2.5 times as wide as tibial diameter, at 0.54 from base of tibia, and slightly beyond midway of the other two dark bands; knees are usually yellowish. Basal white on foretibia is two times as wide as subbasal dark band on foretibia. Subapical spot in M is basal to one above in R. Apex of dististyle : aedeagal blade : dorsal lobe as 2 : 2 : 0.5. Subapical stylet acute, not broadened at apex.

FEMALE: Colored as male; last antennal segment blackish with distinctly mucronate tip.

LARVA: AR 5.7 (range 5.4 - 6.6); sensory pit at 0.53 from base; lingua with all teeth dark, middle three shorter than outers, median shortest; 15 teeth on supralingua; maxillary palpus with two basal segments (20 : 26), second segment smaller in diameter and slightly darker; anal papillae pale brownish, about three times as long as wide; posterior proleg with two dark claws, about equally dark.

PUPA: Cast skin 3.8 - 5.0 mm. long, light brown, lightly patterned; respiratory organ 0.40 - 0.60 mm. long, light brown with very long papilla at apex; seven or eight sharply pointed spines of varying sizes at base; anal fins 1.1 times long as wide; male genital sac is four-fifths as long as anal fins.

This is one of the most widely distributed species in Florida. It has been taken and reared from these locations:

Leon County - Boliek's Pond in April and October 1963, May and June 1964, and January 1965.

Jefferson County - Lake Miccosuckee in September 1961, June and November 1963, and January 1965. Swamp-and-bog stream in December 1961.

Clay County - Black Creek, S. Prong in February 1963; and State Road 16 in November 1964.

Duval County - Beach Blvd. creeks in March 1964; and Expressway creeks in November 1961 and May 1962.

Flagler County - Little Haw Creek in June 1964; and Rayonier Ditch in September 1963, June and November 1964.

Taylor County - roadside ditch in September 1961.

A. peleensis has been recorded from light trap collections in 17 Florida counties.

Within "*A. peleensis*" is a group of specimens that run, in general, larger and darker. This material is not considered describable at present.

MALE: WL 1.9 - 2.2 mm.; WL in females 2.2 - 2.4 mm. The abdomen is usually somewhat infusate, more so in females, but we can find no clear-cut characteristics to separate them as adults; wing patterns are not very clear, somewhat as in *A. illinoensis* as illustrated by Walley (1928). For the present we are including these specimens with *A. peleensis*. The larval ratio is highest in this group of larger specimens (5.8 - 6.6), the pupal casts are 5.0 - 5.8 mm. long, and respiratory organs range from 0.47 - 0.60 mm. long.

Ablabesmyia rhamphe Sublette

(Plate 16, fig. 2; Plate 17, figs. 1-5)

Ablabesmyia rhamphe Sublette, 1964, Tulane Stud. in Zool. 11-114-115.

MALE: WL 2.0 mm. long; AR (2.00 in holotype, antennae missing in Florida specimen); LR 0.82. Pale yellowish-white ground color with medium brown mesonotal vittae, postnotum, pedicel of antennae, marks on pleurae, and sternum. Abdominal segments 1 - 5 pale with faint brownish basal bands; segments 6 - 8 brown; genitalia with distinct basal bulge darkened; forefemur with basal third darkened and apical narrow brown band; other femora with only apical band darker. Tibial bands narrow, especially the median one; median band at 0.54 from base of tibia, and midway between the other two dark bands; subbasal dark band of tibia is about two times as wide

as basal white band. Wing with distinct dark spots, much as in *A. aspera*, the spot in M apical to spot above in R.

FEMALE: Similar to male; WL 2.0 mm., densely hairy, the spots more sharply contrasting in color than in male, large and confluent.

LARVA: AR 4.6, sensory pit at 0.62; lingua with inner lateral teeth almost as long as outer laterals and only slightly longer than the median tooth; anal papillae gray, two times long as wide; two hooked dark claws on posterior proleg, the shorter one slightly darker; maxillary palpus with two approximately subequal basal segments (12 : 12, or 12 : 14).

PUPA: Cast skin 3.9 mm. long, abdominal segments yellow, rest of pupa gray; respiratory organs black, ovoid, 0.36 mm. long, with distinct apical papilla, respiratory duct flared at apex; 14 large and 3-6 tiny blunt-tipped spines at base; anal fin 1.08 times long as wide.

This species was collected and reared from Clay County - Shands Bridge, June 1965. Adults were also collected in light traps in Polk County.

Ablabesmyia ornata new species

(Plate 11, figs. 9-12; Plate 12, fig. 4; Plate 15, fig. 3; Plate 17, fig. 12)

MALE HOLOTYPE: Flagler County, Florida, Rayonier Ditch, May 26, 1964. WL 1.8 (1.7 - 2.0) mm. long; AR (antennae missing in holotype) (1.6 - 1.8 in paratypes); LR 0.82 (0.82 - 0.89). Ground color dark orange-brown, mesonotal vittae, pleural markings, postnotum, pedicel, and sternum darker brown. Femora light, except on foreleg and middle leg it is darkened along anterior edge, and has very narrow dark subapical ring; knee joints dark. The tibial bands are about as wide as tibial diameter, median ring on foretibia is 0.6 from base, and midway between the two other dark bands. Subbasal dark band of foretibia about as wide (or slightly less) as basal white band. Wings with large confluent spots: two large spots in cell R; m-cu dark, a spot at apex of R_{1+2} ; two large dark areas posterior to Cu_2 ; spot in M is apical to spot above in R. Abdominal segments 1 - 5 with basal brown bands, rest of segments dark; genitalia light brown, darker across base.

FEMALE ALLOTYPE: Alachua County, Florida, Hatchet Creek, April 21, 1964. WL 1.78 (1.65 - 1.80) mm., marked as male.

LARVA: AR 4.1 - 4.4, sensory pit at 0.59 from base of segment; lingua with the three median teeth much shorter (median shortest), pale at tip; anal papillae brown, 3.5 times long as wide; two dark claws on posterior proleg; maxillary palpus with five basal segments.

PUPA: Cast skin 3.6 mm. long, light brown with a distinct and very ornate pattern (see Plate 17, fig. 12); respiratory organ 0.27 mm. long, blackish, duct not abruptly widened at apex; seven large and three smaller round-tipped spines; anal fin 1.2 times long as wide; male genital sac three-fourths as long as fin.

The median band of foretibia being at the middle eliminates these species: *A. annulata*, *A. cinctipes*, *A. auriensis*, *A. mallochi*, and *A. prudens*; the wing pattern eliminates *A. ideii* and *A. basalis*; the number of larval palpal segments excludes *A. americana*, *A. rhamphe*, and *A. janta*; and the much smaller size eliminates *A. aspera* and *A. aequifasciata*.

This species has been collected and reared from:

Flagler County - Rayonier Ditch in May 1964 (holotype, 2♂♂, 1♀).

Alachua County - Hatchet Creek in April 1961 (allotype, 3♀♀, 4♂♂).

Clay County - Peter's Creek in February 1965 (2♂♂, 1♀).

Ablabesmyia hauberi new species

(Plate 11, figs. 5-8; Plate 12, fig. 5; Plate 16, fig. 3)

MALE HOLOTYPE: Flagler County, Florida, Rayonier Ditch, May 26, 1964. WL 1.9 (1.6 - 1.9) mm.; LR 0.84; AR (antennae missing in holotype) (2.2 on paratype). Thorax yellow-brown with darker brown vittae and postnotum, marks on plurae, sternum, and pedicel of antennae; scutellum lighter than vittae; tibial bands very narrow, about equal to tibial diameter; median band of foretibia at 0.6 from base of segment, midway between the other two dark bands; subbasal dark band is about one-half as wide as basal white. Abdomen suffused with brown. Wing has two spots in R, one in M; spot in M is apical to one above in R; three dark spots posterior to Cu₂, but these sometimes coalesce to make two spots. Basistyle without lateral bulge at base; aedeagal blade less than two times as long as apex of dististyle, blade almost straight; dorsal lobe three-fourths as long as blade.

FEMALE ALLOTYPE. Flagler County, Florida, Rayonier Ditch, May 26, 1964. WL 1.8 mm. Similar to male; abdominal segments with suggestion of brown basal bands.

LARVA: AR 5, sensory pit at 0.59. Head capsule is brownish-yellow with a conspicuous dark brown rectangle on apex ventrally and small brown median spot near posterior border ventrally; maxillary palpus with five or six basal segments; lingua has the three median teeth shorter and light at tip; at least 15 teeth on supralingua; anal papillae 2.5 - 3.0 times long as wide, pale gray; posterior proleg has one short dark brown claw and one longer claw is very slightly brownish.

PUPA: Cast skin is 4.2 mm. long, light brown with very faint pattern; respiratory organ medium brown, 0.31 mm. long by 0.15 mm. wide, 10 bluntly pointed spines of varying sizes and three very small spines at base; duct not abruptly widened at apex; anal fin 1.3 times long as wide, male genital sac three-fourths long as fin.

The median band of foretibia being midway eliminates; *A. annulata*, *A. cinctipes*, *A. auriensis*, *A. mallochi*, and *A. prudens*; number of larval antennal segments eliminates *A. americana*, *A. rhamphe*, and *A. janta*. This species is also very similar to *A. aequifasciata*, but the genitalia are quite different. A great deal of study and collecting will be necessary before the exact taxonomic positions of *A. hauberi*, *A. mallochi*, *A. aequifasciata*, and *A. auriensis* can be finally determined.

A. hauberi has been collected and reared from:

Flagler County - Rayonier Ditch in May 1964 (holotype, allotype, 1♂, 1♀).

Clay County - Peter's Creek in January 1965 (1♀).

Larvae were collected at the following locations, but not reared:

Clay County - Black Creek in August 1963.

Leon County - Boliek's Pond in May 1964.

Ablabesmyia philosphagnos new species

(Plate 14, figs. 1-6; Plate 17, fig. 7)

MALE HOLOTYPE: St. Johns County, Florida, roadside ditch, February 20, 1965. WL 2.6 (1.85 - 2.6) mm.; AR 2.3 - 2.7; LR 0.83. Mesonotum white with dorsum all brown, vittae black, distinct; sternum, marks on pleurae, occiput, coxae, and pedicel of antenna black, antennal flagellum blackish; all mesonotal hairs pale; pronotum and scutellum white, postnotum black; mouthparts dark, except palpi are pale. Abdominal segments 1 - 5 white with small black median rectangular fasciae, larger and darker on more apical segments; seg-

ments 6-8 entirely blackish-brown. Dark bands of tibia are very narrow, about equal to tibia diameter; middle band of foretibia is at 0.58 from base of segment and midway between the other two dark bands; fifth tarsal segment on all legs and most of fourth segment on foreleg dark. Spot in cell M is basal to spot above in cell R. No bulge at base of basistyle, genitalia pale; aedeagal blade very small, about three-fourths as long as the narrowed apex of dististyle; sub-apical stylet of dististyle acute at tip as in *A. peleensis*, not flared as in *A. americana*.

FEMALE ALLOTYPE: St. Johns County, Florida, roadside ditch, February 6, 1965. WL 2.1 mm. Antenna grayish, last segment all blackened. Marked as in male, except abdominal tergites all with broad basal dark fasciae, sternites dark.

LARVA: AR 5.8; larva very pale, apex of mandible black; teeth of lingua amber, all else pale. Maxillary palpus with two basal segments (12:22), sensory pit at 0.51 from base; lingua with three median teeth shorter, middle one shortest; supralingua with 16 teeth; all claws of posterior proleg pale, one short claw is slightly darker amber, one claw has apex bent at right angles to base; anal papillae three times long as wide. This is the only described North American *Ablabesmyia* that lacks black or dark brown claws on the posterior prolegs.

PUPA: Cast skin 5.1 mm. long, pale yellow; shape of opercula distinctive (see Plate 14, fig. 4); respiratory organ 0.58 mm. long by 0.25 mm. wide, apex of respiratory duct forms a rounded "T"; four large, sharply pointed spines and six tiny spines at base of respiratory organ; anal fin 1.2 times long as wide, male genital sac three-fifths as long as fin.

The acute stylet of dististyle eliminates all described species except *A. cinctipes* (five dark bands on foretibia), *A. peleensis* (duct of respiratory organ of pupa), and *A. illinoiensis*. The wing markings of this species are very similar to those of paratype #18799 *A. illinoiensis*, but the following obvious differences exist: Malloch's (1915) original description says "The basal joint of the foretarsus is slightly longer than the next two joints together. . . ." In *A. philosphagnos* the forebasitarsus has a ratio to the next two tarsal segments together of 10:11.6.

The pupa of *A. illinoiensis* is described in Malloch's key: "Apex of pupal respiratory organ without distinct aperture and with a long conspicuous hair. . . ." *A. philosphagnos* has a very distinct aperture, but no long hair. Malloch says *A. illinoiensis* pupa has 8-10

short tubercles at base of respiratory organ; this new species has 4-5 large, sharply pointed spines and 4-9 much smaller spines.

Specimens recorded as *A. illinoiensis* by Beck and Beck (1959) do not agree with the paratype #18799 in leg markings and other characters; they probably represent a closely related, undescribed species.

A. philosphagnos has been collected and reared only from a roadside ditch in St. Johns County - State Road 210 in February 1965 (holotype, allotype, 18 ♀, 4 ♂).

Guttipelopia Fittkau

The species placed in the genus *Guttipelopia* are those formerly in Edwards' *Pentaneura* (Group B), characterized by having wings with numerous whitish hyaline spots on a gray ground color; C extending scarcely beyond R_{4+5} and ending proximal to M; R_{2+3} indistinct; m-cu about its length proximal to r-m; no pulvilli; tarsi not bearded. The larva has anal gills short, curved like a horn, and reaching only about a seventh of the proleg length. The head capsule is roughly granular and there are wrinkling undulations the length of the body surface. The pupa has an oval respiratory organ with an apical papilla containing a rather long duct; there is a dark brown horn-like projection mid-dorsally on the thorax.

Fittkau (1962) lists *G. guttipennis* for Europe, *G. multipunctata* for North America. The figures given in Fittkau (1962) and in Goetghebuer (1927) for *G. guttipennis* pupae differ chiefly from Florida specimens in that the pupal respiratory organ figured has a much shorter duct at the apex than has *G. currani* n. sp. In Hauber (1946), *Pentaneura "guttipennis"* from Iowa are said to have all femora pale, with the apical fourth darkened; our specimens have gray femora with apical half pale except for a dark subapical band. Curran (1930) describes *Tanypus multipunctatus* from a female, and it would be difficult to state positively that this is not the species we have without seeing the holotype, but his description also says: "legs yellowish; broad apex of femora . . . brown."

Guttipelopia currani new species

(Plate 3, figs. 5-8)

MALE HOLOTYPE: Flagler County, Florida, Rayonier Ditch, June 18, 1964. WL 1.5 (1.5 - 1.75) mm.; LR 0.68; AR 1.3. Yellow-brown with darker brown mesonotal vittae, sternum, postnotum, pleural markings, pedicel of antenna, and coxae. Wing patterned, dark with oval white spots; crossvein dark brown, basal arculus black. Legs

brown, femora lighter on apical half except for a very dark subapical ring; tibia with dark subbasal and apical rings; tarsi brownish, darker on foretarsi, with faint pale ring basally on each segment. Abdomen light brown, with purplish subcutaneous pigmentation.

FEMALE ALLOTYPE: Leon County, Florida, roadside pond, May 5, 1964. WL 1.8 mm. Colored as male, the markings much more distinct.

LARVA: Head capsule pale except for the dark brown teeth of lingua, apex of mandible and very narrow posterior border of head capsule; the three median teeth of lingua slightly shorter than the outers; teeth of mandible approximately equal; basal segment of maxillary palpus about three times as long as wide; AR 6.5-7.3, sensory pit at 0.46 from base of first segment; at least 14 teeth on supra-lingua. Supra-anal bristles, setae of anal papillae, and lateral bristles of posterior proleg dark; claws of posterior proleg varied: three short dark claws (one has a few spines apically along outer margin), at least 10 long pale claws (of which one or two may appear slightly darker than the rest), and two pale claws with fairly large long pectinations on inner edge; anal papillae three times as long as wide; entire body with undulate wrinkles.

PUPA: Cast skin 3.6 mm. long, light brown; respiratory organ 0.4 mm. long (including apical papilla) by 0.25 mm. wide, medium brown, the papilla containing a long coiled duct which ends in a flat disc apically; eight or more pointed spines of varying sizes at base of respiratory organ; a dark brown triangular projection medially on dorsum of thorax, toward posterior, anal fin 1.4 times as long as wide.

This species has been reared from:

Duval County - Beach Blvd. drainage creeks in March 1964 (1 ♀).

Flagler County - Little Haw Creek in June 1964 (1 ♀) and September 1961 (1 ♀); Rayonier Ditch in June 1964 (holotype).

Leon County - Lake Lafayette in April 1963; Boliek's Pond in May 1964 (1 ♂).

Jefferson County - Lake Miccosuckee in June 1963 (2 ♂ ♂, 3 ♀ ♀) and January 1965 (1 ♀).

Polk County - Green Swamp in March 1965 (1 ♂, 1 ♀).

Adults have been taken in light traps at the following locations:

Hamilton County - Jasper in April 1961.

Washington County - Greenhead in September 1961.

Santa Rosa County - West Florida Experiment Station in April 1958.

Pentaneura Philippi

Pentaneura is characterized by Fittkau as having: C slightly to distinctly extending beyond R_{4+5} , ending between M and Cu_1 ; only foretarsi bearded; tibial spurs nearly lyre-shaped, inner and outer spurs approximately equal; tibial comb of hind leg indistinct or lacking; tibiae always longer than femora; fourth tarsal segment of fore and middle leg twice as long as fifth segment; no pulvilli, parameres of male genitalia pale or scarcely visible.

Pentaneura inculta new species

(Plate 3, figs. 1-4)

MALE HOLOTYPE: Clay County, Florida, Peter's Creek, April 15, 1965. WL 1.6 mm. (range 1.6 - 1.95); AR 1.3; LR 0.9. Pale brown with medium brown pedicel of the antenna, markings on pleurae, mesonotal vittae and postnotum, (in some paratype specimens there are distinct brown basal abdominal bands). Legs uniformly pale brown.

FEMALE ALLOTYPE: Clay County, Florida, Peter's Creek, April 15, 1965. WL 1.7 mm. (range 1.60 - 1.9); marked as in male; antennae with 12 segments, the last as long as preceding three segments, not mucronate, but tapered to an apical seta.

LARVA: Body with scattered hairs (as in *Conchapelopia*); AR 3.7 - 4.2, sensory pit at 0.6 from base of segment; all teeth of lingua equal, first laterals out turned; basal segment of maxillary palpus four times long as wide; 10 - 12 teeth on supralingua, longest near the middle of each lateral row; one dark short claw on posterior proleg, fairly broad seta arising near the base of the proleg, which is about one-half as long as the proleg; anal papillae dark, six times long as wide; supra-anal bristles dark, set in distinct papillae. Anal gills very slender, at least twice as long as posterior prolegs.

PUPA: Cast skin 3.6 mm. long, light brown; respiratory organ 0.2 mm. long by 0.08 mm. wide, 10 short round-tipped spines at base; anal fin 1.7 times long as wide, genital sac only about one-half as long as fin.

Fittkau (1962) lists no species of this genus from North America. He lists *P. elisae* and *P. cinerea* from South America. *P. inculta* has

a respiratory organ quite different from that Fittkau figures for *P. elisae*. *P. cinera* is larger (WL 3.2 mm.), and the last antennal segment of the female is longer than the preceding four.

Pentaneura larvae have been collected and reared from the following localities:

Flagler County - Rayonier Ditch in May (1 ♂) and August 1964 (♀), October 1963 (1 ♂), April (1 ♂) and May 1963 (1 ♂).

Jackson County - Waddell's Mill Creek in March 1963 (1 ♀).

Clay County - Peter's Creek in April 1965 (holotype, allotype, 1 ♀).

Monopelopia Fittkau

Monopelopia is characterized as follows: C ends above Cu_1 , R_{2+3} lacking, m-cu and r-m touching or m-cu scarcely proximal; outer tibial spurs missing, inner spurs about as long as diameter of tibia; some tarsal segments on mid and hind legs with sole spines; no basal lobe to basistyle, tergite IX normal, with small setae laterally. The larva has anterior edge of lingua concave, the middle tooth smallest; second antennal segment dark brown, claws of proleg in part dark brown; AR less than 4.

M. boliekae keys to *Monopelopia* both as adult and larva in Fittkau's keys. *M. tillandsia* keys best to *Monopelopia* as an adult, but the larva will not key well in Fittkau's key. The larvae of these two species are separated as follows:

One dark claw with three teeth, two short pale-toothed claws, and four short pale claws with short spines; AR 3.1; anal papillae three times long as wide.....*boliekae*

No dark claws, one short claw has teeth on inner margin, one long claw is serrate on both edges, other long claws are pectinate on one edge; AR 3.6; anal papillae four times as long as wide.....*tillandsia*

Monopelopia boliekae new species

(Plate 10, figs. 1-5)

MALE HOLOTYPE: Leon County, Florida, Boliek's Pond, January 14, 1965. WL 1.5 (1.5 - 1.6) mm.; LR 0.82; AR 1.35. Pale yellow with darker brownish pleural markings; mesonotal vittae, and postnotum dark yellow, abdominal segments with faint blackish basal fasciae; wing veins and macrotrichia light brown; eyes separated by a dis-

tance greater than the pedicel of antennae; no mesonotal tubercule; first palpal segment with two stout spines at apex; tarsal segments bear apical spines (sole spines). Legs uniformly pale.

FEMALE ALLOTYPE: Leon County, Florida, Boliek's Pond, January 14, 1965. WL 1.45 (1.2 - 1.45) mm. Opaque white with distinct yellow mesonotal vittae; postnotum yellowish-brown; forelegs blackish beyond femora; mouthparts unusually elongate; two heavy dark setae near apex of first palpal segment; wing all pale; hairs of mesonotum are dark and rather long.

LARVA: AR 3.1, sensory pit distal to middle, second segment somewhat brown; three median teeth of lingua approximately equal and shorter than outer teeth; basal segment of maxillary palpus 3.5 times long as wide; posterior proleg with one dark claw which has three teeth, two short yellow claws with long teeth along inner edge, and four yellow claws with shorter dentations; anal papillae light brown, about three times long as wide.

PUPA: Cast skin 2.9 mm. long, brown with a very distinct pattern consisting of a small pale median circle with a larger pale circle on each side, and posterior of segment pale; respiratory organ 0.40 mm. long by 0.03 wide, sharply pointed at apex; segment 7 has only three lateral filaments, segment 8 has five; anal fin is 1.3 times as long as wide; male genital sac is longer than fin.

This species has been collected and reared only from Leon County - Boliek's Pond in May (1♂) and June (1♀) 1964, and January 1965 (holotype, allotype, 1♀).

We take pleasure in naming this species for Dr. Irene Boliek, teacher and friend.

Monopelopia tillandsia new species

(Plate 10, figs. 6-9)

MALE HOLOTYPE: Indian River County, Florida, Vero Beach, May 11, 1964. WL 1.75 mm.; AR 1.1; LR 0.7. Pale yellow with mesonotal vittae darker yellow; darker yellow extends to scutellum in a narrow yellow-brown longitudinal stripe each side of midline; forelegs beyond femora are brownish; small brown marks on pleurae; head yellowish-brown with pale brown palps and antennae; antennal pedicel orange-brown; tibial spurs yellow, slender, with basal teeth; eyes separated by slightly more than diameter of pedicel; no spines at apex of first palpal segment; tarsal spines (sole spines) present.

Abdominal segments 2-5 with pale brown irregular basal bands, 6-8 mostly brownish.

FEMALE ALLOTYPE: Indian River County, Florida, Vero Beach, May 11, 1964. WL 1.45 mm.; similar to male in coloring except abdomen all pale; there is a cluster of five or more heavier setae at the apex of first palpal segment:

LARVA: AR 3.8, sensory pit at 0.5, whole antenna somewhat brown; lingua has the three median teeth slightly shorter and distinctly lighter at apex; basal segment of maxillary palpus four times long as wide; all claws of posterior proleg are pale, some serrate; one short yellow-gold claw has two small teeth on inner margin, one long pale yellow claw is serrate along both margins; anal papilla three times long as wide.

PUPA: Cast skin 3.1 mm. long, light brown; respiratory organ 0.32 mm. long by 0.05 mm. wide at apex; no spines at base of respiratory organ; segment 7 has only two lateral filaments, segment 8 has five; anal fin is 0.95 times long as wide.

This species has been collected only from bromeliads in Indian River County - Vero Beach in May 1964 (holotype, 1♂, 1♀). The larvae have been kept alive in the laboratory for 107 days in water from the plants where they were found.

The only other species of Pentaneurini reported from bromeliads is *Isoplastus* (= *Ablabesmyia*) *costarricensis* Picado (1913). Because of the limitations of the original description, we are unable to place this species in one of Fittkau's genera, but it differs in a number of characteristics from *Monopelopia tillandsia*, notably in the shape of the respiratory organ of the pupa, and the number of lateral filaments on the eighth segment of the pupa.

Labrundinia Fittkau

Adult *Labrundinia* are characterized as having C ending above or before Cu₁, R₂₊₃ missing or poorly formed, m-cu double its length proximal to r-m; adults brownish to brown, with patterns on thorax and abdomen; no mesonotal tubercule; tarsi of middle leg with sole spines; inner spur of middle tibia scarcely visible, inner spur missing on hind tibia; fore tibia not bearded, mid and hind tibiae scarcely bearded; ninth tergite of male arched with an apical row of long setae.

Fittkau's characterization of the larvae is based on the only well-described species and is not entirely applicable to the whole genus;

he says the larva has the middle tooth of lingua very large, extending far beyond the other teeth; in two of the species in this paper the outer lateral is about as long as the median tooth. He says the second antennal segment not darkened; in all species included here the second antennal segment is darker than the first, at least basally. In *L. floridana* n. sp. the head capsule is entirely nodulate.

Key to Adult Male *Labrundinia* Species

1. All abdominal tergites brown..... *pilosella*
Abdominal tergites bicolored..... 2
2. Abdominal segment 1 entirely dark (2, 4, and apical half of 6 are pale)
..... *floridana*
Abdominal segment 1 not entirely dark..... 3
3. Abdominal segment 1-4 with dark basal bands, remaining segments dark,
genitalia dark..... *neopilosella*
Abdominal segment 1 entirely pale..... 4
4. Abdominal segment 2 with brown basal band (segments 4 and 6 also
have narrow basal bands; 3, 5, 7, and 8 are mostly dark, paler at
apical margins; genitalia pale..... *johannseni*
Abdominal segment 2 entirely pale (segments 1 and 2 pale, 3-5 with
dark basal bands, wider on each successive segment; 6-8 dark; geni-
talia pale; wing with pale round spots at apex of cell R, M, and
basally in Cu..... *virescens*

Key to *Labrundinia* Larvæ

1. Head capsule distinctly marked with black..... 2
Head capsule not distinctly marked with black..... 3
2. Head nodulate, posterior fourth black..... *floridana*
Head not nodulate, a black band across middle of head capsule..... *johannseni*
3. Median tooth of lingua distinctly longer than outer laterals; posterior
prolegs with *Corynoneura*-like spur with 6-8 spines basally..... *neopilosella*
Median tooth of lingua not longer than outer laterals; spur of posterior
prolegs with only 1-3 fine spines basally..... 4
4. Head capsule darkened apically..... *pilosella*
Head capsule not darkened apically, a pale green larva..... *virescens*

Key to *Labrundinia* Pupæ

1. Pale yellow; anal fins two times long as wide, with very long lateral
spines; dark area of respiratory organ "Z" shaped..... *virescens*
Light brown; anal fins less than two times long as wide..... see below
- The remaining species of *Labrundinia* are very similar as pupæ; the shape

of respiratory organs differ, but is influenced by the slide mount. The following chart may help separate them:

| | Length of cast | Length of respiratory organ | Number of spines | Anal fin l:w |
|---------------------|----------------|-----------------------------|---------------------------------|--------------|
| <i>floridana</i> | 2.5 mm. | 0.18-0.21 mm. | 7-8 | 1.4:1 |
| <i>pilosella</i> | 2.2 mm. | 0.19-0.21 mm. | 7-10 most anterior largest | 1.6:1 |
| <i>neopilosella</i> | 2.1 mm. | 0.20-0.23 mm. | 6 (?) | 1.7:1 |
| <i>johannseni</i> | 2.75 mm. | 0.23-0.25 mm. | 8-12, 3rd from anterior largest | 1.6:1 |

Labrundinia floridana new species

(Plate 7, Figs. 1-5; Plate 9, Fig. 1)

MALE HOLOTYPE: Clay County, Florida, Peter's Creek, March 7, 1963. WL 1.3-1.5 mm.; AR 1.3; LR 0.65. Mesonotum yellowish-white, dorsum black, vittae not distinct; antero-lateral corners of mesonotum, scutellum and halteres white; postnotum, occiput, fore-coxae and pedicel of antenna brown; legs pale brown, apical tarsal segments darker. Abdominal segments dark except apical four-fifths of segments 2 and 4, and apical half of segment 6 pale whitish, genitalia pale; wing macrotrichia brown, dense; a small black spot on wing base, another on squama.

FEMALE ALLOTYPE: Clay County, Florida, Peter's Creek, March 7, 1963. WL 1.3 mm. Light brownish-white, mesonotal vittae and postnotum blackish-brown; marks on pleurae, sternum, and abdominal tergites brown; three small brown spermatheca (about .03 mm. in diameter); last antennal segment not quite as long as preceding two (25 : 27).

LARVA: Head capsule tan, black on apical fourth, entire head nodulate. Lingua with all teeth dark brown, outer laterals about as long as median tooth; mandible with lateral and accessory teeth approximately same size; AR 2.5, second antennal segment brown basally; basal segment of maxillary palpus two times long as wide; anal papillae 3.5-4.0 times long as wide, tan with blackish base and seven dark apical setae; spur of posterior proleg *Corynoneura*-like; claws of posterior proleg yellow, one bifid; some long yellow claws are very finely spined, but this is very difficult to see.

PUPA: Cast skin 2.5 mm. long, light brown; respiratory organ dark brown, 0.18-0.21 mm. long by 0.06-0.08 mm. wide; seven or eight

spines at base, most anterior not largest; anal fin 1.4 times long as wide.

This species has been collected and reared from:

Clay County - Peter's Creek in February (1♂, 1♀) and March (holotype, allotype) 1963.

Flagler County - Little Haw Creek in March (2♂♂) and May (1♂) 1964; Rayonier Ditch in August 1964 (1♀); October 1963 (1♀, 2♂♂), and January 1965 (1♂).

Labrundinia pilosella (Loew)

(Plate 7, figs. 6-10; Plate 9, fig. 4)

Tanypus pilosellus Loew, 1866, Berlin Ant. Zeitschur. 10:5.

This appears to be the same as the specimens described by Roback (1962) as *P. pilosella*.

MALE: WL 1.35 - 1.4 mm.; AR 1.4; LR 0.55. Mesonotum yellow with black-brown dorsum; postnotum, pedicel, occiput, and sternum dark brown; legs light brown. All abdominal segments and basistyle light brown.

FEMALE: WL 1.2 mm. Brown with darker brown dorsum of mesonotum, postnotum, occiput, pedicel of antennae, and abdominal tergites; three brown spermatheca, each about 0.04 mm. in diameter; last antennal segment about as long as preceding two segments (30 : 31).

LARVA: AR 2.1, second antennal segment dark brown; head capsule slightly darker brownish on apical fourth, but not black or nodulate; teeth of lingua dark brown; basal segment of maxillary palpus two times long as wide; anal papillae brown, 3.5 times long as wide; spur of posterior proleg with two or three very fine spines along basal fourth of shaft.

PUPA: Cast skin 2.4 mm. long, light brown; respiratory organ somewhat darker, 0.19 mm. long by 0.07 mm. wide; 7 - 10 spines at base, most anterior longest and darkest; anal fin 1.6 times long as wide.

Collected and reared from:

Flagler County - Little Haw Creek in June 1964.

Alachua County - Hatchet Creek in August 1964.

Labrundinia virescens new species

(Plate 8, figs. 1-5; Plate 9, fig. 2)

MALE HOLOTYPE: Leon County, Florida, Boliek's Pond, June 30, 1964. WL 1.6 mm.; AR 1.45; LR 0.64. Thorax opaque yellowish-white, mesonotal vittae and postnotum brown; sternum light brown, scutellum pale; halteres pale brown; legs white except coxae light brown, forelegs beyond femora, and all apical tarsal segments brown; distinct large empodium; each tarsal segment has a pair of straight brown spines (sole spines) apically; wing macrotrichia brown with clear round areas apically in cell R, M, and in the base of Cu₁. Abdominal segments 1 and 2 white, 3, 4, and 5 with brown basal band (widest on 5), segments 6-8 brown, genitalia pale. Head and antennal flagellum brown, pedicel of antenna darker brown; eyes separated dorsally by less than the diameter of the pedicel; palpi pale.

FEMALE ALLOTYPE: Leon County, Florida, Boliek's Pond, May 5, 1964. WL 1.45 mm. Brown with darker mesonotal vittae, head, pedicel, and postnotum. Wing macrotrichia dark except for clear area at apex of cells R, M, and the base of Cu₁. Last antennal segment distinctly shorter than the two preceding segments (32 : 42).

LARVA: Pale green, head capsule pale; teeth of lingua dark brown; AR 2.4; basal segment of maxillary palpus 3.7 times long as wide. Anal papillae 5.5 - 6.0 times long as wide, pale with slightly darkened base; spur of posterior proleg simple with one to three tiny spines on base of shaft.

PUPA: Cast skin 3.1 mm. long, pale yellow; respiratory organ light brown and 0.25 - 0.30 mm. long, with very distinctive shape; anal fin two times long as wide with unusually long lateral spines, not darkened laterally.

This species has been collected and reared from:

Leon County - Boliek's Pond in May (allotype, 1 ♀), June 1964 (holotype, 1 ♂, 1 ♀), and July 1965 (1 ♀).

Duval County - Expressway creeks in September 1963 (1 ♀).

St. Johns County - ditch on State Road 210 in February 1965 (1 ♂).

Labrundini neopilosella new species

(Plate 7, figs. 11-15; Plate 9, fig. 3)

MALE HOLOTYPE: Flagler County, Florida, Rayonier Ditch, June 3, 1964. WL 1.2 mm.; AR 1.2; LR (missing from holotype). Mesono-

tum yellowish with reddish-brown vittae, sternum, postnotum, pedicel of antenna, and antennal flagellum. Abdominal segments 1-4 pale with brown basal band, remaining segments and genitalia brown; empodium almost as long as claws.

FEMALE ALLOTYPE: Flagler County, Florida, Rayonier Ditch, June 3, 1964. Tan with brown vittae. WL 0.95 mm. Last antennal segment about equal to two preceding segments (30 : 30); three spermatheca, each about 0.03 mm. in diameter.

LARVA: Head capsule somewhat darkened apically; lingua distinctive in the much longer median tooth; basal segment of maxillary palpus three times long as wide. AR 2.3; anal papillae 4.5-5.0 times long as wide, light except darkened at base; *Corynoneura*-like spur on posterior proleg.

PUPA: Cast skin 2.1 mm. long, pale brown; respiratory organ darker, 0.20 mm. long, with about six spines at base; anal fin 1.7 times long as wide, apical points darkened.

This species has been collected and reared from:

Flagler County - Rayonier Ditch in June 1964 (holotype, allotype, 1 ♀) and January 1965 (1 ♂).

Leon County - Boliek's Pond in May 1965.

Polk County - Green Swamp in March 1965 (1 ♀).

L. neopilosella appears to be the same as Roback's (1957) larva described and figured as "nr. *pilosella*." The specimens from California described as *P. pilosella* by Sublette (1964b) appear to be very close to this species but have abdominal third segment mostly brown.

Labrundinia johannseni new species

(Plate 8, figs. 6-10; Plate 9, fig. 5)

MALE HOLOTYPE: Flagler County, Florida, Rayonier Ditch, January 30, 1965. WL 1.45 mm.; AR 1.25; LR 0.72. Mesonotum light brown with dark brown vittae, marks on pleurae; postnotum, head, pedicel of antenna, and antennal flagellum also brown; palpi paler. Legs pale, femora of mid and hind legs and all of foreleg brownish; abdomen pale brown to whitish, second and fourth segments with narrow basal brown band, third, fifth and seventh segments brown on basal three-fourths; wing and macrotricia light; empodium distinct; genitalia pale, arched apical edge of ninth tergite narrowly brown, and apical stylet of dististyle brown.

FEMALE ALLOTYPE: Flagler County, Florida, Rayonier Ditch, February 27, 1965. WL 1.2 mm. Body yellowish-tan with mesonotal vittae and postnotum darker; legs paler; last antennal segment not distinctly darkened, about as long as preceding two segments.

LARVA: Distinctive in having a broad brown band across the middle of the head capsule, the band broadest at the middle, a small nodulate area at lateral margins of head at tip of this band. AR 2.0, second segment darker; basal segment of maxillary palpus 2.3 times long as wide; median tooth of lingua longest and broadest, inner and outer laterals approximately same length; posterior prolegs gray, 5.5-6.0 times long as wide, apical setae blackish; spur of posterior proleg with many fine spines at base.

PUPA: Cast skin 2.75 mm. long, light brown; respiratory organ 0.24-0.26 mm. long by 0.12 mm. wide, 8-12 round-tipped spines, third from anterior of row is usually distinctly larger; anal fin 1.6 times long as wide, genital sac almost long as fin.

This species has been collected and reared from:

Flagler County - Rayonier Ditch in January (holotype, 1♀) and February (allotype) 1965.

This seems to be the same as the specimens from Winter Park, Florida, referred by Johannsen (1946) to *P. pilosellus*.

Zavreliomyia Fittkau

Characteristics that distinguish this genus as adults are: AR 2.0; postoculars in single row; wings more or less patterned; tarsi well-bearded; C ending above M; R_{2+3} well-formed; outer spur of tibia with short main tooth and fan-like spread of proximal teeth, inner spur with proximal teeth lying close, and main tooth as much as two times the spur length. Anal point conical; basistyle without lobe, cylindrical, three times long as wide; stylet as long as width of middle of dististyle. The larva has all teeth of lingua about equal; AR 3-3.3; mandible with similar sized lateral and accessory teeth; this is as in *Paramerina*.

Zavreliomyia carneosa Fittkau

(Plate 4, figs. 1-4)

Ablabesmyia carnea Johannsen, 1905, N. Y. State Mus. Bull. 86:140 (misdetermination of *T. carnea* Fabricius).

Zavreliomyia carneosa Fittkau, 1962, Die Tanypodinae, p. 315.

MALE: None reared.

FEMALE: WL 2.35 - 2.4 mm.; wing with two dark fasciae forming bands across wing, one across r-m and one basad of apex of R_{4+5} .

LARVA: AR 3.1, sensory pit at 0.65 from base of segment; basal segment of maxillary palpus four times long as wide; 12 - 14 teeth on supralingua; all teeth of lingua equal in length, the three median sometimes appearing paler apically; all claws of posterior proleg pale, one bifid; anal papillae gray, 2.5 times long as wide.

PUPA: Cast skin 4.65 mm. long, light brown, with darker spot medially at anterior edge of each segment; respiratory organ 0.32 mm. long by 0.08 mm. wide, with about 12 round-tipped spines at base; anal fin 1.3 times long as wide.

Our only specimens are females reared from larvae collected in Tallahassee, Florida, Caldwell's Ravine, Leon County, February 1957.

Paramerina Fittkau

Paramerina is characterized by: C ending between M and Cu_1 ; R_{2+3} weakly formed, R_2 scarcely visible; m-cu about its length proximal to r-m; outer spurs more than twice as long as inner spurs; tibial comb present on hind tibia, hind tibia well-bearded, fore and mid tibia not bearded; basistyle cylindrical, about 2.5 times long as wide, parameres strikingly dark and distinct.

Paramerina anomala new species

(Plate 4, figs. 5-8)

MALE HOLOTYPE: Clay County, Florida, Peter's Creek, March 7, 1964. WL 1.65 (1.45 - 1.65) mm. long; LR 0.88; AR 1.3. White with light brown mesonotal vittae and occiput; dark gray-black pleural spots, postnotum, and wide basal bands on first, third, fourth, sixth, and eighth segments (this leaves the second, fifth, and seventh all pale). Legs, wings, and antennae light brown; tibia on hind leg with spur and comb.

FEMALE: Not known.

LARVA: Posterior fourth of head capsule blackish-brown; all teeth of lingua equal in length, first laterals out-turned, middle three paler at apex; AR 2.5, sensory pit at 0.6 from base; 13 - 15 teeth on supralingua; lateral and accessory teeth of mandible about equal; claws

of posterior proleg all pale and simple; anal papillae dark, 2.5 times long as wide.

PUPA: Cast skin 3 mm. long, dark brown except for rounded triangular spots on each side near base of the first through seventh segments; segments finely spiculate, especially laterally; respiratory organ 0.18 - 0.22 mm. long; 10 - 12 round-tipped spines at base, as well as a nodulate area; anal fin is 1.7 times long as wide.

This species has been collected and reared only from Clay County - Peter's Creek in March 1963 (holotype), and August 1964 (2♂♂).

Nilotanypus Kieffer

The genus *Nilotanypus* is very distinctive; it is the only genus of Pentaneurini with hairy eyes and the costa ending proximal to the apex of Cu_1 ; a very small species.

Nilotanypus americanus new species

(Plate 6, figs. 4-6)

MALE: No specimens.

FEMALE HOLOTYPE: Clay County, Florida, Peter's Creek, February 28, 1963. WL (wings missing, paratype 1.5 mm.). Light tan abdomen; most of thorax, head, scutellum, postnotum, antennae, legs, wings, and dorsum of abdomen brown; the thorax and head are almost black; three dark spermatheca; eyes hairy; costa ending before apex of Cu_1 ; antennae 12-segmented.

LARVA: AR 3.0, sensory pit at 0.68 from base of segment; all teeth of lingua about the same length, dark, pointed; basal segment of maxillary palpus 2.7 times long as wide; anal papillae dark, about three times long as wide; all claws of posterior prolegs pale, some minutely spined on inner edge.

PUPA: Cast skin 2.2 mm. long, dark brown; respiratory organ 0.160 mm. long by .025 mm. wide. 12 round-tipped spines at base, all approximately equal in length; each abdominal segment has median apical row of rounded short nodules; on the eighth segment these become long spines, the row interrupted medially; no lateral filaments on the seventh segment; five on the eighth segment; eighth segment distinctly spiculate; anal fin 1.17 times long as wide.

Johannsen (1946) describes *Pentaneura dubia* (Meigen) from Ithaca, New York as having a wing length of 1.5 to 2.0 mm. and the basitarsis of the middle leg about 1.5 times as long as its tibia.

From Johannsen's meager description we cannot tell if the two females we reared are the same species he had from New York. Fittkau (1962) states that exuviae of *Nilotanypus* collected in North America by Brundin probably belong to *P. dubius* of Johannsen, but is not the same as *P. dubius* (Meigen).

This species has been reared only from Clay County, Peter's Creek, collected in February (holotype) and March (♀ paratype) 1963.

Conchapelopia Fittkau

The genus *Conchapelopia* is in Fittkau's *Thienemannimyia* series which also includes *Arctopelopia*, *Rheopelopia*, and *Thienemannimyia*. *Conchapelopia* is generally pale with basal abdominal bands; there is a tuft of 8 - 10 large strong setae (about 1.5 times as long as the tibial diameter) at the apex of the third tarsal segment of the middle leg; the femur is not, or is only indistinctly ringed near apex; the crossveins are pale; R_{2+3} well-formed, C ends just before or above apex of M. The thorax bears a small median tubercle. The basistyle of the male genitalia is flattened, hollowed out dorsally with 2 - 8 large dorso-medial setae near insertion of the dististyle; the lobe of the basistyle is strongly differentiated, about two-thirds as long as the basistyle; the dististyle is distinctly broadened distally. The species of this genus are very similar and difficult to separate as larvae or adult females, though the male genitalia and pupal respiratory organs are usually quite distinctive. The female antenna has 12 segments.

Conchapelopia fasciata new species

(Plate 1, figs. 1-4)

MALE HOLOTYPE: Duval County, Florida, Expressway Creek, January 21, 1964. WL 2.5 (2.1 - 2.6) mm.; LR 0.79; AR 1.9. White with yellowish-brown vittae and light brown antennae and forelegs beyond the femora; second through eighth abdominal segments with blackish basal bands, wider on each segment toward posterior of abdomen. Wing pale brown, basal arculus and a spot on squama blackish; third tarsal segment of middle leg with a cluster of six or more stout yellow setae at apex; r-m is distal to m-cu by its length.

FEMALE ALLOTYPE: Flagler County, Little Haw Creek, May 19, 1964. Similar to male except it has no dark abdominal bands; WL 2.25 (2.1 - 2.3) mm.

LARVA: Head capsule yellow; apex of mandible, teeth of lingua, and narrow apical border of head dark; AR 5, pit at 0.68 from base

of segment; basal segment of maxillary palpus is 2.7 times long as wide; body with conspicuous long scattered hairs; anal papillae dark, two times long as wide; setae and supra-anal bristles also dark; long pale claws of posterior proleg are very finely pectinate along inner edge, four short claws are darker yellowish-brown; mandibular teeth are inconspicuous.

PUPA: Cast skin dark brown, 5.1 mm. long, densely spiculate; respiratory organ 0.32 mm. long by 0.12 mm. wide; 14 tiny rounded spines at base (scarcely separable from nodulations and spiculation in this area); anal fin 1.07 times long as wide. Four lateral filaments on the seventh segment, first just beyond middle; five on the eighth, first before middle.

This species had been reared from the following localities:

Duval County - Expressway creeks in January 1964 (holotype, 1♂).

Flagler County - Little Haw Creek in March (1♂, 1♀) and May (allotype, 1♂, 1♀) 1964.

Taylor County - Fenholloway River in March 1963 (1♂).

This appears to be predominantly a vernal species.

Conchapelopia gigas new species

(Plate 2, figs. 1-4)

MALE HOLOTYPE: Clay County, Florida, Peter's Creek, March 7, 1963. WL 3.1 mm.; AR 2.4; LR 0.74; light brown with dark yellow mesonotal vittae; markings on pleurae, sternum, postnotum, antennae, and basal abdominal bands brown; palpi pale brown; legs yellowish, the third tarsal segment of middle leg with an apical cluster of 8-10 brown heavy setae; wing veins and macrotrichia very pale brownish, a black mark on the squama. Genitalia distinctive.

FEMALE: Not known.

LARVA: AR 5.2, sensory pit at 0.68 from base; basal segment of maxillary palpus 3.4 times long as wide; anal papillae blackish, about three times long as wide; claws of posterior proleg yellow, short claws darker yellow, at least six of longer claws finely spined on inner edge, and one finely spined on outer edge also.

PUPA: Cast skin 6.4 mm. long, brown, densely spiculate; respiratory organ 0.40 mm. long by 0.12 mm. wide, small area of nodules at base, no definite spines; anal fin is very slightly wider than long (60:58). Shagreen of abdomen very dense, individual spicules multiply forked.

Only one specimen of this species has been reared; it is described because the very distinct genitalia leave no doubt that it is a new species.

Arctopelopia Fittkau

Arctopelopia is characterized as follows: wings, legs, and abdomen not bicolored; crossveins not darkened; C ends somewhat proximal to M; R_{2+3} well-formed; foretarsi strongly bearded; no mesonotal tubercule; third tarsal segment of middle leg without a cluster of strong setae at apex; lobe of basistyle of male genitalia more than half as long as basistyle, covered with hairs and with a thick row of heavier bristles along inner edge.

Arctopelopia fittkai new species

(Plate 18, figs. 1-4)

MALE HOLOTYPE: Duval County, Florida, Expressway creek, January 26, 1965. WL 2.55 mm.; AR 2.0; LR 0.76. Mesonotum light brown with dark brown vittae, marks on pleurae, sternum and postnotum; abdomen light brown; head light brown, pedicel darkened around insertion of antenna; legs light brown, tibial comb dark and joints very narrowly dark; male genitalia light brown, the parameres black; eyes separated dorsally by less than the diameter of pedicel; no mesonotal tubercule; R_{4+5} ends above the apex of M which ends below curve of wing.

FEMALE: Unknown.

LARVA: AR 4.8, pit at 0.68; head capsule pale brown with apex of mandible, teeth of lingua, and narrow apical border of head dark brown; anal papillae brownish, claws of posterior proleg all pale brown, some finely spined on one or both margins; lingua with three median teeth shorter, the first laterals out-turned; more than 20 teeth on supralingua, all about the same length; anal papillae 3.5 times long as wide with seven setae; supra-anal bristles set in small papillae; body hairy as in *Conchapelopia*.

PUPA: Light brown, not patterned, very spiculate, 5.2 mm. long; no spines at base of respiratory organ which is 0.27 mm. long by 0.10 mm. wide at apex; spinules on fourth segment multiply forked; four lateral filaments on seventh segment, the first just apicad of midway; five filaments on eighth segment, first just before midway; anal fin is about as long as wide with sharply pointed apices; there appears to be a small clear curved spine on the anal fin at the mid-

dle of the inner margins; genital sac of male is three-fifths long as the fin.

This species is represented by a single specimen.

Larsia Fittkau

Adults are characterized as follows: costa extending distinctly beyond R_{4+5} and ending before apex of M; m-cu scarcely basad of r-m; tibial spurs lyre-shaped, no comb on hind tibia; postoculars in single row; mesonotal tubercule present; female with 12 antennal segments. Larva has antennal ratio of 4.0 or less according to Fittkau (our specimens range from 3.7 - 4.6), sensory pit somewhat distal to middle; all proleg claws simple and yellow.

Key to *Larsia* Males

1. r-m not darkened; palpal segment 1 with two large apical setae; genitalia entirely pale..... *berneri*
- r-m darkened; no large setae on palpal segment 1; genitalia darkened at least on dististyle..... 2
2. Base of dististyle darkened, rest pale..... *lurida*
- Entire genitalia gray or blackish..... *indistincta*

Key to *Larsia* Females

1. Wing banded, due to color of macrotrichia, basal 2/3 dark, apical 1/3 and area over r-m pale yellow..... *berneri*
- Wing and macrotrichia entirely brownish..... *lurida, indistincta*

Key to *Larsia* Larvae

1. Inner laterals of lingua distinctly shorter than outer laterals..... *berneri, indistincta*
 - Inner laterals of lingua about as long as outer laterals..... *lurida*
- (Note: All our *Larsia* spp. have second larval antennal segment darkened.)

Key to *Larsia* Pupae

1. Pale yellowish-tan, no distinct pattern; lateral filaments on segment 7 placed about equally far apart, the first before middle of segment..... *berneri*
- Light or dark brown; lateral filaments on 7 placed 2-2, the first at or beyond middle of segment..... 2
2. Very dark brown, distinctly patterned, respiratory organ with a distinct central duct..... *indistincta*
- Light brown, pattern fairly distinct respiratory not having a distinct central duct..... *lurida*

The above keys make it evident that the separation of the species of this genus is not easy; *L. indistincta* and *L. lurida* may represent extremes of the same species, but without intergrading material on hand for study they appear quite different, especially in the pupal stage.

Larsia bernerii new species

(Plate 5, figs. 1-3; Plate 6, fig. 1)

MALE HOLOTYPE: Leon County, Florida, Boliek's Pond, June 30, 1964. WL 1.5 (1.45 - 1.65) mm; AR 1.3; LR 0.72 on foreleg, 0.72 on middle leg, and 0.76 on hind leg. Pale yellow-white with darker yellow mesonotal vittae; hairs of tibiae of mid and hind legs long, more than three times tibial diameter. Palpi and antennal flagellum very pale brown; eyes separated dorsally by less than diameter of pedicel of antenna. Two stout spines or setae at apex of first palpal segment. Last antennal segment with subapical seta. Fourth tarsal segment longer than fifth on all legs, though the two segments are nearly equal on middle leg; crossveins not darkened. Genitalia all pale yellow.

FEMALE ALLOTYPE: Flagler County, Florida, Rayonier Ditch, September 5, 1964. WL 1.25 mm. Pale yellowish-white, palpi brown; vittae dark yellow margined anteriorly with brown; pleural marks and postnotum light brown. Abdominal segments 2 - 6 with brown basal bands; legs pale; wings with dark brown hairs on basal two-thirds, pale yellow hairs on apical one-third and over crossveins; sensory setae at apex of first palpal segment.

LARVA: Yellow except that apex of mandible, second antennal segment, and lingua are brown; inner laterals of lingua are shorter than outer laterals; AR 3.7 - 4.6, sensory pit at 0.56 from base; basal segment of maxillary palpus four times long as wide; anal papillae 3.5 - 5.5 times long as wide.

PUPA: Cast skin 2.8 - 3.5 mm. long; pale brownish-yellow without distinct pattern; respiratory organ 0.24 - 0.25 mm. long with pointed spines at base; anal fin 1.7 times long as wide; lateral filaments on seventh segment about evenly placed, the first before the middle of segment. Second abdominal segment spiculate, but lacking crescent-shaped rows of long pale spines.

This species resembles *Pentaneura pallens* (Coq.) in having crossveins pale, but differs in having no abdominal bands in male, foretarsi not bearded; female of *P. pallens* is "wholly yellow." *Pentaneura*

planensis Johannsen and *Tanypus decoloratus* Malloch both have the crossveins darkened.

L. bernerii occurs widely; we have collected and reared it from: Alachua County - Hatchet Creek in August 1964 (1 ♂).

Jefferson County - Lake Miccosuckee in June 1963 (1 ♂).

St. Johns County - roadside ditch on State Road 210 in April 1965 (1 ♀).

Flagler County - Rayonier Ditch in April 1963, June 1964 (allotype, 1 ♀), January and February 1965, and September 1964 (allotype, 1 ♀).

Polk County - Lake Cannon in March 1965; Green Swamp in March 1965 (1 ♂).

Leon County - Lake Lafayette in April 1963 (1 ♂); Boliek's Pond in May 1964 (1 ♂, 3 ♀ ♀), June 1964 (holotype, 1 ♂), and October and April 1963 (2 ♀ ♀).

Duval County - Expressway creeks in September 1963 and November 1964; Beach Blvd. creeks in March 1964.

Taylor County - roadside ditch in September 1961.

Clay County - Peter's Creek in March 1965.

We take pleasure in naming this species for Dr. Lewis Berner, University of Florida, in appreciation for his generous help with this and other manuscripts.

Larsia lurida new species

(Plate 5, figs. 4-6; Plate 6, fig. 2)

MALE HOLOTYPE: Leon County, Florida, roadside pond, May 1964. WL 1.45 - 1.85 mm.; AR (antenna missing, 1.3 paratype); LR 0.78 on foreleg, 0.74 on middle leg, and 0.74 on hind leg; hairs on mid and hind tibiae very long; fourth tarsal segment longer than fifth on all legs. Uniformly pale yellow except for dark yellow or brown mesonotal vittae, antennae and postnotum, and faint gray bands on abdominal segments 2-5; legs pale brown; wing macrotrichia all brown, r-m slightly darkened; dististyle of genitalia distinctly darkened basally.

FEMALE ALLOTYPE: Leon County, Florida, Boliek's Pond, May 1965. WL 1.3 (1.3 - 1.65) mm.; body pale yellow with mesonotal vittae and postnotum grayish-brown; no stout setae on palpi.

PUPA: Cast skin 3.2-3.8 mm. long; respiratory organs 0.20-0.26 mm. long; anal fin 1.7-2.0 times long as wide. All segments spiculate; second segment with crescent-shaped rows of longer pale spines.

L. lurida appears to agree in most characteristics with *T. decoloratus*, but Malloch's figure for the male genitalia is quite unlike that of *L. lurida*. If Morrissey (1950) is correct in his figure for the pupal respiratory organ of *P. planensis*, that species is probably not a *Larsia*.

L. lurida has been collected and reared from:

Leon County - Boliek's Pond in May and June 1964, May 1965 (allotype, 1♀, 1♂), and April 1963 (1♂); roadside pond in May 1964 (holotype, 1♀).

Jefferson County - Lake Miccosuckee in June 1963 (1♂), and May 1965 (1♂).

Duval County - Expressway creeks in July 1963 (1♀); Beach Blvd. creeks in May 1965.

Taylor County - roadside ditch on September 1961 (1♂).

Broward County - Ft. Lauderdale, Plantation Canal in September 1964.

Larsia indistincta new species

(Plate 5, figs. 7-9; Plate 6, fig. 3)

MALE HOLOTYPE: Polk County, Florida, Green Swamp, March 16, 1965. WL 2.05 (1.7-2.05) mm.; AR 1.75; LR 0.79 on foreleg. Yellow, vittae of mesonotum darker yellow; pedicel of antenna and antennal flagellum brown; genitalia brownish or blackish; all wing macrotrichia brown; abdomen with faint blackish bands on second through fifth segments.

FEMALE ALLOTYPE: Flagler County, Florida, Rayonier Ditch, February 27, 1965. WL 1.55 (1.4-1.6) mm.; body dark yellowish-tan; palpi, postnotum, lower pleurae pale brown; abdomen not banded; wing macrotrichia all brown.

LARVA: Head capsule light brown, antennae brown, second segment only slightly darker than basal segment; AR 4.3-4.5, sensory pit at 0.58 from base of segment; inner lateral teeth of lingua distinctly shorter than outers; anal papillae 4.2 times as wide.

PUPA: Cast skin 3.1-3.6 mm. long, dark brown, with distinct pattern consisting of round clear spot laterally on each side of segments,

and a very small clear apico-medial spot; 12 or more round-tipped spines at base of respiratory organ which is 0.21 - 0.23 mm. long; segments are spiculate, especially the second and eighth; second segment has crescent-shaped rows of longer pale spines; anal fin is 1.6 - 1.8 times long as wide.

L. indistincta agrees with *T. decoloratus* in many particulars, but the male genitalia and the larval lingua are different. Roback (1957) describes as *Pentaneura* poss. *curticalcar* (Kieff.) a larva which may be *L. indistincta*.

This species has been reared from the following:

Leon County - roadside pond in May 1964 (1 ♀).

Flagler County - Rayonier Ditch in February 1965 (allotype).

Jefferson County - Lake Miccosuckee in May 1965 (1 ♂).

Polk County - Green Swamp in March 1965 (holotype).

ECOLOGY OF LARVAE

As mentioned in the introduction, most of the taxonomy and part of the ecology of the Pentaneurini of Florida described here are based on material reared in the course of this study. In addition we have available a great number of larvae collected during routine stream and lake surveys and investigations of many different types of special habitats throughout the State. Part of the purpose of the study was to increase our knowledge of the immature stages of these insects. This could best be done by rearing larvae and identifying the adults, giving us larval and pupal material associated with described adults. It was then possible to examine and identify preserved larval material, increasing our knowledge of the ecology and zoogeography of the species involved through the acquisition of—in many cases—literally scores of additional distribution records.

Species confined to flowing waters are: *Pentaneura inculta*, *Paramerina anomala*, *Nilotanytus americanus*, *Labrundinia floridana*, *L. pilosella*, *Ablabesmyia auriensis*, and *A. mallochi*.

Typically found in standing waters are *Ablabesmyia philosphagnos* (generally in growths of *Sphagnum*, but always in dense growths of submerged vegetation), *Monopelopia boliekae*, and *M. tillandsia* (from a single species of *Tillandsia*).

Ubiquitous species include *Ablabesmyia peleensis* (the most common and widely distributed species of the tribe Pentaneurini in Florida), *A. aspera*, *A. hauberi*, *A. janta*, *A. ornata*, *Guttipelopia*

currani, *Labrundinia virescens*, *L. neopilosella*, *L. johannseni*, and all species of *Larsia* and *Conchapelopia*.

Because of their rarity little can be said of the ecology of *Zavrelimyia carnea*, *Arctopelopia fittkai*, and *Natarsia fastuosa*. We have not collected larvae of *N. fastuosa*.

During this study approximately 10 gynandromorphs have been reared. All of these were of the same type: female antennae and body build, with male genitalia; in each a large mermithid worm was coiled in the distended abdomen. We have observed two types of parasitization: one in which the worm leaves the body of a mature larva, resulting in the death of the larva; a second type in which the parasitized larva develops into an active adult, although generally a gynandromorph. Gynandromorphs of the following species have been reared: *Guttipelopia currani*, *Ablabesmyia peleensis*, *A. hauberi*, and *A. philosphagnos*.

ZOOGEOGRAPHY

At the present time knowledge of the chironomid fauna of North America is too incomplete for any profound discussion of distributions of species. The particular tribe covered in this paper has, however, attracted the interest of several North American workers and has, consequently, received considerable attention. Zoogeographical discussion of this tribe is therefore of some significance at the generic level.

Dr. Ernst-Joseph Fittkau recently spent several days with us, examining our material and discussing at great length the distributions of the genera involved. These discussions, combined with the material in his excellent monograph (Fittkau, 1962), have been of great help in understanding the origin of the fauna. Additionally helpful was his great personal knowledge of holarctic and tropical faunas.

The Pentaneurini of Florida — at the generic level — may be divided into several more or less distinct groups insofar as derivation of the fauna is concerned. Of seven holarctic genera four are found in Florida, each represented by a single species. These species are:

Natarsia fastuosa, *Arctopelopia fittkai*, *Guttipelopia currani*, and *Zavrelimyia carnea*.

The genus *Labrundinia* is considered by Fittkau to be subtropical and tropical in origin. Five species are known in Florida at the present time.

The genus *Pentaneura* (sensu Fittkau) is believed to be of South

American origin and is represented in Florida by a single species. The immature stages of this species are very distinctive, widely distributed in Florida and, it appears at present, may well be monotypic within the State.

At present several genera appear to have rather discontinuous worldwide ranges, a result most probably of discontinuity of areas studied. These include *Conchapelopia* (holarctic and tropical), *Monopelopia* (Europe and Indonesia), and *Nilotanypus* (holarctic and Ethiopian). Genera listed by Fittkau as confined to Europe (*Telmatopelopia* and *Xenopelopia*) have thus far not been found in Florida, nor have the two holarctic genera *Thienemannimyia* and *Rheopelopia*.

By far the greatest number of species of any genus in Florida—12—belong to *Ablabesmyia*, listed by Fittkau as worldwide in distribution.

The subject of endemism must be handled with caution. Six species possibly endemic to Florida are: *Paramerina anomala*, *Nilotanypus americanus*, *Conchapelopia gigas*, *Monopelopia boliekiae*, *M. tillandsia*, and *Ablabesmyia philosphagnos*. Of these the most probable endemic species are: *P. anomala* and *N. americanus*, both of which have been reared only from a small stream in Clay County. *C. gigas* also has been reared only from this same small stream and light trap records suggest a very limited distribution within the State. Larvae of the genus *Conchapelopia* are very widespread and common in Florida, but cannot be separated with certainty at present, hence the more cautious listing among the endemic species. *Monopelopia tillandsia* may well prove to be a tropical species that has been introduced into Florida since the specific host plant is widely distributed in Central America and the West Indies. Recently the Public Health Service sent us some preserved chironomid larvae collected from treeholes in areas surrounding the Miami International Airport. Among these larvae were several specimens of the genus *Monopelopia* differing from both Florida species and not further identifiable. This also may represent an introduced tropical species. The chironomid fauna of the West Indies is almost totally unknown and that of Central America poorly known.

Zavrelimyia carneosa deserves special mention. This species is quite widely distributed in temperate North America. A few adults that may possibly be this species have been taken from light traps in several areas of Florida but, as is so often the case with light trap material, were in too poor shape to identify positively. It is of interest that of many thousands of larvae collected from all types of

habitats in Florida during the past 15 years, larvae of *Z. carneosa* have been found only in a ravine on the Caldwell plantation near Tallahassee. This ravine is deep and densely shaded, roughly circular in shape, with many small springs and seepage areas around the periphery that drain into a small creek which flows out the open end of the ravine. It is quite possible that this population is relict and the only population of this species in the State.

Peter's Creek, mentioned frequently above, is one of many such small streams comprising the Black Creek drainage in Clay County, the latter a tributary of the St. Johns River. This complex of streams is almost totally unaffected by the activities of man. Representatives of several groups of aquatic organisms found here do not occur elsewhere in Florida east of the Apalachicola drainage. For many years we have believed that the Black Creek drainage is a relict area and the evidence of the tribe Pentaneurini lends further credence to this belief.

In summary it appears that Florida's Pentaneurini population migrated into the State largely from the north or northwest, with a significant portion of the fauna migrating from tropical America and the West Indies. Apparently six species, but no genera, are endemic to Florida.

ACKNOWLEDGMENTS

It is a pleasure to acknowledge our gratitude to Dr. Ernst-Joseph Fittkau of the Hydrobiologische Anstalt der Max-Planck-Gesellschaft, Plon, Germany, for the time he spent critically examining the material on which this study is based. To Drs. Oliver L. Austin, Jr., and Pierce Brodkorb of the University of Florida we extend our sincere appreciation for editorial advice and criticism. We wish also to express our appreciation to Mrs. Lavonia Bajalia for her care and patience during several revisions of the manuscript.

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EXPLANATION OF FIGURES

Figures in Plates 1-10 and 18 are drawn to the following scale: larval lingua x 430; larval claws, spur of posterior proleg, pupal respiratory organ, and male genitalia x 215; pupal anal fin x 50.

Exceptions: Plate 2, fig. 4, male genitalia x 100.

Plate 3, fig. 6, respiratory organ of pupa x 100.

Figures in Plates 11-17 are drawn as follows: larval lingua, claws, and antenna x 215; pupal respiratory organ and anal fin x 50; male genitalia x 150; fourth abdominal segment of pupa x 20.

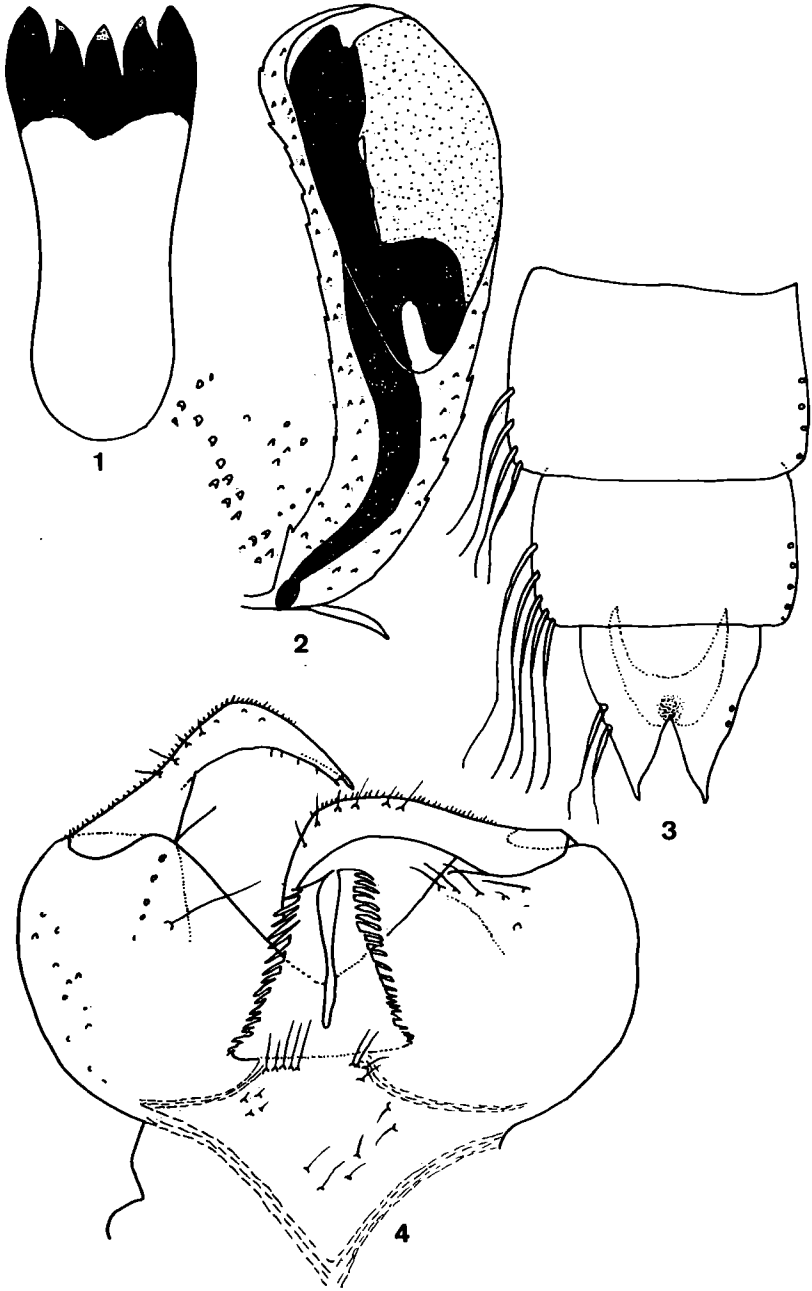


Plate 1
Conchapelopia fasciata, new species: 1 - lingua; 2 - respiratory organ of pupa;
3 - apical segments of pupa; 4 - male genitalia.

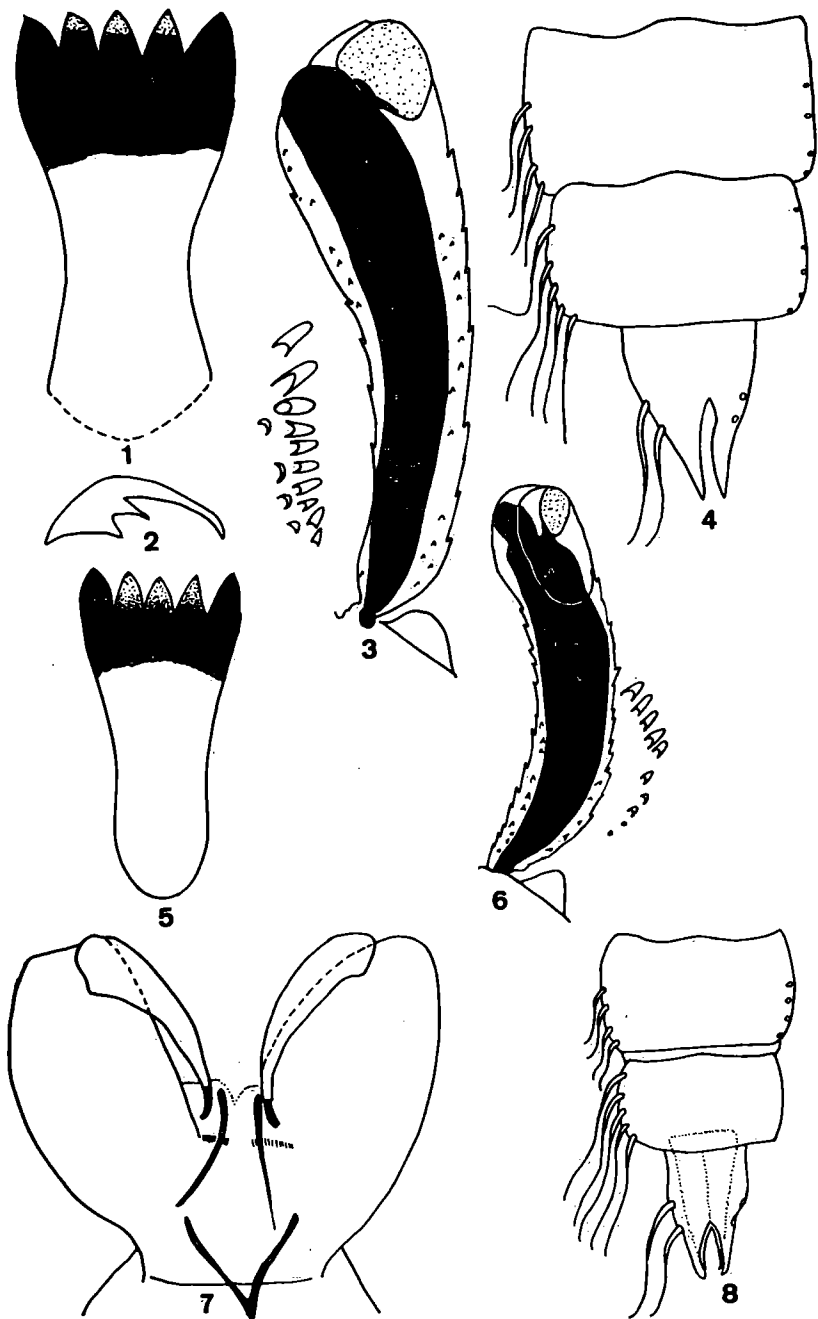


Plate 4

Zavrelimyia carneosa Fittkau: 1 - lingua; 2 - claw of posterior proleg; 3 - respiratory organ of pupa; 4 - apical segments of pupa.

Paramerina anomala, new species: 5 - lingua; 6 - respiratory organ of pupa; 7 - male genitalia; 8 - apical segments of pupa.

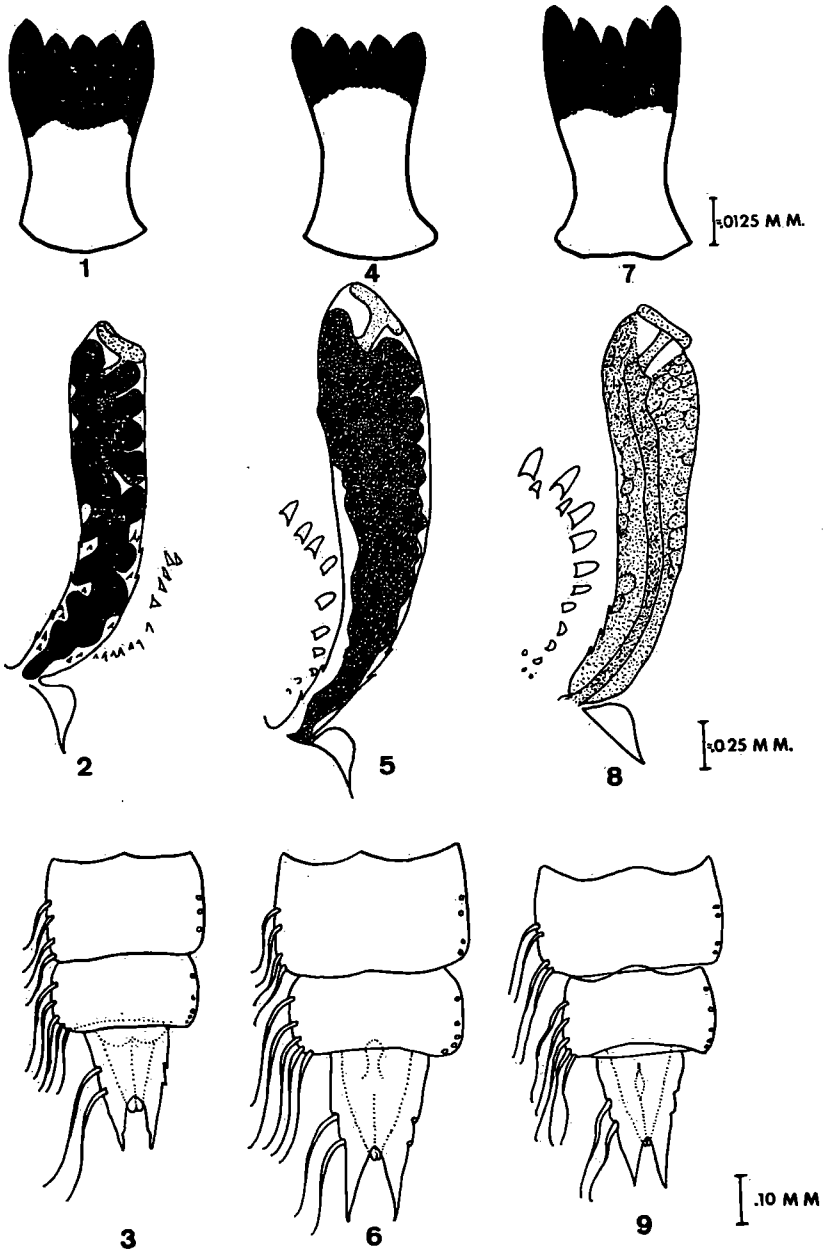


Plate 5

Larsia berneri, new species: 1 - lingua; 2 - respiratory organ of pupa; 3 - apical segments of pupa.

Larsia lurida, new species: 4 - lingua; 5 - respiratory organ of pupa; 6 - apical segments of pupa.

Larsia indistincta, new species: 7 - lingua; 8 - respiratory organ of pupa; 9 - apical segments of pupa.

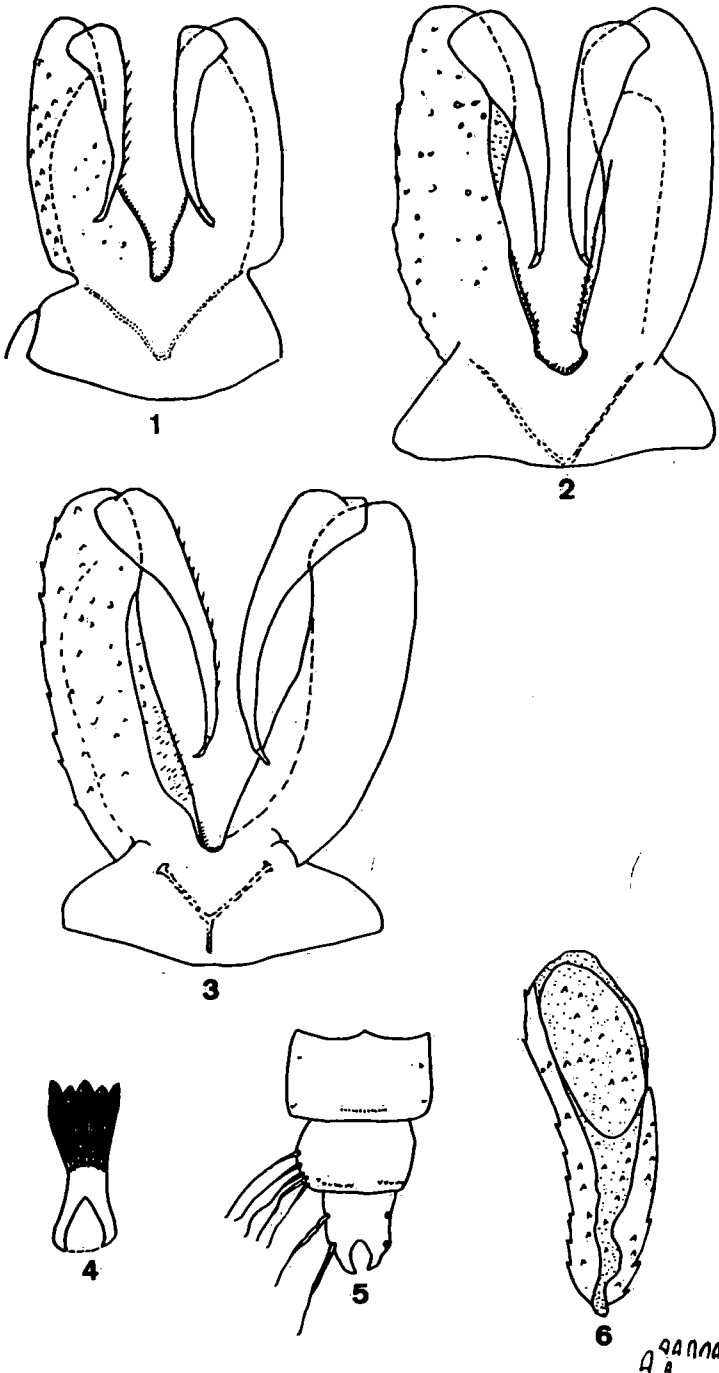


Plate 6

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Plate 6

Larsia bernerī, new species: 1 - male genitalia.

Larsia lurida, new species: 2 - male genitalia.

Larsia indistincta, new species: 3 - male genitalia.

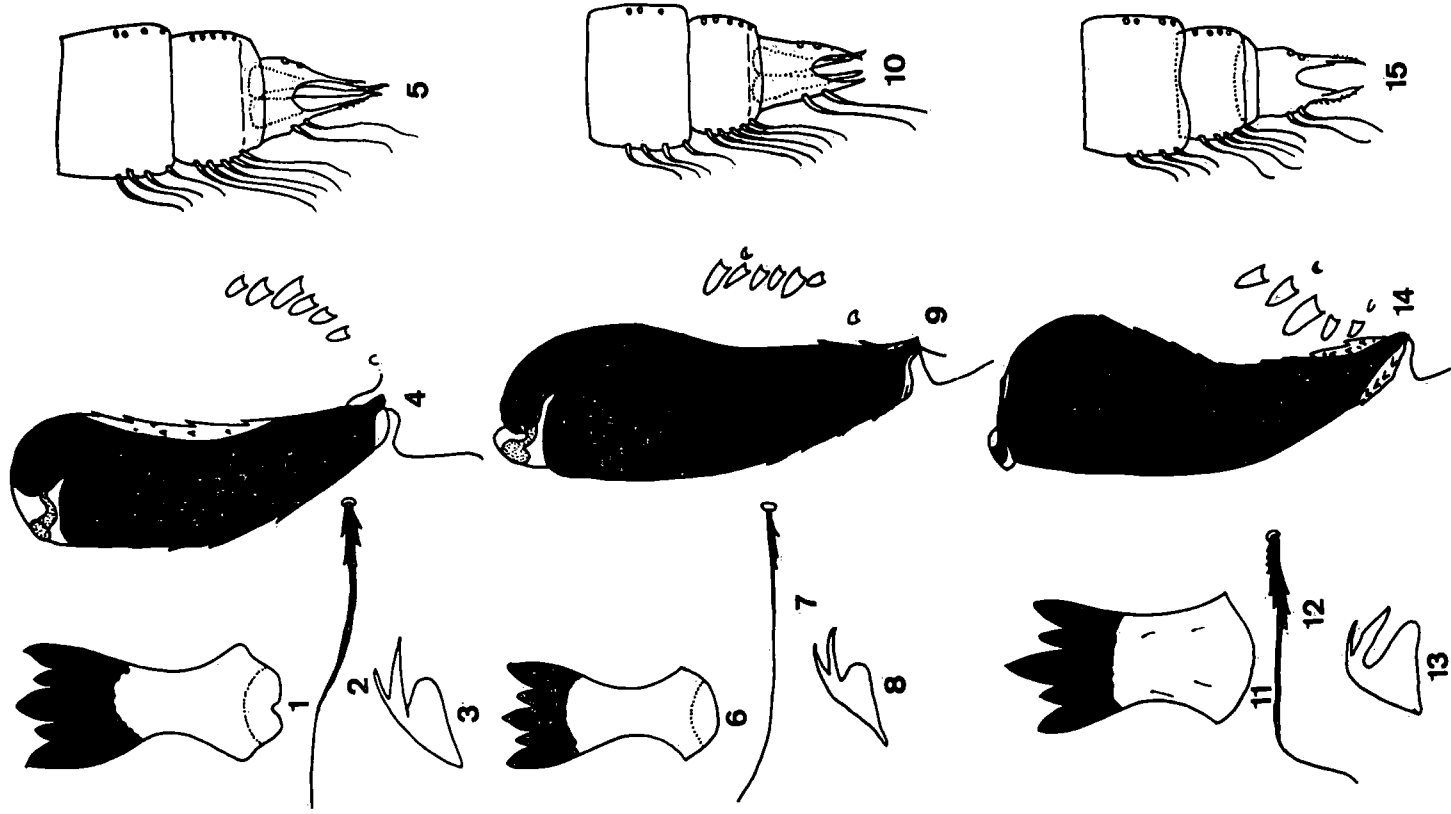
Nilotanypus americanus, new species: 4 - lingua; 5 - apical segments of pupa;
6 - respiratory organ of pupa.

Plate 7

Labrundinia floridana, new species: 1 - lingua; 2 - spur of posterior proleg;
3 - bifid claw of posterior proleg; 4 - respiratory organ of pupa; 5 - apical
segments of pupa.

Labrundinia pilosella (Loew): 6 - lingua; 7 - spur of posterior proleg; 8 - bifid
of claw of posterior proleg; 9 - respiratory organ of pupa; 10 - apical seg-
ments of pupa.

Labrundinia neopilosella, new species: 11 - lingua; 12 - spur of posterior pro-
leg; 13 - bifid claw of posterior proleg; 14 - respiratory organ of pupa; 15 - ap-
ical segments of pupa.



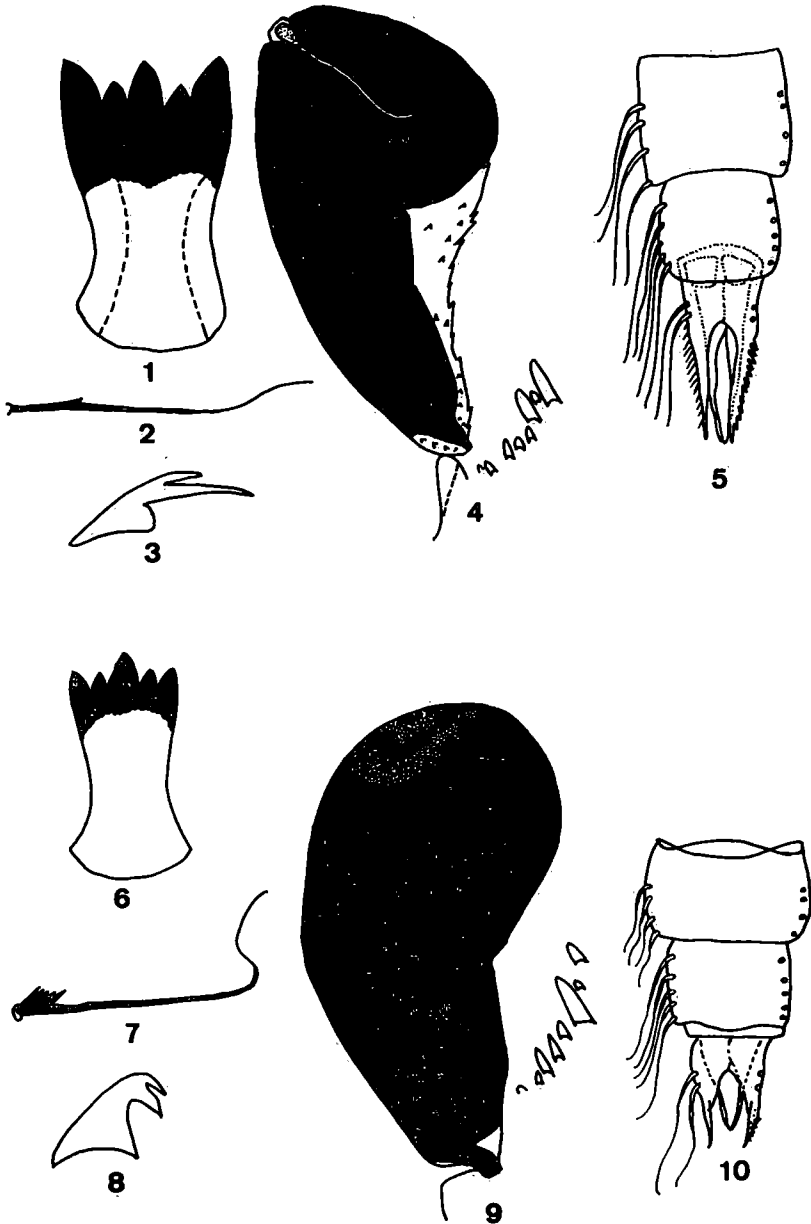


Plate 8

Labrundinia virescens, new species: 1 - lingua; 2 - spur of posterior proleg; 3 - bifid claw of posterior proleg; 4 - respiratory organ of pupa; 5 - apical segments of pupa.

Labrundinia johannseni, new species: 6 - lingua; 7 - spur of posterior proleg; 8 - bifid claw of posterior proleg; 9 - respiratory organ of pupa; 10 - apical segments of pupa.

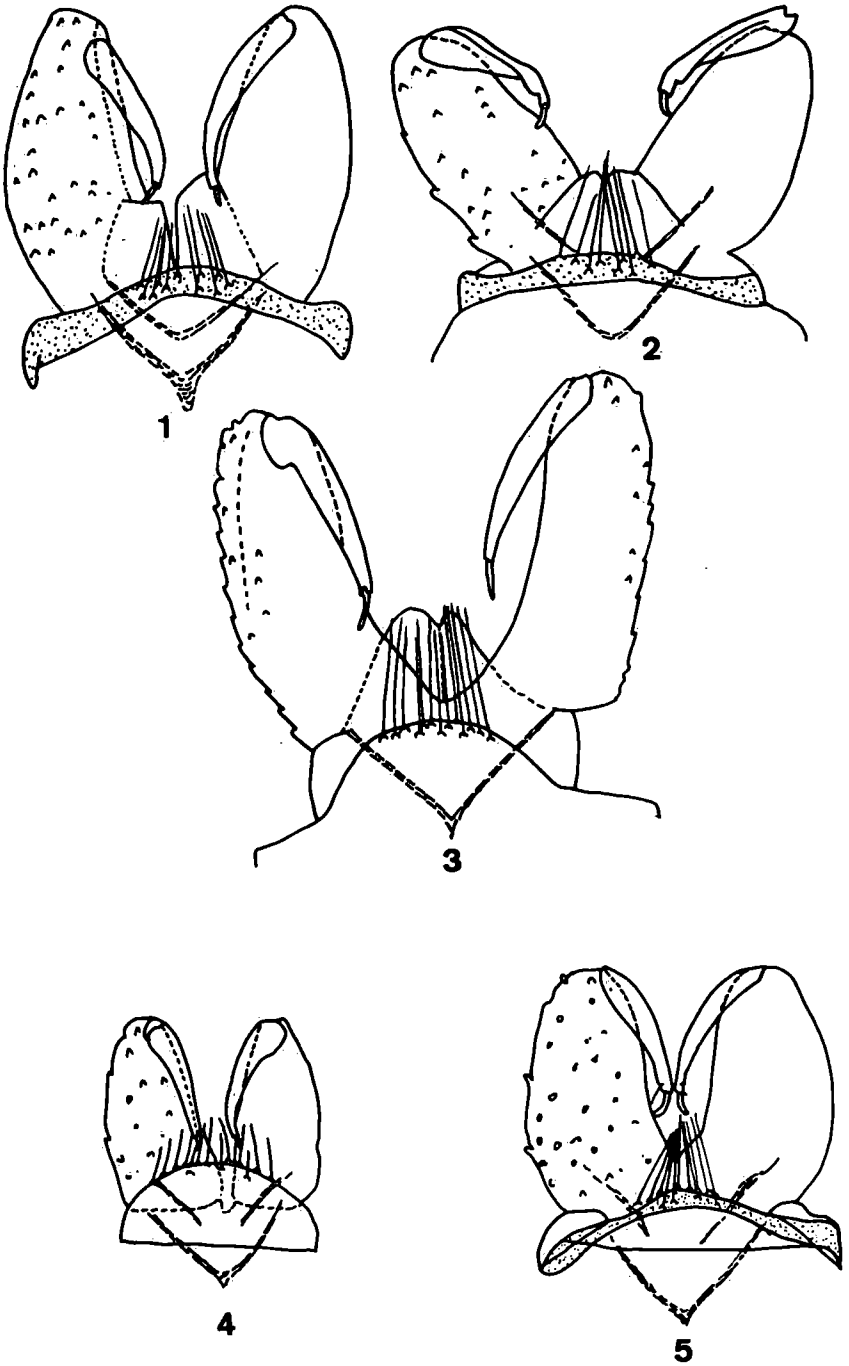


Plate 9

Labrundinia floridana, new species: 1 - male genitalia.

Labrundinia virescens, new species: 2 - male genitalia

Labrundinia neopilosella, new species: 3 - male genitalia.

Labrundinia pilosella (Loew): 4 - male genitalia.

Labrundinia johannseni, new species: 5 - male genitalia.

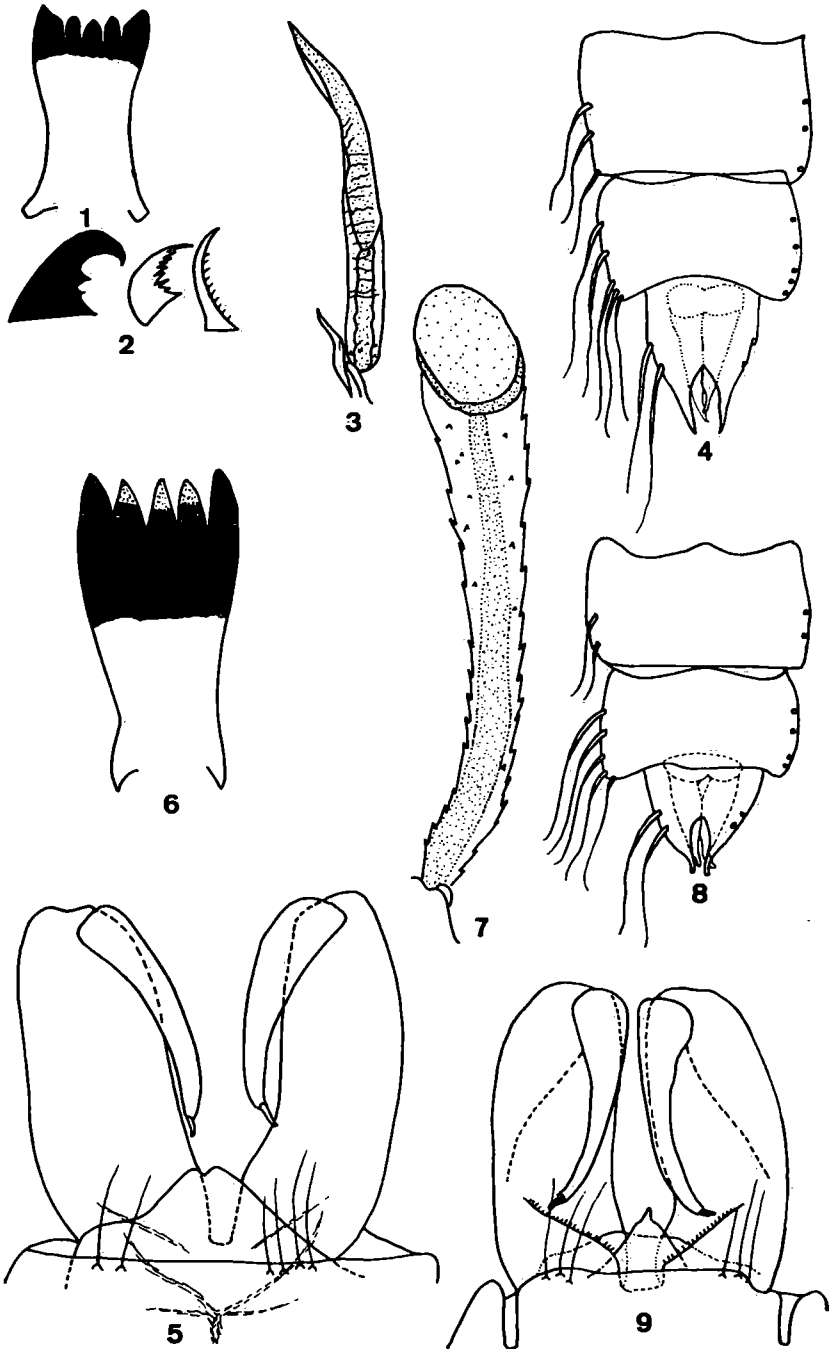


Plate 10

Monopelopia boliekae, new species: 1 - lingua; 2 - claws of posterior proleg;

3 - respiratory organ of pupa; 4 - apical segments of pupa; 5 - male genitalia.

Monopelopia tillandsia, new species; 6 - lingua; 7 - respiratory organ of pupa;

8 - apical segments of pupa; 9 - male genitalia.

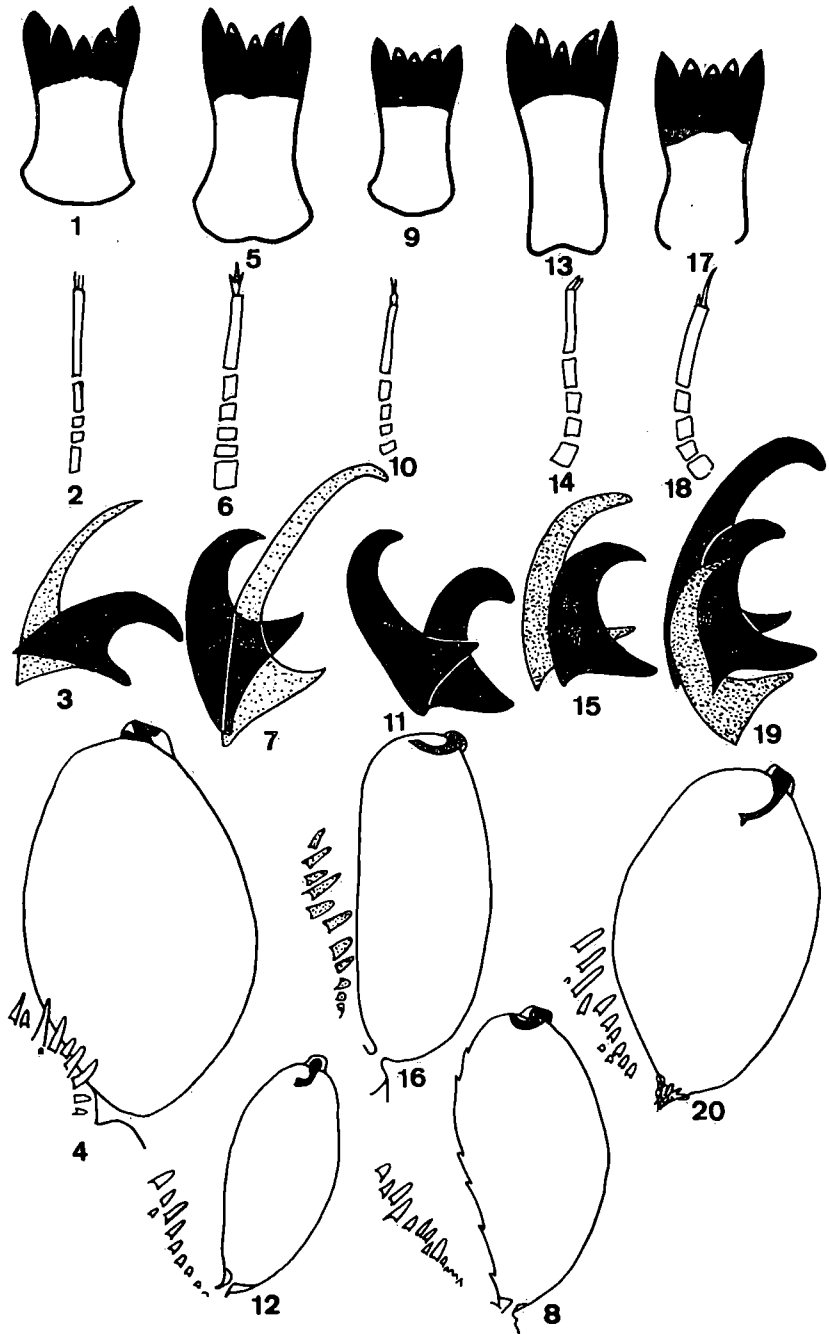


Plate 11

Plate 11

Ablabesmyia aspera (Roback): 1 - lingua; 2 - maxillary palpus; 3 - claws of posterior proleg; 4 - respiratory organ of pupa.

Ablabesmyia hauberi, new species: 5 - lingua; 6 - maxillary palpus; 7 - claws of posterior proleg; 8 - respiratory organ of pupa.

Ablabesmyia ornata, new species: 9 - lingua; 10 - maxillary palpus; 11 - claws of posterior proleg; 12 - respiratory organ of pupa.

Ablabesmyia auriensis (Roback): 13 - lingua; 14 - maxillary palpus; 15 - claws of posterior proleg; 16 - respiratory organ of pupa.

Ablabesmyia mallochi (Walley): 17 - lingua; 18 - maxillary palpus; 19 - claws of posterior proleg; 20 - respiratory organ of pupa.

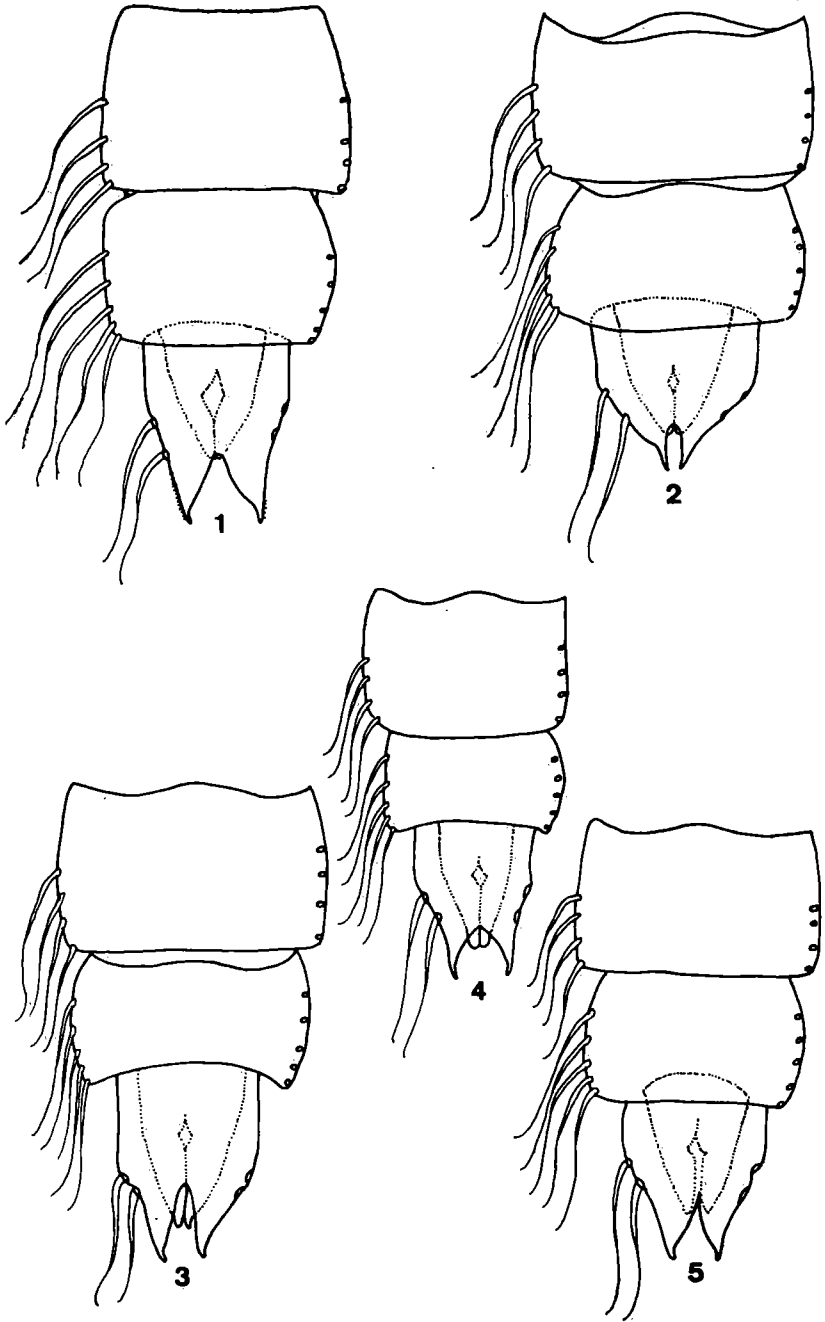


Plate 12

- Ablabesmyia aspera* (Roback): 1 - apical segments of pupa.
Ablabesmyia mallochi (Walley): 2 - apical segments of pupa.
Ablabesmyia auriensis (Roback): 3 - apical segments of pupa.
Ablabesmyia ornata, new species: 4 - apical segments of pupa.
Ablabesmyia hauberi, new species: 5 - apical segments of pupa.

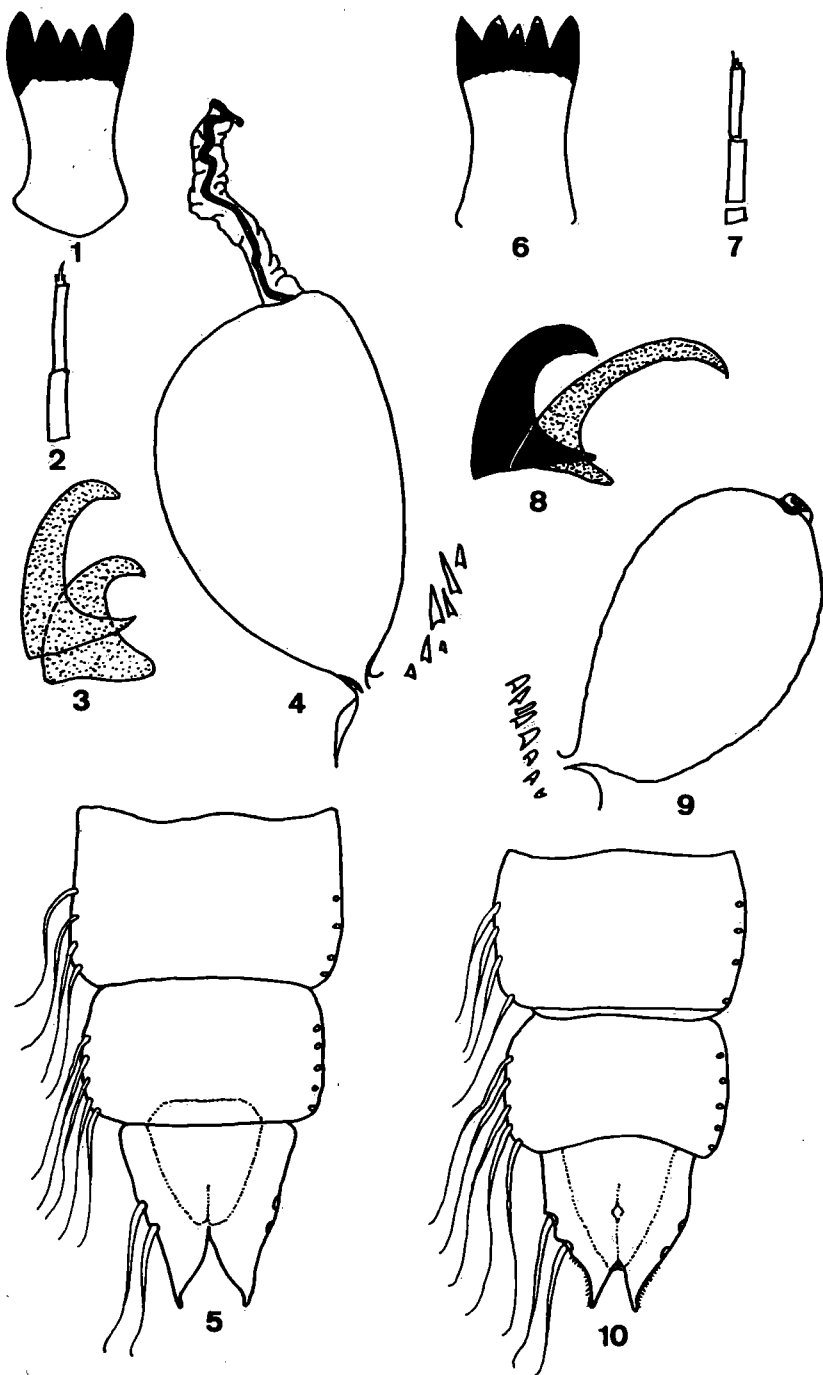


Plate 13

Ablabesmyia peteensis (Walley): 1 - lingua; 2 - maxillary palpus; 3 - claws of posterior proleg; 4 - respiratory organ of pupa; 5 - apical segments of pupa.
Ablabesmyia janta (Roback): 6 - lingua; 7 - maxillary palpus; 8 - claws of posterior proleg; 9 - respiratory organ of pupa; 10 - apical segments of pupa.

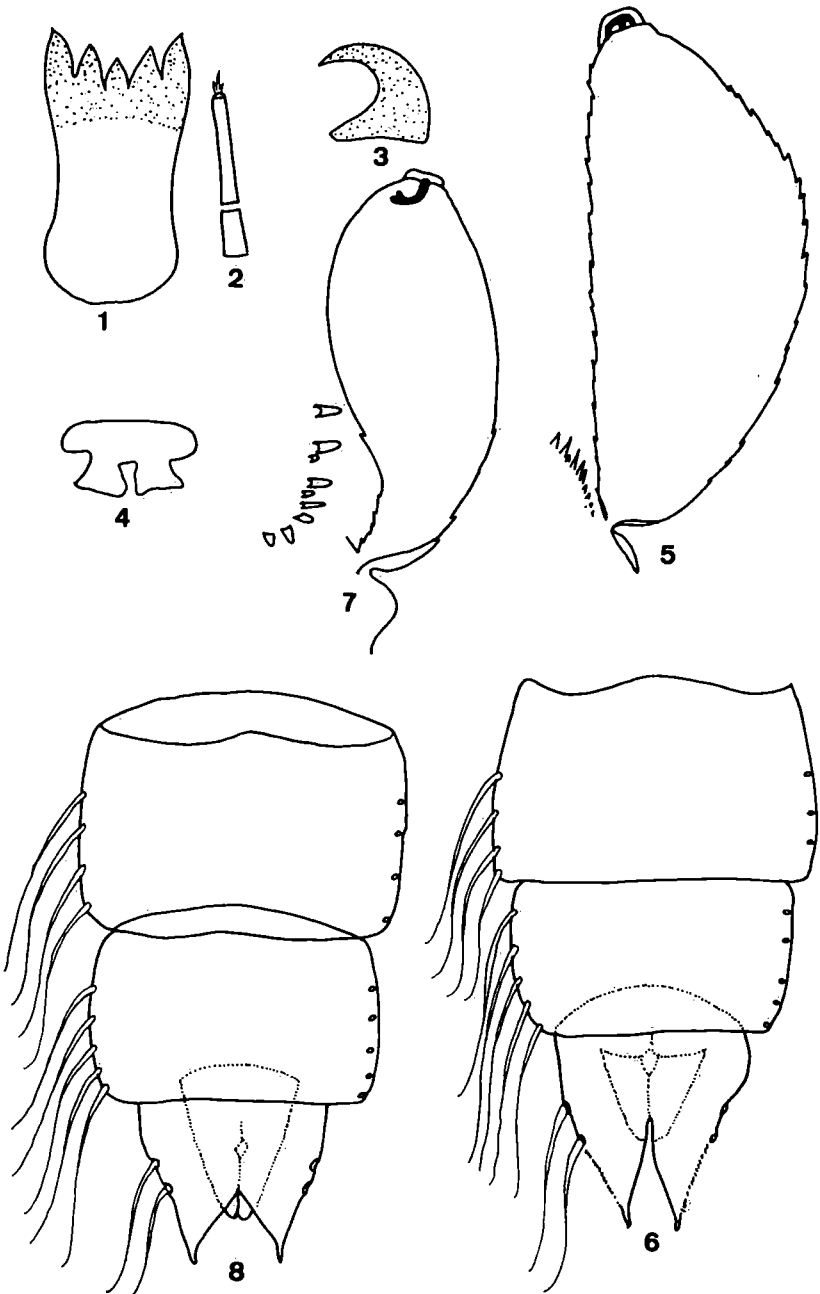


Plate 14

Ablabesmyia philosphagnos, new species: 1 - lingua; 2 - maxillary palpus; 3 - claw of posterior proleg; 4 - pupal opercula; 5 - respiratory organ of pupa; 6 - apical segments of pupa.

Ablabesmyia cinctipes (Johannsen): 7 - respiratory organ of pupa; 8 - apical segments of pupa.

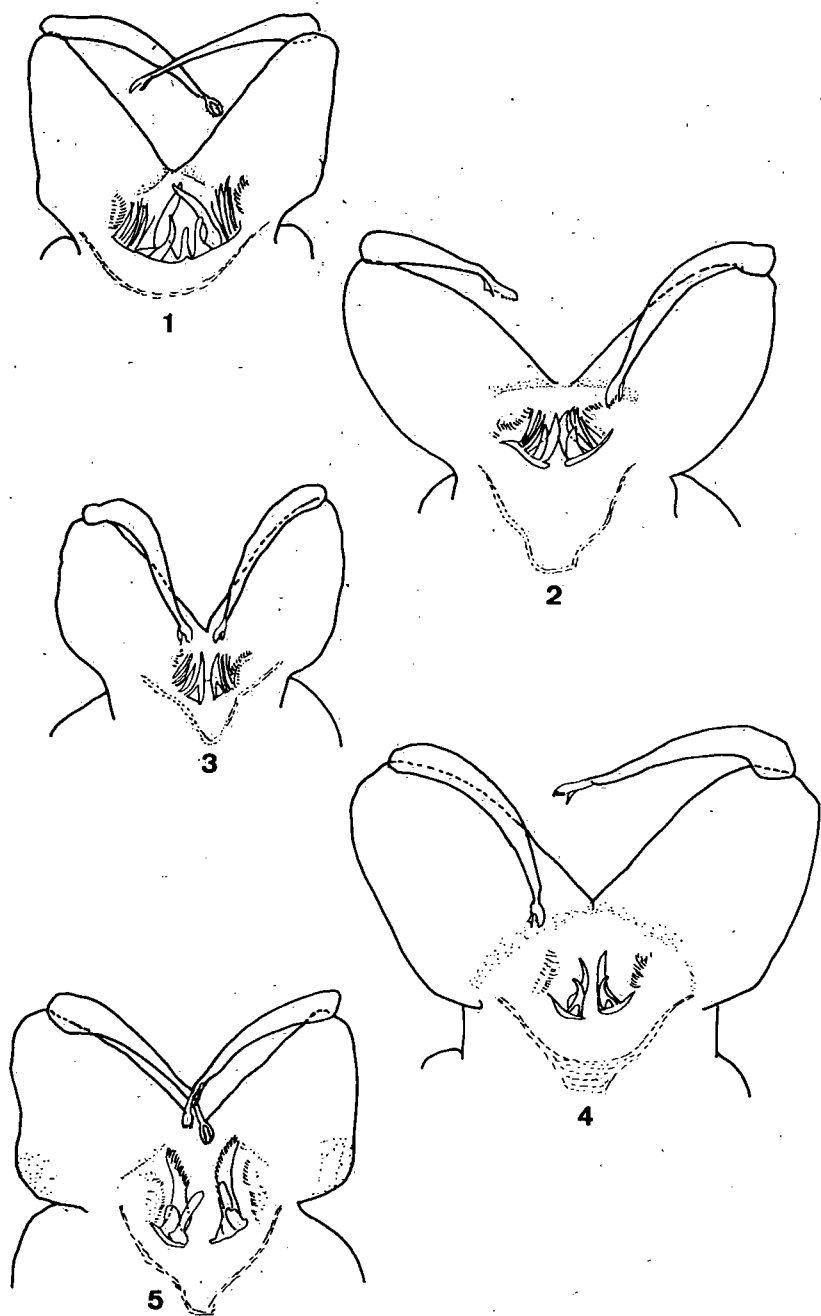


Plate 15

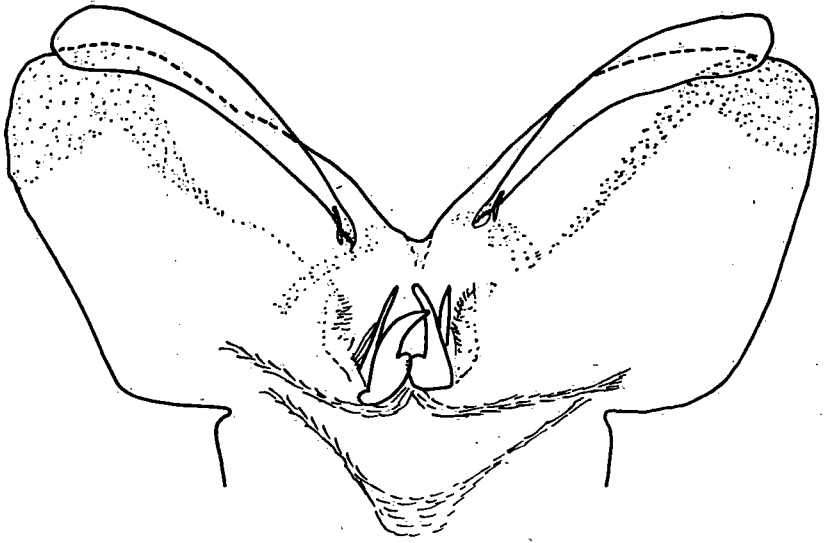
Ablabesmyia aspera (Roback): 1 - male genitalia.

Ablabesmyia mallochi (Walley): 2 - male genitalia.

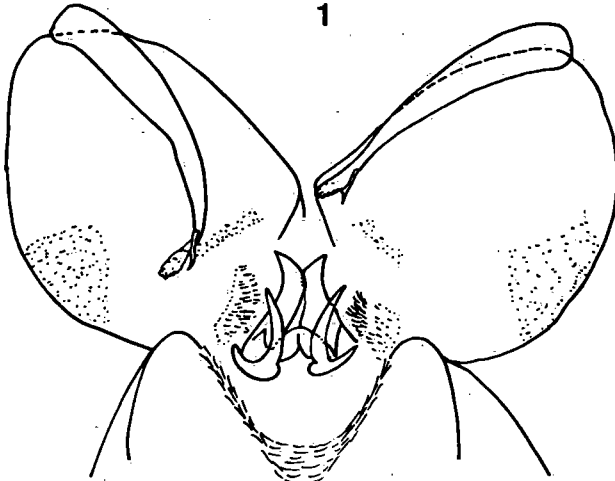
Ablabesmyia ornata, new species: 3 - male genitalia.

Ablabesmyia auriensis (Roback): 4 - male genitalia.

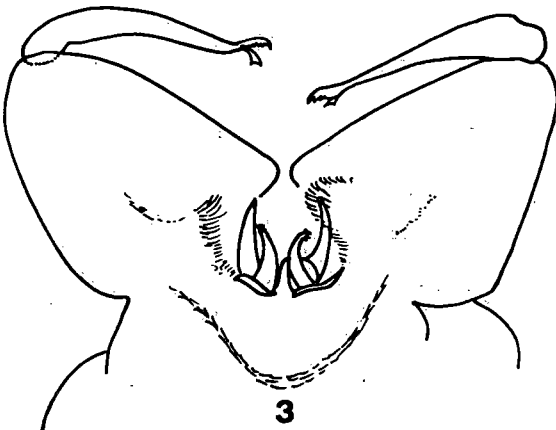
Ablabesmyia janta (Roback): 5 - male genitalia.



1



2



3

Plate 16

- Ablabesmyia annulata* (Say): 1 - male genitalia.
Ablabesmyia rhamphe Sublette: 2 - male genitalia.
Ablabesmyia hauberi, new species: 3 - male genitalia.

Plate 17

- Ablabesmyia rhamphe* Sublette: 1 - lingua; 2 - maxillary palpus; 3 - claws of posterior proleg; 4 - respiratory organ of pupa; 5 - apical segments of pupa.
Ablabesmyia peleensis (Walley): 6 - male genitalia; 13 - dorsal abdominal pattern of pupal fourth segment.
Ablabesmyia philosphagnos, new species: 7 - male genitalia.
Ablabesmyia cinctipes (Johannsen): 8 - male genitalia.
Ablabesmyia janta (Roback): 9 - dorsal abdominal pattern of pupa.
Ablabesmyia mallochi (Walley): 10 - dorsal abdominal pattern of pupa.
Ablabesmyia auriensis (Roback): 11 - dorsal abdominal pattern of pupa.
Ablabesmyia aspera (Roback): 14 - dorsal abdominal pattern of pupa.
Ablabesmyia ornata, new species: 12 - dorsal abdominal pattern of pupa.

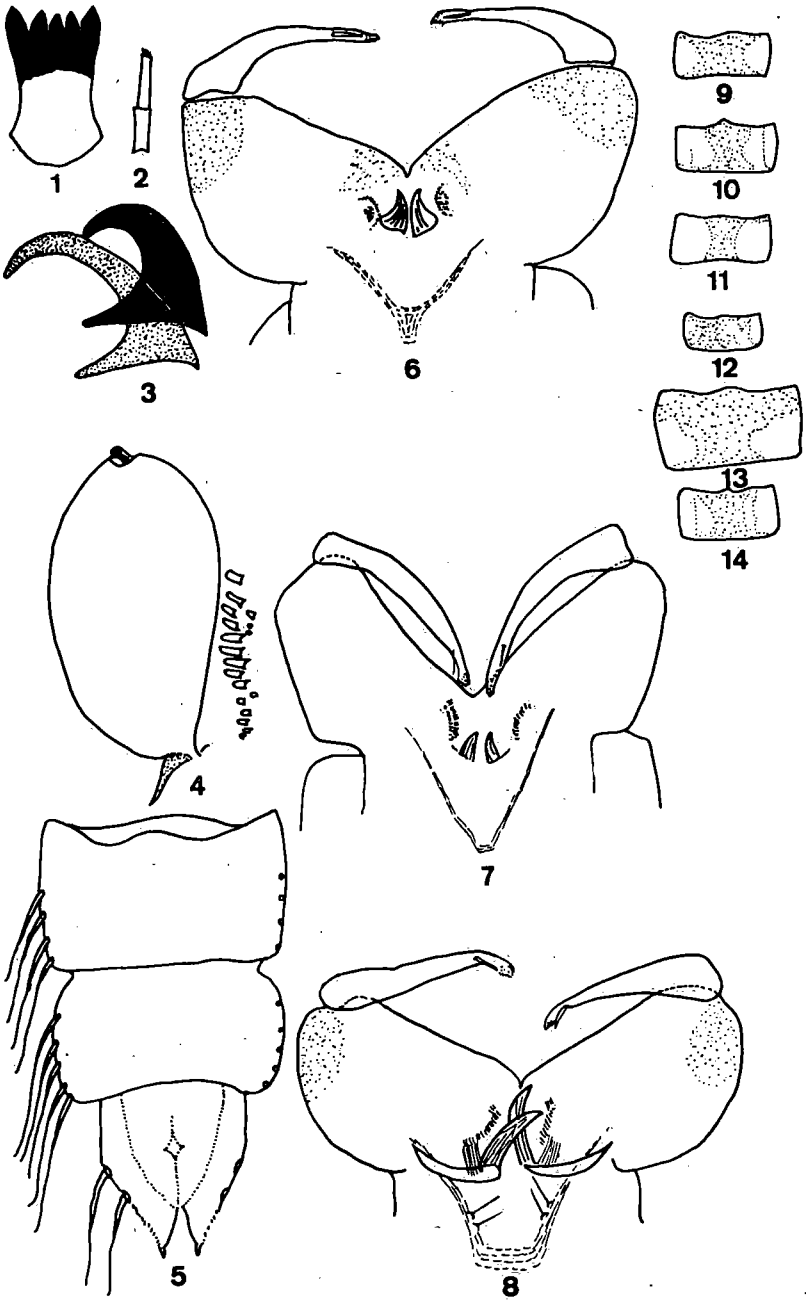


Plate 17

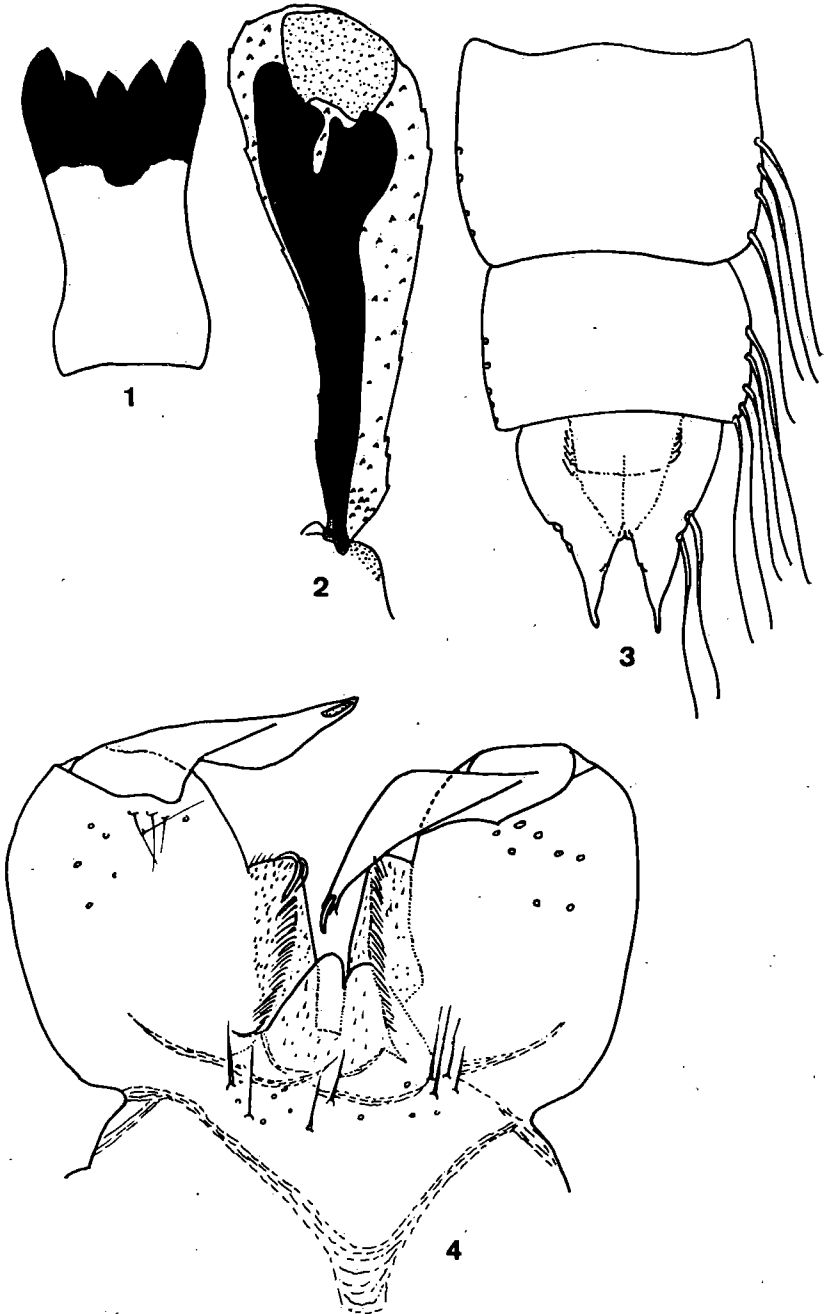


Plate 18
Arctopelopia fittkai, new species: 1 - lingua; 2 - respiratory organ of pupa;
3 - apical segments of pupa; 4 - male genitalia.

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Amer. Inst. Biol. Sci., Washington. 92 p.

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