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**A REVIEW OF THE CAVERNICOLOUS STAPHYLINIDAE (COLEOPTERA) OF  
EASTERN NORTH AMERICA: PART I. ALEOCHARINAE**

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**ABSTRACT**

*A review of the species of Aleocharinae collected in caves in the eastern United States is presented. Twenty species from 10 genera, in 7 tribes, were found, with the following 5 species described here as new: Aloconota diversiseta, Aloconota neospelea, Atheta alabama, Atheta lucifuga, and Atheta trogliphila. Keys to tribes, genera and species are provided and at least a diagnosis is given for each species. Line drawings of genitalia and SEM photomicrographs of external features are given for the new taxa and species previously not illustrated. The species most frequently and regularly found in caves are: Aleochara lucifuga (Casey), Atheta annexa Casey, Atheta lucifuga sp. nov., Atheta trogliphila sp. nov. and Blepharrhymenus illectus (Casey), all of which are tentatively categorized here as trogliphiles. The other species are regarded as accidentals.*

*Seven lectotypes are designated for the following species: Aleochara angusticeps Sharp, Atheta annexa Casey, Callicerus puberulus Casey, Echidnoglossa illecta Casey, Gennadota canadensis Casey, Myrmedonia obliqua Casey and Tachyusa gracillima LeConte.*

**RÉSUMÉ**

*Nous revisons les espèces d'Aleocharinae collectionnés dans des cavernes de l'est des U.S.A. Nous avons découvert 20 espèces distribuées en 10 genres et 7 tribus. Les cinq espèces suivantes sont nouvelles pour la science: Aloconota diversiseta, Aloconota neospelea, Atheta alabama, Atheta lucifuga, et Atheta trogliphila. Nous présentons des tables dichotomiques aux tribus, genres et espèces, et pourvons une diagnose pour chaque espèce. Pour les nouveaux taxa et espèces nous illustrons les organes génitaux pour des dessins et les caractères externes par des photomicrographes faites au microscope électronique à balayage. Les espèces les plus communément rencontrées dans les cavernes sont: Aleochara lucifuga (Casey), Atheta annexa Casey, Atheta lucifuga sp. nov., Atheta trogliphila sp. nov. et Blepharrhymenus illectus (Casey), et tous sont tentativement classifiés comme trogliphiles. Nous considérons les autres espèces comme accidentelles dans les cavernes.*

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*Nous avons désigné des lectotypes pour les espèces suivant: Aleochara angusticeps Sharp, Atheta annexa Casey, Callicerus puberulus Casey, Echidnoglossa illecta Casey, Gennadota canadensis Casey, Myrmedonia obliqua Casey et Tachyusa gracillima LeConte.*

## INTRODUCTION

Many groups of animals occur in caves and of these many species are cave-adapted and cave-limited. Foremost as cave inhabitants are the insects, and especially diverse are cave beetles in the families Carabidae, Leiodidae, and Pselaphidae (Vandel, 1965; Barr, 1968; Peck, 1984). However, other beetle families also occur in cave habitats, and in North America the Staphylinidae or rove beetles are frequently found in caves. Of the staphylinids commonly found in caves, few have been recently reviewed in a systematic sense. In the genus *Quedius*, with 88 species known in the United States and Canada, four species occur with some frequency in caves, but these are not limited to cave habitats (Smetana, 1971). The paederine staphylinid genus *Stilicolina* has been reviewed (Herman, 1970) and *S. condei* Jarrige is commonly known from caves in Texas and Mexico. These and a few other staphylinids are usually given by species name in state survey lists of cave faunas (see reviews in Holsinger, Baroody and Culver, 1976 or Peck and Lewis, 1977).

The most abundantly encountered staphylinids in North American caves are in the subfamily Aleocharinae. This is a group which is notoriously difficult to identify and cave faunal lists usually place these only under the heading of the subfamily name. Of the recent revisions of groups in this subfamily, only the genus *Aleochara*, with 47 species in the United States and Canada, has a species frequently found in caves (Klimaszewski, 1984). This is *A. (Echochara) lucifuga* (Casey) which is known almost exclusively from caves in the southeastern United States.

In some 25 years of field work on the insect fauna of caves, the junior author has assembled thousands of specimens of cavernicolous Staphylinidae, and especially members of the subfamily Aleocharinae. The purpose of this paper is to examine the composition and distribution of this aleocharine fauna. The geographic area covered is eastern North America, including Texas, roughly equivalent to the area covered by the eastern deciduous forest biome. The only other summary known to us of North American cave staphylinids is that of Graham (1963) for California. The keys, illustrations, and descriptions provided here are intended to be useful to a wide audience of students of cave faunas who need to know what species they are encountering, as well as to staphylinid specialists. Some of the data presented are intended to serve as a contribution to future revisions of genera such as *Atheta*, for which some 524 nominal species are listed for the North American fauna (Moore and Legner, 1975).

The remaining subfamilies and genera of cavernicolous Staphylinidae will be reviewed in a later paper. An introduction to the identification of this remaining fauna is Moore and Legner (1979).

## MATERIALS

Most of the specimens used in this study were collected by and are in the collection of the junior author. Additional collections were borrowed from the American Museum of Natural History, New York (AMNH), the Field Museum of Natural History, Chicago (FMNH), and the Illinois Natural History Survey, Urbana (INHS). Some individual cave biologists such as John Holsinger, James Gardner, James Reddell, Norman and Jean Youngstead, and Bruce

Conn contributed material directly.

To help resolve questions of some species identities we have examined types and other specimens from the collections of the United States National Museum, Washington, D.C. (USNM), the California Academy of Sciences, San Francisco (CAS), the Canadian National Collection, Ottawa (CNC), the Museum of Comparative Zoology, Cambridge (MCZ), and the Field Museum of Natural History, Chicago (FMNH). There are particular problems with the large genus *Atheta*, which is much in need of a revisionary study for North America. For example, the *Atheta* fauna of Sweden has 205 known species (Palm, 1970), and Lohse (1974) estimated the number of *Atheta* species in the central European fauna to be 234. Because there are more than 500 named species in this large genus reported from North America we were not able to examine all possible relevant types. We have examined the following species of *Atheta* (listed in alphabetical order) described by Casey and housed in USNM with type localities in states abbreviated (by postal codes) in parentheses followed by numbers of original specimens: *amens* (PA) 1, *annexa* (NC) 1 ♂, *auguralis* (NY) 1 ♂, *bifaria* (DC) 1 ♀, *bucolica* (MS) 1 ♀, *burra* (WI) 1 ♂, *candidula* (NY) 1, *callens* (DC) 1 ♀, *capella* (RI) 4, *catula* (NY) 1, *cephalina* (IA) 1 ♂, 1 ♀, *citata* (NY) 1 ♂, *comitata* (RI) 9 and 1 non paratype (PA), *concessa* (WA) 1 ♀ and 1 (WT), *dama* (NY) 2, *delubis* (NY) 1, *discreta* (NY) 1, *disjuncta* (NC) 1 ♂, 8 and 3 non paratypes (PA), *diffisa* (NY) 1, *ducens* (NY) 18, *elota* (NY) 8, *enitescens* (NY) 1, *fenisex* (RI) 1 ♀, *franklini* (PA) 4, *freta* (ND) 1, *gnoma* (NY) 1, *insidiosa* (NY) 21, *iterans* (NY) 1 ♂, 2, *kansana* (KS) 1, *limulina* (RI) 1, *logica* (PA) 2, *lymphatica* (IA) 1 ♀, 1, *modiella* (RI) 1, *nacta* (MO) 1, *nata* (NY) 1, *nexa* (PA) 2, *novella* (NY) 1, *nupera* (NY) 1 ♀, *nuptalis* (RI) 1 ♀, *nympha* (NY) 9, *ordinata* (NY) 1, *palpator* (OH) 1, *perspicua* (NJ) 1 ♂, *pocahontas* (VA) 3, *promota* (MS) 1 ♂, *propitia* (NC) 1, *reformata* (WI) 1, *regenerans* (IA) 1, *reticula* (VA) 1 ♀, *revoluta* (ID) 1, *rhodena* (RI) 1 ♂, 5, and 8 non paratypes (PA), *replicans* (IA) 1 ♂, 5 and 2 non paratypes, *rusticula* (NY) 1, *sentiens* (KS) 1, *spadix* (NY) 2, *strigulosa* (NY) 1 ♀, *subretracta* (ID) 1, *temperens* (DC) 1, *tractabilis* (NY) 1, *tradita* (NY) 2, *umbonalis* (OH) 1, *vacillans* (NY) 1, *vaticina* (NY) 1 ♀, *vierecki* (CT) 1 ♂, 3, *villica* (PA) 1, *weedi* (MS) 1.

The following species of *Atheta* described by Bernhauer, with types housed in FMNH, have also been examined: *aspericauda* (FL) 1 ♂, *crenulata* (WA) 1 ♂, *virginica* (ME, WV) 2 ♂ different species, *dentata* (CA) 1 ♂, *frosti* (NY) 1 ♂, *fulgens* (WV) 1 ♂, *hampshirensis* (NH) 1, *klagesi* (PA) 1 ♂, *obsoleticollis* (CO) 1, *pedicularis* (NJ) 1 ♀, *ventricosa* (NY) 1 ♂.

The following species of *Atheta* described by Fenyes, with types housed in CAS, have been examined: *hilaris* (NH) 1, *laetula* (NH) 1.

The above listed types were selected for study because their descriptions indicated that they might be species or in species groups represented in our study material. Study of all of the more than 500 North American *Atheta* types must await a comprehensive revision of the genus.

## METHODS

The material used in this study was collected by many people and over many years. That gathered by the junior author was hand collected in caves around and under rocks, organic debris, and animal droppings, and by the use of dung and carrion baits and baited pitfall traps. All material comes from the dark zone of the caves unless otherwise indicated. All available specimens have been included in this study, even if at present they seem to be only of accidental occurrence in caves.

Keys are presented to enable workers to identify the known staphylinid fauna of eastern American caves. Additional generic taxa may be found in the future, and we recommend that the keys of Seevers (1978) be used to attempt to identify those which are not included in the present paper. The higher classification used here follows that of Seevers (1978). Within the large tribe Athetini we use the generic and subgeneric concepts of Lohse (1974). The North American *Atheta* are still so inadequately known that many named species are probably placed in improper subgenera. This may be a source of error, and we may have overlooked already named species which we here describe as new. Procedures of treating specimens are those given by Klimaszewski (1984). Dissections were made of specimens from most localities to confirm species identity. We indicate specimens examined as numbers of either males, females, or of undetermined sex. Genitalic structures were mounted in Canada balsam on clear plastic microslides attached to the pins of the specimens. Line illustrations were made by tracing and drawing projections of these slides. The Scanning Electron photomicrographs were made on a Phillips AMR model at an accelerating voltage of 5–10 Kv. Genitalic characters were considered to be of ultimate importance in making decisions on species identification.

Holotypes from this study are placed in the CNC. Paratypes are designated only from material that has been dissected. Paratypes are deposited in the collections of AMNH, CNC, FMNH, INHS, and the collections of the authors.

We provide extensive redescriptions of previously named species when we think that previous descriptions have been inadequate. In all cases these are based firstly on study of the holotypes, and secondly on other available material.

## BIONOMICS

The Aleocharinae are dominant predators as adults and larvae in soil and litter habitats (and in caves) on mites, small insects, and larvae of Diptera associated with decaying plant material, fungi, animal carcasses, and animal droppings. Some might be direct scavengers on these materials. In the genus *Aleochara* adults are predators on dipteran larvae and pupae, and their larvae are ectoparasitoids on dipteran pupae (Klimaszewski, 1984). Life histories and immature stages of most Aleocharinae, especially those inhabiting caves, are generally unknown. The only ecological study giving data about cave Aleocharinae is that of Conn and DeMoss (1983, 1984) for Bat Cave, Kentucky.

Vandel (1965) places staphylinids which occur regularly in caves in three ecological categories. 1). *Endogeans* are species usually living in soil or litter habitats and which can also live in caves. 2). *Guanobia* are species occurring in decaying organic matter which in caves are frequently found mostly on guano or animal feces. Both of these two groups could also be categorized as troglaphiles. 3). *Troglobia* (troglobites) are species found exclusively in caves, and show morphological specializations for caves. Examples of troglobia are few other than those offered by Vandel (1965) for the North African fauna. *Stenopholea reddelli* Herman (1969) from a cave in Tamaulipas, Mexico has been considered a cave-evolved species (troglobite) because specimens are eyeless, wingless, poorly pigmented, and with long tactile setae, but it may actually be a deep soil (endogean) species. Our study found no species to have apparent cave-related morphological specializations. Many of the species we have found are also known from non-cave habitats and can be classed as troglaphiles (Barr, 1967). Species known only from caves and restricted to them can be classed as troglobites, but the identity and distributions of epigeal Aleocharinae in eastern North America are still so poorly known that

we cannot at this time generalize on whether or not some of our species occur outside of caves.

Of the 20 species treated in this paper, those which are most frequently and regularly found in caves are:

1. *Blepharrhymenus illectus* (Casey)
2. *Atheta (Dimetrota) trogliphila* sp. nov.
3. *Atheta (Atheta) annexa* Casey
4. *Atheta (Dimetrota) lucifuga* sp. nov.
5. *Aleochara (Echiochara) lucifuga* Casey

We tentatively categorize all of these as trogliphiles. We do not know enough about the habits of these species to assign them to Vandell's categories of endogean or guanobia. We regard the other species found in this study to be accidentals. Lastly, we regret that so little is known of these beetles in non-cave habitats that we can offer no hypotheses on the evolution or biogeography of this part of the North American cave fauna. When the epigeal distributions of *Atheta* become known, we expect that interesting disjunct and relictual geographic patterns will emerge, as have been found in some trogliphilic Diptera (e.g., Peck and Russell, 1976 and Marshall and Peck, 1985).

#### SYSTEMATICS

The members of this subfamily are separated from all other subfamilies of Staphylinidae by the following combination of characters: antennal fossae located medial to the eyes; maxillary palpus 4-segmented, occasionally with minute apical pseudosegment; galea and lacinia usually approximately subequal in length; hind coxae transverse; paratergites and parasternites present; spermatheca of variable shape with heavily sclerotized *receptaculum seminis* (=capsule, and chamber and/or duct) and thin and usually not sclerotized seminal canal (Fig. 14, Klimaszewski 1984: 232); aedoeagus with more or less tubular median lobe and two bipartite parameres each consisting of paramerite with apical lobe and velar sac, and condylite (for illustrations see Figs. 12, 13, Klimaszewski, 1984: 121).

#### Key to Tribes found in North American Caves

- |    |  |                                     |
|----|--|-------------------------------------|
| 1  | Pronotum trapezoidal in shape, usually impressed near base (Fig. 106)  |                                     |
|    | .....  | Myrmedoniini Ganglbauer, p. 86      |
| 1' | Pronotum different   | 2                                   |
| 2  | (1') Tarsal formula 4,4,5  | Myllaenini Ganglbauer, p. 85        |
| 2' | Tarsal formula 5,5,5 or 4,5,5  | 3                                   |
| 3  | (2') Last segment of maxillary and labial palpi each with well defined apical pseudosegment  | 4                                   |
| 3' | Last segment of maxillary and labial palpi each without distinctly separated apical pseudosegments   | 5                                   |
| 4  | (3) Tarsal formula 5,5,5   | Aleocharini Thomson, p. 77          |
| 4' | Tarsal formula 4,5,5   | Hoplandriini Fenyés, p. 82          |
| 5  | (3') Head with distinct slender neck; pronotum narrowed behind the middle with distinct median sulcus; mesothoracic peritremes behind procoxae enlarged and usually heavily sclerotized; paramere with velum of paramerite and condylite separated; Tarsal formula 4,5,5 |                                     |
|    | .....  | Falagriini Jeannel & Jarrige, p. 84 |

- 5' Head usually without neck (with neck in *Blepharrhymenus* and *Tachyusa*); pronotum usually with subparallel sides (narrowed behind the middle in *Blepharrhymenus* and *Tachyusa*) lacking median sulcus; mesothoracic peritremes small, corset-like; paramere with velum of paramerite and condylite not separated; Tarsal formula 5,5,5 or 4,5,5 (*Tachyusa*) ..... 6
- 6 (5') Tarsal formula 5,5,5 or 4,5,5 (*Tachyusa*); abdomen either with sides subparallel or slightly claviform (*Blepharrhymenus*, *Tachyusa*); male tergum VIII lacking dentate apical margin; median lobe of aedoeagus with elongate compressor plate and lacking transverse strip in front of it (known as the "athetine bridge") ..... Oxypodini Fenyes, p. 56
- 6' Tarsal formula 4,5,5; abdomen with subparallel sides and sometimes with slightly acuminate apex; male tergum VIII with dentate apical margin; median lobe of aedoeagus with oval compressor plate and with the "athetine bridge": (see Seevers, 1978: 191, Fig. 10M) ..... Athetini Casey, p. 63

#### Tribe Oxypodini Fenyes

Oxypodini Fenyes, 1918: 19, 1920: 315.— Hatch, 1957: 135.— Seevers, 1978: 60.

*Diagnosis* (as defined by Seevers, 1978: 60, 61).— Antenna 11-segmented (except 10-segmented in *Decusa*), with terminal segment bearing pair of coeloconic sensilla in many genera; maxillary and labial palpus lacking apical pseudosegments; frontal suture present in *Oxypoda* and close allies; tarsi 5,5,5 or 4,5,5 or 4,4,4 segmented; mesocoxae narrowly separated; median lobe of aedoeagus with elongate compressor plate and without a transverse strip in front of it known as the "athetine bridge".

The tribe as defined by Seevers (1978) is approximately equivalent to the tribe Oxypodini defined by Lohse (1974).

#### Key to Genera

- 1 Head without apparent neck; abdomen narrowly elongate, with sides approximately subparallel, its first five visible terga each with deep basal impression and lacking median carina ..... *Ilyobates* Kraatz, p. 57
- 1' Head with distinct slender neck; abdomen somewhat claviform with segments 3 to 5 swollen and first four visible terga each with deep transverse impression, basal impression bearing median carinae ..... 2
- 2 (1') Tarsal formula 5,5,5 ..... *Blepharrhymenus* Solier, p. 59
- 2' Tarsal formula 4,5,5 ..... *Tachyusa* Erichson, p. 61

#### Subtribe Oxypodae Seevers (1978: 61)

Distinguished from other Oxypodini by the presence of a frontal suture.

Genus *Ilyobates* Kraatz

*Ilyobates* Kraatz, 1856: 133.

Type species: *Ilyobates nigricollis* (Paykull), fixed by Thomson (1859), by subsequent designation.

*Gennadota* Casey, 1906: 308.– Fenyès, 1920: 336.– Moore and Legner, 1975: 419. Synonymized by Seevers, 1978: 72.

Type species: *Gennadota puberula* (Casey), fixed by Casey (1906), by original designation.

**Diagnosis.**— Body large (length 3.5 - 6.5 mm), elongate and subparallel, with head and pronotum distinctly narrower than elytra, brown to dark brown, with rust-coloured tint in some specimens, and with moderately long pubescence and rough, dorsal setigerous punctures; antenna 11-segmented, slightly broadened apically with segments V - X elongate or as long as wide; maxillary palpus with last segment narrowly elongate; lacinia narrow; galea broader, slightly flattened; ligula long and bilobed apically; postgenal carinae well developed; pronotal hypomera visible in lateral view; first five visible abdominal terga deeply impressed; tarsal formula 5,5,5; mesosternum with a small carina near base and with broadly V-shaped median process; paramere of aedeagus with velum bearing distinct ribbing and with moderately elongate apical lobe with four setae (one small apical, one longer subapical and two long basal). Life history unknown.

**Key to Species**

- 1 Pronotum widest in apical third and markedly narrowed apically and basally (Fig. 4); head, pronotum and elytra rust-brown to dark brown with coarse and dense punctation (Figs. 3–5); metatarsus with basal segment longer than the two following segments combined . . . . .  
 . . . . . *I. puberulus* (Casey), p. 57
- 1' Pronotum widest in middle and only slightly narrowed basally; males with head and pronotum black, and elytra dark brown with fine and moderately sparse punctation, females entirely brown; metatarsus with basal segment slightly shorter than the two following segments combined . . . . .  
 . . . . . *I. canadensis* (Casey), p. 58

*Ilyobates puberulus* (Casey)

Map 1, Figs. 1–14, 62–64

*Callicerus puberulus* Casey, 1893: 310.– As *Gennadota*: Casey, 1906: 308.– Moore and Legner, 1975, 419. Lectotype (here designated): New York; *Callicerus puberulus* Casey; USNM Type 39732; *Gennadota puberula* Casey, Casey bequest 1925 (USNM) 1 ♂; paralectotype: Pennsylvania, Enola, IX, 3.08; *puberulus* 2, Casey det.; Casey bequest 1925 (USNM) 1 ♀. Both specimens studied.

**Diagnosis.**— This species is distinguishable by the following combination of characters: first five visible abdominal terga with exceptionally deep basal impressions (Figs. 1, 2, 14), Pronotal hypomera distinctly visible in lateral view (Figs. 2, 11), body deeply punctate, pronotal pubescence directed laterally from midline of the disc (Fig. 4), and the shape and internal structures of the median lobe of the aedeagus (Figs. 62, 63) and the shape of the spermatheca (Fig. 64).

**Description.**— *Body Length* 5.0 - 6.5 mm; *color* brown with rust-coloured tint, to dark brown, with first 1–3 basal antennal segments, maxillary palpus, entire legs or tarsi only, elytra and apical part of abdomen paler, rusty brown; pubescent, with abdominal pubescence more sparse than that on remainder of body; densely covered with coarse punctures, interspaces between punctation without microsculpture and glossy. *Head* as long as wide (Fig. 3), with labrum tri-lobed (Fig. 9), and with pubescence distributed on central part directed anteriorly and that of baso-lateral parts obliquely laterally; venter of head (Fig. 6) with pronounced postgenal carinae; antenna with segments 1–4 elongate, and 5–10



quadrate or slightly elongate (Figs. 1, 2, 11); labial palpus as in Fig. 13; maxillary palpus (Figs. 3, 6, 9), with last segment narrowly elongate, bearing subapical ring of sensilla (Fig. 10); Ligula long and bilobed apically (Fig. 13). *Pronotum* slightly transverse (length to width ratio 0.9) (Fig. 4), with pubescence directed almost horizontally outward from the midline of disc, with hypomera distinctly visible in lateral view (Fig. 11). *Elytra* transverse (Figs. 5, 14) with pubescence directed posteriorly along suture and obliquely elsewhere. Mesosternum with small carina near base and with broadly V-shaped posterior process narrowly elongate apically (Fig. 8); mesosternal process extended to posterior half of mesocoxae. *Abdomen* narrowly elongate, with sides subparallel, and first five visible terga with deep, basal impressions (Figs. 1, 2, 14).

**MALE.** Tergum VIII transverse, with broadly curved apical margin. Sternum VIII with acutely pointed apical projection. Aedoeagus (Figs. 62, 63): median lobe with narrowly elongate tubus in dorsal view, and venter slightly sinuate laterally; bulbus moderately large with pronounced anterior carina in lateral view; internal sac with membranous structures.

**FEMALE.** Tergum VIII similar to that of male. Sternum VIII with broadly arcuate apical margin. Spermatheca with small capsule, and coiled posterior part (Fig. 64).

**Bionomics.**— Adults have been collected from caves and are without additional data, except for two adults collected from liver-baited pitfall traps. Nothing is known about the life history of this species. Collections have been made in January, June, November and December.

**Geographic Distribution** (Map 1).— The species is known from Iowa, Illinois and Missouri. Casey's original material was from New York State, (1 ♂), and one additional specimen also identified by Casey as *puberulus* from Pennsylvania (1 ♀).

**Material Examined.**— United States; *Illinois*: Monroe Co., Camp Vandeventer Cave, 27.XI.1965, S. Peck (SPC) 1 ♀; Adams Co: Burton, Burton Cave, 4.XII.1946, W.M. Sanderson (INHS) 2 ♂, 1 ♀, same data except 27.XII.1946, R.A. Evers (INHS) 2. *Iowa*: Jackson Co., Hunters Cave, 1.XI.1966, S. Peck (SPC) 1 ♀. *Missouri*: Barry Co., Chimney Rock Cave, 9 mi E Cassville, 22.I.1980, J.E. Gardner (SPC) 1 ♂, 1 ♀.

#### *Ilyobates canadensis* (Casey)

Map. 1, Figs. 96, 107

*Gennadota canadensis* Casey, 1906: 309.— Moore and Legner, 1975: 419. Lectotype (here designated): Canada, no other data; *canadensis* Casey; Casey bequest 1925; USNM Type 35733 (USNM) 1 ♀.

**Diagnosis.**— Readily distinguishable from *I. puberulus* by the following character combination: broader pronotum, with lateral margins only slightly convergent basally; fine punctation on head, pronotum and elytra; bicoloured body of males (head, pronotum and part of abdomen black, elytra brown); metatarsus with basal segment slightly shorter than two following segments combined; median lobe of the aedoeagus with tubus with venter arcuate laterally (Fig. 96), rather than slightly sinuate; and spermatheca with more elongate capsule (Fig. 107).

**Description.**— Similar to that of *I. puberulus* except for the differences given in the "diagnosis". Female uniformly brown, with spermatheca as on Fig. 107.

**Bionomics.**— One male specimen collected in a cave in early June.

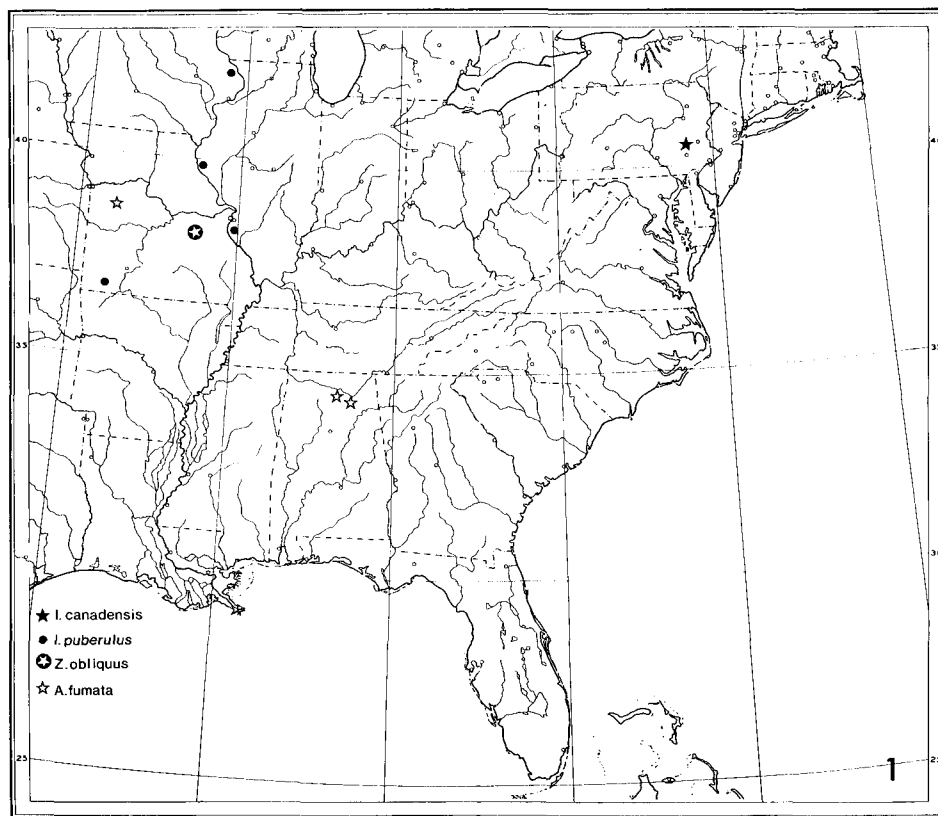
**Geographic Distribution** (Map 1).— Known from caves only from Pennsylvania. Casey's original specimen was collected from an unspecified locality in Canada.

**Material Examined.**— UNITED STATES: *Pennsylvania*, Berks Co., Dragon and Schofer Caves, 5.VI.1935, K. Dearolf (FMNH), 1 ♂.

We have tentatively associated our male specimen with *I. canadensis* (Casey), which was described from a unique female specimen. Our single male agrees in all respect with Casey's *I. canadensis* except color. Additional specimens are needed to confirm our identification.

Subtribe Blepharrhymeni Seevers, 1978: 82

**Diagnosis.**— The Blepharrhymeni are distinguished by tarsal formula 5,5,5, narrowly separated mesocoxae with median process V-shaped and acutely pointed, first four or five



Map 1. Distribution of *Ilyobates canadensis* (Casey), *I. puberulus* (Casey), *Aleochara (Xenochara) fumata* Gravenhorst, and *Zyras obliquus* (Casey) [cave localities only].

visible abdominal terga and sterna deeply impressed basally, and the aedeagal characters (Figs. 100, 101).

#### Genus *Blepharrhymenus* Solier

*Blepharrhymenus* Solier, 1849: 339<sup>2</sup>.— Fenyes 1920: 327.— Moore and Legner, 1975: 381.— Seevers, 1978: 82.

Type species: *Blepharrhymenus sulcicollis* Solier, by original designation and monotypy.

*Echidnoglossa* Wollaston, 1864: 530.— LeConte and Horn, 1883: 91.— Casey, 1886: 259, 1893: 311.— Moore and Legner, 1975: 381.— Seevers, 1978: 82.

Type species: *Echidnoglossa constricta* Wollaston, by original designation and monotypy.

*Colusa* Casey, 1885: 288. 1886: 259.— Moore and Legner 1975: 381: 381.— Seevers, 1978: 82.

Type species: *Colusa gracilis* Casey, fixed by Fenyes (1918), by subsequent designation.

**Diagnosis.**— Body of medium size (length 2.0–4.7 mm), glossy, scarcely pubescent, brown to dark brown, with appendages and basal 0.5 of abdomen paler; setigerous punctures fine on

<sup>2</sup>Solier's original spelling was "*Blepharhymenus*". It was emended to "*Blepharrhymenus*" by Gemminger and Harold (1868:505). The emended form was accepted by most subsequent authors.

head and pronotum, slightly coarser on elytra and coarse in abdominal impressions; antenna 11-segmented, slightly widened apically, with segments elongate, maxillary palpus with basal segment vestigial, 2 and 3 elongate, and 4 minute, needle shaped; lacinia elongate, with numerous spines in apical 0.5; galea 0.5 length of lacinia, finely pubescent apically; ligula narrow, entire apical; labial palpus narrowly elongate; postgenae not carinate; pronotal hypomera visible in lateral view; body form distinctive (Figs. 15, 17): head convex, semirounded posteriorly, slightly broader than pronotum and with distinct neck (Figs. 15, 17, 18); elytra with sides broadly arcuate, almost 0.5 broader than pronotum and abdominal base (Fig. 19); abdomen (Figs. 15, 17) somewhat claviform with base and apical part narrow and segments 3 to 5 swollen (much like those in *Tachyusa* Er.), first four visible abdominal terga with deep, transverse basal impressions, each with coarse punctation and median carina; tarsal formula 5,5,5; mesosternum (Fig. 23) long, with distinct basal carina (at least 0.33 as long as mesosternum) and with V-shaped and narrowly pointed apical process; paramere with velum narrowly elongate and with delicate ribbing, and with apical lobe elongate, with four setae: shortest apical, longest subapical and two of medium length in middle of lobe (Fig. 100).

*Blepharrhymenus illectus* (Casey)

Map 2, Figs. 15–23, 99–101

*Echidnoglossa illecta* Casey, 1911: 60. — As *Blepharrhymenus*: Moore and Legner, 1975: 381. Lectotype (here designated): U.S.A., Oregon, Portland, USNM., Type 39709; Casey bequest 1925 (USNM) 1 ♀ and 1 ♂ paralectotype labelled as above (USNM), both specimens studied.

*Diagnosis*.— Body length 4.2–4.8 mm; color rust-brown, brown with paler appendages or dark brown; body scarcely pubescent with interspaces between setae glossy; antenna with segments 1 to 3 of approximately same length and each at least 3.0 longer than wide, and segments 4 to 10 elongate but at most 2.0 longer than wide (Figs. 15, 17); pronotum (Fig. 19) slightly elongate (length 0.5–0.6 mm, maximum width 0.4–0.5 mm), narrower than head; elytra (Fig. 20) slightly transverse (length 0.7–0.9 mm, maximum width 0.8–1.0 mm), 2.0 broader than pronotum or nearly so; legs exceptionally long; aedeagus and spermatheca as in Figs. 99–101.

This species is very similar to *B. brendeli* (Casey), which is known only from a unique male specimen collected in Cedar Rapids, Iowa (Type USNM 39719). Males of these species have extremely similar genitalia, but may be distinguished by body size, color and proportions of elytra and pronotum. *Blepharrhymenus brendeli* is smaller (body length 3.8 mm), rust-brown in color, with narrower elytra (length 0.6 mm, maximum width 0.7 mm), and ratio of elytral maximum width to pronotal maximum width 0.7, compared to 0.5 in *B. illectus*.

*Bionomics*.— This species has been quite frequently found in caves in Alabama, Missouri and Tennessee. It was collected mainly during summer months but some specimens have also been taken in December and February (Alabama). The life history is unknown.

*Geographic Distribution* (Map 2).— *Blepharrhymenus illectus* is known so far from the type locality in coastal Oregon and from our cave records in Alabama, Missouri and Tennessee. It is difficult at the moment to explain this disjunct distribution, which is almost certainly caused by inadequate collecting. It is most likely more widely distributed, at least in the northern part of North America.

*Material Examined*.— UNITED STATES: *Alabama*: Jackson Co., Paint Rock, Paint Rock Cave, 20.XII.1965, S. Peck (SPC) 1 ♂, 1 ♀, 4; Limestone Co.: Duck Cave, 29.VI.1975, B. Torode (SPC) 2 ♂, 1 ♀, 23; same cave, 7.II.1958, E.L. Hastings and T.W. Daniel (SPC) 1 ♀, 3; Gaston Cave, VI.1958, Jones *et al.* (SPC) 1 ♀, 1; same cave 19.VIII.1965, S. Peck (SPC) 3 ♂, 3 ♀, 16; Spencer Cave, 3.5 mi W Elkmont, 19.VIII.1965, S. Peck (SPC) 2 ♂, 2 ♀, 14.

*Missouri*: Barry Co., 9.5 mi E Cassville, Lohmer Cave, 30.VII.1981, J.E. Gardner (SPC) 2 ♂, 1 ♀; Ozark Co., Huffman Cave, 14 mi SSW Ava, 7.VI.1979, J.E. Gardner (SPC) 1 ♂; Pulaski Co., Ryden Cave, 2 mi W Duke, 10.VIII.1979, J.E. Gardner (SPC) 2 ♀; Taney Co.: Dicus Cave, 12 mi ESE Tanneyville, 7.VI.1979, J.E. Gardner (SPC) 1 ♀, Hercules Lookout Cave, 10 mi ESE Tanneyville, 7.VI.1979, J.E. Gardner (SPC) 1 ♀. *Tennessee*: Cannon Co.: Hill Creek Cave, 4.VII.1973, S. Peck (SPC) 3 ♂, 1 ♀, 11; Highway Spring Cave, 30.VI–5.VII.1973, S. Peck & C. Laing (SPC) 2 ♂, 2 ♀, 22.

#### Subtribe Tachyusae Seevers, 1978: 82

The Tachyusae are distinguished from other Oxypodini by tarsal formula 4,5,5, lack of a frontal suture, moderately widely separated mesocoxae with the median process moderately broad, pronotal pubescence directed caudad (except in *Teliusa*) and by aedeagal characters (Seevers, 1978: 82,83).

#### Genus *Tachyusa* Erichson

*Tachyusa* Erichson, 1837: 307. 1839: 27.– LeConte, 1861: 61.– LeConte & Horn, 1883: 92.– Casey, 1906: 186.– Blatchley, 1910: 345, 347.– Fenyes, 1920: 169.– Bradley, 1930: 83. - As synonym of *Ischnopoda* (Stephens, 1835: 430): Moore and Legner, 1975: 441 (not verified).

Type species: *Tachyusa constricta* Erichson, designated by Int. Com. Zool. Nom., opinion 600.

*Tachyusilla* Casey, 1906: 213.– Fenyes, 1918: 25. - As synonym of *Tachyusa*: Blackwelder, 1952: 371.– Moore and Legner, 1975: 441.

Type species: *Tachyusilla balteata* (Erichson), fixed by Casey (1906), by original designation and monotypy.

*Tachyusota* Casey, 1906: 213.– Fenyes, 1918: 25. - As synonym of *Tachyusa*: Blackwelder, 1952: 371.– Moore and Legner, 1975: 441.

Type species: *Tachyusota gemma* (Casey), fixed by Casey (1906), by original designation and monotypy.

*Diagnosis*.— Adults of *Tachyusa* are very similar externally to those of *Blepharrhymenus*, but may readily be separated from the latter by tarsal formula 4,5,5 (5,5,5 in *Blepharrhymenus*). From other Tachyusae (not known in caves) they are easily distinguished by the somewhat claviform abdomen, with narrow base (no broader than pronotum), and with segments 5–7 swollen; and by deep, transverse, basal impressions on first three to five visible abdominal terga each with coarse punctation and a median carina.

#### *Tachyusa gracillima* LeConte

Map 2, Figs. 97, 108, 109

*Tachyusa gracillima* LeConte, 1863: 29.– Bland, 1865: 412.– Casey, 1906: 206.– Blatchley, 1910: 347.– Moore and Legner, 1975: 442.– Seevers, 1978: 186. Lectotype (here designated): in original description: "Middle and Western States"; on original labels: Type 6249; pale blue label with No. 413 (probably vicinity of Lake Superior); *gracillima* LeC.; J. LeConte coll. (MCZ) 1 ♂. Paralectotypes: Jones Wood, New York (MCZ) 1 ♀; 1 ♂, 2 ♀, 2 without locality data (MCZ).

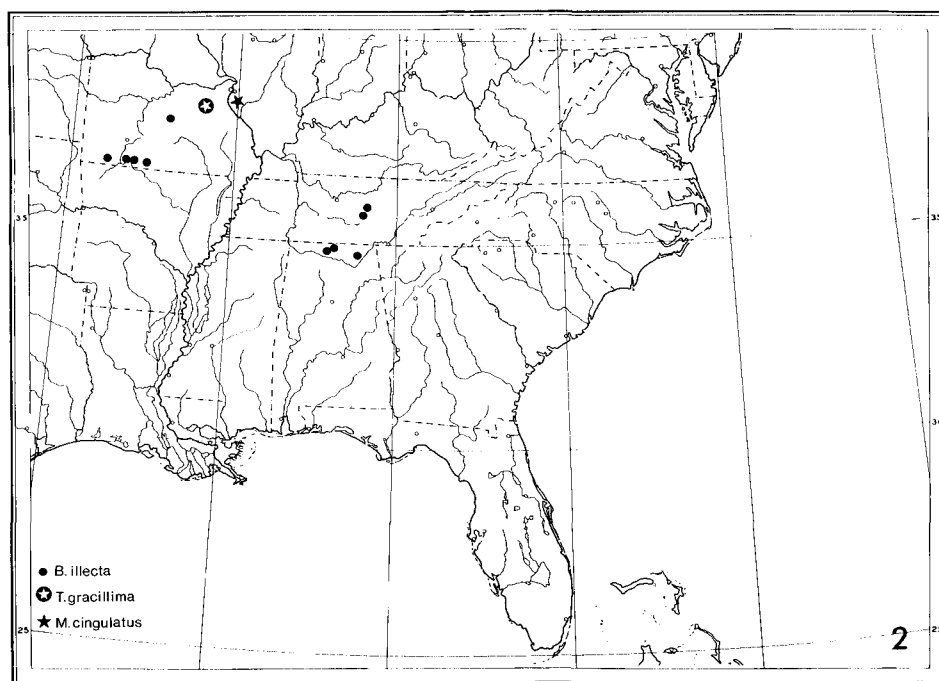
*Tachyusa smithi* Casey, 1906: 206. - As synonym of *gracillima*: Moore and Legner, 1975: 442.

Type material: USA, New York, Catskill Mts., H.H. Smith (USNM). Not seen.

*Tachyusa virginica* Casey, 1911: 172. - As synonym of *gracillima*: Moore and Legner, 1975: 442.

Type material: USA, Virginia (USNM). Not seen.

*Diagnosis*.— Body length 4.0 mm; color brown, with head and posterior portion of elytra slightly darker and apical 0.5 of abdomen black and basal 0.5 yellowish-rustbrown, with antenna, maxillary palpus, tarsi and tibiae yellowish to light brown; body glossy, especially abdomen; pubescence on forebody fine and rather dense; antenna with all segments elongate and segments 9 to 10 each 0.33 longer than wide; head slightly broader than pronotum and elytra distinctly broader than pronotum (at least 0.33 broader); abdominal impressions of first three visible terga with distinct median carinae and elongate pores; metatarsus with basal segment as long as second or only slightly longer. Spermatheca pipe-shaped, with spherical



Map 2. Distribution of *Blepharrhymenus illectus* (Casey), *Tachyusa gracillima* LeConte and *Myrmecocephalus cingulatus* (LeConte), [cave localities only].

capsule and narrow duct slightly swollen near apex (Fig. 97). Aedeagus as illustrated by Seevers (1978: 186), and as in Figs. 108, 109.

*Bionomics*.— Two specimens were collected from caves. No other data available.

*Geographic Distribution* (Map 2).— The original type specimens are from vicinity of Lake Superior and unspecified locality in New York. Our two specimens have been collected from a cave in Missouri (Map 2).

*Material Examined* (excluding type specimens).— UNITED STATES: *Missouri*: Crawford Co., Bear Cave, 8.5 mi NE Steelville, 6.VIII.1980, J.E. Gardner (SPC), 2 ♀.

The type material of the following species described by Casey has been studied and proven to be distinct from *T. gracillima*, *Tachyusa ornatella* and *T. pruinosa*. *Tachyusa americana* Casey does not differ in any important aspect from *T. gracillima* LeC., except for the apex of the median lobe of the aedeagus which is narrower and more produced ventrally.

In external features, specimens of *T. gracillima* are very similar to the holotype of *T. cavicollis* LeConte. Differences in the male genitalia (Figs. 108 and 109, *T. gracillima*; cf. Figs. 110 and 111, *T. cavicollis*) indicate the specific distinctness of these named forms.

## Tribe Athetini Casey

Athetae Casey, 1910: 2 (subtribe of Myrmediini).

Athetini Fenyes, 1921: 34.— Borgmeier, 1949: 110.— Seevers, 1978: 88.

*Diagnosis* (as defined by Seevers, 1978: 88–90).— Antenna 11-segmented, without coeloconic sensilla; maxillary and labial palpus without apical pseudosegments; frontal suture absent; tarsi 4,5,5-segmented; mesocoxae narrowly to moderately widely separated; median lobe of aedeagus with oval compressor plate and transverse strip in front of it defined by Seevers (1978) as the “athetine bridge”.

*Remarks*.— This tribe is approximately equivalent to the tribe Callicerini defined by Lohse (1974). *Aloconota* Thomson is considered as a subgeneric taxon by Brundin (1954) and as a distinct genus by Lohse (1974) and Seevers (1978). We have followed the latter authors for practical reasons because a classification based upon the phylogeny of the group is not possible at the present time.

## Key to Genera

- 1 Pronotum flattened, widest in apical third with pubescence either uniform or diversified, short and stout setae in central and posterior parts and longer elsewhere, at least pubescence of posterior part of disc directed cephalad; antennal segments four and five distinctly elongate, at least 1.5 as long as wide; last tarsomeres with greatly elongate empodial bristles, usually distinctly longer than tarsal claws; body narrowly elongate . . . . .  
 . . . . . *Aloconota* Thomson, p. 63
- 1' Pronotum from moderately to strongly convex dorsally, widest in middle; pubescence uniform and setae in posterior part of disc directed either caudad or obliquely outward from median line; antennal segments four and five as long as maximum width or slightly elongate; last tarsomeres without or with short empodial bristles; body moderately elongate to robust . . . . .  
 . . . . . *Atheta* Thomson, p. 67

Genus *Aloconota* Thomson

*Aloconota* Thomson, 1858: 33.— Casey, 1906: 337. 1910: 84.— Fenyes 1918: 176.— Blackwelder, 1952: 47.— Moore and Legner, 1975: 347.— Seevers, 1978: 110.

Type species: *Aloconota gregaria* Erichson (through synonymy with *Tachyusa immunita* Erichson).

*Taphrodota* Casey, 1906: 338. 1910: 84. - As synonym of *Aloconota*: Blackwelder, 1952: 47.— Moore and Legner, 1975: 347.— Seevers, 1978: 110. Type species: *Taphrodota ventralis* Casey, fixed by original designation and monotypy.

*Terasota* Casey, 1906: 337; 1910: 84. - As synonym of *Aloconota*: Blackwelder, 1952: 47.— Moore and Legner, 1975: 347.— Seevers, 1978: 111.

Type species: *Terasota brunneipes* Casey, fixed by original designation and monotypy.

*Diagnosis*.— Body narrowly elongate, flattened dorsally, length 3.0–5.0 mm, color brown to dark brown, in general form somewhat similar to *Tachyusa*, usually with fine microsculpture of irregularly hexagonal sculpticells; antenna insignificantly broadened apically; pronotum broadened apically and widest in apical 0.33, with pubescence usually directed cephalad along midline of disc and in posterior part; first three visible abdominal terga deeply and fourth shallowly impressed at base; last tarsomeres with elongate empodial bristles, usually distinctly longer than tarsal claws (for illustration see Seevers, 1978: 210).

The concept of this genus by Seevers (1978) agrees generally with that by Lohse (1974).

### Key to Species

- 1 Pronotal pubescence with setae in posterior part of disc directed cephalad in form of three V-shaped patterns (Fig. 33); male tergum VII lacking carinate median projection; male tergum VIII with four teeth similar in shape and size (Fig. 94); aedoeagus and spermatheca as in Figs. 92, 93, 95; widely distributed ..... *A. insecta* (Thomson), p. 65
- 1' Pronotal pubescence forming different pattern, male tergum VII with carinate median projection (Fig. 25); male tergum VIII with diversified teeth (Fig. 89); known from Alabama ..... 2
- 2 (1') Pronotum with uniform pubescence in females, directed cephalad, outward and caudad from the midline; pubescence diversified in males, of short, stout setae in central and posterior part of disc directed caudad, and longer setae elsewhere directed obliquely cephalad, outward and caudad (Fig. 27); male tergum VIII with two narrowly elongate and sharply produced lateral teeth and two shorter median ones with rounded apices (Fig. 89); aedoeagus and spermatheca as in Figs. 87, 88, 90 .....  
..... *A. diversiseta* sp. nov., p. 64
- 2' Pronotum with uniform pubescence in males (females unknown), radiated from midline of disc and directed cephalad, obliquely outward and caudad; male tergum VIII with small lateral teeth and two median ones on slightly produced posterior portion of tergum (Fig. 103) .....  
..... *A. neospelea* sp. nov., p. 65

*Aloconota diversiseta* sp. nov.

Map 7, Figs. 25–31, 87–90, 98

*Diagnosis.*— Males of *A. diversiseta* are readily distinguishable from those of other species of *Aloconota* collected in caves by having a diverse pronotal pubescence consisting of short, stout setae distributed in central and posterior part of the disc and longer, thinner setae distributed elsewhere (Fig. 27), by the broadly dentate apical margin of male tergum VIII with two longer and rather sharply pointed lateral teeth and two apically rounded median ones (Fig. 89), and by the shape of the median lobe of the aedoeagus in dorsal and lateral views (Figs. 87, 98). Females are distinguished by the shape of their spermatheca (Fig. 90).

*Description.*— Body Length 4.2 - 5.0 mm; color light brown to dark brown, with maxillary palpi, clypeus, legs, or tibiae and tarsi only, and often apical part of abdomen paler - light brown; dorsal surface slightly glossy with microsculpture of irregularly hexagonal sculpticells. *Head* slightly elongate, with central part shallowly impressed in males and with short, stout setae in central and posterior part and longer, thinner, setae elsewhere (Fig. 26); pubescence of female uniform; venter of head with elongate genae bearing longitudinally meshed microsculpture, transversely meshed elsewhere (Fig. 29); antenna with segments 1 to 7 elongate and 8 to 10 each as long as wide (Fig. 25); labial palpus as in Fig. 30; maxillary palpus as in Fig. 30. *Pronotum* slightly transverse (Fig. 27), with pubescence uniform in females and diverse in males, with short, stout setae in central and posterior part of the disc and longer, thinner setae elsewhere (Fig. 27). *Elytra* slightly transverse, with pubescence directed obliquely posteriorly from suture (Fig. 28). Mesosternum not carinate, with narrowly V-shaped and acutely pointed median process, extended to slightly more than 0.33 length of mesocoxae (Fig. 31). *Abdomen* elongate with broadly curved edges, strongly narrowed posteriorly in apical 0.25, pubescence scarce, terga glossy.

MALE. Terga VII and VIII each with median carinate projection (Fig. 25). Tergum VIII with two longer and more sharply produced lateral teeth and two shorter and apically rounded median ones (Fig. 89). Aedoeagus (Fig. 87), with

median lobe with tubus obliquely produced ventrally (Fig. 98), paramere as in Figs. 87, 88.

FEMALE. Tergum VIII with apical edge broadly curved. Spermatheca S-shaped, with capsule directed apically (Fig. 90).

*Bionomics*.— Adults have been collected from caves in July and August, using pitfall traps. No other data are available.

*Geographic Distribution* (Map.7).— This species is known only from individuals collected in Jackson and Marshall counties, Alabama.

*Material Examined*.— Holotype ♂: UNITED STATES, Alabama, Marshall Co., Cathedral Caverns, 12.VII.1965, S. Peck (CNC). Paratypes: 3 ♂, 1 ♀ labelled as allotype (AMNH) 1 ♂, (CNC) 1 ♀, (SPC) 2 ♂; Alabama, Marshall Co., Cathedral Cave Grant, 17–24.VIII.1965, S. Peck (CNC) 1 ♀, (SPC) 1 ♂, 3 ♀; Alabama, Jackson Co., Limrock Blowing Cave, 17.VIII.1965, S. Peck 1 ♀.

*Aloconota neospelea* sp. nov.

Map 3, Figs. 91, 102, 103

*Diagnosis*.— Males of this species are distinguishable by the pattern of the pronotal pubescence, with uniform setae radiating from midline of disc and directed cephalad, obliquely outward and caudad; by a distinctly transverse pronotum; by the shape of tergum VIII with four small teeth, with two lateral and two median ones located on the slightly produced posterior portion of tergum (Figs. 91, 102); and by shape of median lobe of aedeagus (Fig. 103). Females of this species are unknown.

*Description*.— Externally, extremely similar to *A. diversiseta* except body less glossy and slightly smaller (length 4.1 mm), pronotum distinctly transverse (maximum width 0.6 mm, length 0.5 mm), and pattern of pubescence on pronotum characteristic (see diagnosis).

MALE. Tergum VIII with four small apical teeth and two median ones on slightly produced posterior portion of tergum (Fig. 103). Aedeagus (Figs. 91, 102), with median lobe having broadly oval bulbous part and short tubus with ventral margin straight and only apical part slightly produced ventrally.

FEMALE. Unknown.

*Bionomics*.— One male was collected in mid September in a cave. No other data are available.

*Geographic Distribution* (Map 3).— The unique specimen of *A. neospelea* was collected in Madison County, Alabama.

*Material Examined*.— Holotype ♂: UNITED STATES: *Alabama*: Madison Co., Barclay Cave, 18.IX.1952, Jones, Park (CNC).

*Aloconota insecta* (Thomson)

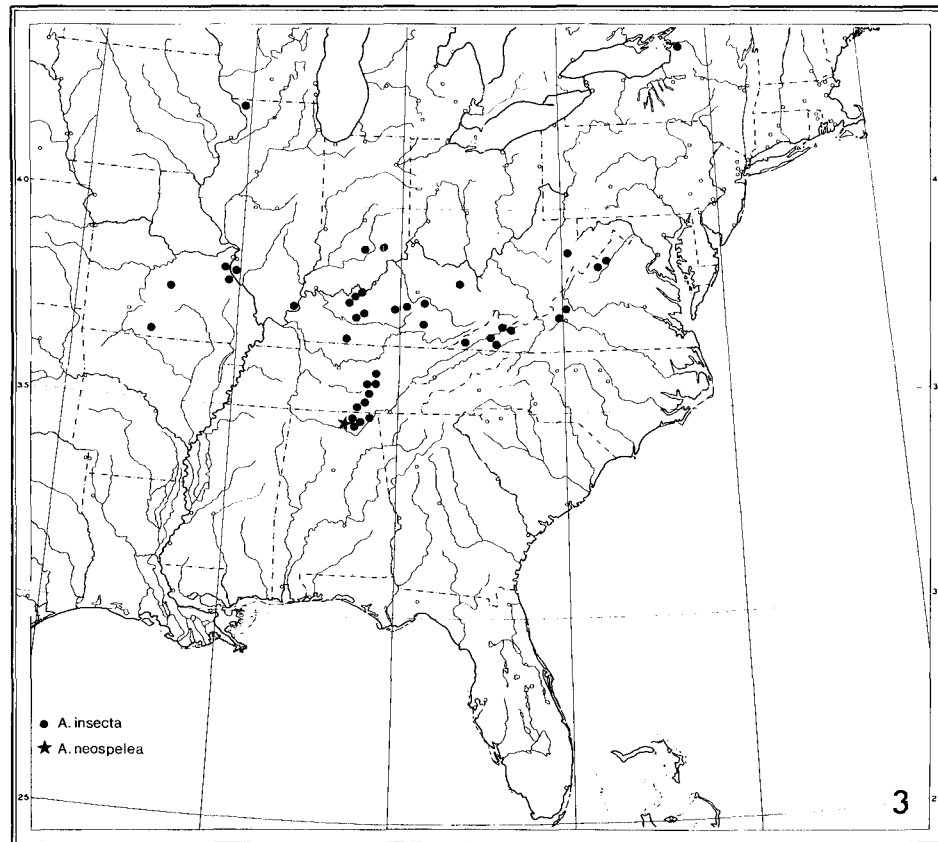
Map 3, Figs. 32–37, 92–95

*Homalota insecta* Thomson, 1856: 93. Nearctic records: Fauvel, 1889: (as *Homalota*); Brundin, 1934: 320.– Moore and Legner, 1975: 363.

*Diagnosis*.— The species may be readily distinguished from all other species of *Aloconota* occurring in caves by the peculiar pattern of pubescence on the pronotum (Fig. 33), with setae on the posterior part of the disc directed cephalad, forming three V-shaped patterns; by the four teeth on the apical margin of male tergum VIII (Fig. 94) which are similar in shape and size; by the shape of the median lobe of the aedeagus in dorsal and lateral views (Figs. 92, 93), with a flagellum at least 2.0 as long as the median lobe, and by shape of the spermatheca (Fig. 95).

*Description*.— Body length 3.8 - 4.5 mm; color light brown to dark brown, with first antennal segment, maxillary palpi, occasionally the clypeus, legs or tarsi only, entire elytra or only its posterior part, and apical part of abdomen paler, light brown with reddish tint; forebody dull with microsculpture of irregularly hexagonal sculpticells. *Head* (Fig. 32), approximately as wide as long or only slightly elongate, with shallowly impressed central part and with pubescence directed toward midline; venter of head (Fig. 35), with transversely, meshed microsculpture on mentum and longitudinal





Map 3. Distribution of *Aloconota insecta* (Thomson) and *A. neospelea* sp. nov., [cave localities only].

microsculpture on genae; antennal segments 1 to 6 elongate and 7 to 10 as long as wide or slightly transverse; labial palpus as in Fig. 36; maxillary palpus with terminal segment needle-shaped (Figs. 35, 36). *Pronotum* slightly elongate (Fig. 33), with pubescence of posterior part of disc directed cephalad in form of three more or less distinctly defined V-shaped patterns. *Elytra* transverse with pubescence directed obliquely posteriorly from suture (Fig. 34). Mesosternum not carinate, with broad, V-shaped, median process and acute apex reaching almost to 0.5 of mesocoxae (Fig. 37). *Abdomen* narrowly elongate, gradually narrowed posteriorly in apical 0.25, pubescence scarce, and tergal impression slightly glossy.

**MALE.** Tergum VII without carinate median projection. Tergum VIII with four teeth similar in shape and size (Fig. 94). Aedeagus (Figs. 92, 93), with median lobe having tubus obliquely produced ventrally and with narrow and rounded apex; flagellum long, at least 2.0 as long as median lobe; paramere as in Fig. 93.

**FEMALE.** Tergum VIII with apical edge broadly curved. Spermatheca S-shaped with capsule oriented laterally (Fig. 95).

**Bionomics.**— Some specimens have been collected from organic debris and fungi and one from a dead hog. Collections have been made from February to December. This species is frequently collected in caves and is considered to be troglomorphic.

**Geographic Distribution (Map 3).**— This species is known to occur primarily in Middle Europe and Scandinavia— Finland, Norway, Sweden and Denmark (Strand, 1946; Palm, 1970) — but is also recorded from the Caucasus, Siberia (Irkutsk) and North America (Brundin

1934). In North America it was reported by Moore and Legner (1975) from Massachusetts, West Virginia and Virginia. Our records based on specimens collected from caves show that *Aloconota insecta* ranges from southern Indiana in the north to northern Alabama in the south, and from north-western Virginia throughout the contiguous states to central and southern Missouri. Two additional isolated records are known, one from northern Illinois and the other from Buffalo, New York. It is difficult to say whether this is an introduced or a genuine Holarctic species since the range of the species in North America is completely unknown other than our records and those previously mentioned by Moore and Legner.

*Remarks.*— There is another European species, *Aloconota sulcifrons* (Stephens), closely allied to *Aloconota insecta* and also recorded in North America from Buffalo, New York, by Fauvel (1889) [under the generic name *Homalota*] and subsequently by Hamilton (1894), and Moore and Legner (1975). We have not seen representatives of the former species in our material from caves. Through the courtesy of Dr. A. Smetana, we have examined European specimens of both species. European specimens of *A. insecta* did not differ in any important aspect from our native specimens of this species. Although *Aloconota sulcifrons* is so far not recorded from North American caves we feel obliged to mention some important features distinguishing these two. *Aloconota sulcifrons* may be differentiated from *Aloconota insecta* by its somewhat smaller body (length 3.4 - 3.8 mm), by its slightly broader antenna with the apical segments distinctly transverse, by having the venter of the tubus of the median lobe markedly sinuate and the spermatheca with the posterior part only slightly swollen (for illustrations see Lohse, 1974: 96).

*Material Examined.*— UNITED STATES: *Alabama*: Jackson Co.: Montagne Cave, 11.VIII.1960, M. Kroeger (SPC) 1 ♂, Russell Cave, Russell Cave National Monument, 31.VIII.1965, S. Peck (SPC) 1 ♂, 1 ♀; Madison Co.: Barclay Cave, 24.VIII.1965, S. Peck (SPC) 1 ♀; *Illinois*: Hardin Co.: Griffith Cave, 2 mi N Rosiclare, 19.IX.1965, S. Peck (SPC) 1; Jo Daviess Co.: Angoma Farm Cave, 3 mi NW Elizabeth, 14.XI.65, S. Peck (SPC) 1; Monroe Co.: Illinois Mammoth Cave, 25.VI.65, S. Peck (SPC) 1 ♂, 6; *Indiana*: Jennings Co.: Wyaloosing Cave near North Vernon, 18.VIII.1960, H.S. Dybas (FMNH) 2; Lawrence Co.: Colglazier Sink Cave, 9.VIII.64, S. Peck (SPC) 1; Donaldson Cave, 13.XI.1965, T. Barr (AMNH) 2; Hert Cave, 8.VIII.64, S. Peck (SPC) 3; *Kentucky*: Breckinridge Co.: Dockard Cave, 3 mi W Big Spring, 19.IX.1964, T.C. Barr (AMNH) 2, Thornhill Cave, Big Springs 26.XII.1964, S. Peck (SPC) 1 ♂, 5 ♀, 5; Boyle Co.: near Perryville, Lawrence Cave, 20.VIII. 1960, K. Krekeler (FMNH) 1 ♂; Carter Co.: Bat Cave, 25.VI.37, K. Dearolf (FMNH) 1♂; Carter Cave St. Pk., Bat Cave, I.X.64, S. Peck(SPC) 1 ♂; Green Co.: Greasy Creek Cave, 2.X.1965, T.C. Barr (AMNH) 2; Hart Co.: Cave Spring Cave, 1 1/2 mi NW Three Springs, 26.VI.73, S. Peck (SPC) 1 ♂; Three Springs Cave, Three Springs, 26.VI.73, S. Peck (SPC) 1 ♂, 2; Cave City, Mammoth Onyx Cave, 27.II.1933, Pohl (FMNH) 3 ♂; Meade Co.: Sig Shacklett Cave, 2.XII.1961, Barr & Kuehne (AMNH) 1 ♀; Madison Co.: Adams Cave, 15.VIII.1964, T. Barr & S. Peck (SPC) 1 ♂; Pulaski Co.: Hyden Cave, 10.VI.1964, S. Peck (SPC) 1 ♀, 2; Simpson Co.: Hoy Cave, 2.III.1956, L. Hubricht (AMNH) 8; *Missouri*: Camden Co.: Hahatunka, River Cave, 8.VI.1938, K. Dearolf (FMNH) 2; Christian Co.: Ozark, Smallen's Cave, 26.VI.1938, K. Dearolf (FMNH) 2; Jefferson Co.: Pleasant Valley Cave, 24.VI.1965, S. Peck (SPC) 1, St. Genevieve County: 1 mi S St. Genevieve, Kohms Cave K.V. 1966, S. Peck (SPC) 3, 3 mi SW St. Genevieve, Gegg Cave, 15.VI.1966, S. Peck (SPC) 1; *New York*: Jefferson Co.: 3 mi W Watertown, Ice Labyrinth Cave, 16.X.66, S. Peck (SPC) 1; *Tennessee*: Coffee Co.: 2.5 mi NE Gossburg, Burke Cave, 21.VIII.1969, S. Peck & A. Fiske (SPC) 2 ♀; De Kalb Co.: 2 mi SE Dowlstown, Indian Grave, 25.V.1972, S. & J. Peck (SPC) 1 ♀, 2 Point Cave, 20.III.1964, S. Peck (SPC) 1 ♂, 1 ♀; Franklin Co.: 5.5 mi SE Belvidere, Caroline Cove Cave, 11.VII.1967, S. Peck & A. Fiske (SPC) 1 ♀; 6 mi N Hytop Ala., Pitcher Ridge Cave, S. Peck & A. Fiske (SPC) 1 ♀, 1; Rutherford Co.: Burk Spring Cave, at Burk Cave, 30.VI–15.VII.1973, S. Peck (SPC) 1 ♀; Warren Co.: Hubbard Cave, 10.XI.1956, T.C. Barr (AMNH) 1; *Virginia*: Botetourt Co.: Thomas Cave, 3.VIII.1970, L.M. Ferguson & B.L. Ferguson (SPC) 2 ♂, 1 ♀, 15; Lee Co.: Bowling Cave, 29.III. 1967, J. Holsinger *et al.* (SPC) 1 ♀, 1; Roanoke Co.: Hodges Cave #1, spring 1974, L.M. Ferguson (SPC) 1 ♂, 1; Russell Co.: Banners Corner Cave, 29.II.1964, S. Peck (AMNH) 1; Tazewell Co.: Fallen Rock Cave, 10.X.1970, L.M. & B.L. Ferguson (SPC) 1 ♂, 1, Gully Cave, 4 mi SE Pounding Mill, 28.VII.1974, J. Holsinger and D.C. Culver (SPC) 1 ♀.; *West Virginia*: Pendleton Co.: Seneca Caverns, 12.IV.1935, K. Dearolf (FMNH) 2.

#### Genus *Atheta* Thomson

*Atheta* Thomson, 1858: 36. Type species: *A. graminicola* (Gravenhorst), fixed by the Int. Com. Zool. Nom., opinion 600. As defined by Lohse (1974).

Although Seevers (1978:107) indicated that the application of this genus name should be restricted to less than a dozen boreal and north temperate species with Holarctic distribution, we have followed the broader generic concept of *Atheta* as defined by Lohse (1974), because his paper represents the only workable solution to this problem at the present time. *Xenota* Mulsant and Rey (*sensu* Seevers, 1978: 113) would be equivalent to the subgenus *Atheta s. str.* *sensu* former European authors. Seevers (1978: 107) considered *Megista* Mulsant and Rey [type species: *M. graminicola* (Grav.)] and *Elytrusa* Casey [type species: *E. granulata* (Mannerh.)] to be synonyms of *Atheta* Thomson.

*Diagnosis.*— Body moderately elongate, 1 to 5 mm long, brownish, yellowish or black with dorsal surface shining or matte and pubescence pattern diverse, punctuation fine to slightly coarse; eyes usually as long as temples; subgenal suture present and clearly visible laterally; empodial bristles, if present, not longer than tarsal claws (verified only for a few species); pronotum from moderately to markedly convex dorsally and slightly or distinctly transverse, with pubescence radiating from the midline of the disc and either directed or in combinations of obliquely cephalad, obliquely caudad, approximately straight caudad or laterally (for illustrations see Lohse, 1974: 125), lateral margin of pronotum with long (protruding) setae, hypomera visible laterally; elytra slightly shorter than pronotum, with posterior margin approximately straight; abdomen subparallel or slightly broadened in the middle, first four visible terga with transverse impressions; hind tarsus with basal segment as long as second or slightly longer but not longer than segments 2 and 3 combined; aedoeagi and spermathecae as illustrated by Strand and Vik (1964), Palm (1970) and Lohse (1974).

### Key to Species

- 1 Pronotal pubescence directed straight or obliquely caudad (Fig. 51); elytra and abdomen bicolored (oblique yellowish-brown belt ranging from anterior outer to posterior inner angle of each elytron, basal abdominal terga also paler, yellowish-brown), male tergum VIII with series of small and apically rounded teeth and with two more pronounced marginal ones (Fig. 81), aedoeagus and spermatheca as on Figs. 78–82; distributed as on Map 6 ..... *Atheta (Atheta) annexa* Casey, p. 74
- 1' Pronotal pubescence of a different pattern, elytra and abdomen unicolored, male tergum VIII, aedoeagi and spermathecae different ..... 2
- 2 (1') Pubescence on head, pronotum and elytra short and adherent to body surface, with setae slightly elevated on fine granules giving impression of rough surface (Figs. 44–46); pronotal pubescence directed from midline of disc toward posterior angles (Fig. 45); male tergum VIII with four broadly triangular teeth (Fig. 84); aedoeagus and spermatheca as on Figs. 83, 85, 86; distributed as on Map 5 ..... *Atheta (Dimetrota) lucifuga* sp. nov., p. 72
- 2' Pubescence on head, pronotum and elytra longer and slightly protruded, setae not elevated on small granules (Figs. 38–40, 56–58); pronotal pubescence radiated from midline of disc with setae directed cephalad, laterally and caudad (Figs. 39, 57); male tergum VIII, aedoeagi and spermathecae different ..... 3
- 3 (2') Body narrowly elongate, subparallel, with elytra only 1.1 times broader

- than pronotum, head approximately as broad as pronotum; pronotal pubescence directed almost horizontally outward from midline of disc (Fig. 57); pronotal microsculpture distinct, of flat, hexagonal sculpticells; male tergum VIII with approximately nine teeth, two large and rounded laterally and insignificant ones between (Fig. 75); aedoeagus and spermatheca as on Figs. 73, 74, 76, 77 distributed as on Map 6 . . . . .
- 3' . . . . . *Atheta (Atheta) alabama* sp. nov., p. 76
- Body moderately elongate (Fig. 24), rather robust with sides broadly curved, with elytra 1.2 times broader than pronotum, head distinctly narrower than pronotum; pronotal pubescence directed cephalad anteriorly and laterally from midline of disc in form of arcuate lines (in some pubescence directed obliquely posteriorly from the midline of disc, Fig. 39); pronotum without hexagonal sculpticells; male tergum VIII with two large triangular teeth laterally and series of smaller ones equal in size between (Fig. 71); aedoeagus and spermatheca as in Figs. 69, 70, 72; distributed as on Map 4 . . . . . *Atheta (Dimetrota) troglophila* sp. nov., p. 69

*Atheta (Dimetrota) troglophila* sp. nov.

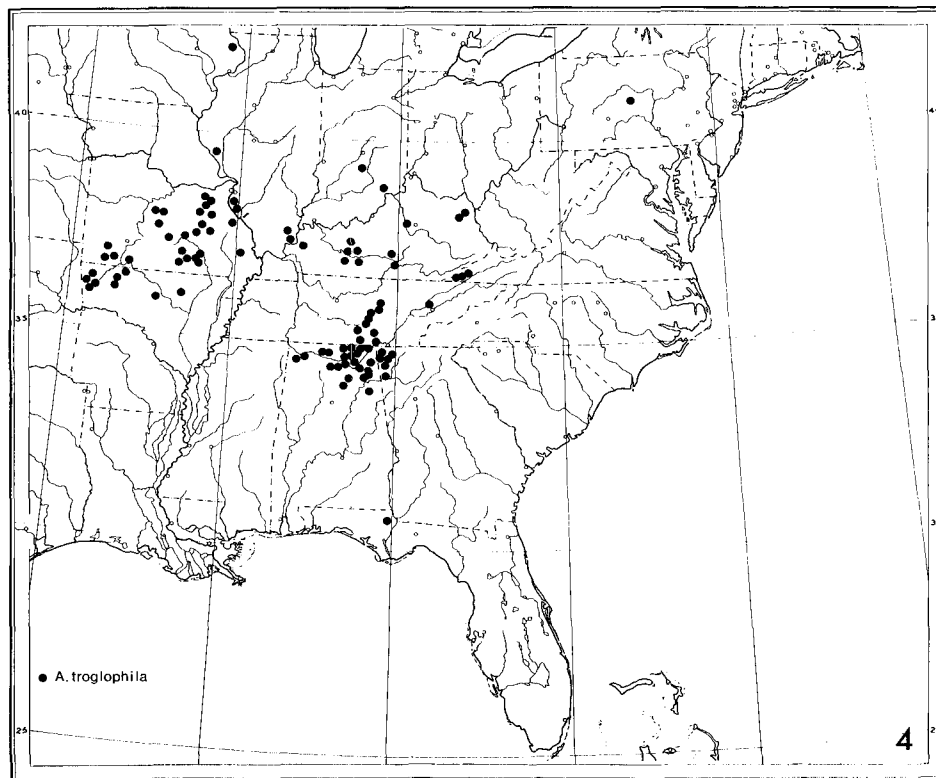
Map. 4, Figs. 24, 38-43, 69-72

*Diagnosis.*— This species is distinguished by the following combination of characters: body of medium size, 3.7 - 4.2 mm long, robust with sides broadly curved (Fig. 24), glossy with scarcely visible to virtually lacking microsculpture occurring on head only; pronotal pubescence moderately long, directed cephalad anteriorly and outward from midline of disc in form of arcuate lines (Fig. 39); in some pubescence directed obliquely posteriorly from midline of disc; pronotum wider than head; antenna with segment 5 quadrate; male tergum VIII with series of apical teeth, of approximately 8-10 usually sharply pointed and smaller teeth, and with two most lateral teeth pronounced (Fig. 71); aedoeagus (Fig. 69) and spermatheca (Fig. 72) of distinctive shapes. This species may be confused with *A. alabama* from which it differs externally by having a quadrate antennal segment 5, larger and more robust and glossy body, lacking distinct microsculpture on pronotum and elytra and by different pronotal pubescence patterns (Fig. 39).

*Description.*— Body length 3.7 - 4.2 mm; color brown to dark brown, with first antennal segment, maxillary palpi, entire legs or tarsi only, and in some elytra paler, light brown; forebody glossy, without apparent microsculpture between pubescence. *Head* approximately as long as wide to slightly transverse (Fig. 38), with pubescence distributed on central part directed inward, at different angle anteriorly, and elsewhere directed anteriorly or slightly latero-anteriorly; venter (Fig. 41) with microsculpture transverse on mentum and oblique on genae, latter short; antenna with segments 1-3 elongate, 4 quadrate to slightly elongate, 5 quadrate and 6 to 10 slightly transverse; maxillary palpus with last segment narrowly elongate, as long as penultimate segment (Figs. 41, 42). *Pronotum* slightly transverse (Fig. 39), with moderately long pubescence directed cephalad anteriorly and outward from midline of disc in form of arcuate lines, sometimes pubescence directed obliquely posteriorly from midline of disc. *Elytra* distinctly transverse, distinctly broader than pronotum, with pubescence directed obliquely or posteriorly (Fig. 40), each seta in pore elevated on small granule giving an impression of slightly rough surface. Mesosternum not carinate, with broadly V-shaped median process rounded apically and reaching 0.5 of mesocoxa (Fig. 43). *Abdomen* long with broadly curved edges, gradually narrowed apically.

*MALE.* Tergum VII without carinate apical projection. Tergum VIII with series of apical teeth of approximately 8-10 smaller teeth with most apices acute and with two more pronounced lateral teeth (Fig. 71). Aedoeagus (Figs. 69, 70) with median lobe having short, wide and rounded tubus in apical view which appears as having obliquely straight ventral margin laterally; bulbous large, especially in dorsal view; internal sac with four narrowly elongate subapical sclerites forming together a rhomboidal figure; paramere as in Fig. 69.

*FEMALE.* Tergum VIII with apical edge broadly curved. Spermatheca with moderately large capsule, long posterior part with twisted subapical portion (Fig. 72).



Map 4. Distribution of *Atheta (Dimetrota) trogliphila* sp. nov.

**Bionomics.**— Adults have been collected throughout the year using pitfall traps baited with carrion (liver, dead pigeon and snake), or fungus, in Berlese samples taken in various caves, and by visual collecting from raccoon dung, human feces, *Neotoma* (packrat) dung, and also from debris near cave entrances. Conn and DeMoss (1984) reported specimens of *Atheta*, identified here as *A. trogliphila*, from Bat Cave in Kentucky. The specimens were captured frequently near winter guano beds of Indiana Bat (*Myotis sodalis*) and also from stream-bank deposits of detritus in the lower level of the cave. This species is considered to be a troglophile. The species is known so far only from caves.

**Geographic Distribution (Map. 4).**— *Atheta trogliphila* is widely distributed in eastern North America ranging from Iowa, Illinois, Indiana and Pennsylvania south to Florida and Alabama, and west to Missouri and Arkansas.

**Material Examined.**— Holotype ♂: UNITED STATES: *Tennessee*: DeKalb Co., Gin Bluff Cave, 1 mi NW Dowelltown, 14, 25, May, 1972, S. & J. Peck (CNC). Paratypes: same data as holotype (AMNH) 1 ♂, (CNC) 1 ♀, 1 ♂, (FMNH) 1 ♀, (INHS) 1 ♂, (SPC) 1 ♂, 2 ♀; *Alabama*: DeKalb Co., Bartlett Cave, 12.VIII.1958, W.B. Jones (SPC) 1 ♂, Jackson Co., Nat Cave, 9.VII.1967, S. Peck & A. Fiske (SPC) 2 ♂, Hall Cave, 8.VII.1973, S. Peck (SPC) 1 ♂, 1 ♀; Limestone Co., Rockhouse Cave, 20.V.1972, S. & J. Peck (SPC) 1 ♂, 2 ♀; Morgan Co., Vandever Cave, 3 mi SSW Lacey's Spring, 22.V.1972, S. & J. Peck (SPC) 2 ♂, 2 ♀; *Arkansas*, Washington Co., Corkscrew Cave, 1938, M.W. Sanderson

(INMS) 1 ♀; *Georgia*, Dade Co., Howard Waterfall Cave, 30.VII.1965, S. Peck (SPC) 1 ♂, 1.5 mi SW Rising Fawn, Byers Cave, 18.VI.1967, J. Holsinger *et al.* (SPC) 1 ♂; Walker Co., 1.5 mi E Lookout Mt. Cove Cave, 11.VI.1967, J. Holsinger *et al.* (SPC) 1 ♂; *Missouri*, Crawford Co., Bear Cave, 8 m NE Steelville, 6.VIII.1980, J.E. Gardner (SPC) 1 ♂, Sullivan Co., Panther Cave, 4 mi E Sullivan, 29.II.1980, J.E. Gardner (SPC) 1 ♂, 1 ♀; *Tennessee*: Cannon Co., Connell Creek Cave, 4, 16.VII.1973, S. Peck (SPC) 1 ♀, Doolittle Cave, 2 mi Woodbury, 13, 25.V.1972, S. & J. Peck (SPC) 2 ♂, Fisher Cave, 1 mi NE Woodbury, 25.V.1972, S. & J. Peck (SPC) 1 ♀; 1.VII.1973, S. Peck (SPC) 1 ♂; DeKalb Co., Overall Cave, 4.VII.1973, S. Peck & C. Laing (AMNM) 2 ♂, 2 ♀, (CNC) 2 ♀, (FMNH) 1 ♂, 3 ♀, (INHS) 3 ♂, 1 ♀, (SPC) 6 ♂, 3 ♀.

Specimens not dissected and therefore excluded from paratype series: *Alabama*: Blount Co., Bangor Cave, Bangor, 29.XII.1965, S. Peck & S. Most (SPC) 1; 28.VI.1967, S. Peck & A. Fiske (SPC) 4; 0.5 mi SW Bangor, Catfish Cave, 28.VI.1967, S. Peck & A. Fiske (SPC) 1; Bryant Cave, 19.III.1966, S. Peck (SPC) 9, 1 ♂; Horseshoe - Crump Cave, 7 mi S Cleveland, 28.VI.1967, S. Peck & A. Fiske (SPC) 3; Randolph Cave, 11.IV.1966, Cooper (AMNH) 1; Calhoun Co., Robertson Cave, 5.VI.1958, W.B. Jones *et al.* (SPC) 4 ♂, 13; Colbert Co., McCluskey Cave, 4 mi S Margerum, 21.XII.1965, S. Peck (SPC) 1; McKinney Cave, 20.VIII.1965, S. & J. Peck (SPC) 2; DeKalb Co., Bartlett Cave, 12.VIII.1958, W.B. Jones (SPC) 5; Fort Payne, Manitou Cave, 25.VIII.1965, S. Peck (SPC) 3 ♂, 2; Louis Killian Cave, 30.VII.1965, S. Peck (SPC) 3; Killian Cave, 12.VI.1958, Hastings *et al.* (SPC) 1 ♂, 1; Lykes Cave, 27.VIII.1965, S. Peck (SPC) 1; Sequoyah Cave, 9, 25.VIII.1965, S. Peck (SPC) 2 ♂, 26 near Valley Head, 9.VIII.1965, S. Peck (SPC) 2; Jackson Co., Coon Creek Cave, 28.VIII.1965, S. Peck (SPC) 4; Cornelson Cave, 3 mi SE Skyline, 7.VIII.1967, S. Peck & A. Fiske (SPC) 2; Cox Cave, 11.VI.1940, W.B. Jones (SPC) 10; Doug Green Cave, 21.III.1966, S. Peck (SPC) 2; 2 mi N Garth, Ronsean Cave, 29.XII.1965, S. Peck (SPC) 13; 2 mi E Hollytree, Williams Saltpeter Cave, 5.VIII.1967, S. Peck & A. Fiske (SPC) 1; Horseshoe Cave, 6 mi N Princeton, 30.VI.1967, S. Peck & A. Fiske (SPC) 1; McFarlan Spring Cave, Garth, 29.II.1940, W.B. Jones (SPC) 3; Montagne Cave, 11.VIII.1960, M. Kroeger (SPC) 1; Schiffman Cove Cave, 21.III.1966, S. Peck (SPC) 1, 22.I.1967, S. Peck (SPC) 11; 3 mi NNE Stevenson, Edgefield Cave, 11.VIII.1967, S. Peck & A. Fiske (SPC) 1; 5 mi NNW Stevenson, Tally Ditch Cave, 11.VIII.1967, S. Peck & A. Fiske (SPC) 18; 1.VIII.1967, S. Peck *et al.* (SPC) 4; 2 mi W Stevenson, Rainbow Cave, 16.VIII.1967, S. Peck & A. Fiske (SPC) 3; Swain Cave, 21.III.1965, S. Peck (SPC) 1; 1.5 mi SE Paint Rock, Nat. Cave, 9.VII.1967, S. Peck & A. Fiske (SPC) 3; Tumbling Rock Cave, 15.VIII.1965, S. Peck (SPC) 1, 3.IX.1965 (SPC) 10, 27.XII.1967, E. Steenburn (SPC) 1 ♂, 3; Tway Cave, 9.VII.1973, S. Peck (SPC) 1 ♂, 5; Limestone Co., Pope Cave, June 1958, W. Jones (SPC) 1; Madison Co., Aladdin Cave, 1937, W.B. Jones (AMNH) 1; Barclay Cave, 3.VIII.1965, S. Peck (SPC) 3 ♂, 10, 10.VII.1965 (SPC) 20, 21, 26.VII.1965 (SPC) 24, 17, 24.VIII.1965 (SPC) 21; 5 mi S Huntsville, Byrd Spring Cave, 5.VII.1967, S. Peck & A. Fiske (SPC) 1; Goat House Cave, (AMNH) 1; Hurricane Cave, 5 mi E New Market, 9.VII.1967, S. Peck & A. Fiske (SPC) 6; 1 mi E Jeff, Burwell Cave, 5.VII.1967, S. Peck & A. Fiske (SPC) 12; 1.5 mi SE Jeff, Ellis Cave, 5.VI.1967, S. Peck & A. Fiske (SPC) 7; Scott Cave, 8.IV.1967, S. Peck (SPC) 2; Marshall Co.: Cathedral Cave, 20, 27.VII.1965, S. Peck (SPC) 11; Griffith Cave, 22.VIII.1903, W.G. Jones (AMNH) 1; 4.5 mi S Grant, Dunham Cave, 14.VIII.1967, S. Peck & A. Fiske (SPC) 4; Merrill Cave, 16.III.1966, S. Peck (SPC) 1; 2.5 mi S New Hope, Keller Cave, 26.VI.1967, S. Peck & A. Fiske (SPC) 2; Porches Spring Cave, 17.III.1966, S. Peck (SPC) 2; 2.5 mi NE Union Grove, Old Blowing Cave, 27.VI.1967, S. Peck & A. Fiske (SPC) 1; 4 mi N Union Grove, Painted Bluff Cave, 10.VII.1967, S. Peck & A. Fiske (SPC) 3; Walnut Cave, 9.XII.1967, R. Graham (SPC) 8; Morgan Co., Blowing Spring Cave, W of Lacon, 2.VIII.1953, R.C. Boyer (SPC) 1; 2.5 mi N Hartselle, Horseback Cave, 31.VIII.1965, S. Peck (SPC) 1; 2 mi S Trinity, Royer Cave, 31.VIII.1965, S. Peck (SPC). *Arkansas*: Boone Co., Majors Cave, T18N, R20W, Sec. 16, NW 1/4 NW 1/4, N. Youngsteadt (AMNH) 1; Independence Co., Foushee Cave, ± 6 mi W Locust Grove, N. Youngsteadt (AMNH) 3; Newton Co., Bat Cave, T15N, R23W, Sec. 15 center, N. Youngsteadt (AMNH) 4; Bat House Cave, T16N, R19W, Sec. 18, NW 1/4 center, N. Youngsteadt (AMNH) 4; Big Bear Cave, T16N, R20W, Sec. 29, NE 1/4 center, N. Youngsteadt (AMNH) 4; Stone Co., Blanchard Springs Caverns, 27.IX.1967, T. Barr & T. Marsh (AMNH) 1; Washington Co., Corkscrew Cave, 1938, M.W. Sanderson (INMS) 1 ♀, 8; Davis Pit, 22.VIII.1968, J. Reddell & S. Fowler (AMNH) 1; Fincher Cave, 23.III., 28.IV.1940, M. W. Sanderson (INMS) 28; Kid Cave, 2 mi S.W. Clyde, 18.I.1964, D. Martin (SPC) 1. *Florida*: Jackson Co., Florida Caverns St. Pk., nr. Marianna, Millers Cave, 11.IX.1965, S. Peck (SPC) 9. *Georgia*: Chattooga Co., 2.5 mi NE Cloudland, Blowing Spring Cave, 21.VI.1967, S. Peck & A. Fiske (SPC) 41; 2 mi NE Sublinga, Parker Cave, 20.VI.1967, S. Peck & A. Fiske (SPC) 3; Dade Co., Howard Waterfall Cave, 30.VII.1965, S. Peck (SPC) 21; Morrison Cave, 2 mi E Trenton, 13.VII.1967, S. Peck & A. Fiske (SPC) 23; 4.5 mi NE Rising Fawn, Johnson Crook Cave, 3.VII.1967, S. Peck & A. Fiske (SPC) 16; 1.5 mi SW Rising Fawn, Byers Cave, 18.VI.1967, J. Holsinger *et al.* (SPC) 1; Twin Snakes Cave, near Trenton, 24.XII.1968, T. Iles & A. Dobson (AMNH) 1; Polk Co., White River Cave, 3.XII.1967, Tiller (AMNH) 1; Walker Co., Bible Springs Cave, 2 mi NE Lookout, 11.VI.1967, S. Peck & A. Fiske (SPC) 6; Horseshoe Cave, 4 mi SW Chickamauga, 21.VI.1967, S. Peck & A. Fiske (SPC) 3; Mt. Farm Cove Cave, 1.5 mi E Lookout, 11-12.VI.1967, S. Peck & A. Fiske (SPC) 5, 20.VII.1967 (SPC) 3, 11.VI.1967, J. Holsinger *et al.* (SPC) 2; 5 mi SW Lafayette, Pettijohn Cave, 10-21.VI.1967, S. Peck & A. Fiske (SPC) 8; 21.VI.1967, S. Peck & A. Fiske (SPC) 7. *Illinois*: Hardin Co., Cave Spring Cave, 27.VI.1965, S. & J. Peck (SPC) 1; Monroe Co., Horsethief Cave, 3 mi E Valmeyer, 28.XI.1965, S. Peck (SPC) 6; Illinois Mammoth Cave, 25.VI.1965, S. Peck (SPC) 5; Saltpeter Cave, Fuels, 13.V.1966, 27.XI.1965, S. Peck (SPC) 10; Pike Co., Lost Creek Cave, 3.5 mi SW Pearl, 25.XI.1965, S. Peck (SPC) 8; Saline Co., Cave Hill Cave, 5 mi SW Equality, 23.X.1965, S. Peck (SPC) 9. *Indiana*: Jefferson Co., Wilson Cave, 9.VIII.1964, S. Peck (SPC) 3; Monroe Co., Salamander Cave, near Bloomington, 16.VIII.1960, H.S. Dybas (FMNH) 1. *Iowa*: Jackson Co., Maquoketa Caves St. Pk., Barred Cave, 24.V.1964, S. Peck (SPC) 5. *Kentucky*: Adair Co., Cue Cave, 29.VII.1964, S. Peck (SPC) 7; Jones Cave, near Columbia, 21.VIII.1960, H.S. Dybas (FMNH) 1; Walker Cave,

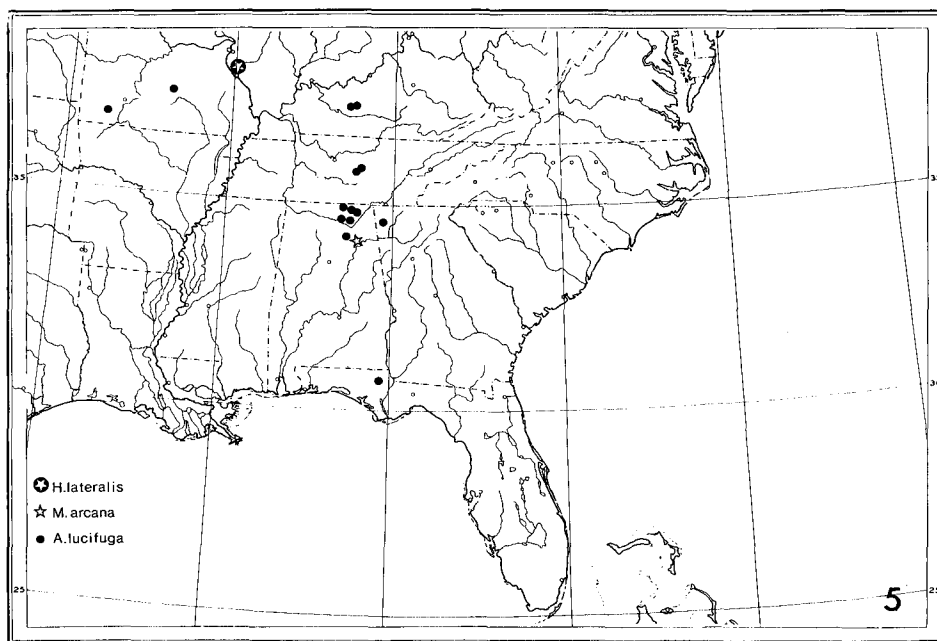
27.VII.1964, S. Peck (SPC) 1; Barren Co., Bowles Branch Cave, 6 mi SE Glasgow, 18.III.1966, T.C. Barr (AMNH) 2; Carter Co., Bat Cave, 9.XI.1979, B. Conn (SPC) over 100 adults and larvae; Tarkiln Cave, 2.IX.1964, S. Peck (SPC) 1; Crittenden Co., Kinnin Cave, 8.VII.1965, T. Barr & W. Anderson (AMNH) 1; Edmonson Co., Mammoth Cave Nt. Pk., Great Onyx Cave, 3.IX.1967, S. Peck (SPC) 3; Mammoth Cave, MCNPk., 22.II.1964, T. Barr (AMNH) 2; Grayson Co., Willis Cave, 6.VIII.1966, T. Barr & R. Norton (AMNH) 7; Greene Co., 2 mi S. Pierce, Wisdom Cave, 28.VIII.1967, S. Peck & A. Fiske (SPC) 23; Russell Co., Rowe Cave, 31.VII.1964, S. Peck & T. Barr (SPC) 6; Warren Co., 13 mi NW Bowling Green, Thompson Cave, 31.VIII-4.IX.1967, S. Peck & A. Fiske (SPC) 3; Woodford Co., Clifton Cave, 8, 9.IX.1964, S. Peck (SPC) 7. *Missouri*: Barry Co., 5.75 mi E Cassville, Bear Waller Cave, 12.V.1981, J.E. Gardner (SPC) 2; 7 mi S Cassville, Cliff Notch Cave, 2.IV.1981, J.E. Gardner (SPC) 3; Camden Co., Onyx Mine Cave, 8 mi N Macks Creek, 16.XII.1982, J.E. Gardner (SPC) 3; 2.25 mi S Osage Beach, 20.V.1981, Pine Oak Cave, J.E. Gardner (SPC) 2; Carter Co., Coolbank Cave, 8.5 mi SW Van Buren, 18.II.1983, J.E. Gardner (SPC) 1; Seesh Cave, 7 mi SSW Van Buren, 23.VII.1979, J.E. Gardner (SPC) 1; 8 mi W Van Buren, Upper Camp Yarn Cave, 10.VII.1981, J.E. Gardner (SPC) 4; 7 mi NW Van Buren, Cat Track Cave, 10.VI.1982, J.F. Gardner (SPC) 1; Crawford Co., Bear Cave, 8.5 mi NE Steelville, 6.VIII.1980, J.E. Gardner (SPC) 1; 4.75 mi SE Leasburg, Little Crystal Cave, 13.III.1982, J.E. Gardner (SPC) 4; Franklin Co., Mine Cave, 4 mi ENE Sullivan, 15.I.1980, J.E. Gardner (SPC) 2; Sprinkle Spring Cave, 4 mi E Sullivan, 24.I.1980; J.E. Gardner (SPC) 1; Panther Cave, 4 mi E Sullivan, 19.II.1980, J.E. Gardner (SPC) 1; Mushroom Cave, 3.5 mi SE Sullivan, 1.VI.1974, J. Craig (AMNH) 2; Outlaw Cave, 4 1/4 mi E Sullivan, 12.III.1981, J.E. Gardner (SPC) 1; 2.25 mi E Sullivan, 12.III.1981, J.E. Gardner (SPC) 3; Iron Co., 12.5 mi NNE Bunker Cave, Hollow Cave, 2.VI.1982, J.E. Gardner (SPC) 2; Lawrence Co., 3.5 mi W Halltown, Turnback Cave, 24.VIII.1981, J.E. Gardner (SPC) 1; Madison Co., Marsh Creek Cave, 13 mi SW Fredericktown, 12.VIII.1980, J.E. Gardner (SPC) 3; Oregon Co., McDowell Cave, 10 mi NE Alton, 21.VII.1981, J.E. Gardner (SPC) 1; Pulaski Co., Little Cave, 1 mi E Devil's Elbow, 6.VIII.1979, J.E. Gardner (SPC) 1; Phelps Co., 5 mi S. Newburg, Coon Cave, 1.V.1982, J.E. Gardner (SPC) 1; Shannon Co., Bootlegger Cave, 0.25 mi E Round Springs, 15.III.1983, J.E. Gardner (SPC) 1; 11 mi E Eminence, Larkin Ford Cave, 15.VI.1981, J.E. Gardner (SPC) 6; 3.25 mi NW Round Springs, Bat Cave, 2.XII.1982, J.E. Gardner (SPC) 1; Taney Co., Tumbling Creek Cave, 24.II.1975, 23, 30.VII.1975, 22.VIII.1975, 31.XII.1975, 2.II.1976, 10.VIII.1976, B. Martin (SPC) 28; Washington Co., 4 mi E Anthonies Mill, Black Snake Hole Cave, 18.IV.1982, J.E. Gardner (SPC) 1; Ste. Genevieve Co.: Kohms Cave, 1 mi S St. Genevieve, 14.V.1966, S. Peck (SPC) 2. *Pennsylvania*: Mifflin Co., Aitkin Cave, 4.IV.1937, K. Dearolf (FMNH) 1. *Tennessee*: Anderson Co., Jones Bend Cave, 12.VII.1974, J. Bengston (SPC) 33; Bedford Co., Reece Cave, 29.VII.1965, 12.III.1966, S. Peck (SPC) 7; Cannon Co., Connell Creek Cave, 4, 16.VII.1973, S. Peck (SPC) 12; Doolittle Cave, 2 mi N Woodbury, 13, 25.V.1972, 1, 15.VII.1973, S. Peck (SPC) 15; Espey Cave, 24.VII.1965, S. Peck (SPC) 6; Fisher Cave, 1 mi NE Woodbury, 13, 25.V.1972, S. Peck (SPC) 16; Henpeck Mill Cave, 1, 16.VII.1973, S. Peck & C. Laing (SPC) 1; 2.5 mi N Hollow Springs, Reed Cave, 8, 21.VIII.1967, S. Peck & A. Fiske (SPC) 6; Jacks Cave, 30.VI.1973, S. Peck (SPC) 2; DeKalb Co., Cave Spring Cave, 2 mi S Liberty, 14, 25.V.1972, S. Peck (SPC) 6; Frazier Hollow Cave, 3 mi Dowelltown, 14, 25.V.1972, S. & J. Peck (SPC) 1; Gin Bluff Cave, 1 mi NW Dowelltown, 14, 15.V.1972, S. & J. Peck (SPC) 19; Overall Cave, 4.VII.1973, S. Peck & C. Laing (SPC) 2; Franklin Co., Mill Hollow Head Cave, 5.5 mi NE Still Forks, 30.VII.1967, S. Peck & A. Fiske (SPC) 3; 7 mi NE Still Forks, Round Cave, 20.VII.1967, S. Peck & A. Fiske (SPC) 2; Marion Co., Little Cedar Mt. Indian Cave, 4.5 mi SE Jasper, 29.VII.1967, S. Peck & A. Fiske (SPC) 6; Nickajack Cave, Shell Mound, 8.IV.1967, S. Peck (SPC) 8; 1.VII.1947, K. Dearolf (FMNH) 1; Grundy Co., Trussell Cave, 2 mi NW Monteagle, 15.V.1972, S. & J. Peck (SPC) 6; Rutherford Co., Burk Spring Cave at Burk Cave, 15.VII.1973, S. Peck (SPC) 2. *Virginia*: Lee Co., Lucy Beatty Cave, 17.VIII.1962, J.R. Holsinger (AMNH) 1, 7 mi ESE Rose Hill Smith Cave, 2.VIII.1975, T.C. Kane (SPC) 2 ♂, 6; Young-Fugate Cave, 18.VIII.1962, J.R. Holsinger (SPC) 7.

*Atheta (Dimetrota) lucifuga sp. nov.*

Map 5, Figs. 44–49, 83–86

*Diagnosis.*— This species is distinguishable by its robust and rather matte body, slightly elevated setal pores giving an impression of a rough surface, distinctly transverse pronotum (1.4 times wider than long) with adherent pubescence (Fig. 45), transverse antennal segments 6–10, the shape of male tergum VIII with four broadly triangular apical teeth (Fig. 84), by shape of the median lobe of the aedeagus (Figs. 85, 86) and shape of the spermatheca (Fig. 83).

*Description.*— Body Length 2.6 - 3.8 mm; color dark brown to almost black, with basal antennal segments, maxillary palpus, legs or tarsi only and elytra slightly paler, often with rust coloured tint. Pubescence relatively short, with setae, especially those of forebody, in slightly elevated pores (asperites) giving an impression of rough surface: microsculpture fine, with irregularly hexagonal sculpticells, particularly well defined on head and pronotum. *Head* approximately as wide as long (Fig. 44), with short pubescence directed medially, toward center of head; venter of head with slightly longer pubescence and with microsculpture of irregular, transverse, sculpticells scale-shaped on mentum and submentum and obliquely oriented on genae (Fig. 47); genae short; antenna with segments 1–4 elongate, 4–5 quadrate and 6–10 slightly transverse; labial palpus as in Fig. 48; maxillary palpus with last segment narrowly elongate, as long as 0.66



Map 5. Distribution of *Atheta (Dimetrota) lucifuga* sp. nov., *Hoplandria lateralis* Melsheimer, and *Myllaena arcana* Casey [cave localities only].

of penultimate one (Fig. 48). *Pronotum* distinctly transverse, 0.33 wider than long (Fig. 45), with short pubescence directed from midline of disc toward posterior angles. *Elytra* transverse, with pubescence directed posteriorly (Fig. 46). Mesosternum without carina, width broad, V-shaped median process, acutely pointed apically and extended 0.5 length of mesocoxae (Fig. 49). *Abdomen* broad, with lateral edges slightly curved, and abruptly narrowed near apex, pubescence less dense than on forebody.

MALE. Tergum VII lacking carinate apical projection. Tergum VIII with four broadly triangular apical teeth, lateral teeth slightly larger (Fig. 84). Aedeagus (Figs. 85, 86) with median lobe with tubus widest in its middle and then gradually narrowed anteriorly and posteriorly in dorsal view, in lateral view tubus emarginate basally and obliquely straight elsewhere; bulbus moderately large; internal sac with two small subapical sclerites and moderately long flagellum; paramere as in Fig. 86.

FEMALE. Tergum VIII with broadly rounded apical margin. Spermatheca with small, slightly elongate capsule and hooked posterior part (Fig. 83).

*Bionomics*.— Adults have been collected from April through September. Several specimens have been captured from *Neotoma* (packrat) dung.

*Geographic Distribution* (Map 5).— The species ranges from Missouri and Kentucky south to Florida, Alabama and Texas.



*Material Examined.*— Holotype ♂: UNITED STATES: *Alabama*, Marshall Co., Green Bar Cave, 10.VII.1973, S. Peck (CNC). Paratypes: *Alabama*, Jackson Co., Nat Cave, 9.VII.1967, dung, S. Peck & A. Fiske (SPC) 1 ♂; *Tennessee*, Cannon Co., Doolittle Cave, 2 mi N Woodbury, 13, 25.V.1972, S. & J. Peck (AMNH) 2 ♂, (SPC) 1 ♀. The following specimens have not been dissected and are excluded from paratypic series: UNITED STATES: *Alabama*: Blount Co., 7 mi S Cleveland, Horseshoe Crump Cave, 28.VI.1967, S. Peck & A. Fiske (SPC) 1; Jackson Co., Cornelson Cave, 3 mi SE Skyline, 7.VIII.1967, S. Peck & A. Fiske (SPC) 10; Nat Cave, 9.VII.1967, S. Peck & A. Fiske (SPC) 1; 1.5 mi SE Paint Rock, Nat Cave, 9.VII.1967, S. Peck & A. Fiske (SPC) 13; Madison Co.; Barclay Cave, 17.VIII.1965, S. Peck (SPC) 2; 1 mi E Jeff, Burwell Cave, 5.VII.1967, S. Peck & A. Fiske (SPC) 1; Marshall Co.; 4 mi N Union Grove, Painted Bluff Cave, 10.VII.1967, S. Peck & A. Fiske (SPC) 2; Madison Co.; Hurricane Cave, 5 mi E New Market, 9.VII.1967, S. Peck & A. Fiske (SPC) 3. *Florida*: Jackson Co., Florida Caverns St. Pk., nr. Marianna, Miller Cave, 11.IX.1965, S. Peck (SPC) 1. *Georgia*: Walker Co., Mt. Farm Cove Cave, 1.5 mi E Lookout, 11–20.VI.1967, S. Peck & A. Fiske (SPC) 11. *Kentucky*: Edmonson Co., Mammoth Cave Nat. Pk., Great Onyx Cave, 3.IX.1967, S. Peck (SPC) 3; Collins Cave, VIII.1967, D. Culver (SPC) 1. *Missouri*: Christian Co., Camp Ridge Cave, 2 mi SW Chadwick, 18.IV.1979, J.E. Gardner (SPC) 1; Texas Co., Unnamed Cave, 10.5 mi NW Licking, 1.V.1980, J.E. Gardner (SPC) 1. *Tennessee*: Cannon Co., Doolittle Cave, 13, 25.V.1972, 1, 15.VII.1973, S. Peck (SPC) 3; Henpeck Mill Cave, 1, 15.VII.1973, S. Peck & C. Laing (SPC) 2. *Texas*: Travis Co., Mold Hole, 8.VI.1966, J. Reddell (AMNH) 11.

*Atheta (Atheta) annexa* Casey

Map 6, Figs. 50–55, 78–82

*Atheta annexa* Casey, 1910:43. - As *Atheta s. str.*: Moore and Legner, 1975: 354. As *Xenota* Mulsant and Rey: SeEVERS, 1978: 115. Lectotype (here designated): North Carolina; Casey bequest 1925; Type USNM 39284; *Atheta annexa* Casey (USNM) 1 ♂.

*Diagnosis.*— This species is distinguishable by long pubescence on dorsum of head, pronotum and elytra directed approximately straight or obliquely caudad (Figs. 50–52); by the paler, yellowish-brown first two or three visible abdominal terga and often yellowish-brown belt ranging from anterior outer to posterior inner angle of each elytron; by the shape of male tergum VIII with apical margin bearing apically rounded teeth with two lateral teeth more pronounced (Fig. 81); and also by the shape of the median lobe of the aedoeagus (Figs. 85, 86) and the shape of the spermatheca (Fig. 83).

*Redescription.*— Body length 3.4 - 3.8 mm; color brown, with basal two to three antennal segments, maxillary palpi, legs or tarsi yellowish-brown, also first two or three visible abdominal terga and a belt extended from anterior outer to posterior inner angle of each elytron yellowish-brown; head and pronotum with inconspicuous microsculpture of flat, irregularly hexagonal sculpticells. *Head* approximately as long as wide (Fig. 50), with long pubescence directed caudad; venter with microsculpture of irregularly hexagonal transverse sculpticells on mentum and submentum, and oblique microsculpture on genae; genae short; antenna with segments 1–3 elongate, 4–5 quadrate and 6–10 slightly transverse; labial palpus as in Fig. 53; maxillary palpus with last segment narrowly elongate, 0.66 length of penultimate segment (Fig. 53). *Pronotum* transverse, 1.2 times wider than long (Fig. 51), with pubescence long, directed posteriorly or obliquely caudad. *Elytra* transverse (Fig. 52), distinctly broader than pronotum, with pubescence directed posteriorly. Mesosternum not carinate, with narrowly elongate, V-shaped median process, acutely pointed apically and extended to middle of mesocoxae (Fig. 55). *Abdomen* elongate, with slightly curved sides, gradually narrowed apically, with pubescence sparse, and very fine meshed microsculpture.

MALE. Tergum VII lacking carinate apical projection. Tergum VIII with regularly serrate apical margin of approximately 12 apically rounded teeth and with two most lateral teeth (Fig. 81). Aedoeagus (Figs. 85, 86) with median lobe with bottle-shaped tubus in dorsal view which appears as having a straight ventral margin laterally; bulbus large, gradually narrowed anteriorly; internal sac with narrow, sclerotized subapical sclerites (Fig. 86); paramere as in Fig. 86.

FEMALE. Tergum VIII with apical edge broadly curved. Spermatheca with moderately large capsule and coiled posterior part (Fig. 83).

*Bionomics.*— Adults have been collected from January through October from organic debris, fungi near cave entrances, raccoon dung, and *Neotoma* nests.

*Geographic Distribution* (Map 6).— This species is known to occur from Iowa, Illinois and Indiana south to Florida and Alabama, east to Virginia and west to Missouri.

*Material Examined.*— UNITED STATES: Blount Co., Horseshoe-Crump Cave, 7 mi S Cleveland, 28.VI.1967, S. Peck & A. Fiske (SPC) 1; Calhoun Co., Robertson Cave, 5.VI.1958, W.B. Jones *et al.* (SPC) 4; Conecuh Co., Turks Cave, Brooklyn, 11.III.1965, S. Peck (SPC) 45; DeKalb Co.: Fort Payne, Manitou Cave, 25.VIII.1965, S. Peck (SPC) 10; Lykes Cave, 27.VIII.1965, (SPC) 6, Fort Payne, Louis Killian Cave, 30.VII.1965, S. Peck (SPC) 1; Limestone

Co., Indian Cave, 19.VIII.1965, S. Peck (SPC) 1; Madison Co.: Barclay Cave, 26.VII.1965, 3.VIII.1965, S. Peck (SPC) 5, 18.IX.1952, Jones, Park (SPC) 2; Burwell Cave, 1 mi E Jeff, 5.VII.1965, S. Peck (SPC) 2, 22.VIII.1965, S. Peck (SPC) 2; Byrd Spring Cave, 5 mi S Huntsville, 5.VII.1967, S. Peck & A. Fiske (SPC) 1; Ellis Cave, 1.5 mi SE Jeff, 5.VI.1967, S. Peck & A. Fiske (SPC) 1; Hurricane Cave, 5 mi E New Market, 9.VII.1967, S. Peck & A. Fiske (SPC) 1; Marshall Co.: Cathedral Cave, 20.27.VII.1965, S. Peck (SPC) 2, Green Bar Cave, 18.VII.1973, S. Peck (SPC) 2; Hampton Cave, Guntersville, 11.VII.1973, S. Peck (SPC) 2 ♂, 3; Honey Comb Cave, 24.I.1939, W.B. Jones (AMNH) 3; St. Claire Co., McGlendon Cave, 3 mi NE Whitney Jct., 15.VI.1965, S. Peck & A. Fiske (SPC) 2; Talladega Co.: Dulaney Cave, 4.IV.1958, W.B. Jones (SPC) 1; Kymulga Cave near Childersburg, 27.II.1940, W.B. Jones (SPC) 4. *Florida*: Jackson Co., Florida Caverns St. Pk., nr. Marianna, Miller Cave, 11.IX.1965, S. Peck (SPC) 4. *Georgia*: Bartow Co., Yarbrough Cave, 2 mi E Adairsville, 12.VI.1967, S. Peck *et al.* (SPC) 3; Dade Co., Morrison Cave, 2 mi E Trenton, 13.VII.1967, S. Peck & A. Fiske (SPC) 3; Walker Co.: 2.5 mi N Chickamagua Cave Spring Cave, 10.VI.1967, S. Peck & A. Fiske (SPC) 1, Horseshoe Cave, 4 mi SW Chickamagua, 21.VI.1961, S. Peck & A. Fiske (SPC) 1, Mt. Cove Cave, 1.5 mi E Lookout, 20.VI.1967, S. Peck & A. Fiske (SPC) 1. *Illinois*: Jackson Co., Ava Cave, 26.VI.1965, S. & J. Peck (SPC) 1, Monroe Co.: Fogel Pole Cave, 25.VI.1965, S. Peck (SPC) 1, Illinois Mammoth Cave, 25.VI.1965, S. Peck (SPC) 1. *Indiana*: Clark Co., Cave Spring Cave, near New Washington, 18.VIII.1960, H.S. Dybas (FMNH) 4; Monroe Co., Salamander Cave, 23.VI.1973, S. Peck (SPC) 3 ♂. *Iowa*: Jackson Co., Maquoketa Cave St. Pk., Barred Cave, 24.V. 1964, S. Peck (SPC) 1. *Kentucky*: Adair Co., Cue Cave, 29.VII.1964, S. Peck (SPC) 1; Edmonson Co.: Mammoth Cave Nat. Pk., Great Onyx Cave, 3.IX.1967, S. Peck (SPC) 3; Collins Cave, VI.1967, D. Culver (SPC) 1; Hart Co., Three Springs Cave, Three Springs 26.VI.1973, S. Peck (SPC) 1 ♀; Warren Co.: Danger Cave, 3 mi E Bowling Green, 16, 27.VI.1973, S. Peck (SPC) 1 ♂; Detrex Cave, Bowling Green, 18, 28.VI.1973, S. Peck (SPC) 1; Horseshoe Cave, Bowling Green, 18.27.VI.1973, S. Peck (SPC) 1 ♀; Pruett Saltpeter Cave, 1 mi S Anna, 31.VIII. - 1.IX.1967, S. Peck & A. Fiske (SPC) 1; Thomas Cave, 31.VIII. - 4.IX.1967, S. Peck & A. Fiske (SPC) 1; Lexington, Phelps Cave, 10.IX.1964, S. Peck (SPC) 1. *Missouri*: Barry Co., 5 mi NWE Eagle Lock, Last Cave, 6.V.1982, J.E. Gardner (SPC) 1; Franklin Co., Sprinkle Spring Cave, 4 mi E Sullivan, 24.I.1980, J.E. Gardner (SPC) 1; Howell Co.: Willow Branch Cave, 12.5 mi WNW West Plains, 26.VI.1976, J.E. Gardner (SPC) 1; Ripley Co., Panther Cave, 9.IX.1978, J.E. Gardner (SPC) 1. *Tennessee*: Cannon Co.: Connell Creek Cave, 4, 16.VII.1973, S. Peck (SPC) 3; Jackson Cave, 30.VI.1973, S. Peck (SPC) 1 ♂, 1 ♀, 1, Tenpenney Cave, 1.15.VII.1973, S. Peck (SPC) 1; Franklin Co., Mill Hollow Cave, 30.VII.1967, S. Peck & A. Fiske (SPC) 1 ♂. *Virginia*: Giles Co. Giant Cave, Narrows, 21.III.1931, J.M. Valentine (FMNH) 2; Montgomery Co., Old Mill Cave NE Bank of Mill Creek, 8.V.1970, L.M. Ferguson (SPC) 1; Smyth Co., Stone's Cave no. 2. VI.1970, L.M. & B.L. Ferguson (SPC) 1; Roanoke Co., Goodwins Cave, X. 1972, 2.M & 2.2 & L.S. Ferguson (SPC) 1. Shenandoah Co., Battlefield Crystal Cave, 2.IX. 1937, K. Dearolf (FMNH) 2; *West Virginia*: Monroe Co., Steeles Cave, 29.VII. 1970, L.M. & B.L. Ferguson (SPC) 1.

*Remarks.*— The genitalia of *A. annexa* Casey closely resemble those of the European *A. pallidicornis* Thomson (for illustrations see Palm, 1970, pl. XI, Fig. 115 and Lohse, 1974: 175, Fig. 4). The European species, however, has a spermatheca with the capsule more spherical and the median lobe of the aedoeagus with the tubus more evenly narrowed apically in dorsal view, while it is bottle-shaped in *A. annexa*. Palm (1970) assigned *A. pallidicornis* to *Atheta s. str.*, group I, and Lohse (1974) assigned it to his "Mischgruppe II" of *Atheta*, embracing species which have pronotal pubescence directed caudad. Seevers (1978) placed *A. annexa* in the genus *Xenota* Mulsant and Rey (species group 2) which is the equivalent to *Atheta s. str.* of European authors. As previously mentioned under the "Methods" we have followed the European concepts of the classification of this genus.

Two Nearctic species described by Casey as *A. cephalina* and *A. lymphatica* are closely related to *A. annexa*. Externally they are (practically) indistinguishable. We have dissected and studied the original specimens of both. *Atheta cephalina* is represented in the original Casey material by 1 ♂ and 1 ♀, both from Iowa. The spermatheca of the former does not differ from that of *A. annexa*, the aedoeagus is also very similar but has the tubus of the median lobe wide and gradually narrowing apically in dorsal view, not bottle-shaped as in *A. annexa*. *Atheta lymphatica* is represented in the Casey collection by a unique female also from Iowa, which has a spermatheca indistinguishable from those of *A. annexa* and *A. cephalina*. It is most likely that *A. annexa* is conspecific with *A. lymphatica*, but association with a male of the latter would be essential to confirm this.

The following species, also described by Casey, have the pronotal pubescence pattern similar to that of *A. annexa* and probably represent the same species group (type specimens have been

studied): *A. burra*, *A. concussa*, *A. franklini*, *A. palpator* and *A. propitia*.

*Atheta (Atheta) alabama* sp. nov.

Map 6, Figs. 56–61, 73–77

**Diagnosis.**— The species may be distinguished from other species of *Atheta* occurring in caves by the following combination of characters; body of a medium size, 3.9 - 4.0 mm long, subparallel, integument matte by distinct microsculpture consisting of irregular hexagonal sculpticells; pronotal pubescence long, directed almost horizontally outward from the midline of disc (Fig. 57), pronotum as wide as head and approximately equal in size to the latter; antenna with segments 5–10 transverse; male tergum VIII with approximately nine teeth with apices either slightly pointed or rounded and with the two most lateral teeth rounded and larger (Fig. 75); median lobe of aedoeagus (Figs. 76, 77) with an enlarged bulbus and reduced, narrow and short tubus strongly produced ventrally; spermatheca with long and irregularly twisted posterior part (Figs. 73, 74).

*Atheta alabama* is very similar to *Atheta trogliphila*, but differs externally by its matte body, by the distinct microsculpture, by antennal segment 5 which is transverse instead of quadrate and by the different pattern of pubescence on pronotum, with setae directed almost horizontally outward from the midline of disc. Genitalia also distinctive (see description).

**Description.**— Body length 3.9 - 4.0 mm; color brown to dark brown, with first antennal segment, maxillary palpi, sometimes clypeus, entire legs, or tibiae and tarsi only, elytra and apical part of abdomen paler, usually light brown with reddish tint; forebody rather matte with distinct microsculpture of irregularly hexagonal sculpticells. **Head** approximately as long as wide (Fig. 56), with pubescence distributed on central part directed inward and elsewhere directed anteriorly; venter of head (Fig. 59), with microsculpture transverse on mentum and oblique on genae; genae short; antenna with segments 1–3 elongate, 4 quadrate and 5–10 transverse; maxillary palpus with last segment narrowly elongate (Figs. 59, 60), labial palpus as in Figs. 59, 60. **Pronotum** slightly transverse (Fig. 57) with long pubescence directed almost horizontally outward from midline of disc. **Elytra** distinctly transverse, slightly broader than pronotum, each elytron with pubescence directed obliquely posterior from suture (Fig. 58). **Mesosternum** not carinate, with narrowly V-shaped posterior process and with acute apex extended to almost 0.66 length of mesocoxae (Fig. 61). **Abdomen** long with subparallel edges, slightly narrowed near apex.

**MALE.** Tergum VII lacking carinate apical projection. Tergum VIII with approximately nine apical teeth with apices either rounded or slightly pointed and with the two most lateral teeth the largest (Fig. 75). Aedoeagus (Figs. 76, 77) with median lobe with short and narrow, strongly ventrally produced tubus and enlarged bulbus with almost horizontal ventral projection; internal sac with two falciform sclerites in basal 0.5, flagellum not apparent; paramere as in Fig. 77.

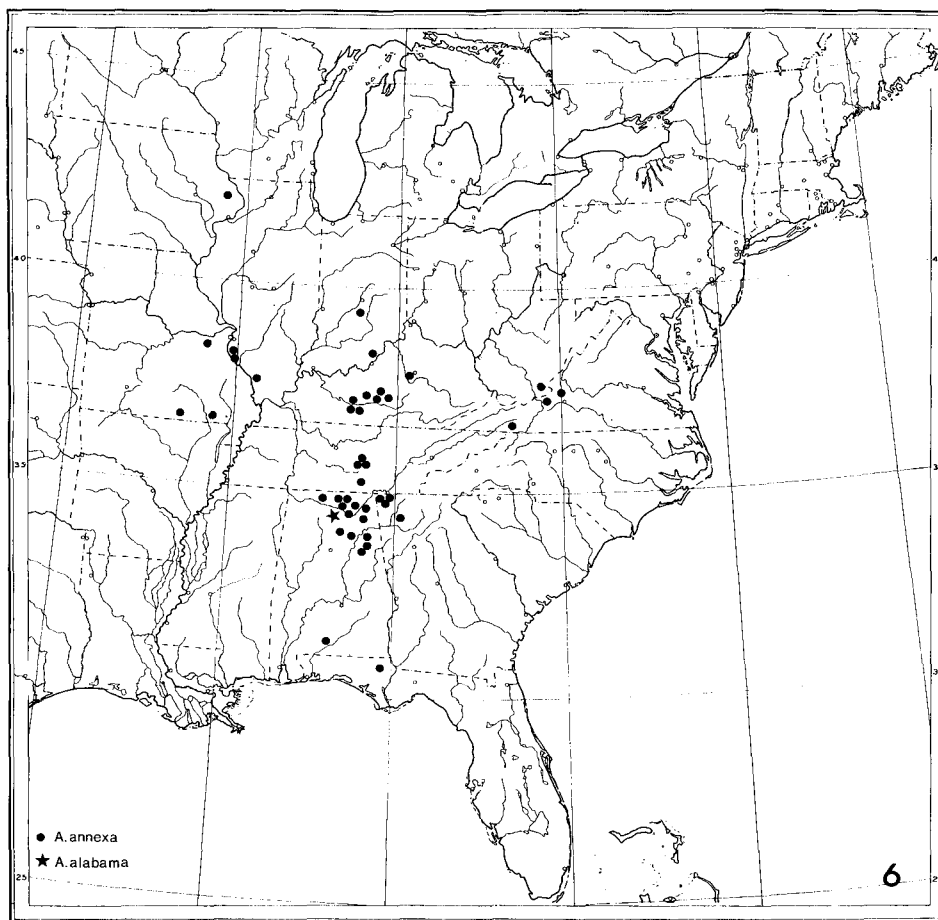
**FEMALE.** Tergum VIII with apical edge broadly curved. Spermatheca with small capsule and irregularly twisted posterior part (Figs. 73, 74).

**Bionomics.**— Unknown.

**Geographic Distribution** (Map 6).— Known only from Morgan County in Alabama.

**Material Examined.**— Holotype ♂: UNITED STATES: *Alabama*: Morgan Co., Vandever Cave, AL #824, 3 mi SSW Lacey's Spring, 22.V. 1972, S. & J. Peck (CNC). Paratypes: same data as holotype (SPC) 1 ♂, 4 ♀.

**Remarks.**— *Atheta alabama* is very similar to European *Atheta (Atheta) allocera* Eppelsheim. The median lobe of the aedoeagus and the spermatheca of both species are indistinguishable. We have been able to study a few European specimens of *A. allocera* sent to us by Dr. R. Baranowski (Lund, Sweden). Although there were no apparent differences in the genitalia, there were obvious external differences between both species. The European species is distinct by having the body wider and rather robust with the sides broadly arcuate, with the head apparently smaller than the pronotum and the elytra distinctly wider than the latter, by its almost black coloration, glossy dorsal surface of body, and by having the dorsal setae elevated on small asperites (granules) making the surface rough, especially on the head and pronotum. Both species are apparently closely related.



Map 6. Distribution of *Atheta (Atheta) alabama* sp. nov., and *A. (s. str.) annexa* Casey, [cave localities only].

The following Nearctic species also seem to be related to *A. alabama* although differing by the shape of spermathecae and some external features (type specimens have been studied): *A. nupera* Casey and *A. vaticina* Casey.

#### Tribe Aleocharini Thomson

*Diagnosis*.— Last segment of labial and maxillary palpi each with well defined apical pseudosegment, tarsal formula, 5,5,5, velum of paramere reticulated. Larvae are ectoparasitoids of the pupae of cyclorrhaphous Diptera. Definition *sensu* Seevers (1978).

#### Genus *Aleochara* Gravenhorst

For detailed description see Klimaszewski (1984: 8).

*Diagnosis*.— Body small to large (length 2.0–13.0 mm); fusiform, exceptionally in some species subparallel, more or less evenly pubescent, antenna 11-segmented, usually incrassate in

apical 0.5; lacinia wide, multispinose; galea with tuft of apical setae; ligula small bilobed apically; mesocoxae from narrowly to widely separated and mesosternum varied from completely carinate to lacking carina; paramere with moderately elongate apical lobe bearing three setae; (Seevers, 1978; Klimaszewski, 1984).

#### Key to Subgenera with Species found in Caves

1. Mesosternum with complete carina as long as mesosternum or only slightly shorter ..... *Xenochara* Mulsant & Rey, p. 78
- 1' Mesosternum not carinate ..... *Echochara* Casey, p. 81

#### Subgenus *Xenochara* Mulsant & Rey

For detailed description see Klimaszewski (1984).

*Diagnosis.*— Pronotum evenly pubescent, with setigerous punctures fine to coarse, and interspaces between punctures usually glabrous; mesosternum with a complete carina which is as long as mesosternum or slightly shorter.

#### Key to Species

- 1 Pronotal setigerous punctures coarse (wider than base of seta); median lobe of aedeagus with venter sinuate and internal sac with two pairs of sclerites: apical sclerites with apices directed dorsally and subapical ones oblique to venter of median lobe laterally; spermatheca pipe-shaped, with long posterior part (for illustrations see Klimaszewski, 1984) ..... *Aleochara (Xenochara) castaneipennis* Mannerheim, p. 78
- 1' Pronotal setigerous punctures fine (no wider than base of seta), genitalia different ..... 2
- 2 (1') Median lobe of aedeagus with internal sac with two prominent apical sclerites, each hooked at apex, and two subapical ones approximately parallel to venter of median lobe; spermatheca with capsule L-shaped, distinctly differentiated from wide duct (for illustrations see Klimaszewski, 1984) ..... *Aleochara (Xenochara) fumata* Gravenhorst, p. 79
- 2' Median lobe of aedeagus with internal sac with two small apical sclerites, each rounded at apex and approximately parallel to the ventral margin of tubus laterally (Fig. 65); spermatheca unknown ..... *Aleochara (Xenochara) angusticeps* Sharp, p. 79

#### *Aleochara (Xenochara) castaneipennis* Mannerheim

#### Map 7

For illustration and detailed description see Klimaszewski (1984).

*Diagnosis.*— Body large (length 3.0 - 5.0 mm); color brown to dark brown with appendages and elytra usually paler; pronotal setigerous punctures coarse; median lobe of aedeagus with sinuate ventral margin and internal sac having two small apical sclerites, each acutely pointed

and with apex directed dorsally, and two elongate subapical sclerites which are laterally oblique to venter of median lobe; spermatheca pipe-shaped with elongate posterior part.

*Bionomics*.— Adults of this species are occasionally found in caves and in groundhog burrows (Klimaszewski, 1984: 55), where they are probably seeking dipteran larvae and pupae associated with decomposing organic matter.

*Geographic Distribution* (Map 7).— This species is widely distributed across America north of Mexico (Klimaszewski, 1984: 55). The present cave records are given on Map 7. The single male specimen collected in Warrenton Cave, Alabama, constitutes a new state record for this species and the southernmost locality in the eastern United States.

*Material Examined*.— UNITED STATES: *Alabama*: Marshall Co., Warrenton Cave, 11.VII.1973, S. Peck (SPC) 1 ♂; *Illinois*: Monroe Co., Illinois Mammoth Cave, 11.VII.1973, S. Peck (SPC) 1 ♂; *Missouri*: Crawford Co., 4.5 mi SE Leasburg, Moonshine Cave, 13.III.1982, J.E. Gardner (SPC) 1 ♂; *Pennsylvania*: York Co., Lisburn Cave, 16.I.1937, K. Dearolf (FMNH) 1 ♂, 1 ♀.

*Aleochara (Xenochara) fumata* Gravenhorst

Map 1

For illustrations and detailed description see Klimaszewski (1984)

*Diagnosis*.— Body medium (length 2.8–5.0 mm) usually smaller than *A. castaneipennis*; color brown to dark brown with appendages, apex of abdomen and often elytra paler; pronotal setigerous punctures fine; median lobe of aedoeagus with tubus with concave ventral margin and internal sac with two band-shaped apical sclerites with a hooked apex, and two subapical ones each parallel to venter of median lobe; spermatheca with capsule L-shaped, distinctly differentiated from the wide duct.

*Bionomics*.— As in *A. castaneipennis*, adults of this species are occasionally found in caves and groundhog burrows where they are most likely associated with larvae and pupae of Diptera living in decomposing organic matter.

*Geographic Distribution* (Map 1).— The specimen collected in Missouri constitutes a new state record. This species is widely distributed across North America. For cave localities see Map 1.

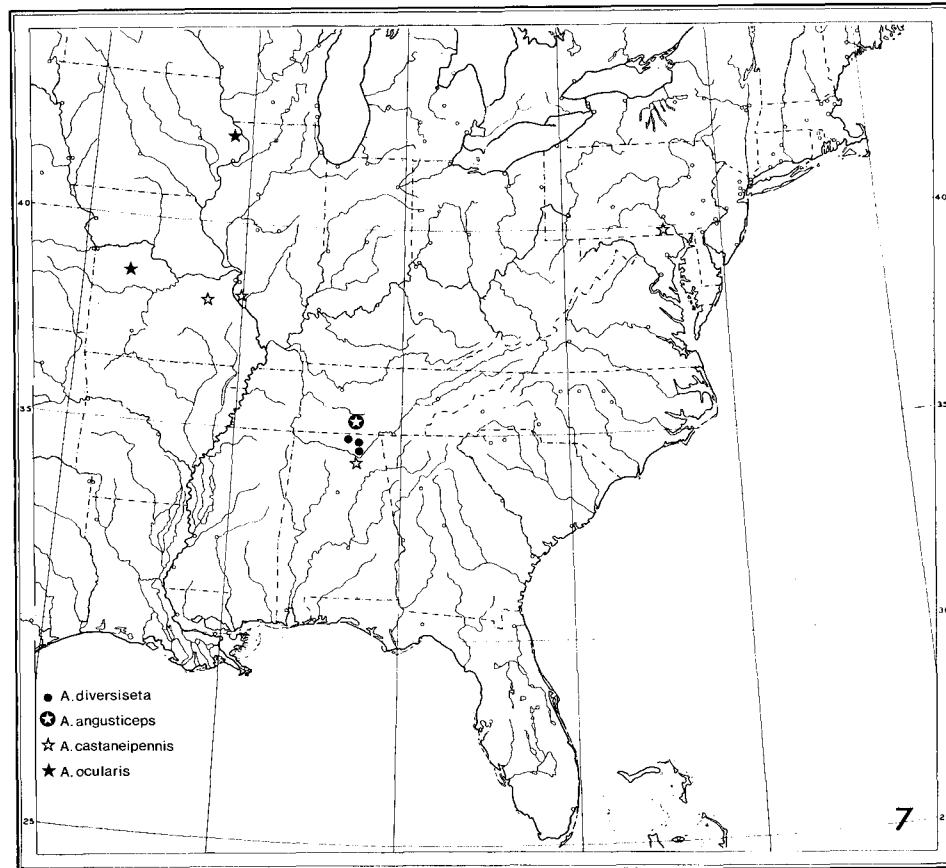
*Material Examined*.— UNITED STATES: *Alabama*: Marshall Co., Warrenton Cave, 11.VII.1973, S. Peck (SPC) 1 ♀; Morgan Co., Vandever Cave, 3 mi SSW Lacey's Spring, 22.V.1972, S. & J. Peck (SPC) 1 ♀, 3; *Missouri*: Pettis Co., 4.25 mi N Sedolia, Dining Room Cave, 23.IV.1982, J.E. Gardner (SPC) 1 ♀.

*Aleochara (Xenochara) angusticeps* Sharp

Map 7, Figs. 65

*Aleochara angusticeps* Sharp, 1883: 153. Lectotype (here designated): Guatemala, Paso Antonio, 400 feet, Champion (BMNH) 1 ♂.

*Diagnosis*.— Body length 5.5 mm; color dark brown to almost piceous, with basal antennal segments, maxillary palpi and tarsi paler, rust-brown; pronotal setigerous punctures moderately coarse (much less than those of *A. castaneipennis*), and pubescence rather sparse with surface glossy; male terminal segments as in *A. castaneipennis* (Klimaszewski, 1984: 135); median lobe of aedoeagus (Fig. 65) with tubus having venter broadly arcuate and internal sac with two apical sclerites each with rounded apex and approximately parallel to ventral margin of tubus laterally.



Map 7. Distribution of *Aleochara (Xenochara) angusticeps* Sharp, *A. (Xenochara) castaneipennis* Mannerheim, *A. (Echiochara) ocellaris* Klimaszewski, and *Aloconota diversiseta* sp. nov. [cave localities only].

**Bionomics.**— One specimen, probably accidentally collected in cave. Other data not available.

**Geographic Distribution (Map 7).**— This record constitutes the first record of this species from the United States. Originally it was known only from Guatemala.

**Material Examined.**— UNITED STATES: *Tennessee*: Bedford Co., Reece Cave, 23.VIII.1969, S. & J. Peck (SPC), 1 ♂.

**Remarks.**— Our association of this cave-collected specimen with the name *A. angusticeps* Sharp is tentative at this time. A comparison of the Tennessee cave specimen with the Guatemalan lectotype shows them to be identical in all respects except for the following in the Tennessee specimen: it lacks the minute punctation between the setigerous pores on the pronotum; the pronotum is slightly more transverse; and the median lobe of the aedeagus possesses two elongate and straight-sided sclerites in the internal sac (these sclerites are apically curved in the lectotype). We hope more material will eventually become available to help clarify the question of the conspecific status of these two widely spaced populations.

Subgenus *Echochara* Casey

For detailed description see Klimaszewski (1984).

*Diagnosis.*— Head, pronotum, and often elytra with irregularly hexagonal microsculpture and sculpticells flat; pronotum evenly pubescent with setigerous punctures usually coarse; mesosternum narrow, not carinate.

**Key to Species found in Caves**

- 1 Eye large, prominent, with maximum diameter in dorsal view more than 2.0 as long as temple; pronotum distinctly transverse (0.25 wider than long) with posterior margin broadly rounded . . . . . *Aleochara (Echochara) ocellaris* Klimaszewski, p. 81
- 1' Eye smaller, not prominent, with maximum diameter in dorsal view 2.0 as long as temple or shorter; pronotum slightly transverse, almost as long as wide (1/6 wider than long) with posterior margin sinuate . . . . . *Aleochara (Echochara) lucifuga* (Casey), p. 81

*Aleochara (Echochara) ocellaris* Klimaszewski  
Map 7

For detailed description and illustrations see Klimaszewski (1984).

*Diagnosis.*— Body length 4.0–7.0 mm; color dark brown with appendages and often elytra paler, light brown; eyes large and prominent; pronotum strongly transverse (0.25 wider than long); median lobe of aedeagus with tubus lacking two lateral, acutely pointed projections dorsally.

*Bionomics.*— Adults of this species are known either from caves or animal burrows, such as those of fox and groundhog (Klimaszewski, 1984). The Iowa specimens were collected from carrion in the cave.

*Geographic Distribution* (Map 7).— It ranges from southern Ontario, Quebec and Manitoba south to Kentucky (Klimaszewski, 1984). Localities of specimens studied for this project are indicated on Map 7.

*Material Examined.*— UNITED STATES: *Iowa*: Jackson Co., Maquoketa Caves St. Pk., Barred Cave, 24.VI.1964, S. Peck (SPC) 1 ♂, 1 ♀. *Missouri*: Pettis Co.: 4.25 mi N Sedalia, Dining Room Cave, 23.IV.1982, J.E. Gardner (SPC) 1 ♀.

*Aleochara (Echochara) lucifuga* (Casey)  
Map 8

For detailed description and illustrations see Klimaszewski (1984).

*Diagnosis.*— Body length 4.0 - 7.0 mm: color yellowish brown to brown, often with rust-coloured tint, occasionally with darker head and basal 0.5 of abdomen; eyes moderate in size, not prominent; pronotum slightly transverse (1/6 wider than long); median lobe of aedeagus with tubus bearing two, acutely pointed lateral projections in dorsal view.

*Bionomics.*— Adults of *A. lucifuga* are frequently found in caves; just one specimen was reported from a groundhog burrow (Klimaszewski, 1984). Specimens used in this study have been collected throughout the year from raccoon dung, bat guano, human feces, carrion and



traps baited with liver and banana. As in *A. ocellaris*, this species is associated with dipteran larvae and pupae, living on carrion and decaying organic matter. Conn and DeMoss (1984) reported *A. lucifuga* from Bat Cave, Kentucky, as a troglomorphic species associated with summer and winter guano beds.

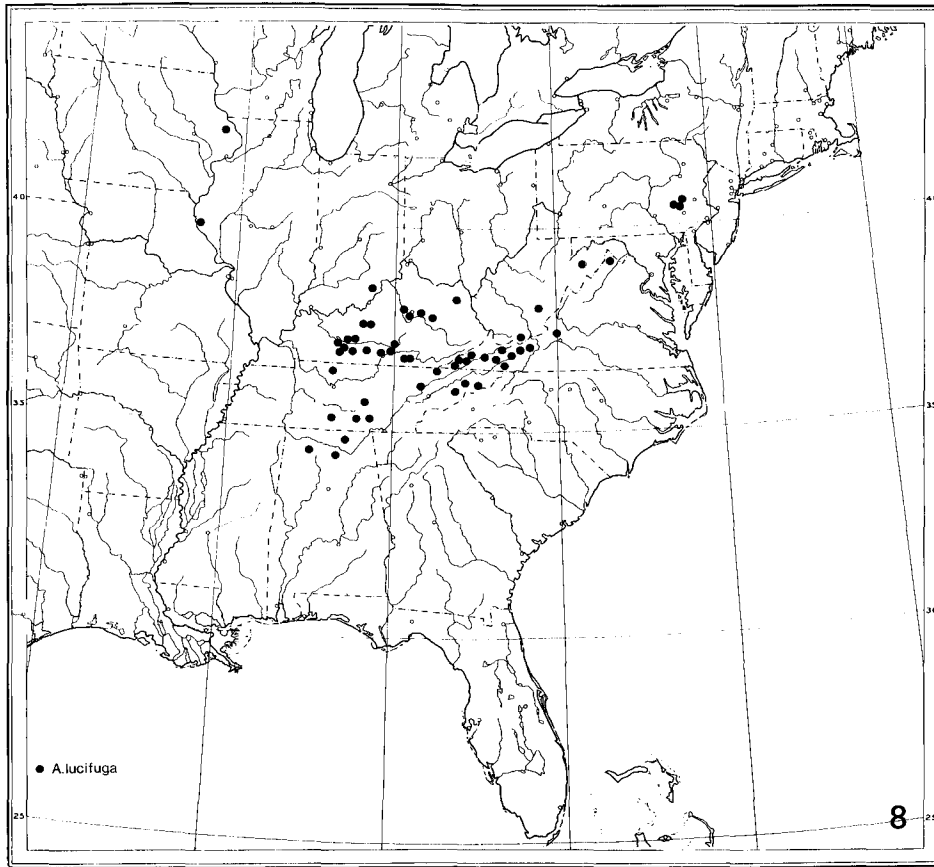
*Geographic Distribution* (Map 8).— *A. lucifuga* is distributed in the eastern United States ranging from Wisconsin and Pennsylvania south to Alabama and west to Iowa. The specimens collected in Alabama, Illinois and Iowa constitute new state records. Localities for specimens used in this study are shown on Map 8.

*Material Examined*, not repeating records in Klimaszewski (1984).— UNITED STATES: *Alabama*: Lawrence Co., Ivy Hollow Cave, 8 mi S Courtland, 21.VIII.1965, S. Peck (SPC) 1 ♀; Morgan Co., Blowing Spring Cave, W of Lacon, 2.VIII.1953, R.C. Royer (SPC) 3; *Illinois*: Adams Co., Burton, Burton Cave: 4.XII.1944, M.W. Sanderson (INHS) 3 ♂, 1 ♀, 35; 27.XII.1946, R.A. Evers (INHS) 2 ♂, 68; 24.VI.1965, S. Peck (SPC) 1 ♂, 2; *Indiana*: Clark Co., Cave Spring Cave, near New Washington, 18.VIII.1960, H.S. Dybas (FMNH) 1; *Iowa*: Jackson Co., Hunters Cave, NW Andrews, 24.V. 1964, S. Peck (SPC) 1; *Kentucky*: Adair Co., near Columbia, Jones Cave, 21.VIII.1960, H.S. Dybas (FMNH) 1; Cue Cave, 29.VII.1964, S. Peck (SPC) 4, 27.VII.1974, T. Barr (SPC) 1; Saltpeter Cave, 1 mi NE Breeding, 3.VIII.1957, L. Hubricht (AMNH) 2; Walker Cave, 27.VII.1964, S. Peck (SPC) 1; Barren Co.: Bowles Branch Cave, 6 mi SE Glasgow, 8.III.1966, T.C. Barr (AMNH) 6; Hanson's Cave, SE Cave City, 15.VII.1973, S. Peck (SPC) 1; Slick Rock Cave, 17.III.1966, T. Barr *et al.* (AMNH) 8; Tarbarri Cave, 0.5 mi NW Beckton, 20.IV.1954, T. Barr (AMNH) 3; Walnut Hill Cave, 9.VIII.1965, T. Barr & Gittelsohn (AMNH) 7; Carter Co.: Tarklin Cave, 2.IX.1964, S. Peck (SPC) 2 ♂, 7; Clark Co.: Jones Cave, 12.28.VIII.1964, S. Peck (SPC) 1 ♀, 3; Hardin Co.: Turkey Hollow Cave, 30.X.1965, T. Barr (AMNH) 1; Wilmouth's Cave, near Stephensburg, 30.X.1964, S. Peck (SPC) 1; Fayette Co.: Lexington, cave, V–VI.1947, (INHS) 1 ♂, 33; Phelps Cave, 4.VIII.1964, S. Peck (SPC) 1 ♂, 10, 19.IX.1964, S. Peck (SPC) 1 ♂, 15; Madison Co.: Adams Cave, 15.VIII.1964, T. Barr & S. Peck (SPC) 1 ♂, 4; Metcalf Co.: Devils Den Cave, 2 mi S Center, 25.IX.1965, T.C. Barr (AMNH) 7; Powell Co.: Prairie Hall Cave, 16.VIII.1966, Reddell & Barr (AMNH) 1; Warren Co.: Bowling Green, Horseshoe Cave, 6.V–27.VI., S. Peck (SPC) 1 ♀, 44; Danger Cave, 27.VI.1973, S. & J. Peck (SPC) 10; Plano Saltpeter Cave, 10 m S Bowling Green, 18.VI.1973, S. Peck (SPC) 11; South Meade Cave, 3 1/2 mi SW Bowling Green, 4–7.XI.1972, S. & J. Peck (SPC) 1; Wayne Co.: Hurt Cave, 10.VII.1964, T. Barr & S. Peck (SPC) 2; Keith Cave, 17.VII.1964, S. Peck & T. Barr (SPC) 1 ♀; Woodford Co.: Cifton Cave, 8.IX.1964, S. Peck (SPC) 3; Weber's Cave, 6.VI.1964, S. Peck (SPC) 1 ♂, 7; *Pennsylvania*: Berks Co.: Dragon Cave, 28.IV.1935, 3.VIII.1935, K. Dearolf (FMNH) 26, (FMNH) 2, 1; 22.VII.1938, K. Dearolf (FMNH) 2; Dragon and Schafer Caves, 5.VI.1935, K. Dearolf (FMNH) 1; Merkle Cave, 25.VIII.1938, K. Dearolf (FMNH) 4; County ? : South Temple Cave, 28.IV.1935, K. Dearolf (FMNH) 1; *Tennessee*: Anderson Co.: Jones Bend Cave, 12.VII.1974, J. Bengston (SPC) 16; Bedford Co.: Reece Cave, 23.VIII.1965, S. & J. Peck (SPC) 3; Cannon Co.: Jacks Cave, 30.VI.1973, S. Peck (SPC) 2; Claiborne Co.: English Cave, Harrogate, 2.VII.1937, K. Dearolf (FMNH) 1; Giles Co.: Maxwell Cave, 13.VI.1967, T. C. Barr & R. Norton (AMNH) 2; Green Co.: Cedar Creek Cave, 11.VII.1972, L.M. & B.L. Ferguson (SPC) 2; Grundy Co.: Trussell Cave, 2 mi NW Monteagle, S. & J. Peck (SCP) 1; Robertson Co.: Christian Cave, 2.I.1958, T.C. Barr (AMNH) 1; Unicoi Co.: Blankenship's Cave, 8.VII.1977, L.M. & B. L. Ferguson (SPC) 3; *Virginia*: Bland Co.: Hamilton Cave. 1.V.1971, L.M. & B.L. Ferguson (SPC) 1; Fredrick Co.: Ogdens Cave, 17.X., J.R. Holsinger (AMNH) 1; Lee Co.: Elys Moonshine Cave, 5 mi E Rose Hill, 26.VII.1975, J. Holsinger (SPC) 1, Gilley's Cave, 26.VI.1963, J.R. Holsinger (AMNH) 2; 5.VII.1965, T. Barr (AMNH) 3; Lucy Beatty Cave, 17.VIII.1962, J.R. Holsinger (AMNH) 2; Smith Cave, 7 mi ESE Rose Hill, 2.VIII.1975, T.C. Cane (SPC) 1, 5; J. Holsinger (SPC) 2; Sweet Potato Cave, 6.5 mi ESE Rose Hill, 2.VIII.1975, T.C. Kane (SPC) 1 ♀, 4, J. Holsinger (SPC) 1 ♂, 2; Roanoke Co.: Goodwin's Cave, X.1972, L.M. & L.L. & L.S. Ferguson (SPC) 1; Russell Co.: Dickenson Cave, 1961, J.R. Holsinger (AMNH) 1; Smyth Co.: Roberts Cave, 15.VI.1962, J.R. Holsinger (AMNH) 4; Sugar Grove Cave, 13.VI.1970, L.M. & B.L. Ferguson (SPC) 1 ♀, 4; Tazewell Co.: Cassell's Farm Caves, Burke's Garden, 3.VII.1937, K. Dearolf (FMNH) 1; IX.1958, T. Barr (AMNH) 1; Wise Co.: Wildcat Saltpeter Cave, 1.7 mi SE Big Stone Gap, 27.XI.1975, J. Holsinger (SPC) 1 ♀; Wythe Co.: Sam Six Cave, 14.VIII.1962, J. R. Holsinger (AMNH) 2; *West Virginia*: Grant Co.: Elkhorn Mt. Cave, 14.VII.1962, J.R. Holsinger (AMNH) 1; Greenbrier Co.: Lewisburg, Court St. Cave, 27.VI.1968, S. Peck (SPC) 3; Mercer Co.: Neely Farm Cave, (Berret's Cave), Athens, 2.XI.1972, G. Park (SPC) 3.

#### Tribe Hoplandriini Fenyes

Hoplandriini Fenyes, 1920: 306.– Cameron, 1939: 555.– Borgmeier, 1949: 114.– Seevers, 1978: 140.

*Diagnosis*.— Last segment of the labial and maxillary palpi each with well defined pseudosegment, tarsal formula 4,5,5 (except some oriental genera), velum of paramere reticulated. Definition *sensu* Seevers (1978).



Map 8. Distribution of *Aleochara (Echiochara) lucifuga* (Casey), [cave localities only].

### *Hoplandria* Kraatz

*Hoplandria* Kraatz, 1857: 4.—LeConte 1861: 61.—LeConte and Horn, 1883: 91.—Casey, 1910: 174.—Blatchley, 1910: 345, 350.—Fenyés, 1920: 306.—Notman, 1920: 720.—Bradley, 1930: 83.—Moore and Legner, 1975: 438.—Seevers, 1978: 141.

Type species: *Hoplandria ochracea* Kraatz, fixed by Casey (1910), by subsequent designation.

**Diagnosis.**— Body rather robust, rust to rust-brown; sparsely pubescent and with punctation distinct; head slightly transverse with strong postgenal carina and with pronounced eyes; pronotum almost 0.5 broader than long, with broadly arcuate sides and base, truncate apex, and with pubescence directed approximately straight caudad; antenna incrassate apically, with segments 5–10 markedly transverse; metatarsus with basal four segments equal in length.

### *Hoplandria lateralis* Melsheimer

Map 5, Fig. 105

*Hoplandria lateralis* Melsheimer, 1844: 32.—Bland, 1865: 402.—Blatchley, 1910: 350.—Moore and Legner, 1975: 438.—Seevers, 1978: 195 (genitalic illustrations of male). Type not studied.

*Diagnosis*.— Length 3.4 - 4.0 mm; color dark reddish-brown with head almost piceous and posterior part of abdomen dark-brown, upper surface glossy, with deep punctation and scarce pubescence. Pronotum almost 2.0 as broad as long, distinctly wider than head; elytra 0.40 broader than long, with each elytron broadly arcuate posteriorly; abdomen gradually narrowed posteriorly. Aedoeagus as illustrated by Seevers (1978: 195). Spermatheca as in Fig. 105.

*Bionomics*.— Blatchley (1910) reported this species from vegetable debris in moist places. It is only accidental in caves.

*Material Examined*.— UNITED STATES; *Illinois*: Monroe Co.: Fogelpole Cave, 15.VI.1965, trap downstream 1000', S. Peck (SPC) 1 ♀; Illinois Mammoth Cave, 25.V.1965, S. Peck (SPC) 1 ♀.

The original type material of *H. lateralis* has not been examined and the application of this name to our specimens was based only on the published descriptions.

#### Tribe Falagriini Jeannel & Jarrige

Falagriae Erichson, 1840: 34.— Casey, 1906: 183 (*ex parte*).— Fenyés, 1918: 18.— Leng, 1920: 124 (*ex parte*).— Notman, 1920: 730 (*ex parte*).— Bernhauer & Scheerpeltz, 1926: 571 (*ex parte*).— Scheerpeltz, 1929: 9 (*ex parte*).— Bradley, 1930: 85.— Scheerpeltz, 1934: 1568 (*ex parte*).— Blackwelder, 1944: 158 (*ex parte*).— Hansen, 1954: 95 (*ex parte*).— Scheerpeltz, 1974: 51, 221 (*ex parte*).

Falagriates Mulsant & Rey, 1875: 428.— Ganglbauer, 1895: 107.

Falagriini Jeannel & Jarrige, 1949: 277.— Horion, 1967: 198 (*ex parte*).— Lohse, 1974: 15, 64 (*ex parte*).— Seevers, 1978: 143 (*ex parte*).— Hoebeke, 1985: 920.

Falagrina Arnett, 1968: 288 (*ex parte*).

The genera and species of this tribe were recently revised by Hoebeke (1985) which should be consulted for more information.

*Diagnosis*.— Body narrowly elongate, usually small (length 2.0 - 4.0 mm); head with distinct neck, latter not more than 0.66 as broad as head; antenna 11-segmented; lacinia spinose at apex and ciliate along inner margin; galea finely ciliate on membranous apex; maxillary palpus with last segment narrowly elongate, no longer than 0.5 of penultimate one; ligula bilobed; pronotum narrowed at base to no more than 0.75 of its maximum width, and usually with distinct sulcus along median line; mesosternum not carinate with median process from narrow to wide extended to middle of mesocoxae; scutellum large, triangular with sculptured dorsum; elytra elongate, approximately subparallel, convex, and broadly arcuate posteriorly; abdomen with first three visible terga transversely impressed at base, impressions smooth or coarsely punctate; legs long and slender; tarsal formula 4,5,5.

#### Genus *Myrmecocephalus* MacLeay

*Myrmecocephalus* MacLeay, 1873: 134.— Hoebeke, 1985: 942. — As subgenus of *Falagria*: Tottenham, 1957: 90.— Blackwelder, 1952: 253.— Arnett, 1968: 289.— Moore and Legner, 1975: 414.— As synonym of *Stenagria*: Bernhauer and Scheerpeltz, 1926: 575.

Type species: *Myrmecocephalus cingulatus* MacLeay, fixed by Blackwelder (1952: 253), by subsequent designation.

*Stiliciodes* Broun, 1880: 95. — As synonym of *Stenagria*: Bernhauer and Scheerpeltz, 1926: 575.

Type species: *Stiliciodes micans* Broun, by monotypy.

*Stenagria* Sharp, 1883: 237. Synonymized by Blackwelder, 1952: 358.

Type species: *Stenagria gracilipes* Sharp, fixed by Fenyés (1912: 23), by subsequent designation.

*Lorinota* Casey, 1906: 238. — Synonymized by Blackwelder, 1952: 227.

Type species: *Falagria cingulata* LeConte, fixed by Fenyés (1912: 23), by subsequent designation.

*Diagnosis*.— Distinguishable from other Falagrini by absence of apical comb of denticles on tergum VIII, by presence of a noncarinate scutellum, by delimited hypomera and by especially elongate legs.

*Myrmecocephalus cingulatus* (LeConte)

Map 2, Fig. 104

*Falagria cingulata* Leconte, 1866: 370; Hoebeke, 1985, 945. Lectotype (designated by Hoebeke, 1985): Central Valley of Western States, Type 6239 (MCZ). Lectotype not studied.

*Myrmecocephalus cingulata*; Moore and Legner, 1975: 415; Hoebeke, 1985: 945.

*Lorinota tenuicornis* Casey, 1906: 243. — As synonym of *M. cingulatus*: Hoebeke, 1985: 945. Lectotype (designated by Hoebeke, 1985): Iowa city, Iowa, Casey bequest 1925, Type USNM 38916 (USNM). Lectotype not studied.

*Lorinota sinuosa* Casey, 1911: 178. — As synonym of *M. cingulatus*: Hoebeke, 1985: 945. Holotype: Wisconsin, Bayfield, Wickham, Casey bequest 1925, Type USNM 38915 (USNM). Holotype not studied.

**Diagnosis.**— Body length 2.0–3.3 mm, color rufocastaneous with elytra slightly paler at base and apical part of abdomen darker; head elongate, evenly rounded at base and with sparse punctation and pubescence; pronotum cylindrical, convex, markedly converging at base, with deep sulcus along median line; scutellum finely carinate; elytra moderately sparsely punctate; abdomen slightly narrowed at base, subparallel, with first three visible terga transversely impressed basally and bearing coarse and rugose punctations.

For detailed description and illustrations of genitalia see Hoebeke (1985). Spermatheca as in Fig. 104.

**Bionomics.**— This species is only accidentally found in caves. Hoebeke (1985) reported it to be collected from under bark, from fungus on a stump, from a sawdust pile, and from various litter.

**Geographic Distribution** (Map 2).— Hoebeke (1985) reported *M. cingulatus* from eastern North America ranging from Nova Scotia and Ontario south to Louisiana and Alabama and west to eastern Kansas. Our single cave record from Illinois is shown on Map 2.

**Material Examined.**— UNITED STATES: *Illinois*: Monroe Co., Fogelpole Cave. 25.VI.1965, trap downstream 1000', S. Peck (SPC) 1 ♀.

## Tribe Myllaenini Ganglbauer

As defined by Klimaszewski (1982a: 412).

Genus *Myllaena* Erichson

For detailed description and key to Nearctic species see Klimaszewski (1982b: 184).

**Diagnosis.**— Body small (length 1.3–3.3 mm); color brown to dark brown, with short adherent pubescence and with long protruding setae on abdomen; antenna 11-segmented with segments 4 to 10 usually narrowly elongate, in some species segments 4 to 10 as long as wide or slightly transverse; maxillary palpus with segments 1 and 4 scarcely visible, segment 4 needle-shaped; lacinia narrowly elongate, bearing numerous denticles on inner edge; galea narrow, with series of subapical bristles; glossa styliform<sup>3</sup>; tarsal formula 4,4,5; mesosternum carinate, with narrowly triangular, acute median process; paramere with velum slightly reticulate and with narrow elongate apical lobe, with two long basal and two short apical setae; hydrophilous species associated with moss and gravel on river and stream banks.

<sup>3</sup>This structure might be interpreted as labial palpi.

*Myllaena arcana* Casey

## Map 5

For detailed description and illustrations see Klimaszewski (1982b: 220).

*Diagnosis*.— Body length 1.9–2.5 mm; color dark brown with appendages usually paler, antenna with segments 7–10 slightly longer than maximum width, last abdominal tergum almost completely divided into two elongate lobes; spermatheca with large spherical capsule and narrow and short posterior part; aedoeagus with triangularly elongate tubus dorsally and internal sac with three basal sclerites and two inconspicuous, semilunar structures near apex of median lobe (when sac inverted).

*Bionomics*.— This species is only accidentally found in caves. It is common by streams and wet debris near lakes (Klimaszewski, 1982b: 220).

*Geographic Distribution* (Map 5).— *Myllaena arcana* is widely distributed in eastern North America ranging from Ontario and Quebec, south to Alabama and west to Iowa, with three isolated records: one in Alberta and two in southern Mexico (Klimaszewski, 1982b: 221). Our single record from a cave in Alabama is shown on Map 5.

*Material Examined*.— UNITED STATES: *Alabama*: St. Clair Co., McGlenon (=McLendon) Cave, 3 mi NE Whitney Jct., 15.VI.1965, S. Peck & A. Fiske (SPC) 1 ♂, 1 ♀, in litter below entrance pit.

## Tribe Myrmedoniini Ganglbauer

Myrmedoniini Ganglbauer, 1895: 106.— Casey, 1906: 183.— Fenyés, 1918: 18.— Bernhauer and Scheerpeltz, 1926: 571.— As *Zyrasini*: Lohse, 1974: 222.— Klimaszewski, 1982a: 420.

*Diagnosis*.— Body narrowly elongate (Fig. 106); antennal segments V–X subquadrate or transverse (Fig. 106); lacinia and galea moderately long to very much elongated and finely pubescent apically; galea much longer than ligula; maxillary palpus with minute apical segment (Fig. 106); ligula bilobed apically; pronotum trapezoidal in shape and usually depressed near base (Fig. 106); mesosternum not carinate, with wide median process and mesocoxae widely separated; metasternal process much longer than mesosternal process and contiguous with it; elytra short with blunt lateroposterior angles (Fig. 106), and almost straight posteriorly; abdomen with first four visible terga deeply impressed basally (Fig. 106); legs long with basal segment of metatarsus usually as long as three following segments combined; tarsal formula 4,5,5; median lobe of aedoeagus with capsule of bulbus almost divided in two parts (Seevers, 1978: 151). This tribe consists mostly of myrmecophilous and termitophilous species (Seevers, 1978: 151).

The concept and classification of this tribe by Seevers (1978) is quite different from that of Lohse (1974), followed by Klimaszewski (1982a). However, as already mentioned in the “methods”, we have followed Seevers’ (1978) higher classification in this paper.

Genus *Zyras* Stephens

*Zyras* Stephens, 1835: 430.— Blackwelder, 1952: 410.— Lohse, 1974: 223.— Moore and Legner, 1975: 507.— Seevers, 1978: 153.

Type species: *Zyras haworthi* (Stephens), fixed by Stephens (1835) by monotypy.

*Platyusa* Casey, 1885: 305.— Fenyés, 1918: 24.— As synonym of *Zyras*: Seevers, 1978: 153.— As synonym of *Bolitochara*: Blackwelder, 1952: 314.

Type species: *Platyusa sonomyae* Casey, fixed by original designation and monotypy.

*Diagnosis*.— Body elongate, glossy, usually bicolored, coarsely punctate and with long and rather scarce pubescence (Fig. 106); head slightly produced apically (in form of beak), and

lacking distinct neck (Fig. 106); pronotum trapezoidal, wider than head, and usually depressed basally (Fig. 106); abdomen not expanded laterally and with deep basal impressions on first four visible terga (Fig. 106).

*Zyras obliquus* (Casey)

Map 1, Figs. 66–68, 106, 112, 113.

*Myrmedonia obliqua* Casey, 1893: 322, 325. – As *Zyras*: Moore and Legner, 1975: 508. – As synonym of *Z. howarthi* Stephen: Seevers, 1978: 153, 154. Lectotype (here designated): New York; Type USNM 39403; *Myrm. obliqua*; Casey bequest 1925 (USNM) 1 ♀. Paralectotype: Michigan; Marquette; Casey determ. *obliqua* -2; Casey bequest 1925 (USNM) 1 ♂.

**Diagnosis.**— Distinguishable by its bicolored body, with head and pronotum black and the remainder of the body rust-brown with darker posterior outer angles of elytra, by the shape of the pronotum (Fig. 106) with the setae directed straight caudad and by the shape of the female spermatheca and tergum and sternum VIII (Figs. 66–68), and by the shape of male tergum VIII and the aedeogagus (Figs. 112, 113).

**Description.**— Body length 5.0–6.5 mm; head and pronotum black, elytra rust-brown with posterior part especially near each outer angle gradually darkened to almost black, abdomen rust-brown to brownish, with basal parts of terga dark brown and with black tint, antenna, maxillary palpi and legs yellowish/light-brown; upper body surface glossy; punctuation coarse especially on pronotum with interstices glabrous; pubescence sparse, moderately long, and except on head directed straight caudad (Fig. 106). **Head** transverse, with apical portion above eyes produced anteriorly, and with pubescence directed outward from midline; antenna slightly broadening apically with segments 4 to 5 as long as wide and 6 to 10 transverse with segment 9 and 10 each being almost 0.5 wider than long, **Pronotum** (Fig. 106) transverse, widest in apical 0.33, and gradually narrowed basally with base broadly arcuate, and with distinct baso-medial impressions. **Elytra** (Fig. 106) distinctly transverse, approximately as long as pronotum with apical margin of each elytron broadly arcuate; mesosternum not carinate, with short and broad median process extended no more than 0.20 of mesocoxae, metasternum with median process broad and produced cephalad, extended to mesosternal process apically, and broadly separating mesocoxae. **Abdomen** (Fig. 106) gradually narrowed apically with three deeply, transversely impressed basal terga; metatarsus with basal segment almost as long as three following segments combined.

**MALE.** Tergum VIII similar in shape to that of female but with two small, triangular teeth near apex and with shallow emargination between. Tergum VIII lacking medio-subapical protuberance [present in closely related European species: *Z. howarthi* (Stephens) and *Z. fulgidus* (Gravenhorst)]. Sternum VIII elongate, longer than that of female. Median lobe of aedeogagus with tubus narrowly elongate laterally and with slightly ventrally produced apex (Fig. 113). Internal sac with rough internal surface and three sclerites in bulbous (Fig. 113).

**FEMALE.** Tergum and sternum VIII as on Figs. 67, 68. Spermatheca as in Fig. 66, connected posteriorly with thin, sclerotized, and multiple coiled duct.

**Bionomics.**— Unknown.

**Geographic Distribution** (Map 1).— The original Casey type material consists of two specimens collected in New York and Michigan. Our unique cave specimen of this species was found in Missouri. We have also seen one male of *Z. obliquus* collected recently from the summit of Mt. Albert, in Gaspé Provincial Park, Québec, which is deposited in the Lyman Entomological Museum. These records suggest that *Z. obliquus* is widely distributed in eastern North America, and that it accidentally occurs in caves.

**Material Examined.**— UNITED STATES: *Missouri*: Crawford Co., Bat Cave, 8.5 mi NE Steelville, 12.VII.1980, J.E. Gardner (CNC) 1 ♀.

*Zyras obliquus* (Casey) was considered to be conspecific with European *Z. howarthi* (Stephens), which also occurs in the northern Nearctic Region (Seevers, 1978: 153). We have studied the type specimens of the former species and also several European specimens of the latter from the collection of A. Smetana. Contrary to Seever's opinion, these species proved to be distinct and therefore we reinstate the name *Z. obliquus* (Casey). The true European *Z. howarthi* differs from Nearctic *Z. obliquus* by the following combination of characters: body larger (length 7–8 mm), and more glossy, with pronotal and elytral punctuation coarser and

scarcer, setae longer, elytra bright-orange, with black postero-outer angles, and abdomen rust-orange with darker apical and central parts. *Zyras obliquus* is also very similar to European *Z. fulgidus* (Gravenhorst), which is distinct in its uniformly orange elytra.

The genitalic structures of the three species are very similar. This fact probably led Seevers to the incorrect synonymization of *Z. obliquus* with European *Z. haworthii*.

#### ACKNOWLEDGEMENTS

We especially thank all the collectors who have gathered staphylinids from the many caves covered in this study. We also thank the following curators for allowing study of material deposited in the collections under their care: Lee Herman (AMNH), Dave Kavanaugh (CAS), Milton Campbell and Aleš Smetana (CNC), Hank Dybas and Larry Watrous (FMNH), Milton Sanderson and Donald Webb (INHS), A.F. Newton, Jr. (MCZ) and Terry Erwin (USNM). Rickard Baranowski, Lund, Sweden, provided specimens of some European species of *Atheta* for comparison. Dr. Adolf Lohse, Hamburg, West Germany, kindly gave taxonomic assistance from his encyclopaedic knowledge of the Aleocharinae. The manuscript was improved by careful and constructive reviews by our colleagues Milton Campbell, Lee Herman, Howard Frank, Aleš Smetana, and anonymous reviewers, for which we are most appreciative.

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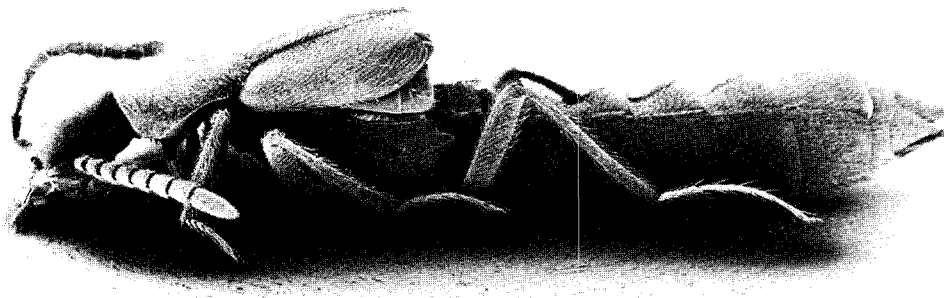
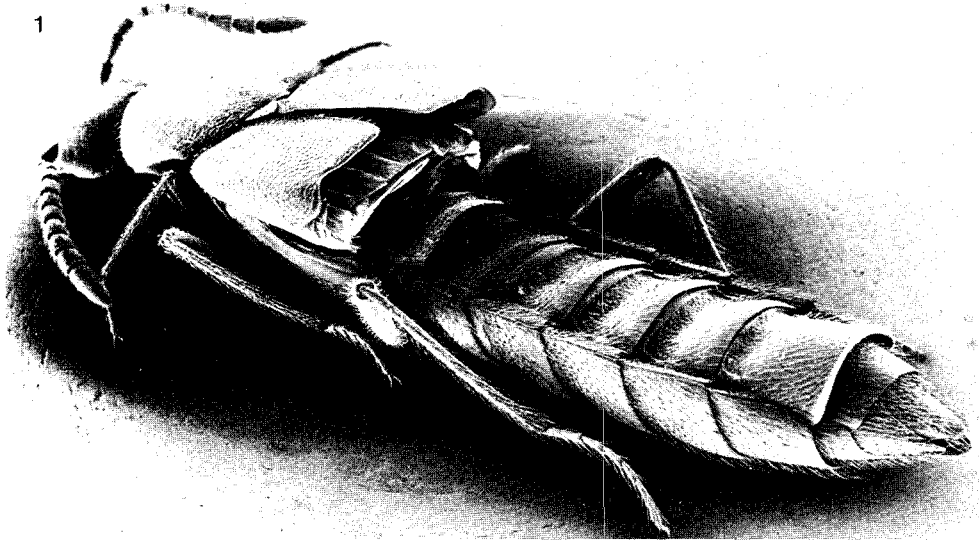
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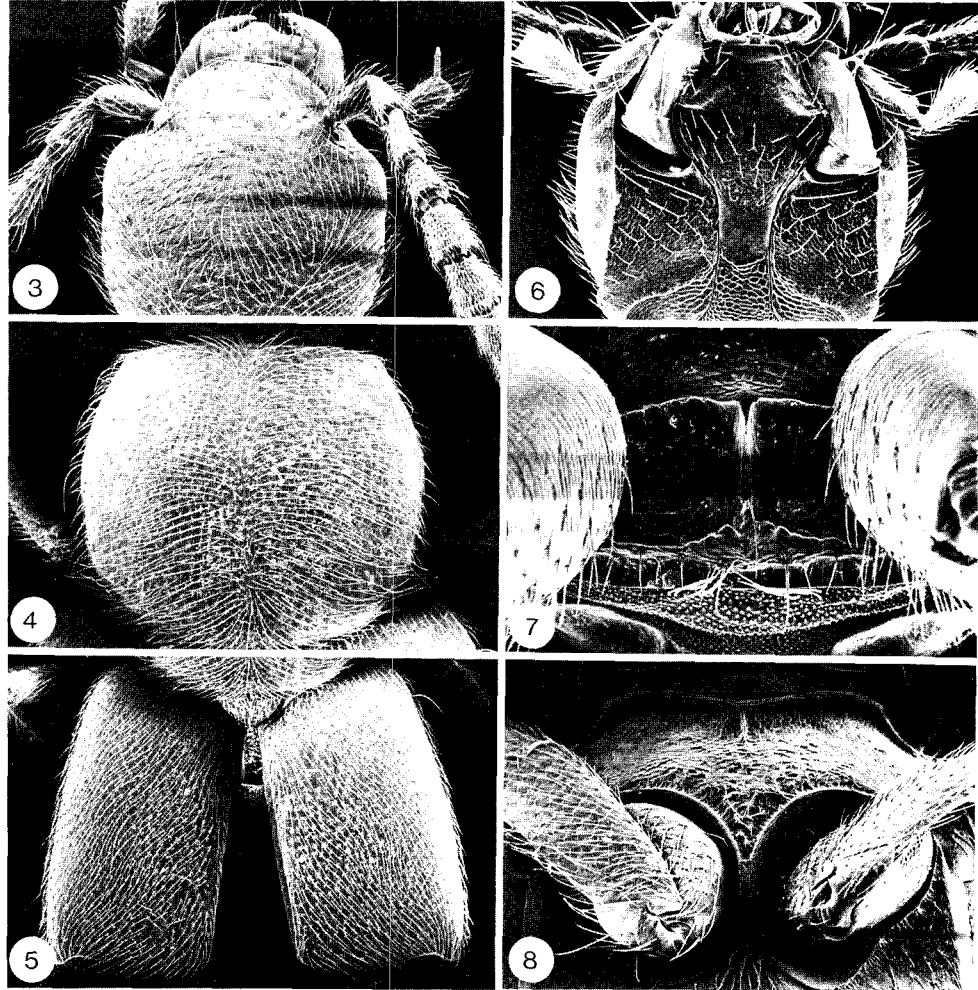
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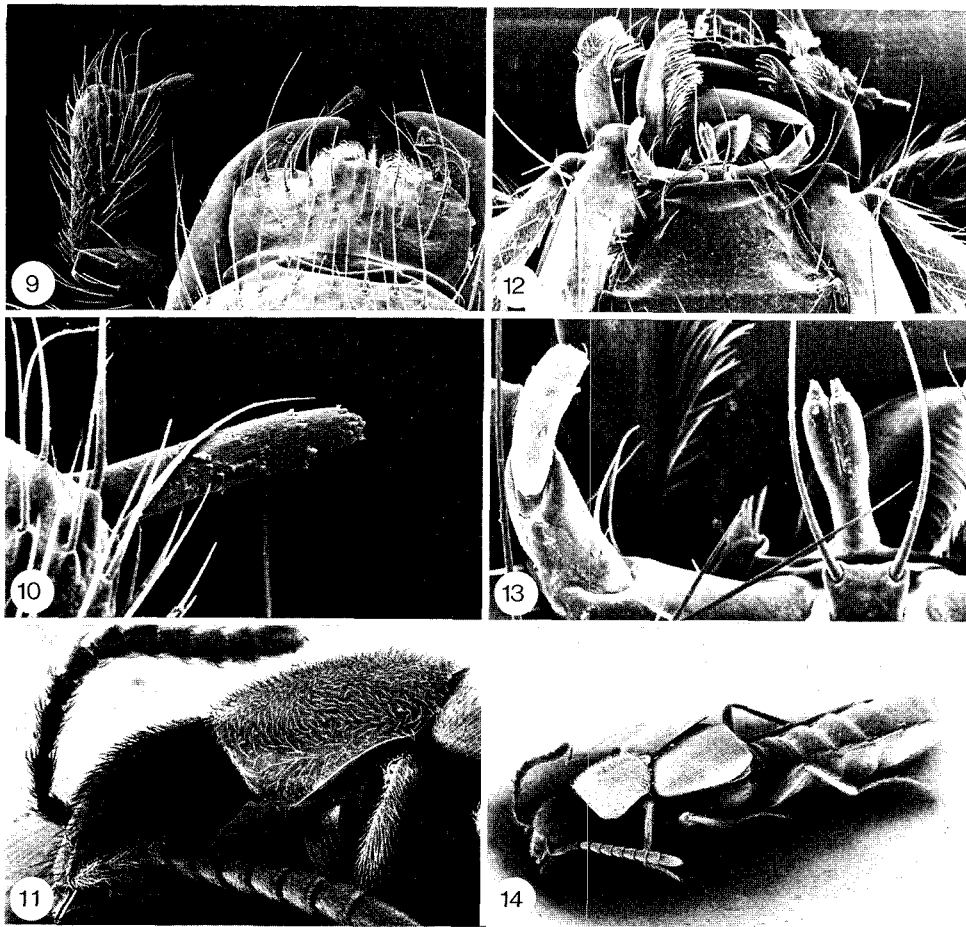


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Figs. 1-2. *Ilyobates puberulus* (Casey): latero-dorsal and lateral views (membranous wings removed).

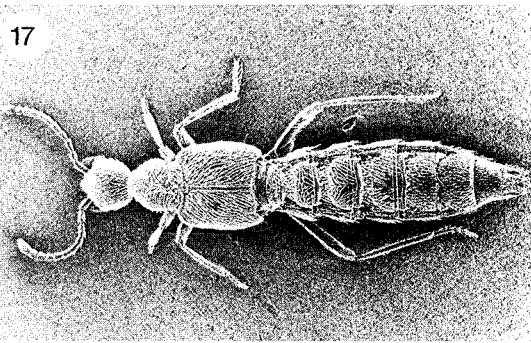
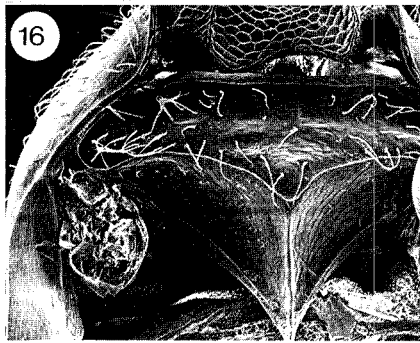
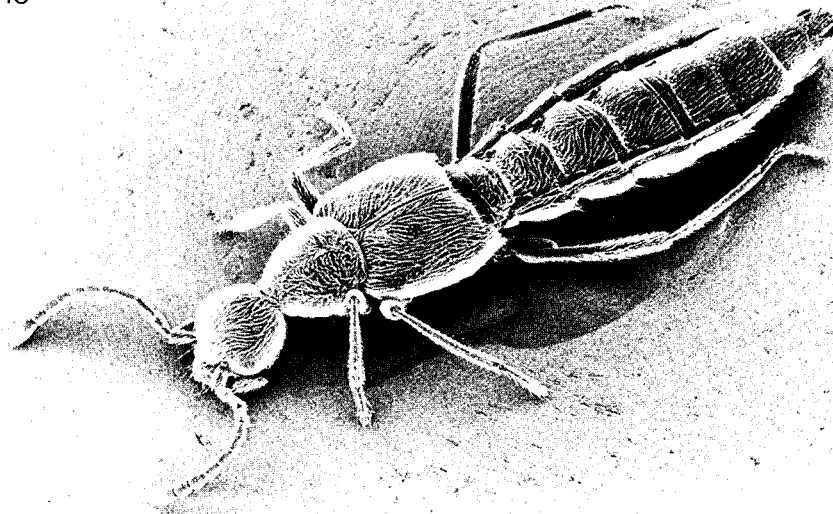


Figs. 3–8. *Ilyobates puberulus* (Casey): 3, head dorsally; 4, pronotum; 5, elytra; 6, head ventrally; 7, prosternum; 8, mesosternum and mesocoxae.

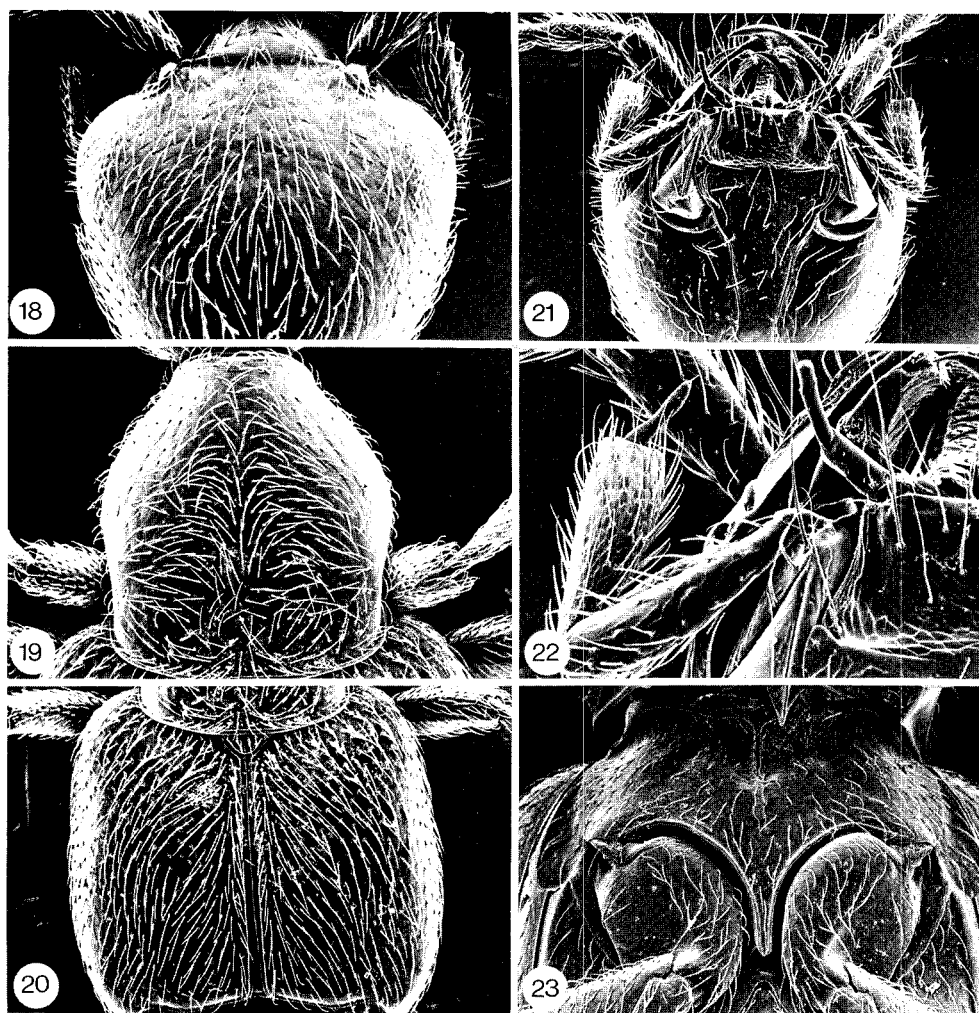


Figs. 9–14. *Ilyobates puberulus* (Casey): 9, maxillary palpus, labrum and mandibles; 10, last segment of maxillary palpus; 11, pronotum and head laterally; 12, mentum, labial palpi and maxillae; 13, labial palpus and ligula; 14, habitus.

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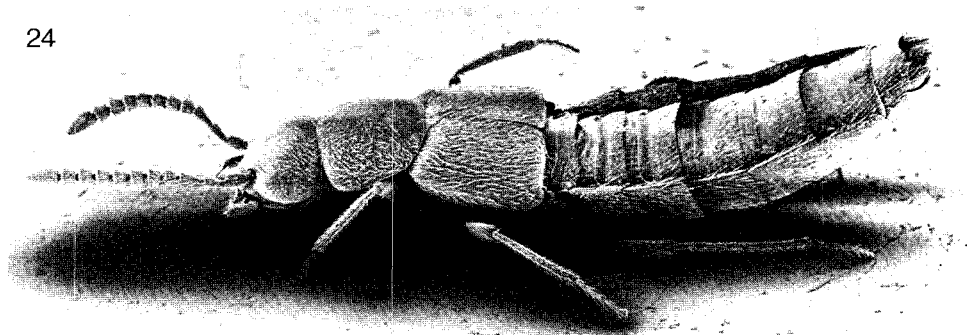
Figs. 15–17. *Blepharrhymenus illectus* (Casey): 15, habitus in latero-dorsal view; 16, prosternum; 17, habitus dorsally.



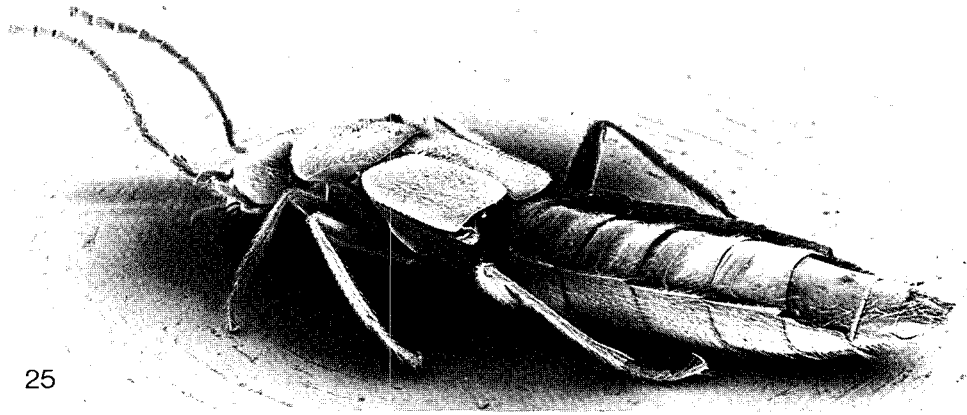
Figs. 18–23. *Blepharhymenus illectus* (Casey): 18, head dorsally; 19, pronotum; 20, elytra; 21, head ventrally; 22, maxillary and labial palpi; 23, mesosternum and mesocoxae.



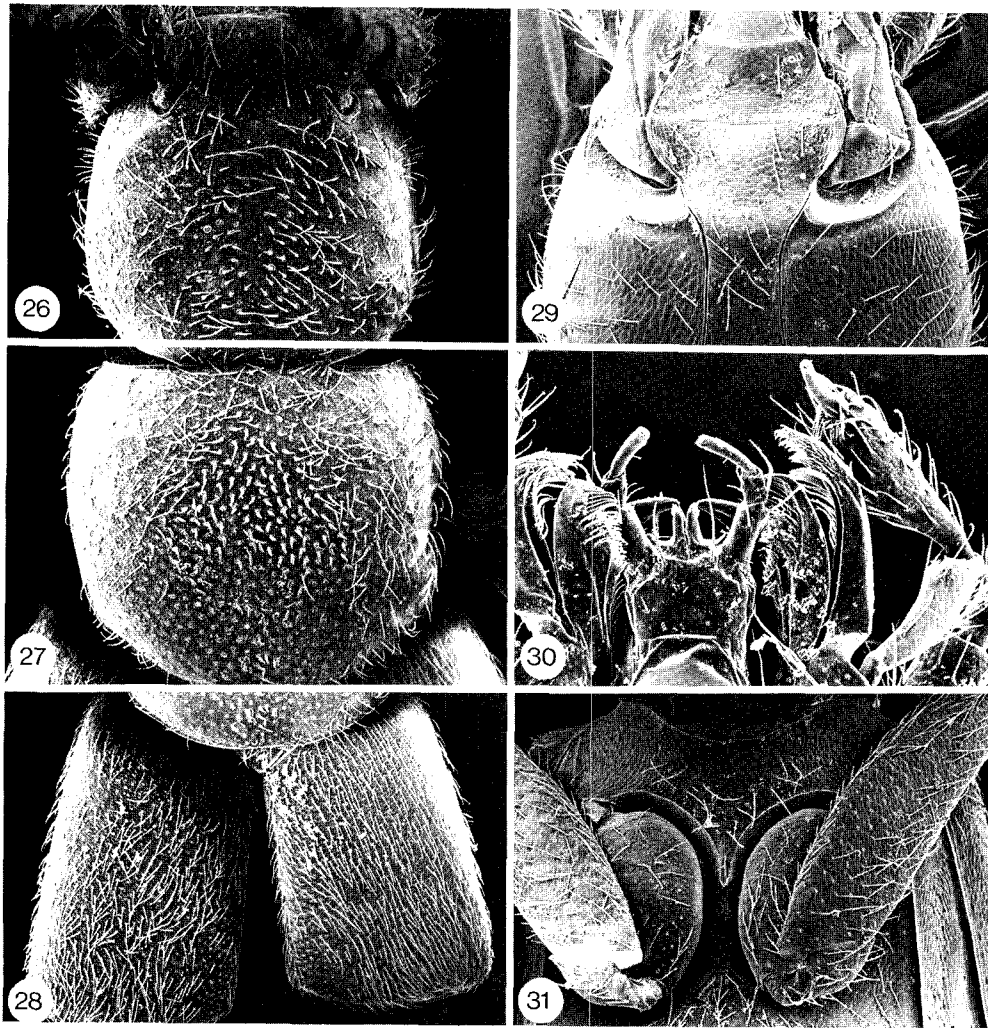
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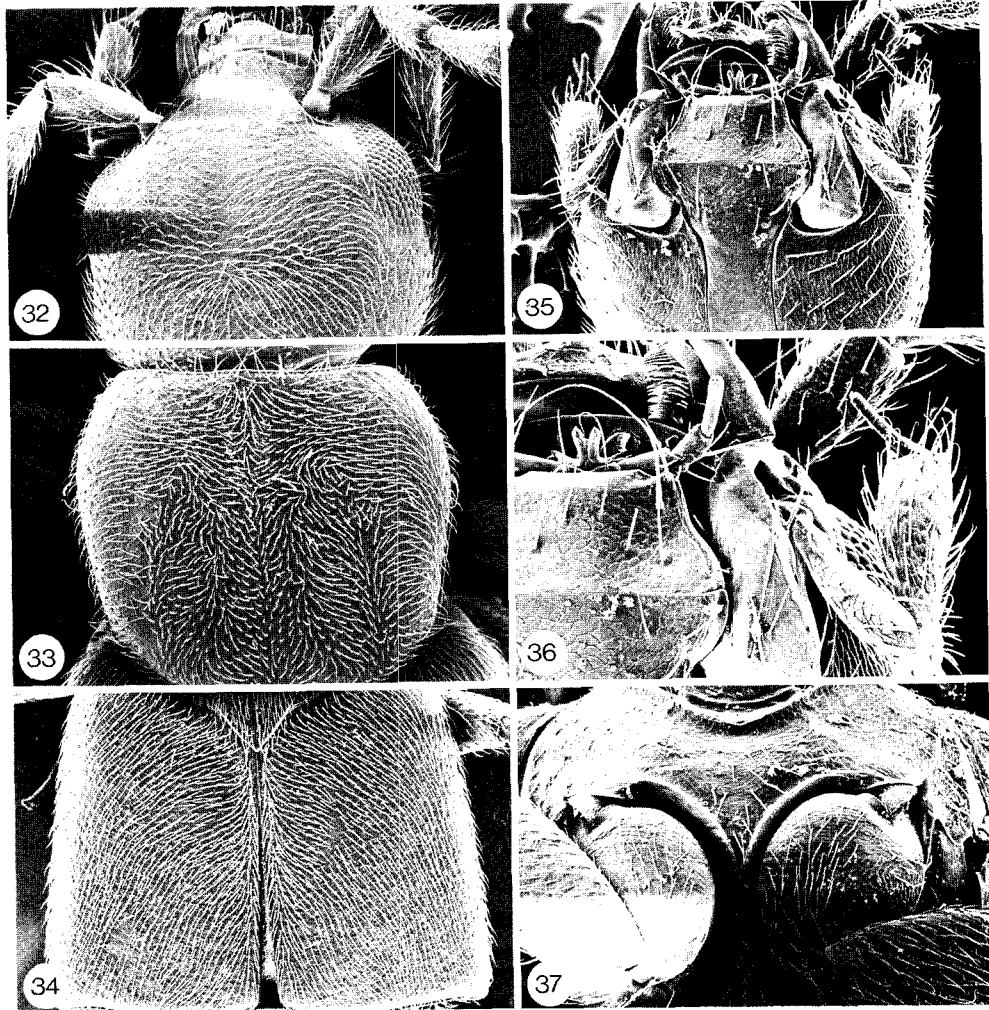
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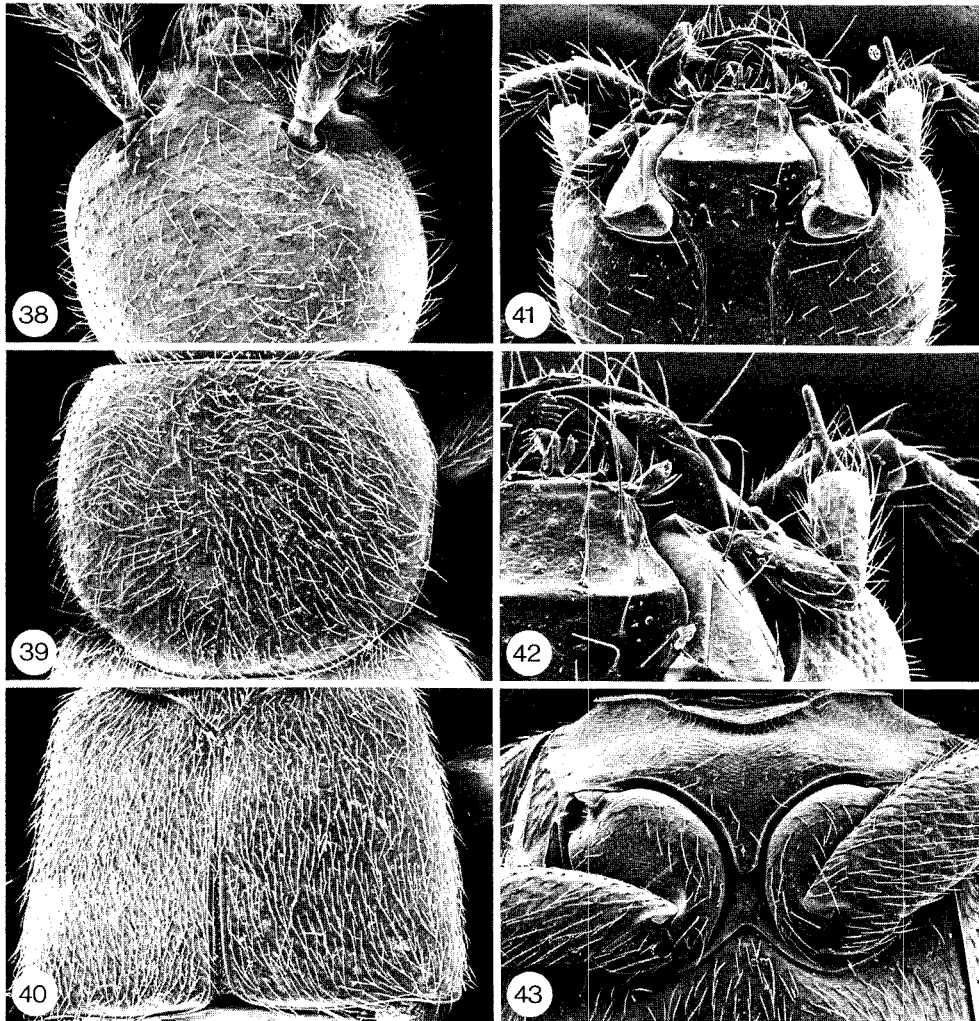
Figs. 24, 25. Habitus of: 24, *Atheta (Dimetrota) trogliphila* sp. nov.; 25, *Aloconota diversiseta* sp. nov.



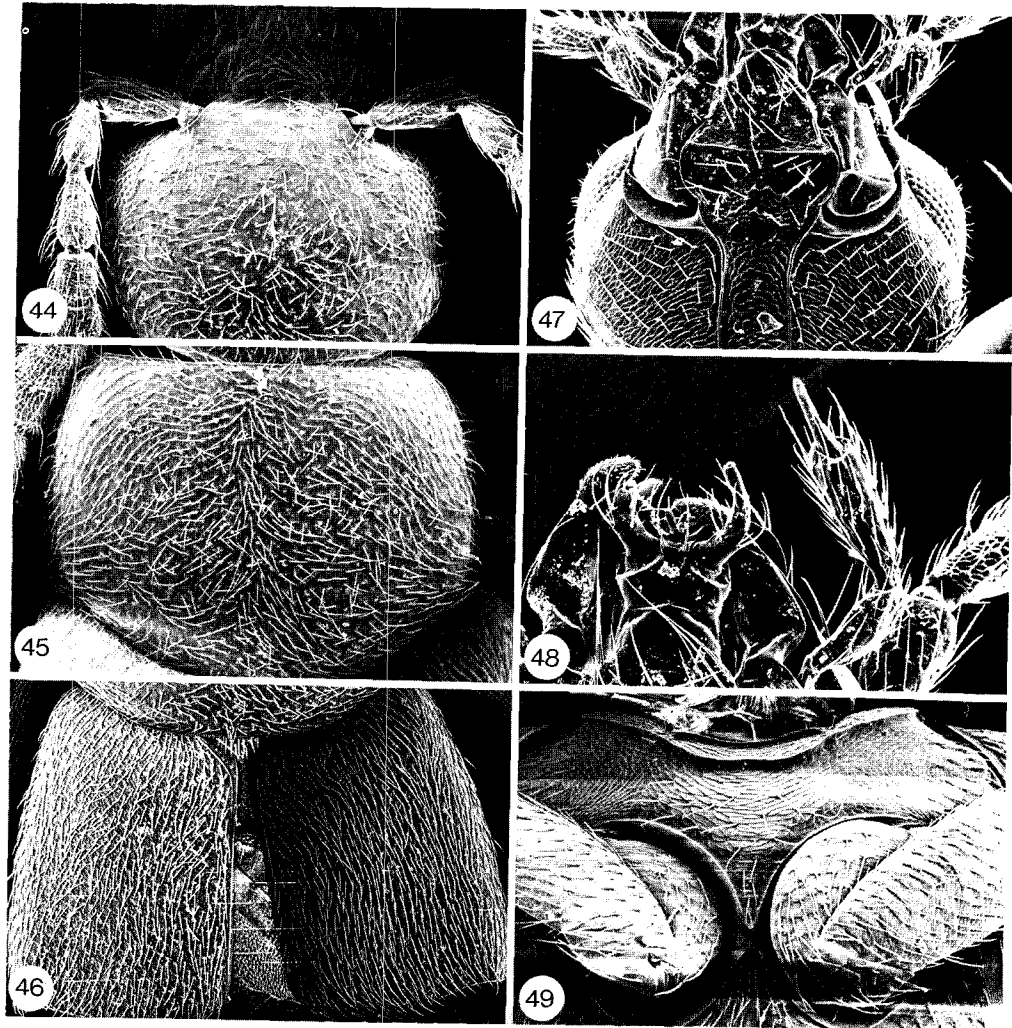
Figs. 26–31. *Aloconota diversiseta* sp. nov.: 26, head dorsally; 27, pronotum; 28, elytra; 29, head ventrally; 30, labial palpi and maxillae; 31, mesosternum and mesocoxae.



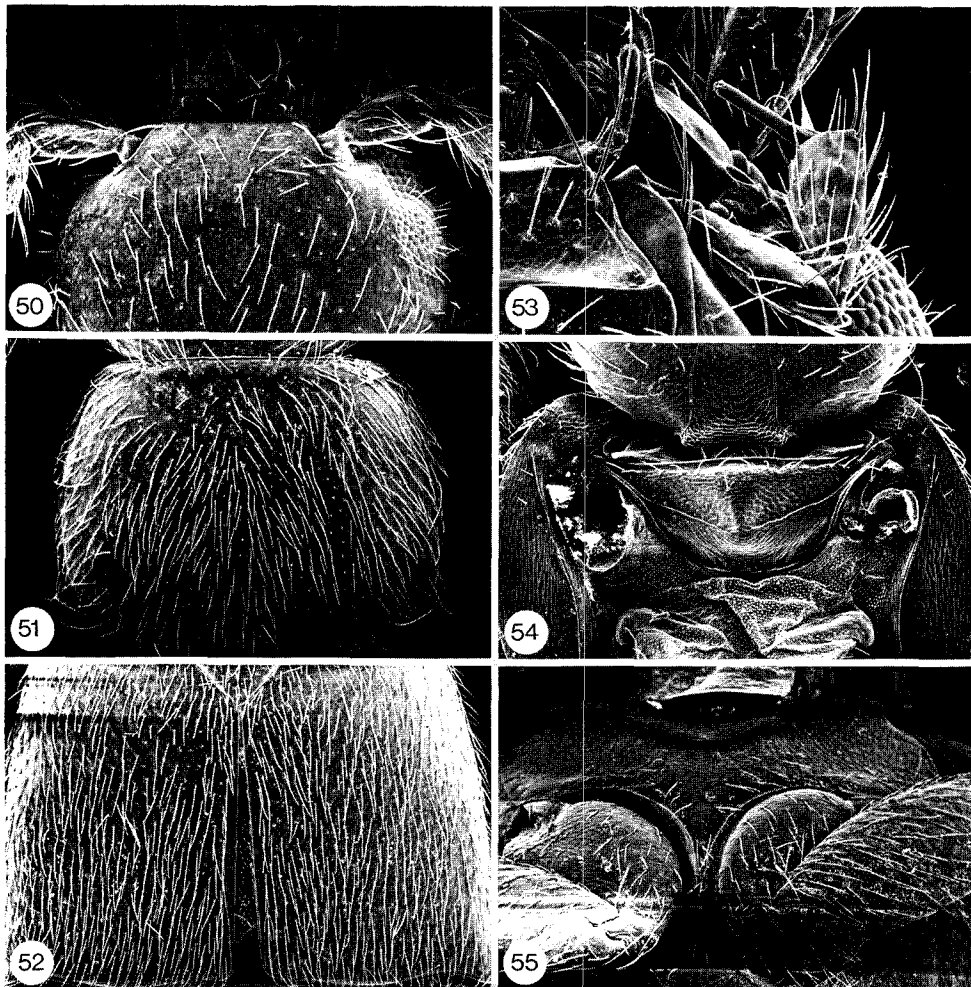
Figs. 32–37. *Aloconota insecta* (Thomson): 32, head dorsally; 33, pronotum; 34, elytra; 35, head ventrally; 36, labial palpus, mentum and maxilla; 37, mesosternum and mesocoxae.



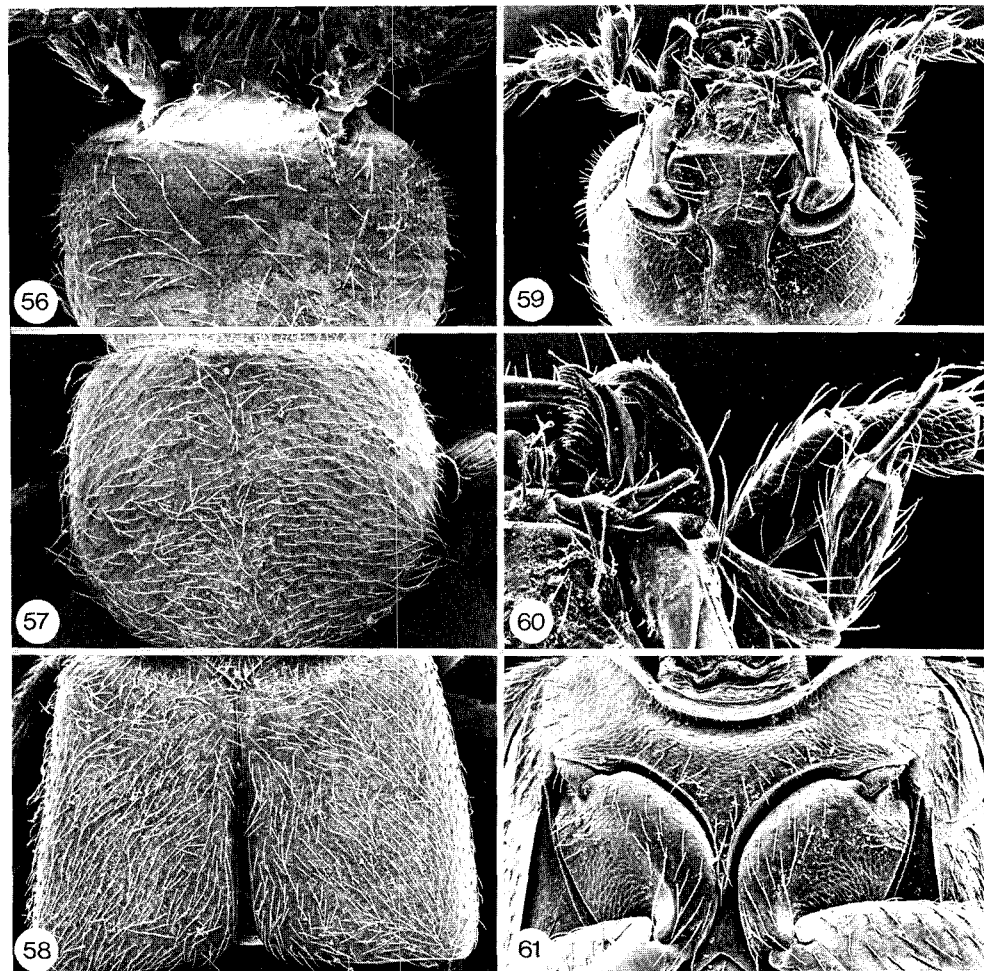
Figs. 38–43. *Atheta (Dimetrota) trogliphila* sp. nov.: 38, head dorsally; 39, pronotum; 40, elytra; 41, head ventrally; 42, mentum and maxilla; 43, mesosternum and mesocoxae.



Figs. 44–49. *Atheta (Dimetrota) lucifuga* sp. nov.: 44, head dorsally; 45, pronotum; 46, elytra; 47, head ventrally; 48, labial and maxillary palpi; 49, mesosternum and mesocoxae.

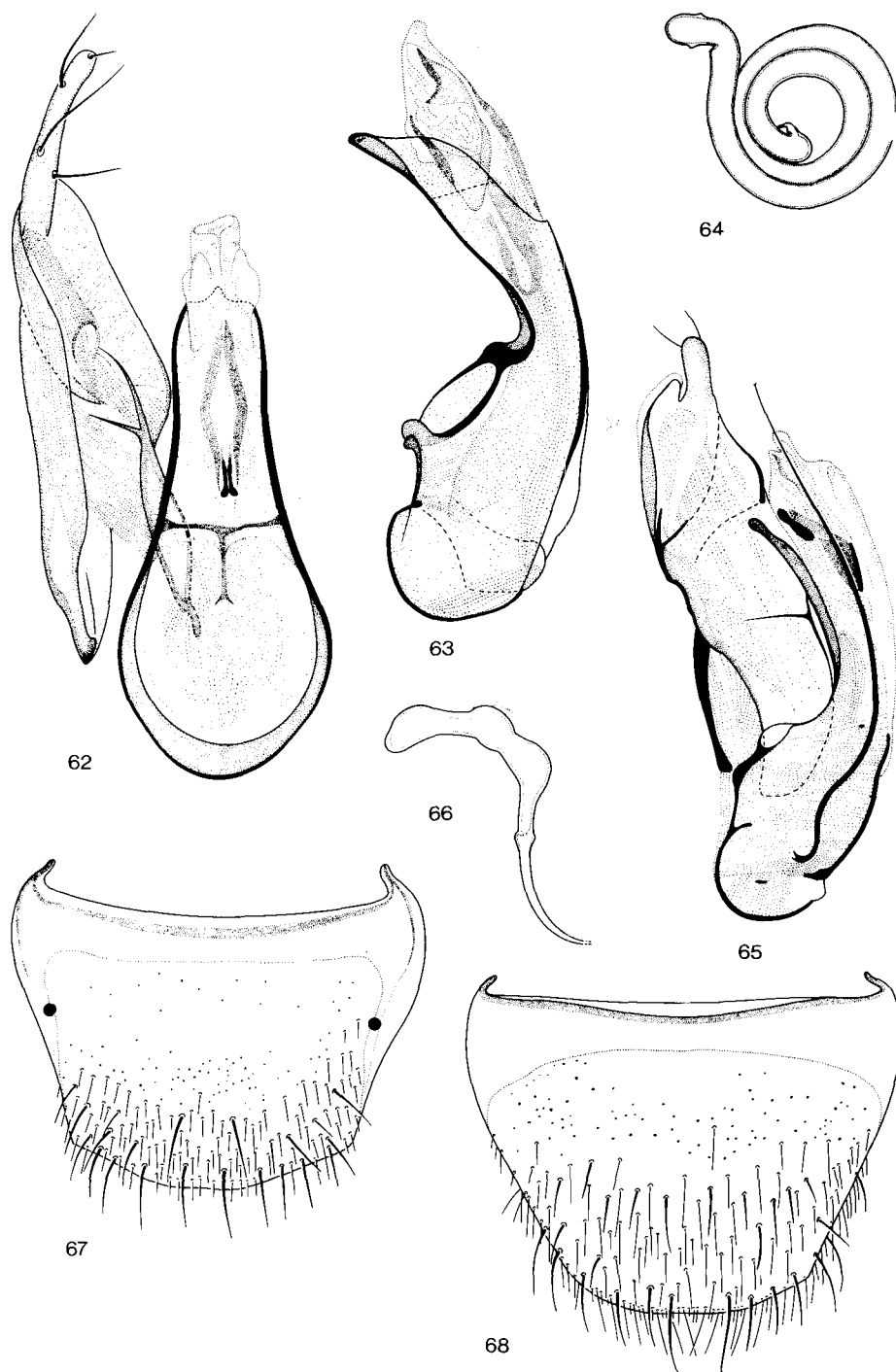


Figs. 50–55. *Atheta (Atheta) annexa* Casey: 50, head dorsally; 51, pronotum; 52, elytra; 53, labial palpus and maxilla; 54, prosternum; 55, mesosternum and mesocoxae.



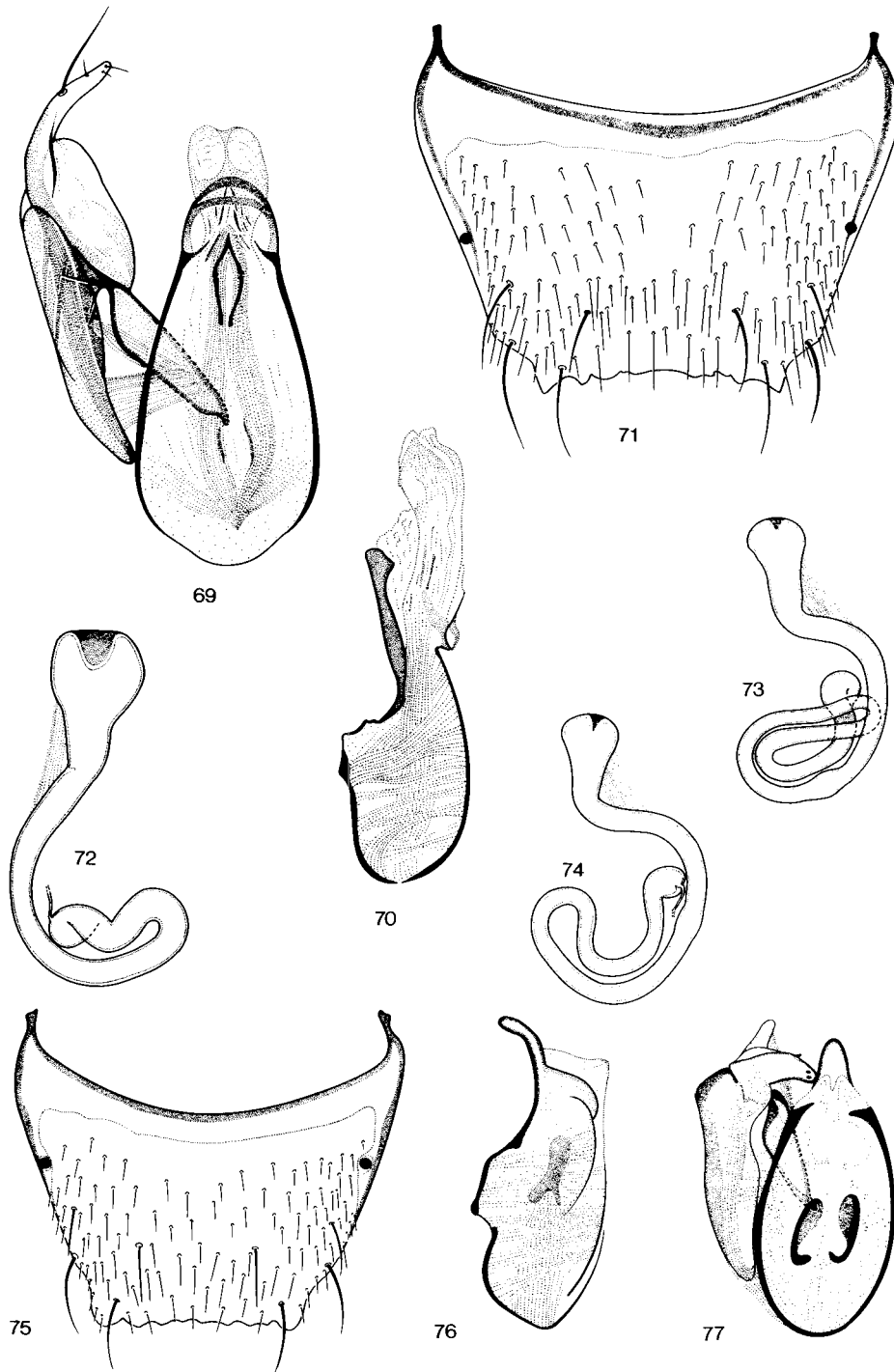
Figs. 56–61. *Atheta (Atheta) alabama* sp. nov.: 56, head dorsally; 57, pronotum; 58, elytra; 59, head ventrally; 60, labial palpus and maxilla; 61, mesosternum and mesocoxae.



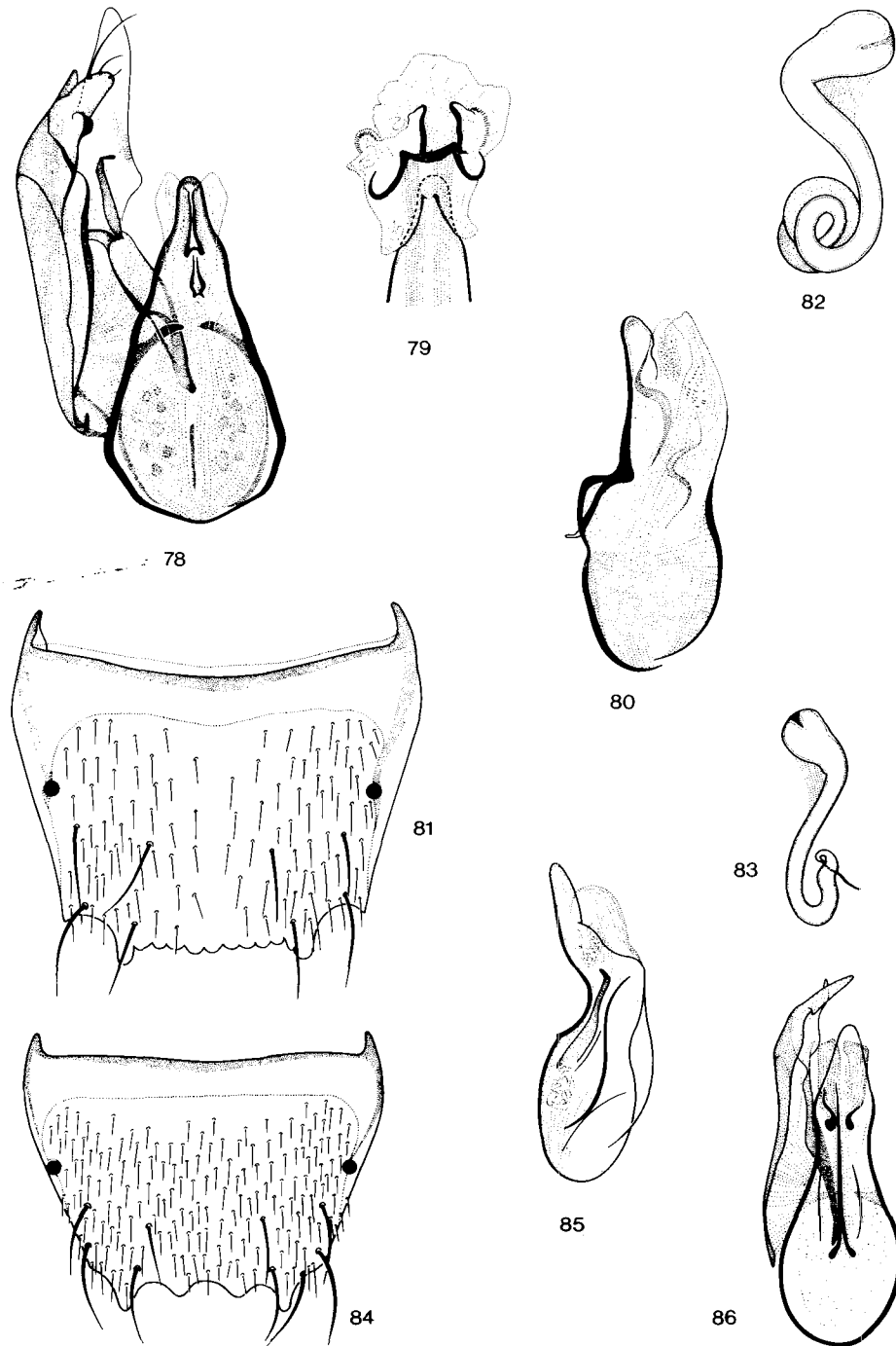


Figs. 62–68. 62–64, *Ilyobates puberulus* (Casey): 62, aedeagus in dorsal view (right paramere removed); 63, median lobe of aedeagus in lateral view; 64, spermatheca. 65, aedeagus of *Aleochara (Xenochara) angusticeps* Sharp, in lateral view (left paramere removed). 66–68, *Aleochara (Atheta) seticauda* sp. nov.: spermatheca; 67, female tergum VIII; 68, female sternum VIII.

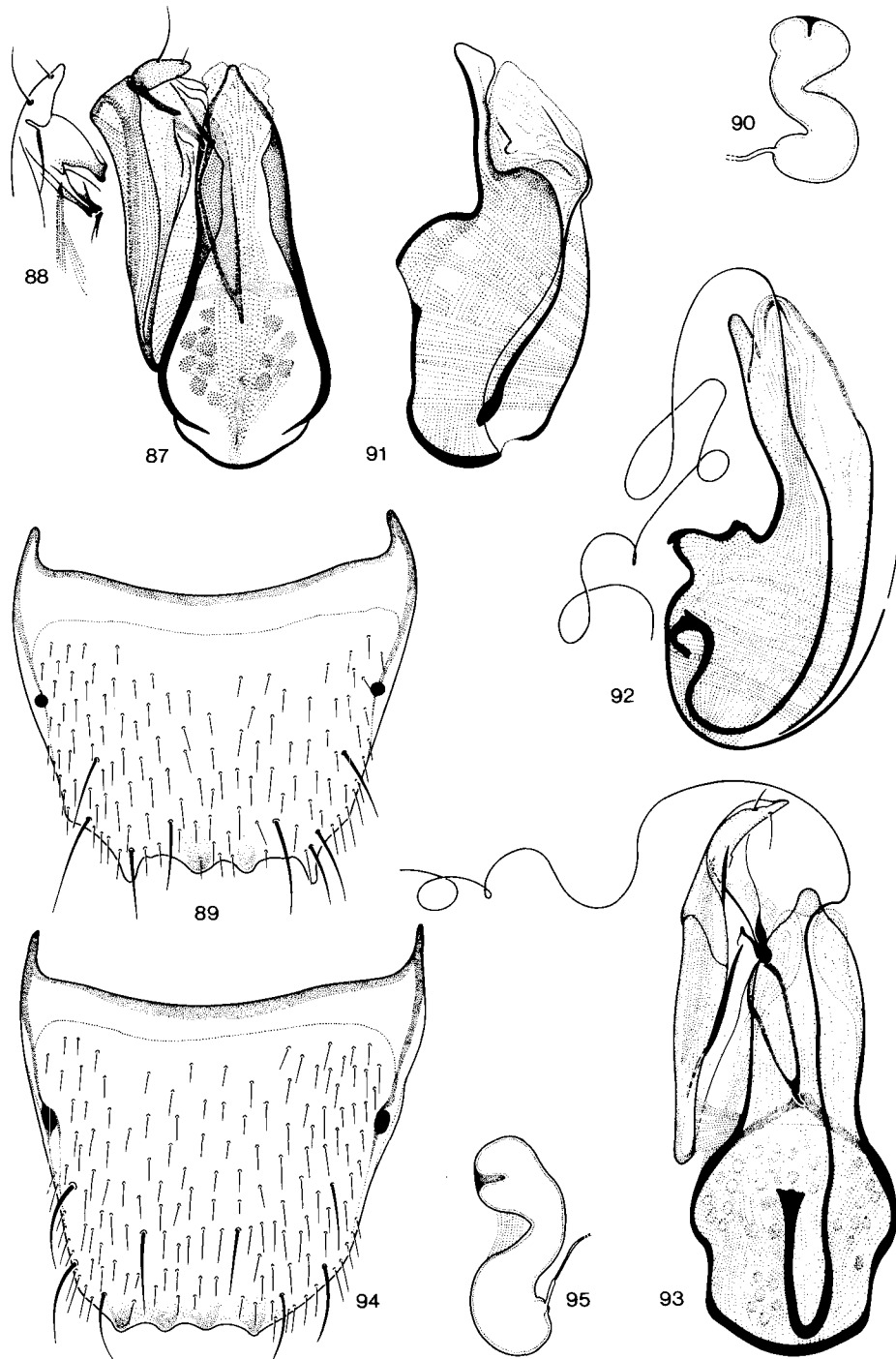




Figs. 69–77. 69–72, *Atheta (Dimetrota) trogliphila* sp. nov.: 69, aedeagus in dorsal view (right paramere removed); 70, median lobe of aedeagus in lateral view; 71, male tergum VIII; 72, spermatheca. 73–77, *Atheta (Atheta) alabama* sp. nov.: 73, 74, spermatheca; 75, male tergum VIII; 76, median lobe of aedeagus in lateral view; 77, aedeagus in dorsal view (right paramere removed).



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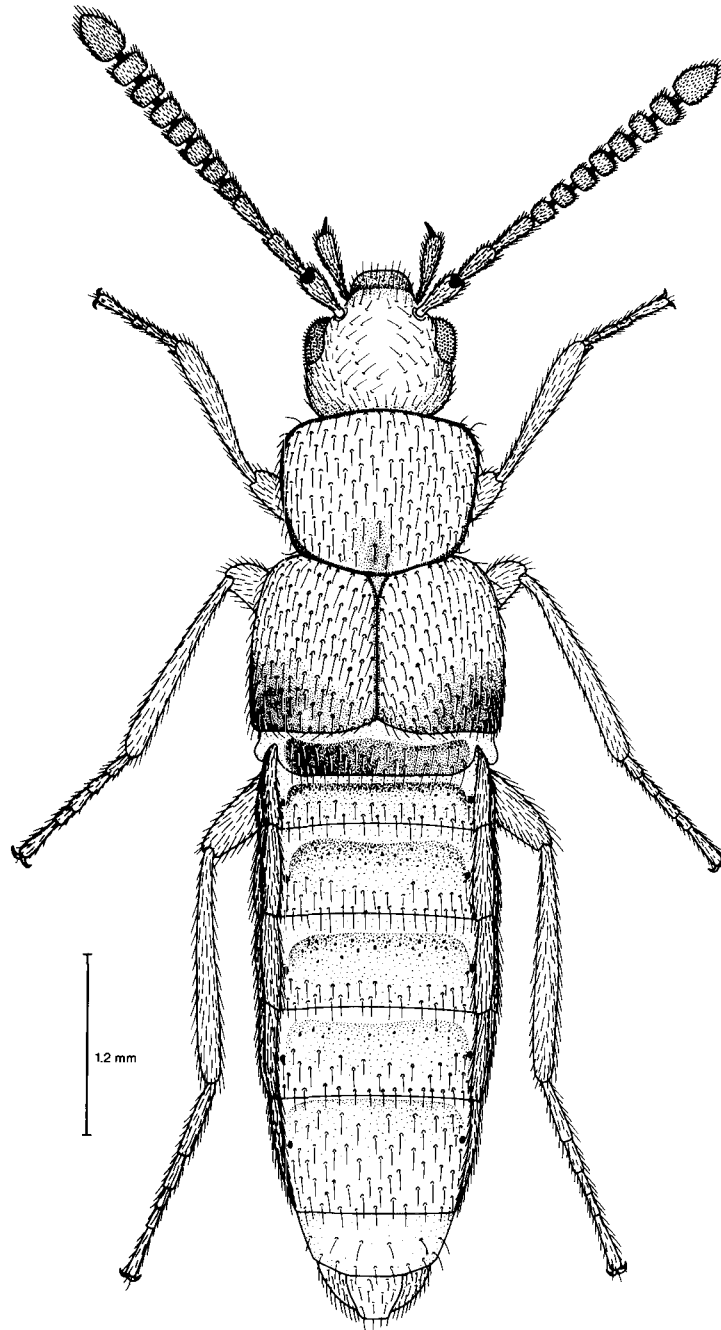
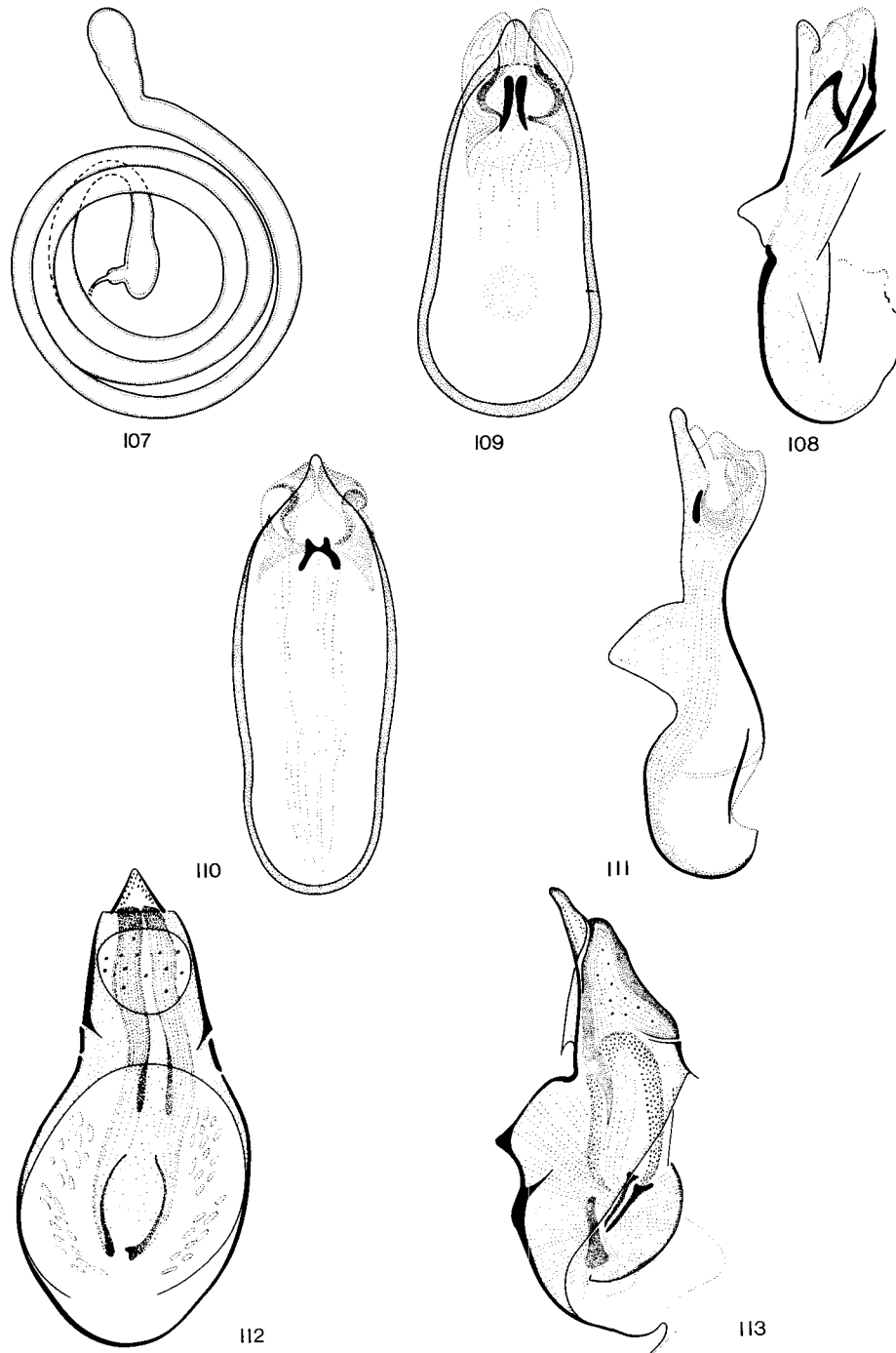


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