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PHANEROTA CUBENSIS AND *PHANEROTA BRUNNESSA*
N.SP., WITH A KEY TO THE SPECIES OF *PHANEROTA*
OCCURRING IN FLORIDA (COLEOPTERA: STAPHYLINIDAE)

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ABSTRACT

Phanerota cubensis Casey, previously known only from Cuba, is reported from Florida, and a new species, *Phanerota brunnessa* n.sp., is described and illustrations of distinctive features are provided. A key for identification of the 5 species of *Phanerota* occurring in Florida is provided, and diagnostic characteristics of the species are discussed. Species of *Phanerota* can be distinguished primarily by differences in color pattern, sculpture and secondary sexual characteristics of males. Structure of the male copulatory organ is very similar among species and offers unreliable distinguishing characteristics for some species. Similarity in aedeagal form among *Phanerota* species, in contrast to the interspecific diversity of form among other gyrophaenine staphylinids, suggests that study of these groups may provide insight into evolution of isolating mechanisms among species.

RESUME

Phanerota cubensis Casey, previamente conocida solo de Cuba, se reporta en la Florida, y una nueva especie, *Phanerota brunnessa* n. sp., es descrita y se proveen

ilustraciones de rasgos distintivos. Se da una clave para identificar las 5 especies de *Phanerota* que ocurren en la Florida, y se discuten características diagnósticas de las especies. Especies de *Phanerota* pueden ser distinguidas principalmente por diferencias en el patrón de color, la escultura, y las características sexuales secundarias de los machos. La estructura del órgano copulatorio del macho es muy similar entre las especies, y en algunas especies ofrece características que no se pueden utilizar con confianza para distinguirlas. Similarmente, en la forma aedeagal entre las especies de *Phanerote*, en contraste a la diversidad interespecifica de forma entre gyrophaenine staphylinids, sugiere que estudios de estos grupos pudiera dar un discernimiento de la evolución del mecanismo de aislamiento entre las especies.

The genus *Phanerota* Casey is one of the most distinctive aleocharine staphylinids found on fresh mushrooms in North America. Among gyrophaenine aleocharines, members of this genus are immediately recognizable by their extremely large bulbous eyes which take up virtually the entire lateral margins of the head. In addition, they have a number of apomorphic characteristics which clearly separate them from members of the genus *Gyrophaena* to which they are closely related (Ashe 1984).

Phanerota is primarily a tropical group with species occurring throughout the world in the tropics and subtropics and a few species in more temperate areas. At least 14 species which should be assigned to *Phanerota* have been described in the New World fauna, mostly in the genus *Gyrophaena*. All New World forms are in the subgenus *Phanerota* (see Ashe 1984). Seevers (1951) recognized 3 of these species in America north of Mexico. Remaining species occur in Mexico, Central America, South America or the West Indies, where, in addition, undescribed species exist.

Of the 3 species recognized by Seevers (1951) in America north of Mexico, 2 species, *P. fasciata* (Say) and *P. dissimilis* (Erichson) are broadly sympatric across the eastern half of North America south of 45° N latitude. Along the Gulf Coast and throughout Florida these 2 species are sympatric with a 3rd species, *P. carinata* Seevers, which is limited to this region.

In 1973 I collected a single male specimen of a *Phanerota* from a wood rat nest on Upper Key Largo, Florida. This specimen did not agree in color pattern or details of body sculpture with any known North American species. Some time later I was able to identify it as *P. cubensis* Casey by comparing it to type material in the Casey collection at the United States National Museum. Recently, Dr. Howard Frank, Florida Medical Entomology Lab, Vero Beach, Florida, sent me a number of specimens of *Gyrophaena* and *Phanerota* from Florida for identification. Among these were additional specimens of *P. cubensis*. Finally, while searching for other specimens of *P. cubensis* among undetermined *Phanerota* in the collections of the Field Museum of Natural History, I discovered a number of highly distinctive dark brown specimens of *Phanerota* from Florida. Comparisons with specimens of all species of *Phanerota* described from the New World in the collection of the Field Museum showed it to be an undescribed species. This increases the known *Phanerota* fauna of America north of Mexico from 3 to 5 species, all of which are sympatric in Florida.

The purposes of this paper are to report the occurrences of the West Indian species *P. cubensis* in Florida, to provide diagnostic characteristics for recognition of this species, to report on the known distribution of *P. cubensis* in Florida and the West Indies, to describe a new species of *Phanerota* from Florida, and to provide a key to the 5 species of *Phanerota* known to occur in Florida. Specimens discussed are in the collections of the Field Museum of Natural History (FMNH) or the private collection of Dr. Howard Frank, Florida Medical Entomology Lab, Vero Beach, Fla., (HF).

Phanerota cubensis Casey

Phanerota cubensis Casey, 1906, p. 228. Leng and Mutchler, 1914, p.407. Seevers, 1951, p.747.

Gyrophaena cubensis (Casey), Fenyés, 1918-21, p.97. Bernhauer and Scheerpeltz, 1926, p.527. Blackwelder, 1943, p.541.

Diagnosis.—The description of *P. cubensis* provided by Casey (1906) within his key to the species of *Phanerota* is essentially correct in the characters he discusses. *P. cubensis* may be distinguished from all other North American *Phanerota* by the combination of: body flavate to rufo-flavate; head, posterior 0.50-0.75 of elytra and abdominal terga 5-10 (or 6-10) black to dark piceous; elytra rufo-flavate to testaceous in antero-lateral 0.50-0.25 to medial margin at, or slightly posterior to, scutellum; antenna and legs flavate; antenna with article 4 slightly elongate, 5-10 more or less quadrate; head with moderate reticulate microsculpture; pronotum slightly to obsoletely reticulate; elytra with reticulate microsculpture, slightly transverse in some specimens; abdomen moderately reticulate. Secondary sexual characteristics of male with posterior margin of tergum VIII broadly sinuate, lateral margins of sinuation more or less prolonged as blunt spines, sinuation internally with very slight (0.05 times length of lateral margins of sinuation) to slight (0.25 times length of lateral margins) broad lobe; some males with lateral margins of sterna III and IV very slightly thickened and slightly spiniform posteriorly and/or very slight broad elevation near apico-lateral margins of elytra (absent in most); aedeagus similar to that of *Phanerota fasciata* (Say) (Figures 9A,B, and Seevers 1951, p. 748, Figure 123). Female with apex of tergum VIII broadly, shallowly sinuate, sinuation without broad lobe medially.

Distribution in Florida.—Known in the United States from specimens from the following localities. FLORIDA, Dade County. Matheson Hammock, 22-XI-1975, Coll. M.C. Thomas (2) (HF); Monroe Co., Upper Key Largo, 24-III-1973, J.S. Ashe, berlese from wood rat nest (1) (FMNH).

Comments.—*Phanerota cubensis* is distinctive and easily recognized among North American *Phanerota* by the dark apical segments of the abdomen and more extensive dark areas of the elytra. All other North American members of *Phanerota* have at least the apex of the abdomen and medial margins of the elytra light.

Casey (1906) gives the known distribution of *P. cubensis* as Cuba (Cayamas). This distribution is repeated by Blackwelder (1943). In addition to the specimens from Florida noted above I have seen additional specimens from Cuba (FMNH) and from several localities in Jamaica (HF).

Phanerota brunnessa new species

(Fig. 1-7)

Length 1.8-2.3mm. Coloration of body brown to piceous-brown, many specimens with head, outer apical 0.5-0.3 of elytra and abdominal tergum VI, and, in a few specimens, terga V, VI and anterior margin of VII, darker, piceous-brown. Punctuation and setation throughout body very sparse, body subglabrous, shining; head with 12-14 large, widely scattered setigerous punctures in each half; punctures of pronotum small to minute, distant, widely scattered, microsetae very sparse and fine, pronotum subglabrous, macrosetae small to moderate in size; elytra with microsetae sparsely scattered, punctures moderate to fine, uniformly scattered; abdomen with punctures and microsetae very widely scattered and fine, subglabrous. Sculpture of head and pronotum without isodiametric reticulate microsculpture, integument smooth, markedly shining; elytral microsculpture various, moderately developed to obsoletely reticulate, reticulations slightly to moderately transversely elongated, a few specimens with reticulate

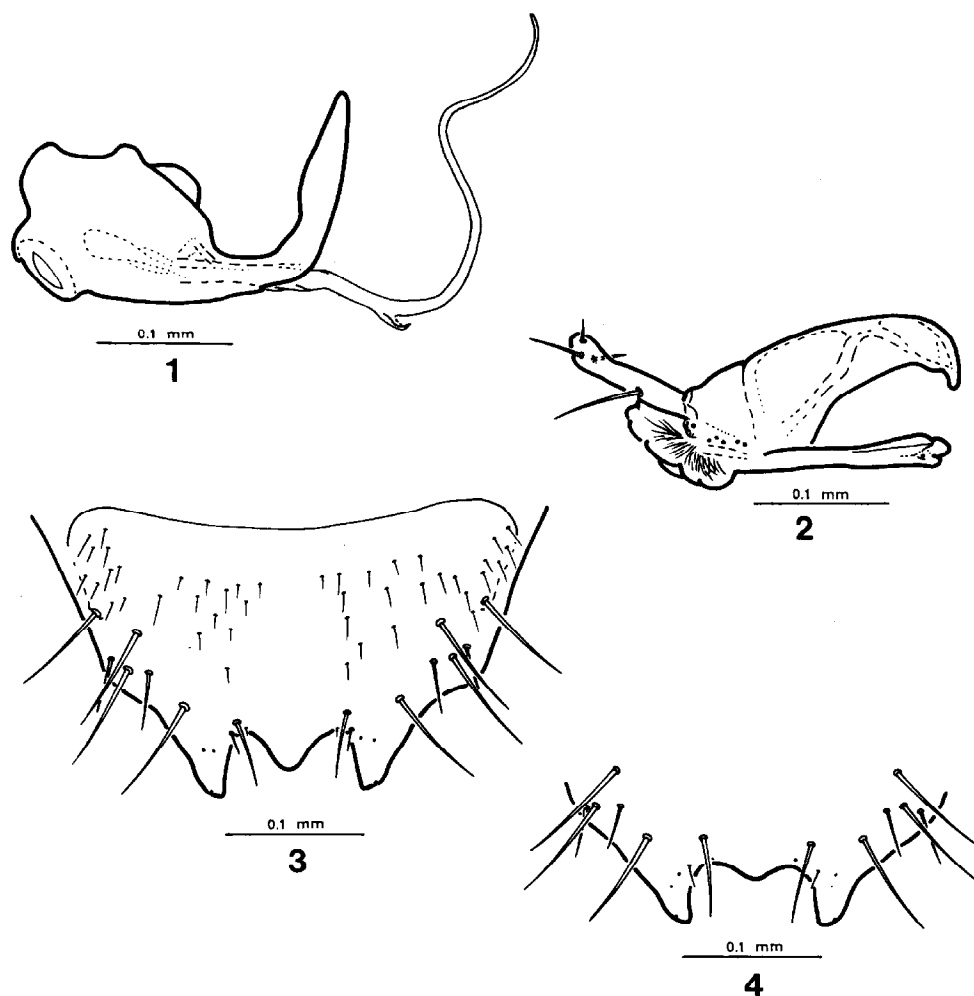


Fig. 1-4. *Phanerota brunnessa* n. sp. 1, aedeagus, median lobe, lateral aspect; 2, aedeagus, paramere, internal aspect; 3, male, abdominal tergum VIII; 4, male, distal margin of abdominal tergum VIII showing variant structure of secondary sexual characteristics.

microsculpture absent and integument strongly shining; abdomen with microsculpture obsolete to moderately developed.

Head, including eyes, 0.9-1.0 times as wide as pronotum; eyes typical of genus, very large, bulbous, occupying entire lateral margins of head from tempora to insertion of mouthparts; interocular width to total head width (including eyes) 0.52-0.54; infraorbital carina moderately developed, complete, forming ventral margin of eyes. Antenna (Fig. 5) with antennomeres 1-3 elongate, 4 about 1.3 times as long as wide, 5-10 about equal in length and progressively increasing slightly in width from basal to distal articles; antennomere 5 quadrate, about as long as wide; antennomere 10 slightly transverse, about 0.8-0.9 times as long as wide. Hind tarsus with tarsomere 1 about 1.3 times as long as 2. Abdomen with tergum VII broadly and very shallowly concave dorso-medially.

Male: (Fig. 1-4) Posterior margin of tergum VIII broadly emarginate medially, emargination flanked by broad blunt tooth on each side, emargination internally with slight (about 0.25 times length of lateral margins) to marked (about 0.85 times length lateral

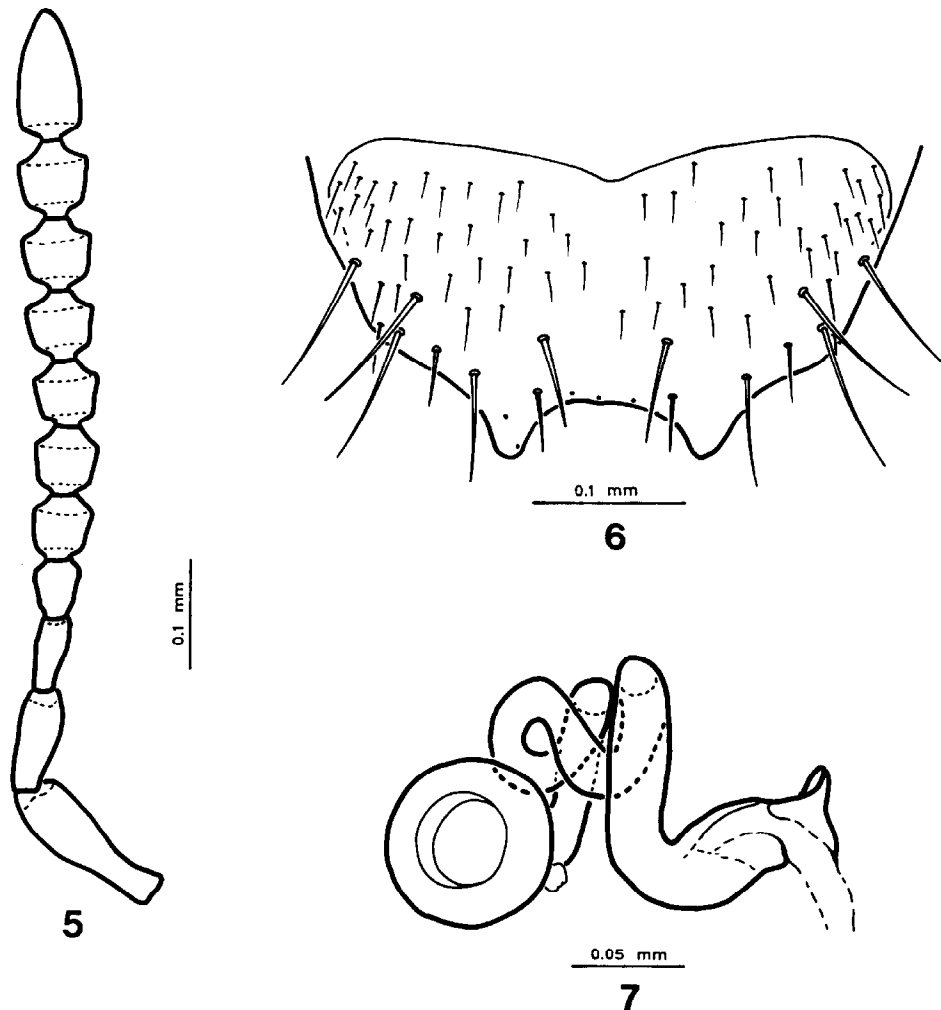


Fig. 5-7. *Phanerota brunnessa* n. sp. 5, antenna; 6, female, abdominal tergum VIII; 7, spermatheca.

margins) broad lobe medially, lobe broadly rounded to bluntly pointed apically (Fig. 3,4). Elytral punctures slightly to markedly asperate; some specimens with distinct, blunt, more or less elongate elevation in latero-apical third of elytra and smaller more flattened elevation in medio-apical third; elytral modifications absent in some and various among individuals from without elytral elevations to elevations prominent. Lateral margins of abdominal sternum III unmodified to postero-lateral margins thickened and slightly spiniform. Aedeagus distinctive; parameres as in Fig. 2, median lobe as in Fig. 1; median lobe markedly sclerotized, piceous-brown.

Female: Posterior margin of tergum VIII broadly emarginate medially, lateral margins of emargination not produced to prominent broad, blunt teeth (Fig. 6); emargination internally without medial lobe. Spermatheca as in Fig. 7.

Type.—Holotype, male and allotype, female, each with labels as follows: USA: Fla., Leon Co., Tallahassee, 8-IV-1976, mixed hardwood litter, C.W. O'Brien & Marshall/HOLOTYPE ♂ (on ALLOTYPE ♀.) *Phanerota brunnessa*, desig. 1985, J. S. Ashe. Both holotype and allotype are deposited in the collection of the Field Museum of

Natural History, Chicago, Illinois.

Paratypes. 22, Deposited in the collection of the Field Museum of Natural History, Chicago. FLORIDA, Leon Co., Tallahassee, 19-IX-1977, mixed hardwood litter, C. W. O'Brien et al, 1 male; Tallahassee, 8-IV-1976, mixed hardwood litter, C. W. O'Brien & Marshall, 4 males, 3 females (2 males, 1 female on microslides); Tall Timbers Research Sta., Woodyard Hammock, 31-V-1977, beech-magnolia litter, C. W. O'Brien and Wibmer, 1 female; Lafayette Co., 10 mi. NW Mayo, hwy. 27, 24-V-1977, mixed hardwood litter, C. W. O'Brien, et al, 3 males, 3 females; GEORGIA; Decatur Co., 4 mi. N Faceville, 28-II-1977, hardwood litter, C. W. O'Brien & Marshall, 5 males, 2 females.

Distribution.—This new species is only known from localities in northwestern Florida in Leon and Lafayette Counties and an adjacent locality in southwestern Georgia in Decatur County.

Habitat.—Specimens of this species have only been collected in relatively short series from litter associated with mixed hardwoods. All *Phanerota* for which adequate natural history information is available are known to be obligate inhabitants of fresh mushrooms (Ashe 1984). It seems reasonable to expect that members of *P. brunnessa* are likewise fungicolous, though this association requires confirmation. Specimens have been collected in February, April, May and September.

Etymology.—The name of this species is chosen to reflect the distinctive brown color of the body (from medieval latin, *brunneus* = brown).

Remarks.—Specimens of *Phanerota brunnessa* are easily distinguished from all other known North American *Phanerota* (and all described New World species) by the distinctive uniformly brown to piceous-brown color of the body. The median lobe of the aedeagus is also unusual among those of North American *Phanerota* because it differs from the relatively uniform structure of the aedeagus found among males of other species. Differences in the median lobe of the aedeagus of *P. brunnessa* in comparison to those of other species are slight but easily distinguishable. Distinctive characteristics include the dark brown and relatively heavily sclerotized nature of the median lobe, the more sharply upturned apical process (more nearly approaching a 90° angle with the basal bulb) without a recurved apex, and the slightly longer flagellum (compare Figures 1 and 9A).

Males show a great diversity of secondary sexual characteristics. Relative development of these characteristics appears to be correlated among most males; most males with a larger lobe in the emargination of tergum VIII usually also have more asperate elytra with more prominent apico-lateral elevations and modification of the postero-lateral margins of abdominal sternum III to slightly thickened and spiniform processes.

Key to the species of *Phanerota* occurring in Florida

Seevers (1951) gives keys and descriptions for four species of *Phanerota*, including *P. fasciata* (Say), *P. dissimilis* (Erichson) and *P. carinata* Seevers, all of which are found in Florida. The key presented here is a modification of his key to include other species and use additional distinguishing characteristics.

Discrimination of species of *Phanerota* is based primarily on differences in color pattern and sculpture. These features show little overlap among most species. Structure of the male copulatory organ is very similar among species of this genus and offers unreliable or difficult species discrimination in most instances. However, aedeagi are at least marginally useful for some species and can be used to eliminate some alternative choices even when aedeagal characteristics overlap broadly. Therefore, they are included in the key presented here.

- 1. Ground color of body brown to piceous-brown or testaceous 2
- 1'. Ground color of body rufo-flavate to flavate 3
- 2. Head microsculpture smooth, not reticulate; ground color of body brown to piceous-brown throughout with head, outer apical angle of elytra and abdominal tergum 6 (or 5-7) darker piceous-brown in some; aedeagus as in Figure 1 *P. brunnessa* new species
- 2'. Head microsculpture reticulate; ground color of body testaceous, with head, postero-lateral 0.7-0.5 of elytra and abdominal terga 5-9 dark; aedeagus similar to Figure 9A *P. dissimilis* (Erichson)
- 3. Head microsculpture moderately reticulate; ground color of body flavate; elytra dark in outer apical 0.7-0.5 to near scutellum medially; abdominal terga 6-10 (or 5-10) dark; elytra of males without distinct carina near apico-lateral margin (slight broad elevation may be present in some males); aedeagus similar to Figures 9A,B *P. cubensis* Casey.
- 3'. Head microsculpture smooth, or, at most obsoletely reticulate; ground color of body flavate to rufo-flavate; elytra dark in apico-lateral 0.5-0.3 to near postero-apical angles medially, or dark color not extended to medial margin; terga 7 or 6-8 dark; elytra of males with or without distinct carina near apico-lateral margin 4
- 4. Elytra of most males with distinct spiniform carina near apico-lateral border; aedeagus as in Figures 8A-C *P. carinata* Seevers
- 4'. Elytra of males without distinct spiniform carina near apico-lateral border (slight to distinct elevation may be present in some males); aedeagus as in Figures 9A-D *P. fasciata* (Say)

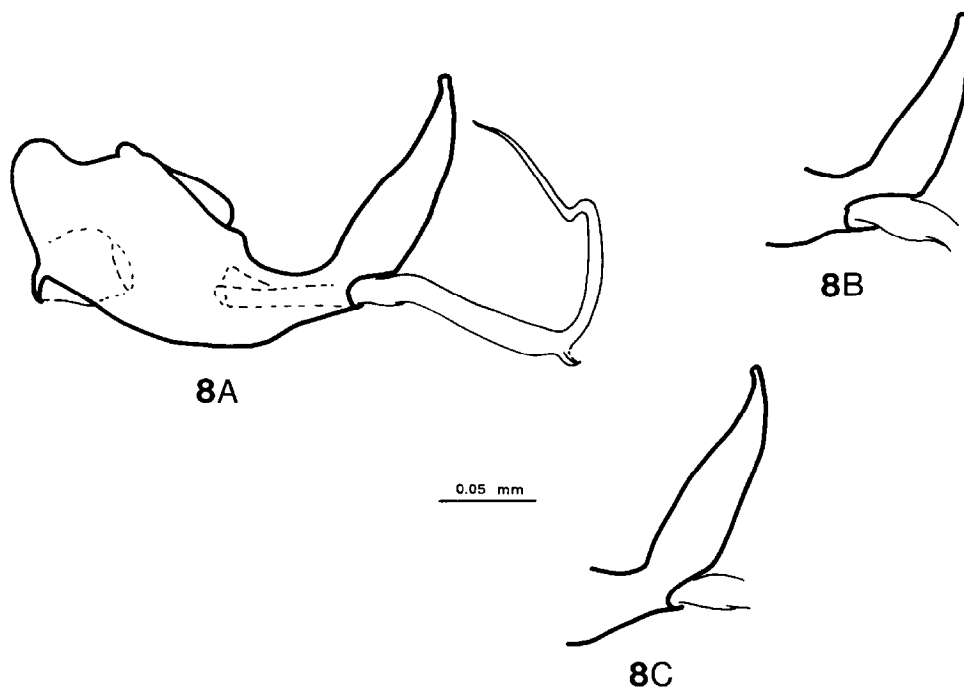


Fig. 8A-C. *Phanerota carinata* Seevers, aedeagus. 8A, medial lobe, lateral aspect; 8B-C, variant forms of apical process of median lobe.

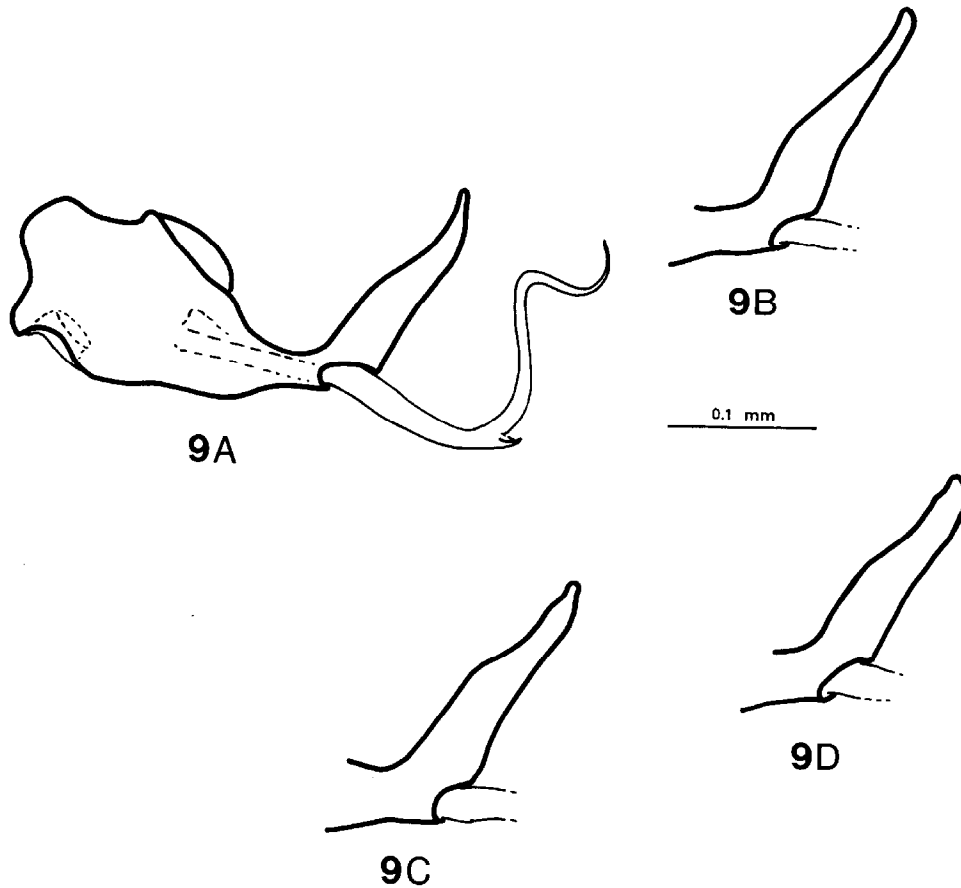


Fig. 9A-D. *Phanerota fasciata* (Say), aedeagus. 9A, median lobe, lateral aspect; 9B-D, variant forms of the apical process of the median lobe.

DISCUSSION

The addition of 2 species, *P. cubensis* and *P. brunnessa* to the *Phanerota* fauna of Florida increases the number of species known from that state to five, the maximum diversity of *Phanerota* of any area of America north of Mexico.

Members of *Phanerota* are unusual among gyrophaenine staphylinids because they must be distinguished primarily by differences in color pattern, sculpture and secondary sexual characteristics of males. The highly distinctive interspecific differences of the male copulatory organ, so characteristic of members of the closely related genus *Gyrophaena*, are not evident among species of *Phanerota*.

This paucity of reliable aedeagal characteristics is evident in the key provided above as well as in the treatment of *Phanerota* by Seevers (1951), and caused Seevers considerable uncertainty about whether some available morphs of *Phanerota* actually represented distinct species. Reexamination of material considered by Seevers as well as newly acquired material has revealed small, but distinguishable, variation in aedeagal structure among some species. For other species color pattern appears to be a reliable distinguishing feature.

Among the *Phanerota* of Florida, specimens of *P. brunnessa* are the most easily distinguished, both because of the brown or piceous-brown color pattern and because

of the relatively distinctive aedeagus. Males of *P. cubensis* and *P. dissimilis* have aedeagi which fall within the range of variation of those of males of *P. fasciata*. However, all specimens of these 2 species can be easily distinguished from those of other *Phanerota* and each other by the characteristics of color pattern and sculpture given in the key.

Separation of specimens of *P. fasciata* and *P. carinata* is a particular problem. Seevers (1951) noted that most males of *P. carinata* are readily recognizable from those of all other North American *Phanerota* by presence of a prominent carina near the apico-lateral border of the elytra. However, a few males lack this feature. Seevers also noted that most specimens of *P. carinata* have a slightly more rufous ground body color and somewhat more extensive dark areas on the elytra and abdomen; however, specimens of these two species overlap broadly in these characteristics and cannot be reliably distinguished by color. Under these circumstances, isolated females and non-carinate males of *P. carinata* may be impossible to identify.

Seevers did not recognize any differences in the median lobe of aedeagi of males of *P. carinata* and *P. fasciata*. However, reexamination of Seevers material shows that slight, but in most instances recognizable, differences exist (compare Figures 8A-C and 9A-D). Apical processes of aedeagi of *P. carinata* are relatively more robust and broader basally and lack the attenuate and recurved apex characteristic of those of *P. fasciata*. However, at the extremes of variation these are structurally very similar (compare Figures 8C and 9A). Therefore, it is not possible to identify all males of these 2 species based on aedeagus alone.

Sympatry of a number of species of *Phanerota*, all of which are distinct in external characteristics, but which can either not be distinguished or only marginally distinguished by differences in the male copulatory organ, suggests questions about the isolating mechanisms by which these species maintain their distinctness. Unfortunately, too little is known about habits and life histories of most *Phanerota* for this question to be addressed effectively at this time. Ashe (1982) documented a distinct separation of adults of *P. fasciata* and *P. dissimilis* on different host mushrooms which provided support for the hypothesis that these represent distinct species. In addition, after evaluating a number of possible isolating mechanisms, he suggested that isolation on different breeding hosts was implicated as a possible premating mechanism responsible for limiting interbreeding between members of these two species. However, other possible isolating factors could not be eliminated based on available information.

Host relationships of most species of *Phanerota* have not been investigated and information about other ecological factors that might have bearing on this problem are equally lacking. The problem of isolating mechanisms among species of *Phanerota* without marked divergence of aedeagal form is especially interesting since members of the very closely related genus *Gyrophaena* exhibit great interspecific variation in this structure, associated with little external structural diversification in many instances. These contrasts between apparent primary modes of modification in closely related groups provide excellent opportunity to investigate comparatively the factors responsible for development of different approaches to limiting hybridization between species.

ACKNOWLEDGEMENTS

I thank Dr. Howard Frank, Florida Medical Entomological Lab, Vero Beach, Florida, for loan of specimens of *Phanerota cubensis* as well as other gyrophaenines and for numerous other courtesies.

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LEG ABCISSION AND ADULT *DOLANIA* (EPHEMEROPTERA: BEHNINGIIDAE)

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ABSTRACT

Legs of male imagos and female subimagos of *Dolania americana* Edmunds and Traver are described. Distal segments of meso- and metathoracic legs of males break during the subimaginal molt and remain in the cast exuviae. Leg abscission is probably a method to ensure rapid completion of the subimaginal stage in this short-lived mayfly.

RESUMEN

Se describen las patas de los imagos machos y los subimagos hembras de *Dolania americana* Edmunds y Traver. Los segmentos distales de las patas meso- y metatorácicas de los machos se rompen durante la muda subimaginal y permanecen en la exuvia. La abscisión de las patas es probablemente un método que asegura la conclusión rápida del estado subimaginal en esta efímera de vida de la mosca de mayo.

The descriptions of male imagos and female subimagos of *Dolania americana* Edmunds and Traver, the only North American member of the Behningiidae, have been published in parts. The wings, male genitalia, and female subimaginal head are illustrated in Edmunds *et al.* (1976), and the female abdomen and fore legs in Peters & Peters (1977). The only formal description of any adult behningiid is that for *Behningia lestagei* (?) Motas and Bacesco by Keffermüller (1959).

Herein, we describe the legs of subimagos and imagos of *Dolania*. Interestingly, the tarsi and claws of the meso- and metathoracic legs of the male imago are rarely attached