



The *Neotrichia caxima* Group (Trichoptera: Hydroptilidae) in the southeastern United States

STEVEN C. HARRIS¹ & ANDREW K. RASMUSSEN²

¹Department of Biology, Clarion University, Clarion, Pennsylvania 16214. E-mail: sharris@clarion.edu

²Center for Water and Air Quality, Florida A&M University, Tallahassee, Florida 32307. E-mail: andrew.rasmussen@famuc.edu

Abstract

The *Neotrichia caxima* Group in the southeastern United States is reviewed and a new species from Virginia is described. New figures for the males are provided and females of the 8 species are illustrated and diagnosed. Keys are provided to separate the males and associated females of the *N. caxima* Group occurring in the southeastern United States.

Key words: Trichoptera, Hydroptilidae, microcaddisflies, *Neotrichia*, new species, Virginia, southeastern United States

Introduction

The genus *Neotrichia* is currently divided into 6 species groups (Keth 2002), 4 of which have representatives in the United States. The *Neotrichia caxima* Group is currently composed of 16 species (Keth 2002). Herein, we describe another new species of the *N. caxima* Group from Virginia. Members of this group occur in Argentina, Brazil, Chile, Mexico, Peru, Surinam, and the islands of the Caribbean, but exhibit their highest diversity in the southeastern United States. Eight members occur in this region, although their distribution within the Southeast is often limited.

Females have been described for only 3 members of the *N. caxima* Group: *N. falca* Ross, *N. riegeli* Ross, and *N. mobilensis* Harris. Recent collections by Rasmussen and others throughout the southeastern United States have enabled us to associate the females of the remaining species, including the newly described species. Descriptions of these females are included herein, along with new illustrations of the previously known females and males. Keys are provided to separate the males and females of the *N. caxima* Group in the southeastern United States.

Larvae of *Neotrichia* have been associated for only a few species (Wiggins 1996), so reliable characters for separation into species groups are not known. Cases of *Neotrichia* are made of sand grains, and the larvae occur on rocks and gravel in the faster sections of streams (Wiggins 1996).

The *N. caxima* Group, as defined by Keth (2002), is delineated by the following male synapomorphic characters: highly reduced inferior appendages with the length equal to or less than the width and with abdominal segment X usually wrapping ventromesally around the subgenital plate. Because females for most species of *Neotrichia* had not been associated, female morphology has not been used to characterize species groups. For the *N. caxima* Group females associated in this paper, we follow the general terminology for *Neotrichia* females as discussed by Keth (2002). Abdominal segments VII and VIII are annular with a ring of stout setae on the posterior margin of segment VIII, and the sternum of segment VIII typically possesses a mesal sclerotized plate. Segment VIII has 2 pair of lateral apodemes, the outermost originating from the anterior portion of the segment and extending into segment VI, and the innermost originating from posterior portion of the segment and extending into VI (Fig. 12B). Segment IX tapers posteriorly and bears a pair of sclerotized, internal rods that extend into segment VIII. Segment X is conical and bears a pair of posterolateral papillae. The bursa copulatrix has a narrow, elongate copulatory channel, and lateral margins of the genital

chamber are sclerotized and extend anteriorly as short processes. The bell-shaped mesal sclerite tapers distally and is divided anteriorly with light sclerotization between the arms (Fig. 14B).

Material was collected using UV-blacklights placed over pans of 75% alcohol situated adjacent to streams and operated from 1 hour prior to sunset to 1 hour past sunset. In the laboratory, specimens were cleared in a concentrated solution of NaOH and rinsed in distilled water. Specimens were mounted in a depression slide fixed with CMCP solution. Drawings were initially made using a compound microscope at 150X on grid paper. These drawings were then enlarged to a standard size, inked, and scanned.

Terminology for the descriptions follows that of Keth (2002) and structures are labeled in Figs. 11 and 12. The holotype and allotype of the new species from Virginia are deposited at the National Museum of Natural History. Representatives of the males and females of the other *Neotrichia* species included in this paper will be deposited with the following collections: National Museum of Natural History, Illinois Natural History Survey, Clemson University Arthropod Collection, University of Minnesota Insect collection, Florida A&M University Insect Collection, University of Alabama Insect Collection, and the collections of the authors. Utilizing the database compiled and maintained by Dr. John Morse at Clemson University (<http://bugs.clemson.edu/faculty/morseneartictrichopteraabbr.pdf>), the geographic distribution of each species is summarized by listing all US states where the species is known to occur.

Species descriptions

Neotrichia mobilensis Harris

(Figs 1, 2)

Harris (1985): 252, ♂, ♀

Neotrichia mobilensis was originally described from a small series collected from the Mobile River in Alabama. It has subsequently been collected in Texas (Moulton and Stewart 1997) and by Dr. Pat O'Neil and his colleagues at the Geological Survey of Alabama in streams and rivers of the Mobile Delta in Alabama.

The male of *N. mobilensis* is easily separated from other southeastern members of the *N. caxima* Group by the structure of the phallus, which has a single apical rod rather than the typical double rods, and an acute, subapical process (Fig. 1D). Although the female of *N. mobilensis* was described by Harris (1985), it is redescribed here and compared with other southeastern members of the *N. caxima* Group.

Redescription of female. Length 1.9–2.2 mm, 18 antennal segments. Brown in alcohol. Abdominal segment VII annular; segments VIII and IX narrowing apically, as in Fig. 12B, sternum segment VIII with small tubular process (Fig. 2A), which is inconspicuous or lacking in some specimens; segment X narrowing apically, bearing lateral papillae. Bursa copulatrix as in Fig. 2B, with posterior copulatory channel about same length as anterior genital chamber, this chamber sclerotized on margins and extending forward as small leg-like processes, bell-shaped central sclerite.

As with the males, the females of *N. mobilensis* are atypical of other southeastern species of the *N. caxima* Group. In some of the specimens examined, the sternal plate on abdominal segment VIII seems to be absent, in others a small sclerotized tubular process is present (Fig. 2A), but all lack the large, conspicuous sternal plate seen in other species of the *N. caxima* Group.

Material examined. **Alabama, Baldwin County,** Jessamine Bayou @ Kettle Creek, N31.0122, W87.9260, 1 June 2004, P. O'Neil, 16 ♂, 4 ♀; Bottle Creek tributary, N30.9558, W87.9362, 29 May 2004, P. O'Neil, 316 ♂; Tensaw Lake, slough west of Dead Lake Island, N31.0503, W87.8954, 22 October 2003, P. O'Neil, 21 ♂; Proctor Creek @ New Hubbard Landing, N31.0732, W87.8781, 22 October 2003, O'Neil/Ford, 16 ♂; Red Hills Creek @ Tensaw Lake, N31.0899, W87.8701, 22 October 2003, O'Neil/Ford, 8 ♂; Mifflin Lake, Squirrel Bayou, N30.9559, W87.8953, 20 October 2003, O'Neil/Shepard, 4 ♂; Upper Briar Lake, North Rice Creek, N31.0181, W87.8889, 22 October 2003, O'Neil/Shepard, 28 ♂; Bayou Tallapoosa, East End, N31.0374, W87.9137, 22 October 2003, O'Neil/Ford, 49 ♂; Tensaw Lake @ inlet, N31.0488, W87.8711, 22 October 2003, O'Neil/Shepard, 107 ♂, 37 ♀; **Mobile County,** Mobile River @ Bucks, N31.0226, W88.0226,

15 May 2003, O'Neil/Shepard, 5♂; Dead Lake @ Dead Lake Marina, N30.9047, W87.9801, 15 May 2003, O'Neil/Shepard, 3♂; **Washington County**, Tombigbee River @ McIntosh Landing, N31.2565, W87.9888, 15 May 2003, O'Neil/Shepard, 45♂.

Distribution. AL, TX.

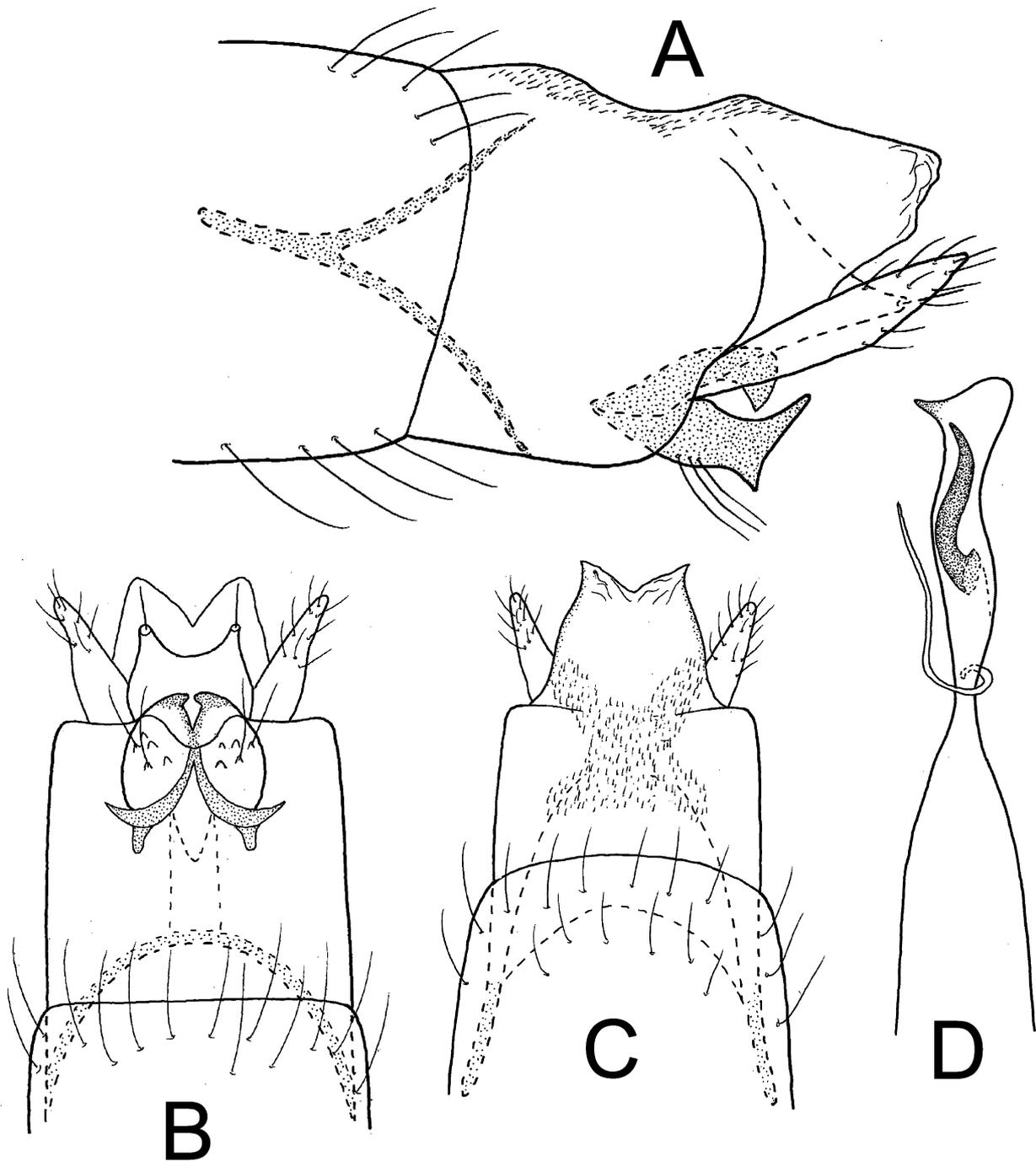


FIGURE 1. *Neotrichia mobilensis*, male genitalia. A. Left lateral view, B. Ventral view, C. Dorsal view, D. Phallus, left lateral view.

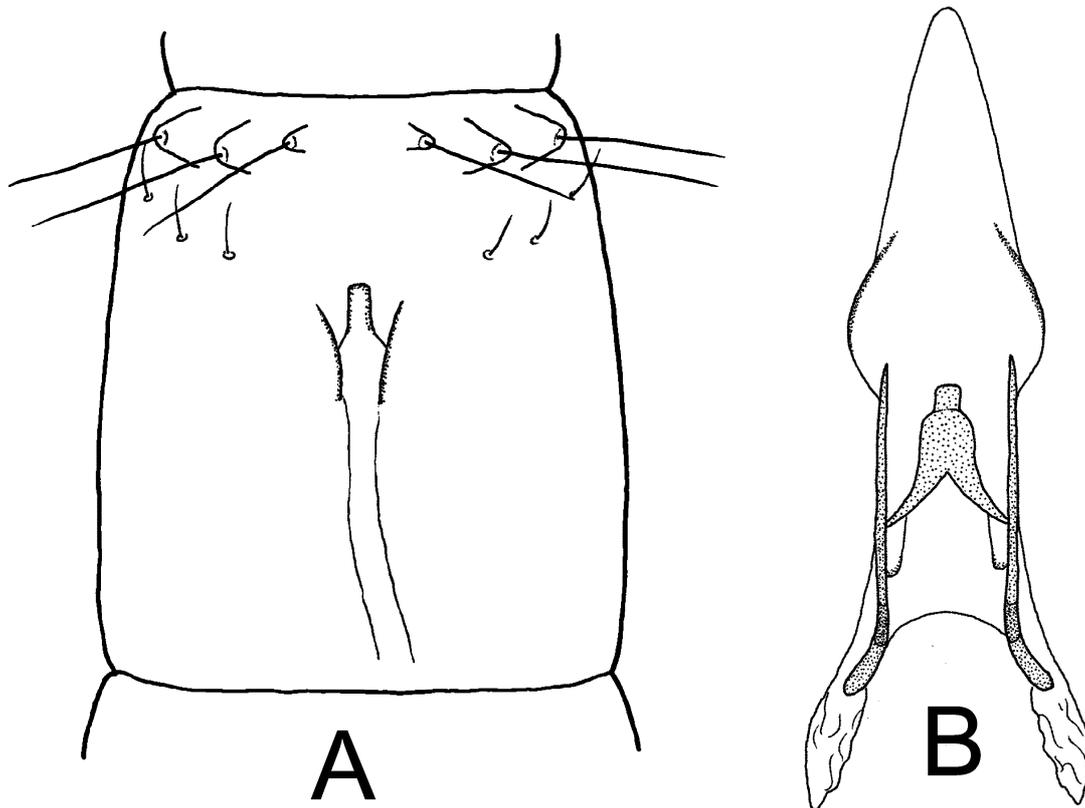


FIGURE 2. *Neotrichia mobilensis*, female genitalia. A. Abdominal segment VIII, ventral view, B. Bursa copulatrix, ventral view.

***Neotrichia falca* Ross**

(Figs 3, 4)

Ross (1938): 119, ♂; Ross (1944): 159, ♀

Neotrichia falca was originally described from Illinois by Ross (1938) and subsequently reported from Kansas, Ohio, South Carolina, and Wisconsin (Keth 2002). The male is separated on the basis of the apically divided inferior appendage (Fig. 3A) and the deeply divided 10th tergite. The female of *N. falca* was described by Ross (1938), but is redescribed below in the context of the other southeastern species of the group.

Redescription of female. Length 2–2.5mm. 18 antennal segments. Brown in alcohol. Abdominal segments VII–X typical for the genus, sternum segment VIII with mesal sclerite as in Fig. 4A, with thin, lateral processes narrowing apically. Bursa copulatrix as in Fig. 4B with posterior copulatory channel about same length as anterior genital chamber, this chamber sclerotized marginally, extending anteriorly as elongate processes, with bell-shaped central sclerite.

On the basis of the narrow, curved sternal sclerite on abdominal segment VIII, *N. falca* is grouped with *N. riegei* and *N. alabamensis*. It differs in the linear nature of the sternal sclerite in comparison to the other two species.

Material examined. Illinois, Kankakee County, Momence, Kankakee River, 22 June 1938, Ross/Burks, 87♂, 16♀.

Distribution. IL, KS, MN, OH, SC, WI.

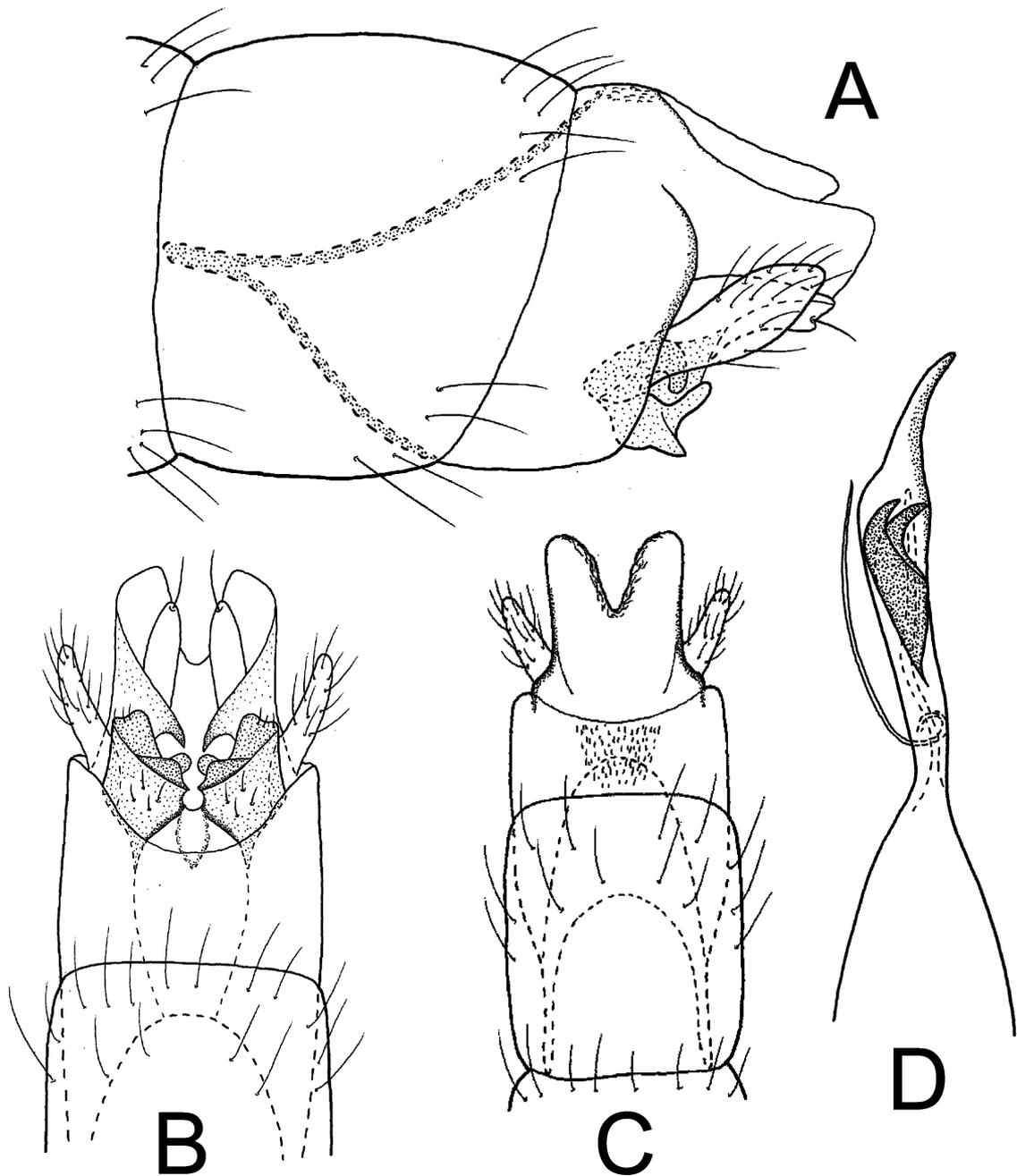


FIGURE 3. *Neotrichia falca*, male genitalia. A. Left lateral view, B. Ventral view, C. Dorsal view, D. Phallus, left lateral view.

***Neotrichia riegeli* Ross**

(Figs 5, 6)

Ross (1941): 61, ♂, ♀

Neotrichia riegeli was originally described from Illinois by Ross (1941) and has a general southcentral distribution (Keth 2002). The specimens labeled as *Neotrichia* sp. nr. *riegeli* in Abbott et al (1997) were examined and found to be *N. armitagei*. The male of *N. riegeli* is separated on the basis of the inferior appendages, which are cubical in ventral view. The female of *N. riegeli* was also described in Ross (1941), but is redescribed below in the context of the other southeastern species of the group.

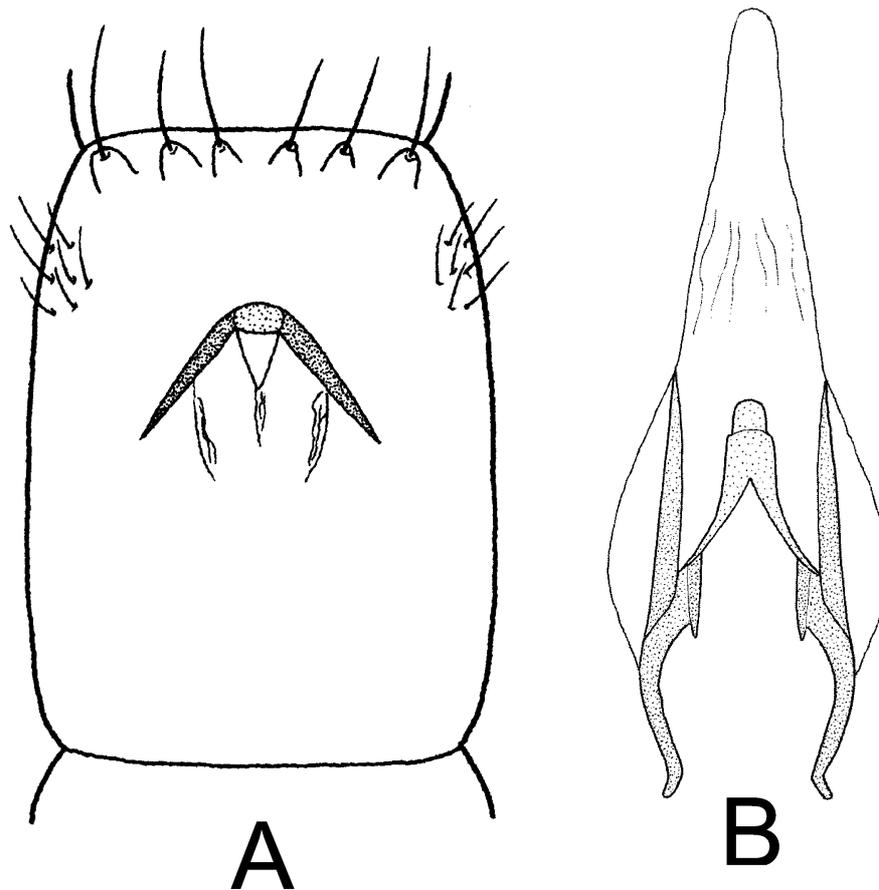


FIGURE 4. *Neotrichia falca*, female genitalia. A. Abdominal segment VIII, ventral view, B. Bursa copulatrix, ventral view.

Redescription of female. Length 2–2.5 mm. 18 antennal segments, brown in alcohol. Abdominal segments VII – X typical for genus, sternum segment VIII with crescent-shaped mesal sclerite (Fig. 6A). Bursa copulatrix as in Fig. 6B with posterior copulatory channel about $\frac{3}{4}$ length of genital chamber, this chamber with sclerotized lateral bands extending anteriorly as elongate processes, bell-shaped mesal sclerite elongate anteriorly.

As with *N. alabamensis*, *N. riegei* is identified by the crescent-shaped, sternal sclerite on segment VIII. However, in *N. riegei* the sclerite is entire mesally.

Material examined. Illinois, Pope County, Eddyville, Lusk Creek, 19–20 June 1940, Mohr/Riegel, 6♂, 90♀.

Distribution. AR, IL, KY, OK.

Neotrichia armitagei Harris

(Figs 7, 8)

Harris (1991): 15, ♂

Neotrichia armitagei was originally described by Harris (1991) from Florida and is mainly distributed in the southeast, with a seemingly disjunct population in Texas (Keth 2002). The male is separated from the closely related *N. rasmusseni* on the basis of the inferior appendages which are rounded distally in ventral view (Fig. 7B).

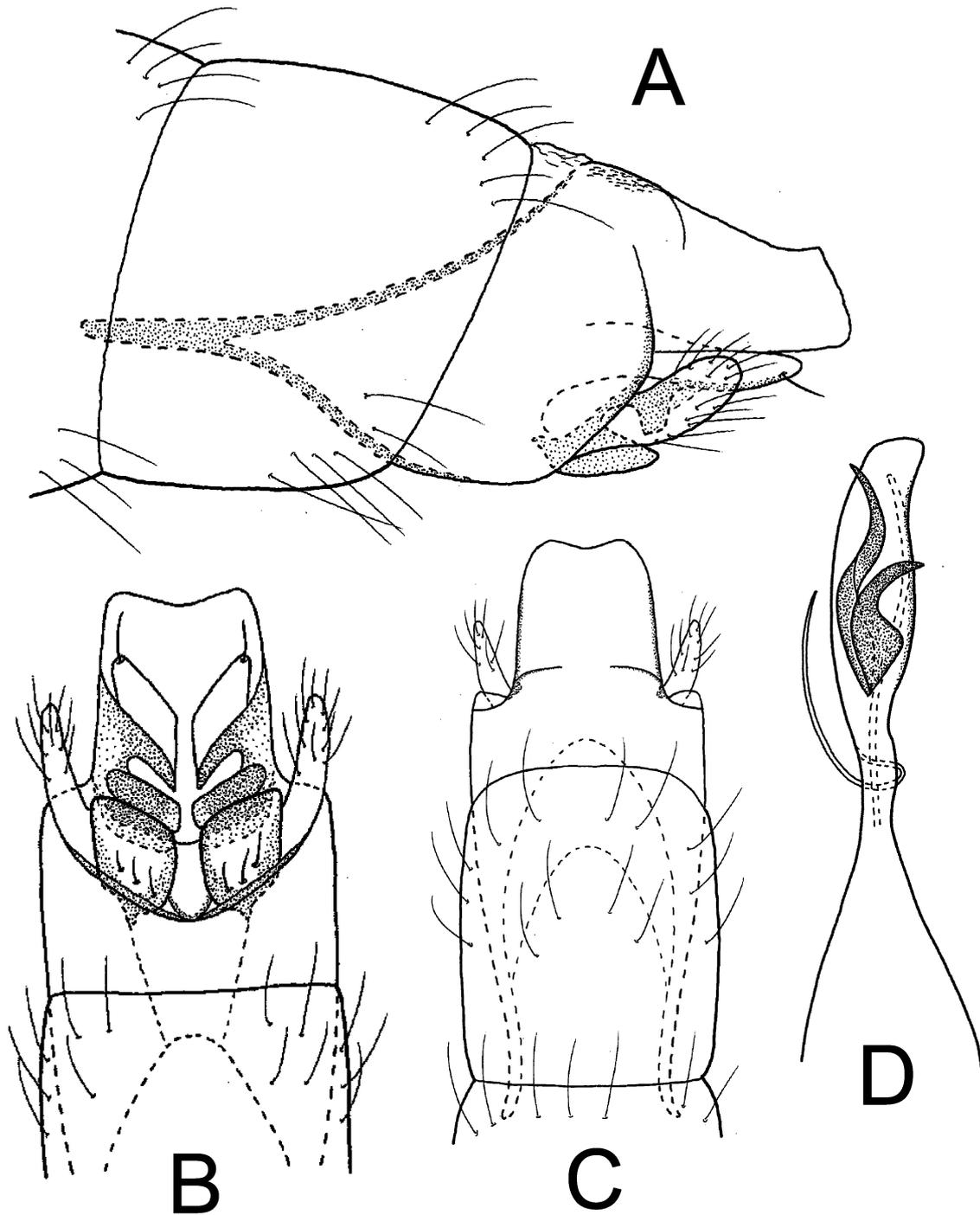


FIGURE 5. *Neotrichia riegei*, male genitalia. A. Left lateral view, B. Ventral view, C. Dorsal view, D. Phallus, left lateral view.

Female. Length 1.8–2.0 mm, 18 antennal segments, brown in alcohol. Abdominal segments VII – X typical for genus, sternum VIII with large mesal plate which is divided anteriorly (Fig. 8A). Bursa copulatrix as in Fig. 8B with posterior copulatory channel elongate and narrow, about same length as genital chamber, this chamber with thin lateral bands which extend anterolaterally as narrow feet; bell-shaped mesal sclerite with shallow anterior excision.

Females appear to be most similar to *N. mentonensis* and *N. rasmusseni*. All three species have a large, rectanguloid sternal plate on segment VIII. Females of *N. armitagei* differ in that the posterior margin is not sinuate, as in the other two species, and the anterior margin is deeply incised.

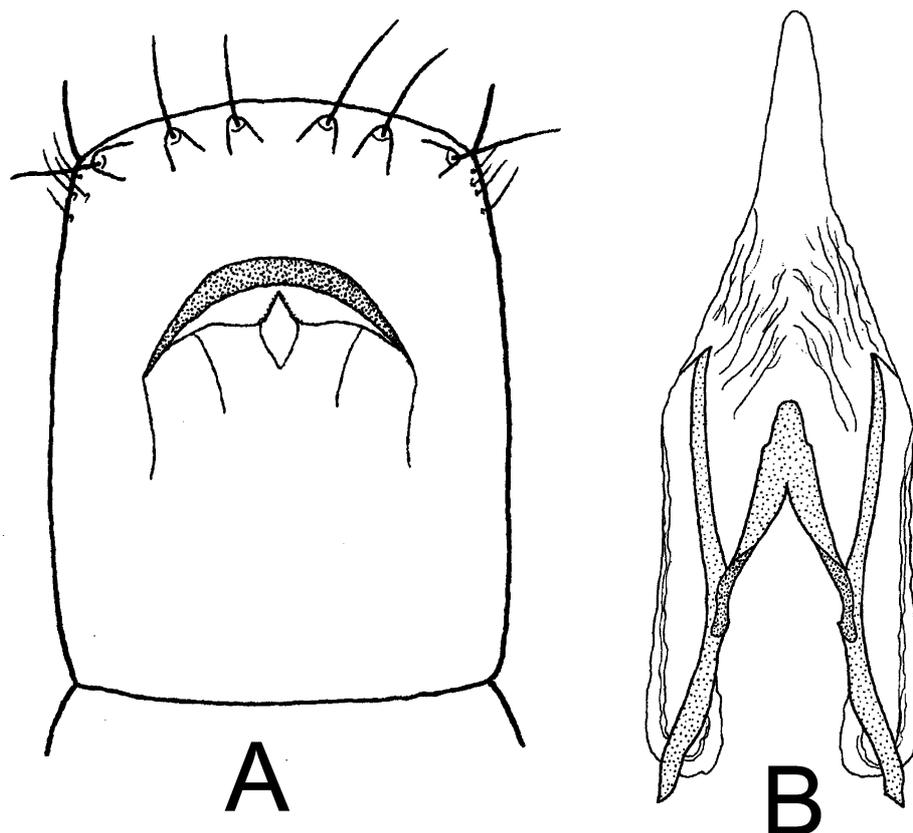


FIGURE 6. *Neotrichia riegei*, female genitalia. A. Abdominal segment VIII, ventral view, B. Bursa copulatrix, ventral view.

Material examined. **Alabama, Baldwin County,** Rains Creek @ AL Hwy 225, 14 May 2003, Shepard/O'Neil, 3♂. **Florida, Clay County,** Gold Head Branch, Gold Head Branch State Park, near old mill trail crossing, N29°49'56", W81°56'45", 6 March 1999, Rasmussen, 7♂, 12♀; same but, 3 October 1998, 31♂; **Putnam County,** Little Orange Creek @ SR 21, 2.6 mi. N Orange Springs, N29°32'29", W81°57'14", 16 May 2003, Rasmussen/Denson, 69♂, 3♀. **Georgia, Thomas County,** Titi Branch, vic. jct. Springhill and Metcalf Rds., N30°42'49", W84°04'16", 1 November 1997, Kovarik/Rasmussen, 1♂. **Mississippi, Franklin County,** Middleton Creek, T5N, R4E, S31S, 2-8 June 1992, Schiefer/Fontenot, malaise trap, 2♂. **Texas, Hardin County,** Beech Creek, ca 4 mi, W FM 92, N Kountze, 31 July 1993, Moulton/Kennedy, 9♂; Turkey Creek, ca 4 mi. E US Hwy 287/69, ca 8 mi. N Kountze, 31 July 1993, Moulton/Kennedy, 1♂; **Polk County,** Big Sandy Creek @ FM 1276 nr jct FM 943, 4 mi. S Dallardsville, 23 April 1994, Chirhart, 1♂.

Distribution. AL, FL, GA, MS, TX.

Neotrichia rasmusseni Harris and Keth

(Figs 9, 10)

Harris and Keth (2002): 74, ♂

Neotrichia rasmusseni was originally described from a small series collected in the Santa Fe River in Suwannee County, Florida. We have subsequently collected the species in Clay, Lake, Marion and Wakulla Counties, Florida. The male is separated from the similar *N. armitagei* on the basis of the inferior appendages, which are triangular in ventral view (Fig. 9B). The males also lack the elongate apical extension of segment X (Fig. 9A), as was illustrated in the original figures. In all of the material examined for this paper, segment X

was generally square in both lateral and dorsal views. The original description was based on a small number of specimens and it's possible the specimen originally drawn was aberrant. As well, the lateral bracteoles are erect rather than curving ventrad as in the original illustrations.

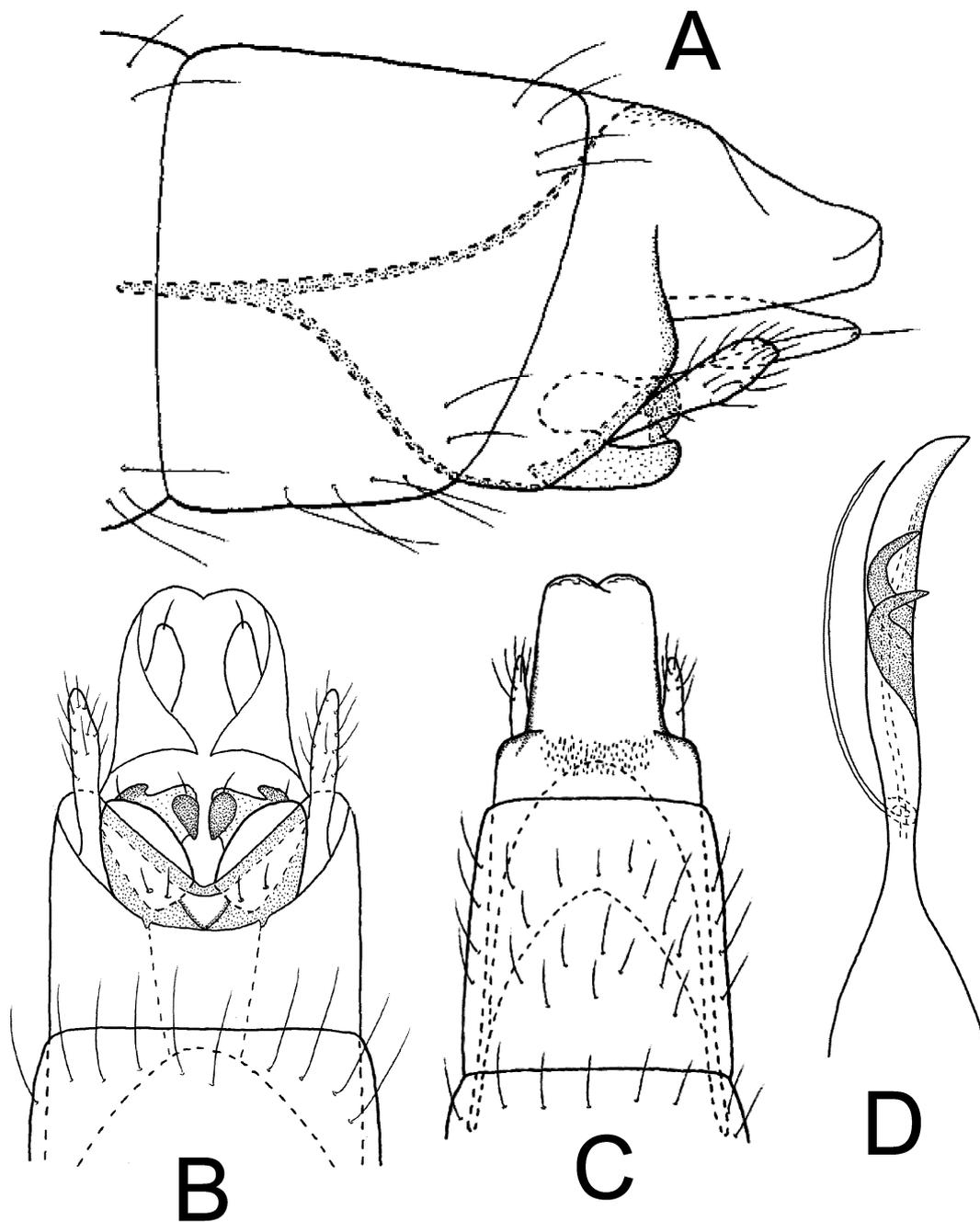


FIGURE 7. *Neotrichia armitagei*, male genitalia. A. Left lateral view, B. Ventral view, C. Dorsal view, D. Phallus, left lateral view.

Female. Length 2–2.2 mm, 17 antennal segments, brown in alcohol. Abdominal segments VII – X typical for genus, sternum VIII with large mesal plate, which while sinuate along margin is not deeply divided anteriorly (Fig. 10A). Bursa copulatrix as in Fig. 10B, posterior copulatory channel elongate, about same length as genital chamber; this chamber with lateral sclerotized bands terminating anteriorly in short processes; mesal bell-shaped sclerite split anteriorly into elongate narrow processes.

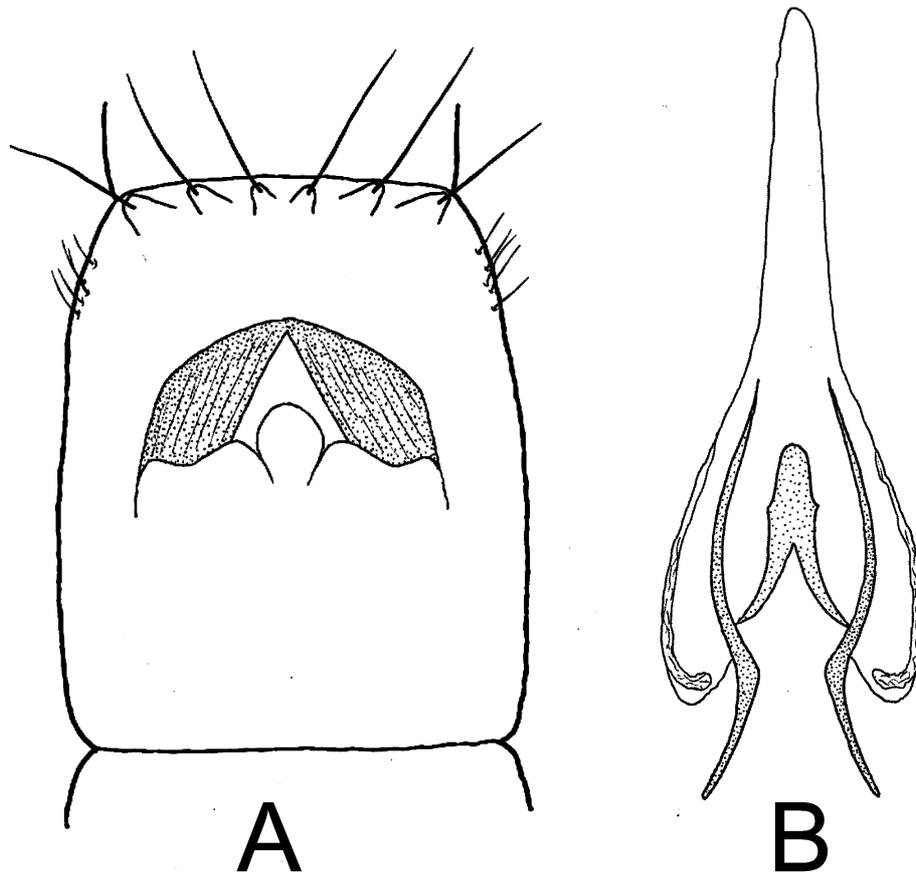


FIGURE 8. *Neotrichia armitagei*, female genitalia. A. Abdominal segment VIII, ventral view, B. Bursa copulatrix, ventral view.

Females of *N. rasmusseni* are very similar to those of *N. mentonensis*. Unlike other species in the southeast, both have a solid, rectanguloid sternal plate on segment VIII. This plate in *N. rasmusseni* differs from that of *N. mentonensis* in that the anterior and posterior margins are sinuate.

Material examined. **Florida, Clay County**, Gold Head Branch, Gold Head State Park nr Little Lake Johnson, N29°49'38", W81°56'45", 25 May 2007, Denson/Rasmussen, 1♂, 3♀; **Lake County**, Alexander Spring Creek @ Hwy. 445, Ocala National Forest, N29°04'52", W81°34'00", 22 May 2004, Rasmussen/Denson, 21♂, 14♀; **Marion County**, Juniper Creek @ Hwy. 19, Ocala National Forest, N29°13'18", W81°39'09", 17 May 2003, Rasmussen/Denson, 20♂, same, but 23 March 2002, 3♂, same, but 20 October 2007, 750♂, 250♀; same, but 10 October 2008, 145♂, 20 ♀; **Wakulla County**, Wakulla River @ CR 61, N30°12'55", W84°15'39", 26 October 2006, Denson/Rasmussen, 2♀.

Distribution. FL

Neotrichia alabamensis Kelley and Harris

(Figs 11, 12)

Kelley and Harris (1983): 182, ♂

Neotrichia alabamensis is fairly common on the Coastal Plain of Alabama extending westward into Mississippi and eastward into the western Florida panhandle. Males are separated on the basis of the inferior appendages which are acutely narrowed in ventral view (Fig. 11B). As well, the inferior appendages have a large, prominent dorsal process which is sharply downturned apically (Fig. 11A).

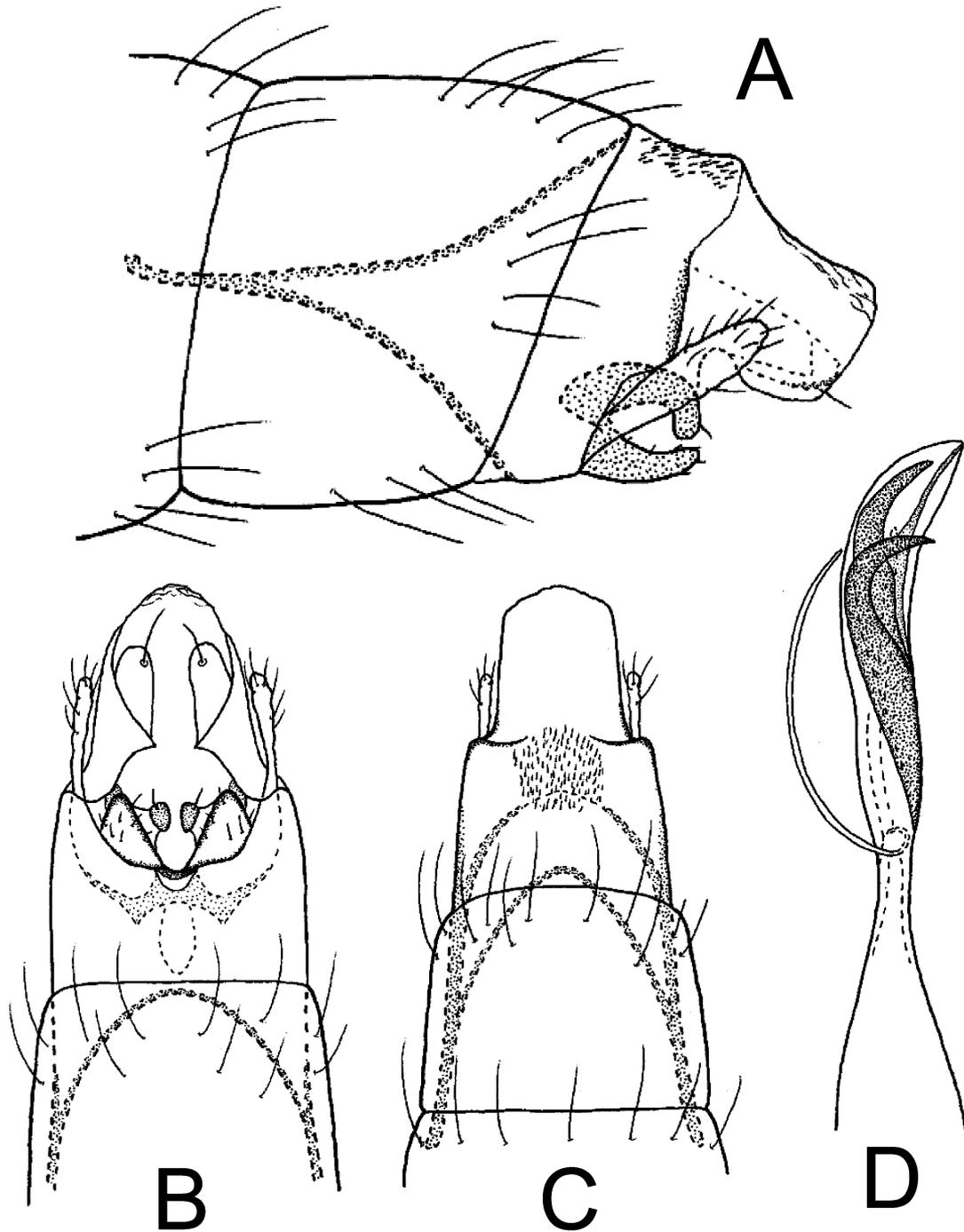


FIGURE 9. *Neotrichia rasmusseni*, male genitalia. A. Left lateral view, B. Ventral view, C. Dorsal view, D. Phallus, left lateral view.

Female. Length 1.6–2.0mm, 18 antennal segments, brown in alcohol. Abdominal segments typical for genus (Fig. 12B), with mesal plate of sternum VIII similar to that of *N. falca*, differing in the curving lateral sclerites (Fig. 12A). Bursa copulatrix with posterior copulatory channel slightly longer than genital chamber (Fig. 12C), this chamber with narrow sclerotized bands on lateral margins which extend anteriorly as thin processes; mesal bell-shaped sclerite deeply split anteriorly.

Females of *N. alabamensis* are most similar to *N. falca* and the following new species in possessing a narrow sternal sclerite on segment VIII. From *N. falca*, females of *N. alabamensis* are separated on the basis

of the curved shape of the sclerites, and from the new species below on the basis of the shorter posterior process of the bursa copulatrix.

Material examined. Alabama, Perry County, Oakmulgee Creek @ Hwy. 219, 18 September 1991, Harris/O'Neil, 197♂, 23♀.

Distribution. AL, FL, MS.

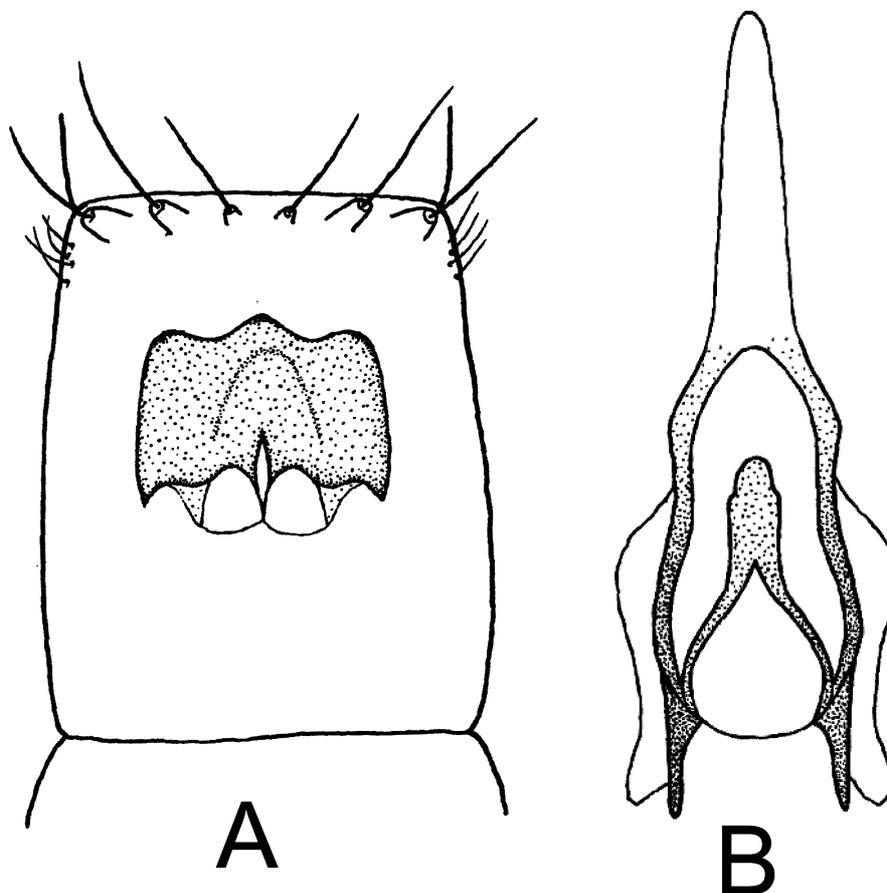


FIGURE 10. *Neotrichia rasmusseni*, female genitalia. A. Abdominal segment VIII, ventral view, B. Bursa copulatrix, ventral view.

Neotrichia dracanamalama Harris, new species

(Figs 13, 14)

Neotrichia dracanamalama is known from only the type locality in Virginia. Males of the new species are most similar to those of *N. mentonensis* Frazer and Harris, differing in the structure of the inferior appendages. In *N. dracanamalama* the dorsal process is visible in lateral view and divided into multiple sections in ventral view. In *N. mentonensis* these processes are entire in ventral view and hidden in lateral view. The female of *N. dracanamalama* is most similar to *N. falca* in the general appearance of the sternal plate on abdominal segment VIII. However, the mesal portion of the sternal plate is more sclerotized in *N. falca* than in *N. dracanamalama*, and the length of the posterior copulatory channel of the bursa copulatrix differs in the 2 species.

Male. Length 2.3 mm, antennae broken, but based on other members of the group, likely having 18 segments, brown in alcohol. Abdominal segment VIII annular. Segment IX annular in lateral and ventral view, dorsally fused with segment X, bracteoles uniform in width, gradually upturned distally. Segment X in lateral view shelf-like, narrowing posteriorly, dorsum squarish with narrow excision on posterior margin, venter not

encircling subgenital plate. Genitalia as in Fig. 13. Subgenital plate in lateral view shelf-like, narrowing to setal bearing apex, in ventral view bifid, each lobe rounded apically and bearing stout seta. Inferior appendages triangular in both lateral and ventral views, dorsal process triangular and heavily sclerotized, in ventral view these processes divided into 3 sections, dorsal-most beaklike, ventral-most narrowing to setal-bearing knob. Phallus rectanguloid distally with pair of heavy internal sclerites strongly curved in lateral view, paramere encircling shaft and extending distal length of phallus.

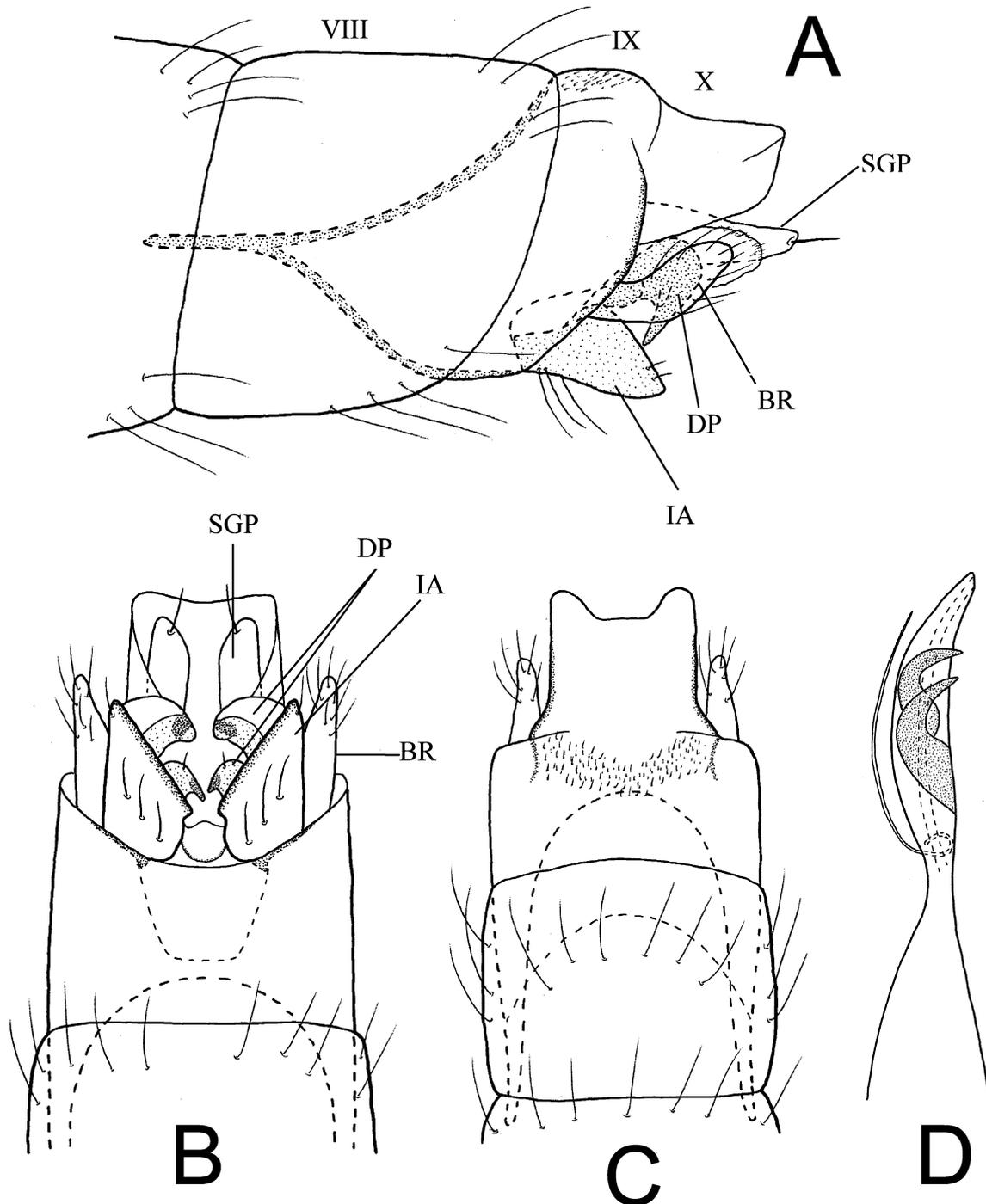


FIGURE 11. *Neotrichia alabamensis*, male genitalia. A. Left lateral view, B. Ventral view, C. Dorsal view, D. Phallus, left lateral view. Abbreviations: abdominal segments = VIII, IX, X; bracteole = BR; inferior appendage = IA; dorsal process of inferior appendage = DP; subgenital plate = SGP.

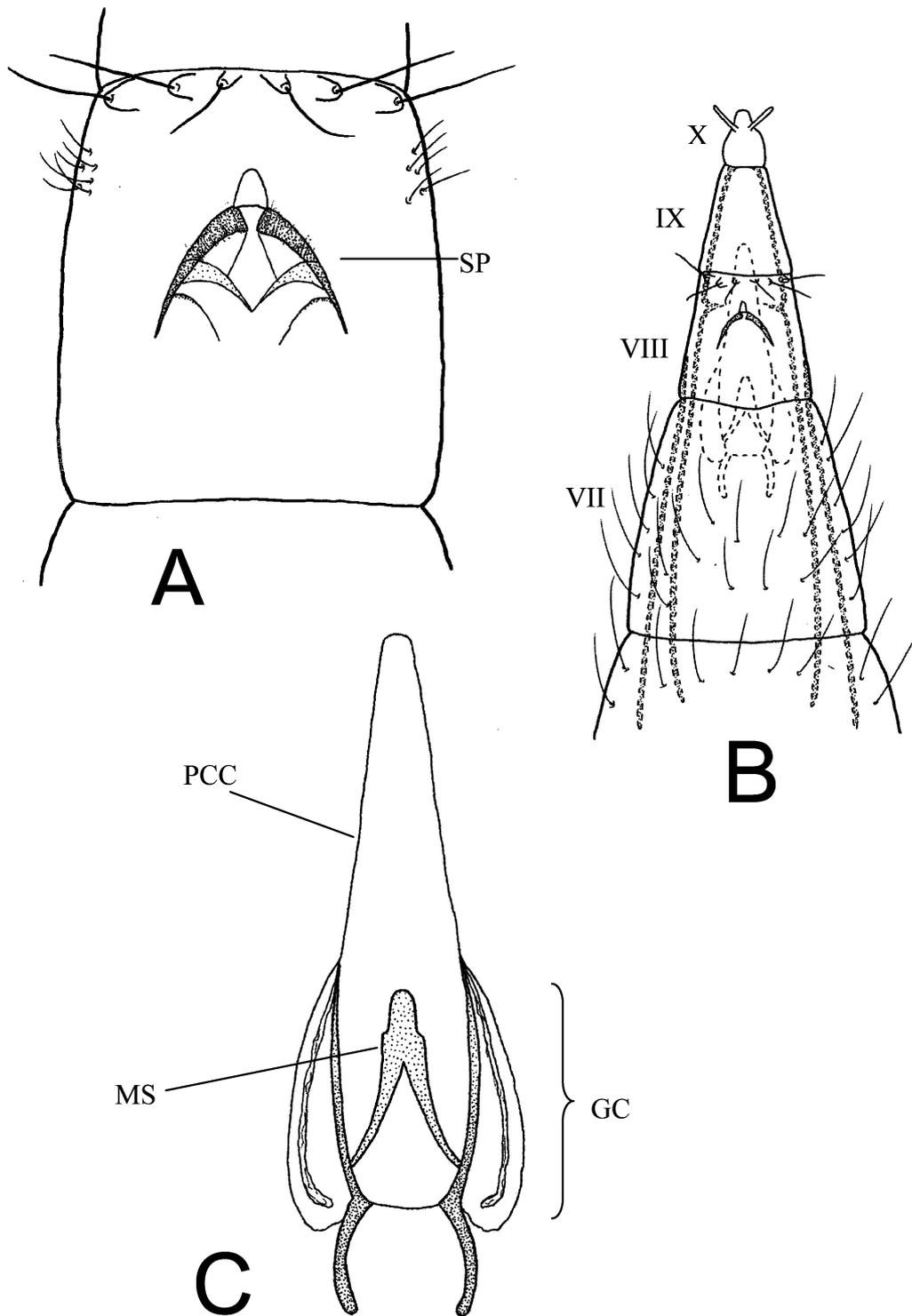


FIGURE 12. *Neotrichia alabamensis*, female genitalia. A. Abdominal segment VIII, ventral view, B. Abdominal segments VII – X, ventral view, C. Bursa copulatrix, ventral view. Abbreviations: abdominal segments = VII, VIII, IX, X; sternal plate = SP; posterior copulatory channel = PCC; genital chamber = GC; mesal sclerite = MS.

Female. Length 2.2 mm. 18 antennal segments, brown in alcohol. Abdominal segments VII – X very similar to those of other species in the group (see Fig. 12B). Abdominal segments VII and VIII annular; segment VIII with ring of stout setae on posterior margin, sternum with pair of mesal sclerites thin and

diverging anteriorly, posteriorly with mesal separation (Fig. 14A); internally with pair of lateral sclerotized rods, inner pair connecting anteriorly with lateral rods of segment IX, outer rods originating on anterior margin of VIII, both pairs extending anteriorly into segment VI. Segment IX tapering posteriorly bearing pair of sclerotized internal, lateral rods extending into segment VIII. Segment X conical, bearing pair of posterolateral papillae (as in Fig. 12B). Bursa copulatrix as in Fig. 14B. Posterior copulatory channel elongate, genital chamber with lateral margins sclerotized extending anteriorly as short processes, bell-shaped mesal sclerite tapering distally, divided anteriorly with light sclerotization between arms (Fig. 14B).

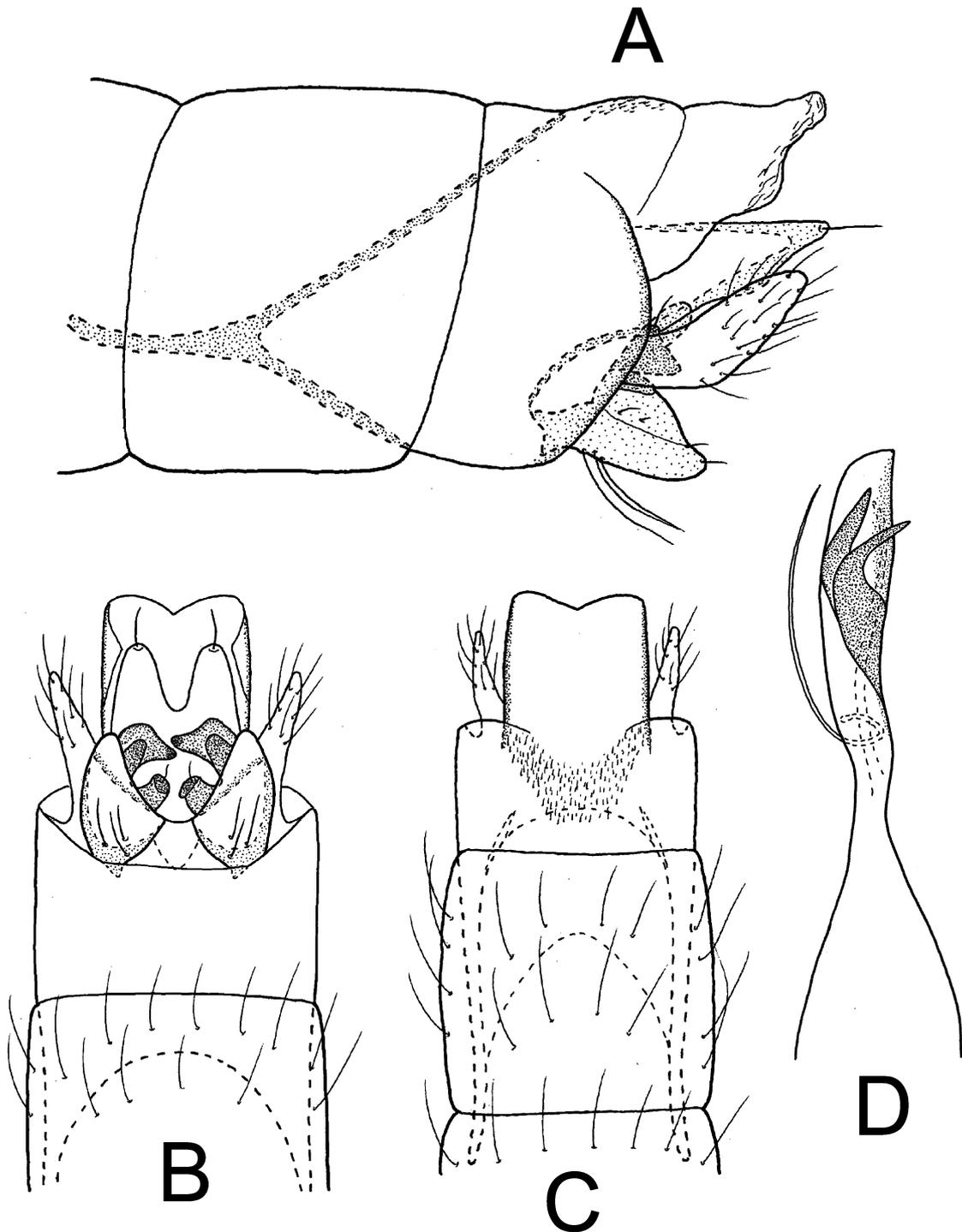


FIGURE 13. *Neotrichia dracanamalama*, n. sp. male genitalia. A. Left lateral view, B. Ventral view, C. Dorsal view, D. Phallus, left lateral view.

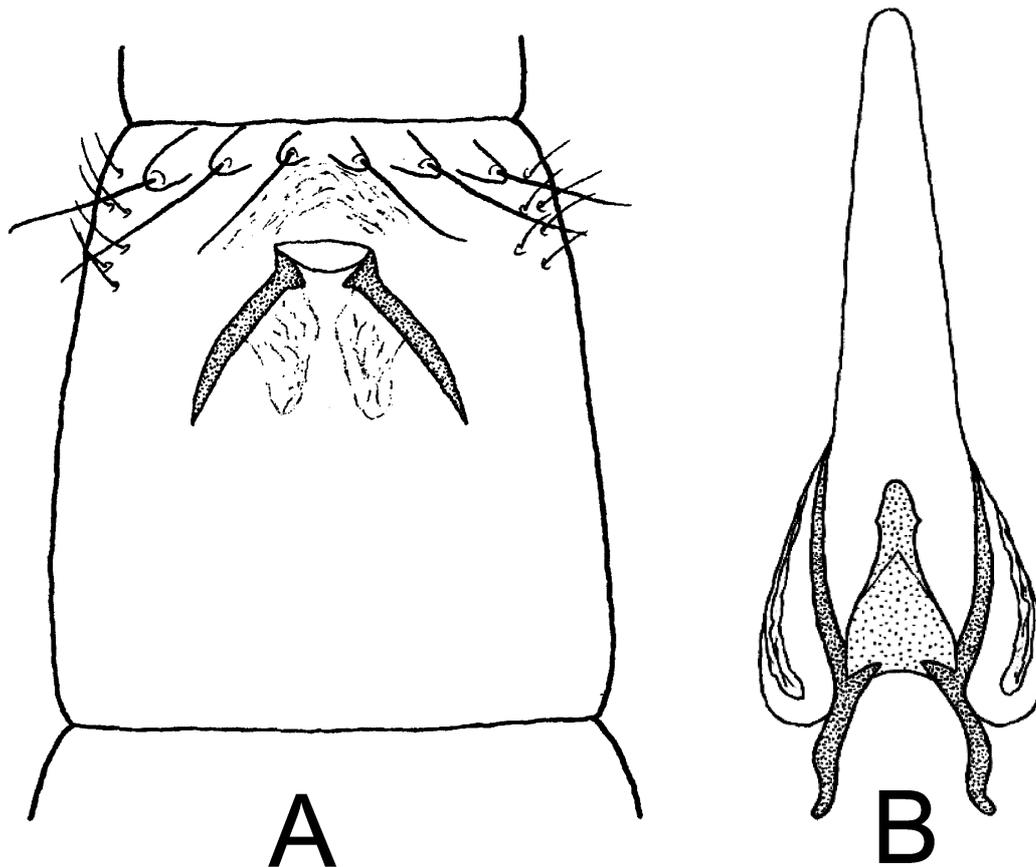


FIGURE 14. *Neotrichia dracanamalama*, n. sp. female genitalia. A. Abdominal segment VIII, ventral view, B. Bursa copulatrix, ventral view.

Holotype, male. United States: Virginia, Middlesex County, Dragon Run Swamp, Rt. 603, 3 mi. S Warner, N37.380, W 76.418, 10 June 2005, C.M. and O.S. Flint, Jr. (NMNH).

Paratype, female. Same as holotype (NMNH).

Etymology. “Draca” (L)–dragon, nama (G) –stream, lama (L)–bog, swamp. Literally, dragon-run swamp, referring to the unique type locality.

Distribution. VA.

Neotrichia mentonensis Frazer and Harris

(Figs 15, 16)

Frazer and Harris (1991): 7, ♂

Neotrichia mentonensis is endemic to several tributaries of the Little River along the Alabama/Georgia state line. Males are separated from the similar *N. dracanamalama* on the basis of the inferior appendages which have an undivided dorsal process in ventral view (Fig. 15B).

Female. Length 1.9–2.1 mm, 17 antennal segments, brown in alcohol. Abdominal segments VII–X typical for genus, sternum VIII with large, rectanguloid mesal plate (Fig. 16B) similar in general appearance to that of *N. rasmussenii*. However, anterior margin of plate in *N. mentonensis* relatively straight compared to sinuate margin seen in *N. rasmussenii*. Bursa copulatrix (Fig. 16A) with tapering copulatory channel about same length as genital chamber; this chamber with sclerotized bands laterally extending anteriorly as elongate processes, tapering to acute apex, bell-shaped mesal sclerite divergent anteriorly.

Material examined. Alabama, DeKalb County, West Fork of Little River @ Union Bridge, nr. Cloudmont Resort, 22 June 1988, Frazer, 5♂, 2♀. Georgia, Chattooga County, Gilreath Creek @ Co. Hwy. 234, N34.34, W85.27, 21 July 1989, Frazer, 1♀.

Distribution. AL, GA.

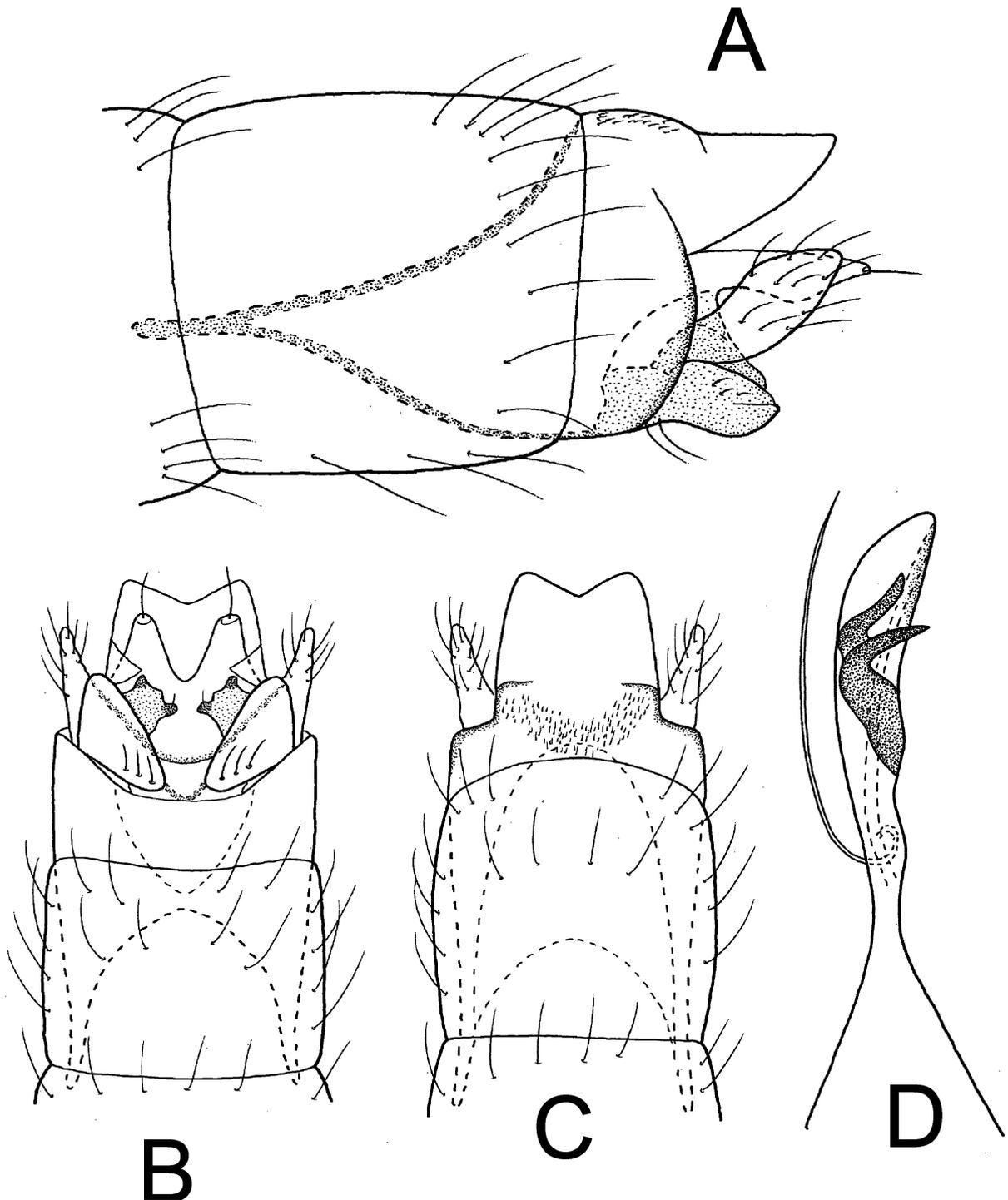


FIGURE 15. *Neotrichia mentonensis*, male genitalia. A. Left lateral view, B. Ventral view, C. Dorsal view, D. Phallus, left lateral view.

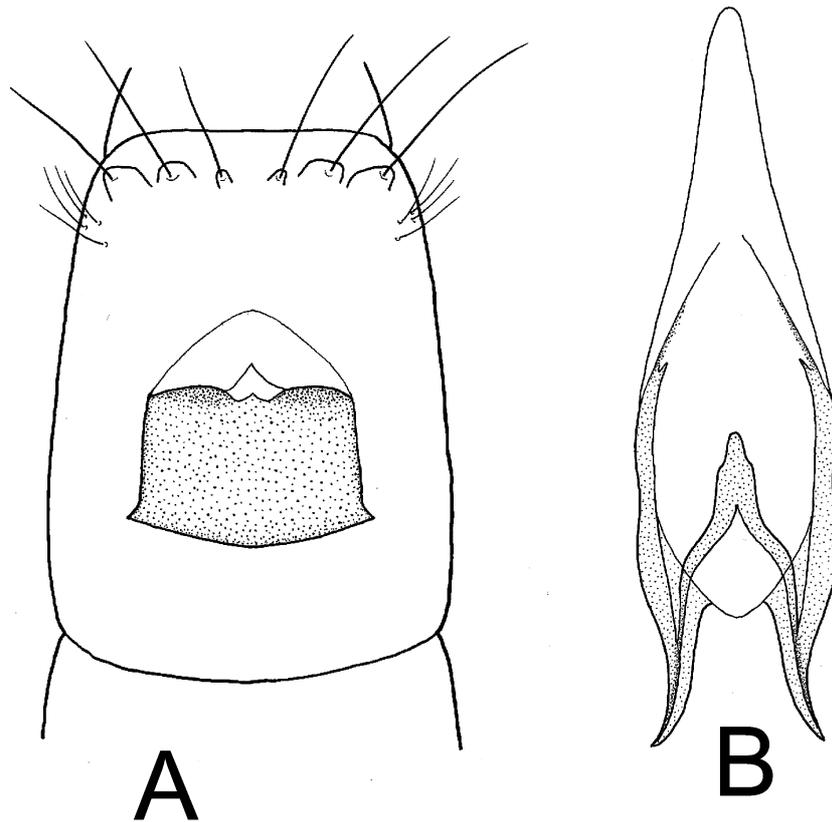


FIGURE 16. *Neotrichia mentonensis*, female genitalia. A. Abdominal segment VIII, ventral view, B. Bursa copulatrix, ventral view.

Key to males and females of the *Neotrichia caxima* Group in the southeastern United States

1. Males..... 2
- Females 9
2. Phallus with single, internal sclerotized rod apically, apex beak-like (Fig. 1D) *N. mobilensis*
- Phallus with pair of internal sclerotized rods apically, subapically without sclerotized projection (Figs 7D, 15D).. 3
3. Inferior appendages bifid apically in lateral view (Fig. 3A); tergum X deeply incised distally (Fig. 3C); phallus apex narrowing abruptly (Fig. 3D) *N. falca*
- Inferior appendages entire apically in lateral view (Figs. 5A, 7A, 11A); tergum X only slightly incised distally (Fig. 5C), or rounded (Fig. 9C); phallus apex not narrowing abruptly (Fig. 5D)..... 4
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