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The Trichoptera of Panama XIV.
New species of microcaddisflies (Trichoptera: Hydroptilidae)
from Omar Torrijos Herrera National Park

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The Trichoptera of Panama XIV. New species of microcaddisflies (Trichoptera: Hydroptilidae) from Omar Torrijos Herrera National Park

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Abstract. In 2017, a new project was begun to assess the biodiversity of national parks and forest reserves in the Republic of Panama. Designated “Proyecto Sistema de Producción Sostenible Conservación de la Biodiversidad (PSPSCB)”, this project is managed by Panama’s Ministerio de Ambiente. The first park sampled in 2017 was Omar Torrijos Herrera National Park (OTHNP). Trichoptera (Insecta) were collected at four locations using both Malaise traps and UV light traps. The rugged terrain and lack of access in this remote park limited the sampled area. Sampling included streams in both the Caribbean and Pacific drainages. Seven new species of microcaddisflies (Hydroptilidae: *Alistotrichia coclensis* Armitage and Harris, *Cerasmatrixia akanthos* Armitage and Harris, *Metrichia corazonos* Armitage and Harris, *Neotrichia espinosa* Armitage and Harris, *Neotrichia michaeli* Armitage and Harris, *Neotrichia pierpointorum* Armitage and Harris, and *Neotrichia yayas* Armitage and Harris) and one new country record, *Metrichia macrophallata* Flint, were identified from this preliminary survey and are reported herein. Other recently described species are reported here for the first time outside of their type localities. Based on other areas more extensively sampled compared to this modest survey, many more new species and new country records await discovery in OTHNP as are reported herein. There are now 439 species distributed among 15 families and 55 genera known from Panama.

Key words. Central America, conservation, Neotropics, protected area, species inventory.

Resumen. En 2017, se inició un nuevo proyecto para evaluar la biodiversidad de parques nacionales y reservas forestales en la República de Panamá. Designado “Proyecto Sistema de Producción Sostenible Conservación de la Biodiversidad (PSPSCB)”, este proyecto es administrado por el Ministerio de Ambiente de Panamá. El primer parque muestreado en 2017 fue el Parque Nacional Omar Torrijos Herrera (OTHNP). Se recogieron Trichoptera en cuatro ubicaciones utilizando trampas Malaise y trampas de luz UV. El terreno accidentado y la falta de acceso en este parque remoto limitaron el área muestreada. El muestreo incluyó corrientes en los drenajes del Caribe y del Pacífico. Siete nuevas especies de micro-Trichoptera (Hydroptilidae: *Alistotrichia coclensis* Armitage and Harris, *Cerasmatrixia akanthos* Armitage and Harris, *Metrichia corazonos* Armitage and Harris, *Neotrichia espinosa* Armitage and Harris, *Neotrichia michaeli* Armitage and Harris, *Neotrichia pierpointorum* Armitage and Harris, and *Neotrichia yayas* Armitage and Harris) y un nuevo registro de país, *Metrichia macrophallata* Flint, se identificaron a partir de esta encuesta preliminar y se informan aquí. Otras especies recientemente descritas se registran aquí por primera vez fuera de sus localidades tipo. Con base en otras áreas más extensamente muestreadas, en comparación con esta modesta investigación, muchas más especies nuevas y nuevos registros para el país esperan ser descubiertos en el OTHNP como se informa aquí. Ahora en Panamá, hay 439 especies conocidas de Trichoptera distribuidas entre 15 familias y 55 géneros.

Palabras clave. América Central, conservación, Neotrópico, área protegida, inventario de especies.

Introduction

Beginning in 2017, field sampling for a new biodiversity project in the Republic of Panama was initiated under the management of Panama’s Ministerio de Ambiente. The focus was on biodiversity of the country’s national parks and protected areas. Designated “Proyecto Sistema de Producción Sostenible

Conservación de la Biodiversidad (PSPSCB; <http://produccion sostenible y biodiversidad.org/proyecto/>), this project is funded by the World Bank. M'Ambiente collaborated with the Instituto Conmemorativo Gorgas de Estudios de la Salud (Gorgas Institute), and their Colección Zoológica Dr. Eustorgio Méndez (COZEM) to execute the work. These biodiversity surveys are included under the framework of the “Sistema Nacional de Información y Monitoreo de la Diversidad Biológica”, or National Biological Diversity Information and Monitoring System, to better understand the country's biodiversity. One of the components of this new project involved surveys for aquatic invertebrates.

During 2017, four national parks were sampled: Omar Torrijos Herrera, Santa Fe, Volcan Baru, and La Amistad International. The first park sampled was Omar Torrijos Herrera National Park (OTHNP). Previously, four species of macrocaddisflies from this park and project were described: *Smicridea dividua* and *S. spatulata* in Razuri-Gonzalez and Armitage (2019) and *Mortoniella yayas* and *Protoptila inflata* in Blahnik and Armitage (2019). In addition, three new country records from OTHNP, which resulted from this investigation were previously reported: *Bredinia sucrensis* Harris, Holzenthal and Flint and *Rhyacopsyche ramphisa* Wasmund and Holzenthal were recorded in Armitage et al. (2018), and *Triainodes moria* Holzenthal and Andersen, was recorded in Armitage et al. (2020). Herein, we add seven new species and one new country record of microcaddisflies (Trichoptera: Hydroptilidae) collected from OTHNP. Some of these same new species were found in samples from the other three national parks sampled in 2017. These are included as paratypes in the description accounts below. Other records for four recently described species identified from OTHNP, are recorded here for the first time outside of their type locality.

Omar Torrijos Herrera National Park

Omar Torrijos Herrera National Park has an area of 25,275 hectares. It is located in central Panama (Fig. 1), primarily in northwest Coclé Province (Fig. 2), district of La Pintada, north of the town of El Copé. Western portions of the park are also part of Veraguas and Colón provinces. The Continental Divide passes through the southern half of the park, separating Caribbean (Cuenca 103–Río Belen and Cuenca 105–Río Cocle del Norte) and Pacific (Cuenca 134–Río Grande) drainages. As a result, the park contains the headwaters of over 20 major rivers and creeks. Buffer zones have been created along the northern and southern borders of the park (Fig. 2). The geology of the Park reflects past volcanic activity. Whereas the terrain is rugged, the highest peaks (Peña Blanca–1,314 m and Tigreiro–1,300 m) are about 39–40% of the heights for Cerro Fábrega (3,335 m) and Volcán Baru (3,475 m) in Talamanca Mountain Range of western Panama. The average temperature range in the Park is approximately 20°C in the higher altitudes and 25°C in the lower altitudes. The Pacific drainages experience lower rainfall events, receiving about 2 m annually, whereas the Caribbean slopes receive about 4 m annually. Vegetation zones are identified as very humid tropical forest in the lower altitudes and premontane rainforest in the higher altitudes.

Materials and Methods

Single, overnight collections were made, in general, using UV light traps (Calor and Mariano 2012). Multiple-night collections were made employing Malaise traps over four-day periods. Malaise (Fig. 3) and UV light traps (Fig. 4) were both used for collecting aquatic insects from four different streams. Two streams were collected in a Caribbean drainage (Quebrada Corazones and afluyente Quebrada Corazones) and two in a Pacific drainage (Quebrada Las Yayas and Quebrada La Maquina). Specimens were prepared and examined following standard methods outlined in Blahnik and Holzenthal (2004). Male genitalia were soaked in 5% KOH overnight, and washed in weakly acidified alcohol prior to examination under a dissecting scope.

Holotypes listed in this publication are deposited in **COZEM**. Paratypes are deposited in the Universidad de Panamá Museo de Invertebrados (**MIUP**), Museo de Peces de Agua Dulce e Invertebrados (**MUPADI**) at the Universidad Autónoma de Chiriquí, or the second author's reference collection (**SCH**). The order of families below follows the classification presented by Holzenthal et al. (2015).

Results

From the OTHNP samples, seven new species of microcaddisflies were discovered and are described below. In addition, we identified one new country record, *Metrichia macrophallata* Flint, which also is recorded herein.

New Species

Alisotrichia coclensis Armitage and Harris, new species

Fig. 5

Diagnosis. *Alisotrichia coclensis* does not fit well into any of the species groups outlined by Olah and Flint (2012), but we tentatively assign it to the orophila group based on the lateral process of abdominal segment VIII bearing a pair of apical spines. The number of these spines varied among the specimens we examined. In some cases there are two on each side, in others there are three on a side, and some have two on one side and three on the other. The new species is most similar to *A. cainguas* Angrisano and Sganga from Argentina, but differs in lacking a ventromesal process from segment VII and in the antennae having both the scape and the flagellum greatly dilated.

Description. Length 1.6–1.8 mm, 18 antennal segments, scape enlarged, pedicel elongate and covered with spatulate hairs, flagellum flattened and expanded, and color brown (in alcohol).

Male genitalia. Abdominal segment VII annular, lacking a ventromesal process. Segment VIII expanded into posteromesal process, which bears 2-3 elongate spines, dorsolaterally with a short process bearing elongate thickened seta; in ventral view, the spines originate from lateral lobes; in dorsal view, segment VIII is produced anteriorly into a pair of finger-like processes, each bearing an elongate, thickened seta. Segment IX divided posteriorly, dorsal portion narrow and elongate, ventral portion rectanguloid, with a thin coiled process from upper surface, which curves downward distally, anteriorly narrowing to an elongate apodeme; in dorsal view rectanguloid, bilobed apically, laterally with elongate spines. Segment X a thin lobe in lateral view, dorsally short, rounded apically. Phallus tubular, narrowing at midlength, posterior margins rounded and lightly sclerotized, ejaculatory duct narrow protruding distally as small lobe.

Female and larva. Unknown.

Type material. Holotype male. Panama, Coclé Province, Cuenca 105, Omar Torrijos Herrera National Park, Quebrada Corazones, PSPSCB-PNGDOTH-C103-2017-001, Malaise trap, 8.6776°N and 80.6001°W, 728 m, 22–26 March 2017, A. Cornejo, T. Ríos, E. Álvarez, and E. Pérez (COZEM). **Paratypes.** ibid., 9 males (COZEM, MIUP, MUPADI); ibid., afluente Quebrada Corazones, PSPSCB-PNGDOTH-C103-2017-002, 8.67801°N and 80.60006°W, 792 m, UV light trap, 24 March 2017, A. Cornejo, T. Ríos, and E. Pérez, 1 male (SCH).

Etymology. Named for the province of Coclé where the species was collected.

Cerasmatrixia akanthos Armitage and Harris, new species

Fig. 6

Diagnosis. This new species is difficult to place. In overall appearance it resembles the genera *Leucotrichia* and *Betrichia* within the Leucotrichiini, but it lacks the diagnostic phallic structure of the Leucotrichiini. The phallus of the new species is tubular, without the medial constriction and median complex with dorsal “windows” and basal supports, which is characteristic of the Alisotrichiini (Santos et al. 2016). Based on the tibial spur count of 1–3–4, 3 ocelli and an incomplete tentorial bridge with a mesal gap, and the unmodified antennae and wings, the new species is placed in *Cerasmatrixia*. However, the foreleg spur is elongate rather than short, the inferior appendages are fused, and the phallus is structurally different from the typical *Cerasmatrixia*. The same structures above are also characteristic of *Celaenotrichia*, but this genus has an elongate ventromesal process from abdominal

segment VII and an elongate tenth tergite with sclerotized bands, both of which are lacking in the new species. The new species is easily recognized by the extensive phallic spines.

Descriptor. Length 2.0–2.3 mm, head unmodified, 24 antennal segments, unmodified, tibial spurs 1–3–4, wings unmodified, and overall color brown (in alcohol). All specimens were cleared, so any color pattern was lost. Mesoscutellum with transverse suture, metascutellum pentagonal to triangular.

Male genitalia. Abdominal segment VII annular, lacking a ventromesal process. Segment VIII triangular, narrowing dorsally; in dorsal view deeply incised medially; in ventral view, more sharply incised mesally. Segment IX truncate posteriorly, bearing a series of stout setae on posterior margin, dorsal and ventral sclerites thin, anteriorly narrowing mesally; in dorsal view, deeply incised mesally, margins acute and lightly sclerotized, anteriorly nearly truncate; in ventral view, divided into a pair of lateral processes, which widen distally to truncate apices. Segment X lobate laterally, in dorsal view wide and rounded apically. Inferior appendages wide basally, narrowing distally to upturned and curving apex; in ventral view wide basally, abruptly narrowing subapically and basally fused. Subgenital plate shelf-like, wide basally, narrowing distally to rounded apex; in ventral view wide basally, rounded apically. Phallus tubular in dorsal view, cluster of spines at midlength, apically narrowing and membranous, ejaculatory duct inconspicuous, in lateral view wide basally and mesally, narrowing apically, cluster of spines in mesal region.

Female and larva. Unknown.

Type material. Holotype male. Panama, Coclé Province, Cuenca 134, Omar Torrijos Herrera National Park, Quebrada La Yayas, PSPSCB-PNGDOTH-C134-2017-004, 8.66168°N and 80.5952°W, 602 m, Malaise trap, 22–26 March 2017, E. Álvarez, E. Pérez, and T. Ríos (**COZEM**). **Paratypes.** *ibid.*, **Veraguas Province, Cuenca 097, Santa Fe National Park,** Afluente Río Caloveboro, PSPSCB-PNSF-C097-2017-005, 8.54318°N and 81.16398°W, 536 m, Malaise trap, 19–23 April 2017, T. Ríos, E. Álvarez, and C. Nieto, 3 males (**MIUP**); *ibid.*, Río Caloveboro, PSPSCB-PNSF-C097-2017-006, 8.55038°N and 81.16486°W, 461 m, Malaise trap, 23–27 April 2017, A. Cornejo, T. Ríos, E. Álvarez, and C. Nieto, 1 male (**COZEM**); *ibid.*, **Cuenca 132,** Río Mulaba, afluente 2do Brazo, PSPSCB-PNSF-C132-2017-007, 8.52577°N and 81.13045°W, 623 m, Malaise trap, 19–23 April 2017, A. Cornejo, T. Ríos, E. Álvarez, and C. Nieto, 2 males (**MUPADI**); *ibid.*, Río Mulaba, Isleta, PSPSCB-PNSF-C132-2017-015, 8.54513°N and 81.11970°W, 412 m, UV trap, 22 April 2017, T. Ríos, E. Álvarez, and C. Nieto, 1 male (**SCH**).

Etymology. *akanthos* is the Greek word for spiny, referring to the spiny phallus characteristic of this species.

***Metrichia corazones* Armitage and Harris, new species**

Fig. 7, 8

Diagnosis. *Metrichia corazones* appears to be most closely related to *M. helenae* Flint and Bueno on the basis of the lack of abdominal pouches, the quadrate inferior appendages, and the pair of subapical phallic spines. It differs from this species in the inferior appendages being more rectanguloid, the phallic spines being dissimilar in length, and the phallus having a median process. The new species has enlarged, flattened antennae (Fig. 8H) and darkened foreleg tibia, with a row of stout setae (Fig. 8F).

Description. Length 1.3–1.5 mm, 19 antennal segments, basal segments flattened and dilated, foreleg with tibia darkened and bearing row of stout setae, overall color brown (in alcohol).

Male genitalia. Abdomen without eversible sacs, but with thick hair patches on segment VII and VIII, patches on VII much larger than those on VIII, with median sclerotized plate. Segment VII annular, with ventromesal process. Segment VIII triangular, narrowing anteroventrally. Segment IX truncate posteriorly, anteriorly narrowing ventrally; in dorsal view narrow posteriorly, anteriorly rounded. Pre-anal appendage (cercus) short and rectanguloid in lateral view; in dorsal view lobate; dorsolateral hook elongate and apically curving ventrad in lateral view; in dorsal view thick, with distal hook projecting laterally and serrate. Segment X elongate and narrow, in dorsal view thin and slightly tapering to notched apex, basally with membranous triangular lobe. Inferior appendages in lateral view rectanguloid,

distally with posteroventral incision; in dorsal and ventral views wide basally, narrowing in distal $\frac{1}{4}$ length to acute apex. Phallus tubular, narrowing below mid-length where a lateral process originates, subapically with pair of spines, lowermost short, uppermost about twice length of lower and projecting posteriorly, apex with lateral sclerite.

Female and larva. Unknown.

Type material. Holotype male. Panama, Coclé Province, Cuenca 105, Omar Torrijos Herrera National Park, Quebrada Corazones, PSPSCB-PNGDOTH-C103-2017-001, Malaise trap, 8.6776°N and 80.6001°W, 728 m, 22–26 March 2017, A. Cornejo, T. Ríos, E. Álvarez, and E. Pérez (COZEM).

Etymology. Named for the stream, Quebrada Corazones, from which the species was collected.

***Neotrichia espinosa* Armitage and Harris, new species**

Fig. 9

Diagnosis. *Neotrichia espinosa* has a pair of elongate dorsal spines from abdominal segment IX, which are similar to the single process seen in *N. carlsoni* Harris and Armitage, *N. botka* Olah and Johansen and *N. hiaspa* (Mosely). However, the elongate, apical rods of the phallus in these species are unequal in length, whereas they are equal length in the new species, similar to those of *N. gotera* Flint and *N. longissima* Flint.

Description. Length 1.6–1.9 mm, 18 antennal segments, and overall color brown (in alcohol). Abdominal segment VIII annular.

Male genitalia. Segment IX complete dorsolaterally, fused with tergite X dorsally, posterior margin with pair of elongate, spine-like processes dorsolaterally, dorsal-most process narrow over length, ventral-most process wide basally, narrowing to acute apex, anteriorly narrowing into elongate apodeme; in dorsal view, dorsal-most processes thin and elongate, ventral-most processes more lateral in position, wide basally then tapering to acute distal apex; in lateral view truncate with medial process, anterior margin deeply incised. Segment X lobate in lateral view, dorsally short and membranous, inconspicuous. Subgenital plate in lateral view wide basally, abruptly narrowing distally to tapering process; in ventral view triangular, pair of lateral setae apically. Bracteole narrow basally, widening and parallel-sided distally; in dorsal and ventral views rectanguloid, apically acute with serrate inner margin. Inferior appendages very thin and elongate, slightly upturned apically; in ventral view, very thin over length, extending to apex of bracteoles. Phallus tubular, narrowing at midlength and bearing paramere encircling shaft, distally divided into pair of elongate, sclerotized processes, which are equal in length.

Female and larva. Unknown.

Type material. Holotype male. Panama, Coclé Province, Cuenca 134, Omar Torrijos Herrera National Park, Quebrada Las Yayas, PSPSCB-PNGDOTH-C134-2017-004, 8.66168°N and 80.5952°W, 602 m, UV light trap, 25 March 2017, E. Álvarez, E. Pérez, and T. Ríos (COZEM). Paratypes. *ibid.*, 2 males (MIUP); *ibid.*, **Cuenca 105, PSPSCB-PNGDOTH-C103-2017-002, affluente Quebrada Corazones, 8.67801°N and 80.60006°W, 792 m, UV light trap, 24 March 2017, A. Cornejo, T. Ríos, and E. Pérez, 4 males (COZEM, MUPADI, SCH).**

Etymology. *espinosa* is Spanish for spiny, referring to the elongate spines from abdominal segment IX.

***Neotrichia michaeli* Armitage and Harris, new species**

Fig. 10

Diagnosis. *Neotrichia michaeli* is a member of the canixa species group of Keth et al. (2015) based on the apical horns of the tenth tergite and the bifid bracteoles, both characteristic of the group. The new species appears most similar to *N. bika* Olah and Johansen, *N. kehelia* Olah and Johansen, and *N. chihuahua* Harris and Flint all of which have relatively short apical horns from the tenth tergite. The new species is recognized by the short, subapical spine of the phallus, which is also present in *N. bika*,

and the widening extension of the ejaculatory duct. It differs from these species in the elongate ventral process of the subgenital plate.

Description. Length 1.2–1.4 mm, 18 antennal segments, overall color brown (in alcohol). Abdominal segment VIII annular.

Male genitalia. Segment IX incomplete dorsolaterally, fused with tergite X dorsally, laterally bearing subapical setal-bearing lobes, anteriorly with medial incision; in ventral view shallowly incised laterally on posterior margin. Tergite X narrow, with pair of short, widely separated, squarish symmetrical, horns distally, subapically with pair of membranous lobes, basally fused with segment IX; in lateral view apical horn thick and hook-like distally. Subgenital plate in lateral view bulbous basally, narrowing distally to setal-bearing lobe, ventrally produced into an elongate tapering process; in ventral view wide basally, truncate distally with a pair of lateral setae, subapically with medial process. Bracteoles bifid, dorsal branch much longer than stub-like lower branch, bearing elongate setae apically. Inferior appendages bifid, outer portion narrow and gradually tapering posteriorly, inner portion thin and short; in ventral view narrow over length, slightly curving on inner margin to apical point, basal mesal processes about $\frac{3}{4}$ length of outer portion, wide basally, tapering to setal-bearing apex. Phallus tubular in dorsal view, constricted below mid-length and bearing a thin paramere encircling shaft, posterior portion narrow over length, incised subapically and containing an ejaculatory duct, apex divided into a pair of processes, apical-most process long and curving, in lateral view, the ejaculatory duct is contained within a narrow process, which is sharply downturned apically, the apical-most rod of the phallic tip is sickle-shaped, with a short basal spine.

Female and larva. Unknown.

Type material. Holotype male. Panama. Coclé Province, Cuenca 134, Omar Torrijos Herrera National Park, Quebrada Las Yayas, PSPSCB-PNGDOTH-C134-2017-004, 8.66168°N and 80.5952°W, 602 m, Malaise trap, 22–26 March 2017, E. Álvarez, E. Pérez, and T. Ríos (COZEM). Paratype. Chiriquí Province, Cuenca 102, La Amistad International Park, Río Candela, Finca Felix, PSPSCB-PILA-C102-2017-021, 8.90614°N and 82.72882°W, 1,799 m, Malaise trap, 1–5 November 2017, E. Álvarez, E. Pérez, and T. Ríos, 1 male (SCH).

Etymology. We take pleasure in naming this species in honor of the brother of the second author, who recently retired from the University of Louisville.

Neotrichia pierpointorum Armitage and Harris, new species

Fig. 11

Diagnosis. *Neotrichia pierpointorum* is similar in some respects to *N. bifurcata* Harris in the presence of bifid inferior appendages and a phallus, which is divided apically. The new species is also reminiscent of *N. negroensis* Harris in the presence of a thin, elongate phallus and a median extension from the posterior margin of abdominal segment IX. However, the new species has a sclerotized process from the inner surface of segment IX, which is not seen in *N. negroensis* or *N. bifurcata*, and it lacks the medial paramere typical of *Neotrichia*.

Description. Length 1.2–1.4 mm, 18 antennal segments, overall color brown (in alcohol). Abdominal segment VIII annular.

Male genitalia. Segment IX incomplete, narrow, posterior margin undulate, bearing a sword-like sclerotized process dorsolaterally, medially with elongate, finger-like process, fused with tergite X dorsally, anteriorly rounded; in dorsal and ventral views, lateral processes elongate, narrowing distally, dorsally incised laterally, ventrally incised medially, anterior margin shallowly incised. Segment X lobate in lateral view, dorsally elongate, abruptly tapering distally to bi-lobed apex. Subgenital plate in lateral view thin and finger-like bearing an elongate apical seta, basally with thin, ventrally projecting process; in ventral view wide basally, tapering apically to truncate apex bearing pair of thick setae. Inferior appendages bifid, dorsal-most process about half the length of ventral process and truncate apically, ventral-most process narrowing distally to acute apex; in ventral view, inner process narrowing posteriorly with a small subapical tooth on inner margin, outer process about $\frac{1}{2}$ length of inner process and finger-like,

with elongate seta apically. Phallus thin and elongate in dorsal view, divided subapically into a short, thin tube twisting around the more elongate, narrow main shaft, which bears the ejaculatory duct.

Female and larva. Unknown.

Type material. Holotype male. Panama, Coclé Province, Cuenca 134, Omar Torrijos Herrera National Park, Quebrada Las Yayas, PSPSCB-PNGDOH-C134-2017-004, 8.66168°N and 80.5952°W, 602 m, Malaise trap, 22-26 March 2017, E. Álvarez, E. Pérez, and T. Ríos (**COZEM**). **Paratypes.** *ibid.*, **Veraguas Province, Cuenca 132, Santa Fe National Park,** Río Mulaba, 2do Brazo, PSPSCB-PNSF-C132-2017-007, 8.52577°N and 81.13045°W, 623 m. Malaise trap, 19-23 April 2017, A. Cornejo, T. Ríos, E. Álvarez, and C. Nieto, 1 male (**MIUP**); *ibid.*, Río Mulaba, 3er Brazo, PSPSCB-PNSF-C132-2017-010, 8.52906°N and 81.13943°W, 662 m, UV light trap, 19 April 2017, T. Ríos, E. Álvarez, and C. Nieto, 1 male (**SCH**).

Etymology. We take great pleasure in naming this species for Donnie and the late Surse Pierpoint, for inviting many entomologists to conduct research at their estate in Santa Rita Arriba, Colon Province, Panama, in the 1970's and 80's, where many outstanding butterflies, moths, and other insects were found, including a new species of scarab beetle, *Chrysina ratcliffei* (Morón) (Coleoptera: Scarabaeidae).

***Neotrichia yayas* Armitage and Harris, new species**

Fig. 12

Diagnosis. *Neotrichia yayas* belongs to a cluster of Neotropical species with characteristic elongate processes from abdominal segment IX, including *N. tatianae* Armitage and Harris, *N. colmillosa* Harris, and *N. gilmari* Santos and Nessimian. The new species is readily identified by the lobate inferior appendages and the shape of the subgenital plate.

Description. Length 1.2–1.4 mm, 18 antennal segments, overall color brown (in alcohol). Abdominal segment VIII annular.

Male genitalia. Segment IX narrow, undulate posteriorly, bearing elongate sclerotized processes dorsolaterally, one turning downward at apex, the other straight and acute, posteroventrally with elongate finger-like process; in dorsal view square, posterior margin with triangular process, lateral rods thin and sinuate, anterior margin slightly incised medially; in ventral view, posterior margins incised laterally with truncate mesal process, anterior margin shallowly emarginate, short lateral processes curving outward. Segment X thin and elongate in lateral view, dorsally elongate, gradually tapering to a rounded apex with small incision. Bracteole wide basally, narrowing into a thin, finger-like process distally bearing an apical seta. Subgenital plate in lateral view narrowing distally to rounded apex bearing elongate subapical seta, posteroventrally with thin, elongate process, which extends below the inferior appendages; in ventral view narrow over length, posterior margin divided into lateral lobes, each bearing thickened seta. Inferior appendages wide basally, narrowing distally with posterior margin divided into three small tooth-like processes; in ventral view triangular, small teeth along inner margin and apically, basally with short processes from inner margin, narrowing to rounded apices with subapical inner points. Phallus tubular in dorsal view, constricted at mid-length and bearing a thin paramere encircling shaft, posterior portion narrow over length with rounded apex having ejaculatory duct protruding.

Female and larva. Unknown.

Type material. Holotype male. Panama, Coclé Province, Cuenca 134, Omar Torrijos Herrera National Park, Quebrada Las Yayas, PSPSCB-PNGDOH-C134-2017-004, 8.66168°N and 80.5952°W, 602 m, Malaise trap, 22-26 March 2017, E. Álvarez, E. Pérez, and T. Ríos (**COZEM**). **Paratypes.** *ibid.*, 3 males (**MIUP**); *ibid.*, **Chiriqui Province,** Quebrada Jaramillo, K. Collier property, 8.76320°N and 82.41383°W, 20–25 April 2018, B. Armitage, 1 male (**MUPADI**); *ibid.*, **Darién Province, Cuenca 156, Darién National Park,** Rancho Frio, 8.01981°N and 77.73250°W, 125 m, A. Thurman, 5–12 February 2018, 1 male (**SCH**).

Etymology. Named for the stream, Quebrada Las Yayas, where the species was first collected.

New Country Record

Metrichia macrophallata Flint, 1991

Material examined. Panama, Coclé Province, Cuenca 105, Omar Torrijos Herrera National Park, Quebrada Corazones, PSPSCB-PNGDOTH-C097-2017-001, 8.67760°E and 80.60007°W, 728 m, UV light trap, A. Cornejo, T. Ríos, E. Álvarez, and E. Pérez, 24 March 2017, 3 males.

Distribution. Costa Rica, Ecuador, Panama.

New Records

The following species, first described from the Quebrada Rambala drainage (Harris and Armitage 2019) near Chirquí Grande, Bocas del Toros Province, Panama (120 m asl), are here recorded for the first time outside of their type locality. All records for these species occur in Panama's Caribbean drainage, although these new records are at some distance east and at a higher altitude than their type locality.

Metrichia thurmani Harris and Armitage, 2019

Material examined. Panama, Coclé Province, Cuenca 103, Omar Torrijos Herrera National Park, Quebrada Corazones, PSPSCB-PNGDOTH-C103-2017-001, UV light trap, 8.6776°N and 80.6001°W, 728 m, 24 March 2017, A. Cornejo, T. Ríos, E. Álvarez, and E. Pérez, 1 male; *ibid.*, afluyente Quebrada Corazones, Malaise trap, 22-26 March 2017, 1 male.

Ochrotrichia birdae Harris and Armitage, 2019

Material examined. Panama, Coclé Province, Cuenca 105, Omar Torrijos Herrera National Park, afluyente Quebrada Corazones, PSPSCB-PNGDOTH-C103-2017-002, Malaise trap, 8.6776°N and 80.6001°W, 728 m, 22-26 March 2017, A. Cornejo, T. Ríos, E. Álvarez, and E. Pérez, 1 male.

Rhyacopsyche holzenthali Harris and Armitage, 2019

Material examined. Panama, Coclé Province, Cuenca 105, Omar Torrijos Herrera National Park, afluyente Quebrada Corazones, PSPSCB-PNGDOTH-C103-2017-002, Malaise trap, 8.6776°N and 80.6001°W, 728 m, 22-26 March 2017, A. Cornejo, T. Ríos, E. Álvarez, and E. Pérez, 6 males.

Tizatetrichia panamensis Harris and Armitage, 2019

Material examined. Panama, Coclé Province, Cuenca 105, Omar Torrijos Herrera National Park, Quebrada Corazones, PSPSCB-PNGDOTH-C103-2017-001, Malaise trap, 8.6776°N and 80.6001°W, 728 m, 22-26 March 2017, A. Cornejo, T. Ríos, E. Álvarez, and E. Pérez, 1 male.

Discussion

This project was intended to be preliminary in nature. As should be obvious from Fig. 2, only a small fraction of the park was sampled, one time, with this first effort. This reflects both the project design for 2017 as well as the realities of sampling a large area with rugged terrain and few or no access routes. Future sampling efforts should be conducted to more extensively sample Omar Torrijos Herrera National Park, both in terms of the area covered as well as over a prolonged time period (e.g., quarterly or monthly for one-year). The identification of seven previously undescribed species one new country record of caddisflies, and additional collections of previously described endemic species are indicative of the vast biological diversity in this region.

Previously, the total of known caddisflies from the Republic of Panama was 431 species distributed among 15 families and 55 genera (Armitage et al. 2020). With this publication, there are now 439 species in Panama's caddisfly fauna.

Acknowledgments

We are grateful to the Ministry of Environment, who, through the Sustainable Production System and Biodiversity Conservation Project (PSPSCB), financed the collections in Omar Torrijos Herrera National Park, and who granted collecting permits. We are grateful for the overall coordination of the entomofaunal portion of the national parks project by Aydeé Cornejo of the Gorgas Institute. We thank Aydeé Cornejo, Eric Álvarez, Carlos Nieto, Edgar Pérez, and Tomás Ríos for their significant efforts to collect all of the aquatic insect material from the national parks. We appreciate the assistance of Tatiana I. Arefina-Armitage for editing the manuscript and Leah Keth for rendering the pencilled drawings into their final format. Finally, we thank Dr. Robin Thomson of the University of Minnesota–St. Paul and an anonymous taxonomic researcher for reviewing and improving this manuscript.

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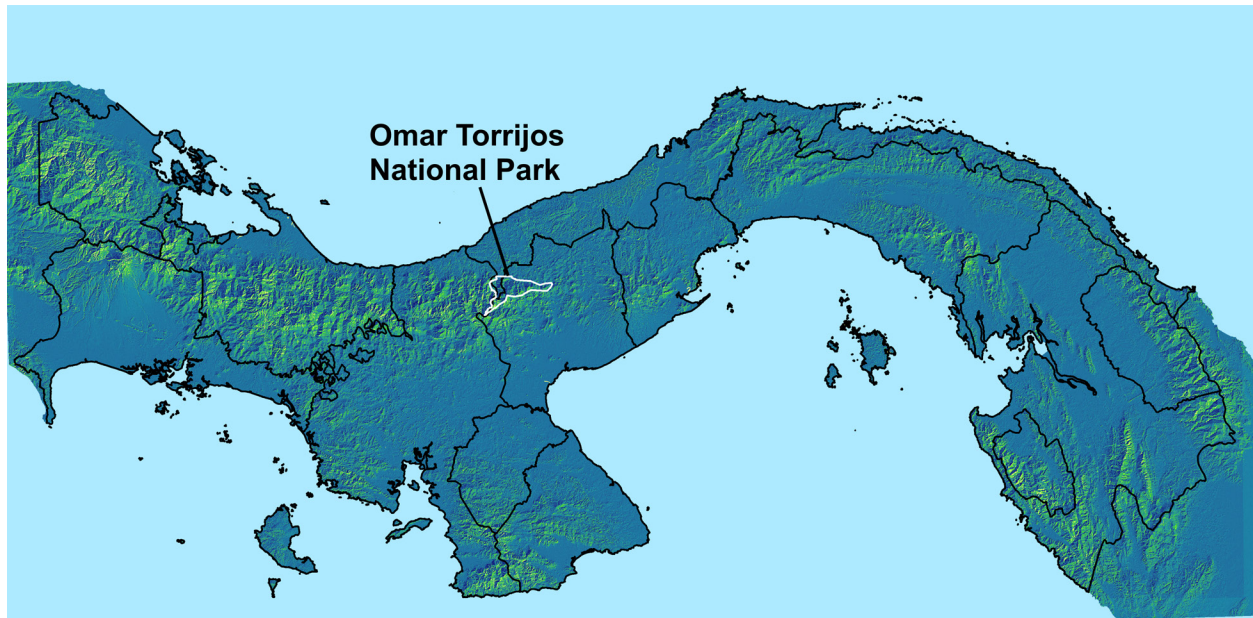


Figure 1. Map showing location of OTHNP in Panama.

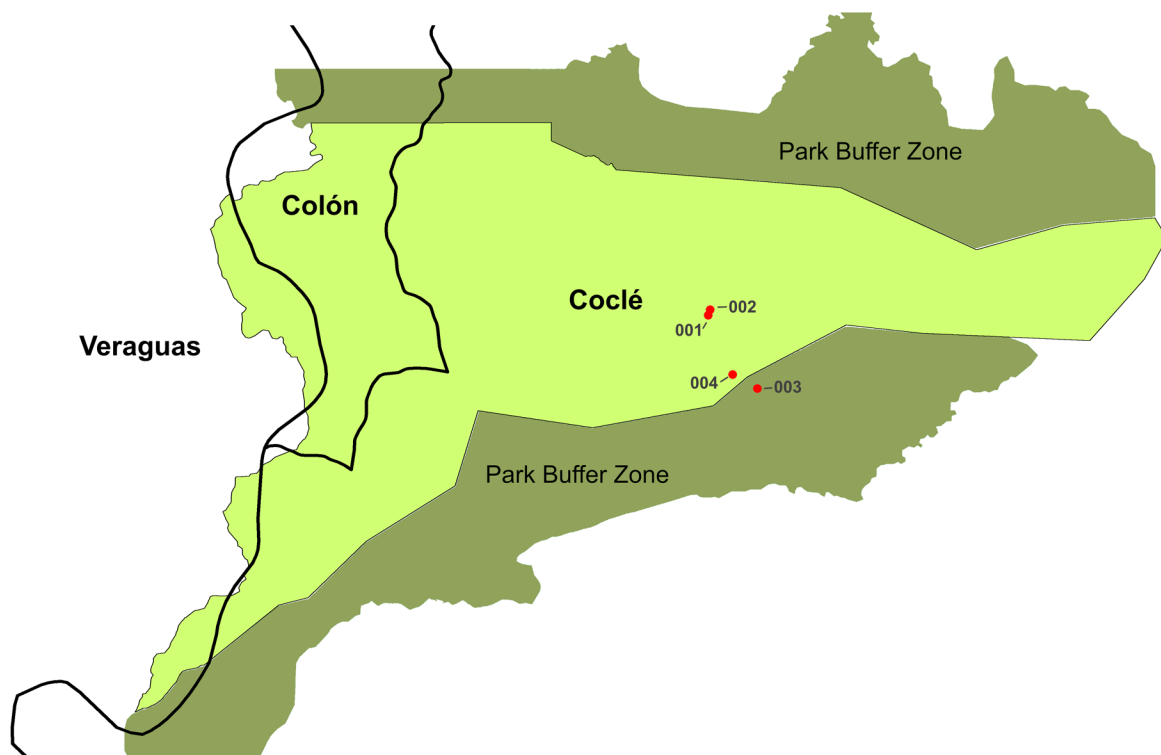


Figure 2. Boundaries and buffer zones of OTHNP in relation to Panamanian province boundaries. Sample locations (red circles): 001–Quebrada Corazones; 002–affluente Quebrada Corazones; 003–Quebrada Maquina; and, 004–Quebrada Las Yayas.

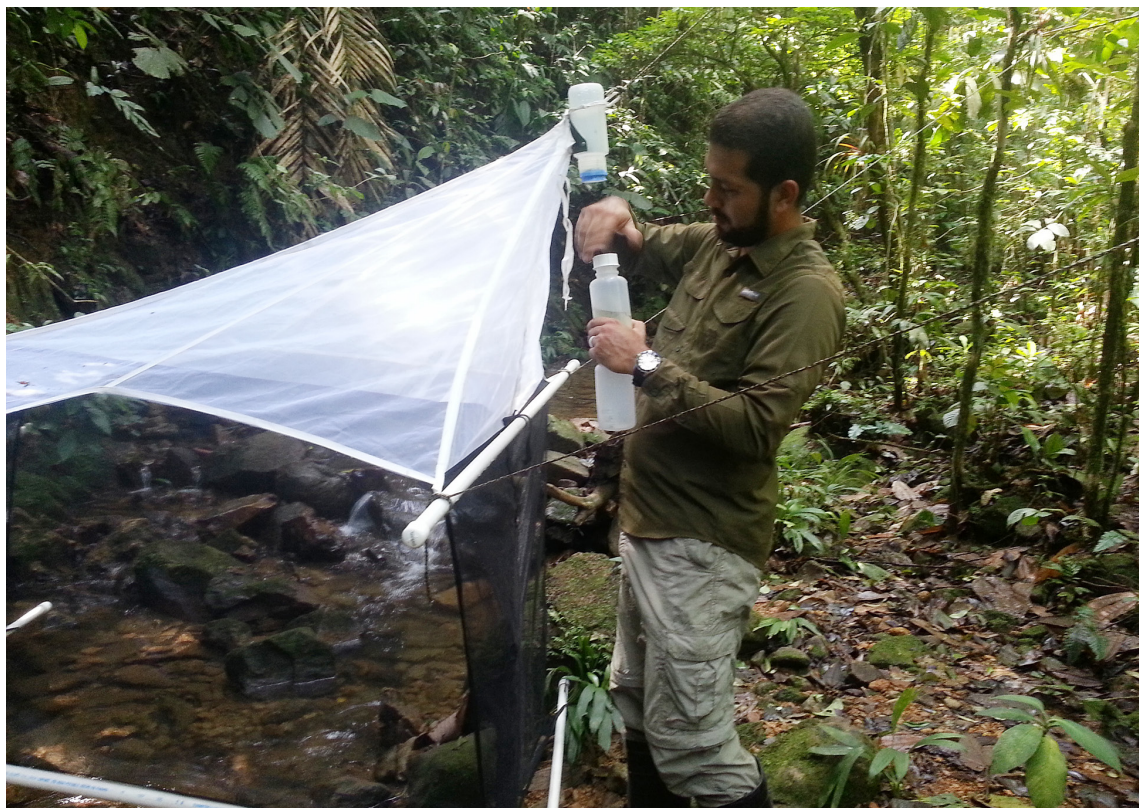


Figure 3. Initiation of Malaise trap collection on Quebrada Corazones (Tomás Ríos).



Figure 4. Ultraviolet (UV) light trap employed during this study.

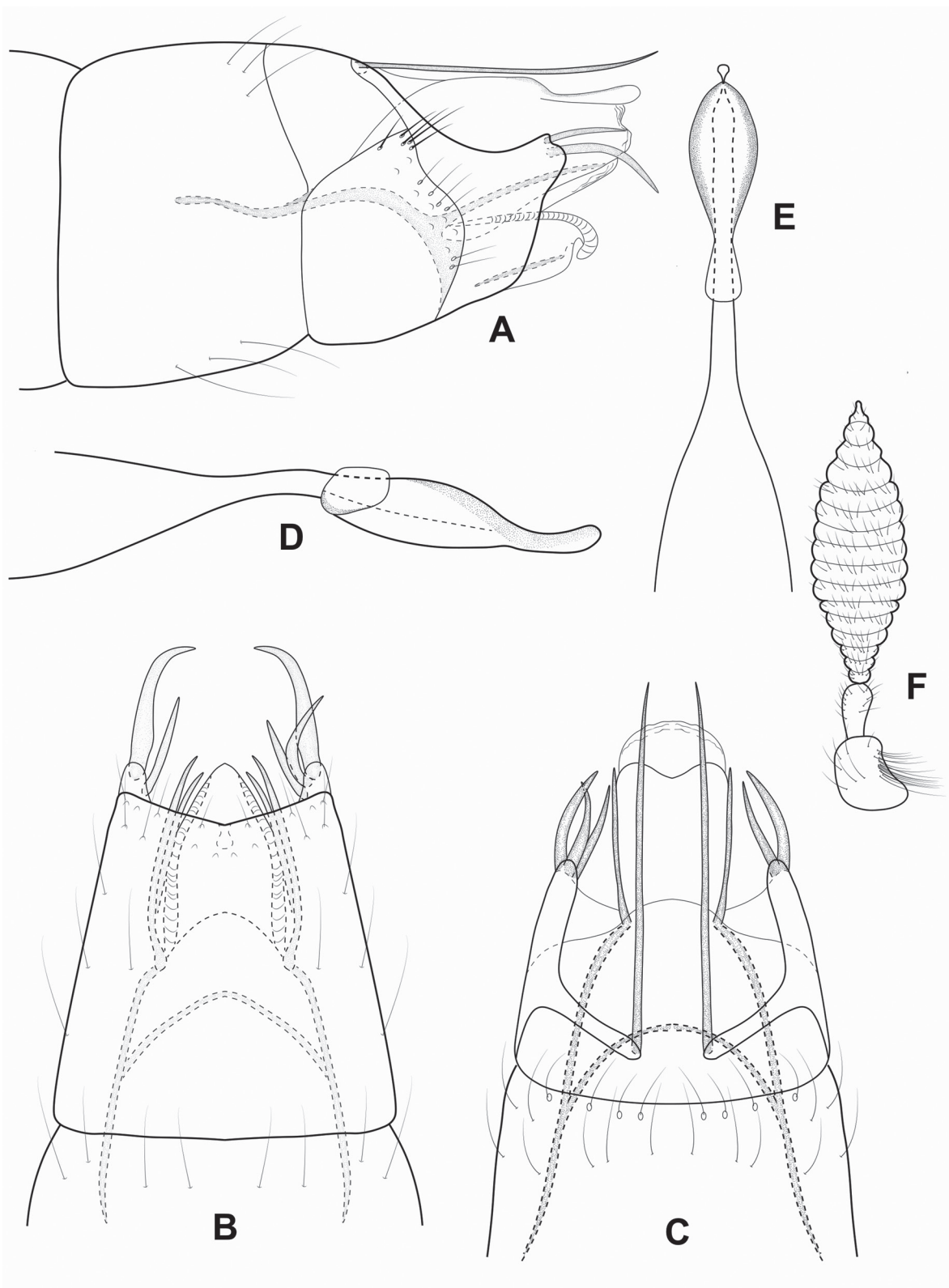


Figure 5. *Alisotrichia coclensis*, sp.n. Male features, genitalia. **A)** Lateral view. **B)** Ventral view. **C)** Dorsal view. **D)** Phallus, lateral view. **E)** Phallus, ventral view. **F)** Antenna, dorsal view.

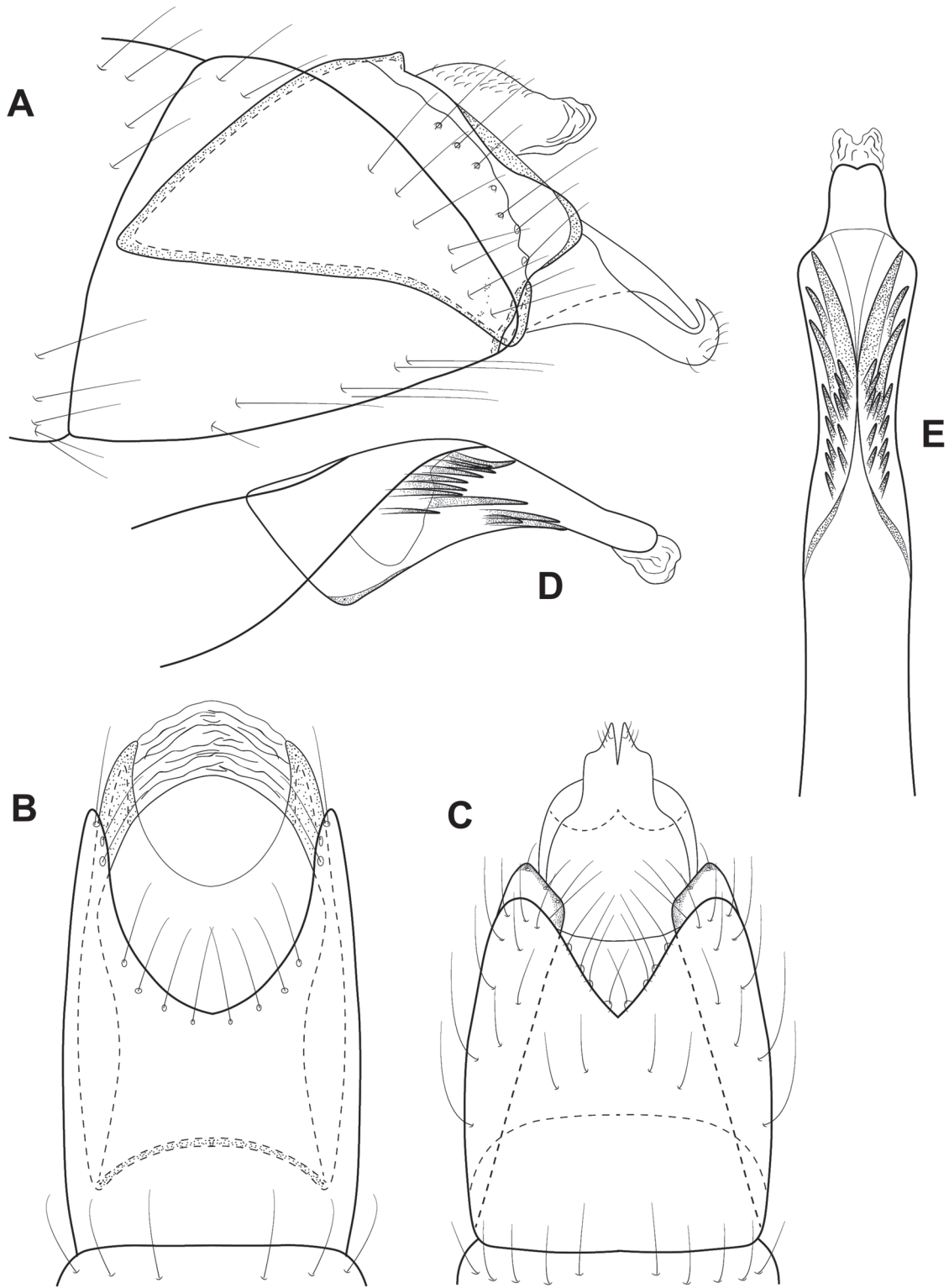


Figure 6. *Cerasmatrixchia akanthos*, sp.n. Male genitalia. **A)** Lateral view. **B)** Dorsal view. **C)** Ventral view. **D)** Phallus, lateral view. **E)** Phallus, dorsal view.

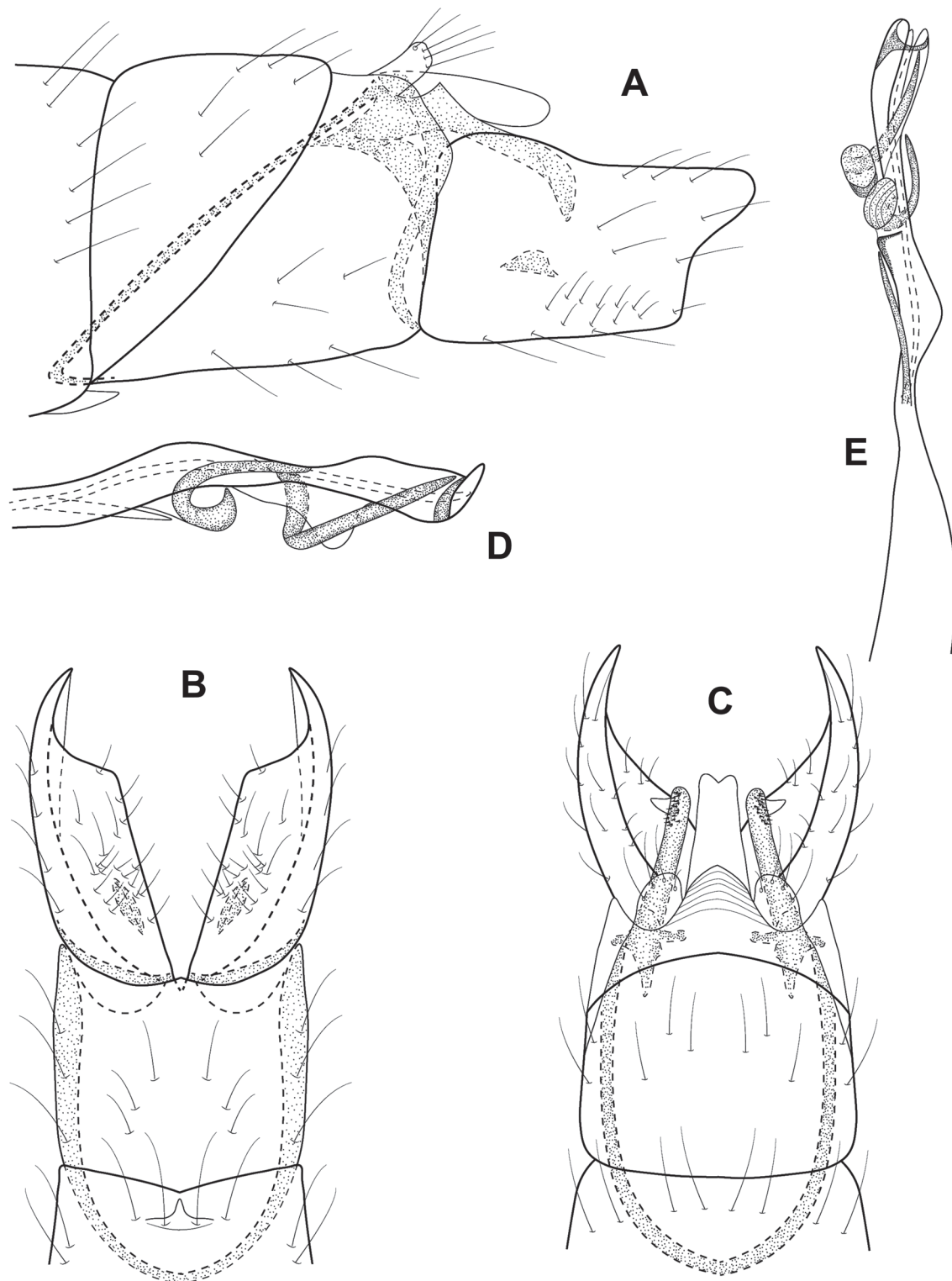


Figure 7. *Metrichia corazonnes*, sp.n. Male genitalia. **A)** Lateral view. **B)** Ventral view. **C)** Dorsal view. **D)** Phallus, lateral view. **E)** Phallus, dorsal view.

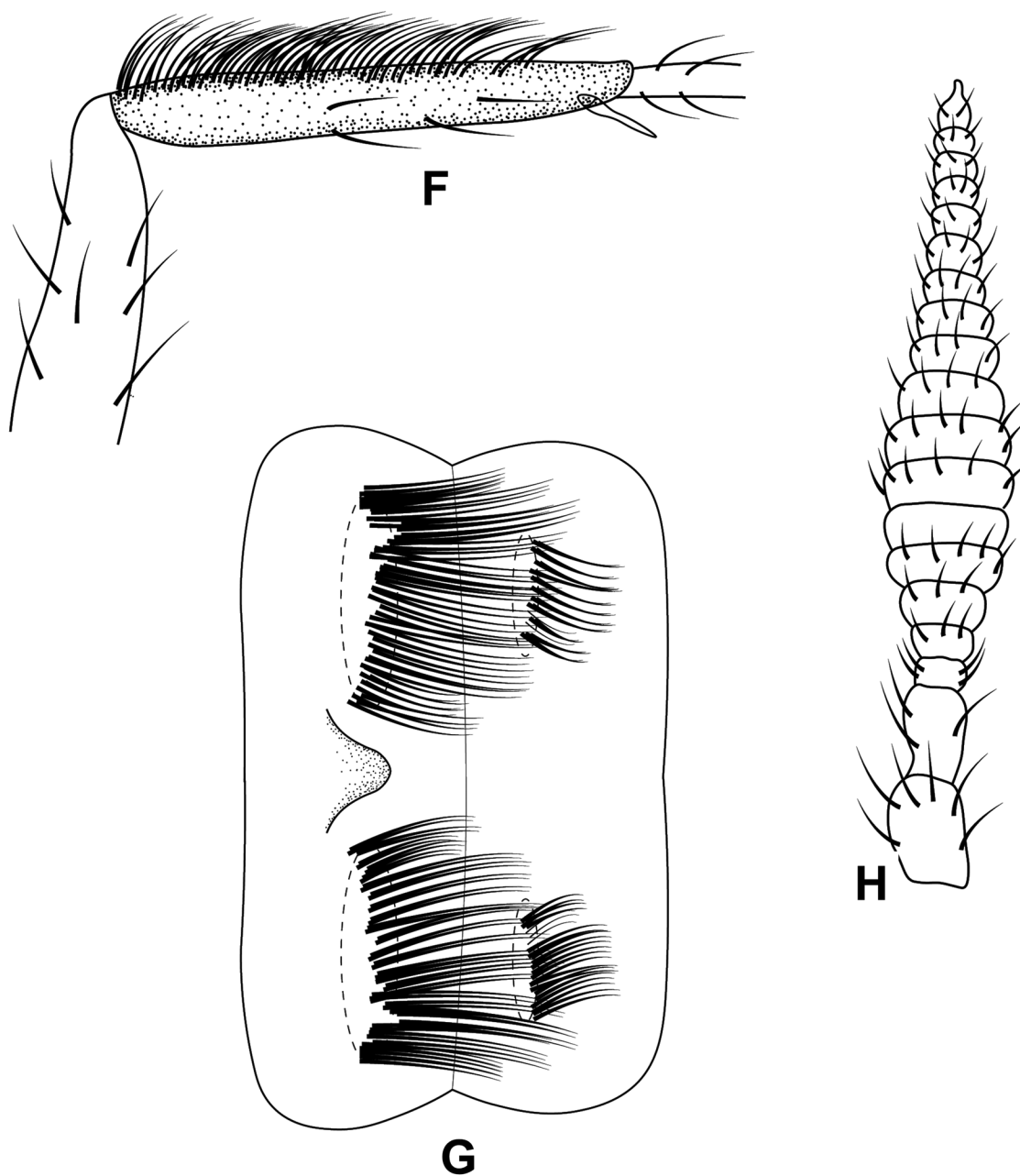


Figure 8. *Metrichia corazonos*, sp.n. Male features. **F)** Foreleg tibia, ventral view. **G)** Abdominal segments VII and VIII, dorsal view. **H)** Antenna, dorsal view.

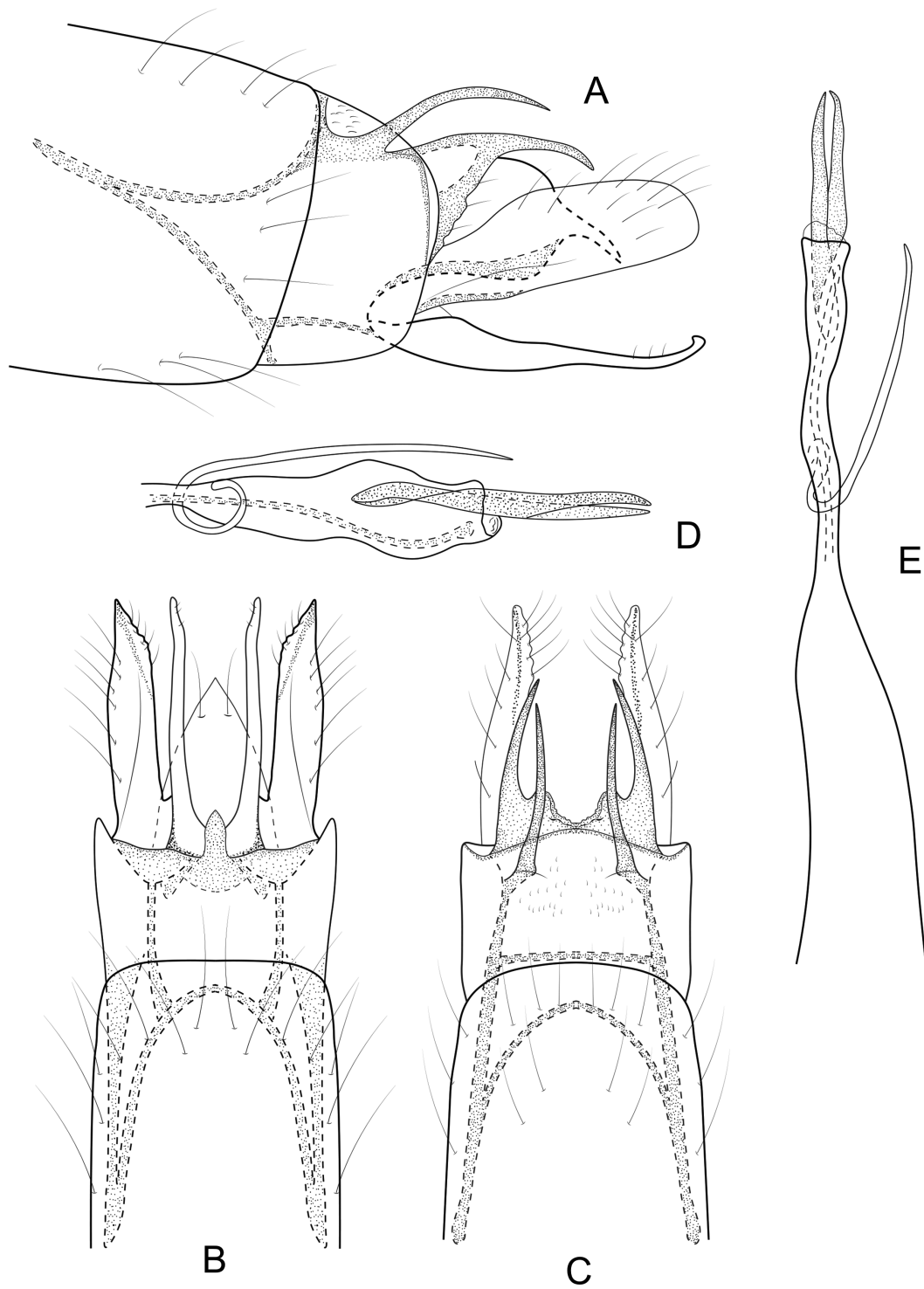


Figure 9. *Neotrichia espinosa*, sp.n. Male genitalia. **A)** Lateral view. **B)** Ventral view. **C)** Dorsal view. **D)** Phallus, lateral view. **E)** Phallus, dorsal view.

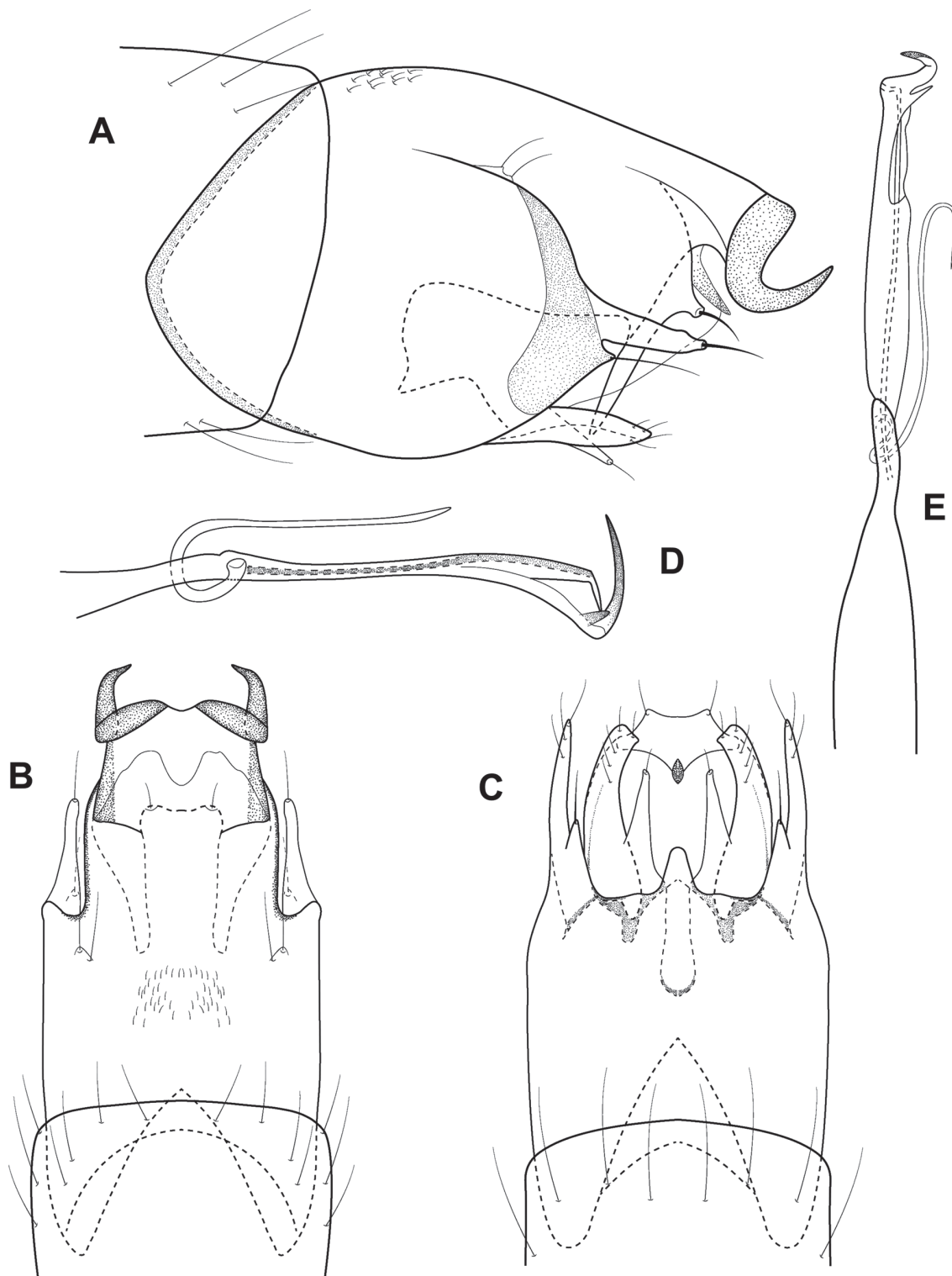


Figure 10. *Neotrichia michaeli*, sp.n. Male genitalia. **A)** Lateral view. **B)** Dorsal view. **C)** Ventral view. **D)** Phallus, lateral view. **E)** Phallus, dorsal view.

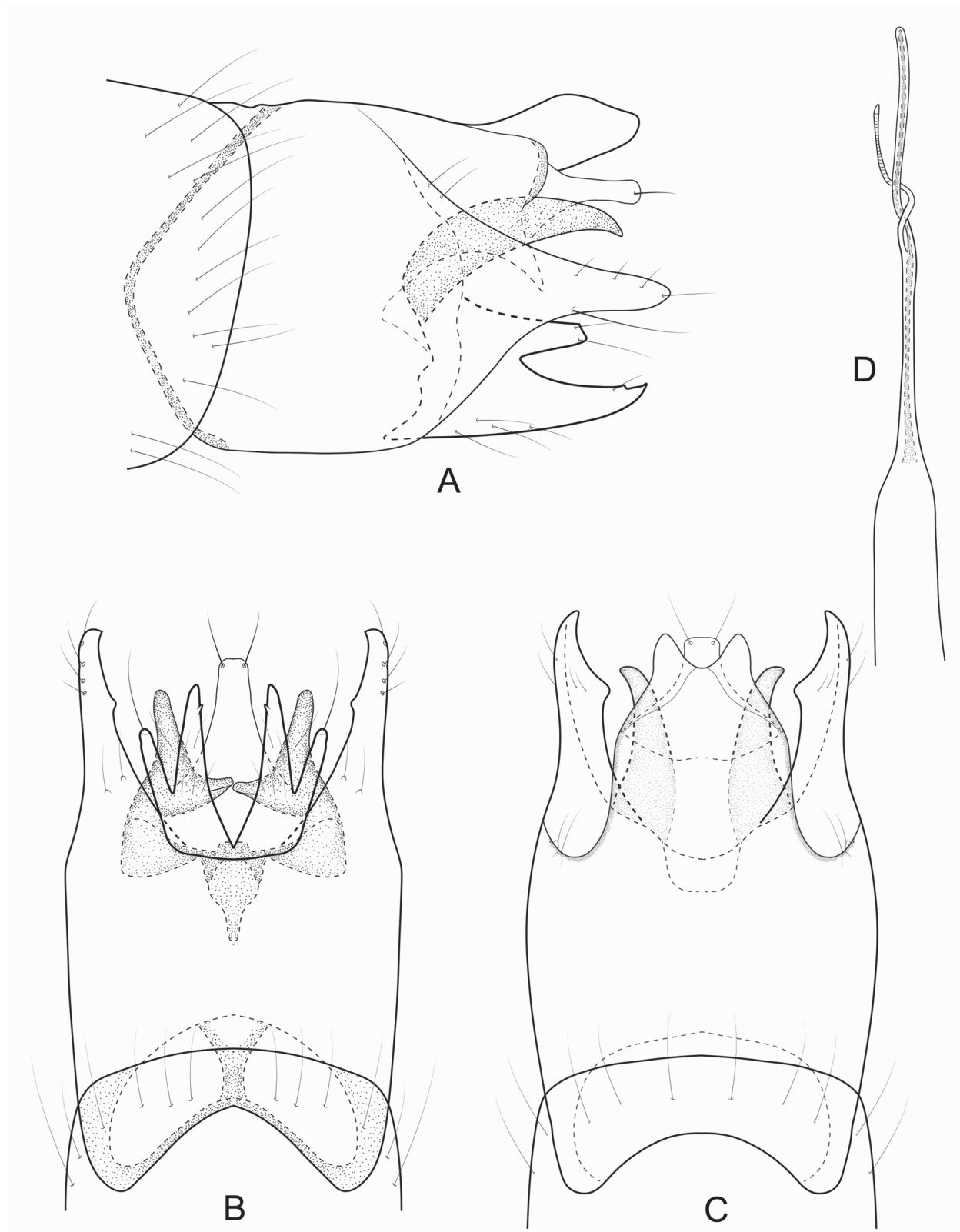


Figure 11. *Neotrichia pierpointorum*, sp.n. Male genitalia. **A)** Lateral view. **B)** Ventral view. **C)** Dorsal view. **D)** Phallus apex, dorsal view.

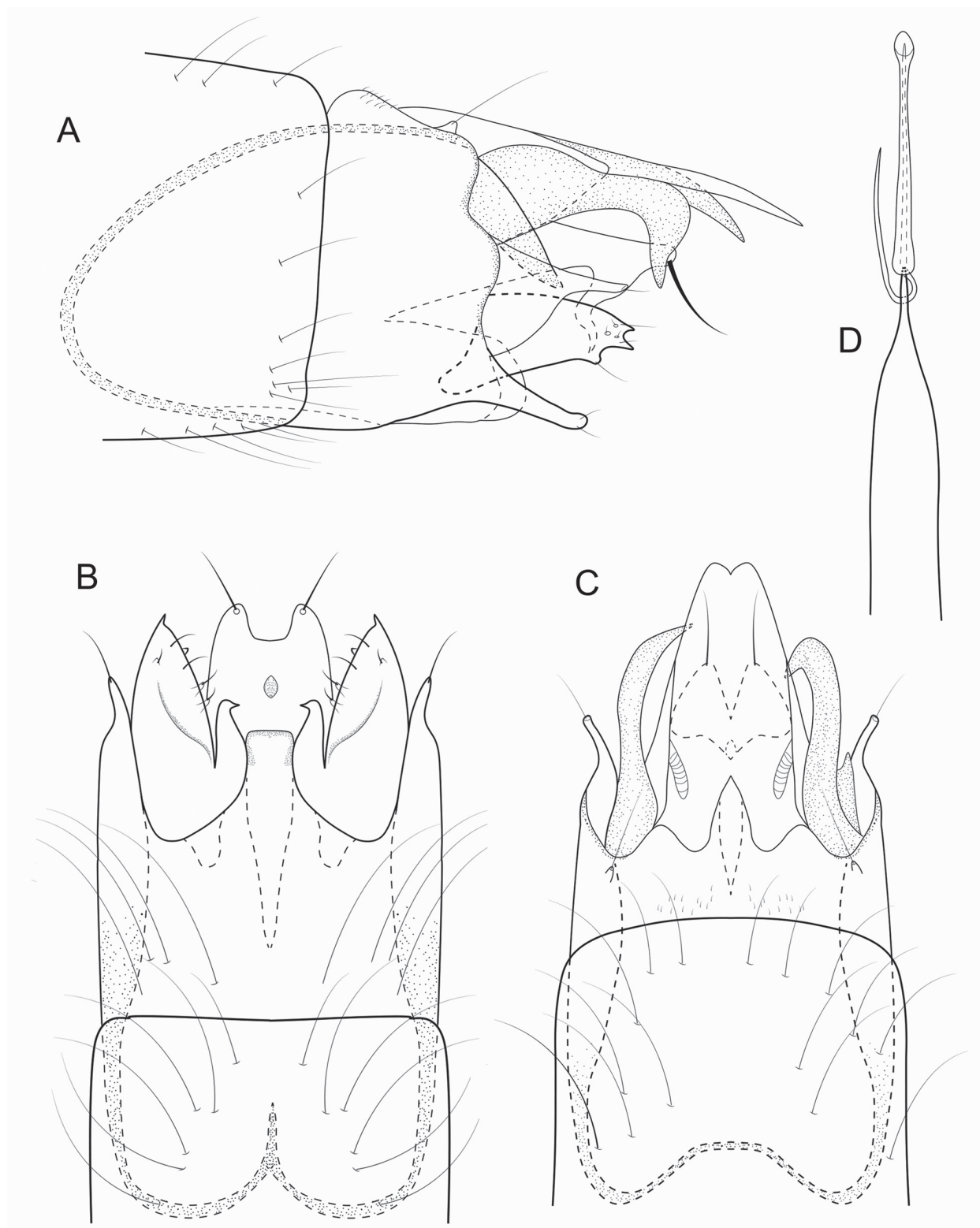


Figure 12. *Neotrichia yayas*, sp.n. Male genitalia. **A)** Lateral view. **B)** Ventral view. **C)** Dorsal view. **D)** Phallus apex, dorsal view.

