

INTERACTIVE KEY OF THE TRIBE TABANINI (DIPTERA:  
TABANIDAE) FROM PROTECTED AREAS IN COLOMBIA AND  
DESCRIPTION OF A NEW SPECIES OF TABANIDAE (DIPTERA)  
FROM COLOMBIA: *Tabanus chiribiquensis* sp. nov.

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UNIVERSIDAD INDUSTRIAL DE SANTANDER  
FACULTAD DE CIENCIAS  
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BUCARAMANGA

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Trabajo de grado para optar al título de Biólogo

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*To my family for their love and support.*

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## RESUMEN

**CLAVE INTERACTIVA DE LA TRIBU TABANINI (DIPTERA: TABANIDAE) DE ÁREAS PROTEGIDAS EN COLOMBIA Y DESCRIPCIÓN DE UNA NUEVA ESPECIE DE TABANIDAE (DIPTERA) PARA COLOMBIA *Tabanus chiribiquensis* sp. nov.\***

AUTOR: Juliette Cristina Gualdrón Díaz\*\*

PALABRAS CLAVE: Horse flies, Tabanini, taxonomía, genitalia femenina, nueva especie.

Proporcionamos una clave interactiva para las especies de la tribu Tabanini de áreas protegidas en Colombia. La clave está basada en caracteres morfológicos externos de hembras adultas, incluyendo caracteres de genitalia. La clave contiene 22 especies del género *Tabanus* y dos especies del género *Poeciloderas*. La clave usa 38 caracteres de cabeza, 23 de tórax, seis de abdomen y doce de genitalia para un total de 79 caracteres morfológicos. La clave y los archivos están disponibles en <https://www.dropbox.com/sh/i6kd1ppfi1z2l19/DQ-0hyjGNP> y se ejecuta en el programa open-delta (<http://code.google.com/p/open-delta/>). Asimismo, dibujamos y describimos la genitalia de once especies de la tribu, tres de estas fueron descritas por primera vez aquí: *P. allusiosis* Wilkerson, 1979; *T. aniptus* Fairchild, 1976 y *T. chiribiquensis* sp. nov. Adicionalmente, describimos una nueva especie de Tabanidae (Diptera), *Tabanus chiribiquensis* sp. nov., distribuida en Colombia, en los departamentos de Caquetá y Vaupés. Los caracteres diagnósticos son: Callo frontal como una cresta; frente estrecho, de lados paralelos; placa basal con una proyección como una espina; espina curva, nunca alcanzando el estilo. Ojos verdes. Ala opaca; bifurcación de la vena R4 sin apéndice. Abdomen bicolor; tergitos 1-4 naranja oscuro y 5-7 marrón oscuro. Cercos más anchos que largos, con pelos largos; hipoprocto más ancho que largo y furca genital basalmente cóncava.

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\*Proyecto de Grado.

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## ABSTRACT

### INTERACTIVE KEY OF THE TRIBE TABANINI (DIPTERA: TABANIDAE) FROM PROTECTED AREAS IN COLOMBIA AND DESCRIPTION OF A NEW SPECIES OF TABANIDAE (DIPTERA) FROM COLOMBIA: *Tabanus chiribiquensis* sp. nov.\*

AUTHOR: Juliette Cristina Gualdrón Díaz\*\*

KEYWORDS: Horse flies, Tabanini, taxonomy, female genitalia, new species.

We provided an interactive key to the species of the tribe Tabanini from protected areas in Colombia. The key is based on morphological characters of the adult female, including characters of genitalia. The interactive key contains 22 species belonging to the genus *Tabanus* and two species of the genus *Poeciloderas*. The key uses 38 characters from head, 23 from thorax, six from abdomen and 12 from genitalia to a total of 79 morphological characters. The key and files are available at <https://www.dropbox.com/sh/i6kd1ppfi1z2119/DQ-0hyjGNP> and runs on open-delta (<http://code.google.com/p/open-delta/>). Moreover, we drew and described the genitalia of eleven species of the tribe, three were described for first time here: *P. allusiosis* Wilkerson, 1979; *T. aniptus* Fairchild, 1976 and *T. chiribiquensis* sp. nov. Additionally, we described a new species of Tabanidae (Diptera), *Tabanus chiribiquensis* sp. nov., distributed in Colombia, in the states of Caquetá and Vaupés. Diagnostic characters are: frontal callus ridge-like; frons narrow, parallel-sided; basal plate with a spine-like projection, dorsal spine curved and never reaching the style. Eyes green. Wing fumose; fork of the vein R4 without appendix. Abdomen bicolor, dark orange on the tergites 1-4 and dark brown on the tergites 5-7. Cerci wider than long, with long hairs; hypoproct wider than long and genital furca basally concave.

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\*Undergraduate Project.

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## INTRODUCTION

Tabanidae (Horse-flies and Deer-flies) is a diverse family of true flies with worldwide distribution. It comprises about 4434 described species with 1205 occurring in the Neotropical region [1]. The tribe Tabanini comprises five genera from Neotropics, only two occur currently in Colombia: *Tabanus* Linnaeus, 1758 and *Poeciloderas* Lutz, 1921.

The genus *Tabanus* Linnaeus, 1758 comprises 1340 valid species worldwide [2] with 191 occurring in the Neotropical region [3]. *Tabanus* is the largest genus of Tabanidae in the Neotropical region. This is a diverse genus, their sizes vary among 8-27 mm and is characterized by having basicosta densely and entirely covered with setae, usually unpatterned wings and lacks of ocellar tubercle.

In Colombia, most studies on Tabanidae have consisted of ecological and parasitological aspects, but few studies have specifically addressed its taxonomic aspects. Bequaert & Renjifo-Salcedo [4], published the first study of the family in Colombia, and found two subfamilies, Tabaninae and Pangoniinae, 28 genera and 132 species (The subfamily Pangoniinae included members of the current Crysopsinae subfamily). They used all available information about Tabanids from the Museum of Comparative Zoology Harvard, the United States National Museum Washington, The Academy of Natural Sciences of Philadelphia and the American Museum of Natural History.

Lee *et al.* [5] listed 39 species known and 5 new records from the Río Raposo, on the Pacific coastal plain of Colombia. Tabanini was represented by only one genus with 12 species. After then, Wilkerson [6] collected and identified the fauna of Tabanids present in the Cauca, Valle del Cauca and Chocó states, providing a taxonomic key at the species level based on Fairchild [7] and describing 33 new species. He reported three subfamilies, five tribes, 29 genera and 218 Tabanidae species, 21 of them belonging to the tribe Tabanini. Recently, Piscioti [8], identified some species of Tabanids collected from the “Parque Nacional Natural Chiribiquete”, as part of her undergraduate project. She found three subfamilies, four tribes, 14 genera, 30 species and 34 morphospecies

(species undetermined).

The high intraspecific variation in this tribe has made her classification very difficult and confusing. The genus *Tabanus* has been divided into several complex or groups, on the basis of its morphology, without phylogenetic inferences. Fairchild [9] questioned the placement of species within these groups and encouraged the use of genitalia. We do not consider these groups herein because they have not been evaluated phylogenetically.

Most researchers have mainly used head, wing, abdominal characteristics and coloration patterns of the body for identification purposes. The use of genital characteristics at level of genus and species has been uncommon. Nevertheless, some papers have included genitalia characters to distinguish subfamilies and tribes [3, 10–16].

The purpose of this paper is to present an interactive key for the females of the species belonging of the tribe Tabanini from protected areas in Colombia, and include characters of genitalia for identification purposes. Additionally, we describe a new species.

## MATERIALS AND METHODS

The specimens studied were collected during the project “Insects Diversity of Colombia”. This project is a joint research among the Alexander von Humboldt Institute for Research on Biological Resources (IAvH), the Colombian National Natural Parks System (UAESPNN), the University of Kentucky (UK) and the Natural History Museum of Los Angeles County (LACM), with the support of National Science Foundation (NSF). The specimens were collected at several stations, located in areas protected by UAESPNN, using Malaise traps with ethanol as killing agent from January 2000 to November 2003. (Figure 1). We also examined the collections from the ICN (Instituto de Ciencias Naturales) and UdeA (Universidad de Antioquia).

The tabanids were classified and labelled. We only used females; the males were rarely collected. The last tergite was separated from the abdomen, rinsed in distilled water and dissected in 80% ethanol. Afterwards, the genitalia was softened in 10% Na-OH to remove the soft tissues. Finally, the genitalia was placed into vials with glycerin.

We examined characters of external morphology and genitalia. The morphological terminology follows McAlpine [17], Burger [18] and Cumming & Wood [19]. The specimens were determined at the level of species using the keys from Coscarón [16]; Fairchild [9, 20, 21] and Wilkerson [6]. The material studied was deposited in the IAvH’s collection.

The external morphology and genitalia were photographed using a Cannon EOS-05 camera attached to a Nikon SMZ1000 Stereomicroscope and a Nikon Eclipse Ni-U Microscope. The species distribution maps were produced using the R package “maptools” [22], “raster” [23] and “mapdata” [24]. To edit and draw the images, we used Inkscape [25] and GIMP [26].

The species names, characters, character states and data (such as comments, pictures and photos) were imported into Delta Editor [27] of The DEscriptive Language for

TAXonomy (DELTA) program [27, 28], The “toint” file was edited to select and score the characters used for the interactive key; we also modified the layout file to generate the descriptions and diagnoses of the species [29, 30]. DELTA and open-delta intkey were used to create the key [27, 28, 31]. All source files and images used in this publication are available at <https://www.dropbox.com/sh/i6kd1ppfi1z2119/DQ-0hyjGNP>. These files are under the GNU public v3.0. license.

## RESULTS AND DISCUSSION

We examined a total of 1801 specimens of the tribe Tabanini distributed in 22 states of Colombia. 95% were specimens from the IAvH's collection while 5% were specimens from the ICN or UdeA collections. 97% of the specimens belong to the genus *Tabanus* and 3% to the genus *Poeciloderas*. We found two species of *Poeciloderas* corresponding with the species that have been registered to Colombia.

In the genus *Tabanus*, we found 22 out of the 35 species of the checklists that were compiled by Bequaert & Renjifo-Salcedo [4] and Wilkerson [6]. Some species in these checklists present certain irregularities. For example, the information about locality in many species is incomplete or unknown (*T. bigoti* Bellardi, 1859; *T. colombensis* Macquart, 1846; *T. perplexus* Walker, 1850 and *T. peruvianus* Macquart, 1848). Besides, in Wilkerson's list (1979) appeared *T. fumomarginatus* Hine, 1920 as a new Colombian record however, there is not information about this species in the paper. Some other species (checklist) have been synonymized. Consequently, it is necessary to review whether all species proposed for the country are present, update the distribution and evaluate the taxonomy of the different groups.

In the figure 2, we present the distribution map of the species of the tribe Tabanini collected in the project "Insects Diversity of Colombia" and specimens examined in the collections ICN and UdeA.

### INTERACTIVE KEY

The interactive key contains 22 species belonging to the genus *Tabanus* and two species of the genus *Poeciloderas*. The key uses 38 characters from head, 23 from thorax, six from abdomen and 12 from genitalia to a total of 79 morphological characters of adult

female. It also presents diagnoses, brief descriptions, photos and pictures of some species. Moreover, notes explaining some characters and their states. We drew and described the genitalia of eleven species of the tribe, three were described for first time here: *P. allusiosis* Wilkerson, 1979; *T. aniptus* Fairchild, 1976 and *T. chiribiquensis* sp. nov.

The key includes subsets of predefined characters (external morphology, wing and genitalia). Therefore, if the user wants to use only a subset of characters, for example wing characters, she must click on this subset and only these characters will be available for the determination.

The key opens with the characters listed in in order of their merit for separating the taxa in the identification (the “best” order). The user can change the order clicking the ?natural? order button (i.e. as they are in the input file). The user can follow the list of characters in the order they appear (“best” order or “natural” order) or choose any character during the process of identification. Once the identification ends, all information associated with the identified taxon (or identified taxa) may be viewed by double clicking its (or their) name(s). For further information about DELTA or intkey, the user could consult [30].

## **CHARACTERS**

Our results with regard to the characters used in the taxonomy of Tabanini were in accordance with previous articles Coscarón [16], Coscarón & Papavero [3], Fairchild [9, 20, 21] and Wilkerson [6]. We agree that the diagnostic characters of the most of species are: antenna, subcallus and callus, wing and patterns of coloration of the abdomen and legs. Although the pattern of color are widely used for the identification in Tabanidae, we assigned low score to most of them, due to all colors have faded in the specimens that had been preserved for long time.

Genitalia characters achieved to discriminate at the subfamily and species level. Genitalia characters help to separate and determine species with morphologically similar external characters. The characters with greater variation and that could be used to

distinguish the species are: Shape of the cerci, the genital furca and VIII sternite + gonapophyses.

## TAXONOMY

We can recognize the Tabanini tribe from Diachlorini using the following combination of characters: Basicosta with setae as dense and long as on costa, absent or few developed ocellar tubercle and ocelli and wings without extensive dark patterns. Nevertheless, some genera in the Diachlorini tribe, as *Leucotabanus* Lutz, 1913; *Stypommisa* Enderlein, 1923 and *Dicladocera* Lutz, 1913 may have also the basicosta with setae as in the same way that in the tribe tabanini. However, these genera have ocellar tubercle, clouded wings and sometimes vestigial ocelli (never developed).

The genus *Poeciloderas* is easily identified by having clouds areas on the crossveins, a small ocellar tubercle and the dorsal anterior margin of the scape longer than the style. The genus *Tabanus* is characterized by having basicosta with setae, usually unpatterned wings and lacks of ocellar tubercle.

Regarding genitalia, the characters show differences at the level of subfamily and species, but it is not informative enough to separate the two genera of the tribe Tabanini. According to previous studies [3, 10–13, 15], the subfamily Tabaninae can be separated from other subfamilies by having mushroom-like expansions in the caudal ends of spermathecal ducts. At the species level, the main differences in the species of the tribe Tabanini are in the shape of the cerci, the genital furca, and the VIII sternite.

As a brief summary we consider that this work attempts to provide a useful tool for the determination of species of the tribe Tabanini. It also provides a short summary of the current knowledge concerning this group in Colombia, and tries to promote the use of genitalia as taxonomic characters. Major taxonomic problems are underlined and solutions are proposed. The results of this study encourage future research into the taxonomy and phylogenetic relationships of Tabanidae in Colombia.

## NEW SPECIES

*Tabanus chiribiquensis* sp. nov. (Figs. 3- 4).

**Diagnosis.** Frontal callus ridge-like, extending three-quarters length of frons. Frons narrow, parallel-sided. Basal plate with a spine-like projection, dorsal spine curved and never reaching the second flagellomere. Wing fumose, fork of the vein R4 without appendix. Abdomen bicolor, dark orange on the tergites 1-4 and dark brown on the tergites 5-7. Cerci wider than long.

**Description.** Female. Body length (without antenna) 15.5-18mm, length of the wing 14.61-17.0mm, frontal index 6.78-7.42.

*Head.* (Fig. 3B, 3C) Antennal scape and pedicel reddish brown with black hairs; basal plate and style black with reddish brown at extreme base. Antennal scape enlarged, cap-like. Distal edge of the scape narrower than the basal plate. The base of the pedicel narrow and large, as a petiole. Basal plate twice or less the length of the style, with spine-like projection. Dorsal spine curved, not reaching the first flagellomere. Vertex with a small shiny area. Eyes green. Frons narrow, parallel-sided with yellow pruinescence. Basal and median callus linked. Basal callus clavate, not touching eyes and shining reddish brown. Median callus more than the half of the length of frons. Subcallus flat and pruinose with yellow pruinescence. Gena grayish, with white hairs. Proboscis black, longer than the palpus. Palpus white, slender and with black hairs.

*Thorax.* (Fig. 3A) Bicolor, mesonotum black, with black hairs. Notopleural lobe reddish-brown. Scutellum black. Black legs, with black hairs. Wing fumose, without clouded areas. Vein margins tinted. Costal cell brownish. R5 cell open, veins R5 and M1 parallel. Stigma dark brown. Fork of the vein R4 without appendix.

*Abdomen.* (Fig. 3A) Abdominal tergites bicolor, dark orange on the tergites 1-4 and dark brown on the tergites 5-7.

*Genitalia.* (Fig. 4) Cerci wider than long, with long hairs. Hypoproct wider than long. The sternite VIII longer than wide with long black hairs. Base of sternite VIII as wide as gonapophyses. Gonapophyses with a medial notch. Genital furca basally concave, without two projections. Spines of upper portion of furca short. Distal edge of the spermatheca acuminate. End of spermathecal ducts with mushroom-like expansions.

Male. Unknown.

**Distribution.** Caquetá and Vaupés. (Fig. 5).

**Type material.** **Holotype** female: Colombia, Caquetá, PNN Chiribiquete, Río Saramano, 0°9'N 72° 37'W, 300 m. Ap. 9-13/2000, Malaise. E. González, leg M480.

**Paratypes.** Caquetá, PNN Chiribiquete, Río Saramano locality, 4 females, Apr. 9-13/2000; 6 females, Apr. 11-15/2000; Cuñare-amu locality, 3 females, Feb. 19-22/2001; Mar. 7-10/2001. Vaupés, Estación Caparú, Mosiro-Itajura, Antigua Cabaña Locality, 1 female, Feb. 1-9/2003; 1 female, Mar. 27- Apr. 3/2003. Centro Ambiental locality; 12 females, Jan. 20- Feb. 1/2003.

**Etymology.** The specific name is derived from the locality of type.

**Discussion.** This species was compared with species belonging to Bigoti group, that are morphologically close. *T. chiribiquensis* may be distinguished by the following characters. It has a long dorsal spine rather than a short antennal tooth as present in *T. bigoti* Bellardi, 1859. *T. thiemeanus* Enderlein, 1925 and *T. surifer* Fairchild, 1964 present a short dorsal spine. This spine does not reach the half of the length of the basal plate. In *T. chiribiquensis*, the spine overtakes the half of the length of the basal plate. The antennal tooth never reaches the flagellomeres in *T. chiribiquensis*, while in *T. macquarti*, Schiner, 1868 reaches the flagellomeres. *T. chiribiquensis* has the fork vein R4 without appendix; on the contrary, *T. hirtitibia* Walker, 1850; *T. surifer* and *T. thiemeanus* show an appendix on the fork vein R4. *T. chiribiquensis* has the abdomen orange on the tergites 1-4 and dark brown on the tergites 5-7 and without spots. Instead, *T. macquarti* has vestiture of the abdomen mainly black-haired with median orange-haired triangles on tergites 1-5, *T. hirtitibia* has the abdomen with middorsal black stripes or triangles and *T. weyrauchi* Barreto, 1949 has the abdominal tergites light brown with yellowish lateral triangles.

The new species was not assigned to any complex. We consider that such decision must be based on a phylogenetic study, in order to know whether the groups or complex represent monophyletic units.

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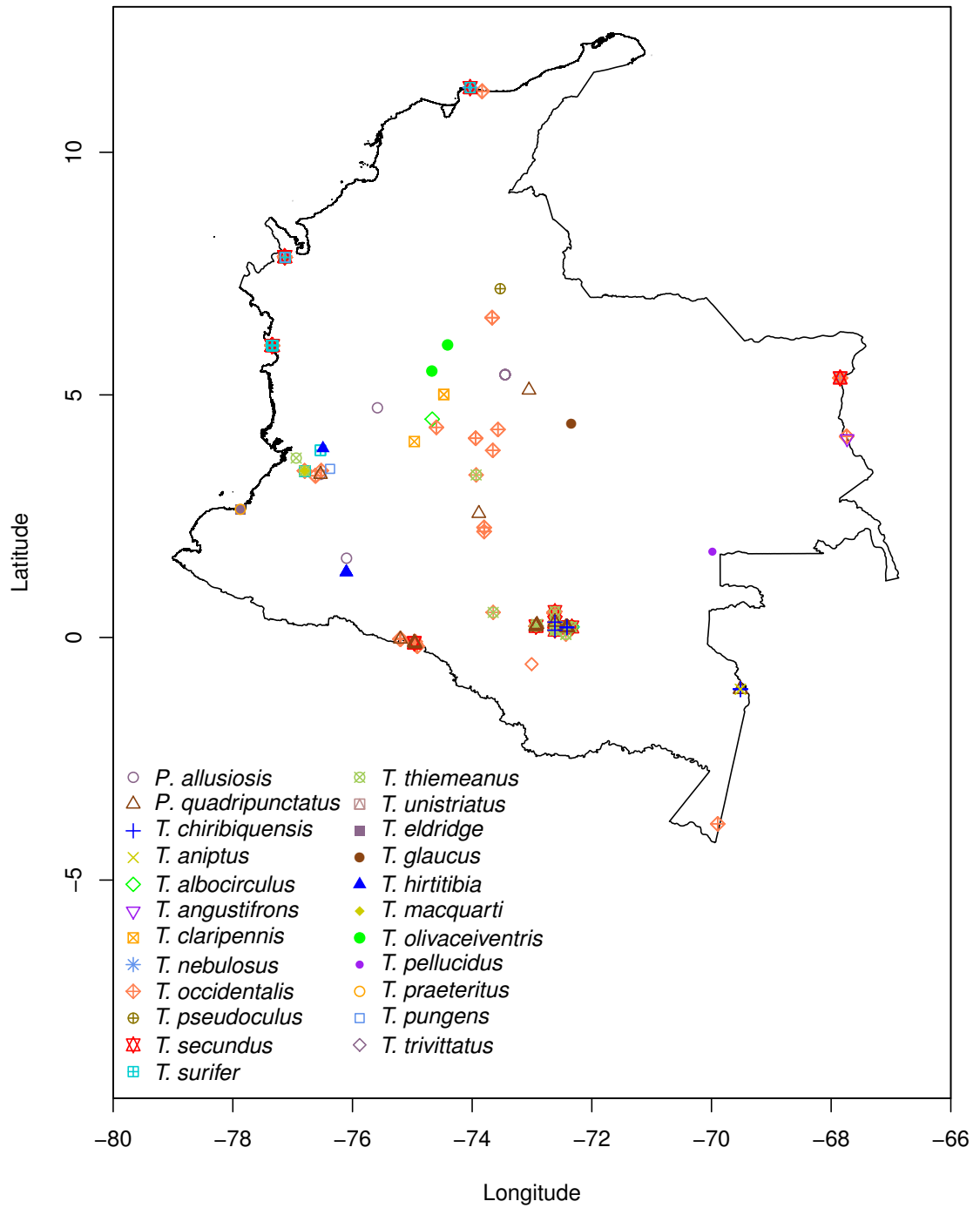
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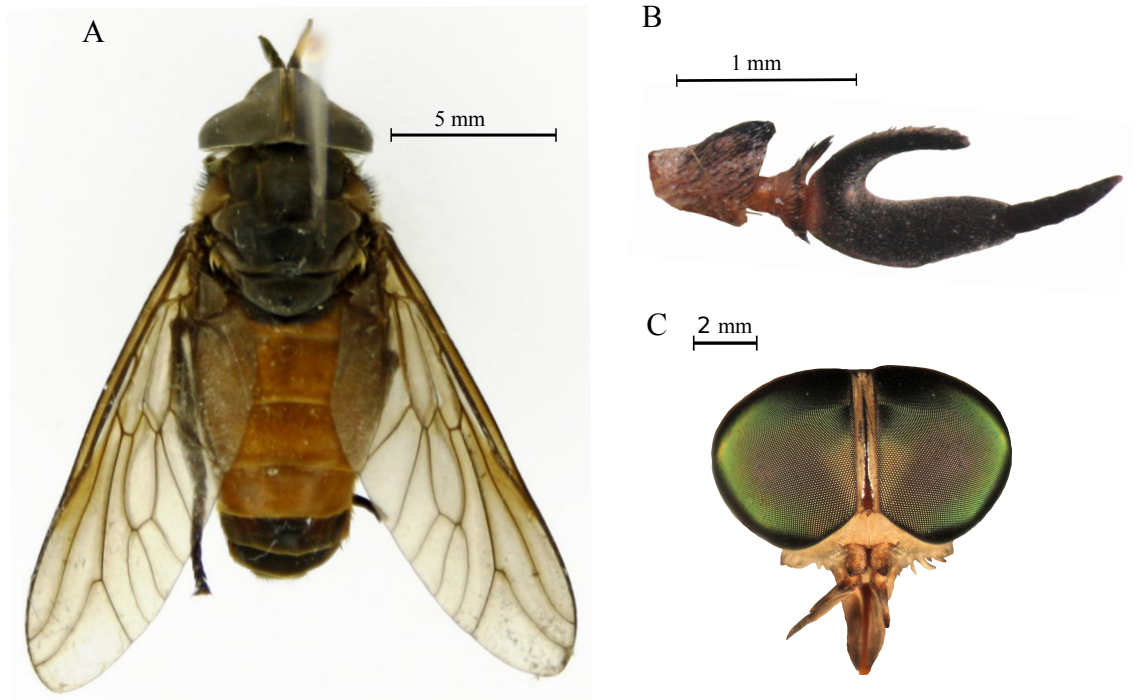
## FIGURES



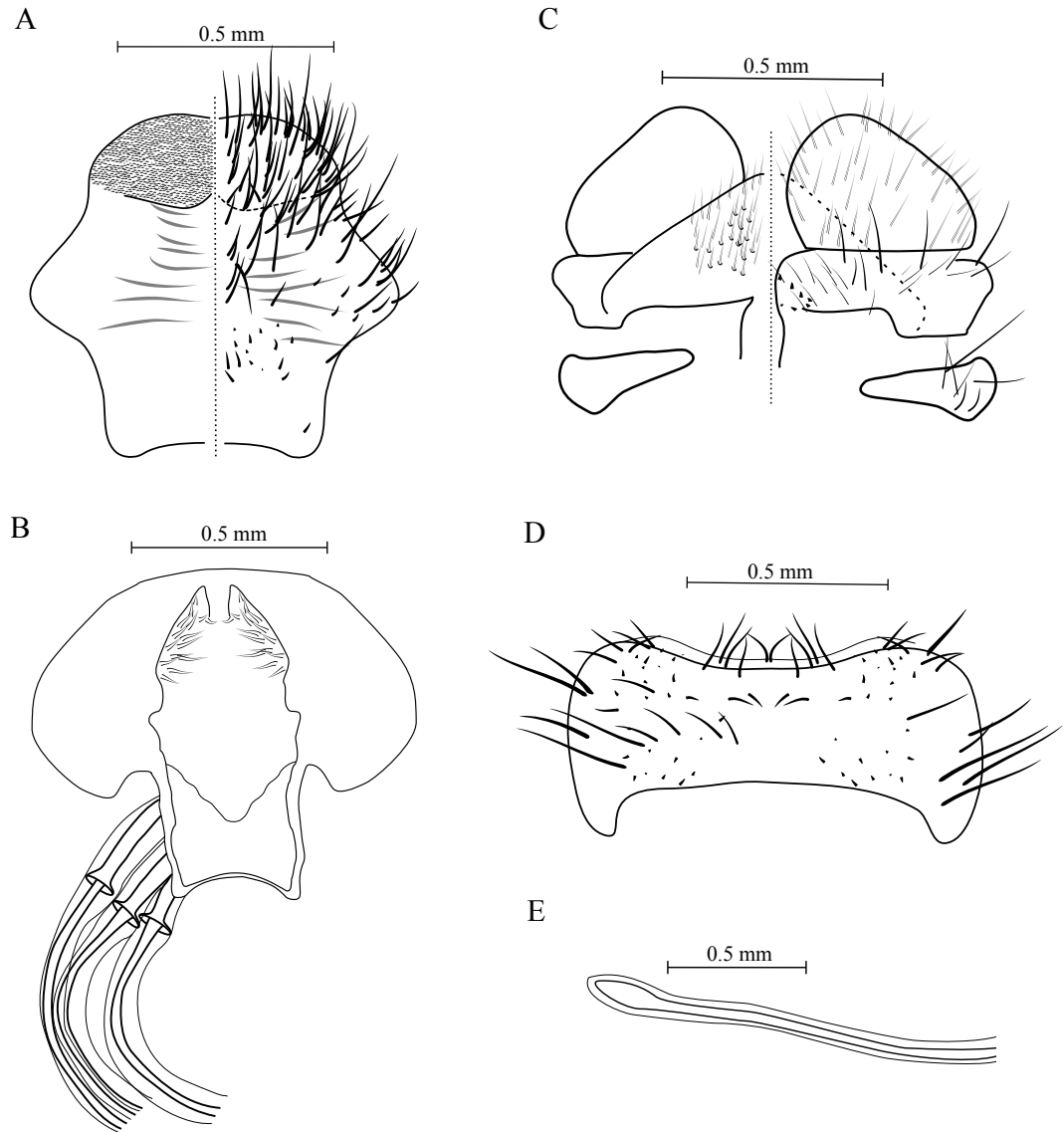
**Figures 1.** Project “Insects Diversity of Colombia”, stations located in protected areas by UAESPNN.



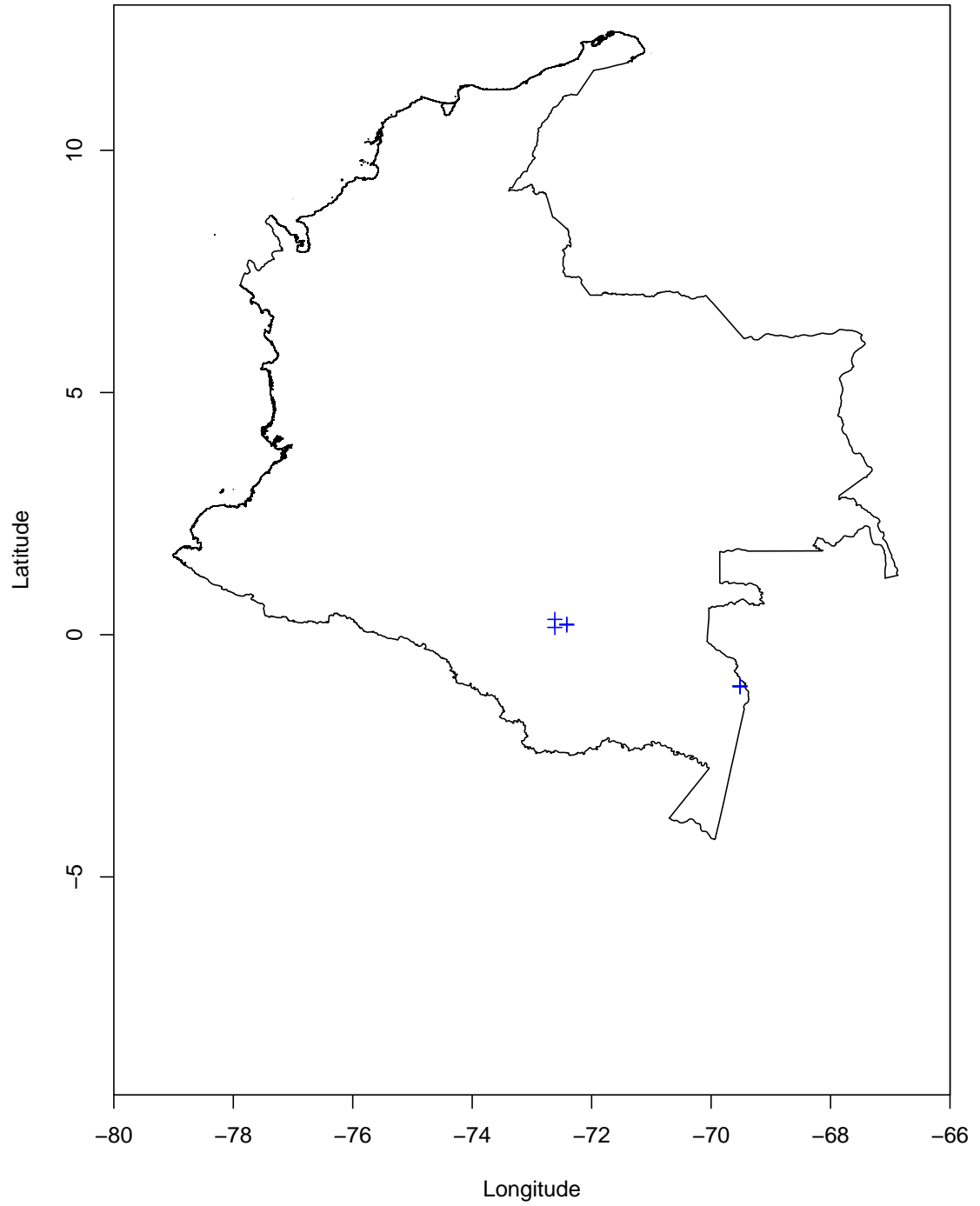
**Figures 2.** Distribution map of the species of the tribe Tabanini collected in the project “Insects Diversity of Colombia” and specimens examined in the collections ICN and UdeA.



**Figures 3.** *Tabanus chiribiquensis*. sp. nov. A, body (dorsal view); B, antenna (lateral view); C, head (anterior view).



**Figures 4.** *Tabanus chiribiquensis*. sp. nov. Paratype, Genitalia. A, Sternite VIII and gonapophyses (ventral and dorsal views); B, Genital furca and spermathecal ducts (dorsal view); C, Tergites nine and ten, cerci and hypoproct (ventral and dorsal views); D, Sternite nine (dorsal view); E, Spermatheca.



Figures 5. Distribution map of *Tabanus chiribiquensis* sp. nov. in Colombia.