

# A Concise Guide to the Bionomics and Key Morphological Characteristics for Identifying *Culex coronator* (Dyar and Knab, 1906)—an Invasive Mosquito Species from the Neotropics<sup>1</sup>

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## Abstract

*Culex coronator* Dyar and Knab is a highly invasive Neotropical species, first described at the beginning of the 20th century in Trinidad and Tobago (Dyar and Knab 1906). This is an important invasive species in Florida, which needs to be carefully surveilled by mosquito control experts.

## Intended Audience and Purpose

This is the general species information page of *Culex coronator* for mosquito control professionals, students, scientists, and the general public.

## Neotropical Region (Nearctic Region) and Part of the United States

### [Global Invasive]

**Family:** Culicidae

**Subfamily:** Culicinae

**Tribe:** Culicini

**Genus:** *Culex*

**Subgenus:** *Culex*

**Group:** *coronator*

## Brief Species Description

*Culex coronator* Dyar and Knab is a neotropical species that has been introduced to Florida and the southeastern United States. The species was first described at the beginning of the 20th century in Trinidad and Tobago (Dyar and Knab 1906). *Culex coronator* is the nominate

member of the *Culex coronator* complex, a group of five cryptic sibling species. The *Culex coronator* complex includes *Culex coronator s.s.*, *Culex camposi* Dyar, *Culex ousqua* Dyar, *Culex usquatissimus* Dyar, and *Culex usquatus* Dyar (Bram 1967). All species of the *Culex coronator* complex have a prominent crown of spines close to the apex. These species are distributed across much of the Neotropics (Bram 1967; Wilke et al. 2020). They have expanded their distribution to most of the Americas where they can occur in sympatry. The sibling species can only be differentiated by characteristics of the male genitalia, while females and immature stages are morphologically indistinguishable (Laurito et al. 2018; Demari-Silva et al. 2017). Recent morphological and molecular evidence suggests that these five species are synonyms of *Culex coronator*, rather than five distinct species, and they represent a single polymorphic species (Laurito et al. 2018). *Culex coronator*, in its native range, has been infected with St. Louis encephalitis virus (Anderson et al. 1957) and Venezuelan equine encephalitis virus (Burguete et al. 1973). Recently Zika virus has been detected in the saliva of wild-caught females of this species (Elizondo-Quiroga et al. 2018). However, its role in the transmission of these viruses to humans is unknown.

## Type Locality

Trinidad and Tobago

## Etymology

*Culex* from Latin (gnat, mosquito)

*coronator*, Dyar and Knab 1906: *coroner* = “crown” in Latin; informal name: “crowned Trinbagonian typical mosquito” (Wilkerson et al. 2021)

*coronator* subspecies: *mooseri* Vargas & Martínez Palacios 1954 (Bram 1967); synonymous with *coronator* (Wilkerson et al. 2021)

*camposi* Dyar, 1925: *campo*—“field” in Portuguese; informal name: “campos Ecuadorian typical mosquito” (Wilkerson et al. 2021)

*ousqua* Dyar, 1918: squalid/foul/filthy in Portuguese; *ousia* = “lively” in Latin; Informal name: “Lively Panamanian Typical Mosquito” (Wilkerson et al. 2021)

*ousqua* subspecies *albertoi* Anduze 1943; synonymous with *ousqua* (Wilkerson et al. 2021)

*usquatissimus*, Dyar 1922: most ancient or old in Portuguese; Informal name: “Large Panamanian Typical Mosquito” (Wilkerson et al. 2021)

*usquatus*, Dyar 1922: whiskey/aged; Informal name: “Whiskey Surinamese Typical Mosquito” (Wilkerson et al. 2021)

## Type Depository

Global Biodiversity Information Facility (Copenhagen, Denmark). Available at:

<https://www.gbif.org/species/1653144> (Bánki et al. 2021)

National Ecology Observatory Network (NEON) Biorepository Data Portal (Arizona State University, USA). Available at: <https://biorepo.neonscience.org/portal/>

National University of Cordoba, Cordoba Argentina

## Diagnostic Characters

### Adult

*Culex coronator* is a medium-sized mosquito. The adults are a drab, brownish color (Figure 1). The mesonotum is brown and lacks ornamentation. Much of the body is covered with brown, black, or pale white scales. The presence of obvious pale bands on the hind tarsi of the adult male and female is a notable morphological character, and in Florida, *Culex coronator* adults can be distinguished from other *Culex* subgenus *Culex* species by the presence of these bands and absence of a complete ring of pale scales on the proboscis, although they may have a pale patch on the underside. *Culex coronator* is somewhat variable in its morphological appearance and coloration. In Florida, the only other *Culex* subgenus *Culex* species with apparent bands of pale scales on the hind tarsi are *Culex bahamensis* and *Culex tarsalis*. *Culex bahamensis* occurs only in the far southern Florida Peninsula and the Florida Keys, while *Culex tarsalis* has been recorded at scattered locations across Florida but is very rare in the state. Both *Culex bahamensis* and *Culex tarsalis* have a complete ring of pale scales on the proboscis, and this character distinguishes them from *Culex coronator*.



Figure 1. *Culex coronator*.

Credit: L. E. Reeves, UF/IFAS

### Head

Head with dark erect forked scales dorsally. Occiput with narrow golden scales and bordered with a patch of broad white scales laterally (Figure 2). As in most mosquitoes, the antennae of the male are substantially larger and bushier than those of the female.

### Palpus

Palpus without pale scales. The palps of the female are short and entirely dark-scaled (Figure 2).

### Proboscis

The proboscis is mostly covered in dark scales with a ventral median area of pale scales that does not form a complete ring; costal and subcostal (Figure 2).



Figure 2. Head and thorax of a *Culex coronator* female.

Credit: L. E. Reeves, UF/IFAS

### Thorax

The integument of the thorax is brown. The scutum is covered with narrow, golden-brown scales. The mesepimeron and meskatepisternum have small patches of white scales, and, in most specimens, patches of brown

integument darker than the background color of the integument above or below the patches of white scales.

## Legs

The hind tarsomeres are ringed with distinct white bands (Figure 3). The white bands are both basal and apical bands, connecting where the tarsomeres meet.

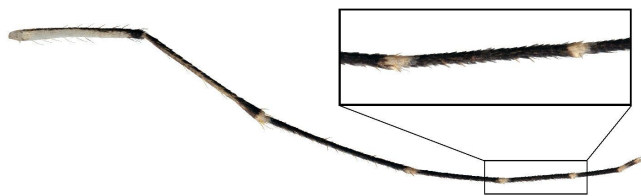


Figure 3. A leg of *Culex coronator*; inset showing a closeup of the tarsal bands.

Credit: L. E. Reeves, UF/IFAS

## Abdomen

Dorsally, the abdomen is covered in black and white scales (Figure 1). White scales form conspicuous basal bands across each tergite that broaden laterally to form lateral patches of pale scales. The sterna are mostly white, though there is some variability in the extent of patterning with darker scales. The abdomen is black with basal white or pale bands of scales; abdominal sterna without dark triangles.

## Wings

The veins of the wings of *Culex coronator* are covered in narrow, dark scales, typical of species of *Culex* subgenus *Culex*; costal and subcostal veins, dark scaled. Wing characteristics are not needed to key out this species (Figure 4).



Figure 4. *Culex coronator* wing.

Credit: A. L. Romero-Weaver, UF/IFAS

## Larva

Antennal tuft located in a constriction near the outer third; antennal shaft spiculate basally (Figure 5A).

Head hair, the upper in four or five, the lower in three or four (Figure 5B).

Postclypeal head hair 4 short, single; upper and lower frontal head hairs 5 and 6 long, three or four branched, and barbed; preantennal head hair 7 long, multiple, and barbed.

Mentum with about 15 teeth; the apical tooth is broader and longer than the lateral teeth.

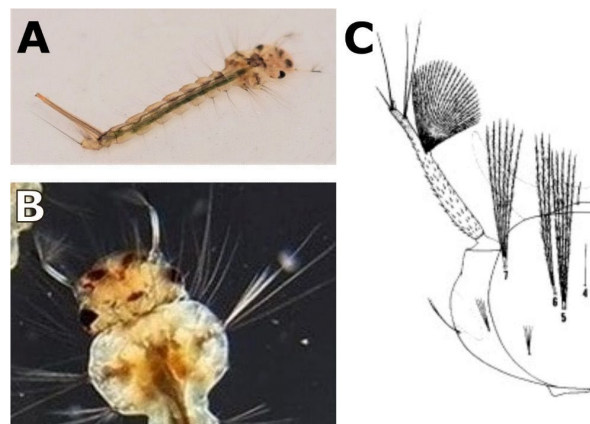


Figure 5. A) *Culex coronator* larvae, whole body; B) *Culex coronator* head and thorax of larvae; C) Illustration of *Culex coronator* head.

Credit: A) Emmanuel Rodriguez Rojas, National Technological University, Alajuela Costa Rica; B) Walter Ishikawa; C) Carpenter and LaCrosse (1955)

**Thorax** spiculate. Comb with many scales in a patch; each scale rounded apically and fringed with subequal spinules.

**Anal segment** spiculate, completely ringed by the saddle, moderate gills.

Siphon long and thin, siphonal index 8.0 to 9.0; four double siphonal tufts inserted on the siphon beyond the pecten; a crown of prominent spines is present before the apex of the siphon of most specimens, with some variability.

Pecten with 8 to 14 teeth on the basal fourth of the siphon; each tooth with two to five coarse barbs on one side. The saddle on segment X with distinct spicules on the posterolateral margins (Figure 6).

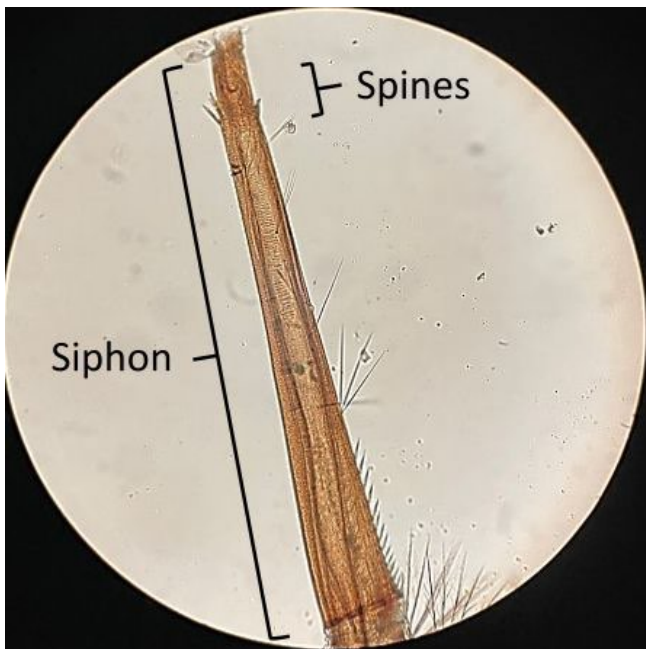


Figure 6. Shown here a crown of prominent spines before the siphon apex of *Culex coronator*.  
Credit: Michael T. Riles, used with permission

## Taxonomic Keys

Dyar and Knab 1906

Bram 1967

Clark-Gil and Darsie 1983

Darsie and Ward 2005

Harrison et al 2016

Laurito et al. 2018

## Exemplar DNA Sequences

### Taxonomy ID 526217

Genbank ID: MF040162.1 (*Culex coronator* isolate RS10\_109 mitochondrion, complete genome; source = Rio Grande do Sul, Brazil)

## Bionomics

### Immatures

*Culex coronator* females lay rafts of eggs in diverse natural and artificial microhabitats including swales, roadside ditches, animal water troughs, forest ponds, and rock pools (Dyar and Knab 1906; Goddard et al. 2006; Varando et al. 2012). Artificial water-holding containers including trash cans and car tires have also been reported as larval habitats (Yee et al. 2012).

## Adults

*Culex coronator* can be found in sylvatic, rural, urban, domestic, and suburban habitats. Females of this species are predominantly nocturnal, and blood feed primarily upon large mammals such as white-tailed deer and horses (Almiron and Brewer 1995; Reyes-Villanueva et al. 2006) although they can also blood feed from birds (Mackay et al. 2008). They are low anthropophilic (Carpenter and Lacasse 1955; Consoli and Lourenco-de-Oliviera 1994).

## Associated Pathogens

*Culex* Flavivirus (Miranda et al. 2019)

Ilheus virus (unpublished data reported in Turell et al. 2005)

St Louis encephalitis virus (Aitken et al. 1964; Turell et al. 2005)

Venezuelan equine encephalitis virus (Burguete et al. 1973)

West Nile virus (Mackay 2007; Kelly et al. 2008; Unlu et al. 2010)

Zika virus (Elizondo-Quiroga et al. 2018)

## DISTRIBUTION NOTES (Bram 1967; Sames et al. 2021)

*Culex coronator* is native to Argentina, Belize, Bolivia, Brazil, Colombia, Costa Rica, Chile, Ecuador, El Salvador, Guatemala, Guyana, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Suriname, United States, Uruguay, and Venezuela (Figure 7). Between the 1920s and 1970s, *Culex coronator* was reported from several states in the western and central United States (Arizona, New Mexico, Louisiana, Mississippi, Oklahoma, and Texas). In the early 2000s, the species expanded its United States distribution eastward, and in 2000s and 2010s, it was reported for the first time as far east as Florida and Virginia (Sames et al. 2021).



Figure 7. *Culex coronator* distribution.  
Credit: UF/IFAS

## Available GIS Models

None as of December 2021.

## Current Synonyms

*Culex camposi*, *Culex ousqua*, *Culex usquatissimus*, *Culex usquatus*

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## Conflict of Interest

The authors declare no conflict of interest. The funders had no role in the writing of the manuscript, or in the decision to publish.

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