CUPIENNIUS REMEDIUS NEW SPECIES
(ARANEAE, CTENIDAE), AND A KEY FOR THE GENUS

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ABSTRACT. A new representative of the neotropical genus Cupiennius Simon 1891 (Araneae, Ctenidae) was found in the highlands of central Guatemala. Cupiennius remedius new species is the ninth species established for the genus. Like all other species of Cupiennius, C. remedius is a hunting spider living in close association with monocotyledonous plants where it hides in a retreat during the day and is active at night. C. remedius is of medium size (carapace length ca. 8 mm) compared to the other species of the genus and is the only Cupiennius species known to live sympatrically with C. salei. Live animals show a spotted coloration pattern unusual for the genus. The distinctive features of the male bulb and female epigyna are described and an example is given of the species-specific courtship vibrations. In addition, we provide a revised key for the genus Cupiennius.

When we first revised the genus Cupiennius Simon 1891 (Lachmuth et al. 1984) the genus contained 21 nominal species. Seven species from Central America (including northern Colombia, Cuba, Haiti, and Jamaica) were recognized by the structure of their genital organs. Six of the seven species (the exception being C. granadensis (Keyserling 1877)) have been bred successfully in the laboratory.

Among the species excluded from the genus Cupiennius Simon 1891 (Lachmuth et al. 1984) the genus contained 21 nominal species. Seven species from Central America (including northern Colombia, Cuba, Haiti, and Jamaica) were recognized by the structure of their genital organs. Six of the seven species (the exception being C. granadensis (Keyserling 1877)) have been bred successfully in the laboratory.

A particular incentive for the clarification of the taxonomy of Cupiennius is the importance of some of its representatives in studies in sensory and behavioral physiology (Barth 1985, 1993; Barth et al. 1993a,b, 1995; Humphrey et al. 1993; Lachmuth et al. 1984; Land & Barth 1992; Strausfeld & Barth 1993). An extensive study of problems in reproductive isolation of the species (Barth 1993) also prompted a PCR-analysis of DNA-sequences which provided evidence for the polyphyly of the family Ctenidae to which the genus Cupiennius is assigned (Huber et al. 1993).

Cupiennius remedius new species was found in 1992 while searching for C. salei (Keyserling 1877) in the highlands of central Guatemala at the Finca Remedios (Fig. 1). C. remedius is the only species of the genus known to live sympatrically with C. salei. The present study describes the new species and in addition provides a revised key for the genus. The key also considers some new aspects.

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Figure 1.—The location of Finca Remedios in Guatemala (Alta Verapaz) where *Cupiennius remedius* new species was found.

which have emerged from many years of research in the field and in the laboratory as well as from breeding most of the species.

*Cupiennius remedius* new species

Figs. 1–5, 13

**Types.**—Male holotype, two male and four female paratypes were collected at the Finca Remedios on 12 February 1992 (F.G. Barth, R. Felber). One of the spiders was collected as a juvenile and developed into an adult male in the laboratory. The holotype and one female paratype are in the arachnological collection of the Senckenberg Museum, Frankfurt am Main, Germany. The other paratypes remain in the collection of the Zoology Department of the University of Vienna, Austria.

**Etymology.**—The name of the new species refers to the type locality, i.e., Finca Remedios.

**Diagnosis.**—Morphologically, *C. remedius* forms a group together with *C. foliatus* EP-Cambridge 1901 and *C. panamensis* Lachmuth et al. 1984, of which it is the largest (Fig. 2). The spotted appearance of its habitus is unique among all known species of *Cupiennius* (Fig. 3). In addition, male *C. remedius* differ from male *C. foliatus* by the terminal apophysis of their bulbs which is not elevated at the embolic base (stipes-embolus) as it is in *C. foliatus* (Figs. 30, 31). Regarding the females, a prominent difference between *C. remedius* and *C. foliatus* is the shape of the lateral plates of the epigynum at their anterior end (Fig. 14a). Apart from the spotted habitus, the lateral plates of the epigynum also distinguish *C. remedius* from *C. panamensis*. In *C. remedius*, the lateral plates are not continuous with the median septum (Fig. 14a). Whereas the vulvae are strikingly similar in *C. remedius* and *C. foliatus* (Fig. 22), the shape of the seminal ducts leading to the seminal receptacles clearly differs between *C. remedius* and *C. panamensis* (Figs. 21, 22). The strong twisting of the seminal ducts of the first receptacles in *C. remedius* and *C. foliatus* is very conspicuous but typical of *C. salei* as well (see Figs. 15, 22).

![Figure 2](image-url)
Figures 3–5. *Cupiennius remedius* new species. 3, Adult female, feeding on a fly; 4, Epigynum of female paratype, ventral view; 5, Bulb and terminal parts of embolus of male holotype, ventral view. Scale = 0.5 mm.
Figures 6–12.—Schematized view of the ventral body of different species of Cupiennius to show diversity of ornamental patterns (see arrows). 6, C. salei; 7, C. coccineus; 8, C. getazi; 9, C. cubae. 10–12. Smaller Cupiennius species, range of pattern variability (12, C. panamensis).

Description.—**Males**: Prosoma 7–9 mm long (\( \bar{x} = 8.2 \) mm, Fig. 2), medium brown with a patchy pattern dorsally (Fig. 3). Opisthosoma dorsally medium brown with light brown markings along the cardiac mark; ventrally light with a slight brown indication of a narrow median stripe or with a distinct dark and narrow median stripe (Figs. 10, 11), variable. Legs light brown without ring-shaped patterns; femur clearly lighter than the other leg segments; tarsus, metatarsus, and tibia covered by conspicuous long thin hairs ventrally and laterally. Pedipalps medium brown with a short tibial apophysis typical of the genus. Bulb (Fig. 5) with its prominent median apophysis slightly curved with a round terminal and a large shovel-like lateral process; conductor largely flat and tip bent towards tegular apophysis; terminal elements (Fig. 30): embolic apophysis distinctly curved, terminal apophysis leaf-like and covering the embolic opening.

**Females**: Prosoma 7.4–9.3 mm long (\( \bar{x} = 7.9 \) mm, Fig. 2), medium brown with a light brown, patchy pattern dorsally (Fig. 3). Opisthosoma dorsally medium brown with light brown markings along the cardiac mark; ventral side light with a dark narrow median stripe (Figs. 10, 11). Legs medium to light brown with distinct annular patterns (Fig. 3). Epigynum (Fig. 4) with narrow median septum slightly narrowing distally and dividing into two parts proximally (bordering the lateral plates), its Y-shape similar to that of C. foliatus; lateral plates elevating towards median septum and connecting to the border of the epigynal plate antero-laterally; vulva with more or less ball-shaped first receptacles and seminal ducts strongly winding dorsally and proximally (Fig. 22).

**Courtship behavior**.—*Cupiennius remedius* is the seventh among all known species of the genus (together with C. salei, C. getazi Simon 1891, C. coccineus EP-Cambridge 1901, C. cubae Strand 1910, and C. foliatus) which has been shown to be a biospecies. We have bred *C. remedius* in Vienna and also observed its courtship behavior. As known from extensive studies with other species of *Cupiennius* (Barth & Schmitt 1991; Barth 1993), the vibrations exchanged between male and female during courtship are important in the reproductive isolation of the species; and it is in particular the male courtship vibration which helps the female to...
Figure 14.—Ventral view of epigyna of the females of all nine species of *Cupiennius*. Note two groups a and b which differ with regard to the way in which the lateral plates are connected to the epigynal plate antero-laterally. See Fig. 3 for nomenclature of various parts. Modified and adapted from Lachmuth et al. 1984 and from Brescovit & von Eickstedt 1995 (*C. celerimimus*).

Figures 15–22.—Epigyna of the females of the nine *Cupiennius*-species. Seen in dorsal view (from inside) and showing the seminal receptacles I and II (RI, RI), the seminal duct (SD) and the fertilization duct (FD). Modified and adapted from Lachmuth et al. 1984 (Figs. 15–19, 21, 22) and Brescovit & von Eickstedt 1995 (*C. celerimimus*).
recognize its conspecific partner. In *C. remedius* the male vibration results from up and down movements of the opisthosoma (without touching the substrate; Dierkes & Barth 1995) and does not come in series of syllables as in *C. coccineus*, *C. getazi*, and *C. salei* (Barth 1993). Instead it is a single syllable resulting from a short bang of the pedipalps onto the dwelling plant followed by just one or two cycles of the opisthosomal movement (Fig. 13). The main frequency components are around 30 Hz in case of both the male vibration and the female response.

**Distribution.**—Until now, *C. remedius* was known only from the type locality. The Finca Remedios is located in the Departamento Alta Verapaz near Coban at an altitude of about 700 m (Fig. 1) and with the climate typical of the “tierra templada” (Barth & Seyfarth 1979; Barth et al. 1988). All animals were collected at the edge of a banana plantation 4 km east of the finca house and close to a small brook and an unpaved road. The spiders all sat behind the trough-shaped basal parts of banana leaf sheaths which are typical retreats of other species of *Cupiennius* as well (Barth et al. 1988).

**KEY TO THE SPECIES**

The following key includes the description of the coloration patterns, typical of living representatives of the species. In the larger species, this permits determination of the species even for subadult specimens. The coloration may be indistinct or even absent in preserved specimens. Then the shape of the epigynum, vulva and bulbal sclerites is of major importance. Especially the smaller species of *Cupiennius* have an indistinct or variable coloration pattern on their body and legs. Their determination is possible only by dissecting the vulva (females) or looking at small details of the male bulb. The key includes all important features of the genitalia already described in Lachmuth
et al. (1984). Besides including *C. remediус* and *C. celerrimus*, it extends the previously published key by considering body size and additional characters of the coloration pattern and of the genitalia. The definition of the colors used in the key is taken from a color table of color-pencils from Faber-Castell, Germany.

**Adult Females:**

1. Large spider (carapace length > 9 mm) (Fig. 2); legs and/or body with conspicuous markings or color pattern ........................................ 2
   Medium sized spider (carapace length < 9 mm) (Fig. 2); legs and/or body uniformly brown or with comparatively indistinct or variable markings ........................................ 4
2. (1) Legs brown with conspicuous dark markings .............................. 3
   Femora I–IV bright carmine-red ventrally; prosoma and opisthosoma medium to dark brown dorsally with a darker median band; ventral opisthosoma without any dark markings (Fig. 7); epigynum with narrow median septum, widening distally; distal part of septum with strongly sclerotized hook (Fig. 14a) .................. *coccineus*
3. (2) Femora I–IV with distinct black annular patterns; prosoma dorsolaterally with light grayish-brown pattern contrasting the darker median band; coxae densely covered with terra cotta red hairs ventrally; ventral opisthosoma always with broad black median stripe (Fig. 6); in some specimens pairs of yellowish to whitish spots disto-laterally on both sides of the cardiac mark; epigynum with narrow median septum of uniform width (Fig. 14a); body length up to 45 mm (largest species, Fig. 2) .................. *salei*
   Femora I–IV on the ventral side with many small black spots; either sternum or sternum and coxae (variable) dark brown to black (Fig. 8); dorsally, body coloration distinct and species-specific: median dark band on prosoma, colored areas laterally on the body; dark cardiac mark (opisthosoma); dark inverse V-shaped stripes, distal to cardiac mark; ventral opisthosoma light brown (populations from Barro Colorado Islands and from Panama were observed to have only a dark median ventral opisthosomal band, and no speckled femora). A grayish morph and an orange morph exist. Epigynum with broad median septum of roughly uniform width, but widening distally (Fig. 14a); distal part of septum with sclerotized nose-like process ............ *getazi*
4. (1) Epigynal plate oval or trapezoid ........................................ 5
   Epigynal plate distinctly triangular (Fig. 14b); median septum of epigynum strongly widened distally forming a sphere; seminal receptacle I cone-like; body color in general uniformly grayish to brownish, ventral opisthosoma with outlines of a dark median band, consisting of a series of short dark reddish hairs (Fig. 9) .................. *cubae*
5. (4) Lateral plate of epigynum directly connected to the median septum forming a loop (Fig. 14b) ........................................ 6
   Lateral plate of epigynum not directly connected to the median septum and extending to the anterior-lateral border of the epigynal plate (Fig. 14a) .................. *panamensis*
6. (5) Epigynum with narrow median septum, seminal receptacles I with seminal ducts of different shapes: S-shaped, twisted, winding or rolled .............................. 7
   Epigynum wider than long (Fig. 14b); median septum broad and leaf-like; vulva: seminal receptacles I ball-shaped with seminal ducts sturdy and slightly curved laterally (Fig. 21); prosoma light brown; opisthosoma darker brown, with narrow dark-shaded median band ventrally (Fig. 11); smallest species (Fig. 2) .................. *granadensis*
7. (6) Median septum with parallel borders, distally ending broad, and with a small hook (Fig. 14b); vulva: seminal receptacles I with distinctly S-shaped seminal ducts (Fig. 19) .................. *celerrimus*
   Median septum long, narrow and slightly widening distally (Fig. 14b); vulva: seminal receptacles large and ball-shaped, seminal ducts rolled dorso-ventrally (Fig. 20); body orange to brown with darker brown median band, legs I–IV yellow ventrally on coxae and femora
8. (5) Lateral plates of epigynum ending rounded before connecting to the epigynal plate (Fig. 14a), median septum of epigynum narrow and continuously narrowing distally (Fig. 14a); vulva with ball-shaped seminal receptacles, seminal ducts strongly winding (Fig. 22); medium large spider (carapace length 7–8 mm); annular patterns on femora, and body remarkably spotted (Fig. 3); tarsi of legs I–IV with long dark hairs both dorsally and ventrally ........... *remediус* new species
   Lateral plates of epigynum as indicated in Fig. 14a before connecting to the anterior-lateral end of the epigynal plate, median septum of epigynum as in Fig. 14a; seminal receptacles I ball-shaped, seminal ducts as in Fig. 22; spider smaller (carapace length up to 7 mm); body
without distinct color pattern or with a series of dark spots along the cardiac mark on the
opisthosoma ................................................................. foliatus

Adult Males:

1. Large spider (carapace length > 9 mm) (Fig. 2). Legs with conspicuous markings (except one
case, see 2); body light gray, light brown to medium brown or bright orange dorsally; ventral
opisthosoma with or without broad dark median stripe ......................................................... 2

Medium sized spider (carapace length < 9 mm) (Fig. 2). Legs and/or body uniformly brown
or with indistinct markings, or pro- and opisthosoma with variable arrangement of more or less
isolated dark dots and lines; opisthosoma light ventrally or with a narrow dark median stripe
.................................................................................................................................................. 4

2. (1) Legs and/or body with conspicuous markings ............................................................... 3

Legs without conspicuous coloration; legs and body gray-brown with median band on dorsal
prosoma consisting of thin dark lines; light opisthosoma with dark cardiac mark, lacking dark
markings ventrally; bulb with terminal apophysis bent downwards, embolic-apophysis strongly
curved and twisted (Fig. 24) .................................................. coccineus

3. (2) Femora I-IV with distinct black annular patterns ventrally; body grayish dorsally with dark
lines along the length of the prosoma (= median band); sternum and coxae grayish; opisthosoma
with broad dark median band ventrally; bulb with terminal apophysis large and bent downwards,
embolic apophysis robust and curved (Fig. 23); body length up to 30 mm (largest species, Fig.
2) ................................................................. salei

Femora I-IV with many small black spots ventrally; sternum and coxae dark brownish (variable);
conspicuous species-specific body coloration: a dark median band dorsally on prosoma
and opisthosoma bordered by light areas laterally; dark cardiac mark dorsally on opisthosoma,
and dark inverse V-shaped stripes posterior to it; two morphs with either grayish or orange
basic coloration. Bulb with terminal apophysis bent downwards, embolic apophysis strongly
curved and twisted (Fig. 25) .................................................. getazi

4. (1) Opisthosoma with narrow dark median stripe ventrally (Figs. 10–12) or without ventral mark-
ings ................................................................. 5

Opisthosoma only with dark reddish outlines of the ventral median stripe (Fig. 9); bulb (Fig.
26) with median apophysis comparatively straight and notched in the proximal third of its
length, distal process and lateral shovel-like process very small, terminal apophysis strongly
domed and extending over the short embolic apophysis. Body grayish or brownish ............... cubae

5. (4) Bulb with embolic base (stipes-embolus) massive (Figs. 27, 28), terminal and embolic apophysis
not distinct ................................................................. 6

Embolic base (stipes-embolus) with distinct terminal and embolic apophysis (Figs. 23–26, 29–
31) ....................................................................................... 7

6. (5) Embolic base (stipes-embolus) bill-shaped and folded forming one furrow (Fig. 27); body light
yellow-brown with a sparse coverage of hairs; prosoma with median line markings dorsally
............................................................................................................ granadensis

Embolic base (stipes-embolus) strongly folded forming two furrows (Fig. 28); embolic tip
appears severed with a pair of short processes; body and legs orange with a brown median
band on pro- and opisthosoma; ventral surface of coxae and femora yellow ............... celerrimus

7. (5) Terminal apophysis levels with the embolic base (stipes-embolus) (Figs. 29, 30) ............. 8

Terminal apophysis elevates at an angle of approximately 45° at the embolic base (Fig. 31) and
covers the embolic apophysis; opisthosoma with a variable line of spots along the border of
the cardiac mark ................................................................. foliatus

8. (6) Carapace length ca. 8 mm; body with spotted coloration pattern dorsally; legs long (sexual-
dimorphic), covered with a “brush” of long and thin hairs along the tibia and metatarsus
and with the longest hairs at the proximal part of the tibia-metatarsus joint; median apoph-
ysis with an elevation near the lateral process, tegulum with deep furrows ventrally (Fig.
5) .......................................................................................................... remedius new species

Carapace length ca. 5 mm; body without distinct coloration pattern dorsally; dorsal opisthosoma
darker than prosoma and with a small dark median band ventrally, widening towards the pos-
terior part of the opisthosoma (Fig. 12) ........................................................................... panamensis
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LITERATURE CITED


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