



## Two new species of *Callibaetis* Eaton (Ephemeroptera: Baetidae) from Southeastern Brazil

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### Abstract

Two new species of *Callibaetis* are described based on nymphs and adults of both genders. Specimens were collected in the states of Rio de Janeiro and Espírito Santo, in the Southeastern region of Brazil. With the description of *C. fluminensis* sp. n. and *C. capixaba* sp. n. we increase the number of species in the genus *Callibaetis* in Brazil to eleven.

**Key words:** Aquatic insects, Mayfly, Taxonomy, New species, Neotropics

### Introduction

The taxonomy of the mayfly family Baetidae (Ephemeroptera) in the Neotropics has improved considerably in the last 15 years. Several new genera and species have been described, and most of the taxa previously known from the region have been revised. However, *Callibaetis* Eaton remains poorly known, some of the species in the genus are difficult to identify with confidence and most are known only at the imaginal stage.

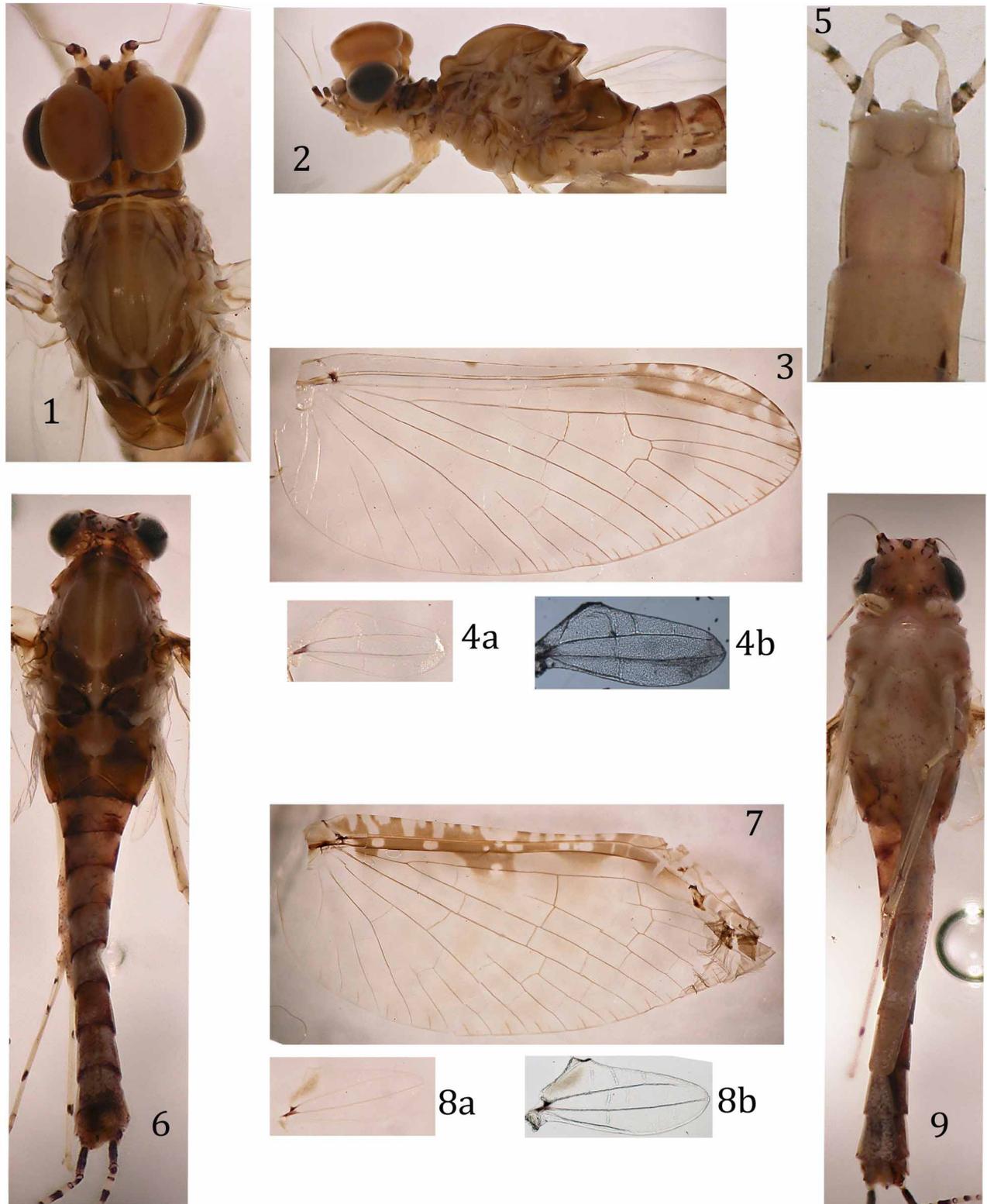
*Callibaetis* was one of the first genera established in the family Baetidae and, as is the case for all of the species described in the early years of mayfly taxonomy, the species in this genus were described based solely on alate stages. Several new species were described at the end of the 19th century and in the first decades of the 20th century, most being described by Navás (1912, 1915a, 1915b, 1916, 1922, 1923, 1930, 1933, 1934). However, most of these species were described inadequately: some of the descriptions were based on subimagos and most of the types were either lost or stored under poor conditions (Hubbard & Peters 1981). Only a few species have been described since that period. Since 1934, when Navás described his last valid species of *Callibaetis*, only two new species have been described from the Neotropics: one by Traver (1944), later considered a junior synonym of one of Navás species, and one by Gillies (1990). Nevertheless, since the beginning of the 21st century the study of the nymphs in this genus has been increasing with the work of Salles *et al.* (2003) and Nieto (2008).

Nine species of *Callibaetis* have been recorded from Brazil: *C. fasciatus* Pictet; *C. gregarius* Navás; *C. guttatus* Navás; *C. jocosus* Navás; *C. pollens* Needham & Murphy; *C. radiatus* Navás; *C. viviparus* Needham & Murphy; *C. willineri* Navás; and *C. zonalis* Navás (Salles *et al.* 2004). Only four of these species have their nymphs described: *C. willineri*, *C. guttatus*, *C. radiatus* and *C. pollens* (Traver 1944, Da-Silva 1991, Salles *et al.* 2003, Nieto 2008).

The objective of this paper is to describe two new species of *Callibaetis* from Southeastern Brazil, based on nymphs and adults of both genders.

## Materials and methods

The descriptions were made in the free program DELTA (DEscription Language for TAXonomy) (Dallwitz 1980).



**FIGURES 1–9.** *Callibaetis fluminensis* sp. n. Male imago: 1, dorsal view; 2, lateral view; 3, forewing; 4a, hind wing; 4b, hind wing details; 5, genitalia. Female imago: 6, dorsal body view; 7, forewing; 8a, hind wing; 8b, hind wing details; 9, ventral body view.

The material examined is housed in the following institutions: Invertebrate Collection of the Instituto Nacional de Pesquisas da Amazônia, Manaus, Brazil (INPA), Entomological Collection of the Universidade Federal do Espírito Santo (UFES), Vitoria, Brazil, and Laboratório de Entomologia da Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil (IBRJ).

## Results

### *Callibaetis fluminensis* sp. n.

(Figs. 1–26)

**Male Imago.** Maximum length: Body 6.1 mm; cerci 10.0 mm; forewing 5.4 mm; hind wing 0.8 mm; antenna 1.3 mm; tibia I 1.9 mm; tibia II 1.4 mm; tibia III 1.2 mm.

**Head.** Coloration brown. Tubinate portion of compound eyes with dorsal area and stalk orange (Figs. 1–2). Antenna with apex of scape and pedicel dark brown, flagellum brownish.

Dorsal portion of turbinate eyes oval (Fig. 1); length  $1.8 \times$  width; stalk height  $1.1 \times$  width of dorsal portion; inner margins parallel, not touching each other.

**Thorax** (Figs. 1–2). Anteronotal protuberance and medioscutum light yellowish brown; submesoscutum whitish brown; posterior scutal protuberance brown; scutellum white surrounded with dark brown.

Anteronotal protuberance rounded.

Metascutellar protuberance pointed.

Legs. Femur I with trachea pigmented, tibia I with brown marks at base and apex, tarsi I white; femur II and III with trachea pigmented, tibia II and III with two brown marks at base and one at apex, tarsi II and III white. Leg I: tibia  $1.5 \times$  length of femur; tarsi  $1.4 \times$  length of femur; and with four segments decreasing in length apically. Leg II and III: tibia  $0.9 \times$  length of femur; tarsi  $0.2 \times$  length of femur.

Wings. Forewing hyaline, except for stigmatic area brownish and small brownish spots along costal vein (Fig. 3); veins brown; stigmatic area with seven cross veins touching Sc; marginal intercalaries paired, except between veins MP and A; length of each intercalary vein  $0.4 \times$  distance between adjacent longitudinal veins; length of forewing about  $2.5 \times$  width.

Hind wing hyaline with three complete longitudinal veins and five cross veins (Fig. 4); costal process rounded, located on basal third.

**Abdomen.** Terga light yellowish brown, lateral margin brown; tracheation not pigmented. Sterna light yellowish brown, with black round mark anterolaterally. Caudal filaments white, base and apex of every segment dark brown.

Genitalia. Forceps segment I light yellowish brown, segment II white with apex reddish brown, segment III white (Fig. 5). Forceps segment I wide at base and with small distomedial projection,  $0.5 \times$  length of segment II; distance between base of forceps  $4.7 \times$  distance between lateral margins of forceps. Forceps segment II narrow medially. Forceps segment III oval,  $1.3 \times$  as long as wide;  $0.1 \times$  length of segment II. Posterior margin of styliger plate straight, with wide and small dorsal projection.

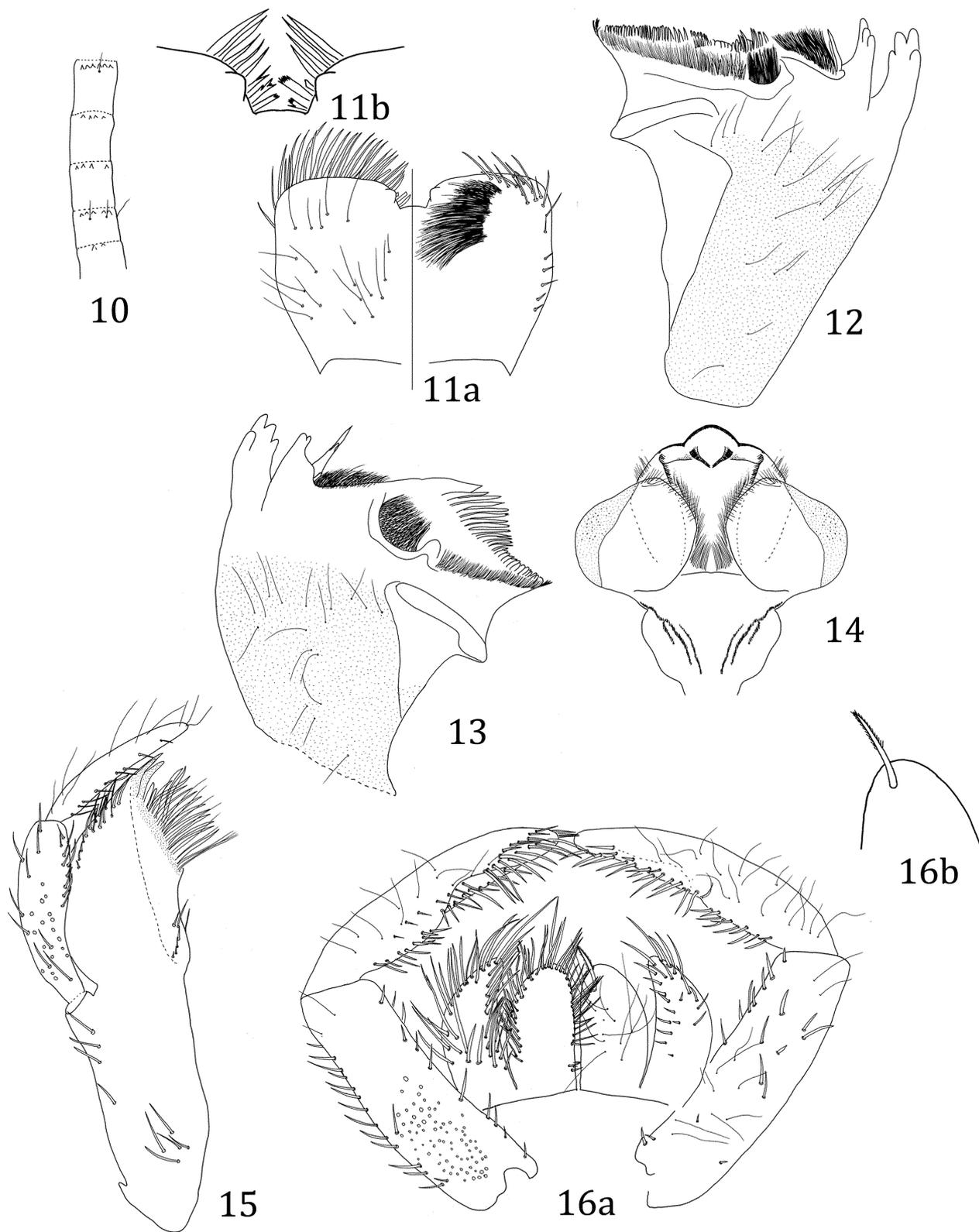
**Female Imago.** Maximum length: body 6 mm; cerci 11.5 mm; forewing 5.5 mm; hind wing 1.1 mm; antenna 1.4 mm; tibia I 1.1 mm; tibia II 1.2 mm; tibia III 1.2 mm.

**Head.** Coloration brown (Fig. 6); compound eyes black with longitudinal brown line. Antenna with apex of scape and pedicel dark brown, flagellum brownish.

**Thorax** (Fig. 6). Anteronotal protuberance blackish dark brown; medioscutum brown; submesoscutum black washed with white; posterior scutal protuberance dark brown; scutellum white with posterior margin dark brown.

Anteronotal protuberance rounded.

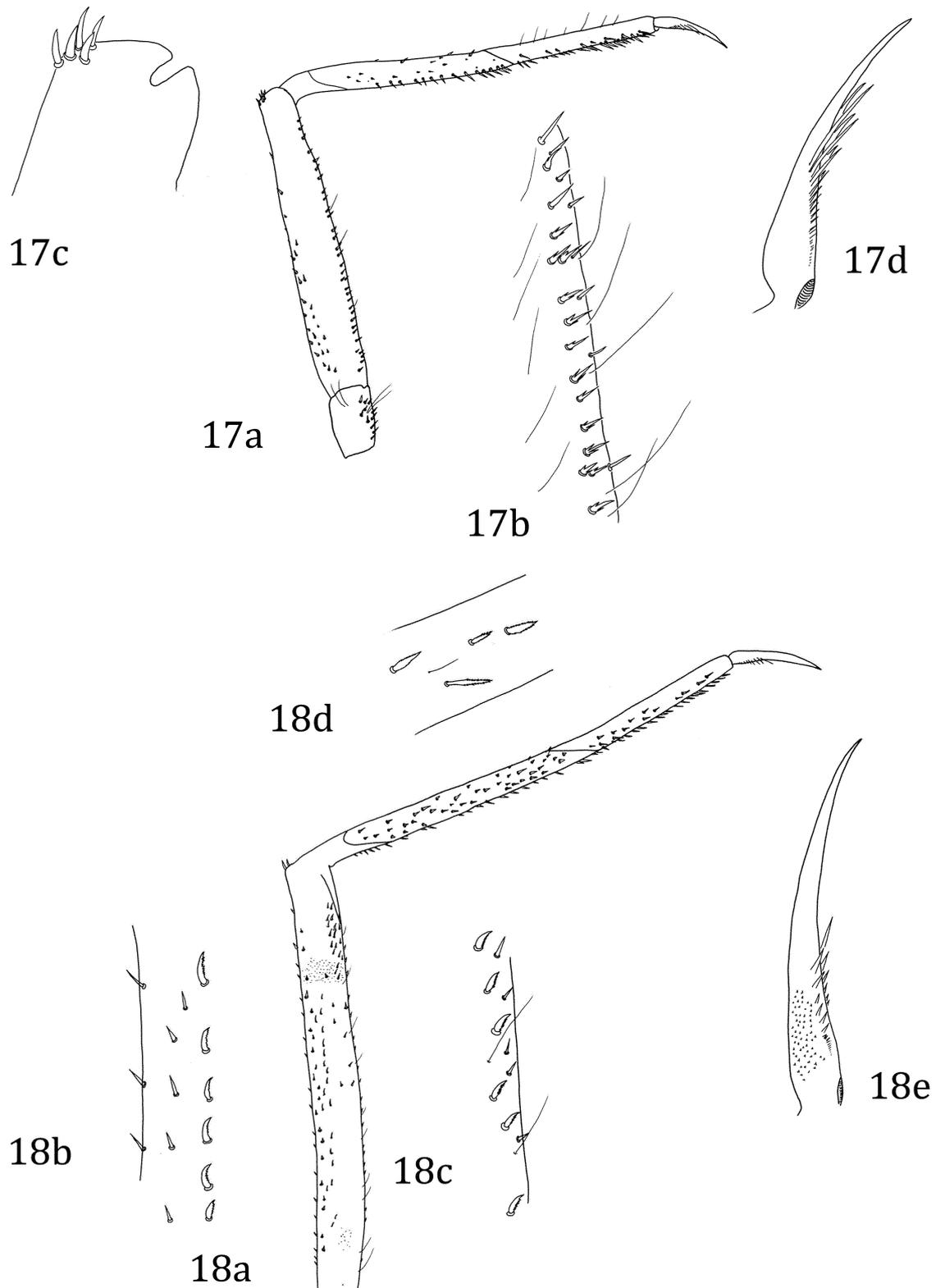
Metascutellar protuberance pointed.



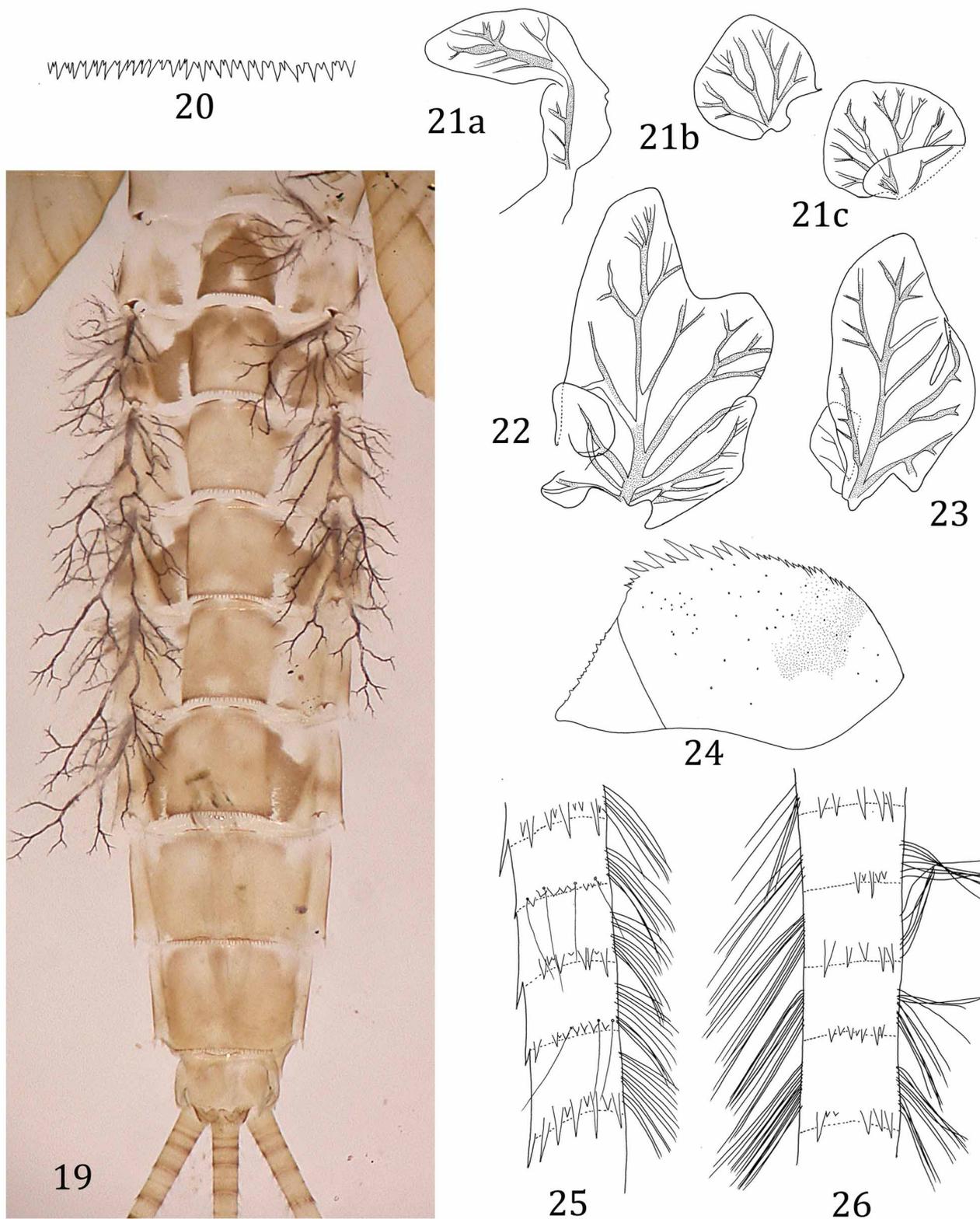
**FIGURES 10–16.** *Callibaetis fluminensis* sp. n. Nymphs. 10, antennae; 11a, labrum left d.v., right v.v.; 11b, anterior margin of labrum detail; 12, right mandible d.v.; 13, left mandible d.v.; 14, hypopharynx d.v.; 15, maxillae d.v.; 16a, labium left d.v., right v.v.; 16b, glossa detail v.v.

Legs. Femur I, II and III with trachea pigmented, one brown spot apically, other subapically; tibia I, II and III with one brown spot basally, subapically and apically; tarsi I, II and III light brown. Leg I: tibia 1x length

of femur; tarsi  $0.5 \times$  length of femur; and with 4 segments decreasing in length apically. Leg II: tibia  $0.7 \times$  length of femur; tarsi  $0.4 \times$  length of femur. Leg III: tibia  $0.6 \times$  length of femur; tarsi  $0.2 \times$  length of femur.



**FIGURES 17–18.** *Callibaetis fluminensis* sp. n. Nymphs. Legs: 17a, fore leg; 17b, anterior surface of fore femur near ventral margin; 17c, fore femur apex detail; 17d, fore claw; 18a, hind leg; 18b, anterior surface of hind femur near dorsal margin; 18c, anterior surface of hind femur near ventral margin; 18d, anterior surface of hind tibia; 18e, hind claw.



**FIGURES 19–26.** *Callibaetis fluminensis* sp. n. Nymphs. Abdominal structures: 19, dorsal body view (exuvia); 20, posterior margin of terga IV; 21a, lamellae I of gill I; 21b, lamellae II of gill I; 21c, lamellae I of gill I; 22, gill IV; 23, gill VII; 24, paraproct; 25, cercus; 26, terminal filament.

Wings. Forewing hyaline, except C, Sc, R1 and area around bulla brown colored (Fig. 7); veins brown; stigmatic area with minimum of three cross veins touching Sc; marginal intercalaries paired, except between

veins CuA and A; length of each intercalary vein  $0.4 \times$  distance between adjacent longitudinal veins; length of forewing about  $2.4 \times$  width.

Hind wing hyaline, except brown spot at base (Figs. 8); three complete longitudinal veins and six cross veins; costal process rounded, located on basal third.

**Abdomen.** Terga light yellowish brown, laterally brown with many red spots (Fig. 6). Tracheation not pigmented. Sterna white with many red spots (Fig. 9). Caudal filaments white, base and apex of every segment dark brown.

**Mature nymph.** Length of body: 7.2 mm; cerci: 7.2 mm; terminal filament: 4.8 mm; antennae: 6.4 mm.

**Head.** Light yellowish brown. Antenna yellowish white.

Antenna (Fig. 10) with fine, simple setae on apex of each segment. Lateral branch of epicranial suture curved. Frontal keel absent.

Labrum. Sub-rectangular; length about  $0.6 \times$  maximum width; distal margin with subquadrangular small emargination (Fig. 11a); with lateral and anterolateral long, fine, simple setae; medially with, short, robust, apically serrated setae (Fig. 11b); dorsally with long, fine, simple setae scattered over surface; submarginal row of setae absent; ventrally with short, spine-like setae near anterolateral margin.

Right mandible (Fig. 12). Incisors deeply cleft in two sets, inner and outer set of incisors respectively with  $4 + 4$  denticles; prosthema stout, bifurcated at apex; margin between prosthema and mola straight with tuft of setae; tuft of spine-like setae at base of mola present; tuft of setae at apex of mola present; lateral margins slightly convex; basal half with short, fine, simple setae scattered over dorsal surface.

Left mandible (Fig. 13). Incisors cleft in two sets, inner and outer set of incisors respectively with  $4 + 4$  denticles; prosthema robust and bifid; margin between prosthema and mola straight with tuft of setae; tuft of spine-like setae at base of mola present; subtriangular process wide, at the same level as area between prosthema and mola; denticles of mola not constricted; tuft of setae at apex of mola present; lateral margins slightly convex; basal half with short, fine, simple setae scattered over dorsal surface.

Hypopharynx (Fig. 14). Lingua with three lobes in distal margin; superlingua not expanded; short, fine, simple setae scattered over distal margin of lingua and superlingua.

Maxilla (Fig. 15). Crown of galea-lacinia with four denticles; double row of setae with two denti-setae. Medial protuberance of galea with  $1 + 5$  spine-like setae. Maxillary palp long,  $1/5$  longer than length of galea-lacinia; palp segment II  $1 \times$  length of segment I; segment I of maxillary palp with short and pointed setae on over surface; segment II with robust, short and pointed setae in medial surface.

Labium. Glossa with regular width along entire length and subequal in length to paraglossa (Fig. 16a); inner margin with 14 spine-like setae increasing in length apically; apex with many short, spine-like setae; outer margin with many long spine-like setae. Ventral surface scattered with long, fine, simple setae and one robust, short pectinated spine-like seta near apical margin (Fig. 16b). Paraglossa curved inward (Fig. 16a); apex with two rows of simple setae. Ventrally with many long, fine and simple setae. Labial palp with segment I  $0.9 \times$  length of segments II and III combined; segment I covered with short, robust, simple setae and micropores; inner and outer margin with many robust, simple setae and many long, fine simple setae; dorsally with row of many long, fine and simple setae; segment III concave, length  $1.5 \times$  width, covered with spine-like simple setae along margins and fine, simple setae, scattered over outer surface.

**Thorax.** Pronotum yellowish, anterior and posterior margin brown; brownish spot near midline; mesonotum yellowish with brown and light brown marks; metanotum yellowish with brown and dark brown marks.

Foreleg. Brownish white. Ratio of foreleg  $1.3: 1 (0.8\text{mm}): 0.5: 0.3$ . Femur (Fig. 17a). Length about  $0.2 \times$  maximum width; dorsally with row of short, spine-like setae and row of short, fine, simple setae; length of setae about  $0.1 \times$  maximum width of femur; apex with five or six robust spine-like setae (Fig. 17c); ventrally with row of short, spine-like setae and row of long, fine, simple setae. Anterior surface with robust spine-like setae near dorsal margin and robust three and two-pointed spine-like setae near ventral margin (Fig. 17b). Tibia. Dorsally with four to five short spine-like setae and with many long, fine, simple setae; ventrally with two rows of short, spine-like setae, one row of three-pointed spine-like setae and few long, short, fine, simple

setae. Anterior surface with many short, robust, spine-like setae. Tibio-patellar suture present. Tarsus. Dorsally with one to two short, robust, spine-like setae; ventrally with two rows of long spine-like setae and one row of three-pointed spine-like setae. Tarsal claw with two rows of denticles increasing in size distally (Fig. 17d).

Middle and hind leg. Femora with one row of short spine-like setae dorsally and ventrally. Anterior surface with many robust, curved, pectinated setae near ventral and dorsal margin (Figs. 18a–c). Anterior surface of tibiae and tarsi with many robust bipectinated spine-like setae (Fig. 18d). Claws with two rows of small denticles (Fig. 18e).

**Abdomen.** Segments II, III, V and VII with brown pigmentation as in Figure 19. Terga. Surface creased. Posterior margin with regular spines,  $3 \times$  as long as wide. Sterna. Surface with scattered fine, simple setae. Segments with posterior margin with spines: II–IX (Fig. 20).

Gills. Margin smooth; tracheae extending from main trunk to outer margin. Gill I subequal in length to segment II (Figs. 21a–c); with two folds; trachea pigmented. Gill IV as long as length of segments V to VII combined (Fig. 22); with two folds. Gill VII as long as length of segments VIII to IX (Fig. 23); with two folds.

Paraproct with 28–30 marginal spines; surface with micropores and short fine, simple setae (Fig. 24); postero-lateral extension with minute marginal spines.

Inner margin of cercus and inner and outer margins of terminal filament with tufts of long setae (Figs. 25–26). Caudal filaments (Fig. 26) brown; posterior margin of segments with short spines on each segment, and long spines on every three segments.

**Diagnosis:** *C. fluminensis* **sp. n.** can be distinguished from other species of the genus by following combination of characters:

In the male imagines: 1) dorsal portion of turbinate eyes oval, inner margins parallel, not touching each other (Fig. 1); 2) forewing hyaline, except for brownish stigmatic area and small brownish spots along costal vein (Fig. 3); 3) marginal intercalaries paired, except between veins MP and A; 4) length of each intercalary vein  $0.4 \times$  distance between adjacent longitudinal veins; 5) hind wing hyaline with three complete longitudinal veins and five cross veins (Fig. 4a–b); 6) costal process rounded; 7) sterna with black round mark anterolaterally (Fig. 2); 8) forceps segment I wide at base and with small distomedial projection (Fig. 5); 9) forceps segment III oval,  $1.3 \times$  as long as wide (Fig. 5).

In the female imagines: 1) forewing hyaline, except C, Sc, R1 and area around bulla brown colored (Fig. 7); 2) marginal intercalaries paired, except between veins CuA and A; 3) hind wing hyaline, except brown spot at base toward costal process, three complete longitudinal veins and six cross veins (Fig. 8a–b); 4) costal process rounded; 5) sterna white with many red spots (Fig. 9).

In the nymph: 1) antenna with fine, simple setae on apex of each segment (Fig. 10); 2) labrum sub-rectangular (Fig. 11a), distal margin with subquadrangular small emargination (Fig. 11b); 3) glossa subequal in length to paraglossa (Fig. 16a); 4) labial palp with inner and outer margin with many robust, simple setae and many long, fine simple setae (Fig. 16a); 5) anterior surface of fore femur with robust three and two pointed spine-like setae near ventral margin (Fig. 17b); 6) fore tarsus dorsally with one or two short, robust, spine-like setae; ventrally two rows of long spine-like setae and one row of three-pointed spine-like setae; 7) anterior surface of hind femur with many robust, curved, pectinated setae near ventral and dorsal margin (Figs. 18b–c); 8) anterior surface of hind tibia and tarsi with many robust bipectinated spine-like setae (Fig. 18d); 9) gill VII as long as length of segments VIII to IX; with two folds; 10) caudal filament with posterior margin of segments with short spines on each segment, and long spines on every three segments (Fig. 25).

**Etymology.** After “Fluminense,” the name by which people born in the state of Rio de Janeiro are known.

**Material examined.** Holotype, female imago with corresponding nymphal exuviae, BRAZIL, Rio de Janeiro State, Nova Friburgo County, Lumiar ( $22^{\circ} 23' 27,2''S$ ;  $42^{\circ} 20' 03,6''W$ ), 3<sup>rd</sup> order tributary of the Rio Bonito, pool, V/ 2008, Souza, M.R. col. Paratypes: ten nymphs, two males same data (both reared). Holotype and five paratypes housed at INPA. Other paratypes deposited at UFES and IBRJ.

**Discussion.** The adults of *C. fluminensis* **sp. n.** and *C. willineri* are similar, although females of *C. fluminensis* **sp. n.** have a pigmented area around bulla and hind wings have a brown spot at base, this does not occur in *C. willineri*. The male of *C. fluminensis* **sp. n.** has the fore wing hyaline with pigmented stigmatic

area. The nymphs have maxillary palp long, 1/5 longer than length of galea-lacinia in *C. fluminensis* **sp. n.** and subequal in length to galea-lacinia in *C. willineri*; anterior surface of hind femur with many robust, curved, pectinated setae near ventral and dorsal margins in *C. fluminensis* **sp. n.**; this does not occur in *C. willineri*.

***Callibaetis capixaba* sp. n.**

(Figs. 27–52)

**Male Imago.** Maximum length: Body 8.6 mm; cerci 9 mm; forewing 6.9 mm; hind wing 1.2 mm; antenna 0.7 mm; tibia I 2.1 mm; tibia II 0.8 mm.

**Head.** Coloration brown. Turbinate portion of compound eyes dorsally dark brown, stalk brown (Figs. 27–28). Antenna with apex of scape and pedicel dark brown, flagellum brownish.

Dorsal portion of turbinate eyes oval (Fig. 27); length  $1.8 \times$  width; stalk height  $0.9 \times$  width of dorsal portion; inner margins parallel, not touching each other.

**Thorax** (Figs. 27–28). Anteronotal protuberance and medioscutum dark brown; submesoscutum whitish brown; posterior scutal protuberance brown; scutellum brown.

Anteronotal protuberance rounded.

Metascutellar protuberance pointed dorsally.

Legs. Femur I with trachea pigmented in posterior surface and one brown spot subapically, tibia and tarsi I light brown; femur II and III light brown, tibia II and III light brown, tarsi II and III light brown. Leg I: tibia  $1.3 \times$  length of femur; tarsi  $1.1 \times$  length of femur; and with 4 segments decreasing in length apically. Leg II and III: tibia  $1.1 \times$  length of femur; tarsi  $0.6 \times$  length of femur.

Wings. Forewing hyaline; veins light brown; stigmatic area with three cross veins touching subcostal vein and six or seven veins not touching subcostal vein (Fig. 29); marginal intercalaries paired, except between veins ICu1 and A; length of each intercalary vein  $0.5 \times$  distance between adjacent longitudinal veins; length of forewing about  $2.5 \times$  width.

Hind wing hyaline with three complete longitudinal veins (Fig. 30); costal process rounded located on basal third.

**Abdome.** Terga brown, anterolaterally light brown; tracheation black. Sterna light brown with many red spots, one red mark laterally and other sublaterally, medially with brown mark. Caudal filaments white, base and apex of every segment dark brown.

Genitalia. Forceps segment I light yellowish brown, segment II light yellowish brown, segment III light yellowish (Fig. 31). Forceps segment I wide at base and with small distomedial projection  $0.4 \times$  length of segment II; distance between base of forceps  $0.2 \times$  distance between lateral margins of forceps. Forceps segment II narrow medially. Forceps segment III oval,  $0.5 \times$  as long as wide;  $0.1 \times$  length of segment II. Posterior margin of styliger plate straight, with wide and small dorsal projection.

**Female Imago.** Maximal length: body 7.8 mm; cerci 12 mm; forewing 7.3 mm; hind wing 1 mm; antenna 0.9 mm; tibia II 1 mm; tibia III 1 mm.

**Head.** Coloration brown with whitish medial marks (Fig. 32); compound eyes greenish black with longitudinal brown line. Antenna with apex of scape and pedicel dark brown, flagellum brownish.

**Thorax** (Fig. 32). Anteronotal protuberance brown; medioscutum brown; submesoescutum white; posterior scutal protuberance brown; scutellum whitish brown.

Anteronotal protuberance rounded.

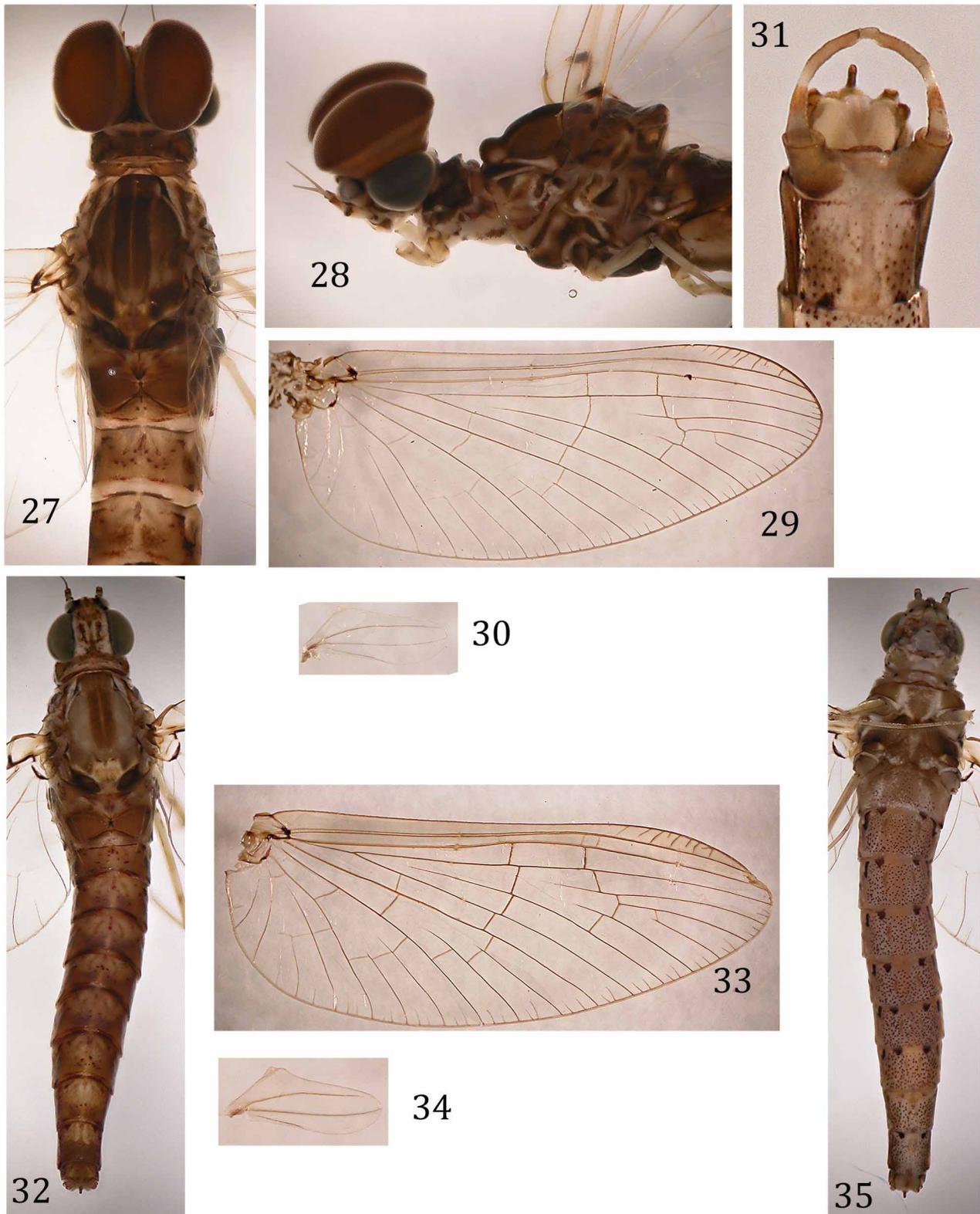
Metascutellar protuberance pointed.

Legs. Femur II and III with trachea pigmented in posterior surface, one brown spot subapically; tibia II and III light brown; tarsi II and II light brown. Leg II tibia  $0.6 \times$  length of femur; tarsi  $0.5 \times$  length of femur. Leg III tibia  $0.6 \times$  length of femur; tarsi  $0.5 \times$  length of femur.

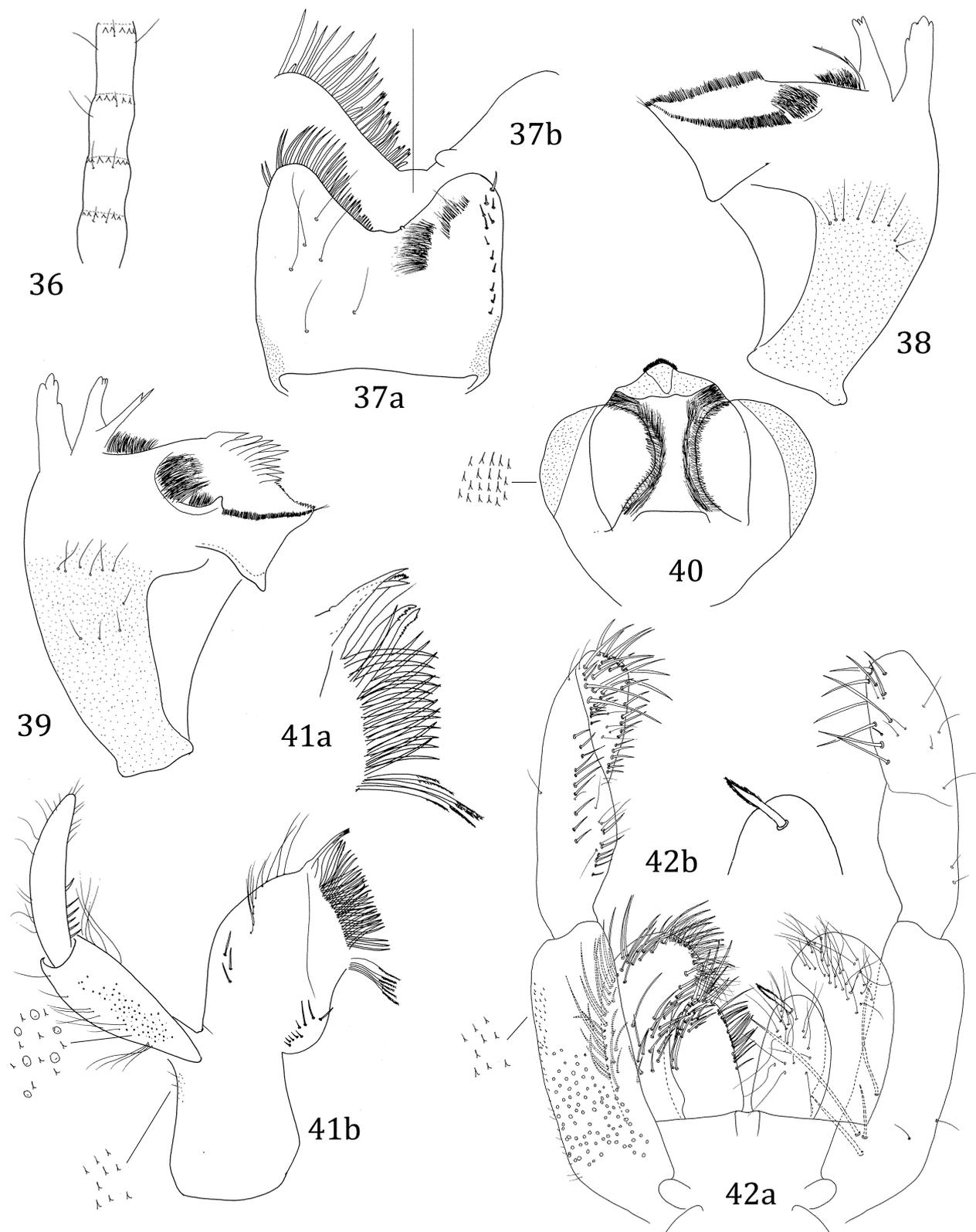
Wings. Forewing hyaline; veins brown; stigmatic area with six cross veins touching subcostal vein and with minimum of one vein not touching subcostal vein (Fig. 33); marginal intercalaries paired, except

between veins CuA and A; length of each intercalary vein  $0.4 \times$  distance between adjacent longitudinal veins; length of forewing about  $2.6 \times$  width.

Hind wing hyaline; two complete longitudinal veins and one incomplete, not reaching apex of hind wing (Fig. 34); costal process rounded, located on basal third.



**FIGURES 27–35.** *Callibaetis capixaba* sp. n. Male imago: 27, dorsal view; 28, lateral view; 29, forewing; 30, hind wing; 31, genitalia. Female imago: 32, dorsal body view; 33, forewing; 34, hind wing; 35, ventral body view.



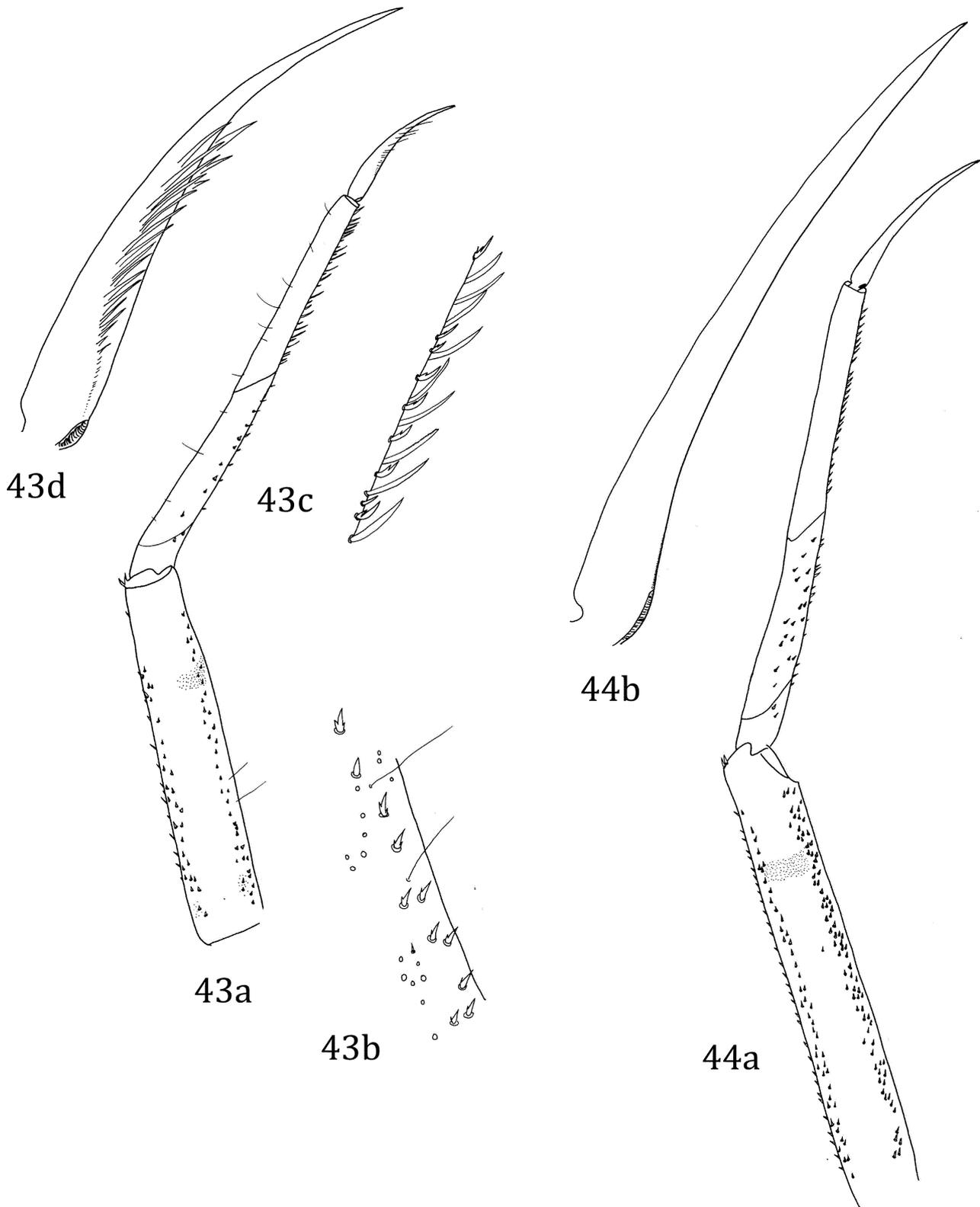
**FIGURES 36–42.** *Callibaetis capixaba* sp. n. Nymphs. 36, antennae; 37a, labrum left d.v., right v.v.; 37b, anterior margin of labrum; 38, right mandible d.v.; 39, left mandible d.v.; 40, hypopharynx d.v.; 41a, maxilla d.v.; 41b, galealacina detail; 42a, labium left d.v, right v.v.; 42b, glossa detail v.v.

**Abdomen.** Terga dark brown with red spots medially (Fig. 32). Tracheation black. Sterna reddish brown with many red spots, one red mark laterally and sublaterally (Fig. 35). Caudal filaments white, base and apex

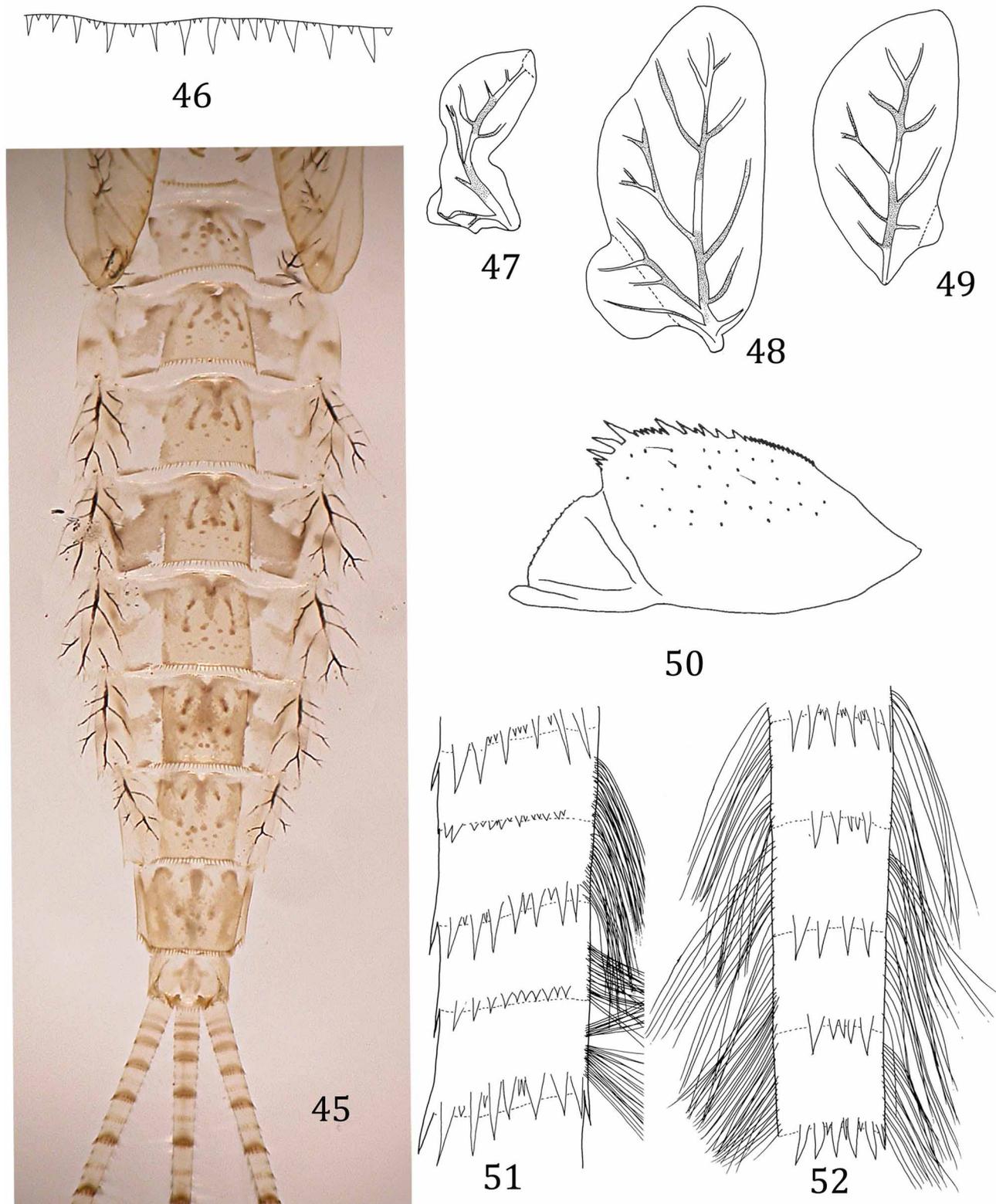
of every segment dark brown.

**Mature nymph.** Length of body: 7.5 mm; cerci: 3.2 mm; terminal filament: 2.6 mm.

**Head.** Turbinate portion of male compound eyes yellowish brown.



**FIGURES 43–44.** *Callibaetis capixaba* sp. n. Nymphs. Legs: 43a, fore leg; 43b, anterior surface of fore femur near ventral margin; 43c, fore tibia ventral detail; 43d, fore claw; 44a, hind leg; 44b, hind claw.



**FIGURES 45–52.** *Callibaetis capixaba* sp. n. Nymphs. Abdominal structures: 45, dorsal body view (exuvia); 46, posterior margin of terga IV; 47, gill I; 48, gill IV; 49, gill VII; 50, paraproct; 51, cercus; 52, terminal filament.

Antenna (Fig. 36) with spines and fine, simple setae on apex of each segment. Lateral branch of epicranial suture curved. Frontal keel absent.

Labrum. Excavate medially; length about  $0.9 \times$  maximum width; distal margin with deep V shaped medial emargination (Fig. 37a); with lateral setae long, fine and simple; anterolateral setae long, fine and apically bifid; medial setae, short, robust and apically bifid (Fig. 37b); dorsally with long, fine, simple setae scattered over surface; submarginal row of setae absent; ventrally with short, spine-like setae near lateral and anterolateral margin.

Right mandible (Fig. 38). Incisors cleft in two sets, inner and outer set of incisors respectively with  $4 + 4$  denticles; prostheca slender, bifurcated at middle, inner lobe long, outer short; margin between prostheca and mola straight with tuft of setae; tuft of spine-like setae at base of mola present; tuft of setae at apex of mola present; lateral margins slightly convex; basal half with short, fine, simple setae scattered over dorsal surface.

Left mandible (Fig. 39). Incisors cleft in two sets; inner and outer set of incisors respectively with  $4 + 4$  denticles; prostheca robust and bifid; margin between prostheca and mola straight with tuft of setae; tuft of spine-like setae at base of mola present; subtriangular process wide, at the same level as area between prostheca and mola; denticles of mola not constricted; tuft of setae at apex of mola absent; lateral margins slightly convex; basal half with short, fine, simple setae scattered over dorsal surface.

Hypopharynx (Fig. 40). Lingua with three lobes on distal margin; superlingua not expanded; short, fine, simple setae scattered over distal margin of lingua and superlingua.

Maxilla. Crown of galea-lacinia with three denticles; double row of setae with two pectinate denti-setae (Fig. 41a). Medial protuberance of galea with  $1 + 7$  spine-like setae. Maxillary palp reaching apex of galea-lacinia; palp segment II  $0.7 \times$  length of segment I; segment I of maxillary palp with long, fine and simple setae on over surface (Fig. 41b).

Labium. Glossa broad and shorter than paraglossa (Fig. 42a); inner margin with 14 spine-like setae increasing in length apically; apex with 3–5 long spine-like setae; outer margin with many long spine-like setae. Ventral surface scattered with long, fine, simple setae and one robust, short pectinated spine-like setae near apical margin (Fig. 42b). Paraglossa sub-retangular, curved truncated at apex (Fig. 42a); apex with many short, fine and simple setae. Ventrally with many long, fine and simple setae. Labial palp with segment I  $0.9 \times$  length of segments II and III combined; segment I bare, covered with micropores as in Fig. 42a; inner and outer margin with seven spine-like setae and few short, fine, simple setae; dorsally with row of three fine and simple setae; segment III concave length  $1.4 \times$  width covered with spine-like simple setae along margins and fine, simple setae, scattered over outer surface.

**Thorax.** Pronotum with yellowish three blackish spots, one near midline, one near lateral margin, and one between them; mesonotum yellowish with brown and light brown marks; metanotum yellowish with brown and dark brown marks.

Foreleg. Basal half with brown mark. Ratio of foreleg 1.5: 1 (0.8mm): 0.8: 0.5. Femur (Figs. 43a). Length about  $0.2 \times$  maximum width; dorsally with row of short, spine-like setae; length of setae about  $0.1 \times$  maximum width of femur; apex with two robust spine-like setae; ventrally with few long, fine and simple setae. Anterior surface with robust spine-like setae near dorsal margin and robust three and two-pointed spine-like setae near ventral margin (Fig. 43b). Tibia. Dorsally bare; ventrally with one row of short, spine-like setae. Anterior surface with few short, robust spine-like setae. Tibio-patellar suture present. Tarsus. dorsally bare; ventrally one row of spine-like setae and one row of three-pointed spine-like setae (Fig. 43c). Tarsal claw with two rows of denticles increasing in size distally (Fig. 43d).

Middle and hind leg. Femora without robust three-pointed spine-like setae near ventral margin (Fig. 44a). Claw with two rows of minute denticles (Fig. 44b).

**Abdomen.** Yellowish washed with brown or light brown with brown and/or dark brown spots on all segments; lateral transversal brown mark on segments II to VII; segments III, V, VII and IX darker (Fig. 45). Abdominal tubercles absent. Terga surface without scales or scale-bases. Posterior margin with regular spines,  $3 \times$  as long as wide. Sterna. Surface with scattered fine, simple setae. Segments with posterior margin with spines: I–IX (Fig. 46).

Gills. On segments I–VII. Margin with short, fine and simple setae; tracheae pigmented, extending from main trunk to outer margin. Gill I subequal in length to segment II (Fig. 47); with one fold; trachea pigmented.

Gill IV as long as length of segments V to half VI combined (Fig. 48); with one fold. Gill VII subequal in length to segment VIII (Fig. 49); with one fold.

Paraproct with 25–30 marginal spines; surface with micropores and short fine, simple setae (Fig. 50); postero-lateral extension with minute marginal spines.

Inner margin of cercus and inner and outer margins of terminal filament with tufts of long setae (Fig. 51–52). Caudal filaments (Fig. 52) white with brown mark on each three segments; posterior margin of segments with spines on each segment.

**Diagnosis:** *C. capixaba* **sp. n.** can be distinguished from other species in the genus by the following combination of characters:

In the male imagines: 1) dorsal portion of turbinate eyes (Fig. 27) oval, inner margins parallel, not touching each other; 2) forewing hyaline (Fig. 29); 3) marginal intercalaries paired, except between veins ICu1 and A; 4) length of each intercalary vein  $0.5 \times$  distance between adjacent longitudinal veins; 5) hind wing hyaline with three complete longitudinal veins (Fig. 30); 6) costal process rounded; 7) sterna light brown with many red spots, one red mark laterally and other sublaterally, medially with brown mark; 8) forceps segment I wide at base and with small distomedial projection (Fig. 31); 9) forceps segment III oval,  $0.5x$  as long as wide (Fig. 31).

In female imagines: 1) forewing hyaline (Fig. 33); 2) marginal intercalaries paired, except between veins CuA and A; 3) hind wing hyaline, two complete longitudinal veins and one incomplete, not reaching apex of hind wing (Fig. 34); 4) costal process rounded; 5) sterna reddish brown with many red spots, one red mark laterally and sublaterally (Fig. 35).

In the nymph: 1) antenna with spines and fine simple setae on apex of each segment (Fig. 36); 2) labrum excavate medially (Fig. 37a), distal margin with deep “V” shaped medial emargination; with lateral setae long, fine and simple; 3) anterolateral setae long, fine and apically bifid; medial setae short, robust and apically bifid (Fig. 37b); 4) glossa broad and shorter than paraglossa (Fig. 42a); 5) labial palp with outer margin with few short, fine, simple setae (Fig. 42a); 6) anterior surface of fore femur with robust spine-like setae near dorsal margin and robust three and two-pointed spine-like setae near ventral margin (Fig. 43b); 7) fore tarsus dorsally bare; ventrally one row of spine-like setae and one row of three-pointed spine-like setae (Fig. 43c); 8) mid and hind leg with femur without robust three-pointed spine-like setae near ventral margin; 9) mid and hind claws with two rows of minute denticles (Fig. 44b); 10) gill VII subequal in length to segment VIII (Fig. 48); with one fold; 11) caudal filaments with posterior margin of segments with spines on each segment (Fig. 50).

**Etymology.** After “Capixaba,” the name by which people born in the state of Espírito Santo are known.

**Material examined.** Holotype, female imago with corresponding nymphal exuviae, BRAZIL, Espírito Santo State, Santa Teresa County, (19° 52' 30,9"S; 40° 32' 07,4"W), pool, sand, 26/x/ 2008, Salles, F.F. col. Paratypes: one male (reared), 20 nymphs, same data as holotype. One male and one female (both reared), Espírito Santo State, Santa Teresa County, Reserva Biológica Augusto Ruschi (19° 55' 30,1"S; 40° 33' 21,9"W), pool, sand, 26/ii/ 2009, Salles, F.F. col. Holotype and 2 paratypes housed at UFES.

## Discussion

The nymphs of *C. capixaba* **sp. n.** and *C. pollens* are very similar; they can be distinguished by the right prostheca, which is bifid in *C. capixaba* **sp. n.** and spine-like in *C. pollens*; the robust setae near the ventral margin of the fore femur also aids in distinguishing both species, they are three or two pointed in *C. capixaba* **sp. n.** and simple in *C. pollens*. The adults have the marginal intercalaries veins paired in *C. capixaba* **sp. n.** and simple in *C. pollens*; the females have many reddish spots ventrally in *C. capixaba* **sp. n.**; such spots are absent in *C. pollens*.

## Acknowledgements

We thank Marcia Regina de Souza (Museu Nacional do Rio de Janeiro) for collecting and rearing part of the material, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) and Fundação de Amparo a Pesquisa do Estado do Espírito Santo (FAPES) for financial support, Angela Bruner and Reserva Biológica Augusto Ruschi for logistical support.

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