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New species and new records of *Hermanella* complex (Ephemeroptera: Leptophlebiidae) from Eastern Brazilian Coast

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Abstract – Based on collections in three coast Brazilian states, *Hydrosmilodon plagatus* sp. nov. and *Needhamella mazama* sp. nov. are described based on nymphs and adults. Besides the description of these species, new geographic records of the *Hermanella* complex are presented. The species included are: *Hermanella maculipennis* (Ulmer, 1920); *Hermanella froehlichi* Ferreira and Domínguez (1992); *Hydrosmilodon gilliesae* Thomas & Péru (2004); *Hylister plaummani* Domínguez and Flowers (1989); *Leentvaaria palpalis* Demoulin (1966); and *Needhamella ehrhadti* (Ulmer, 1920). In addition, in this work *Leentvaaria palpalis* is recorded from Brazil for the first time.

Key words: Biodiversity / Mayflies / taxonomy / *Hydrosmilodon* / *Needhamella*

Introduction

The *Hermanella* complex is a large group of distinct leptophlebiid mayflies (Ephemeroptera: Leptophlebiidae) distributed from the Neotropics to Nearctic regions (Domínguez *et al.*, 2006). This generic complex was defined by Domínguez and Flowers (1989), and encompasses several distinct species easily recognizable by their highly modified and enlarged mouthparts in the nymphs. To date eight genera are recognized in this group: *Hermanella* Needham & Murphy (1924); *Hydromastadon* Polegatto and Batista (2007); *Hydrosmilodon* Flowers and Domínguez (1992); *Hylister* Domínguez and Flowers (1989); *Leentvaaria* Demoulin (1966); *Needhamella* Domínguez and Flowers (1989); *Paramaka* Savage and Domínguez (1992) and *Traverella* Edmunds (1948).

The taxonomy of the *Hermanella* complex in the Neotropics has improved considerably in the last 20 years. New genera and species were described, and most of the taxa previously known from the region have been revised (Flowers and Domínguez, 1991, 1992; Ferreira and Domínguez, 1992; Lugo-Ortiz and McCafferty, 1996; Thomas *et al.*, 2004; Kluge, 2007; Polegatto and Batista, 2007; Mariano *et al.*, 2010). However, the current knowledge about the *Hermanella* complex still does not allow a clearer understanding about the relationships between genera and species. According to Sartori (2005), many of them do not have all the stages described, which prevents a more accurate analysis about this group.

In the present paper, based on studies of mayflies from three coast Brazilian states (Espírito Santo, Bahia and Pernambuco) a new species of *Hydrosmilodon* and *Needhamella* are described. Besides, several genera and species of the *Hermanella* complex are reported for the first time from these states, whereas the first formal record of *Leentvaaria palpalis* is presented for Brazil.

Material and methods

The examined material belongs to three states located on the eastern coast of Brazil (Fig. 1): Espírito Santo (Southeastern Region), Bahia and Pernambuco (Northeastern Region). Nymphs were collected manually or using D-shaped nets. Adults were caught on light traps right after sunset. Specimens are preserved in 80% ethanol. In the following descriptions, terms referring to

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Fig. 1. Map of Brazil with details of the collecting localities (BA: Bahia State; ES: Espírito Santo State; PE: Pernambuco State).

the adult thorax follow Kluge (1994). Pictures were taken using a Leica DME microscope with a Sony Cybershot W320 digital camera and a Leica (M165C) stereomicroscope with a DFC420 digital camera. A series of partially focused digital images of each subject was stacked using the program Leica Application Suite V3.4.1 (Version 2009) to produce final images with enhanced quality. For pictures taken at the microscope, a series of partially focused images were used to drawn the body parts of nymphs and adults according to Coleman (2003, 2006).

The material is deposited in the following institutions: Entomological Collection of the Universidade Estadual de Santa Cruz (UESC), Ilhéus, Brazil; Zoological Collection of the Programa de Pós-graduação em Biodiversidade Tropical (PPGBT), Universidade Federal do Espírito Santo, São Mateus, Brazil; Entomological Collection of the Universidade Federal de Pernambuco (UFPE), Recife, Brazil; Entomological Collection Prof. José Alfredo Pinheiro Dutra (DZRJ), Departamento de Zoologia, Universidade Federal do Rio de Janeiro and Instituto Miguel Lillo (IML).

Results and discussion

Hermanella maculipennis (Ulmer, 1920)

Distribution. Argentina and Brazil (Paraná, Pernambuco and Santa Catarina States).

Material. Two nymphs and four male imagos, Brazil, Pernambuco, São Benedito do Sul, Cachoeira Poço do Soldado (S08°45'52.9", W035°53'06.1), 321 m, 12/xii/2009, LRC Lima coll. (PPGBT). Three nymphs, Brazil, Pernambuco, São Benedito do Sul, Cachoeira Poço do Caboclo (S08°45'53.4", W035°55'16.1"), 532 m, 28/viii/2010, LRC Lima coll. (UFPE).

Discussion. This is the first record of *H. maculipennis* from Pernambuco State and to Northeastern Brazil, significantly extending to north its known distribution.

Ecology. The nymphs were collected in two streams located in a mountainous area of tropical rain forest, at middle elevations 321–532 m, with exposed bedrock bottoms in the southern region of the Pernambuco State. The nymphs were found under subermeged stones. The adults were attracted to light at dusk in December.

Hermanella froehlichi Ferreira and Domínguez (1992)

Distribution. Brazil (Espírito Santo, Pernambuco and São Paulo States).

Material. Two male imagos (reared), one female imago (reared) and 11 nymphs, Brazil, Pernambuco, Amaraji, Rio Amaraji, (S08°21'48.9", W035°28'49.0"), 320 m, 20/i/2011, LRC Lima, Nicácio G. cols. (UFPE). Five nymphs, Brazil, Pernambuco, Amaraji, Cachoeira do Rio Morto (S08°20'59.1", W035°30'21.0), 363 m, 20/i/2011, LRC Lima coll. (UFPE).

Discussion. This is the first record of *H. froehlichi* from Pernambuco State and to Northeastern Brazil, significantly extending to north its known distribution.

Ecology. The nymphs were collected in stretches with exposed bedrock bottoms at the Amaraji River, located in the coastal region of the Pernambuco State. Nymphs were found under submerged stones and macrophytes (Podostemaceae). Nymphs were reared and the imagines emerged at dusk.

Hydrosmilodon gilliesae Thomas *et al.* (2004)

Distribution. Brazil (Bahia, Espírito Santo and Pernambuco States) and French Guiana.

Material. Thirteen nymphs, Brazil, Pernambuco, Jaqueira, Rio Pirangi (S08°44'53.0", W035°48'51.1"), 189 m, 12/xii/2009, LRC Lima coll. (UFPE); six nymphs, same data except 23/ii/2010 (UFPE); three nymphs, same data except 17/iv/2010 (UFPE). Seven nymphs, Brazil, Pernambuco, São Benedito do Sul, Cachoeira Poço do Caboclo (S08°45'53.4", W035°55'16.1"), 532 m, 13/xii/2009, LRC Lima coll. (UFPE). Fourteen nymphs, Brazil, Pernambuco, Bonito, Rio Verde, Camping Bonito Ecoparque (S08°31'58.6", W035°43'26.3"), 28/i/2010, LRC Lima coll. (UFPE). Two nymphs, Brazil, Pernambuco, Cabo de Santo Agostinho, Rio Pavão (S08°17'51.5", W035°03'57.1"), 58 m, 18/viii/2010, LRC Lima coll. (UFPE). Two nymphs, Brazil, Pernambuco, Amaraji, Rio Amaraji, (S08°21'48.9", W035°28'49.0"), 320 m, 20/i/2011, LRC Lima, Nicácio G. cols. (UFPE). One nymph, Brazil, Pernambuco, Amaraji, Cachoeira do Rio Morto (S08°20'59.1", W35°30'21.0), 363 m, 20/i/2011, LRC Lima coll. (UFPE). One nymph, Brazil, Pernambuco, Ribeirão, Cachoeira do Amor, (S08°26'34.1", W035°24'22.1"), 124 m, 21/i/2011, LRC Lima, Nicácio G. cols. (UFPE). Eleven nymphs, Brazil, Bahia, Ituberá, Rio Cachoeira Grande, RPPN das Plantações Michelin da Bahia (PMB) (S13°47'04.9", W39°10'33.2"), 03/vii/2008, LRC Lima coll. (UFPE).

Discussion. This is the first record from the states of Bahia and Pernambuco, and to Northeastern Brazil, significantly extending to north its known distribution.

Ecology. The nymphs were collected in coastal and mountainous rain forest streams, from low to middle elevations 58–532 m high, with exposed bedrock bottoms. Leaves and wood debris were deposited between the rocks. The nymphs were found under subermeged stones.

Hylister plaummani Domínguez and Flowers (1989)

Distribution. Brazil (Bahia, Espírito Santo, Paraná, Santa Catarina, Minas Gerais and Rio de Janeiro States).

Material. Six nymphs, Brazil, Bahia, Ituberá, Rio Cachoeira Grande, RPPN das Plantações Michelin da Bahia (PMB) (S013°47'04.9", W039°10'33.2"), 03/vii/2008, L.R.C. Lima coll. (UFPE); 16 nymphs, same location except 01/vii/2010.

Discussion. This is the first record from Bahia, slightly extending to north its known distribution.

Ecology. The nymphs of this species were collected under submerged stones in stretches at Cachoeira Grande River, at the Reserva Biológica das Plantações Michelin da Bahia in the southern area of the State.

Leentvaaria palpalis Demoulin (1966)

Distribution. Brazil (Espírito Santo and Pernambuco States), French Guiana and Suriname.

Material. One nymph, Brazil, Pernambuco, Jaqueira, Rio Pirangi (S08°44'53.0", W035°48'51.1"), 189 m, 12/xii/2009, LRC Lima coll. (UFPE); one nymph, same location except 23/ii/2010; two nymphs, same location except 17/iv/2010 (UFPE). Eleven nymphs, Brazil, Pernambuco, Ribeirão, Cachoeira do Amor (S08°26'34.1", W035°24'22.1"), 124 m, 21/i/2011, LRC Lima, Nicácio G. cols. (UFPE). Eight nymphs, Brazil, Espírito Santo, Sooretama, Rio São José (S019°07'33.1", W040°14'26.1"), 24 m, 09/ix/2010, FF Salles, JMC Nascimento colls.; six nymphs, same data except 25/x/2010 (PPGBT).

Discussion. Domínguez *et al.* (2001) redescribed this monotypic genus based on 10 nymphs from Roraima State, Northern Brazil. As they did not assign these nymphs to *L. palpalis,* this is the first record of the species from Brazil.

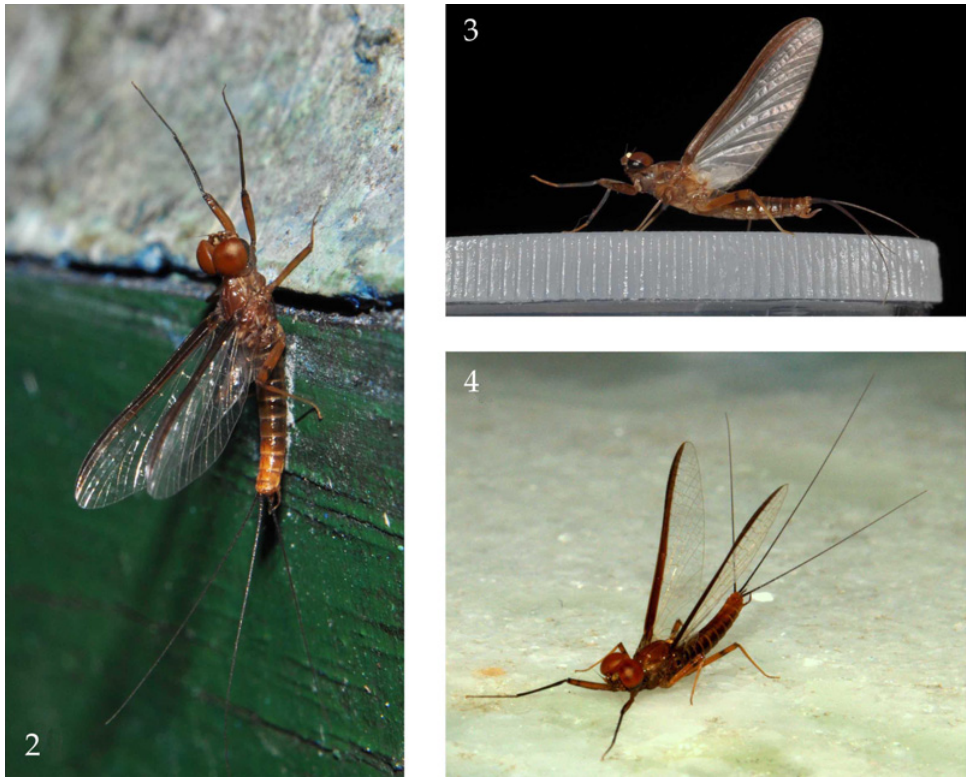
Ecology. The nymphs were collected in coastal and mountain rain forest streams, from low elevations 100–200 m high, with exposed bedrock bottoms. Leaves and wood debris were deposited between the rocks. The nymphs were found under subermeged stones and macrophytes (Podostemaceae).

Needhamella ehrhadti (Ulmer, 1920)

Distribution. Argentina, Brazil (Bahia, Espírito Santo, Goiás, Paraná, Pernambuco, Rio Grande do Sul, Rio de Janeiro and Santa Catarina States) and Uruguay.

Material. One male imago (light trap), Brazil, Pernambuco, São Benedito do Sul, Cachoeira Poço do Soldado (S08°45'52.9", W035°53'06.1), 321 m, 12/xii/2009, LRC Lima coll. (PPGBT). One male subimago (reared), Brazil, Pernambuco, Jaqueira, Rio Pirangi (S08°44'53.0", W035°48'51.1"), 189 m, 12/xii/2009, LRC Lima (UFPE); 14 nymphs, one male imago (light trap), same data except 17/iv/2010 (UFPE); three male imagos, Brazil, Pernambuco, Amaraji, Rio Amaraji (S08°21'48.9", W035°28'49.0"), 320 m, 20/i/2011, LRC Lima, Nicácio G. cols. (UFPE). One nymph, Brazil, Pernambuco, Amaraji, Cachoeira do Rio Morto, (S08°20'59.1", W35°30'21.0), 363 m, 20/i/2011, LRC Lima coll. (UFPE). One nymph, Brazil, Pernambuco, Ribeirão, Cachoeira do Amor (S08°26'34.1", W035°24'22.1"), 124 m, 21/i/2011, LRC Lima, Nicácio G. cols. (UFPE); four imagos (light trap), same data except 05/ii/2011. Twelve male imagos, Brazil, Bahia, Lençóis, Parque Nacional da Chapada Diamantina, Rio Santo Antônio (S012°29.579', W041°19.752'), 340 m, 26/x/2008, A. Calor, R. Mariano, S. Mateus cols. (UESC). Four male imagos, Brazil, Bahia, Amargosa, Boqueirão-Colonha, Fazenda Sr. Alcides (S13°08.111', W39°39.461'), 544 m, A. Calor, L. Lecci cols. (UESC).

Discussion. This is the first record from Bahia, Pernambuco and Northeastern Brazil. The specimens examined fit well with the original description given by Domínguez and Flowers (1989), except by the absence of a medial projection on clypeus in nymphs. Nymphs



Figs. 2–4. *Hydrosmilodon plagatus*, sp. nov. Living adults: **2**, dorsolateral view of male imago; **3**, lateral view of male subimago; **4**, dorsolateral view of male imago.

of these species have been previously reported from the State of Espírito Santo as *Paramaka* sp. n. (Salles *et al.*, 2010).

Ecology. The nymphs were collected in coastal and mountain rain forest streams, from low to middle elevations 100–532 m high, with exposed bedrock bottoms. The nymphs were found in a large number under subermeged stones and some of them in macrophytes (Podostemaceae). The adults were attracted to light traps at dusk in December and January.

Hydrosmilodon plagatus Lima, Nascimento and Salles, sp. nov.

(Figs. 1–17)

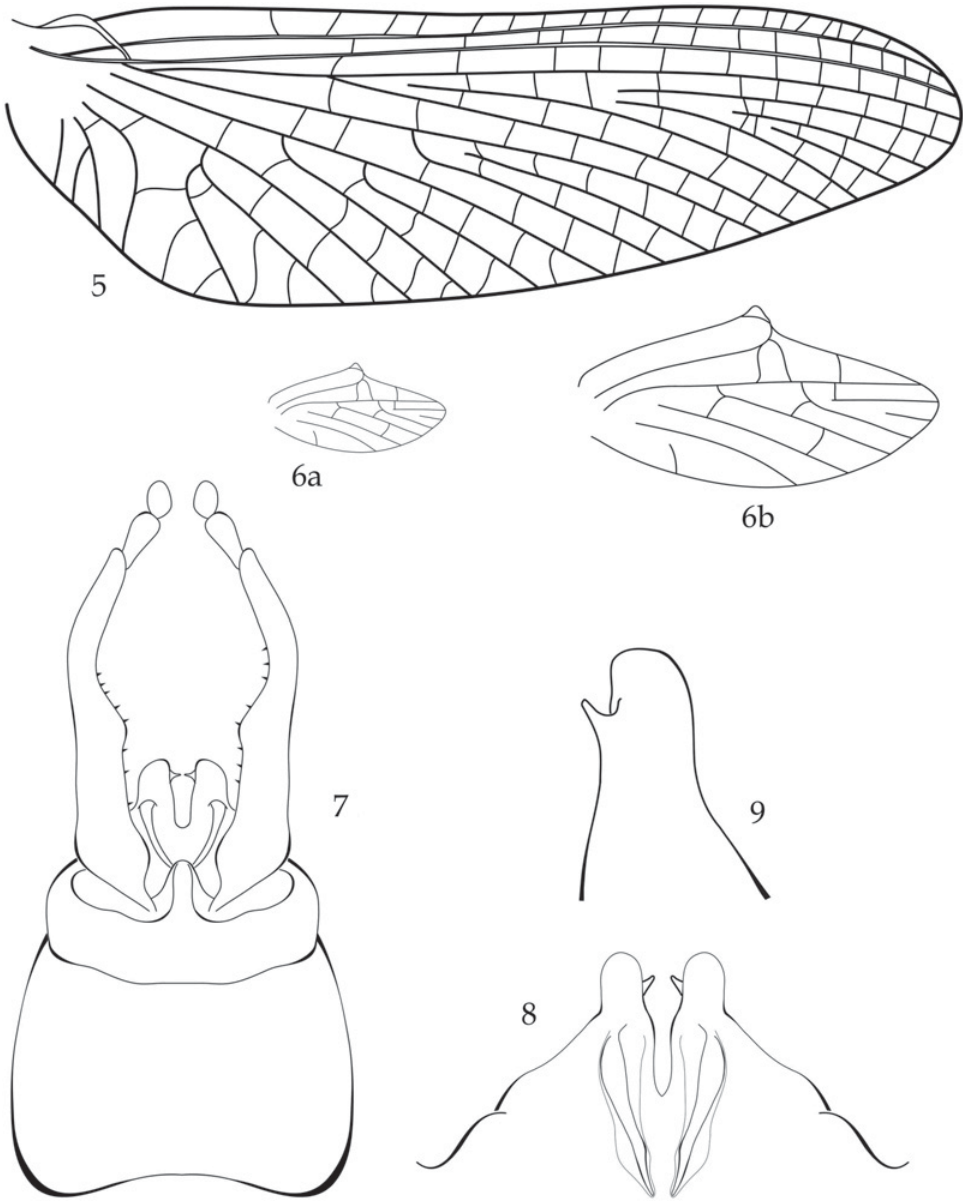
Male imago

Length: body, 9.2–10.9 mm; forewing, 9.0–10.8 mm; hind wings, 1.6–2.3 mm. General coloration orangish brown (Figs. 2–4).

Head. Orangish brown with black marks. Upper portion of compound eye light orangish, lower portion dark gray. *Antenna*. Scape and pedicel orangish brown, flagellum light brown.

Thorax. Pronotum yellowish brown, lateral margin blackish (Fig. 4); mesonotum yellowish brown, sutures yellowish, scuto-scutelar impression and scutellum whitish, pleurae and sterna washed with gray; metanotum yellowish-brown; pleura brownish with sclerites darker; sterna brownish, with sutures darker. **Wings.** Membranes of forewings hyaline, costal and subcostal area brown (Figs. 4 and 5). Veins C, Sc and R_1 brown, remaining longitudinal veins light brown; crossveins in costal and subcostal area brown, remaining crossveins light brown. Membrane of hind wings hyaline, slightly washed with brown at base; vein C, Sc and R brown, remaining longitudinal and cross veins translucent (Fig. 6a and b). **Legs.** Coxae and trochanters light yellowish brown. Leg I. Femur orangish, with a subapical dark brown band; tibia and tarsus dark brown. Leg II and III orangish, femora with a subapical brown band and a subbasal brown mark, tibiae and tarsi orangish.

Abdomen. Terga orangish, laterally washed with dark brown on segments I–VIII (medial area between brown marks of each segment wider toward segment VIII), segments IX–X uniformly orangish (Figs. 2–4); sterna yellowish. **Genitalia.** Subgenital plate without spines close to base of forceps, with a median projection between forceps; segment II of forceps 0.16 length of segment I, 1.5 length of segment III; segment I with medial protuberance on basal ½; subgenital plate yellowish, base of forceps segment I light orangish brown, darker toward apex, segment II dark orangish brown, segment III whitish (Fig. 7). Basal ½ of penes with



Figs. 5–9. *Hydrosmilodon plagatus*, sp. nov. Adult: **5**, forewing; **6a**, hind wing; **6b**, enlarged hind wing; **7**, male genitalia, ventral view; **8**, detail of penes; **9**, lobe of penes.

slightly swollen lateral margins; penes divided on basal ¼, each penes lobe with a ventral long spine and with a distomedial hook-like projection (Figs. 8 and 9). Penis lobe yellowish, ventral spine orangish. Caudal filaments brown, terminal filament longer than cerci.

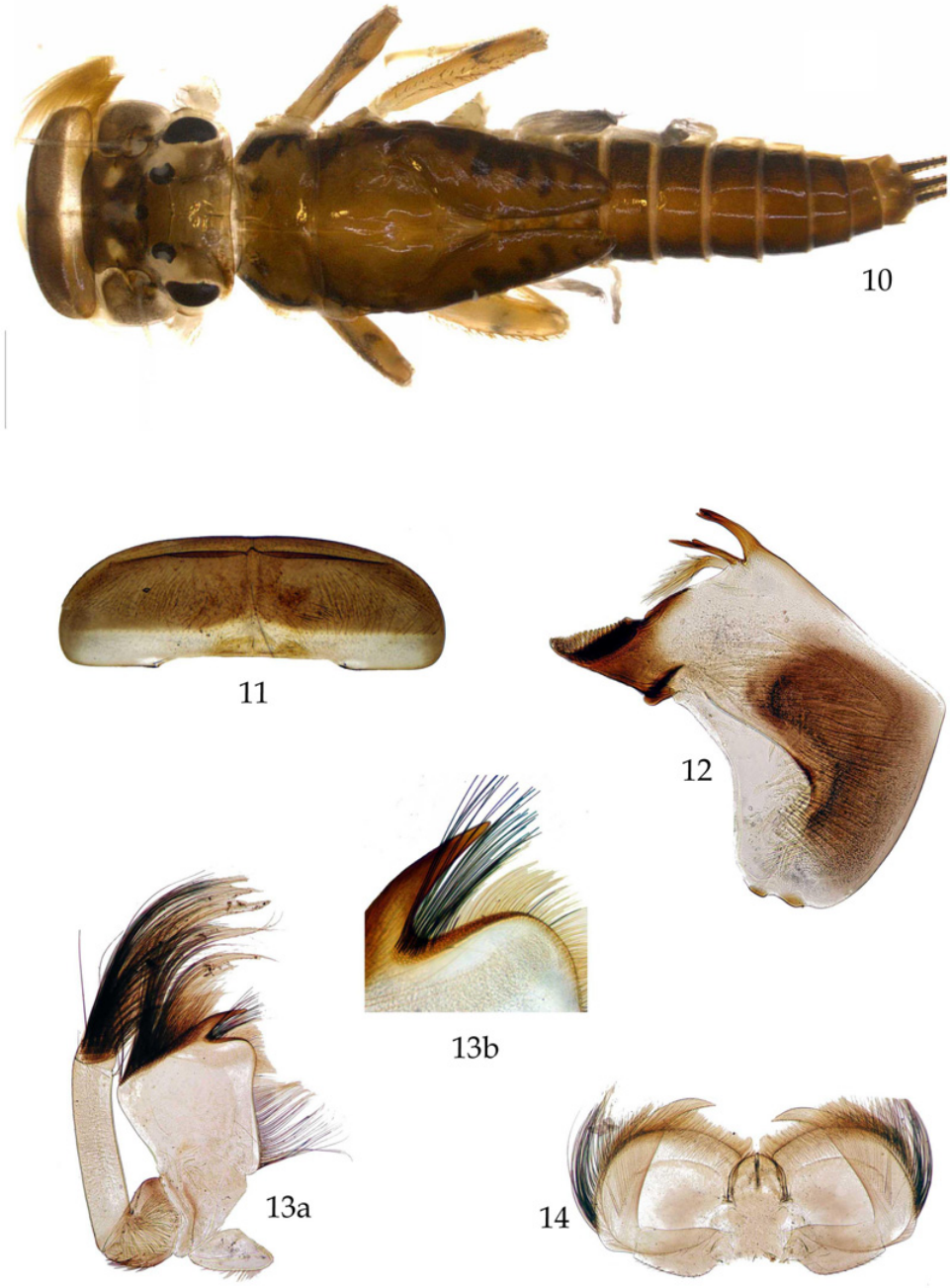
Female imago

Length: body, 10.50–10.84 mm; forewing, 11.32–11.6 mm; hind wings, 1.84–1.9 mm. Color pattern similar to male imago except as follows: head, thorax and abdomen paler, eyes blackish, forefemur dark brown.

Mature nymph

Length: body 7.2–11.8 mm, antennae 4.0–6.0 mm, cerci 12.8–14.2 mm, terminal filament 15.2–16.8 mm. General coloration orange-brown (Fig. 10).

Head. Dark brown. Upper portion of eyes of male reddish-brown, lower portion black. Eyes of female blackish. Antenna paler. *Mouthparts* (11–14). Clypeus without a median projection, lateral margin strongly concave, maximum width of labrum 1.73 times maximum width of clypeus. Labrum brown, with a basal transverse translucent band, medial emargination nearly rectilinear (Fig. 11); with 23–25 long dorsal proximal setae; numerous ventral setae directed obliquely to the sagittal

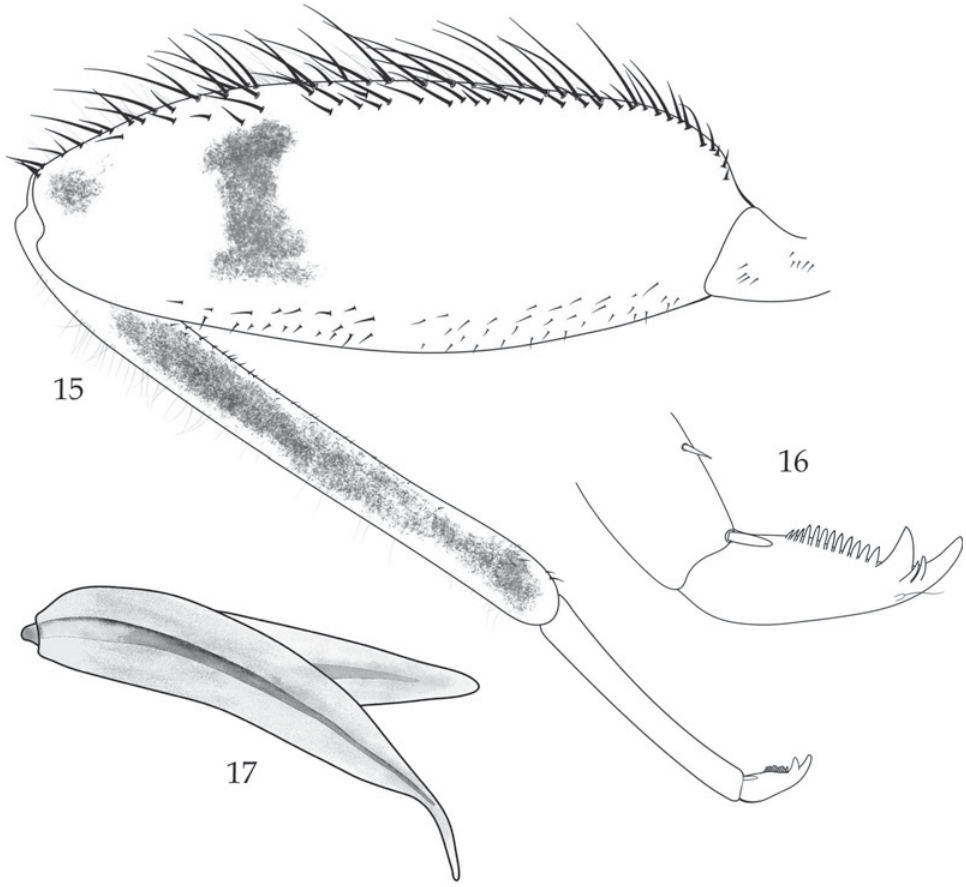


Figs. 10–14. *Hydrosmilodon plagatus*, sp. nov. Nymph: **10**, habitus of nymph. Nymphal mouthparts: **11**, labrum; **12**, mandible; **13a**, maxilla; **13b**, detail of tusk; **14**, labium.

plane. Mandible orange brown, with basal 2/3 and molar area darker; without tuft of setae at basal articulation (Fig. 12). Maxilla. Galea-lacinia with a short tusk right before inner apical angle reaching inner margin, and a ventral, long, thick seta close to inner margin (Fig. 13a and b). Basal segment of labial palpi light brown (Fig. 14).

Thorax. Terga dark orange-brown, pleura and sterna whitish. Anterolateral margin of pronotum with 3–5 thick setae. *Legs*. Yellowish, femora with a subapical dark brown mark, foretibia washed with black (Fig. 15). Trochanters without a row of setae on apicodorsal surface. Femora with thick, long, pointed setae along posterior margin and short spine along inner margin. Outer margin of tibia with row of long, fine setae (absent in tibia I and more numerous in II), hind tibia with thick setae in outer margin. Tarsal claws with a subapical denticle much larger than others, succeeded by two short submarginal denticles and a thin seta, and with a row of smaller marginal denticles (Fig. 16).

Abdomen. Terga orangish, laterally washed with dark brown on segments I–VIII, segments IX and X uniformly



Figs. 15–17. *Hydrosmilodon plagatus*, sp. nov. Nymph: **15**, foreleg; **16**, tarsal claw I; **17**, gill IV.

orangish (Fig. 10); sterna yellowish. Gills elongate, tapered to apical filament, reduced on VII, and without tracheal branches (Fig. 17). Caudal filaments whitish-brown, longer than body, with small spines on posterior margin of each segment.

Etymology. From the Latin word *plagat*, streaked, striped; with reference to the peculiar translucent stripe on the labrum of the nymph, which readily distinguish the new species from its congeners.

Diagnosis. *Hydrosmilodon plagatus*, sp. nov. is distinguished from the other species of the genus by the following combination of characteristics. In the male imago: (1) subgenital plate with a medial projection between forceps, and without spines close to base of forceps (Fig. 7); (2) forceps segment I with a distomedial protuberance; (3) presence of short spines on apex of each penis lobe (Figs. 8 and 9). In the nymphs: (1) mandibles without tuft of setae at basal articulation (Fig. 12); (2) clypeus without small medial projection; (3) galea-lacinia with a short tusk right before inner apical angle reaching inner margin (Fig. 13); (4) tarsal claws with a subapical denticle much larger than others, succeeded by two short submarginal denticles and a thin seta on apex (Fig. 16); (5) gills elongate, tapered to apical filament, reduced on segment VII, and without tracheal branches (Fig. 17).

Type material. Holotype: Male imago (light trap), Brazil, Espírito Santo, Sooretama, Rio São José (S019°07'33.1", W040°14'26.1") 24 m, 09/ix/2010, FF Salles, JMC Nascimento, LRC Lima cols. (DZRJ). Paratypes: five nymphs, five male and two female imagos, same data of holotype (PPGBT); five nymphs, two male imagos, same data of holotype (IML); three nymphs, Brazil, Pernambuco, Jaqueira, Rio Pirangi (S08°44'53.0", W035°48'51.1"), 189 m 12/xii/2009 Lima LRC coll. (UFPE); two nymphs, same data except, 23/ii/2010 (UFPE); 24 nymphs, one male imago (light trap), same data except, 17/iv/2010 (PPGBT).

Ecology. The nymphs of this species were found in large number under submerged stones in stretches with exposed bedrock bottoms at Pirangi River, State of Pernambuco. Adults, in turn, were collected in high numbers in September and February at the São José River, Espírito Santo State. Both rivers are somewhat similar showing same width and riverbed.

Life cycle association: An indirect association between nymphs and imagos is presented. We are confident that they belong to the same species based on the presence of a spot on basal third of tibia, forewing pads pigmented, abdominal coloration and general shape of genitalia present in both mature male nymphs and imagos.

Discussion. The new species differs from the other species in which the imagos are described (*Hydrosmilodon saltensis* and *Hydrosmilodon primanus*) by: presence of a medial projection in a subgenital plate (Fig. 7), forceps segment I with a distomedial protuberance, each lobe of penis with a distomedial hook-like projection (Figs. 8 and 9) and subgenital plate without spines close to base of forceps. The nymphs of the new species are similar to those of *H. gilliesae* because mandibles of both species lack a tuft of setae at basal articulation (Fig. 11), clypeus lacks small medial projection, tarsal claws present a subapical denticle much larger than others, succeeded by two short submarginal denticles (Fig. 16), and in gills I–VII tracheal trunk do not present branches (Fig. 17). However, nymphs of the new species differ from *H. gilliesae* and the others by the relative length of the tusk in galea-lacinia (shorter than in other species) (Fig. 13) and by a distinctive translucent stripe on the labrum (Fig. 11).

Needhamella mazama Nascimento, Mariano and Salles, sp. nov.

(Figs. 1, 18–34)

Male imago

Length: body, 5.8–6.5 mm; forewing, 6.5–6.9 mm; hind wings, 1.0–1.1 mm.

Head. Yellowish brown. Upper portion of compound eyes orangish brown, lower portion black. *Antenna*. Scape and pedicel brownish, flagellum light brown.

Thorax. Pronotum brown, with submedial and lateral blackish stripe; mesonotum brown, with some sutures and scuto-scutellar impression yellowish; metanotum brown; prosternum narrow (Fig. 20); pleura and sterna brown washed with black. **Wings.** Membrane of forewing hyaline, dark brown at base; longitudinal veins light yellow, cross veins translucent. Membrane of hind wing hyaline, base brownish; longitudinal and cross veins translucent. **Legs.** Coxae brown washed with black. Leg I. Trochanter brown washed with black and femur orangish brown, washed with black except for apical 1/4; tibia and tarsus whitish, tibia with basal dark brown mark and apical dark brown band. Leg II and III whitish, femora with an apical dark orangish brown band, tibiae with a small apical dark brown band, tarsi whitish.

Abdomen. Tergum I brown washed with black, with a submedial blackish mark, terga II–VI translucent, posterior margin blackish, tergum II with large submedial blackish mark, tergum III with small submedial blackish mark, terga V–X with a anteromedial blackish spot; terga VII–X orangish brown. Abdominal sternum I brown, sterna II–VI translucent, sterna VII and VIII dark orangish brown, with an anteromedial mark, sternum IX orangish brown. *Genitalia* (Figs. 21 and 24). Subgenital plate orangish brown, forceps whitish; segment II of forceps 0.4 length of segment I, 1.5 length of segment III. Penes divided on basal ¼, each penes lobe pale, apically pointed, and with a ventral, long, medially directed, brownish spine. Caudal filaments white.

Female imago

Length: body, 5.4–6.8 mm; forewing, 7.2–7.8 mm; hind wing, 1.4–1.5 mm. Color pattern similar to male imago except for abdomen uniformly dark brown.

Mature nymph

Length: body 4.3–5.2 mm, antenna 3.1 mm, cerci 5.8–6.3 mm, terminal filament 7.2–7.8 mm. General coloration brown to orange-brown (Fig. 25).

Head: Brown, area between ocelli and compound eye yellowish white. Upper portion of male's compound eye reddish brown, lower portion black. Eyes of female blackish. Antenna paler. *Mouthparts* (Figs. 30–34). Clypeus without a medial projection, lateral margin strongly concave, maximum width of labrum 0.8 times maximum width of clypeus. Labrum brown, with dorsal proximal row of 26–28 long setae; numerous ventral setae directed obliquely to sagittal plane (Fig. 30). Mandible brown, median region translucent, molars orangish brown; outer margin angularly curved, angle blunt; without setae near basal articulation (Fig. 31). Maxilla. Galea-lacinia with prominent tusk on inner apical margin (nearly half length of galea-lacinia); basal segment of labial palpus light brown (Fig. 32).

Thorax: Terga brown, with medial yellowish stripe (Fig. 25), pronotum with submedial and sublateral blackish stripe, pleura and sterna yellowish. Anterolateral margin of pronotum with two thick setae. Legs yellowish (Figs. 26–28), slightly washed with brown. Leg I (Fig. 26). Tibia with basal and subapical brown band, tarsus with a basal brown band. Leg II and III (Figs. 27 and 28). Femora with an apical brown band, tibiae with basal and subapical brown band, tarsi with a basal brown band. Femora with long setae along posterior margin, dorsal surface covered with thick, short spines, absent in forefemur. Tarsi with spine-like setae along inner margin. Tarsal claws (Fig. 29) with subapical denticle much larger than others, 4–6 median denticles subequal in size, without accessory denticles.

Abdomen: Terga orangish brown, segments II, III and VI–IX with a medial and submedial brown mark (Fig. 25); sterna yellowish white. Posterolateral projections on abdominal terga VIII–IX. Plate-like gills translucent, with a basal mark and median grayish band. Caudal filaments yellowish. Terminal filament longer than cerci.

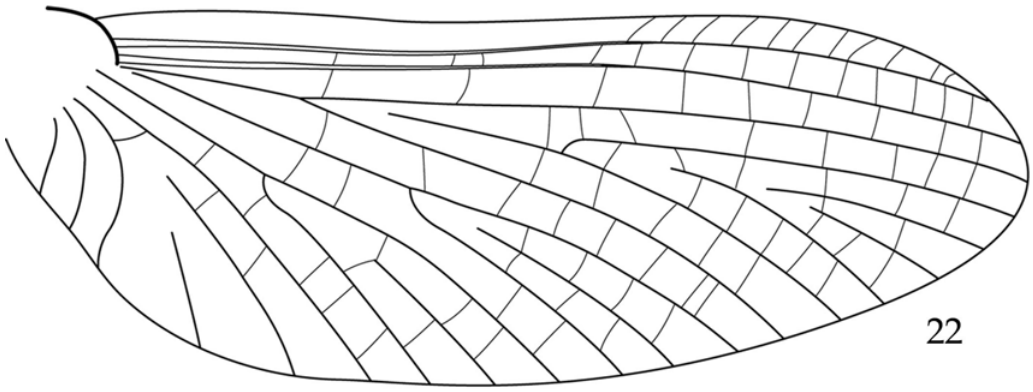
Etymology. After *Mazama americana* (Erxleben, 1777) (Mammalia: Cervidae), scientific name of the Veado Mateiro, the species that gave name to the Reserva Biológica Córrego do Veado, the only locality so far where the new species has been found.

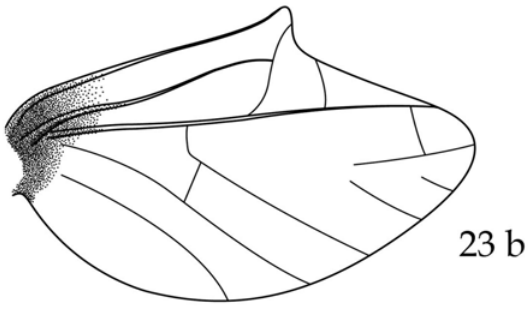
Diagnosis: The imagos of *N. mazama*, sp. nov. are distinguished from those of *Needhamella ehrhardti* by the following combination of characteristics: (1) prosternum narrow (Fig. 20); (2) penes divided on basal ¼ (Figs. 21

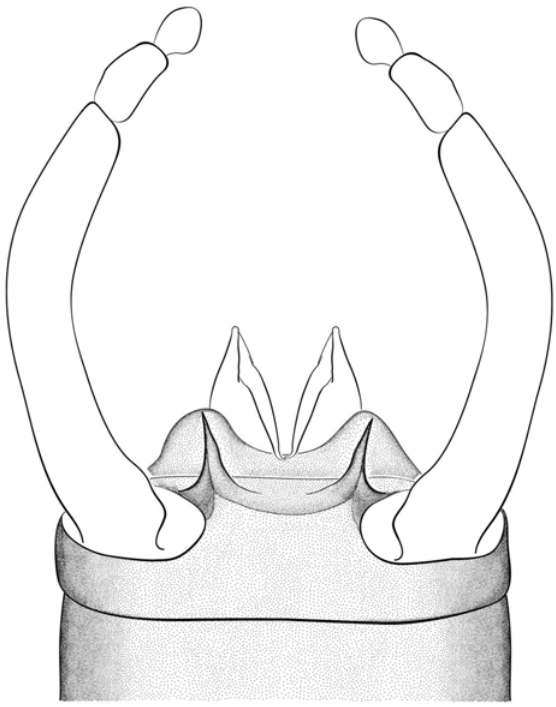
Figs. 18–21. *Needhamella mazama*, sp. nov. Adult: **18**, male imago, dorsal view; **19**, male imago, lateral view; **20**, prosternum; **21,** male genitalia, ventral view.

and 24); (3) penes lobe apically pointed, with ventral, long, medially directed spine (Figs. 21 and 24); and (4) abdomen with contrasting color pattern (segments II–VI translucent, segments I, and VIII–X brown and orangish brown, respectively) (Figs. 18 and 19). The nymphs of *N. mazama*, sp. nov. are distinguished by the following combination of characteristics: (1) clypeus without medial projection (although this projection may also be absent in *N. ehrhardti* (Fig. 25); (2) galea-lacinia with prominent tusk on inner apical margin (nearly half length of galea-lacinia) (Fig. 32); (3) gills translucent, with a basal and median grayish band (Fig. 25); (4) tarsal claw devoid of accessory denticles and (5) terga yellowish brown (Fig. 25).

Type Material. Holotype: Male imago (light trap), Brazil, Espírito Santo, Pinheiros, Córrego São Roque (S018°19'25.8", W040°07'33.9") 57 m, 22/vi/2010,







Figs. 22–24. *Needhamella mazama*, sp. nov. Adult: **22**, forewing; **23a**, hind wing; **23b**, enlarged hind wing; **24**, male genitalia, ventral view.

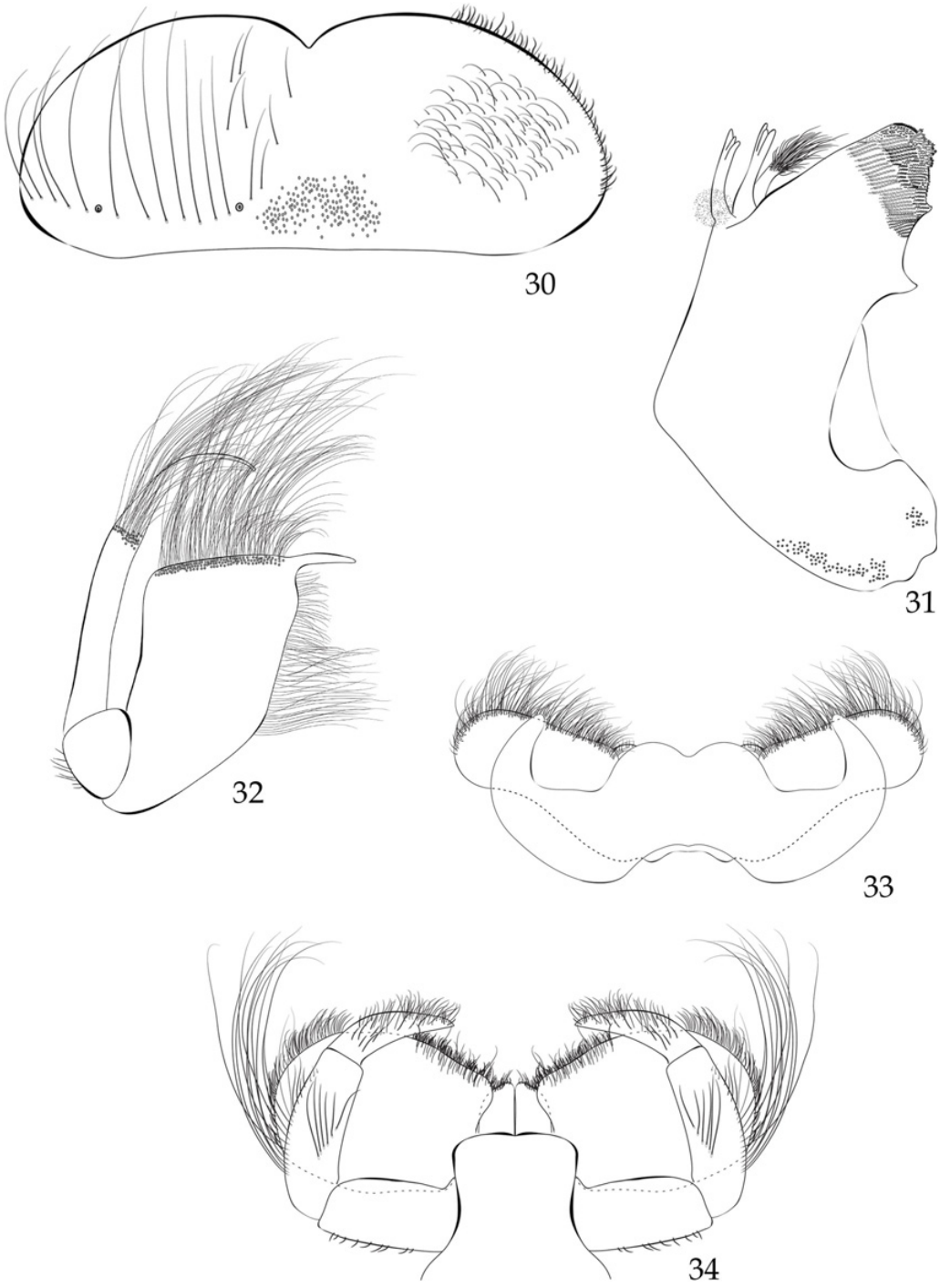
FF Salles, JMC Nascimento, R Mariano cols (DZRJ). Paratypes: ten nymphs, three male and three female imago, same data as holotype (4 nymphs, 1 male imago, 1 female imago at PPGBT; 3 nymphs, 1 male imago, 1 female imago at DZRJ and 3 nymphs, 1 male imago, 1 female imago at IML).

Figs. 25–29. *Needhamella mazama*, sp. nov. Nymph: **25**, nymph, dorsal view; **26**, fore leg; **27,** middle leg; **28;** hind leg; **29,** tarsal claw.

Ecology: *N. mazama*, sp. nov. was found exclusively at the Reserva Biológica Córrego do Veado, a small but important conservation unit in the northern area of the Espírito Santo State. Adults and nymphs were collected in a single stream, Córrego São Roque, which comes from outside the reserve and is somewhat impacted due to the deviation of water for the plant of papaya. The nymphs of this species were found in large number under submerged stones. Imagines were attracted to light traps in June, dry season (most part of the examined material), and October, beginning of the rainy season (only two specimens).

Life cycle association: Nymphs, male and female imagos, are tentatively associated by sharing the same color pattern of legs. Besides that, *N. mazama*, sp. nov was the single representative of the Hermanella Complex found in the type locality, or even at the Reserva Biológica Córrego do Veado.

Discussion: *N. mazama*, sp. nov. is the second described species of the genus, therefore some changes need to be performed in the generic diagnoses proposed by Domínguez and Flowers (1989) and Domínguez *et al.* (2006), once some characteristics proposed by these authors are of specific value. They are: (1) the width of imago prosternum – broad in *N. ehrhardti*, but narrow in the new species (as in *Hermanella* and *Hylister*); (2) the division of the penis – apical ½ in *N. ehrhardti*, basal ¼ in *N. mazama*, sp. nov.; (3) the medial projection on the clypeus – absent in the examined nymphs of the new species, present or absent in *N. ehrhardti* (see comments under *N. ehrhardti*) and finally (4) accessory



Figs. 30–34. *Needhamella mazama*, sp. nov. Nymphal mouthparts: **30**, labrum; **31**, mandible; **32**, maxilla; **33b**, hypopharynx; **34**, labium.

denticles – two are present in *N. ehrhardti* and none in *N. mazama*, sp. nov.

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