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Redescription of the female, male, larva and pupa of *Sabethes* (*Sabethoides*) *glaucodaemon* (Dyar & Shannon) (Diptera: Culicidae) and description of the female genitalia

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Abstract

Sabethes (*Sabethoides*) *glaucodaemon* was described for the first time by Dyar & Shannon (1925) based on the adult female. Later, descriptions of the male genitalia and parts of the fourth-instar larva and pupa were published by other authors. No one has described the female genitalia or made a complete description of the larva and pupa. The aim of this study was to redescribe *Sa. glaucodaemon* in the adult stage, including the male and female genitalia, and the pupa and fourth-instar larva. All stages are illustrated. Distinctions from *Sa*. (*Sbo*.) *tridentatus* are discussed.

Key words: *Sabethes glaucodaemon*, *Sabethes tridentatus*, Sabethini, sylvatic mosquitoes, taxonomy

Introduction

Currently, the genus *Sabethes* Robineau-Desvoidy includes 41 species organized into five subgenera: the nominotypical subgenus (18 species), *Sabethoides* Theobald (4 species), *Sabethinus* Lutz (6 species), *Peytonulus* Harbach (12 species) and *Davismyia* Lane & Cerqueira (1 species) (Harbach 2018). This group of mosquitoes has a distribution restricted to the Neotropical Region. The species are diurnal. Its immature stages develop in phytotelmata, such as tree holes and bamboo internodes (Lane & Cerqueira 1942; Forattini 2002). The genus includes species that play a role in the epidemiological cycle of yellow fever virus. Some findings of naturally infected mosquitoes have been recorded in Brazil and Argentina (Roberts *et al*. 1981; Dégallier *et al*. 1992; Vasconcelos *et al*. 1997; Goenaga *et al*. 2012). Among those species, *Sa.* (*Sbo.*) *chloropterus* (von Humboldt) plays an important role in the transmission of the virus (Galindo 1958; Galindo & Trapido 1957; Galindo *et al*. 1950, 1951, 1955, 1956). This species was found naturally infected in a recent outbreak of yellow fever in the state of Rio de Janeiro, southeastern Brazil (Abreu *et al*. 2019). The subgenus *Sabethoides* includes four species: *Sa. chloropterus*, *Sa. glaucodaemon* (Dyar & Shannon), *Sa. tridentatus* Cerqueira and *Sa. conditus* Moses, Howard & Harbach, and includes at least two undescribed species (Moses *et al*. 2000). It is important that all species are well known and accurately identified. In this context, one of them, *Sa. glaucodaemon* is incompletely described and illustrated. This species was described for the first time by Dyar & Shannon (1925), from adult females collected by J. Bequaert in Rio Branco, Amazonas (current State of Roraima), Brazil. Da Costa Lima (1931) collected larvae and pupae of this species from Obidos, Pará, Brazil. He reared those specimens to obtain adult females and males, but only provided a brief description and photograph of the male genitalia. He also included a key for females of the subgenus *Sabethoides*. Lane (1953) illustrated the male geni-

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talia. Lane & Causey (1955), based on three larval and pupal exuviae obtained from specimens collected in Minas Gerais, Brazil, described the fourth-instar larva and pupa. But these descriptions are poor and the immature stages were only partially illustrated, without mention of chaetotaxy. They only described and illustrated the head and the last abdominal segments of the larva and pointed out a few characters and illustrated the abdominal segments of the pupa. None of the authors mentioned above described the female genitalia or provided a complete description of the larva and pupa. Therefore, the purpose of this paper is to provide complete descriptions and illustrations of all life stages (except the egg) to aid the unequivocal recognition of the species.

Materials and methods

During sampling carried out in the province of Misiones, Argentina, larvae belonging to the genus *Sabethes* were collected from bamboo stumps. Several larvae were individually reared to obtain adults. The adults were identified as *Sa. glaucodaemon*. The adults were pin-mounted and the immature stages, and dissected female and male genitalia were mounted in Canada balsam on microscope slides. The morphological terminology follows Harbach & Knight (1980, 1982) for immature and adult stages and female genitalia, and Moses *et al*. (2000) for male genitalia. Voucher specimens are deposited in the Laboratory of Entomology, Instituto de Medicina Regional (Universidad Nacional del Nordeste), Chaco, Argentina. Life stages are indicated as follows: M (male), MG (male genitalia), F (female), FG (female genitalia), L (larva), Pe (pupal exuviae) and Le (larval exuviae). An asterisk following an abbreviation indicates that a drawing is available. Measurements are given in millimeters, with a range followed by the mean in parentheses; the number of branches for each seta are given followed by the mode in parentheses. In mosquito pupa, paddle index and trumpet index were measured as the ratio of the paddle length to the paddle width and the ratio of the trumpet length to the trumpet width, respectively. The siphonal index of larvae was measured as the ratio of the siphon length to the siphon width.

Sabethes (*Sabethoides*) *glaucodaemon* (Dyar & Shannon, 1925)

Sabethoides glaucodaemon Dyar & Shannon, 1925: 39 (F). Type locality: near San Alberto, Rio Branco, Amazonas (current State of Roraima), Brazil (USNM).

Sabethes (*Sabethoides*) *glaucodaemon* of Da Costa Lima 1931: 57 (M*); Lane & Cerqueira 1942: 673 (M*, F); Lane 1953: 1057, 1075–1075 (MG*); Lane & Causey 1955: 16 (P*, L*); Pinheiro *et al*. 1981 (medical importance); Xavier *et al*. 1989 (collection record); Dégallier *et al*. 1992 (bionomics); Moses *et al*. 2000: 998 (taxonomy); Camargo-Neves *et al*. 2005 (medical importance); Pinto *et al*. 2009 (collection record); Silva *et al*. 2010 (collection record); Moreno *et al.* 2011 (medical importance); Tubaki *et al*. 2011 (bionomics); Confalonieri & Costa 2012 (collection record); Mucci *et al*. 2015 (bionomics); Alencar *et al*. 2018 (collection record); Silva *et al*. 2019 (collection record); Cunha *et al*. 2019 (medical importance).

FEMALE (Fig. 1). Medium-sized species. General coloring metallic green. *Head*: Occiput with metallic violaceous scales, above with light blue reflections depending on angle of light, postgena with silver scales. Black short setae along eye margin, 2 long dark interocular setae. Proboscis with bluish scales, as long as abdomen, 0.80 length of forefemur, expanded in distal third. Maxillary palpus slightly longer than clypeus, dark, about 0.1 length of proboscis. Clypeus dark, without setae and scales, pruinose. Antenna 0.80 length of proboscis; pedicel without scales, pruinose. *Thorax*: Integument dark brown. Antepronota approximated, forming nearly a continuous straight edge, covered with metallic greenish scales above and golden scales below, a row of strong short black setae on margin of each lobe, postpronotum with metallic golden scales; scutum dark with broad metallic greenish and purple scales, purple scales mainly on prescutellar area. Scutellar scales with purple and golden reflections. Pleura completely covered by broad decumbent silvery white scales, on metepisternum and metameron, some reflections golden depending on angle of light. Thoracic setae as follows: short setae on anterior promontory (16), antepronotum (12), supraalar area (8), scutellum with 3 dark long setae on lateral lobes, 2 on midlobe, mesopostnotum with 4–6 setae, 2 dark prespiracular setae; proepisternal (1), lower mesokatepisternal setae (2) short and yellow; 9–12 golden upper mesepimeral setae, 5 long, curved and reaching median area of mesopostnotum. *Wing*: Length about 3.0–3.1 mm; dorsal scales brown and broad on most veins, anal vein with narrow scales; alula with fine scales; calypter without scales. *Halter*: Scabellum yellowish, without scales, pedicel with brown scales, capitellum with black scales.

Legs: General color black with bluish reflections. Coxae and trochanters with silvery scales; trochanters with some yellowish scales at base. Forefemur white-scaled on almost all of ventral length, white scaling gradually narrows towards apex; midfemur with white scales on ventral surface, hindfemur with white scales ventrally, dorsal surface white-scaled on basal 0.5. Hindtibia with white scales on proximal 0.5. Fore- and hindtarsi entirely dark-scaled. Midtarsus with white scales as follows: midtarsomere 2 white-scaled anteriorly on distal 0.2–0.5, midtarsomere 3 totally covered with white scales, midtarsomere 4 with white scales on proximal 0.5 to whole length, and midtarsomere 5 dark-scaled, sometimes with few pale scales at base. Ungues of all legs simple and black. *Abdomen*: Slightly longer than hindfemur. Terga generally dark with bluish reflections; basal iridescent bands with irregular margins, except on tergum I with white scales. Basal bands wider and complete on terga VI and VII, from which they progressively narrow on more anterior terga until completely interrupted medially on terga I and II. Laterally dark and iridescent scales are limited by angular incisions. Sterna yellowish-scaled. *Genitalia* (Fig. 2): Sternum VIII with rounded posterior margin, with 3 or 4 rows of setae aligned posteriorly, similar in size; tergum VIII quadrate, covered with setae of different sizes interspersed with scales, setae arranged in an area forming a triangle towards posterior margin, longer setae located in middle; postgenital lobe longer than cerci, dorsal surface covered with small setae, with 3 or 4 larger setae on either side of mid-line; cerci long, rounded at apex, slightly curved at middle of mesal side, dorsal surface covered with long setae; tergum IX thin, slightly concave in middle, with 4 thick setae on each side; insula with small depression on caudal margin, 4 or 5 longer and thicker setae born from prominent papillae at each side on outer edge of caudal area.

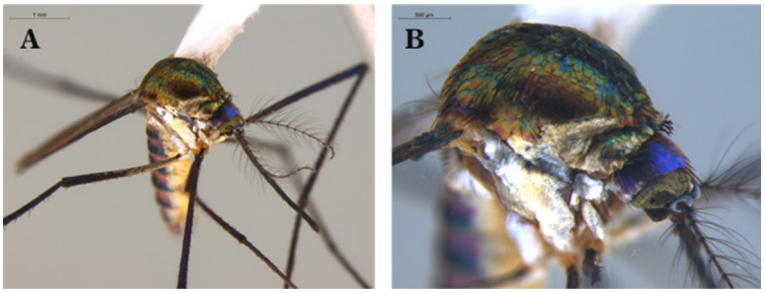

FIGURE 1. (A) *Sabethes glaucodaemon.* General aspect of female; (B) higher magnification showing the coloration of the scales on the antepronotum, occiput and scutum.

TABLE 1. Numbers of branches for setae of the pupa of *Sabethes glaucodaemon* (14 specimens). Modes in parentheses.

Seta	Cephalothorax	Abdominal segments								Paddle
		I	II	III	IV	V	VI	VII	VIII	
0	-	-	1	1	1	1	1	1	1	-
1	1-3(2)	26-81[a]	1-3(2)	1,2(1)	1	1	1	1	-	-
2	1,2(3)	1	1,2(1)	1	1	1	1	1	-	-
3	1,2(1)	1	1	1,2(1)	1-3(2)	1,2(1)	1	1	-	-
4	1,2(1)	3-5(4)	1-5(3,4)	1-3(1,2)	1-3(2)	2-6(3,6)	1,2(1)	1	1	-
5	1,2(2)	1	1,2(1)	1-4(1)	1	1	1	1	-	-
6	1,2(1)	1	1,2(1)	1	1	1	1	1	-	-
7	1,3(2)	1-3(1)	1-5(2)	1,2(1)	1,2(1)	2-4(3)	1	1,2(1)	-	-
8	1	-	-	1-4(2)	1-3(2)	1-3(1)	2-4(3)	1-4(2)	-	-
9	1	1-3(1)	1	1	1	1	1	9-17(14)	13-24(18)	-
10	1	-	1	1	1,2(1)	1	1,2(1)	1,2(1)	-	-
11	1	1,2(1)	1,2(1)	1	1,2(1)	1,2(1)	1-5(2,3)	1	-	-
12	1,2(2)	-	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	3-5	-	-	-
14	-	-	-	-	-	-	-	-	1	-

[a] dendritic.

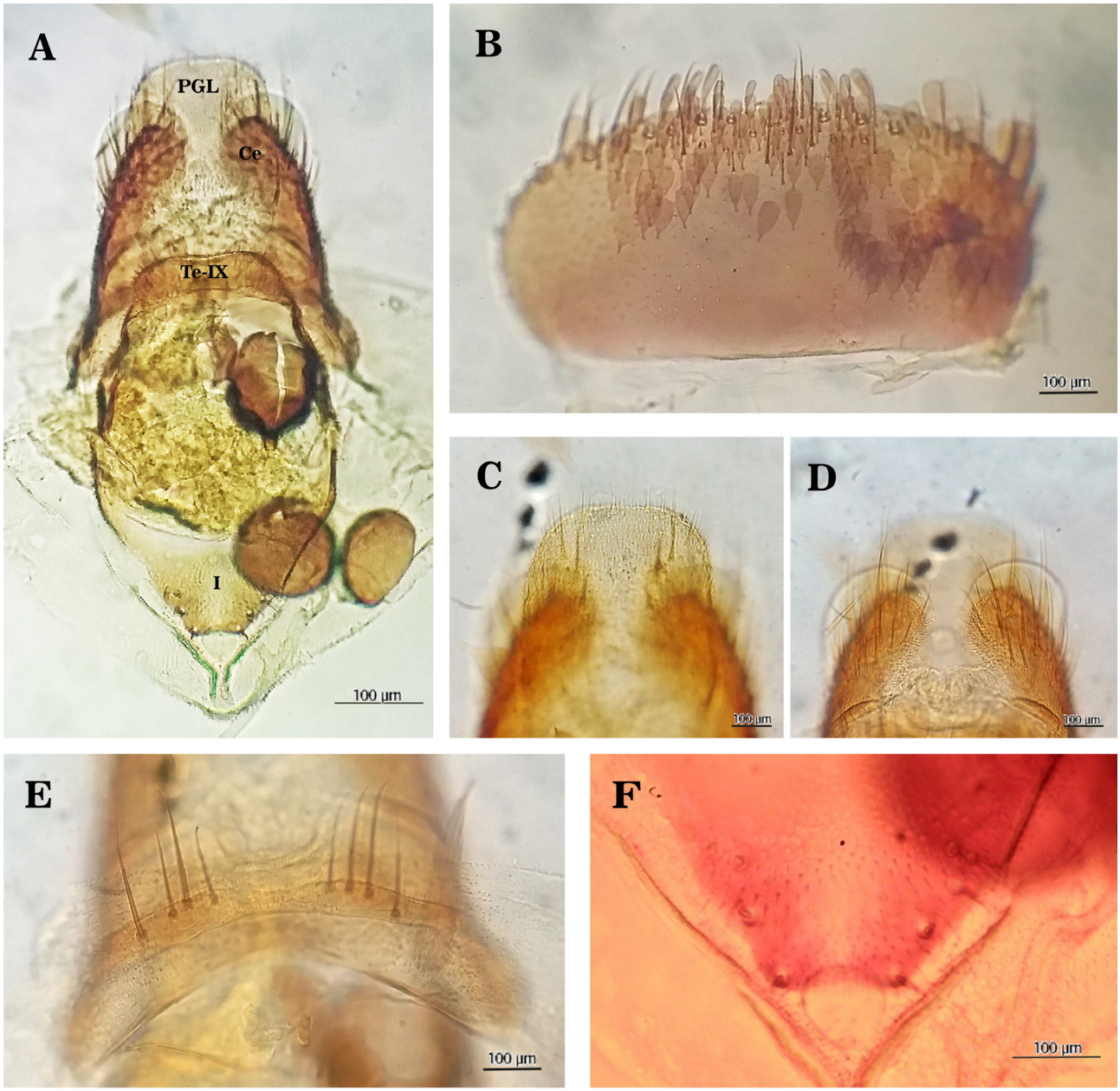

FIGURE 2. Female genitalia of *Sabethes glaucodaemon*. (A) Ventral view; (B) sternum VIII; (C,D) postgenital lobe and cerci; (E) tergum IX, dorsal view; (F) insula. Abbreviations: Ce, cercus; I, insula; PGL, postgenital lobe; Te-IX, tergum IX.

MALE (Fig. 3A). As in female except for the following differences. Antenna 0.50 length of proboscis (length 1.5–1.6 mm, mean 1.53 mm). Midtarsomere 2 white on apical 0.20–0.5, midtarsomeres 3 and 4 white on proximal 0.30–1.00. *Genitalia* (Figs. 3B–D, 4A–D): Tergum VIII invaginated in middle forming 2 lobes with rounded corners; third of posterior area covered by numerous spatulate scales, scales longer laterally; posterior margin with numerous long setae distributed uniformly. Sternum VIII with a row of moderately long setae on posterior margin, almost 0.5 of apical surface covered by spatulate scales. Tergum and sternum IX fused laterally, forming a complete ring. Ninth tergal lobes not produced, without invagination in middle, very small space between setal clusters, each side with 4–10(6) strong setae with tips slightly bent laterally and increasing in length. Sternum IX almost rectangular with rounded corners. Gonocoxite cylindrical, elongate, length approximately twice mid-width; minutely spiculate, 0.5 distal sternal surface with numerous scales and short setae, about 8 moderately long setae at apex; 1 strong tubercle without seta on apical third of sternal surface; 2 tergomesal setae emerge basally, mesal seta longer than sternal seta; basal mesal lobe pilose, 3 setae larger than others on upper external angle. Gonostylus shorter than gonocoxite, with short, strong stem, divided into 5 main lobes; lobes A and E almost fused, prominent, rounded with a row of about 15

setae on distal margin and 2 strong sclerotized setae shaped like claws, below this, a cockscomb-like membranous process with irregular margin. In middle of mesal surface of lobe A-E is a small brush-like appendage; adjacent to A is another appendage resembling a small inverted wing. Lobe M elongate, with 2 long foliform branches, sternal branch single, mesal branch with tip slightly curved downwards, apical third with a row of about 7 setae. Lobe B arises from middle of lobe M as a small stemmed appendage with rounded and pilose apex. Lobe C a very large and long recurved arm with strong elbow and ending in 2 strong points; middle of this arm bears 2 processes, one long fimbriate arm at apex and a short dense filamentous tuft (fp). Proctiger with broad basal sclerotization (tergum X); paraproct slender, sclerotized on margin, with protuberant apex, with 4 very close-set teeth and 1–4(4) cercal setae inserted on sclerotized area. Aedeagus rounded, widest in middle, submedian tergal arms fused, forming a median tergal bridge; apical tergal arms not fused, serrate on distal margin; median sternal plate pronounced and slightly folded outward, like a tulip flower.

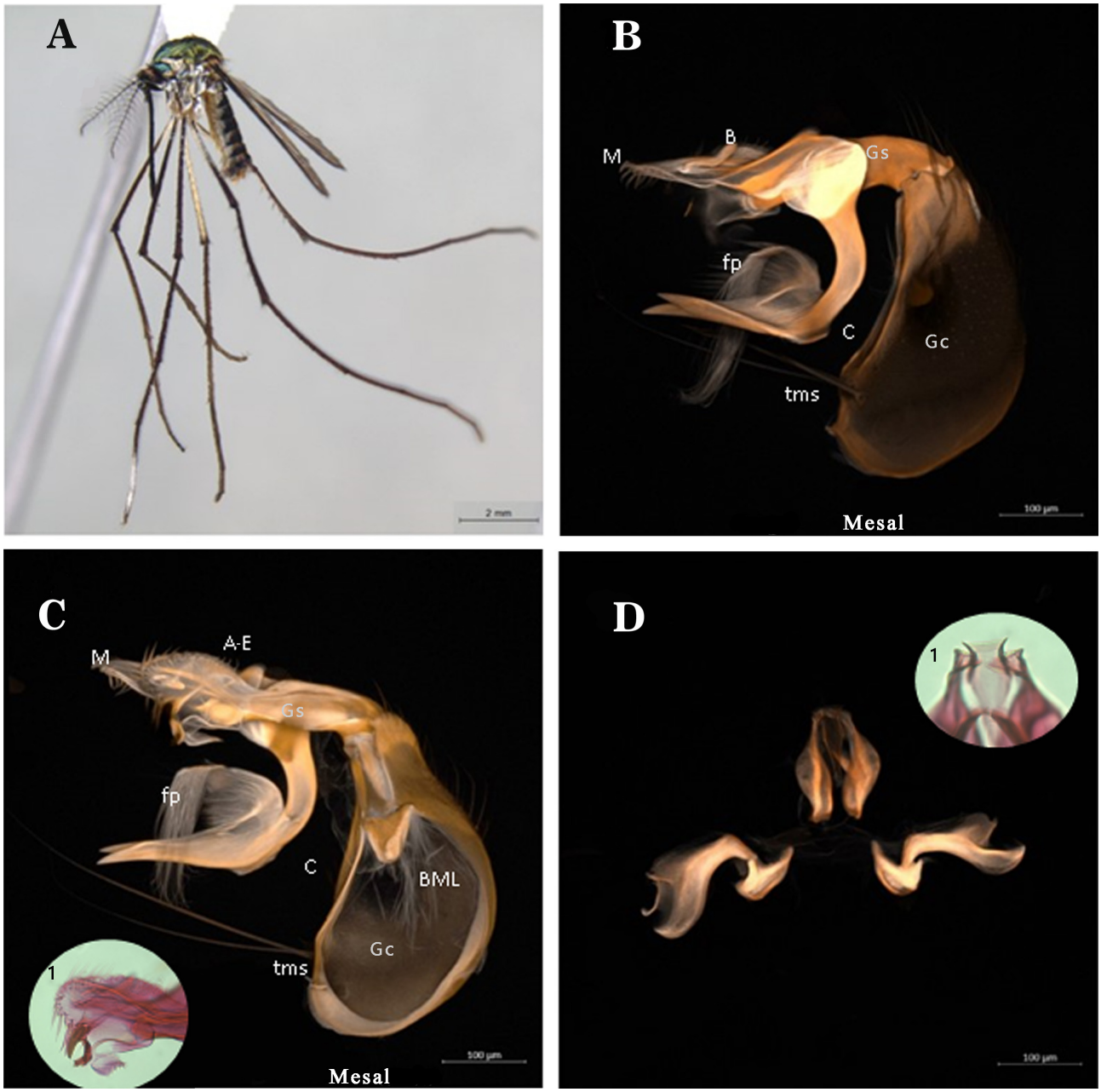

FIGURE 3. Male of *Sabethes glaucodaemon*. (A) Habitus; (B) gonocoxite and gonostylus, mesal view; (C) gonocoxite and gonostylus, mesal view, insert: higher magnification showing cockscomb-like membranous process; (D) aedeagus, parameres and basal pieces, insert: higher magnification showing submedian and apical tergal arms. Abbreviations: A–E, C and M, lobes of gonostylus; BML, basal mesal lobe; Gc, gonocoxite; Gs, gonostylus; fp, fimbriated process of lobe C; tms, tergomesal setae of gonocoxite.

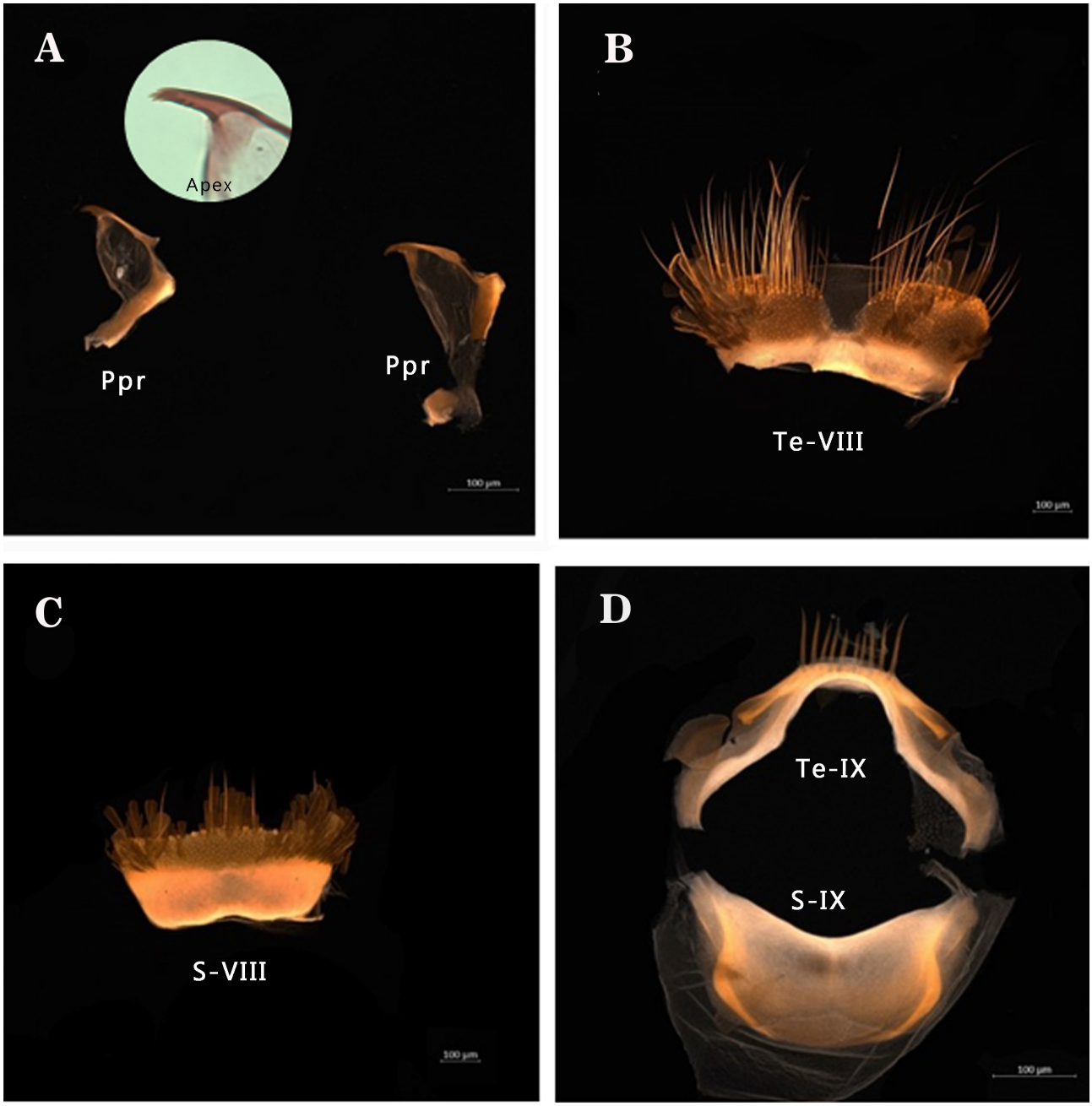

FIGURE 4. Male genitalia of *Sabethes glaucodaemon.* (A) Paraprocts; (B) tergum VIII; (C) sternum VIII; (D) tergum and sternum IX. Abbreviations: Ppr, paraproct; S-VIII, sternum VIII; S-IX, sternum IX; Te-VIII, tergum VIII; Te-IX, tergum IX.

PUPA (Fig. 5). Positions and character of setae as figured; range and modal number of setal branches in Table 1. *Cephalothorax*: Integument slightly tanned, darker on postscutal area. Trumpet cylindrical, tanned; length 0.315–0.470 mm (mean 0.390 mm), width 0.015–0.0165 mm (mean 0.013 mm), trumpet index 2.24–2.86; pinna 0.0078–0.0169 mm (mean 0.0130 mm), ≈0.30 length of trumpet. Seta 1-CT double, sigmoid, very long; 5-CT long, more often double. *Abdomen*: Tanned, sterna darker on basal area. Length 3.5–4.0 mm (mean 3.8 mm). Seta 1-I well developed, dendritic; 1-III–VII inserted lateral to seta 2. Seta 5-IV–VI always single, longer than length of corresponding segment; setae 10-II and 13-VI present. *Genital lobe*: Tanned in female and male. Length 0.26–0.34 mm (mean 0.30 mm) in female and 0.50–0.63 (mean 0.58mm) in male. *Paddle:* Hyaline, minutely speculate at base. Inner part shorter than outer part. Length 0.63–0.89 mm (mean 0.74 mm), width at widest point 0.42–0.57 mm (mean 0.49 mm), paddle index 0.30–0.89.

LARVA (fourth-instar) (Fig. 6). Position and character of setae as figured; range and modal number of setal branches in Table 2. Exhibiting the subgeneric characters noted by Harbach (1991). *Head*: Wider than long, width

TABLE 2. Number of branches for setae of the fourth-instar larva of *Sabethes glaucodaemon* (14 specimens).

Seta	Head	Thorax			Abdominal segments								
		P	M	T	I	II	III	IV	V	VI	VII	VIII	X
0	1	6-11(10)	-	-	-	1	1	1	1	1	1	1	
1	1	2-5(2,3)	1-4(2)	2-4(3)	3-6(4)	2-5(3)	1-3(1)	1	1,2(1)	2-4(2)	2,3(2)	4-6(5)	2,3(2)
2	-	1	1	1,2(1)	1-3(2)	1-3(1)	1-4(1)	1-3(1)	1-3(1)	1-3(1)	1,2(1)	1	3-4(3)
3	1	2	1	1-4(2)	1	1	1	1	1	1,2(1)	1	3-5(3)	2,3(2)
4	1	5-10(5)	1	2,3(2)	3-4(3)	3-5(3)	1,2(1)	1	4-7(6)	1	1,2(1)	1	2-5(3)
5	1	1	1	2-5(3)	1-3(1)	3-6(4)	2-5(4)	2-4(4)	2-4(3)	2-4(3)	2,3(3)	1,2(2)	
6	1	2,3(2)	1	1-3(2)	3-8(6)	3-7(5)	1	1	1	1	3,5,6(5)		
7	2,3(2)[a]	8-14(10)	1-2(1)	7-13(7)	2,3(3)	2-5(3)	3-9(7)	4-9(6,7)	7-9(7)	2-6(3,5)	1	**1-S,**	**1**
8	1-3(2)	7-12(9)	3-5(5)	6-10(7,9)	-	1-3(1)	1-4(2)	1-3(2)	1-4(2)	4-11(8)	8-14(11)	**1a-S,**	**1**
9	1-3(2)	2,3(2)	1	9-14(9)	1	1	1,2(1)	1,2(1)	1-3(1)	1,2(1)	1-3(1)	**2a-S,**	**1,2(2)**
10	1,2(1)	3-7(6)	4-7(5)	1,2(1)	1	1	1	1	1-2(2)	1	1,2(2)		
11	4-7 (5)	1	1	1	3-7(5)	2-4(4)	3,4(3)	2-5(4)	2-5(3)	6,8-11(9)	1		
12	2,3	1	1	1	-	1	1	1	1	1	1,2(1)		
13	1,2(2)	-	6-11(8)	4-9(8)	2-9(6,7)	3-8(7)	3-8(7)	3-8(7)	2-7(6)	12-14,18,25(18)	2-5(3)		
14	3-6(5)	1-4(2)	10-16(11,12)	-	-	-	-	-	-	-	-	1	
15	2,3 (2)	-	-	-	-	-	-	-	-	-	-		

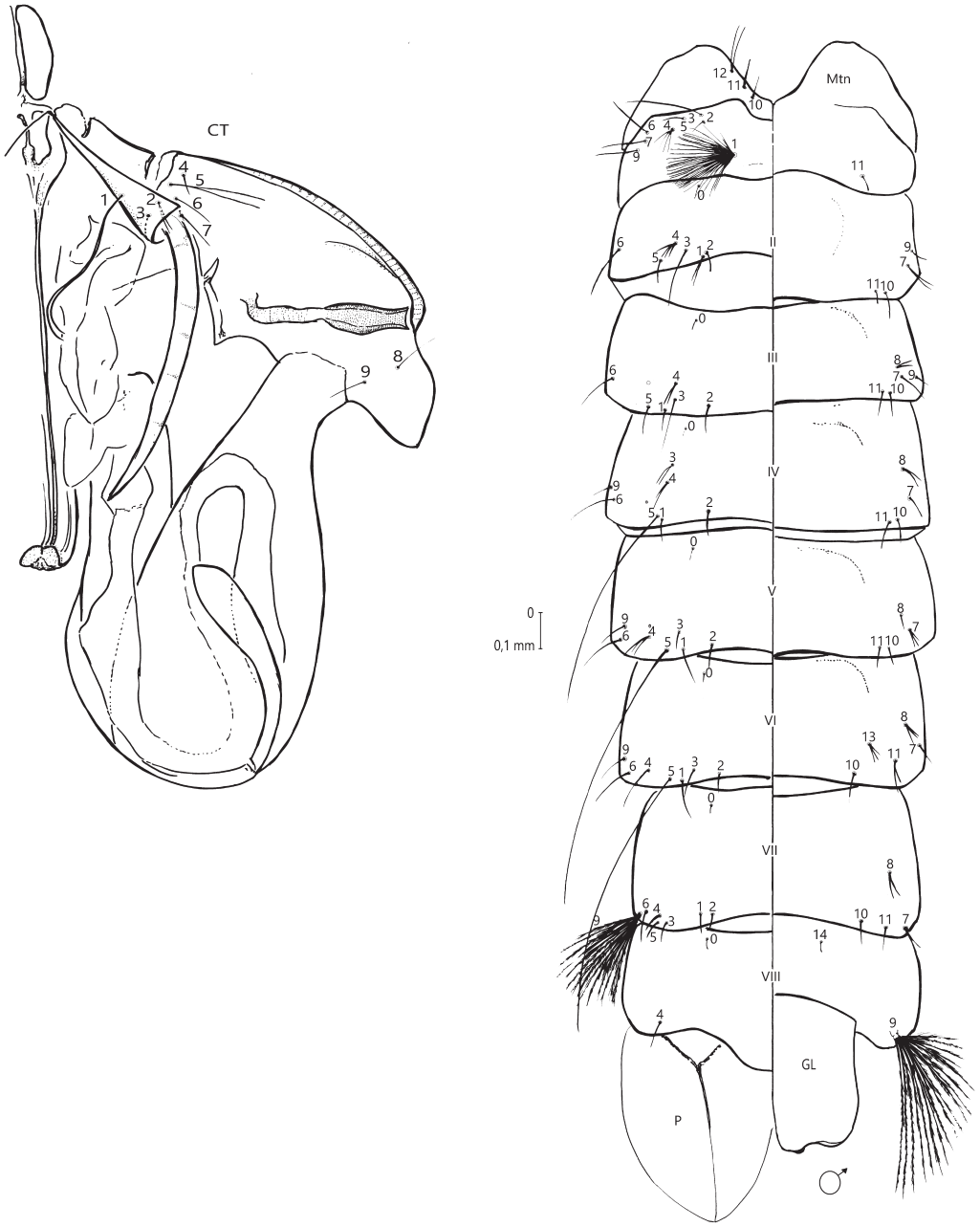

FIGURE 5. Pupa of *Sabethes glaucodaemon*. (A) Cephalothorax; (B) metanotum and abdomen. Abbreviations: CT, cephalothorax; GL, genital lobe; Mtn, metanotum; P, paddle; I–VIII, abdominal segments (terga on left; sterna on right); 1–14, setal numbers.

1.05–1.57 mm (mean 1.26 mm), length 0.84–1.15 mm (mean 0.99 mm). Occipital foramen widely V-shaped, margins heavily tanned. Integument lightly tanned. Dorsomentum with 7–9 (7) dark teeth on each side of median tooth, sometimes outers shorter or similar in length. Maxilla with 5,6(5) teeth (laciniarastrum), apical tooth (AT) 0.80 length of maxillary body. Setae 1-C stout, expanded in basal third; 0,3-C single; 2-C absent; setae 4–6-C single; 10-C with 1,2(1) mostly simple branches, inserted at level of 14-C; 15-C with 2 or 2,3(2) branches, inserted near anterior margin of labiogula. *Antenna*: Short, length 0.26–0.30 mm (mean 0.27 mm), spiculose. Seta 1-A single, borne near apex, length about 2 times width of antenna. *Thorax*: Integument hyaline, smooth. Setae 0,8-P, 1,13,14-M and 5,8-T with short multiple branches. Setae 2,5,11,12-P, 2–6,911,12-M and 11,12-T always single, 3-P always double, 13-T strongly developed, with 4–9(8) very long aciculate branches. *Abdomen*: Integument hyaline, smooth. Abdominal segments I–VI with stellate setae, branches with truncate apices. Tubercles of setae 6,7-I,II tanned. Setae 6,7-I,II strongly developed, long, aciculate, with multiple branches. Seta 6-III–VI long, aciculate and single.

Seta 1-I,II, strong, aciculate, with multiple branches, seta 1-III–V long, mostly single, seta 1-V as long as segment; seta 5-II–VI strongly developed, stellate, with multiple aciculate branches; seta 2-I inserted lateral of seta 1, 2-II–VII inserted mesal to seta 1. Seta 13-I–V strongly developed, stellate, aciculate, with multiple branches. Segment VII with small setae, only 3-VII large. *Segment VIII*: Comb with 17–22(17) scales arranged in a single row, scales with fringe of minute spicules. *Segment X*: Hyaline. Saddle incomplete, tanned, surface covered with short rows of minute spicules, length 0.21–0.24 mm (mean 0.21 mm). Seta 1-X usually double, 2-X triple, 3-X usually double, 4-X with 2–5(3) branches. Anal papillae slightly shorter than siphon, about 4 times length of segment X. *Siphon*: Brown, surface covered with short rows of minute spicules, gradually tapered from base to apex, length 1.03–1.26 mm (mean 1.17 mm), width at base 0.26–0.33 mm (mean 0.28 mm), siphonal index 3.34–4.83. Seta 1-S single, inserted 0.4–0.5 from base. Pecten with about 60 fine filaments extending from siphon base to point below level of insertion of seta 2a-S. Seta 2-S forked at tip. Seta 1a-S longer than 2a-S, always single and simple; 2a-S single or double, more often double.

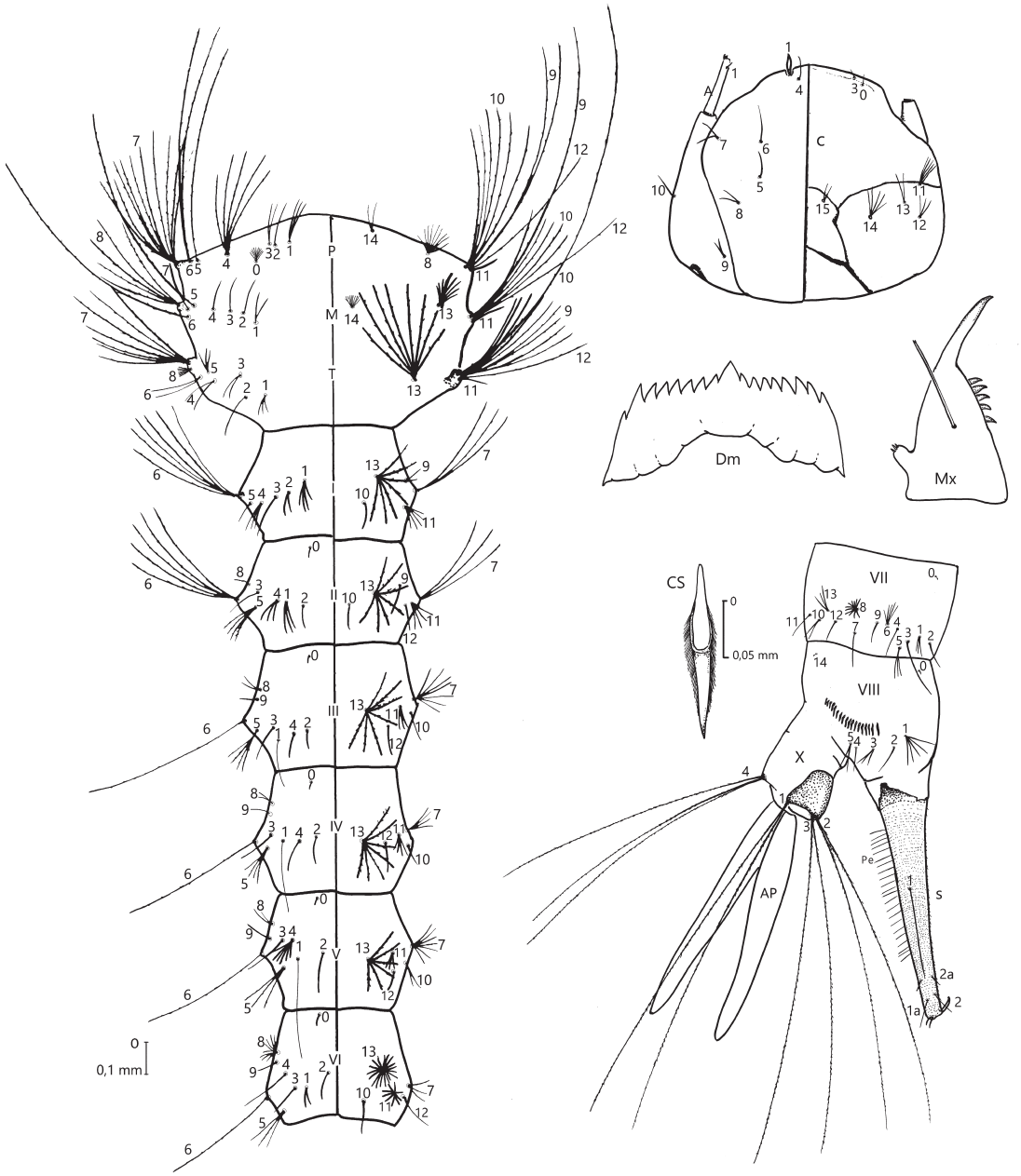

FIGURE 6. Larva of *Sabethes glaucodaemon.* (A) Head (dorsal on left, ventral on right); (B) thorax and abdominal segments I–VI (dorsal on left, ventral on right); (D) abdominal segment VII–X (lateral, left side). Abbreviations: AP: anal papillae; C, cranium (head); CS, comb scale, Dm, dorsomentum; M, mesothorax; Mx, maxilla; P, prothorax; Pe, pecten; S, siphon, T, metathorax; I–VIII, X, abdominal segments I–VIII, X; 1–14, setal numbers.

Material examined. *Sabethes glaucodaemon*: 3F, 3FG, 11M, 11MG, 14Le, 14Pe as follows: ARGENTINA, *Misiones*, Eldorado (26° 24′ S 54° 38′ W), 16-ix-16, 1M, Le, Pe, MG, 19-iv-18, 2M, Le, Pe, MG, 29-i-16, 1F, 1M, Le, Pe, FG, MG, 19-i-17, 1F, Le, Pe, FG, 15-xii-15, 1M, Le, Pe, MG, 19-iii-16, 1M, Le, Pe, MG, 22-vi-17, 1M, Le, Pe, MG, 1-ix-17, 2M, Le, Pe, MG, 24-x-16, 1M, Le, Pe, MG, 28-ii-18, 1F, Le, Pe, FG Alonso, Alvarez, Bangher and Stein coll.; Alvarez, Bangher, Neves, Motta and Stein det. Specimens IMR.CUL 10-010 to -021: BRAZIL, *Goiás*, Campos Belos (13° 00′ 52.4″ S 46° 44′ 30.7″ W), natural container trap, col. Quintella M and Motta MA, det. Motta M.A., 5-x-14, 1M, Le. Pe, No. CCULI 4071. This voucher specimen was donated by the Laboratório de Mosquitos Transmissores de Hematozoários, Instituto Oswaldo Cruz, Fiocruz, RJ, Brazil.

Distribution. *Sabethes glaucodaemon* is recorded from Argentina, Bolivia, Brazil, Colombia, Guyana and Suriname (Stein *et al*. 2018; Walter Reed Biosystematics Unit 2015).

Bionomics. Larvae were collected from a bamboo stump in association with larvae of *Aedes* (*Stegomyia*) *albopictus* (Skuse) and *Limatus durhamii* Theobald.

Discussion

Sabethes glaucodaemon resembles *Sa*. *tridentatus*. Both species differ from the other species of the subgenus *Sabethoides* in having longer upper mesanepimeral setae, which reach the middle of the mesopostnotum. Females of these species can be distinguished by differences in the coloration of the scales on the antepronotum. *Sabethes tridentatus* has the antepronotum covered with blue scales whereas *Sa. glaucodaemon* has green scales. On the other hand, the pattern of white scaling on the midtarsi can separate them, although there is variation in the distribution of white scales. The white scales extend from the apex of midtarsomere 2 to the base of midtarsomere 5 in *Sa. tridentatus* while in *Sa. glaucodaemon* the white scales of midtarsomere 2 extend from apical 0.2–0.5, midtarsomere 3 totally covered with white scales, midtarsomere 4 with white scales on proximal 0.5 to whole length, and midtarsomere 5 dark-scaled, sometimes with few pale scales at base. The structure of the male genitalia differs in both species in having a very different lobe C of the gonostylus. This lobe is a very large, long arm ending in three strong points in *Sa. tridentatus* whereas in *Sa. glaucodaemon* lobe C it is a very well-developed recurved arm ending in two strong points with one very small, bearing two processes: one long and fimbriate and the other a short dense filamentous tuft. These last two structures are absent in *Sa. tridentatus*. Based on the few characteristics of the larva of *Sa. glaucodaemon* described by Lane & Causey (1955), those described in the present study and those described by Cerqueira (1961), the larvae and pupae of *Sa. glaucodaemon* and *Sa. tridentatus* are very similar. The number of comb spines of abdominal segment VIII in *Sa. glaucodaemon* is 17–22(17) whereas in *Sa. tridentatus* there are 12–19. Seta 2-X has five branches in *Sa. tridentatus*; it is triple in *Sa. glaucodaemon*. The anal papillae are three times the length of segment X in *Sa. tridentatus* and four times in *Sa. glaucodaemon*. The siphon index can be 3.34–4.83 in *Sa. glaucodaemon* and 4.5 in *Sa. tridentatus*, as noted by Cerqueira (1961). The pecten in *Sa. glaucodaemon* has about 60 fine filaments extending from the base of the siphon to a point below the level of insertion of seta 2a-S, whereas it extends almost to the apex of the siphon in *Sa. tridentatus*. Seta 1-S is inserted on the basal third of the siphon in *Sa. glaucodaemon*, whereas in *Sa. tridentatus* it is inserted in the middle third. The pupa of *Sa. glaucodaemon* has seta 4-I with 3–5 branches while in *Sa. tridentatus* it has 6 or 7 branches; the male genital lobe of *Sa. tridentatus* bears a small lobe on the distal margin, shaped like the Greek letter theta, which is absent in *Sa. glaucodaemon*.

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