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The neotropical genus *Sporrongia* Gumovsky (Hymenoptera: Eulophidae), including two new species and the first biological record

CHRISTER HANSSON[1,2]
[1]*Scientific Associate, Natural History Museum, Department of Life Sciences, London, UK*
[2]*Biological Museum (Entomology), Lund University, Sweden.*
Christer.Hansson@biol.lu.se; https://orcid.org/0000-0002-9429-0197

Abstract

Two new species of *Sporrongia* Gumovsky (Eulophidae: Entedoninae), *S. marginata* **sp. nov.** from Costa Rica and Mexico, and *S. niveicornis* **sp. nov.** from Peru, are described and compared to the single previously known species, *S. tobagoiensis* Gumovsky. *Sporrongia marginata* has been reared from galls on the legume *Andira inermis* (Leguminosae). This is the first biological record for the genus and an indirect indication of possible gall induction by *S. marginata*.

Key words: galls, gall maker, gall inducer, Andira inermis

Introduction

The genus *Sporrongia* Gumovsky was described with a single species, *S. tobagoiensis*, based on a female specimen caught in a malaise trap on the island of Tobago (Gumovsky 1998). *Sporrongia* was compared to the Australian genus *Horismenoides* Girault, as both genera shared features such as a reduced and very short pronotum, a wide mesoscutum with notauli present only anterolaterally and with a median groove, strongly reduced metanotum and a very short propodeum. They differed in seven features that were listed in a table, one of which was their distribution, Neotropical vs Australian. In the original description, Gumovsky placed *Sporrongia* in tribe Euderomphalini, subfamily Entedoninae, but in a later paper (Gumovsky 2001) he removed it from this tribe as its position there would render Euderomphalini paraphyletic.

Prior to the present study nothing was known about the biology of *Sporrongia* species. Based on specimens described here, reared from galls on *Andira inermis* (Leguminosae) in Costa Rica, it is inferred that species of *Sporrongia* might be phytophagous, inducing galls on plants to develop in. Phytophagy in the Eulophidae has been demonstrated in two groups: the tribe Ophelimini and the subfamily Tetrastichinae (La Salle 2005), but never in subfamily Entedoninae, although such a way of life has been suspected in genus *Klyngon* Hansson (Hansson & La Salle 2010). All known phytophagous eulophids are associated with galls, either as gall inducers or as inquilines in galls.

Methods

Specimen preparation

Specimens from the reared series of *S. marginata* were killed and preserved in 80% EtOH. They were subsequently dehydrated in an EtOH series up to 99.9% and then dried using a critical point drier, as outlined by Bray (2008). The dried specimens were mounted on cards as described by Noyes (1982). Observations of specimens and measurements were done using a Nikon SMZ1000 stereomicroscope.

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Imaging

The colour images were made using a Canon camera equipment including an EOS 5D Mark IV body, a telezoom lens 70–300 mm (using only 135–200mm) with a 10× Mitutoyo microscope lens attached, and macro twin lite MT-24 EX. The camera was attached to a Cognisys stackshot macrorail system. The SEM micrographs are from uncoated specimens, and were obtained using a JEOL®JSM 5600LV scanning electron microscope, in low vacuum and with a backscatter detector. The picture stacking was done with Helicon Focus version 6 software, and Adobe Photoshop was used for image processing and preparation of plates.

Morphological abbreviations and acronyms

Morphological terminology follows Gibson (1997). More illustrations of the morphological terms are available at www.neotropicaleulophidae.com.

The following abbreviations are used in the descriptions: HE = height of eye; HW = height of fore wing; LG = length of gaster; LM = length of marginal vein; LW = length of fore wing, measured from base of marginal vein to apex of wing; MM = length of mesosoma; MS = malar space; OOL = distance between one posterior ocellus and eye; PM = length of postmarginal vein; POL = distance between posterior ocelli; POO = distance between posterior ocelli and occipital margin; ST = length of stigmal vein; WH = width of head; WM = width of mouth opening; WT = width of thorax.

MZLU = Entomological collections, Biological Museum, Lund University, Sweden; MZUCR = Museo de Zoología, Universidad de Costa Rica; NHM = The Natural History Museum, London, England; TAMU = Texas A&M University, College Station, U.S.A.

The ratios in the descriptions below are based on holotypes and one of the paratypes (if present) of the other sex.

Sporrongia Gumovsky, 1998

Sporrongia Gumovsky, 1998:31. Type species: *Sporrongia tobagoiensis* Gumovsky, by original designation.

Diagnosis. Posterior ocelli situated very close to occipital margin (Figs 17, 20); clypeus not delimited (Figs 11–16); pronotum strongly reduced and not visible in dorsal view (Figs 18, 21); anterior ½ of notauli as distinct and deep grooves (Figs 18, 21); transscutal articulation between midlobe of mesoscutum and mesoscutellum is a wide and deep groove (Figs 18, 21); axillae strongly advanced forward, so that at least ½ of axillae is in front of anterior margin of mesoscutellum (Figs 18, 21, 24); dorsellum hidden under mesoscutellum and not visible in dorsal view (Figs 18–22, 25); antenna with 1–2 anelli (Figs 4, 7, 10).

Biology. No biological information was available when the genus was described. One of the species described here, *S. marginata*, is based on a long series of both females and males that have been reared from round succulent galls on *Andira inermis* (Leguminosae) in Costa Rica. No other insects were reared from these galls. It is not established whether *Sporrongia marginata* is a parasitoid on a gall inducer or is the actual gall inducer, but the absence of other gall inhabitants might suggest the latter. However, further investigations are required to establish this with certainty.

Distribution. Costa Rica (**new record**), Mexico (**new record**), Peru (**new record**), Trinidad & Tobago (Gumovsky 1998).

Identification. The best option for identification is to use the multiple entry key to the Neotropical genera of Entedoninae on the website www.neotropicaleulophidae.com. *Sporrongia* does not run smoothly in the key to Nearctic Eulophidae (Schauff *et al*. 1997), but can be easily distinguished from all other Entedoninae in this key through the shape of the notauli.

Key to females

1. Gaster yellowish-white with dark brown lateral margins (Figs 1, 2); mid and hind coxae white (Fig. 2); antenna with scape dark brown (Fig. 3). . . . . ***S. marginata* sp. nov.** (♂ known)
- Gaster without dark lateral margins (Figs 5, 8); mid and hind coxae pale brown (Fig. 8) or dark brown (Fig. 5); antenna with scape white (Figs 6, 9) 2
2. Flagellum white (Fig. 6), coxae dark brown (Fig. 5) . . . . . .***S. niveicornis* sp. nov.** (♂ unknown)
- Flagellum (Fig. 9) and coxae (Fig. 8) pale brown . . . . . .***S. tobagoiensis* Gumovsky** (♂ unknown)

Sporrongia marginata Hansson, sp. nov.

(Figs 1–4, 11–14, 17–19, 23–26)

Diagnosis. Female flagellum white and scape dark brown (Fig. 3); female with mid and hind coxae white (Fig. 2); female gaster yellowish-white with a narrow dark brown band along lateral margins (Figs 1, 2).

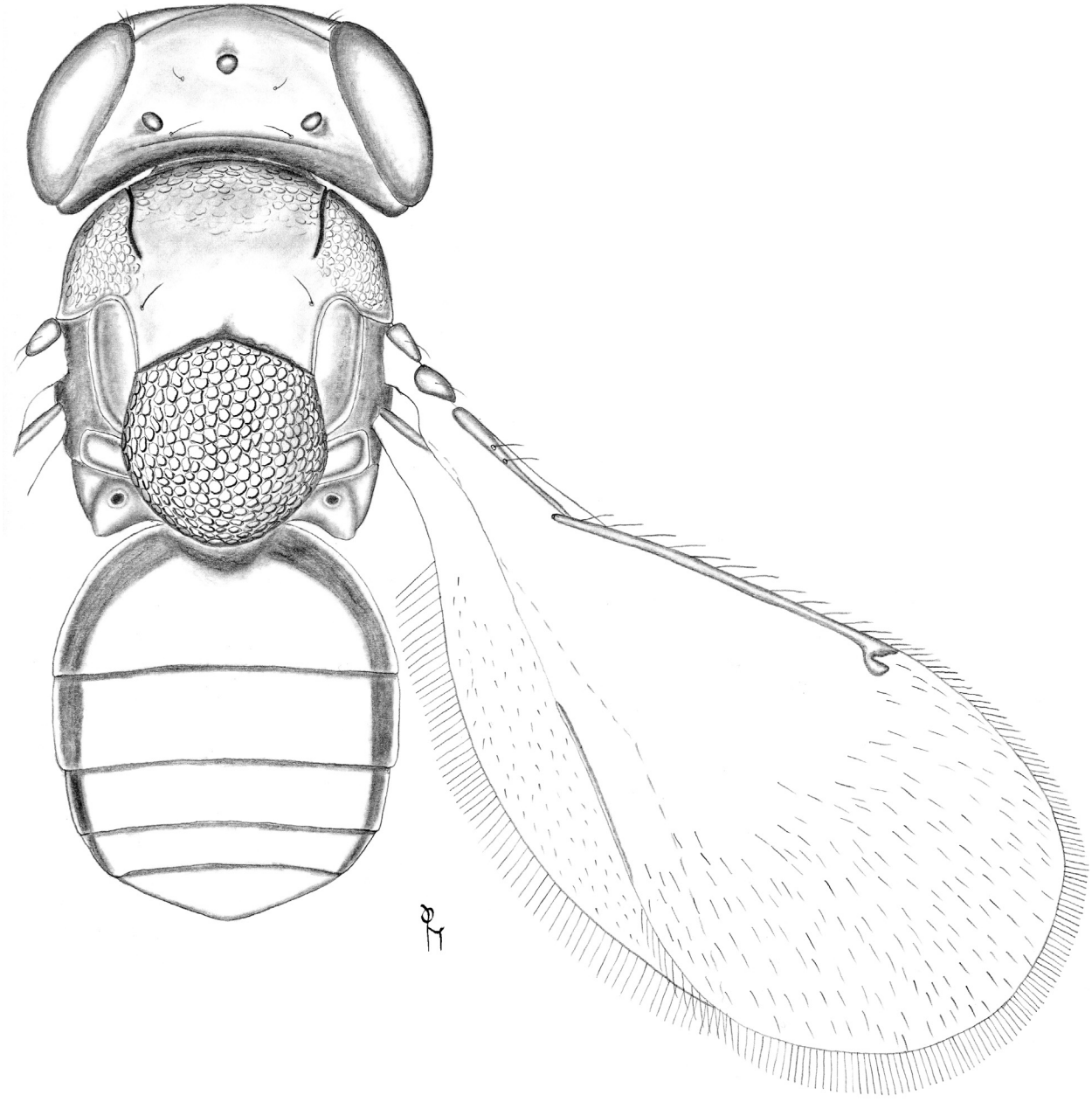
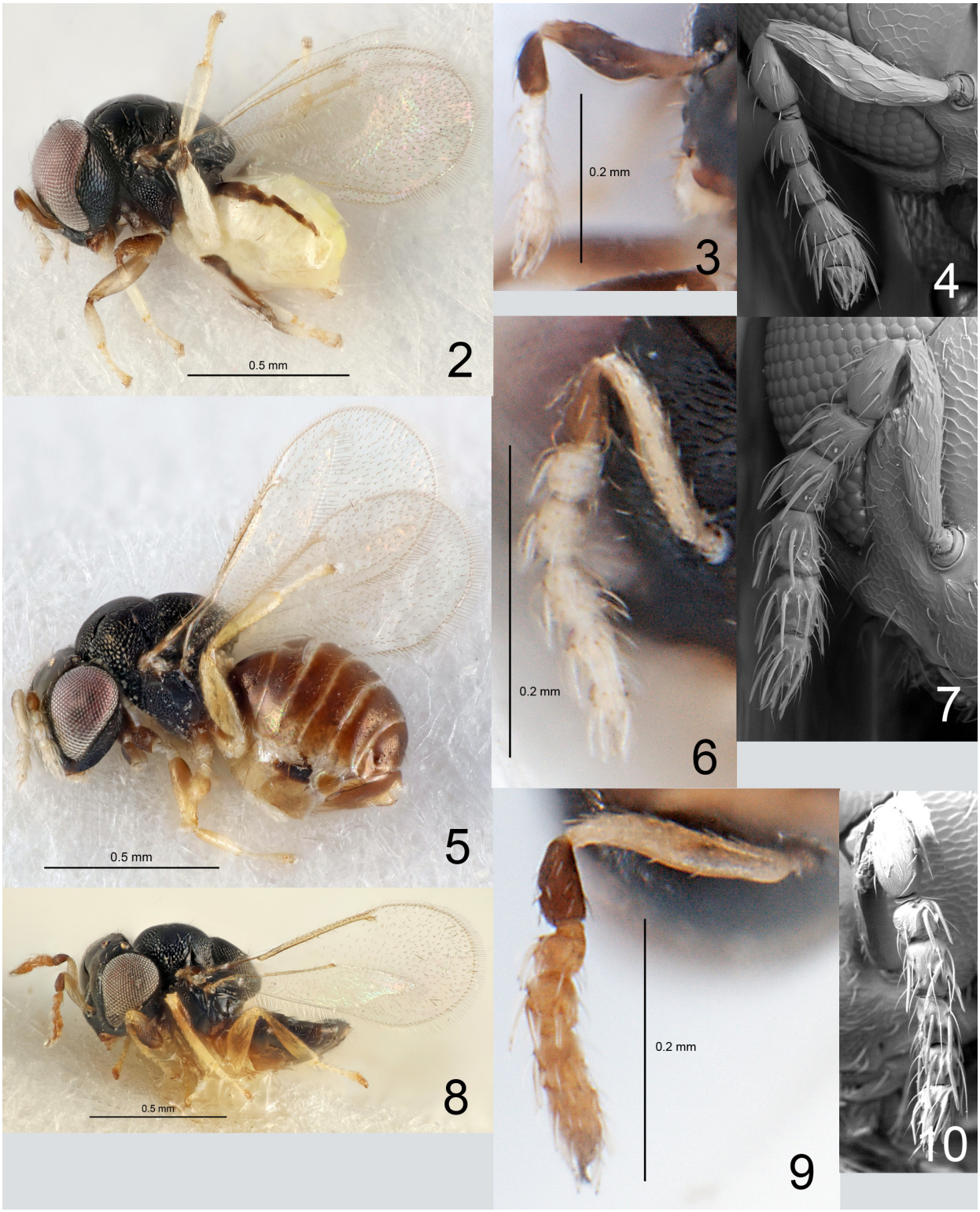


FIGURE 1. *Sporrongia marginata* **sp. nov.**, habitus in dorsal view, based on a female paratype, length of specimen 1.0 mm.



FIGURES 2–10. *Sporrongia* spp., females. **2–4**, *S. marginata* **sp. nov.**; **2**, habitus in lateral view, holotype; **3–4**, antenna in lateral view, paratype. **5–7**, *S. niveicornis* **sp. nov.,** holotype; **5**, habitus in lateral view; **6–7**, antenna in lateral view. **8–10**, *S. tobagoiensis* Gumovsky, non-type; **8**, habitus in lateral view; **9–10**, antenna in lateral view.

Description. FEMALE. Length 1.0–1.1 mm.

Flagellum white, pedicel and scape dark brown (Fig. 3). Frons black with metallic dark purple tinges (Fig. 11). Vertex shiny black. Mesosoma black with metallic dark purple tinges (Fig. 19). Fore coxa dark brown, mid and hind coxae yellowish-white (Fig. 2); fore femur dark brown, mid femur with basal ½ yellowish-white and apical ½ dark

brown, hind femur yellowish-white with apical tip dark brown; fore and hind tibiae yellowish-white, mid tibia with basal ½ yellowish-white and apical ½ dark brown; tarsi yellowish-brown. Fore wing hyaline (Fig. 2). Gaster yellowish-white with a narrow dark brown band along lateral margins (Figs 1, 2).

Antenna as in Figs 3, 4. Frons smooth with weak traces of reticulation (Fig. 12); antennal scrobes join on frontal suture. Vertex smooth (Fig. 17).

Mesoscutum with midlobe with posterior ⅔ predominantly smooth, anterior ⅓ and sidelobes with raised and strong reticulation (Fig. 18). Mesoscutellum with raised and strong reticulation (Fig. 18). Axillae with raised and strong reticulation (Figs 18, 24). Propodeum with a narrow and complete median carina (Fig. 25), surface with raised and weak reticulation; propodeal callus with two setae. Fore wing speculum very large and open below and towards base of wing (Fig. 1); submarginal vein with two setae on dorsal surface (Fig. 1).

Petiole not visible. Gaster round in dorsal view (Fig. 1).

Ratios. HE/MS/WM = 8.4/1.0/4.9; POL/OOL/POO = 54.0/11.0/1.0; WH/WT = 1.2; LW/LM/HW = 1.8/1.0/1.1; PM/ST= 1.0; MM/LG = 1.0–1.1.

MALE. Length 0.9–1.0 mm.

Flagellum pale brown. Coxae and femora dark brown; fore and hind tibiae yellowish-brown, mid tibia with basal ⅔ dark brown, apical ⅓ yellowish-brown. Gaster dark brown with a large ovate white spot in anterior ½. Colour otherwise as in female.

Antenna as in Figs 13, 14. Frons below frontal suture with stronger reticulation than in female (Figs 13, 14). Head otherwise as in female.

Mesosoma as in female.

Phallobase as in Fig. 26, i.e. with two digital spines and with parameral seta attached at apex of paramere.

Ratios. HE/MS/WM = 5.6/1.0/3.9; MM/LG = 0.9–1.0.

Variation. Apart from a small variation in size, no morphological variation was noted in the material examined.

Distribution. Costa Rica, Mexico.

Biology. Reared from round succulent galls on *Andira inermis* (Leguminosae).

Material examined. HOLOTYPE female in MZLU labelled "COSTA RICA, Guanacaste, Hojancha, Reserva Forestal Monte Alto, Estación, 500 m, LN 221900_382500, 13.vi.2001, I. Jiménez, ex agallas rotundas suculentas, hojuelas de las hojas de Andira inermis". PARATYPES (33♀ 18♂ on cards): 31♀ 18♂ with same label data as holotype (MZLU, MZUCR); 1♀ "COSTA RICA, Puntarenas, Reserva Privada Karen Mogensen, 09°52'N 85°03'W, 305 m, 14-15.ii.2005, J.S. Noyes" (NHM); 1♀ "MEXICO, Guerrero, 2 miles east of Ocotito, 11.vii.1985, J.B. Woolley) (TAMU).

Etymology. From the Latin *marginata* = emarginated, referring to the dark lateral margins of female gaster.

Sporrongia niveicornis Hansson, sp. nov.

(Figs 5–7, 15–16, 20–22)

Diagnosis. Female flagellum and scape white (Fig. 6); female with all coxae dark brown (Fig. 5); female gaster dark brown (Fig. 5).

Description. FEMALE. Length 1.2 mm.

Scape and flagellum white, pedicel dark brown (Fig. 6). Frons black with metallic dark purple tinges (Fig. 15), parts below frontal suture also with metallic green tinges. Vertex shiny black. Mesosoma black with metallic dark purple and blue tinges (Fig. 22). Coxae dark brown (Fig. 5); fore femur pale brown, mid and hind femora yellowish-brown; tibiae and tarsi yellowish-white. Fore wing hyaline (Fig. 5). Gaster dark brown (Fig. 5).

Antenna as in Figs 6, 7. Frons below frontal suture with raised and strong reticulation with transverse meshes (Fig. 16), above frontal suture smooth with weak traces of reticulation; antennal scrobes join on frontal suture. Vertex smooth (Fig. 20).

Mesoscutum with raised and strong reticulation (Fig. 21); midlobe with one pair of setae. Mesoscutellum with raised and strong reticulation (Fig. 21). Axillae with raised and strong reticulation (Fig. 21). Propodeum with irregular and strong sculpture; propodeal callus with two setae. Fore wing speculum very large and open below and towards base of wing (as in Fig. 1); submarginal vein with two setae on dorsal surface.

Petiole not visible. Gaster circular.

Ratios. HE/MS/WM = 7.6/1.0/4.3; POL/OOL/POO = 44.0/10.0/1.0; WH/WT = 1.2; LW/LM/HW = 2.0/1.0/1.3; PM/ST= 1.0; MM/LG = 0.8.

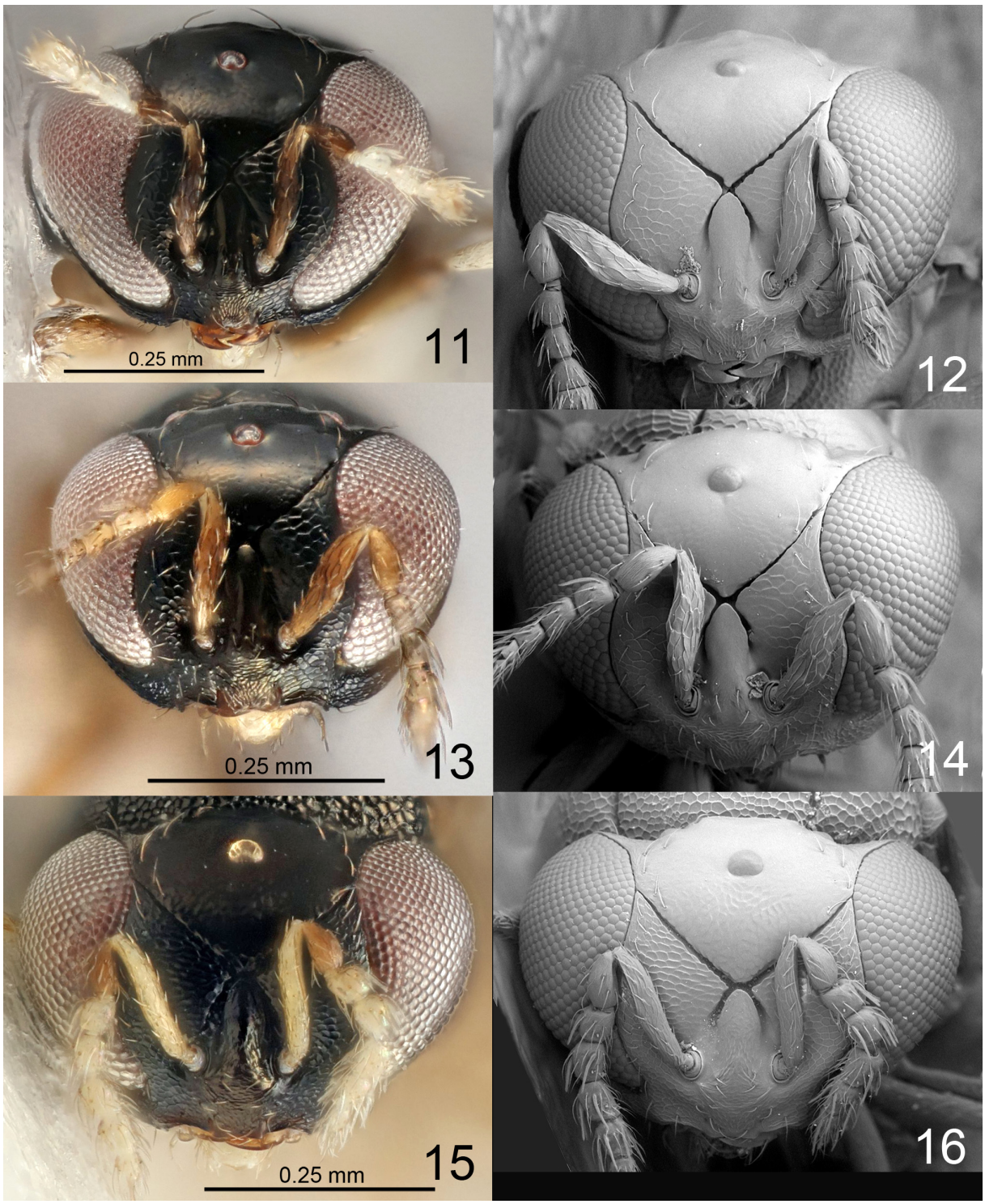
MALE. Unknown.

Distribution. Peru.

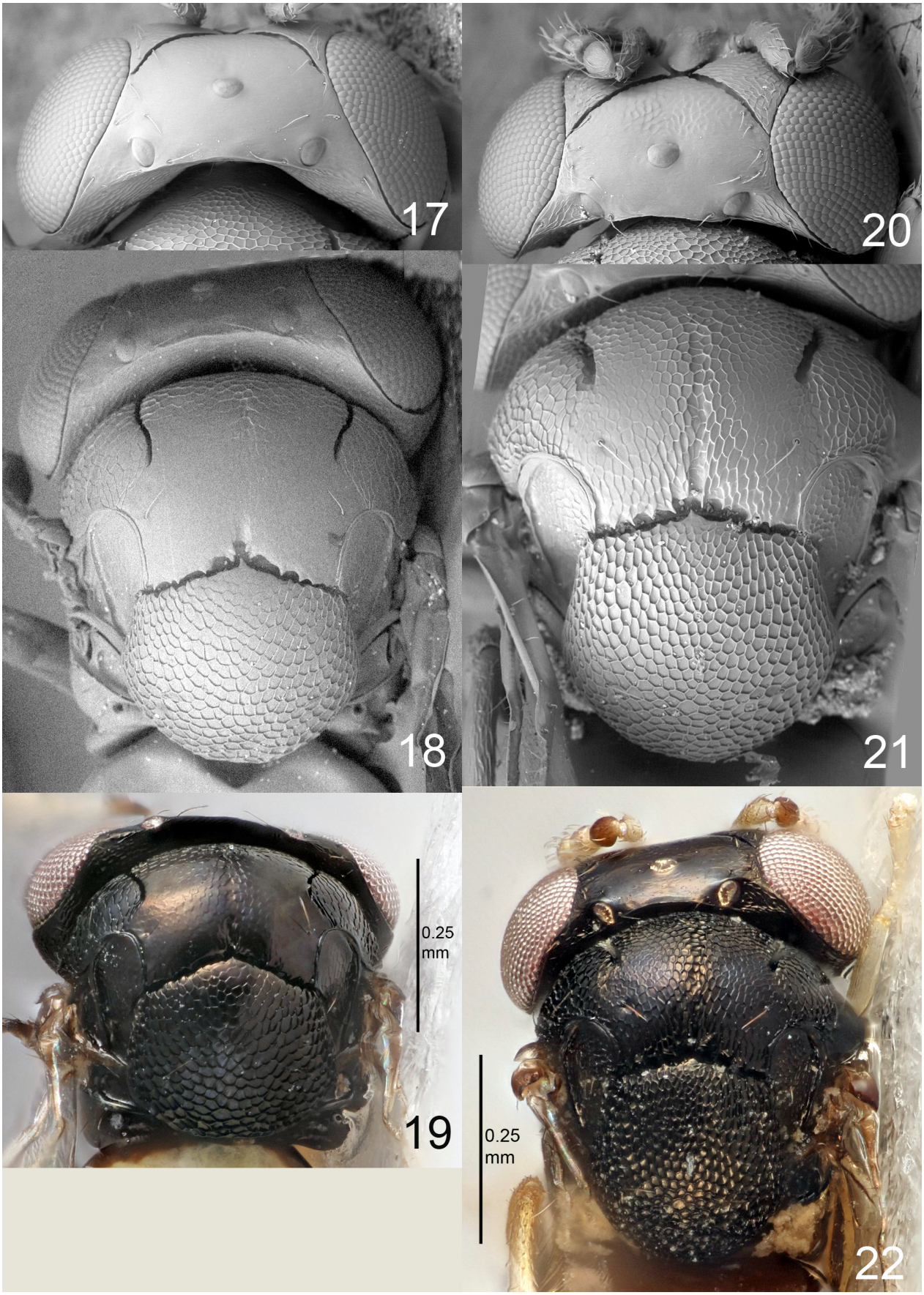
Biology. Unknown.

Material examined. HOLOTYPE female in NHM labelled "PERU, Madre de Dios, Rio Tambopata Reserve, 30 km SW Puerto Maldonado, 290 m, 3-16.x.1983, N. Stork".

Etymology. From the Latin *niveus* = snow white, and *cornu* = horn, antenna, referring to the colour of female antennal flagellum.



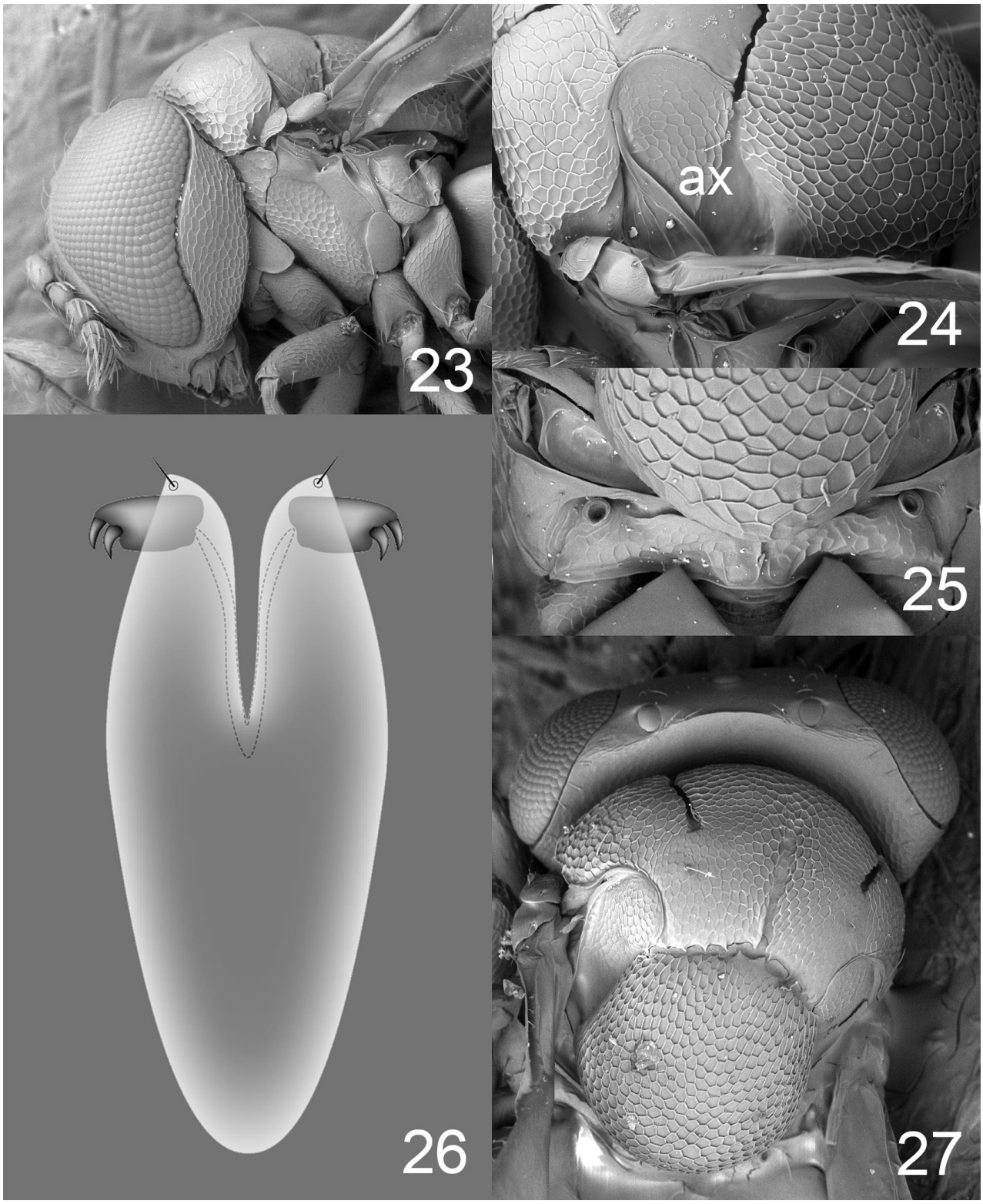
FIGURES 11–16. *Sporrongia* spp. Head in frontal view. **11–14**, *S. marginata* **sp. nov.**, paratypes; **11–12**, female; **13–14**, male. **15–16**, *S. niveicornis* **sp. nov.**, female holotype.



FIGURES 17–22. *Sporrongia* spp., females. **17–19**, *S. marginata* **sp. nov.**, paratypes; **17**, vertex; **18–19**, thoracic dorsum. **20–22**, *S. niveicornis* **sp. nov.**, holotype; **20**, vertex; **21–22**, thoracic dorsum.

***Sporrongia tobagoiensis* Gumovsky**
(Figs 8–10, 27)

Sporrongia tobagoiensis Gumovsky 1998:32. Holotype female in NHM, examined.



FIGURES 23–27. *Sporrongia* spp. **23–26**. *S. marginata* **sp. nov**., paratypes; **23**, head and mesosoma in lateral view, female; **24**, part of mesosoma with axilla (=ax) in lateral view, female; **25**, propodeum, female; **26**, illustration of phallobase, part of male genitalia. **27**, *S. tobagoiensis* Gumovsky, female non-type, thoracic dorsum and head.

Diagnosis. Female flagellum pale brown and scape white (Fig. 9); female with all coxae pale brown (Fig. 8); female gaster dark brown (Fig. 8).

Description. See Gumovsky (1998). The additional specimen included here is very similar to the holotype of this species and the original description of *S. tobagoiensis* applies well to this non-type specimen.

Distribution. Trinidad & Tobago (Gumovsky 1998).

Biology. Unknown.

Material examined. Holotype female of *S. tobagoiensis* in NHM (type no. 5.3947). Additional material: One female from TOBAGO, St. Paul, Delaford, 22.vii.1976, J.S. Noyes, collected in secondary forest (NHM).

Discussion

Sporrongia is a very distinctive group morphologically, sharing some features with the tribe Euderomphalini, as mentioned above. It was originally placed in that tribe by Gumovsky (1998) but was later removed from it (Gumovsky 2001) on the grounds that *Sporrongia* did not have the type of clypeus (delimited as a convex plate with incised anterior margin) and mandibles (with a massive base and semicircularly bent cutting margin) regarded as crucial to define taxa in tribe Euderomphalini. Through the stout and compact body *Sporrongia* is superficially similar to the Neotropical genus *Inti* Hansson (Hansson 2010), but does not share any of the autapomorphies for that genus. The phylogenetic relationships of *Sporrongia* are unclear. It definitely belongs in subfamily Entedoninae but apart from that it is difficult to relate it to other entedonine genera using morphological features. However, an ongoing investigation, including molecular data such as UCEs (Ultra Conserved Elements), will hopefully shed more light on this topic.

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