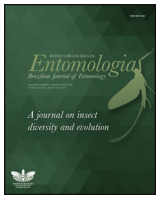
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A new dawn for *Massartella*: description of *Massartella aurora sp. nov.* (Ephemeroptera: Leptophlebiidae) from the Serra do Brigadeiro, Brazil, with micro–CT insights

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ABSTRACT

The Neotropical mayfly genus *Massartella* Lestage, 1930 has long been regarded as species–poor, despite recent evidence indicating that its diversity, especially in the Atlantic Forest, is underestimated. Here, we describe *Massartella aurora sp. nov.* from the Serra do Brigadeiro State Park, Minas Gerais, Southeastern Brazil, based on nymphs, male and female imagos, subimagos, and eggs. The new species is diagnosed in the adult stage by the presence of a single small forewing spot at the IMA bifurcation, 20–21 cross veins in the male forewing costal region, abdominal terga with narrow outer and broad inner oblique bands, and penial lobes with a broad rounded apical projection lacking a dorsal groove. Nymphs are distinguished by maxillary palp II bearing 17–19 robust pectinate setae, femora with numerous robust spatulate setae on the dorsal surface, and gills on abdominal segments I–VI with numerous pigmented tracheae. Eggs have a chorion with regular ridges forming a hexagonal pattern and circular KCT–type attachment structures. Synchrotron X–ray microtomography was used to generate three-dimensional digital models of the nymph and male genital structures, documenting a reproducible methodological workflow that complements traditional morphology and scanning electron microscopy. The description of *M. aurora sp. nov.* represents the first step toward resolving the hidden diversity of *Massartella* in the Atlantic Forest and provides a formal name for a lineage relevant to ongoing taxonomic and integrative studies.

1. Introduction

The genus *Massartella* Lestage, 1930 (Ephemeroptera: Leptophlebiidae) is adapted to cold climates and typically associated with high–altitude streams (Savage, 1987; Pescador and Peters, 1990; Derka, 2002; Derka et al., 2009; Souto et al., 2013; Boldrini and Lima, 2022; Gatti et al., 2022). Currently, *Massartella* comprises five valid species distributed across two major lineages: one associated with the Atlantic Forest and another restricted to the Pantepui region (Gatti et al., 2021). Historically, the taxonomy of the genus was characterized by an apparent low diversity and ambiguous morphological diagnoses, which led to the classification of several Atlantic Forest populations under the identity of the type species, *Massartella brieni* (Lestage, 1924) (Cortes et al., in press).

Recent phylogenetic evidence indicates that *M. brieni* represents a species complex (Gatti et al., 2021). The occurrence of potentially undescribed lineages suggests that the diversity of *Massartella* in the Atlantic Forest remains underestimated, especially in poorly explored mountainous areas. Among these areas, the Serra do Brigadeiro State Park (PESB), located in the Serra da Mantiqueira, Minas Gerais, stands out as an important preservation area for high–altitude environments, which recently led to the discovery of several new species of aquatic insects (Bonfá–Neto et al., 2023; Rippel et al., 2025; Amaral et al., 2025a; Amaral et al., 2025b; Amaral et al., 2026).

In this context, the present study describes a new species of *Massartella* from the PESB. The formal description of this taxon is timely and necessary, even considering the existence of other undescribed lineages within the genus (Cortes et al., in press), and is justified by its relevance in parallel studies. Given that this species has been the subject of investigations in other fields of knowledge, its naming is essential to ensure nomenclatural stability and the reproducibility of future research, allowing the scientific community to refer to this species by a valid and specific name.

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Thus, this work describes a new species of *Massartella* from the PESB based on morphological characters of nymphs and adults. Additionally, we employed synchrotron X– ray microtomography (Micro–CT) to generate three-dimensional digital models of external and internal structures, as well as scanning electron microscopy (SEM) to analyze egg ultrastructure. Although the diagnostic characters used in the present description remain observable through conventional microscopy, this represents, to our knowledge, one of the first applications of a Brazilian synchrotron facility (Sirius/LNLS) to Ephemeroptera taxonomy, establishing a reproducible methodological workflow and a permanent digital reference (deposited at RADAR4KIT) for future studies in which internal structures may prove diagnostically relevant. This discovery reinforces the importance of exploring high–altitude areas and using detailed morphological approaches to understand the true diversity of this Neotropical genus.

2. Materials and methods

Specimens were collected in the Parque Estadual da Serra do Brigadeiro, Minas Gerais, Brazil. Nymphs were collected manually using sieves and D–nets. Last instar nymphs, recognized by swollen and dark wing pads, were reared until emergence of the subimago and imago, allowing the association between nymphal and adult stages. Additional adults were collected using light traps and Pennsylvania traps. Specimens were preserved in 96% ethanol. Selected nymphal structures were mounted on microscope slides using Euparal®, while wings were dry mounted. Species description and terminology followed previous studies on *Massartella* and Leptophlebiidae taxonomy. Photographs of the syntype material of *Massartella brieni* were examined and compared with the specimens analyzed in the present study to ensure accurate species delimitation and to avoid misidentification with the nominal species (Fig. 13).

Photographs of habitus and morphological structures were obtained using a Leica DM–205A stereomicroscope, while photographs of living specimens were taken in the field and laboratory using a Nikon D850 with a Venus Optics Laowa 100 mm lens. Image editing and plate preparation were performed using Adobe Lightroom CC 2022®, Adobe Photoshop CC 2022®, and Adobe Illustrator CS3®.

Eggs were removed from the abdomen of mature nymphs and adult females and prepared for scanning electron microscopy (SEM). Samples were dehydrated in ethanol, dried, mounted on aluminum stubs, coated with gold, and analyzed using a scanning electron microscope. Terminology used for egg morphology followed Koss & Edmunds Junior (1974) and previous descriptions for the genus *Massartella*.

2.1. Synchrotron X–ray microtomography

The nymph and the abdomen of the imago were scanned at the MOGNO beamline (Archilha et al., 2022) at Sirius, the synchrotron light source at the Brazilian Synchrotron Light Laboratory (LNLS). An indirect detector system coupled to an Optique Peter zoom microscope and a PCO Edge 4.2 camera was used. For each scan, a total of 2048 projections were acquired over 360°, along with 10 dark–field and 10 flat–field images. A frame rate of 4 fps resulted in an acquisition time of ca. 8 min and 37 s per scan. The magnifications were adjusted to the specimens' diameter, yielding a pixel size of 2.37 µm (nymph) and 1.717 µm (abdomen of the imago). For the nymph, five height steps were acquired to cover the full specimen.

2.2. Postprocessing of tomographic data

The original 32-bit tomograms were converted to 8-bit in Fiji (Schindelin et al., 2012). The individual volumes of the nymph were registered and merged into a single volume using Amira 2022.2, which was subsequently downsampled to 50% of its original size in Fiji.

For both specimens, a maximum (grayscale dilation) filter with a radius of 0.5 pixels was applied, emphasizing local maxima while suppressing minor intensity variations. In Amira, the Volume Edit module was employed to isolate the specimens from the sample holders. The specimens were segmented using the threshold and filling tools of the software's segmentation editor. Subsequently, surface meshes were created using the "Generate Surface" tool and exported as OBJ files. The latter were imported into CINEMA 4D 2026.2.0, which was employed for surface smoothing, rendering and animation.

In order to create the interactive models, the polygons of the surface meshes were reduced to 10% in Amira before export. In CINEMA 4D, the meshes were smoothed and the polygon count further reduced to 50% before they were exported as OBJ files. In MeshLab 2025.07, they were converted to U3D files and imported into a PDF document using Adobe Acrobat Pro 2026 (Final link S1, Supplementary material).

3. Results

3.1. Taxonomy

***Massartella aurora* sp. nov.**

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***Diagnosis*: Imagos,** 1) Forewing with small spot at IMA bifurcation (Fig. 2D); 2) Costal region of forewing with 20–21 cross veins in males (Fig. 2D); 3) Costal region of hind wing with 7–9 cross veins in males and 1–2 unpigmented basal veins (Fig. 2E). 4) Terga with a narrow outer oblique band and a broad inner oblique band (Fig. 1); 5) Styliger plate with a short and slightly cleft posteromedian emargination; 6) Lobe of penis with a broad, rounded apical projection, and without a dorsal groove (Figs 2H, 4B). **Nymphs,** 1) Maxillary palp II with 17–19 robust and pectinate setae; 2) Femora with robust and spatulate setae on dorsal surface (Fig. 10A–D); 3) Gills on segments I–VI, with numerous pigmented tracheae (Fig. 10E–F).

Description

***Male imago* (**Figs. 1–3, 4A–B and 5**):** Body length: 13.2–13.5 mm; forewing: 14.6–14.8 mm; hind wing: 3.1 mm.

Head (Fig. 1A–C and 3B)**:** Dorsal region yellowish–white with brownish–orange areas; ventral region whitish with dark brown spots. Compound eyes contiguous in submedial region; upper portion of eye light reddish–brown, lower portion light brown; ocelli white with brownish–orange halo. Scape and pedicel reddish–brown, flagellum white with light brown.

***Thorax* (**Fig. 1A–C, 2A–E and 3A–C**):** Pronotum yellowish–white, with lateral margins and median longitudinal bands dark brown (Fig. 1A, 2B). Mesonotum yellowish–brown (Fig. 1A, 2B); mid–longitudinal suture, median parapsidal suture, submedian scutum and scutellum yellowish–brown; median scutum, sublateral scutum, posterior scutellar protuberance and para–scutellum dark brown; scuto–scutellar impression white. Pleura yellowish–brown with dark brown areas, and whitish membranes (Fig. 1B, 2A). Metanotum yellowish–brown (Fig. 1A). Sterna yellowish–brown with dark brown (Fig. 1C); basisternum yellowish–white with apical half yellowish–brown; furcasternal protuberances yellowish–brown with dark brown lateral margins, and median furcasternal impression light brown (Fig. 1C). Legs orange–brown (Fig. 2A–C); coxa and trochanter yellowish–brown with dark brown areas; femora with postero–median and apical transverse dark brown–orange bands; tibiae yellowish–brown; fore tibia with a narrow subapical dark brown band; tarsi yellowish–white with dark brown. Forewing with costal and subcostal areas washed with light brown on distal half (Fig. 2D); small spot at IMA bifurcation light brown; dark brown longitudinal and transverse veins, thickened in the C, Sc, and basal RA regions; costal region with 20–21 cross veins and subcostal region with 19 cross veins (Fig. 2D).

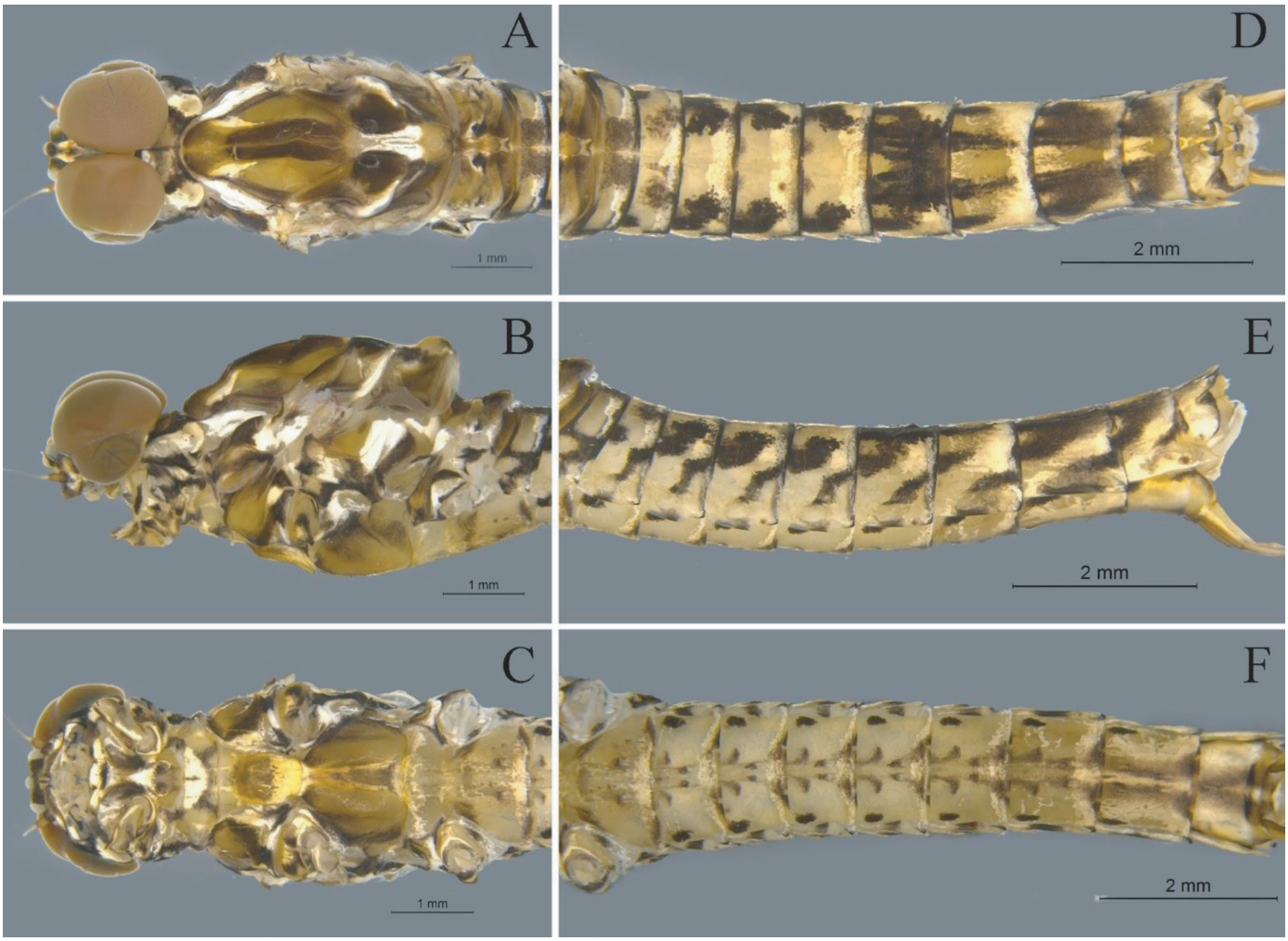


Figure 1 *Massartella aurora* sp. nov., male imago. Head and thorax: A (dorsal view), B (lateral view) and C (ventral view); abdomen: D (dorsal view), E (lateral view) and F (ventral view).

Hind wing with longitudinal and cross veins dark brown; costal region with 7–9 dark brown cross veins and 1–2 colorless basal veins; subcostal region with 7–8 cross veins (Fig. 2E).

Abdomen **(**Figs. 1D–F, 2F–H, 3A–C, 4A–B and 5**).** Terga yellowish–white with dark brown bands. TergumVI almost completely washed with dark brown; terga VIII and IX similarly darkened, except with the median longitudinal line unpigmented (Fig. 1D); laterally, outer and inner oblique stripes hardly connected; outer stripe irregular and narrow, inner stripe irregular and broad (Fig. 1D). Sterna yellowish–white; diffuse medial longitudinal brown stripe on segments VIII to IX; anterior and posterior sigilla and anterolateral spot dark brown (Fig. 1F). Genitalia (Figs. 2F–H, 4A–B, 5; Figs. S1–2, Supplementary material). Styliger plate yellowish–brown and whitish medially, with a short, slightly cleft postero–median emargination (Figs. 2F and 4A). Forceps yellowish–brown on the inner longitudinal half and yellowish–white on the outer longitudinal half, segments II–III whitish washed with brown; length of segment I 0.9 mm with basal constriction at 0.5 mm, segments II and III, each 0.1 mm long. Penes yellowish–white (Figs. 2F–H and 4A–B). Penial lobes with a long subapical lateral spine, a rounded and slightly narrow subapical projection, and a broad, rounded apical projection; without dorsal groove (Figs. 2G–H, 4B). Caudal filaments white with dark brown annulations.

Male subimago (Fig. 3B–C):

Similar to the male imago, except for the following characteristics: anteronotal protuberance dark brown, medio–scutum light brown; basisternum white, furcasternal protuberances yellowish–white, and median furcasternal impression dark brown; inner stripe slightly narrower; spot at IMA bifurcation slightly larger.

Female imago **(**Figs. 4C, 6**):** Body length: 17.4–17.7 mm; forewing: 18.4–19.5 mm; hind wing: 4.2–4.3 mm.

Similar to male imago, except for the following characteristics: compound eyes dark brown (Fig. 6A–C). Light brown spot at IMA bifurcation markedly larger (as in Fig. 7A); costal region of forewing with 26–31 cross veins and subcostal region with 23–27 cross veins; costal region of hind wing with 12–13 cross veins and subcostal region with 8–9 cross veins. Inner stripe slightly narrower (outer and inner abdominal stripes subequal in width in some specimens) (Fig. 6D–F). Sternum IX with a broad median–apical emargination, deeply cleft and V–shaped (Fig. 6F, 4C).

Female subimago (Figs. 7A–B):

Similar to male subimago, except for the following characteristics: light brown spot at IMA bifurcation markedly larger.

Mature nymph **(**Figs. 9–12**;** Fig. S1; Video S1; Supplementary material**):** Body length: female 17–18 mm, male 13–14 mm.

Head **(**Fig. 9 and 11**):** Dorsum dark brown, venter yellow. Antennae yellowish–white. Ocelli black. Female eyes black; upper portion of male eyes dark brown and lower portion black. Labrum (Fig. 9C). Distal margin with a broad, shallow median emargination bearing five subequal denticles. Mandibles (Fig. 9D–E, 11). Outer margin with long, fine, simple setae, and a median tuft of long, fine, simple setae.

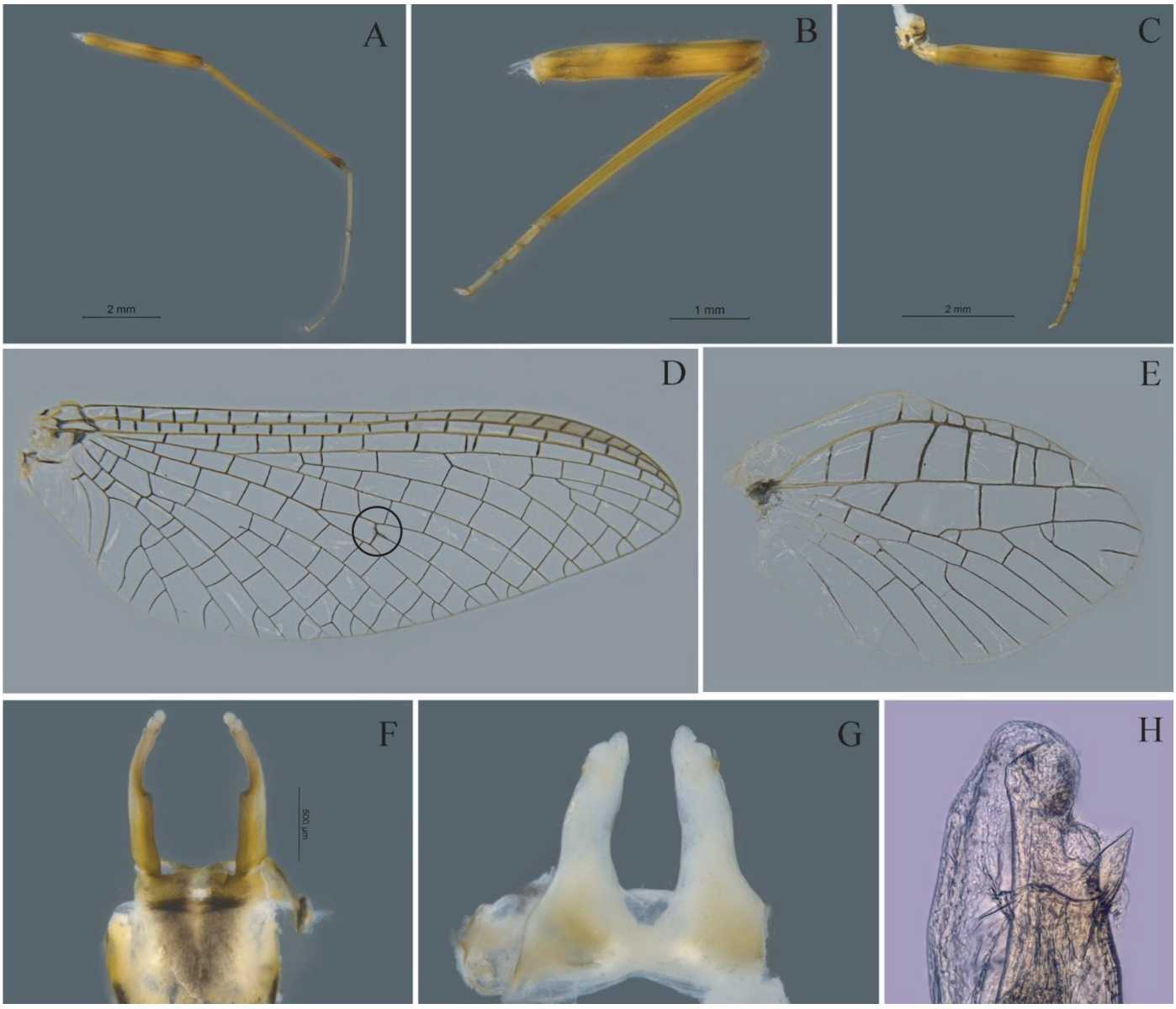


Figure 2 *Massartella aurora* sp. nov., male imago. Legs: A (fore), B (middle), and C (hind); wings: D (fore) and E (hind); genitalia: F (ventral view), G (lateral view), H (dorsal view of the clarified penis detail). Black circle indicates maculae on the forewing.

Hypopharynx (Fig. 9F). Lingua with well–developed lateral projections, slightly shorter than the apex. Maxillae (Fig. 9G–H). Ventral surface with a subapical transverse row of 12 long, pectinate setae. Maxillary palp II and Maxillary palp III 0.7× the length of Maxillary palp I. Maxillary palp I ventral surface with long, fine, simple setae on distal half near the outer margin. Maxillary palp II ventral surface with approximately 17–19 robust pectinate setae near the inner margin. Labium (Fig. 9I). Labial palp II and Labial palp III 0.8× the length of Labial palp I. Labial palp III dorsal surface with a median–longitudinal row of 7 long, robust, spiniform setae.

Thorax (Figs. 9A–B, 10A–D and 12**).** Brown with dark brown and yellow markings. Sternum yellowish–brown. Legs (Fig. 10A–D). Yellowish–brown; coxae and trochanters brown; femora with wide transverse bands (medial and distal) brown, and inner longitudinal half light brown. Trochanter, dorsal surface with robust, spatulate setae near the outer margin. Femora, dorsal surface with numerous scattered, spatulate setae (Fig. 10A–D, 12), on foreleg, 25–27 setae distributed on distal half (Fig. 10D); inner margin with short, thick and spine–like setae. Tibiae with a narrow transverse light brown band close to femoral articulation and a wide submedian brown band. Tarsi with brown broad sub–basal band. Claws with approximately 10 denticles.

Abdomen (Figs. 9A–B, 10E–F and 12**):** Terga yellowish–brown, shaded with dark brown, with dark brown stripes and spots. Inner and outer dark brown stripes subequal in width; median longitudinal stripe likewise dark brown. In mature nymphs, stripes closely approximated, rendering the tergum nearly entirely dark brown (Fig. 9A–B). Postero–lateral projections measuring ½ the length of the segment, with a broad base (Fig. 9A–B, 12). Gills on abdominal segments I–VI, gray membrane, with numerous dark gray pigmented tracheae; dorsal lamella with an apical process measuring 1/5 of the gill length, and on gill VI measuring 1/10 (Fig. 10E–F). Caudal filaments yellowish–brown.

***Egg* (**Fig. 8**):** General shape oval (Fig. 8A); chorion surface adorned with regular ridges forming a hexagonal pattern, with circular projections irregularly distributed around the attachment structures.

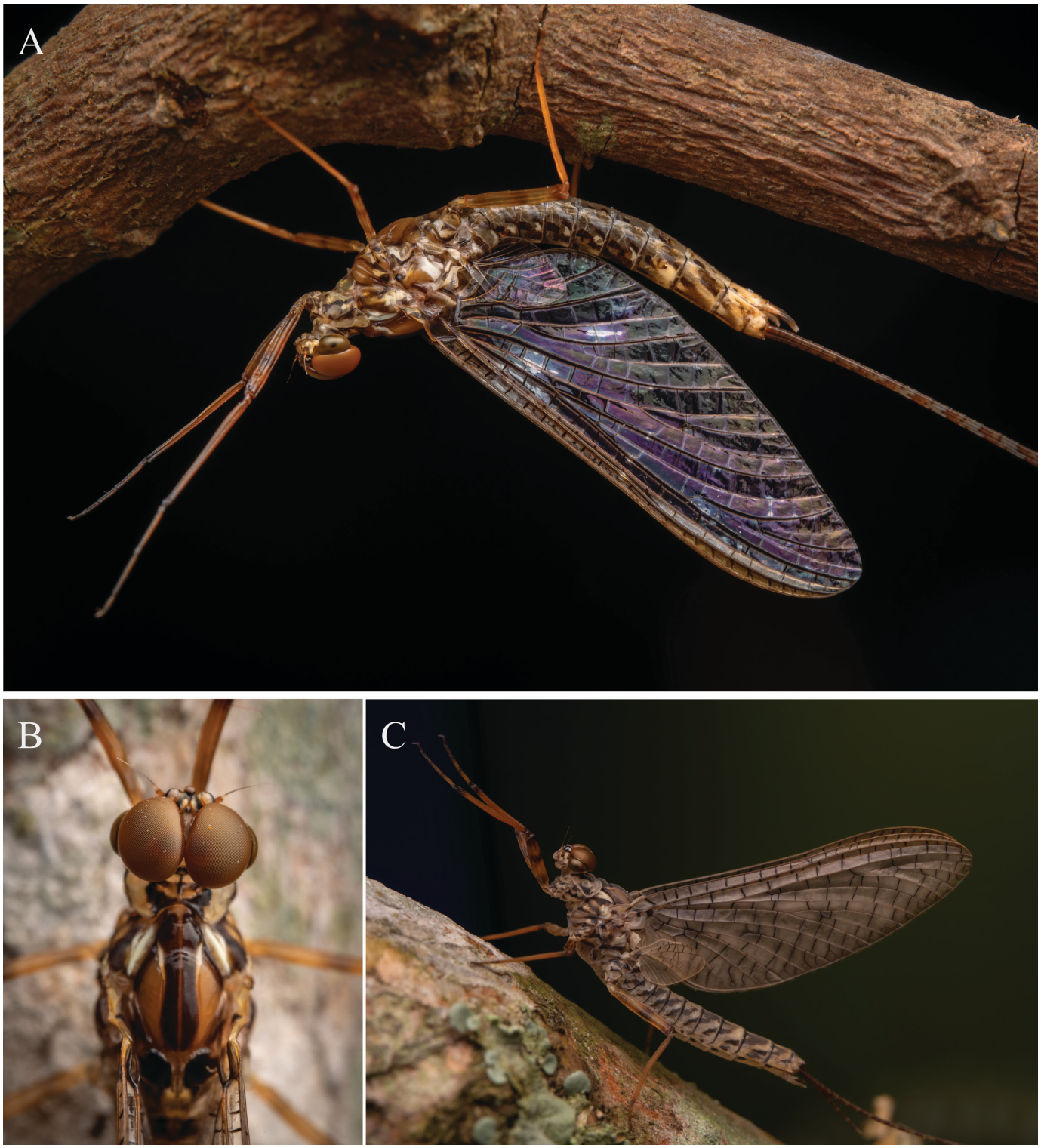


Figure 3 *Massartella aurora* sp. nov., photographs of living specimens. A. Male imago (habitus in lateral view), B. Male subimago (detail of head and thorax in dorsal view), C. Male subimago (habitus in lateral view). All photographs by Frederico F. Salles.

Circular attachment structures of the KCT type, uniformly distributed on the chorion. Micropylar area circular, surrounded by chorionic ridges, located in the equatorial region.

Life cycle association. Life cycle association was performed through the rearing of mature nymphs collected in the field. Nymphs were maintained under both field and laboratory conditions in floating containers with mesh–covered openings to allow water circulation and airflow. In the laboratory, the containers were kept in aquaria with aeration until emergence. Subimagos were transferred to dry vials until molting to imagos, which, together with their corresponding nymphal exuviae, were preserved in 96% ethanol.

Etymology. The specific epithet aurora is named after Aurora Bonfá Cortes, daughter of the first author, Isabel Cristina Hernandez Cortes, and Pedro Bonfá, who was born during the development of this study.

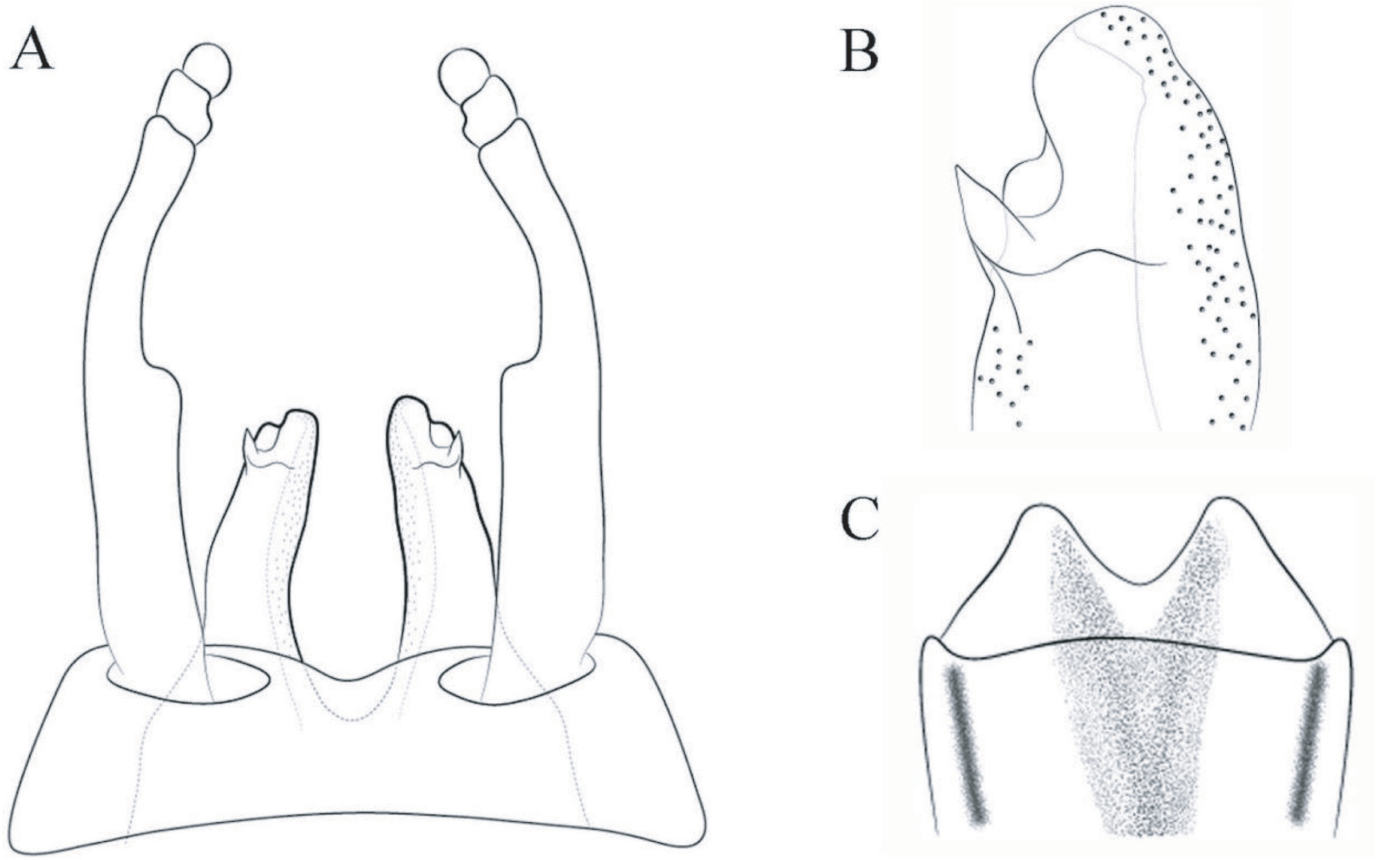


Figure 4 *Massartella aurora* sp. nov., male and female imago. A. Male genitalia (ventral view); B. Detail of the penis (ventral view); C. Female sternum IX.

Noun in apposition. The name also refers to "dawn" or "sunrise", symbolizing a new beginning for the taxonomy of *Massartella*, a genus whose diversity has long been underestimated and which remained without new species descriptions for an extended period. Thus, the name represents both a personal tribute and the beginning of a new phase in the understanding of the genus diversity.

Remarks: Among the described adults of *Massartella*, those of *M. aurora* sp. nov. are most similar to *M. brieni* in several aspects, especially when comparing the new species with the information on *M. brieni* provided by Pescador and Peters (1990). However, when these authors redescribed the type species, they based their redescription on material from several areas in southern and southeastern Brazil (e.g., Minas Gerais, São Paulo, Paraná, Rio Grande do Sul). These materials, after examination of specimens from these areas and comparison with adults collected at the correct type locality of *M. brieni* [not the one indicated by Pescador and Peters (1990)], certainly belong to more than one species, and none of them actually represent *M. brieni* (Cortes et al., in press). Comparison of the new species with adults of *M. brieni*, therefore, must be done with caution and strictly based on type–material (Fig. 13) or based on material from the type–locality.

Another problem related to the comparison of the new species with the adults of *M. brieni* sensu Pescador & Peters is the lack of indication concerning the origin of the drawings. The redescription is based on more than one species, and it is not possible to trace whether the drawings come from specimens collected in Paraná, Minas Gerais, or São Paulo. Figs. 10 and 11 of Pescador and Peters (1990), for example, are similar to the abdominal coloration of the new species. Fig. 13 and Fig. 14 of Pescador and Peters (1990), on the other hand, are most similar (if not identical) to that of *M. fruhstorfferi* Ulmer, 1943. The genitalia presented by Pescador and Peters (1990), Figs. 5 to 7, are somewhat similar to those of the new species, with slight differences in the apex and in the subapical spine. Given this heterogeneity among the illustrated specimens, it is plausible that the genitalia figured by these authors do not belong to *M. brieni* sensu stricto either; consequently, although genitalia are usually reliable diagnostic characters within the family, they cannot be used with confidence to compare the new species with *M. brieni* based on Pescador and Peters' (1990) illustrations alone.

The main similarities and differences between the adults of *M. aurora* sp. nov. and those correctly assigned to *M. brieni* are the following. On the forewings of both males and females, cross veins between RP and AA are not as thickened as those below C and RA. But while in *M. brieni* three spots are present on forewings [on RA, iMA, and iMP (Fig. 13A)], only a single spot on iMA is present on the new species (Fig. 2D, 7A). Abdominal coloration, especially of the terga, is also similar among them. In *M. aurora* sp. nov., however, the outer and inner oblique stripes of the terga hardly connect to each other laterally, while in *M. brieni* they are connected in most of the terga, and this union forms a conspicuous circular lateral mark (Fig. 13A). On the sterna of the male imagos, in contrast to the well–outlined median marks of *M. aurora* sp. nov., they are more spread and diffuse in *M. brieni* [somewhat similar to the same marks on the female imago of the new species (Fig. 1D–F, 6D–F)].

Nymphs and eggs of *M. aurora* sp. nov. are also more similar to those described by Pescador and Peters (1990) as belonging to *M. brieni*. Since the nymphs and eggs of *M. brieni* have been described exclusively by these authors, based on material that does not belong to that species (see comments above), both semaphoronts remain undescribed for the type–species. In spite of this, the comparison provided here is between *M. aurora* sp. nov. and *M. brieni* sensu Pescador and Peters (1990).

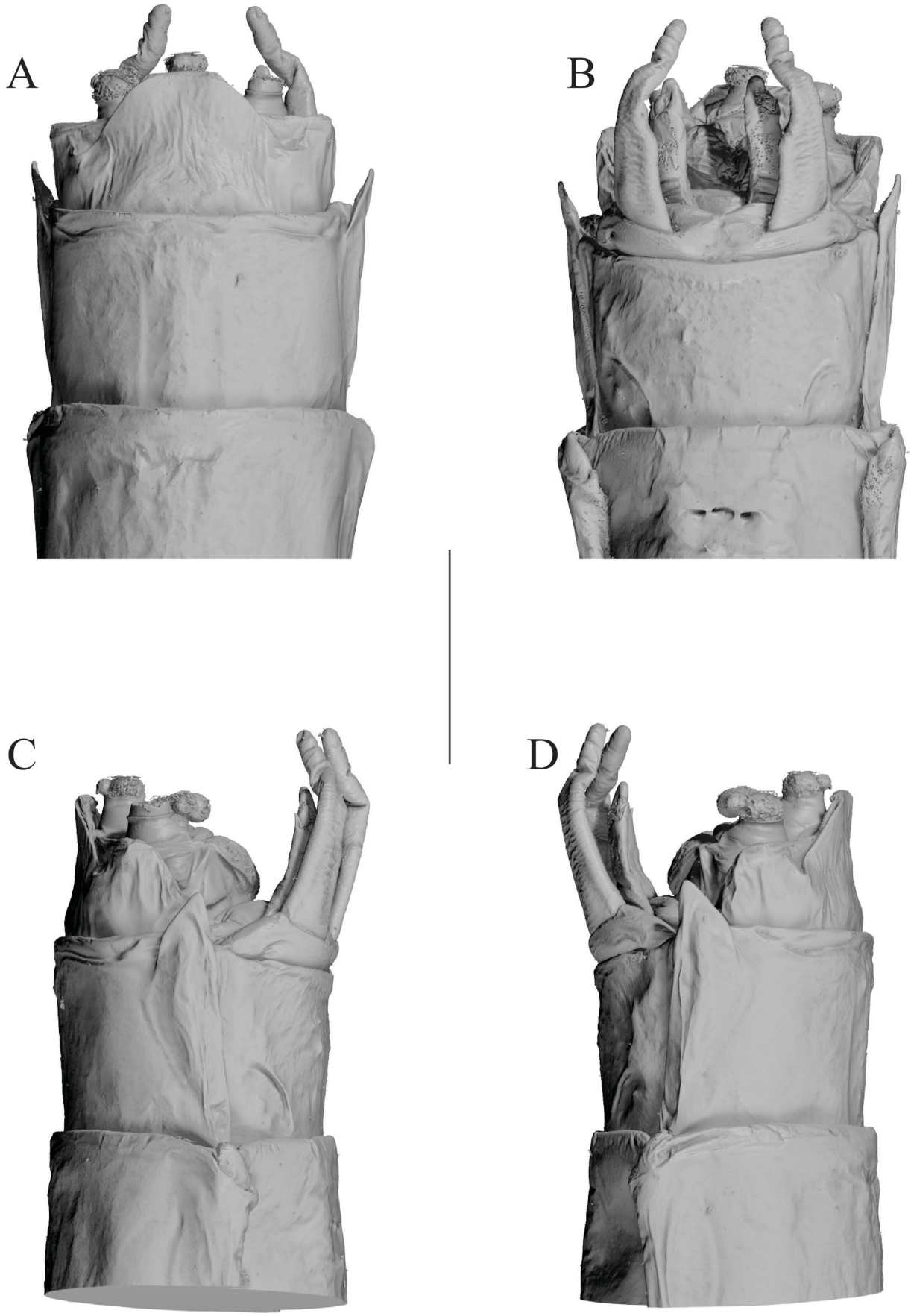


Figure 5 *Massartella aurora* sp. nov., surface rendering of male abdomen. A. Dorsal view, B. Ventral view, C-D. Lateral view.

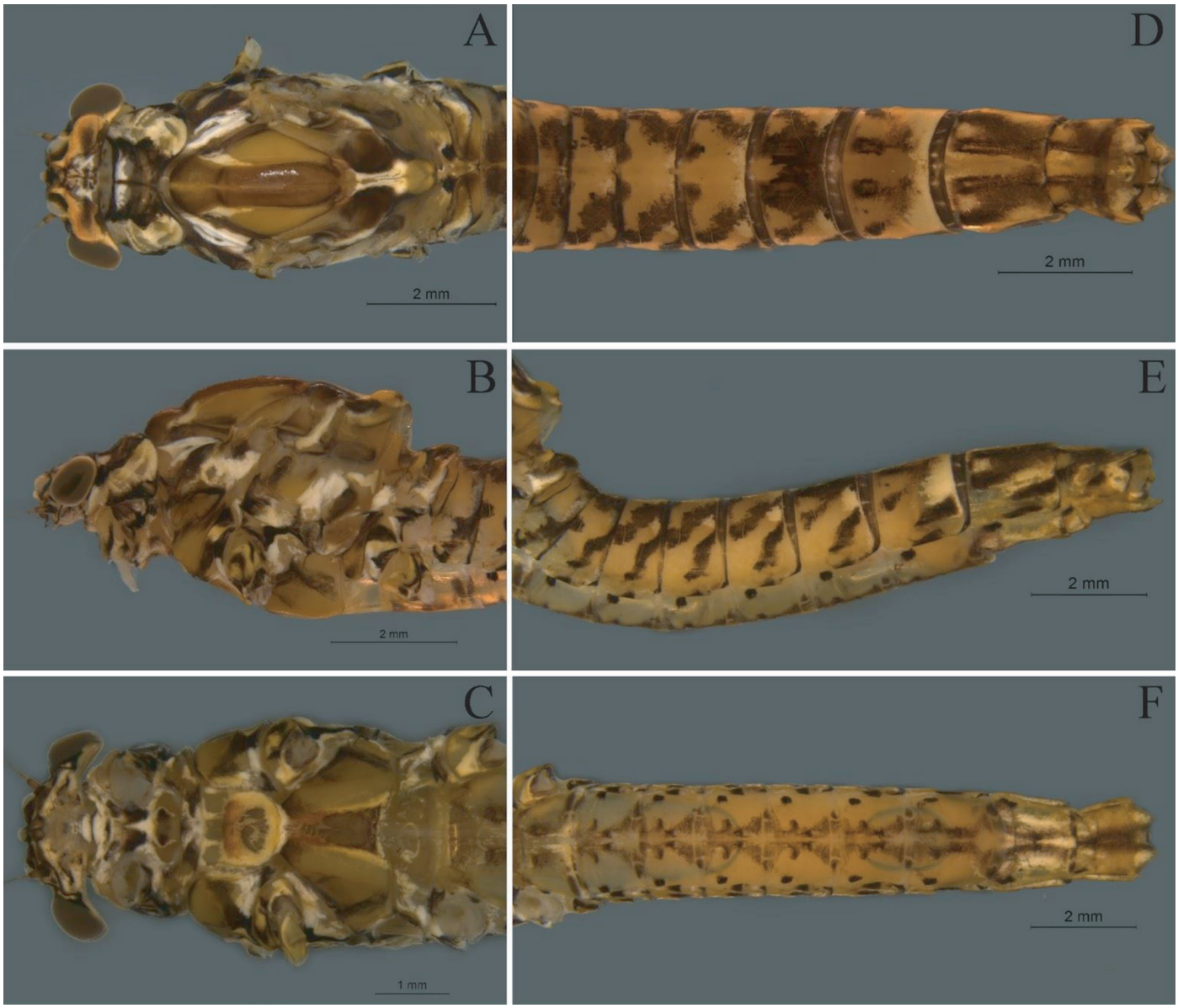


Figure 6 *Massartella aurora* sp. nov., female imago. Head and thorax: A (dorsal view), B (lateral view) and C (ventral view); abdomen: D (dorsal view), E (lateral view) and F (ventral view).

In the nymphal stage, both species are similar due to the presence of a median tuft of long, fine, simple setae on the mandibles, pectinate setae near the inner margin of maxillary palp II, and gills on abdominal segments I–VI. They can be easily distinguished by the setae present on the dorsal surface of the femora: in *M. brieni* sensu Pescador and Peters (1990), these setae are lanceolate, whereas in *M. aurora* sp. nov. they are robust and apically spatulate.

The chorion surface of *M. aurora* sp. nov. and *M. brieni* sensu Pescador & Peters (1990) is adorned with regular ridges forming a hexagonal pattern, with circular projections irregularly distributed along the ridges. These circular projections are more abundant in the new species than in those described by Pescador and Peters (1990).

***Distribution*:** Brazil, **Minas Gerais State:** Parque Estadual da Serra do Brigadeiro, Araponga and Fervedouro.

***Type material*: Holotype,** BRAZIL: **Minas Gerais State:** Fervedouro, Parque Estadual da Serra do Brigadeiro, Trilha das águas, Ponto da malaise, 20°43'52.00"S, 42°27'50.00"W, 1110 m, 1 male imago (UFVB:EP4605), 29.vi.2022, Salles, F.F., Castillo, R., Lopez, J.M. (UFVB).

Paratypes. BRAZIL: Minas Gerais State: Fervedouro, Parque Estadual da Serra do Brigadeiro, Trilha das águas, Ponto da malaise, 20°43'52.00"S, 42°27'50.00"W, 1110 m, 55 nymphs, 2 male imagos, 1 female subimago, 6 male subimago, 29.vi.2022, Salles, F.F., Castillo, R., Lopez, J.M. (UFVB); Fervedouro, Parque Estadual da Serra do Brigadeiro, Trilha das águas, Ponto da malaise, 20°43'52.00"S, 42°27'50.00"W, 1110 m, 18 nymphs, 3 female subimagos, 6 male subimagos, 28.vii.2022, Salles, F.F., Carvalho, M., Cortes, I., Pantoja, G. (UFVB); Parque Estadual da Serra do Brigadeiro, Trilha das águas, Poço Cipó, 20°43'45.00"S, 42°28'11.00"W, 1180 m, 42 nymphs, 28.vii.2022, Salles, F.F., Carvalho, M., Cortes, I., Pantoja, G. (UFVB); Fervedouro, Parque Estadual da Serra do Brigadeiro, Trilha das águas, Poço do Pato, 20°43'52.00"S, 42°27'54.00"W, 1120 m, 8 nymphs, 28.vii.2022, Salles, F.F., Carvalho, M., Cortes, I., Pantoja, G. (UFVB); Fervedouro, Parque Estadual da Serra do Brigadeiro, Casa do Pesquisador, 20°43'15.20"S, 42°28'45.80"W, 1334 m, 1 nymph, 2 male imagos, 1 male subimago, 19.x.2022, Salles, F.F., Rippel, M., Lopez, J. (UFVB).

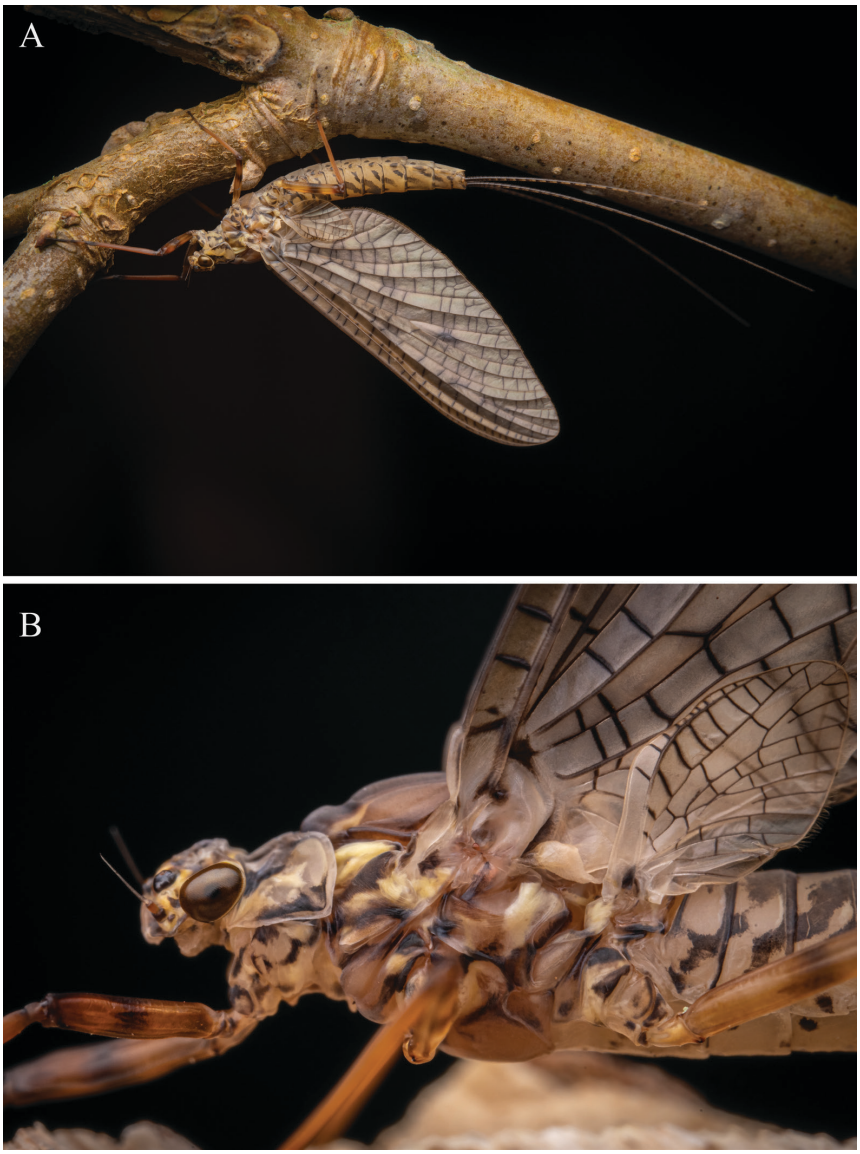


Figure 7 *Massartella aurora* sp. nov., photographs of living specimens. A. Female subimago (habitus in lateral view), B. Female subimago (detail of head and thorax in lateral view). All photographs by Frederico F. Salles.

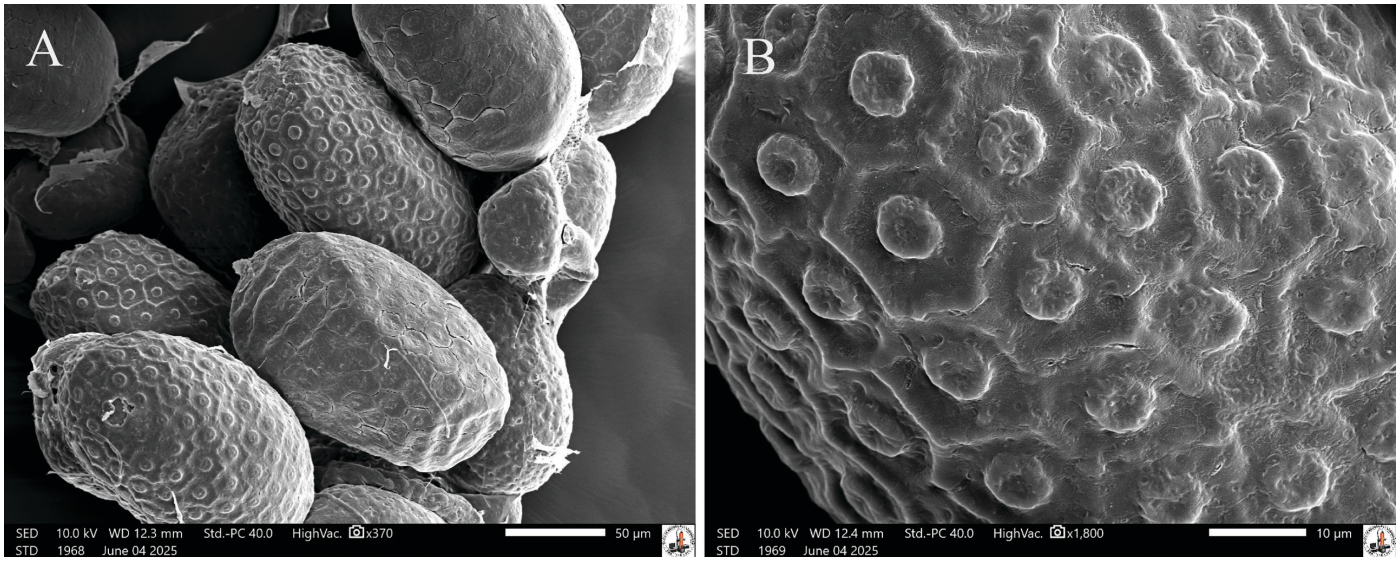


Figure 8 *Massartella aurora* sp. nov., SEM photographs of eggs. A. General view, B. Detail of chorion surface.

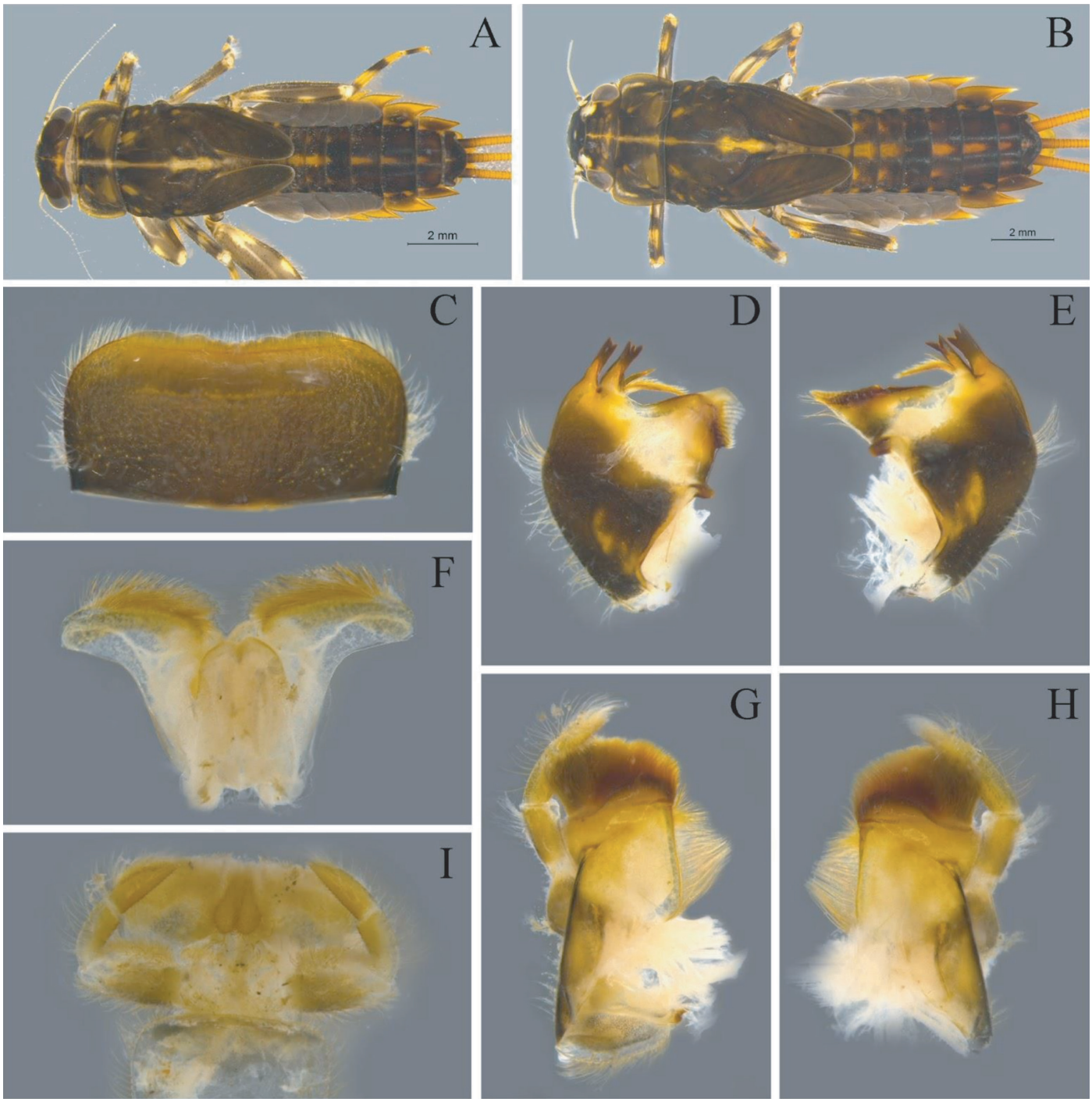


Figure 9 *Massartella aurora* sp. nov., nymph. A. Male habitus; B. Female habitus; C–I. Mouthparts: C. Labrum; D. Left mandible; E. Right mandible; F. Hypopharynx; G. Left maxilla; H. Right maxilla; I. Labium.

Comparative material examined: *Massartella brieni* (Lestage, 1924)–**syntype examined (photographs)**: BRAZIL: **Rio de Janeiro State**: Itatiaia, Forêt de Maromba, 1090 m, 1 female imago syntype, Mission Massart-Brien au Brésil, J. Lestage coll., Collection Lestage, R.M.H.N.B. 14.976. *Massartella brieni*–**topotypic material examined**: BRAZIL: **Rio de Janeiro State**: Itatiaia, Parque Nacional do Itatiaia, Cachoeira da Maromba, 22°25'46.0"S, 44°37'10.0"W, 1 male imago, 1 nymph, 14.iii.2022, Salles FF, Cortes IC, Rippel M, & Bonfá PN (UFVB); Itatiaia, Parque Nacional do Itatiaia, córrego Maromba, cachoeira Véu da Noiva, 22°25'36.5"S, 44°37'00.5"W, 2 female imagos, 2 male imagos, 08.x.2017, Dias & Campos (UFVB); Itatiaia, Parque Nacional do Itatiaia, córrego Maromba, cachoeira Véu da Noiva, 22°25'36.5"S, 44°37'00.5"W, 2 males subimagos, 29.iii.2026, Casagrande L, Cavalcanti M, Santos I, & Gastaldo RB (UFVB); Itatiaia, Parque Nacional do Itatiaia, córrego Maromba, cachoeira Véu da Noiva, 22°25'36.5"S, 44°37'00.5"W, 1 male subimago, 17 nymphs, 14-15.iii.2022, Salles FF, Cortes IC, Rippel M, & Bonfá PN (UFVB); Itatiaia, Parque Nacional do Itatiaia, córrego Campo Belo, cachoeira da Maromba, 22°25'38.60"S, 44°37'09.70"W, 1 male subimago, 03.x–02.xi.2015, Takiya DM, Santos APM & Azevedo LG (DZRJ), 1 male subimago, 25.viii–03.x.2015, Takiya DM, Santos APM & Azevedo LG (DZRJ), 2 nymphs, 03–30.v.2015, Takiya DM & Santos APM (DZRJ);

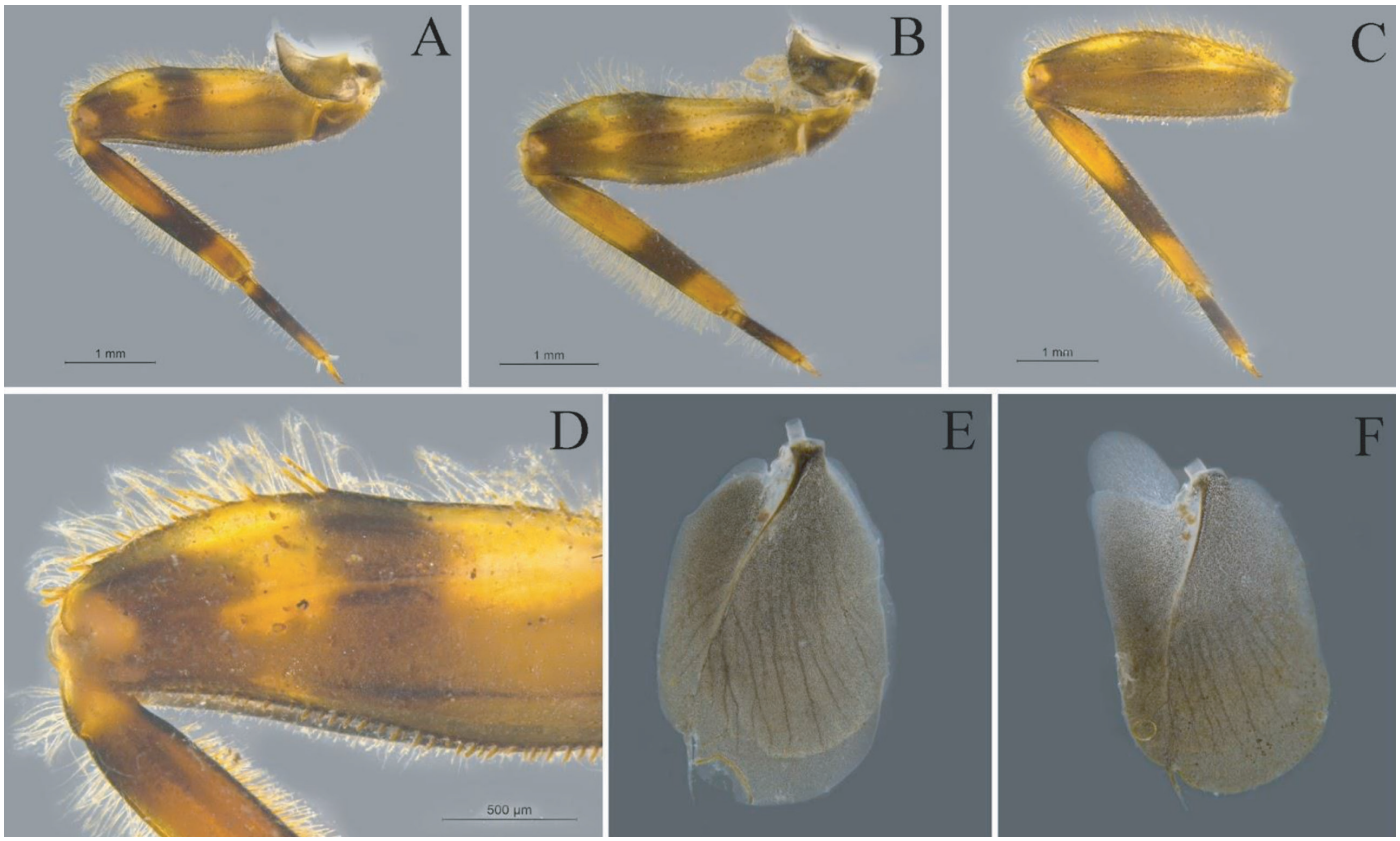


Figure 10 *Massartella aurora* sp. nov., nymph. A. Fore leg; B. Middle leg; C. Hind leg; D. Detail of the setae on the foreleg; E. gill I; F. gill IV.

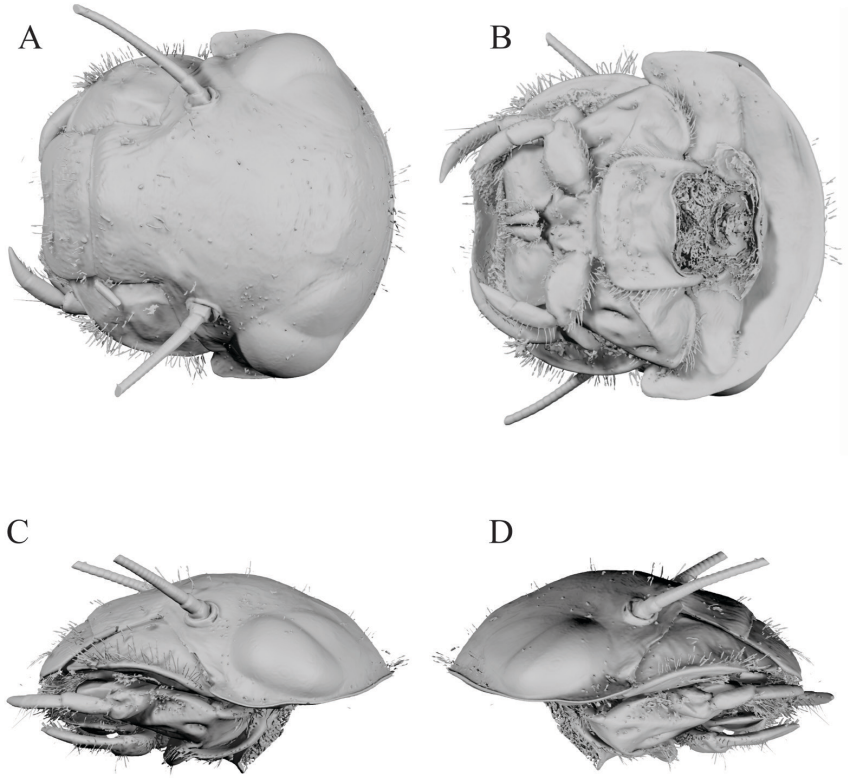


Figure 11 *Massartella aurora* sp. nov., surface rendering of nymphal head. A. Dorsal view, B. Ventral view, C-D. Lateral view.

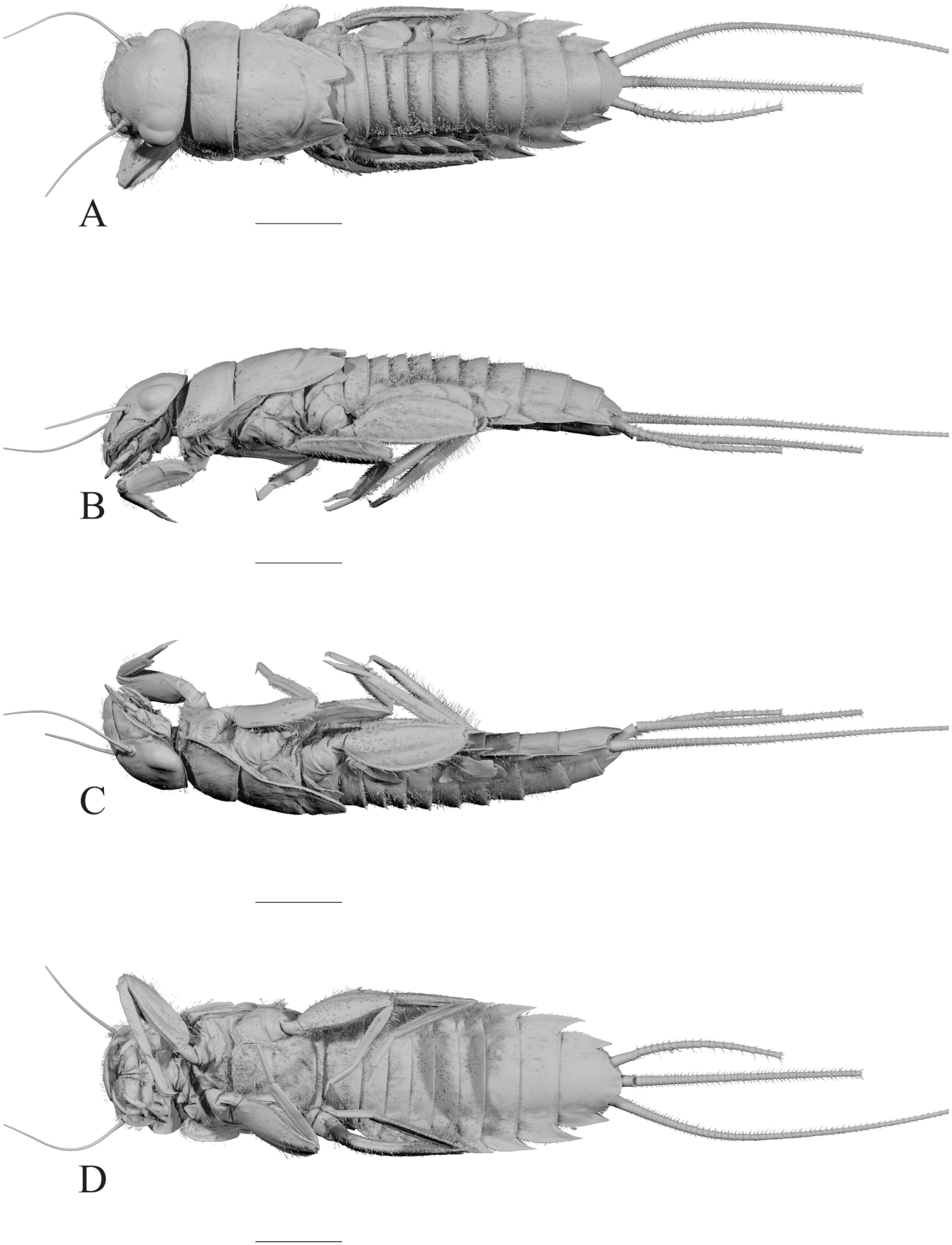


Figure 12 *Massartella aurora* sp. nov., surface rendering of habitus of nymph. A. Dorsal view, B-C. Lateral view, D. Ventral view.

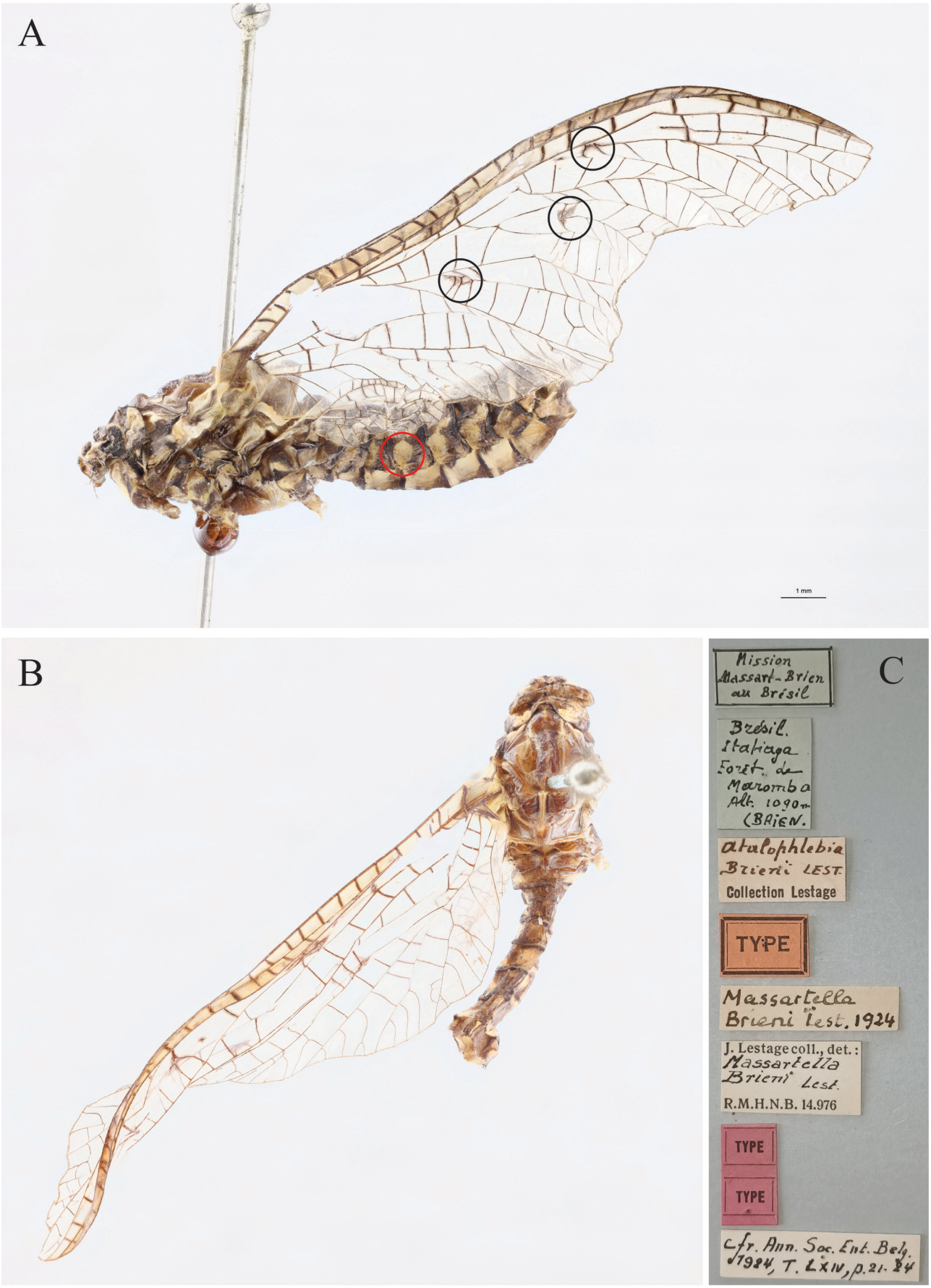


Figure 13 *Massartella brieni*, female syntype at the Royal Belgian Institute for Natural Sciences. A. Lateral view, B. Dorsal view, C. Labels. Black circles indicate maculae on the forewing. Red circle indicates a conspicuous circular lateral mark on the abdomen.

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Data statement

The processed tomographic datasets of the nymph and the abdominal tip of the imago are accessible through the RADAR4KIT repository under https://doi.org/10.35097/cw590f72vgkk28u8

Conflicts of interest

The authors declare no conflicts of interest.

Author contribution statement

ICHC Conceptualization, data curation, formal analysis, investigation, writing - original draft. TVDK Formal analysis, investigation, resources. FFS Conceptualization, formal analysis, funding acquisition, project administration, supervision, writing - review & editing.

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Supplementary material

The following online material is available for this article:

Figure S1 - Interactive 3D PDF.

Figure S2 - Animation of imago surface mesh.

Video S1 - Animation of nymph surface mesh.

Link S1 - The final link.