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A new tribe of scaphocephalic Achilidae from South Africa (Hemiptera: Fulgoromorpha)

Alicja M. BRYSZ [1], Adam STROIŃSKI [2] & Jacek SZWEDO [3,*]

[1,3] Laboratory of Evolutionary Entomology and Museum of Amber Inclusions, Department of Invertebrate Zoology and Parasitology, Faculty of Biology, University of Gdańsk, 59, Wita Stwosza St, PL80-308 Gdańsk, Poland.
[2] Museum and Institute of Zoology, Polish Academy of Sciences, 51/55, Twarda St., 00-818 Warsaw, Poland.

[*] Corresponding author: jacek.szwedo@ug.edu.pl
[1] Email: ambrysz@gmail.com
[2] Email: astroinski@miiz.waw.pl

[1] urn:lsid:zoobank.org:author:0BEC2392-D954-4866-A290-931FF50D5D2F
[2] urn:lsid:zoobank.org:author:EB925C2B-94A6-41A7-949E-9CAE10FD5624
[3] urn:lsid:zoobank.org:author:36BAE161-ECCD-4D89-B383-C7CC84FF0A89

Abstract. This paper describes a new genus and species of Achilidae (Hemiptera: Fulgoromorpha) *Achiplecton stilleri* gen. et sp. nov from the newly established tribe Achiplectini trib. nov. This tribe belongs to one of three Achilidae subfamilies, Myconinae, and is found solely in the West Cape of Southern Africa. The whole region is thought to be one the of the Earths most biologically diverse areas, also characterized by the phylogenetic antiquity of its invertebrates. Morphological peculiarities of the new achilids are discussed, especially modification of the head capsule presenting the 'laternarisation syndrome', which is unique in Achilidae, and tegmina modifications, without the postclaval lobe overlapping.

Keywords. Planthoppers, taxonomy, new tribe, new genus, new species.

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Introduction

The Achilidae Stål, 1866 is a moderately sized family of planthoppers, comprising 162 genera and 521 species (Bourgoin 2024). The family is divided into 11 recent and 2 extinct tribes and is currently found on all continents except for Arctica and Antarctica. They are distributed across almost all ecozones, with the highest diversity in the northern subtropics and temperate climates (Bourgoin 2024). Longitudinal distribution profile present higher number of recent species known from Western Hemisphere, but with two lower species richness peaks in the Eastern Hemisphere, latitudinal profile of species richness presents a peak in latitudes 30°–45° N (Bourgoin 2024). The biology of this group is still poorly

researched, with almost no data about the nymphs and limited ones on adults associated with a variety of gymnosperm and angiosperm plants (Wilson *et al.* 1994; Asche 2015). Bourgoin (2024) listed host plants belonging to the following orders: gymnosperms Pinales (Pinaceae, Cupressaceae), monocots Arecales (Arecaceae), Asparagales (Asteliaceae, Xanthorrhoeaceae), Poales (Poaceae), magnoliids Laurales (Lauraceae, Monimiaceae), and eudicots: Asterales (Asteraceae), Berberidopsidales (Aextoxicaceae), Boraginales (Boraginaceae), Cornales (Cornaceae), Cupressales (Cupressaceae), Ericales (Ericaceae), Fabales (Fabaceae), Fagales (Betulaceae, Fagaceae, Juglandaceae, Nothofagaceae), Hamamelidales (Platanaceae), Lamiales (Lamiaceae, Oleaceae), Malpighiales (Malpighiaceae, Salicaceae), Malvales (Malvaceae, Tiliaceae), Myrtales (Melastomataceae, Myrtaceae), Rosales (Elaeagnaceae, Escalloniaceae, Rhamnaceae, Rosaceae), Sapindales (Rutaceae) and Vitales (Vitaceae). However, the ecological implications of the host-plant associations of the adults remain unclear. The immatures are believed to live in litter and soil, on roots, and some under the bark of decaying trees, where they presumably feed on fungal hyphae (possibly favouring Polyporales; O'Brien 1971; Asche 2015).

They can usually be recognized as dorsoventrally flattened planthoppers with the forewings broadly overlapping distally and a complete row of spines at the apex of the second hind tarsomere.

The higher classification of the Achilidae has been the subject of discussions. It was initially, considered as a whole by Metcalf (1938, 1948), Fennah (1950) and Emeljanov (1991, 1992). However, the addition of fossil taxa and revisionary studies on recent ones has resulted in a current, complex subdivision with three subfamilies and 13 tribes. The family's fossil record can be traced back to the Aptian, Lower Cretaceous (Brysz & Szwedo 2018, 2019; Brysz *et al*. 2023) while the Fulgoroidea Latreille, 1807 lineage origination and diversification was postulated to start in the Jurassic (Bucher *et al*. 2023).

The present contribution widens knowledge of the taxonomic diversity and morphological disparity of the modern Achilidae.

Material and methods

Observations and documentation were proceeded in the Laboratory of Evolutionary Entomology and Museum of Amber Inclusions, University of Gdańsk, Gdańsk, and the Museum and Institute of Zoology, Polish Academy of Sciences, Warsaw. Observations and documentation were made using stereoscopic microscopes Leica M205A with Leica DM6000 camera attached, Olympus SZX10 with EP50 camera attached, microscope Olympus BX51 with Canon EOS 90D camera. The photographs of the habitus and internal structures were taken using a stereo microscope Leica MZ 16 with an IC3 D camera. Final images were adjusted using Helicon ver. 5.0 software and Adobe Photoshop (ver. 7.0). Drawings were composed with CorelDRAWX7 software. The SEM photographs of uncoated specimens were taken in the Laboratory of Scanning Microscopy, MIZ PAS (Warsaw), using a scanning electron microscope HITACHI S-3400N under low vacuum conditions. To reveal genitalic structures the whole abdomen of the specimen examined was cut off and cleared for 30 min in a warm (50°C) 10% potassium hydroxide (KOH) solution with a few drops of black chlorazol (CAS No. 1937-37-7) for staining the ectodermic genital structures, based on the method introduced by Carayon (1969). Dissections and cleaning of the genital structures were carried out in distilled water.

Morphological terms are used after the proposals of Anufriev & Emeljanov (1988), Bartlett *et al*. (2014), and Asche (2015). The nomenclature of the fore wing (tegmen) follows the interpretation proposed by Bourgoin *et al*. (2015) and Stroiński (2020), for hind wings after Anufriev & Emeljanov (1988) and Emeljanov (1991, 1992). Antennal structures are named following Stroiński *et al*. (2011). The terminology of the genitalia follows proposals of Bourgoin (1988), Bourgoin & Huang (1990), Yang & Chang (2000) and Asche (2015) for the male and Bourgoin (1993) and Asche (2015) for the female.

Material is deposited in SANCI – Southern African Collection of Insects, Pretoria, Southern Africa, and collection of the Laboratory of Evolutionary Entomology and Museum of Amber Inclusions, University of Gdańsk (MAIG).

Biogeographic divisions after Holt *et al*. (2013) and Linder *et al*. (2013).

Results

Systematics

Class Insecta Linnaeus, 1758
Order Hemiptera Linnaeus, 1758
Suborder Fulgoromorpha Evans, 1946
Superfamily Fulgoroidea Latreille, 1807
Family Achilidae Stål, 1866

Subfamily **Myconinae** Fennah, 1950

Emended diagnosis

Vertex often strongly produced anteriorly of margin of the compound eyes, with a rounded anterior margin. Lora visible in ventral view. Pronotum with postocular carina present. Metatibial lateral spines in various number, subgenual one present, the pattern with more than one cuticular lateral spine except genual spine only in this subfamily. Tegmen (fore wing) with length/width on clavus apex proportion up from 3.5; postcosts area not widened; low number of RA terminals (1 to 4). Hind wing second anal vein simple, more or less straight and apically dilated, usually not reaching wing margin by a considerable distance; median fold usually reaching wing margin.

Achiplectini trib. nov
urn:lsid:zoobank.org:act:8CE175F6-30F2-40EF-BD3D-FAFC6506A6AC

Type genus

Achiplecton gen. nov., here designated.

Diagnosis

Apical portions of tegmina not overlapping (exceptional feature among Achilidae); apex of clavus blunt, claval veins Pcu+A_1 reaching margin at same point as CuP (clavus 'open' in other tribes, with terminal Pcu+A_1 reaching bent section of CuP); hind wing with median vein leaving the base with a short common stalk with ScP+R, 'arculus' (the very base of CuA), absent, viz. basal cell absent; median fold entering cubital area (as in Plectoderini); second anal vein of hind wing simple, not reaching margin, dilated posteriorly; frons with intermediate carina, separating 'acrometope' sensu Emeljanov (as in Rhotalini and extinct Waghildini); lateral carinae of postclypeus well developed, not prolonged on anteclypeus (similar as in extinct Waghildini; prolonged to anteclypeus in Rhotalini, Myconini, Mycarini; vestigial to absent in Plectoderini; absent in Amphignomini); anteclypeus narrow, oval, with median carina; subantennal carinae absent (present in Amphignomini); disc of pronotum not covering vertex (coryphe); metatibia with single lateral cuticular spine (as in Plectoderini); basi- and midmetatarsus with subapical platellae, except the lateral teeth. The male phallic complex retracted deep into the abdomen. Male medioventral projection of pygofer present; lateral margin of pygofer without projections. Anal tube flattened, in males, with epiproct short and paraproct short. Periandrium symmetrical, three-lobate. Connective long, Y-shaped. Female 7th sternite (pregenital sternite, last sternite) "smooth", without any additional lobe. Gonoplac and endogonocoxal process trilobate. Bursa copulatrix single-pouched, ornamented.

Distribution

Afrotropical region, Southern African, the Cape.

Composition

Only type genus so far.

Genus ***Achiplecton*** gen. nov
urn:lsid:zoobank.org:act:92ED1F04-3801-45B0-B823-BE81C6047A55

Type species

Achiplecton stilleri gen. et sp. nov; by present designation and monotypy.

Diagnosis

The body flattened somewhat laterally. Head elongated, with fastigium developed, lateral margins of frons carinate, undulating, prolonged on postclypeus; lateral carinae of postclypeus converging ventrad, but not connected, not prolonged on anteclypeus; anteclypeus about three times as long as wide, elongated oval, with median carina not reaching its apex, wedged in between lora; clypellus triangularly elongate, acute, about half as long as anteclypeus; lora well visible in anteroventral view; antennal pedicel subglobose, with plate organs star-like with dichotomic arms, present on whole surface of pedicel. Pronotum wider than head with compound eyes, with disc elevated, with median carina and parallel lateral carinae, not reaching posterior margin, disc with lateral pits; lateral portion of pronotum declivous with 4 incomplete ridges in posterior portion, and two postocular carinae. Mesonotum wider than long, with median and lateral carinae, obsoletely reaching posterior margin, mesoscutellum separated. Tegmen elongate, with longitudinal veins on corium and clavus carinate, 'frosted' on the membrane; stem ScP+R forked in basad ¼ of tegmen length, stem MP forked beyond the apex of clavus, stem CuA forked apicad of claval veins junction, terminals of CuA reaching margin on tornus. Corium slightly more sclerotized than membrane. Cell C3 short, less than ¼ of C1 length. Appendix distinct, tornus very long, almost straight. Hind wing with single RP and MP, cell C5 wide, intersected by median fold; cubital fold posteriorly diverging from CuP; anal lobe rounded. Profemora with a double row of ventral short, stout setae. Metafemur with the lateral cuticular spine in basal half, with 10 apical teeth, basimetatarsus and midmetatarsus with 10 apical teeth, with subapical cuneiform platellae, viz. metatibiotarsal formula 10 : 10(8) : 10(8). Male medioventral projection of pygofer unilobate; suspensorium circular; male genital styles with dorsad and mediad processes at the base and bilobate projection near the middle. Ventral lobes of periandrium with two cephalad projections near the base. Aedeagus with apical portion more sclerotized, forming a 'fang' with apices directed laterad. Female anal tube (segment XI), in lateral view, reaching posterior margin of gonoplac. Posterodorsal part of gonoplac with numerous setae (bristles). Anterior connective lamina (ACL) with 2 sclerotized arms and apical teeth. The base of the bursa copulatrix pouch with single sclerite.

Etymology

The generic name is derived from the Classic Greek 'plectos' (πλεκτός, plektós) meaning 'woven' and the generic name *Achilus*. Gender: masculine.

Distribution

Western Cape Province, Republic of Southern Africa.

Composition

Only the type species is known so far.

Achiplecton stilleri sp. nov.
urn:lsid:zoobank.org:act:EDD9079F-DF2E-4797-ADD4-E221102D7529
Figs 1–12

Etymology

Specific epithet dedicated to our friend Dr Michael Stiller, South African entomologist and collector of the specimens.

Type material

Holotype

SOUTH AFRICA • ♂; "Western Cape, Gifberg Pass summit, Vanrhynsdorp; 31°45′ S, 18°42′ E; 360 m a.s.l.; 9 Oct. 2002; M. Stiller leg.; sweeping, low grass, forbs & restios, at FM tower"; SANC.

Paratypes (1 ♀, 4 ♂♂)

SOUTH AFRICA • 1 ♂; same data as for holotype; SANC • 1 ♂; same data as for holotype; MAIG • 1 ♀; same data as for holotype; SANC • 1 ♂; "South Africa, Western Cape Prov., Dwarsrivier, Farm Cedarberg, SE Citrusdal, 32°27′S 19°12′E, 10-15.x.2002, 850 m, M Stiller; Swept off *Aspalathus costulata*, Fabaceae; National Coll. of Insects, Pretoria, S. Afr."; SANC • 1 ♂; same data as for preceding; MAIG.

Description

Coloration. Body dark brown with light brown carinae. Tegmina dark brown in the posterobasal part, and lighter brown in the anteroapical part, with an irregular dusting of light spots.

Appearance. In both sexes habitus subcylindrical, somewhat flattened laterally, with elongated head and narrow tegmina, fully covering apex of the abdomen. Length ca 6.0–7.5 mm (median 6.66 mm; examined specimens slightly distorted).

Head. Head with compound eyes narrower than pronotum, elongated, with fastigium well developed, in lateral view with apical portion slightly bent dorsad; fastigium in cross-section subhexagonal. Vertex elongately subtriangular, lateral margins undulate, converging anteriad toward rounded anterior margin, disc tectiform, in lateral view in a plane with a disc of pronotum and mesonotum; median carina ridge-like, expanded from posterior margin towards the apex, undulate, apex rounded, carinate, posterior margin almost straight, merely angulately concave in dorsal view, reaching half of compound eye length; occiput not visible, hidden below anterior margin of pronotum. Frons more flattened near the frontoclypeal margin, more convex towards the apex, lateral carinae undulate, merely convex, converging anteriad, with subapical transverse carina; median carina distinct, undulate; disc delicately transversely wrinkled. Preocular area with irregularly dispersed eminences. Clypeal suture incomplete, obsolete in median portion, angulately convex. Postclypeus subtriangular, about as long as wide, with lateral carinae distinctly converging mediad, but not touching, median carina distinct, prolonged on anteclypeus. Anteclypeus about three times as long as wide, suboval, wedged in between lora; its median carina not reaching lower margin. Clypellus long, acutely triangular. Lora wide, convex, visible in frontal view. Emarginate margins of maxillary plate visible in frontal view; maxillary plate extremely narrow. Posterior margin of the head capsule (maxillary plate and gena) delicately carinate. Lateral ocelli present, below the lower margin of the compound eye, posteriad of its anterior margin. Compound eyes large, subglobular with posteroventral angle subangular, devoid of some ommatidia at the lower median section, but without subocular callosity; postocular callus narrow. Antennal foveae below the compound eye, posteriad of half of the compound eye length, slightly elevated; scapus very short, pedicel subglobose, with plate organs of stellar type, with dichotomic arms, present on the whole surface of the

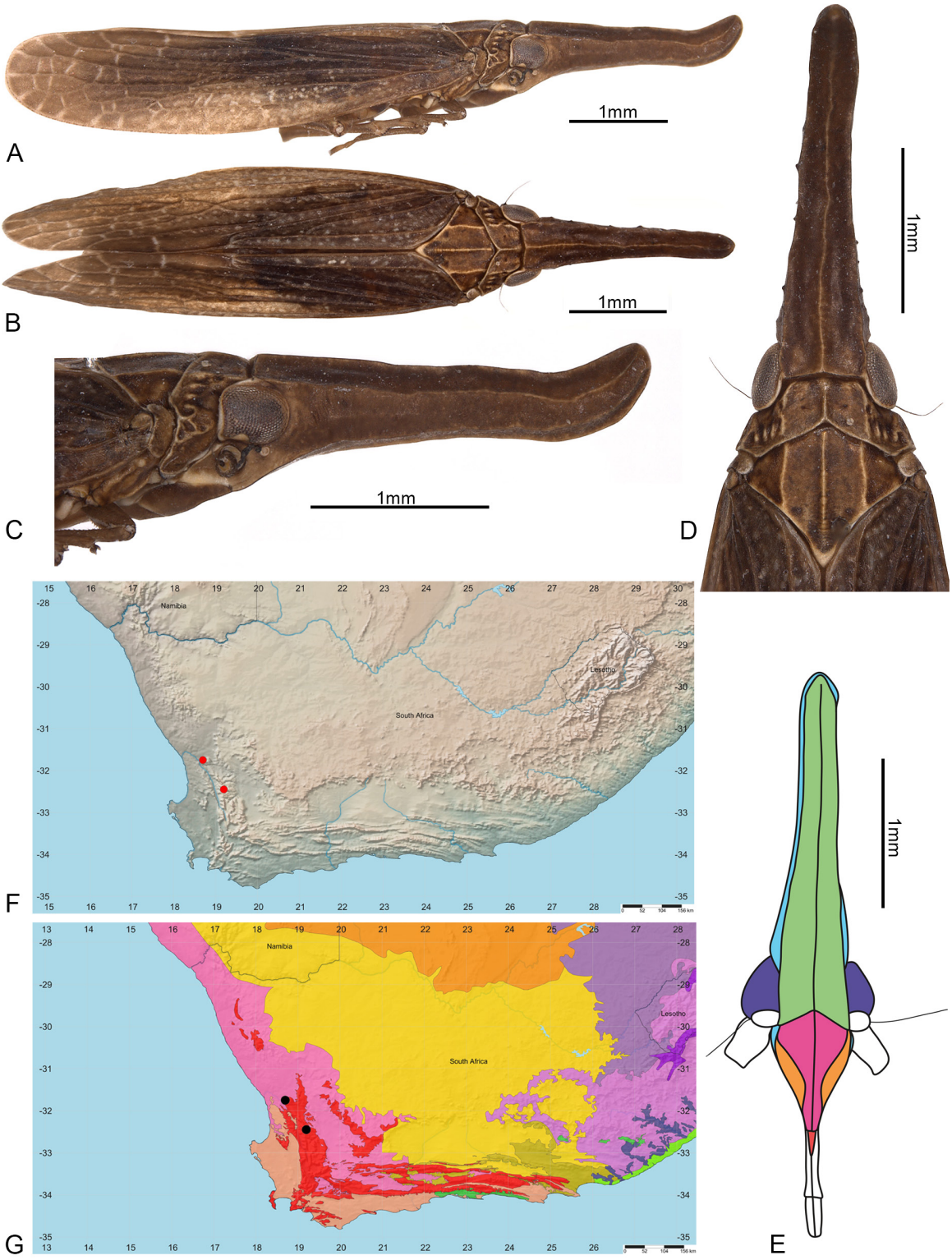

Fig. 1. *Achiplecton stilleri* gen. et sp. nov., holotype, ♂ (SANC). **A**. Habitus, lateral view. **B**. Habitus, dorsal view. **C**. Anterior part of the body, lateral view. **D**. Anterior part of the body, dorsal view. **E**. Head, frontal view, schematic drawing. **F**. Distribution map, physical. **G**. Distribution map, ecoregions. Colors on the head scheme: frons = green; clypeus = purple; clypellus = red; loral plates = orange; lateral part of the head capsule = light blue; compound eyes = deep blue; antennal pedicel = white.

pedicel. Rostrum reaching middle of metacoxae, subapical segment shorter than subapical one, widened medially, with rounded apex, about three times as long as wide, blackish, covered with short setae.

Pronotum. In midline about four times as long as wide, disc elevated, not protruded far anteriad, not covering vertex surface, median carina, and parallel lateral carinae not reaching posterior margin, disc with lateral pits; lateral portion of pronotum declivous with 4 incomplete ridges in posterior portion, and

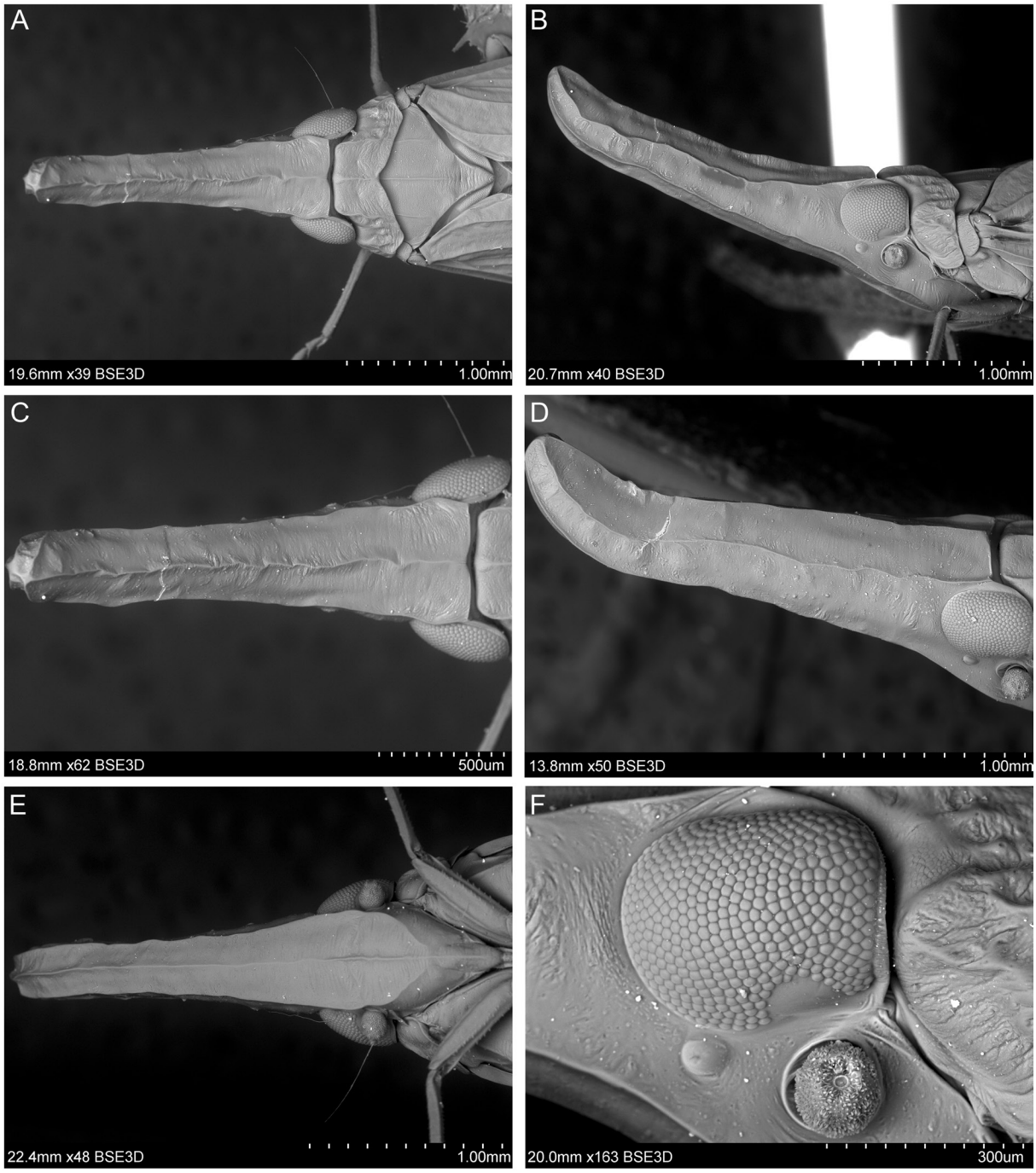

Fig. 2. *Achiplecton stilleri* gen. et sp. nov., holotype, ♂ (SANC). **A**. Anterior part of the body, dorsal view. **B**. Anterior part of the body, lateral view. **C**. Head dorsal view. **D**. Head, lateral view. **E**. Head, frontal view. **F**. Lateral part of the head, lateral view.

two incomplete postocular carinae (carina lateralis weakened anteriorly and carina collateralis weakened posteriorly), pectoral area narrow, emarginate ventromediad.

Mesonotum. Wider than long, with median and lateral carinae obsoletely reaching posterior margin, lateral carinae merely converging anteriad, mesoscutellum separated; disc of mesonotum with leathery,

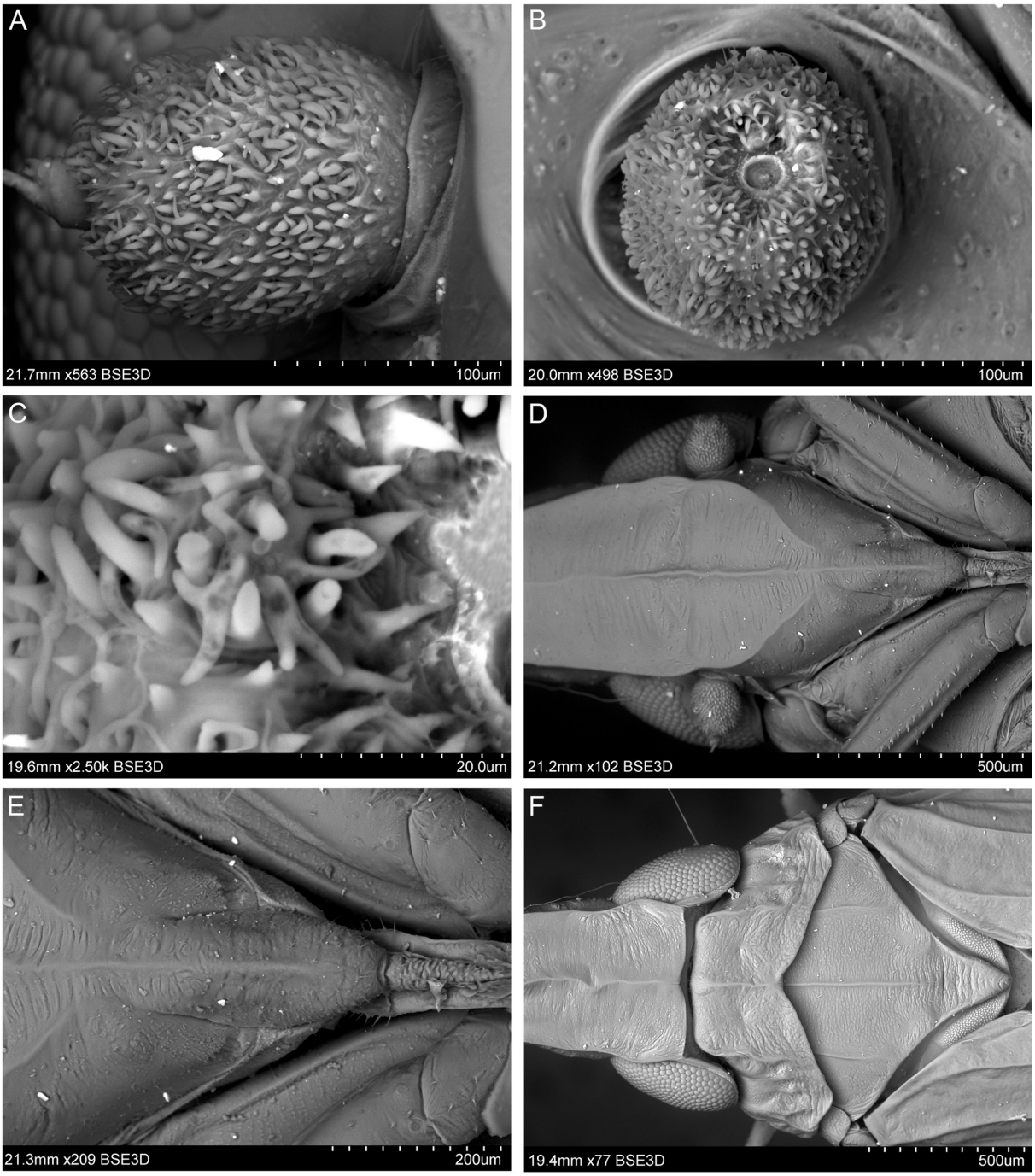

Fig. 3. *Achiplecton stilleri* gen. et sp. nov., holotype, ♂ (SANC). **A**. Antenna, frontal view. **B**. Antenna, top view. **C**. Antennal plate organs. **D**. Clypeus and antyclypeus, frontal view. **E**. Antyclypeus and labrum, frontal view. **F**. Pronotum and mesonotum, dorsal view.

transversely-scaly texture, mesoscutellum transversely wrinkled; mesothoracic axillary cord with distinct scally sculpture.

Tegula. Wider than long, with leathery sculpture, without median carina.

Tegmen. Narrow, narrower at base than on membrane, with longitudinal veins on corium and clavus carinate, 'frosted' on membrane; costal margin slightly arcuate at base, than less arcuate to level of $ScP+RA_1$ terminal, than arcuate to widely arcuate anteroapical angle, apex rounded, posteroapical angle arcuate, tornus merely arcuate; apex of clavus reaching half of tegmen length; costal margin thickened, appendix widened, transversely wrinkled, wider at anterior margin and apex, narrowing on tornus; basal cell narrow, about 4 times as long as wide, triangularly widening posteriad, closed with short very basal section of CuA, basal veinlet *cua-cup* slightly thickened; stems ScP+R+MP leaving basal cell with a short common stalk, stem ScP+R forked basad of claval veins junction, branch ScP+RA slightly diverging mediad, terminal $ScP+RA_1$ split at level of claval apex, 4–5 terminals of RA reaching margin well basad of anteroapical angle; branch RP almost straight, forked apicad of level of tornal veinlet on membrane, reaching margin basad of anteroapical angle with 2–3 terminals; stem MP merely sinusoid, forked apicad of claval apex, branches MP_{1+2} and MP_{3+4} not forking on membrane, slightly diverging in apical portion, reaching margin at apex, in area between anteroapical and posteroapical angles; stem CuA leaving basal cell straight, parallel to claval fold and vein CuP, forked apicad of basal ⅓ of tegmen length, apicad of claval veins junction, branch CuA_1 single, branch CuA_2 single reaching posterior section

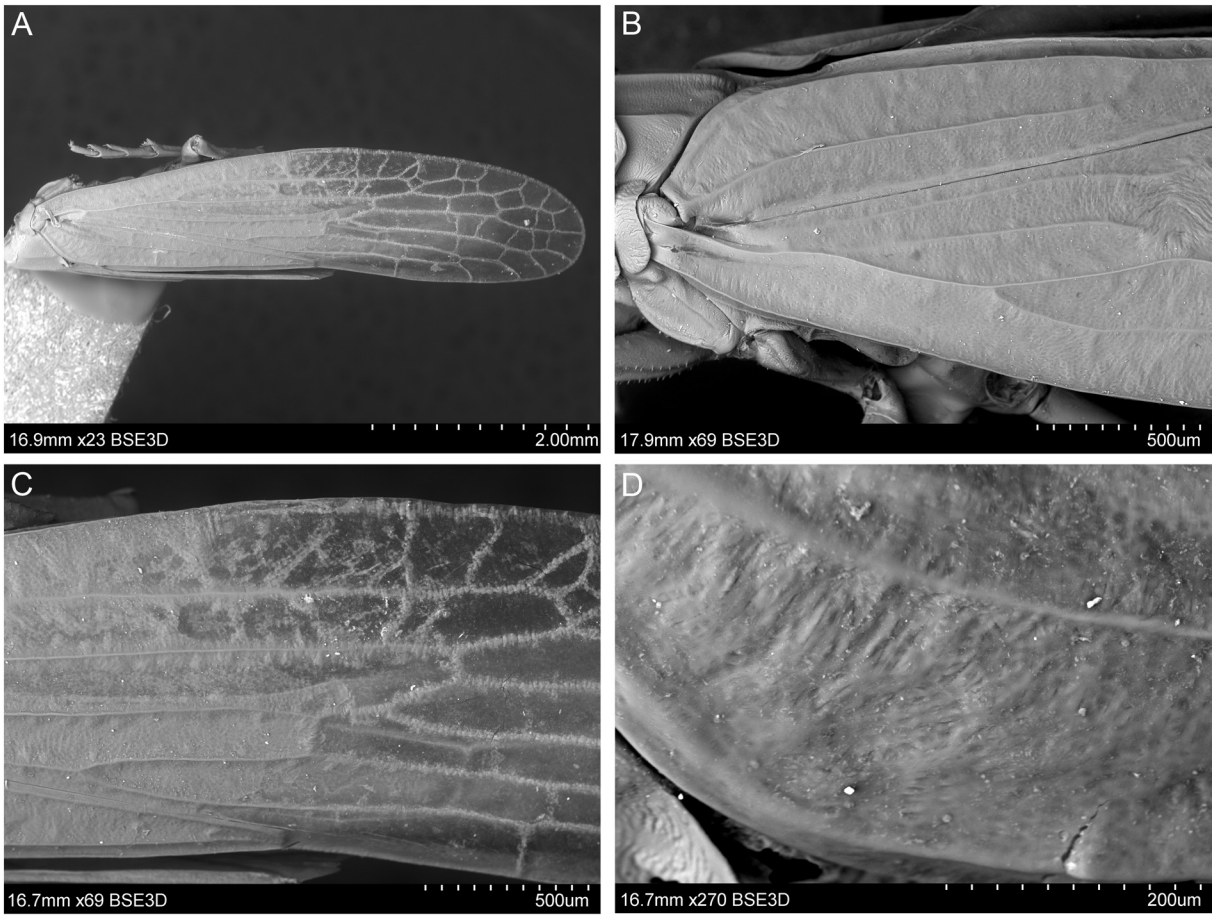

Fig. 4. *Achiplecton stilleri* gen. et sp. nov., holotype, ♂ (SANC). **A**. Tegmen (forewing). **B**. Basal part of tegmen. **C**. Median part of tegmen. **D**. Basal part of clavus.

of tornus; CuP straight, bent near apex reaching the margin (A_2); claval vein Pcu sinuate, connected to A_1 at about ⅔ of clavus length; joined veins Pcu+A_1 reaching claval apex at point with CuP terminus to margin (A_2); clavus open, claval fold prolonged on postclaval cell, but not intersecting tornal veinlet; veinlet *rp-mp*$_{1+2}$ apicad of claval apex, basad of tornal veinlet; nodal veinlet *mp-cua*$_1$ slightly apicad of claval apex; veinlet *icua* slightly apicad of tornal veinlet; cello C1 long, closed with slightly oblique

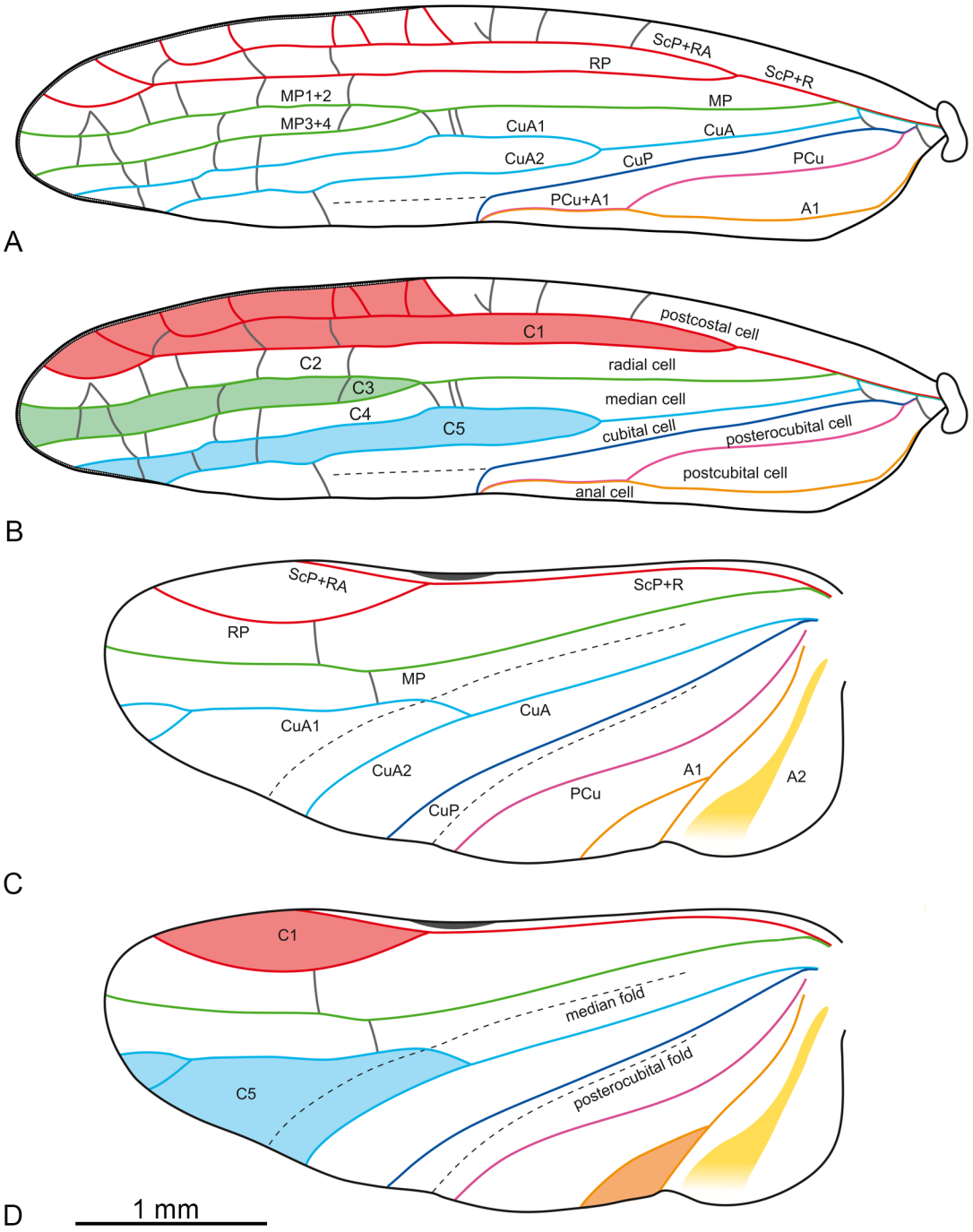

Fig. 5. *Achiplecton stilleri* gen. et sp. nov., drawings. **A**. Tegmen venation pattern. **B**. Tegmen with areas marked. **C**. Hind wing venation pattern. **D**. Hind wing with area marked.

veinlet *ra-rp*; cell C3 short, closed with transverse veinlet mp_{1+2}-mp_{3+4} at about level of tornal veinlet; cell C5 lanceolate, closed with veinlet *icua* merely apicad of tornal veinlet; a few additional transverse veinlets on membrane, not arranged in distinct rows.

Hind wing. Narrow, about twice as long as wide, with distinct anal lobe, basal section of costal margin arcuate, then sinuate to level of wing-coupling lobe (WCL), anteroapical angle widely arcuate, apex arcuate, posterior margin to anal lobe slightly crenelate; basal cell absent, stems ScP+R+MP leaving with short common stem, then diverging, ScP+R subparallel to costal margin to level of WCL, then forked, ScP+RA reaching margin well anteriad of apex, RP arcuately curved reaching margin basad of apex; stem MP single, reaching margin at apex; stem CuA straight, diverging mediad, forked apicad of half of hind wing length, branch CuA_1 forked again before margin, branch CuA_2 slightly arcuate; branch CuP single, sinuate, reaching margin at distance slightly longer than distance to Pcu terminus; Pcu more sinuate, A_1 curved at base, forked in its apical section, A_2 simple, slightly thickened at base, then dilated posteriorly, not reaching margin; median fold intersecting basal portion of CuA_1 branch, entering cubital area and reaching margin; posterocubital fold reaching margin in half way between terminus of CuP and Pcu.

Procoxa. Elongate, somewhat flattened, subtriangular in cross-section, with lateral margin ridged; protrochanter short, scaphoid; profemur flattened, slightly shorter than protibia, with two ridges

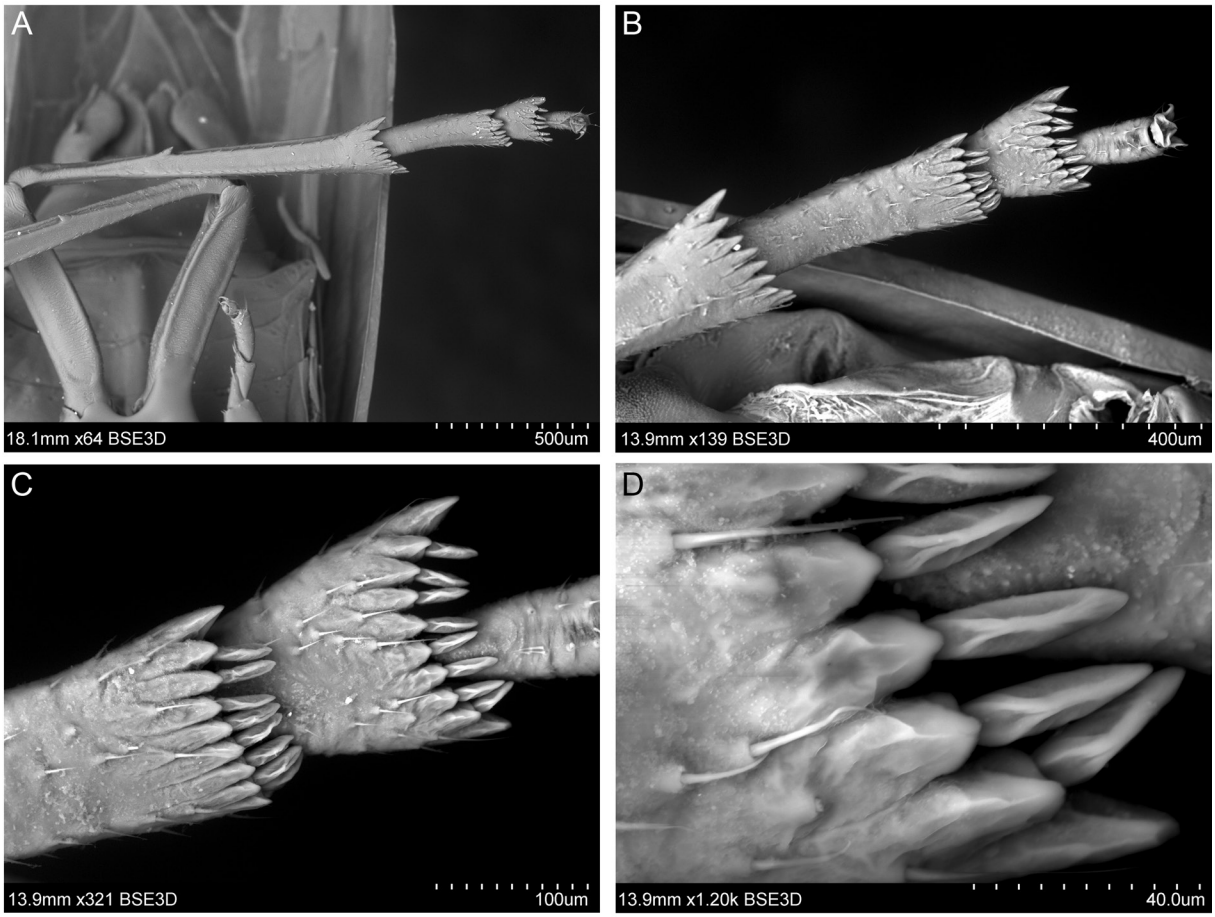

Fig. 6. *Achiplecton stilleri* gen. et sp. nov., holotype, ♂ (SANC), SEM photographs. **A**. Hind legs, ventral view. **B**. Apical part of tibia hind tibia and tarsomere, ventral view. **C**. Ornamentation of the first and second tarsomere, ventral view. **D**. Platellae on the second tarsomere, ventral view.

ventrally, bearing stout, short setae; protibia subquadrate in cross-section, margins ornamented with rows of short setae; protarsus shorther than half of protibia, tarsomeres of similar length, tarsal claws distinct, widespread, arolium distinct, triangular.

Mesothorax. Anterior margin of katepisternum arcuate; mesocoxa elongate, somewhat flattened, more subquadrangular in cross-section (mediad surface convex), ridged laterad; mesotrochanter scaphoid;

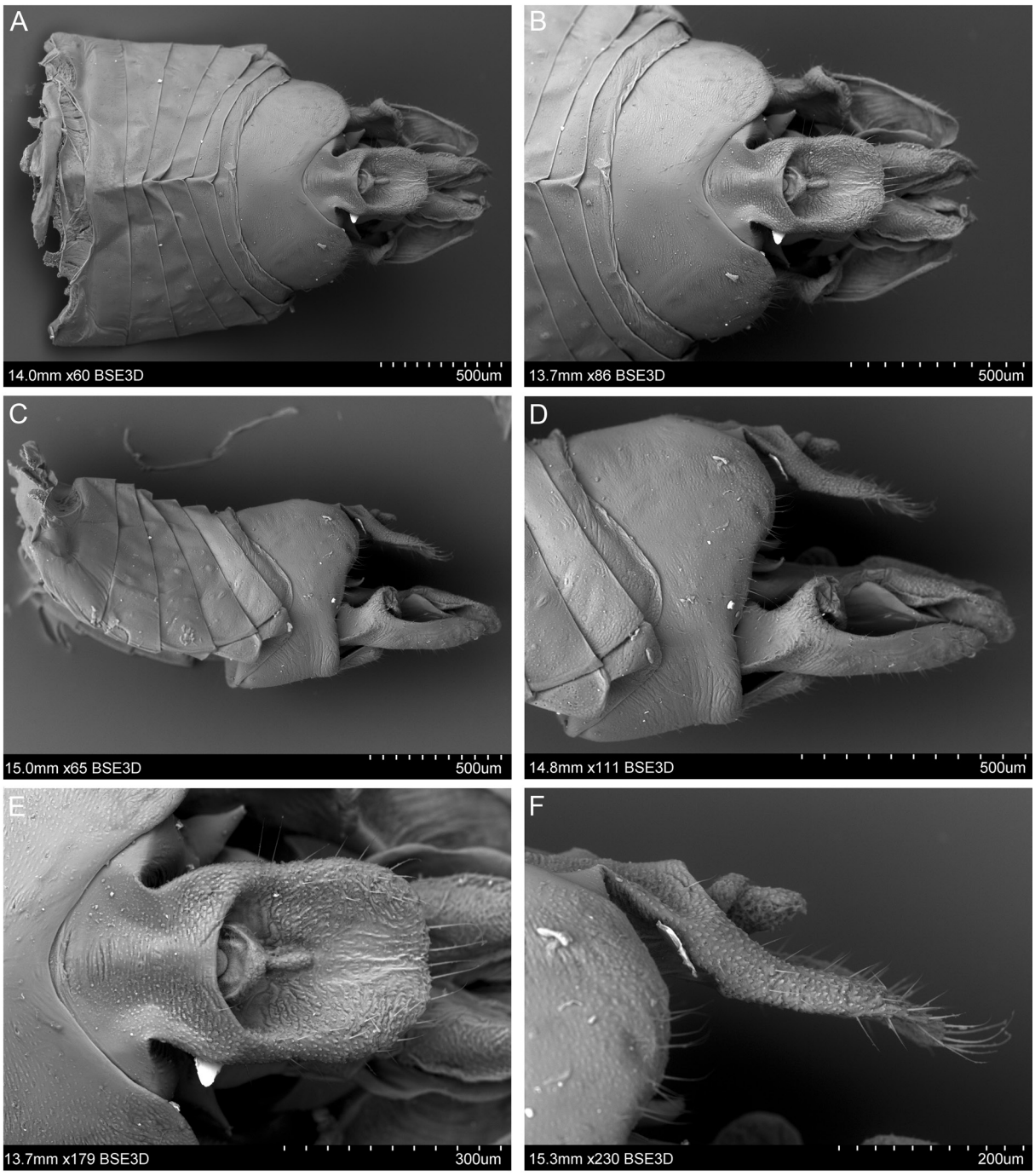

Fig. 7. *Achiplecton stilleri* gen. et sp. nov., holotype, ♂ (SANC), SEM photographs. **A**. Abdomen and terminalia, dorsal view. **B**. Terminalia, dorsal view. **C**. Abdomen and terminalia, lateral view. **D**. Terminalia, lateral view. **E**. Anal tube, dorsal view. **F**. Anal tube, lateral view.

mesofemur flattened, slightly shorter than mesotibia, with two ridges ventrally, ornamented with rows of short setae; mesotibia subquadrangular in cross-section, margins ornamented with rows of short setae; mesotarsus shorther than half of mesotibia, tarsomeres of similar length, tarsal claws distinct, widespread, arolium distinct, triangular.

Metacoxa. Wide, meracantha conical with finger-like acute tip; metatrochanter short, circular, metafemur slightly longer than mesofemur, slightly laterally flattened, lower margins thickened emarginate; metatibia long, widening apicad, less than twice as long as metafemur, genual spine absent, lateral spine placed basad of half of metatibia length, apical row of 10 teeth arranged slightly arcuately, the most external one larger than the most internal one, lateral margins of metatibia with rows of scarce hairs; basimetatarsomere longer than cumulative length of mid- and apical metatarsomeres, plantar surface slightly flattened, apical teeth arranged in almost straight row of 10 teeth of similar size, platellae cuneiform, Y-ridged ventrally; midmetatarsomere about as long as wide apically, slightly widened, plantar surface flattened, with row of 10 apical teeth arranged arcuately, lateral teeth slightly larger, platellae cuneiform, Y-ridged ventrally; apical metatarsomere about as long as midmetatarsomere, row of a few short setae on plantar surface, tarsal claws distinct, widely spread, arolium large, triangular.

Abdomen. Male: abdominal sternites III and IV with a few setae in the median portion and groups of lateral setae; abdominal sternites V and VI without a median group of setae, with a few setae laterally;

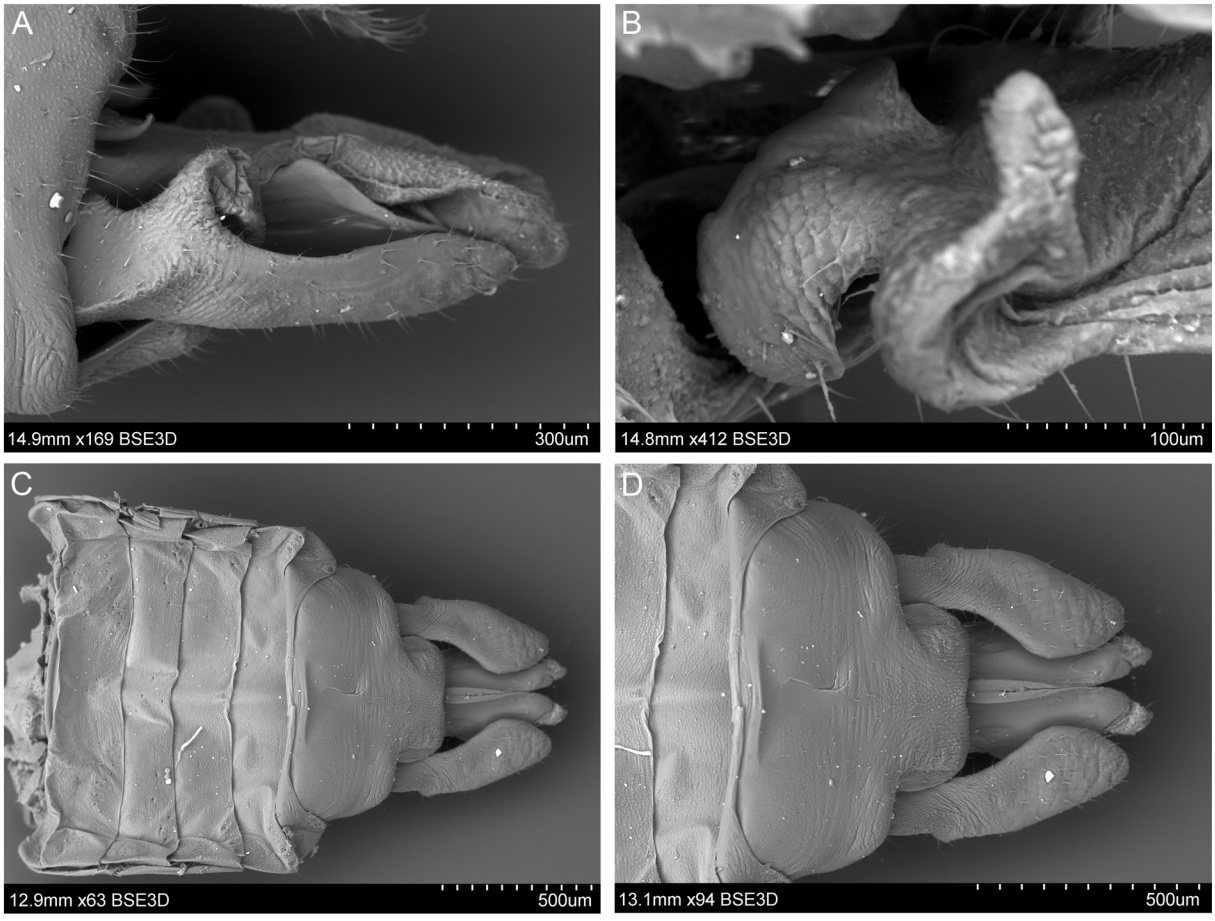

Fig. 8. *Achiplecton stilleri* gen. et sp. nov., holotype, ♂ (SANC), SEM photographs. **A**. Genital style and aedeagus, lateral view. **B**. Processes of genital style, dorsal view. **C**. Abdomen and terminalia, ventral view. **D**. Terminalia, ventral view.

abdominal sternites V and VI with two deep pits with setae posterolaterad, VII abdominal segment with single setae in deep pit posterolaterad. Female: abdominal sternites III and IV with a few setae in median portion, sternites III to VII with a few, decreasing in number posteriad, from 6 to single lateral setae,

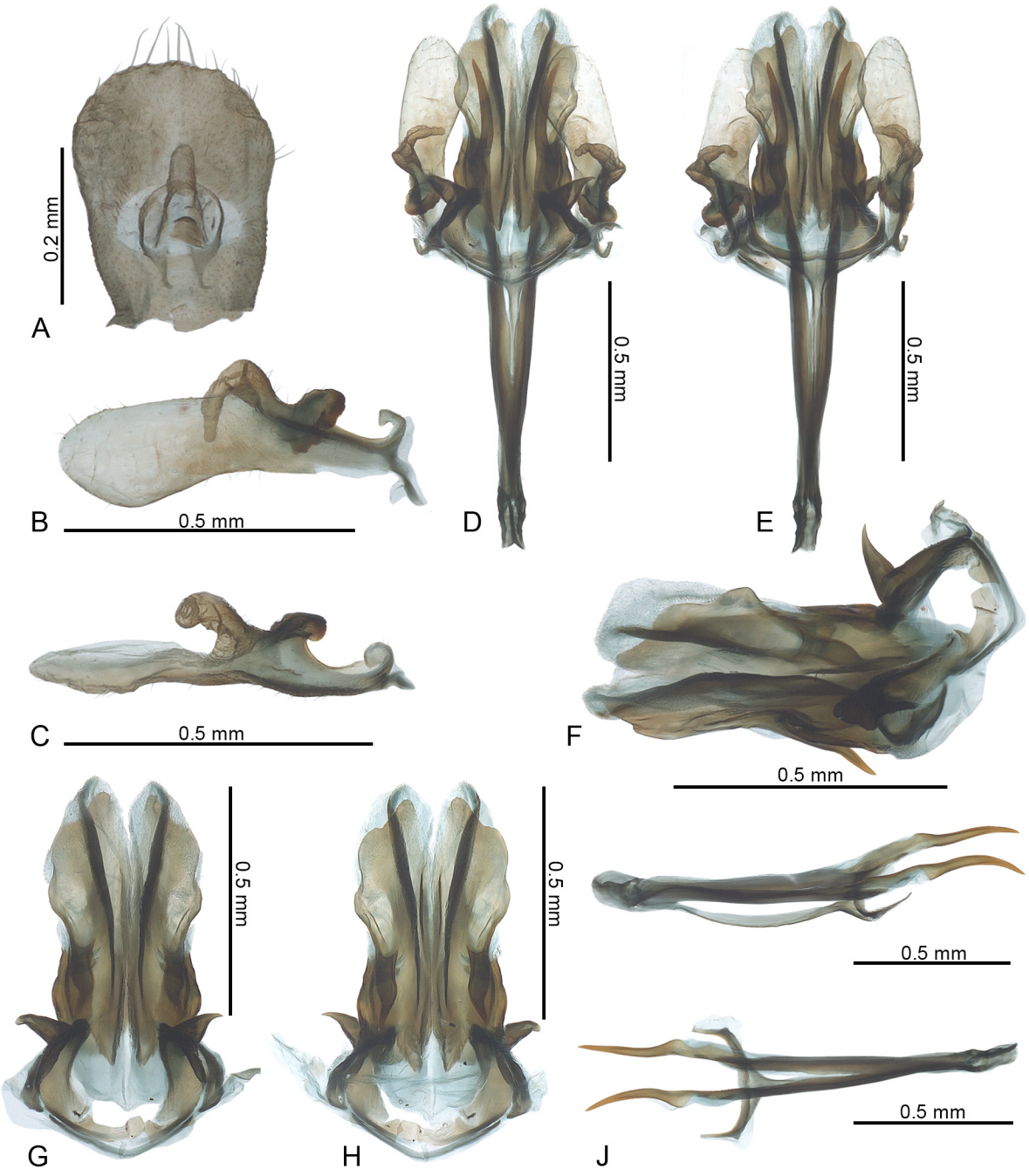

Fig. 9. *Achiplecton stilleri* gen. et sp. nov., holotype, ♂ (SANC), photographs. **A**. Anal tube, dorsal view. **B**. Genital style, lateral view. **C**. Genital style, dorsal view. **D**. Genital styles and phallic complex, dorsal view. **E**. Genital styles and phallic complex, ventral view. **F**. Periandrium, latero-dorsal view. **G**. Periandrium, dorsal view. **H**. Periandrium, ventral view. **I**. Aedeagus, lateral view. **J**. Aedeagus, dorsal view.

abdominal sternites V and VI with two deep pits with setae posterolaterally, VII abdominal segment with single setae in deep pit posterolaterally.

Male terminalia. Pygofer ventrally (including medioventral projection) shorter than dorsally, round in caudal view; ventrally with wide (about twice as wide as long in midline) unilobed, subquadrate projection, its posteroapical angles widely angulate, in caudal view directed mediad, posterior margin

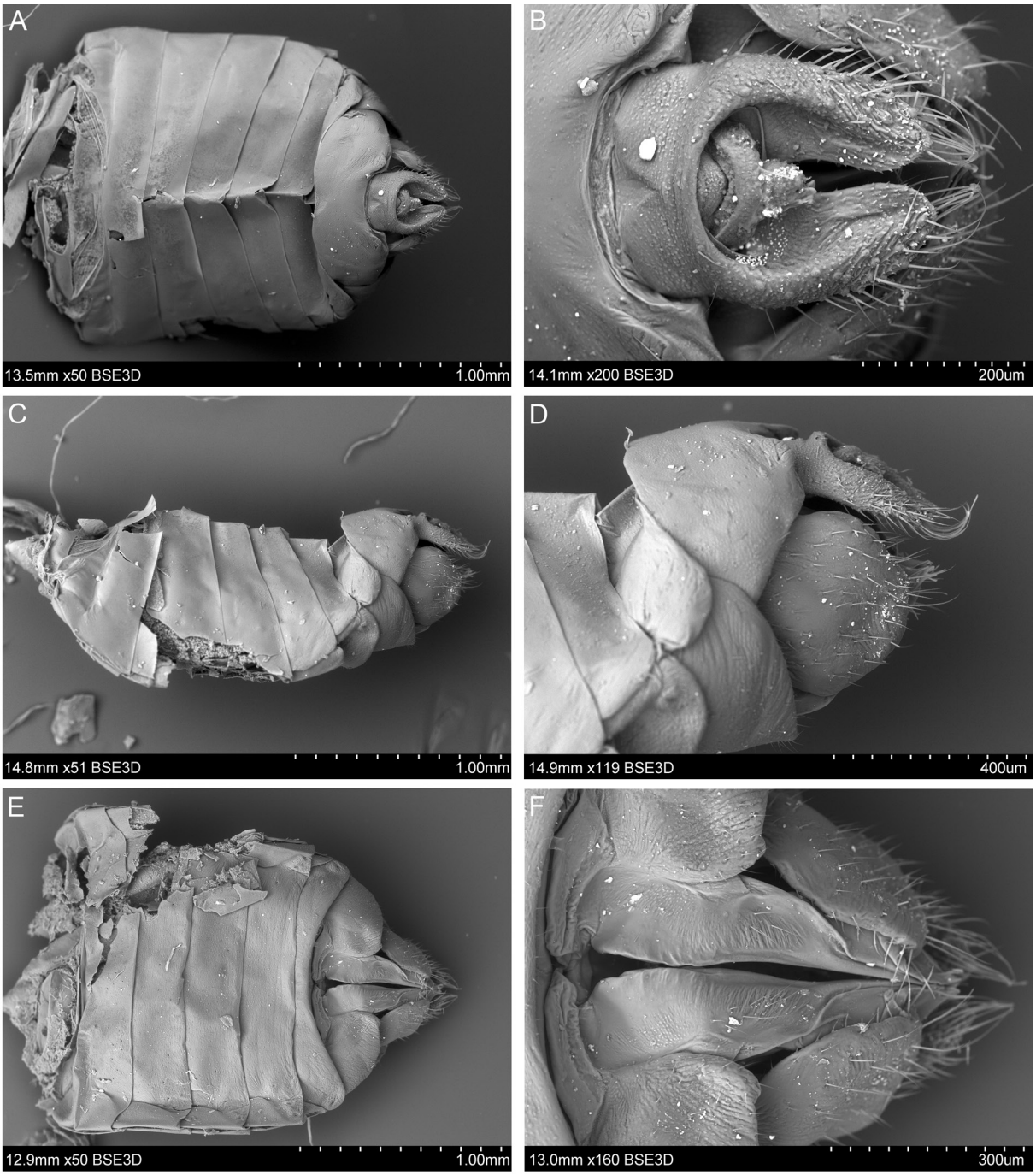

Fig. 10. *Achiplecton stilleri* gen. et sp. nov., paratype, ♀ (SANC), SEM photographs. **A**. Abdomen and terminalia, dorsal view. **B**. Terminalia, dorsal view. **C**. Abdomen and terminalia, lateral view. **D**. Terminalia, lateral view. **E**. Abdomen and terminalia, ventral view. **F**. Terminalia, ventral view.

almost straight, with shallow median notch; lateral margin of pygofer slightly concave, without bulges or protuberances, projecting caudad than arcuately cephalad; dorsal posterior margin arcuately concave. Anal tube flattened, short, widened at base, incised laterally then subrectangular, slightly longer than wide; lateral margins subparallel; posteroapical angles angulate; posterior margin straight, with shallow

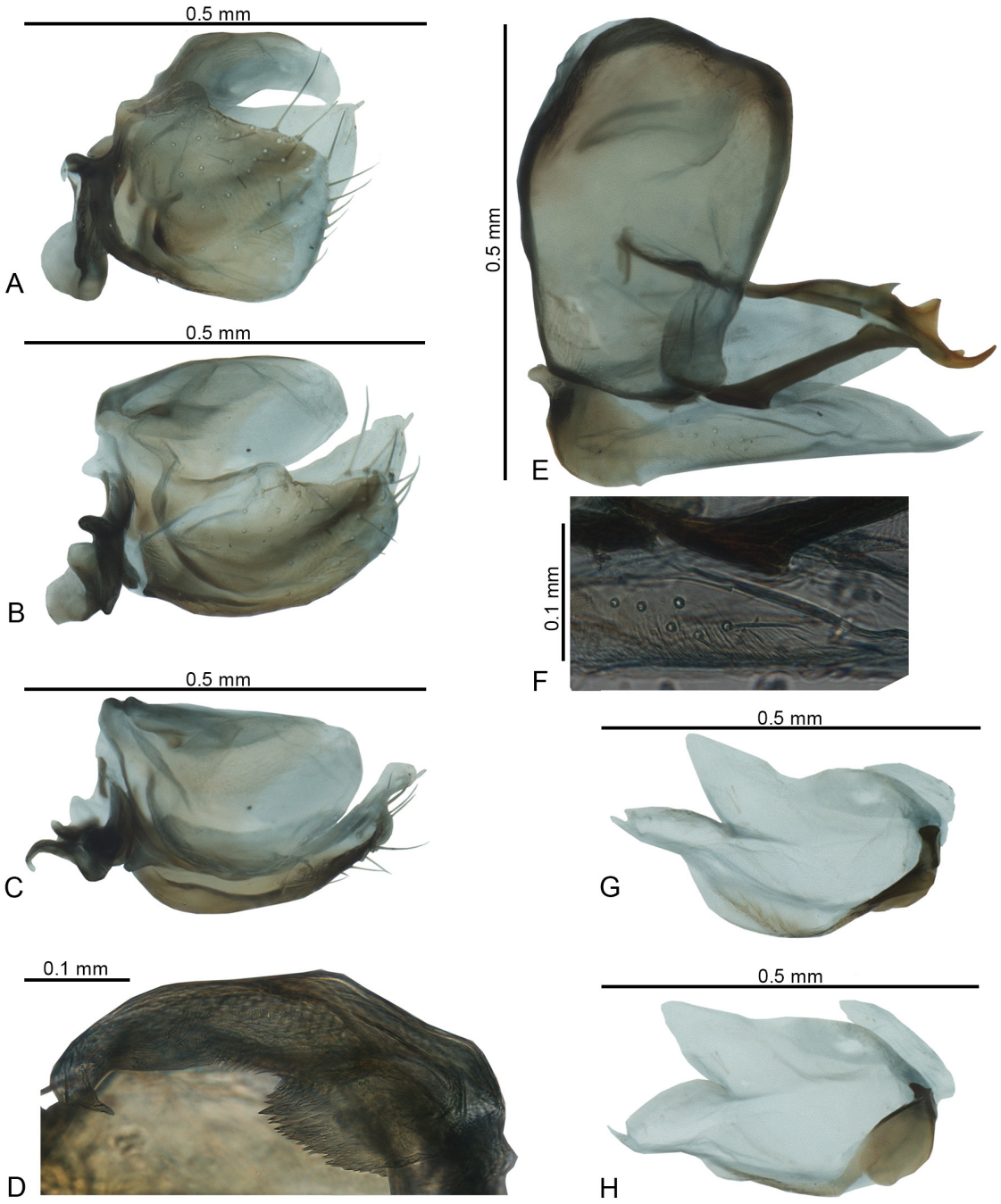

Fig. 11. *Achiplecton stilleri* gen. et sp. nov., paratype, ♀ (SANC), photographs. **A**. Gonoplac, lateral view. **B**. Gonoplac, latero-dorsal view. **C**. Gonoplac, dorsal view. **D**. Gonoplac, internal margin, internal view. **E**. Gonapophysis VIII and endogonocoxal process, lateral view, external side. **F**. Setae on endogonocoxal process, lateral view. **G**. Endogonocoxal process, dorsal view. **H**. Endogonocoxal process, dorsolateral view.

median notch; opening at about half of anal tube length; ventroposterior lobe prolonged caudad, covered with few long bristles; in lateral view, dorsocaudal margin concave, tapered caudad, with few long bristles; epiproct short, paraproct short, not exceeding beyond caudal margin of anal tube. Genital styles distinctly exceeding apex of the anal tube, elongate, tapering to base, widening caudad; dorsal margin arcuate, with basal hook, directed dorsad, mediad and cephalad, with blunt, slightly widening, subquadrate apex; larger asymmetrically bilobate process basad of half of the genital style length; posterodorsal lobe rounded, directed cephalad and laterad; anterior lobe elongate, twisted, directed mediad, caudad then laterad, with apex bluntly rounded, finger-like; then posterodorsal margin straight; posteroapical angle wide, apex rounded; posteroventral margin almost straight, then angulately bent, shallowly concave at level of dorsal bilobate process; margins with a few setae. Periandrium symmetrical, about twice as long as wide at the base, slightly wider basally, with distinct, circular suspensorium, with three elongated lobes; dorsobasal suspensorium with the lateral spine, directed laterocaudad, wider ventrally; dorsal lobe of periandrium membranous, flattened, rounded and widened apically, with spiniferous microsculpture in apical portion; split between dorsal lobes deeply incised, bases of lobes separated, somewhat sclerotized; lateral periandrial lobe narrow, well sclerotized, tapered apically, internalized, not exceeding apex of ventral or dorsal periandrial lobes; ventral periandrial lobe symmetrical, irregularly lobate, apex acutely

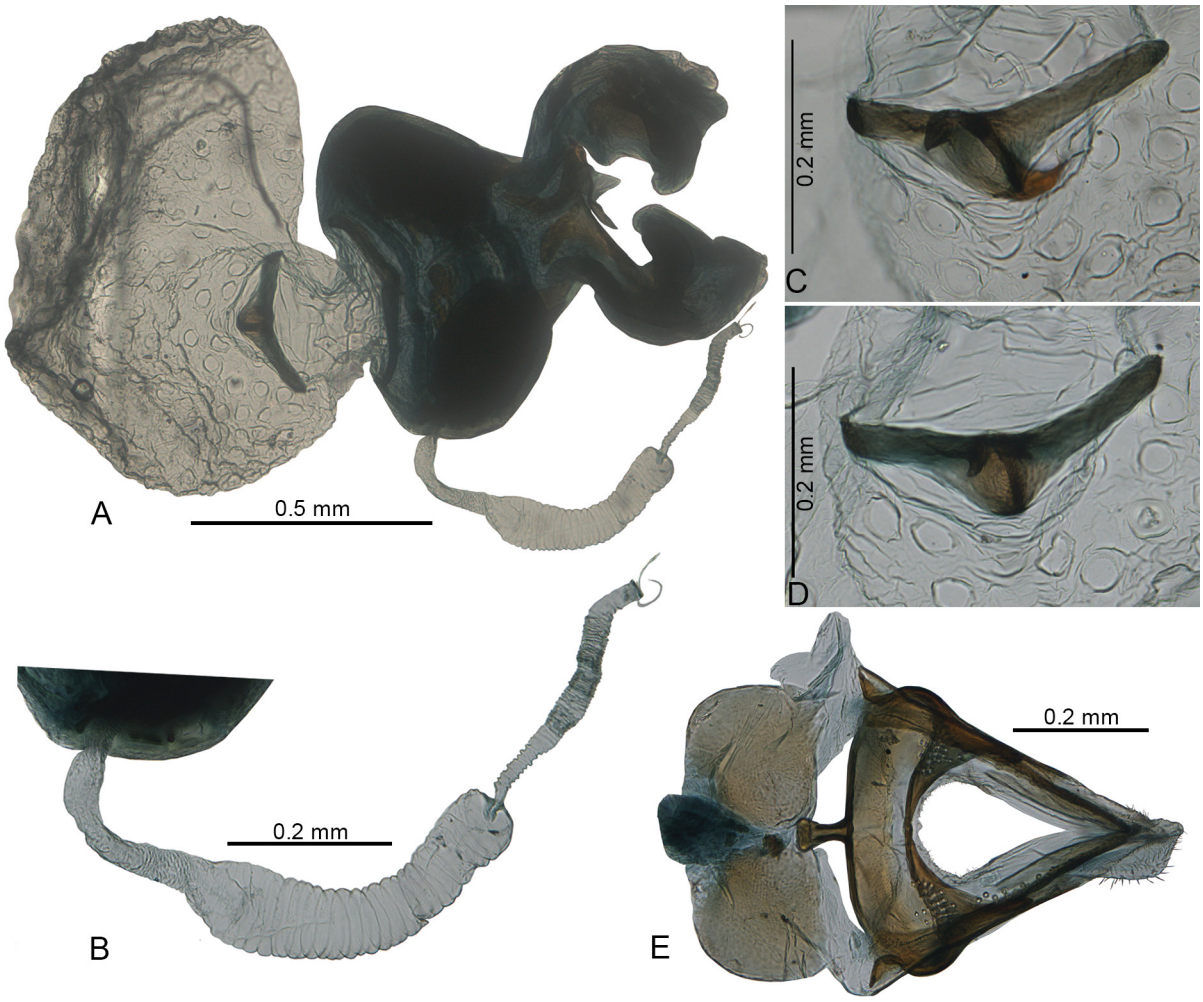

Fig. 12. *Achiplecton stilleri* gen. et sp. nov., paratype, ♀ (SANC), photographs. **A**. Bursa copulatrix and spermatheca, dorsal view. **B–C**. Sclerite on the dorsal wall of bursa copulatrix. **D**. Spermatheca. **E**. Gonapophyses IX and gonospiculum bridge, dorsal view.

rounded, with short, triangular basal projection directed cephalad, median portion bears large S-shaped, acute, process directed cephalad. Aedeagal rods elongate, diverging caudad, basally fused, entering periandrium apically of half of its length; subapical portion below the 'fang' delicately serrate, its laterad section less sclerotized; the 'fang' sickle-shaped, acutely tapered. Connective long, Y-shaped, basal arms widely spread, bent, apical section rod-like.

Female terminalia. Abdominal 7th sternite (pregenital sternite), in ventral view, with anterior margin almost straight; posterior margin weakly concave, lateral lobes slightly prolonged, widely rounded in caudal view, medially with narrow and wide apodeme. Anal tube (segment XI), in lateral view, reaching posterior margin of gonoplac; in dorsal view, elongate-rounded, with deep split medially. Anal style (paraproct) a bit longer than anal segment (epiproct), elongated, but not extending the posterior margin of the anal tube; anal segment wide, semicircular; anus placed slightly before the middle; posterior and lateral parts of anal tube bearing of numerous long setae (bristles). Gonoplac trilobate, dorsally and laterally covering gonapophysis VIII; lateral part of gonoplac sclerotized, with posterodorsal membranous part, with elongate tip; posterodorsal part with numerous setae (bristles); dorsal part of gonoplac membranous, wide and smooth; lateral and dorsal pars well developed and separated by long split; third lobe placed on ventral side, small and membranous, strongly spiniferous at posterior margin. Gonapophysis VIII wide, distinctly tapering distad; anterior connective lamina (ACL) with 2 strongly sclerotized arms, apically with 4 strong teeth of different sizes. Endogonocoxal process as long as gonapophysis, trilobate; ventral lobe membranous, with strongly sclerotized base and narrow, weaker sclerotized ridge alongside ventral margin, medially with 6 setae, apex pointed; median and dorsal lobes fully membranous, smooth; median lobe shorter than ventral; dorsal lobe the shortest and smallest; endogonocoxal lobe strongly sclerotized with short, bluntly terminated process directed cephalad; posterior margin of endogonocoxal lobe elevated and weakly incurved. Gonospiculum as in Fig. 12E. Bursa copulatrix with a membranous single pouch, bean-like, with visible cells; base of pouch with single, tripartite sclerite on the dorsal wall of the bursa, posterior arm curved ventrad, central portion of sclerite with sharp spine oriented dorsad. Spermatheca well developed; *ductus receptaculi* narrow and smooth, shorter than *diverticulum ductus*; *diverticulum ductus* ribbed.

Discussion

The new species fits with Myconinae due to: vertex strongly exceeding anterior margin of the compound eyes (as in Mycarini, Myconini, Rhotalini and Waghildini; extended only slightly before anterior margin of the eye in Amphignomini and Plectoderini, the same as in other subfamilies); lora visible in ventral view (not visible in other subfamilies); incomplete postocular carinae (complete in other Myconinae tribes; absent in other subfamilies); metatibia without subgenual spine (as in Plectoderini and representatives of other Achilidae subfamilies) and one lateral cuticular spine (as in Plectoderini and representatives of other Achilidae subfamilies; other tribes of Myconinae with: 1 lateral spine in Amphignomini, 2 in Myconini and Mycarini; 6+ in Rhotalini and Waghildini); fore wing postcostal area narrow (widened in other subfamilies), RA with 8 terminalia (2 in Mycarini; 3 in Amphignomini and Plectoderini; 4 in Myconini; 5 in Waghildini; 7 in Rhotalini; usually over 7 in other subfamilies); hind wing with A_2 slightly curved (as in tribes other than Amphignomini with its strongly curved vein; A_2 straight in Apatesoninae; with an anastomosis in Achilinae), apically dilated (not dilated in Rhotalini and other subfamilies), not reaching wing margin by a considerable distance (reaching or almost reaching wing margin in other subfamilies), median fold reaching wing margin (as in other tribes apart from Amphignomini, additionally bifurcated in Plectoderini; absent or not reaching wing margin in other subfamilies).

Combination of characters designating it as a new tribe: body compressed laterally (flattened dorsoventrally in other tribes); very long (only slightly elongated in other tribes) eqi-wide (diverting posteriad in other tribes) vertex, with an angular anterior margin (as in Mycarini; rounded in Myconini, Plectoderini,

Rhotalini and Waghildini; straight in Amphignomini) with flat surface (convex in Myconini; concave in other tribes; not known in Mycarini); frons with intermediate carina (absent in other tribes); well-developed lateral carinae of postclypeus not prolonged on anteclypeus (as in Myconini and Waghildini; absent in Amphignomini), and the absence of subantennal carinae; fronto-clypeal suture indistinct in the middle (as in Mycarini) and not submerged below surface of frons and clypeus (as in Myconini); antennae base visibly separated from compound eye margin (as in Rhotalini); pronotum anterior margin extended toward vertex reaching 2 of the compound eye length (as in Waghildini; extended before half of the eye length in other tribes), mediolateral margins straight (as in Waghildini; diverging in other tribes), indentations on lateral lobes (absent in other tribes); fore wing held slightly tectate without crossed membranes (flat with crossed membranes in other tribes), with more 'closed' clavus (according to Emeljanov's 1992 definition) with claval veins Pcu+A_1 reaching the margin at the same point as CuP; basi- and midmetatarsus with subapical platellae.

The new genus *Achiplecton* gen. nov presents a highly elongated head capsule, which is exceptional in Achilidae, but known as "laternarisation syndrome" (Jiang *et al*. 2019b). A scaphocephalic head capsule (term derived from the Greek 'skaphe', 'σκάφη', describing an abnormally long and narrow head capsule) is present in various families of the Hemiptera. Few examples have be found in various Cicadomorpha – Cicadelloidea: Cicadellidae: Hylicinae – *Hatigoria longistylia* Tang & Zhang, 2021; Evacanthinae – *Vangama steneosaura* Distant, 1908; Cicadellinae: Cicadellini – *Namsangia garialis* Distant, 1908; Deltocephalinae: Eupelicini – *Paradorydium menalus* Kirkaldy, 1906; Membracoidea: Ulopidae: Cephalelinae: Cephalelini – *Procephaleus bulbosa* Evans, 1937 (Evans 1975; Dmitriev 2009); Cercopoidea: Aphrophoridae – species of the genus *Philagra* Stål, 1863, but also in the other insect orders e.g., in some Orthoptera, e.g., Acrididae: *Acrida ungarica* (Herbst, 1786); Tettigonidae: *Pseudorhynchus hastifer* (Schaum, 1853). Within the Delphacoidea, the elongate head is present in Delphacidae, e.g., Asiracinae: Idiosystatini – species of the genus *Idiosemus* Berg, 1883; Stenocraninae: Stenocranini – species of the genera *Embolophora* Stål, 1853, *Frameus* Bartlett, 2010, *Tanycranus* Bartlett, 2010; Delphacinae: Delphacini – *Dictyophorodelphax mirabilis* Swezey, 1907 (Bartlett *et al*. 2014); also in Cixiidae: Gelastocephalini genera *Dysoliarus* Fennah, 1949, *Orphninus* Emeljanov, 2000, *Cicerama* Emeljanov, 2010. Within the Fulgoroidea, besides the best known examples in Dictyopharidae and Fulgoridae (O'Brien 1988; Song *et al*. 2018), scaphocephalic head is recorded in extinct family Dorytocidae – genus *Dorytocus* Emeljanov & Shcherbakov, 2018; Lalacidae – *Protodelphax rhinion* Hamilton, 1990, and Mimarachnidae – genus *Jaculistilus* Zhang, Ren & Yao, 2018 (Hamilton 1990; Zhang *et al*. 2018; Luo *et al*. 2021; Jiang *et al*. 2023). Head elongation to different, sometimes extreme degrees is recorded in several modern families: Acanaloniidae – *Acanalonia gundlachi* Metcalf & Bruner, 1930; Caliscelidae: Augilini – genera *Augilina* Melichar, 1914, *Augila* Stål, 1870, *Polychornum* Gnezdilov, 2021, *Symplana* Kirby, 1891 (Baker 1915; Gnezdilov 2021, 2022, 2024) and in extinct Middle Miocene genus *Quizqueiplana* Bourgoin & Wang, 2016 (Bourgoin *et al*. 2016); Nogodinidae: Tongini – e.g., *Tonga baingensis* (Lallemand & Synave, 1953) (Gnezdilov 2009); Tropiduchidae – e.g., genus *Scolopsomorpha* Melichar, 1912 (Constant 2009), and to a lesser extent in Derbidae, Flatidae, Lophopidae (Bartlett *et al*. 2014; Soulier-Perkins & Stroiński 2016). A scaphocephalic head capsule has been reported in a few genera of the Issidae: Parahiracini: Parahiraciina; it was recently discussed by Constant (2021) and Constant & Pham (2023), where such formation is reported for the four genera: *Macrodarumoides* Che, Zhang & Wang, 2012, *Pseudochoutagus* Che, Zhang & Wang, 2011, *Rostrolatum* Che, Zhang & Wang, 2020 and *Laohiracia* Constant, 2021. The phenomenon of the scaphocephalic, elongated, and occasionally extremely elongated head capsules, which has been termed "laternarisation syndrome" (Jiang *et al*. 2019b), remains unexplained in terms of its adaptive value. Various hypotheses have been proposed to explain its function, but none of these have been tested, with the exception of the hypothesis that the head process serves as a house for bioluminescent bacteria (Ridout 1983). Other interpretations posit the role of head expansions in crypsis or mimicry (Hogue 1984; Zolnerowich 1989; O'Brien 2002; Costa-Neto & Pacheco 2003; Goemans 2006); imitation of biological or abiotic models

(assimilated to masquerade) as a way to avoid the species from predators (Matthews & Matthews 2010; Emeljanov & Shcherbakov 2018). It can be posited that the phenomenon of "laternarisation syndrome" is related to the system of multicomponent deceptive signals employed by organisms to fool predators (Pearson 1989; Skelhorn *et al*. 2016; Rubi & Stephens 2016), including the behaviour of the organisms themselves (Stevens & Ruxton 2019; Jiang *et al*. 2019a; Yu *et al*. 2024).

The exaggerated morphological structures are frequently interpreted as playing a role in sexual selection (Emlen & Nijhout 2000; Lavine *et al*. 2015; Toubiana & Khila 2016; O'Brien *et al*. 2018). The concept of sexual selection within the planthoppers is still underdeveloped, with a particular focus on signalling (Ott 1994; Soulier-Perkins & Bourgoin 1998; Soulier-Perkins 2001; Davranglou *et al*. 2019). However, measurements of female and male head process lengths and total body lengths of Costa Rican Fulgoridae *Phrictus quinquepartitus* Distant, 1883 suggested no sex-based differences in those metrics (Urban & Cryan 2009).

All specimens were collected in 2002 by Michael Stiller in the western part of the Republic of Southern Africa. The collection method involved sweeping low grass, forbs, and members of the genus *Restio* Rottb. (Poales, Restionaceae). The Montane Fynbos and Renosterveld are part of the Cape Floristic Region (CFR), which is recognized as one of the most biologically diverse areas on Earth. The Lowland Fynbos and Renosterveld (AT1202) and the Montane Fynbos and Renosterveld (AT1203) ecoregions, as classified by the World Wildlife Fund (2021a, 2021b), form part of this small region. The regional richness is among the highest in the world, and certainly the highest outside of some tropical rainforest areas (Cowling *et al.* 1992; Allsop *et al*. 2014). The Montane and Lowland Fynbos and Renosterveld ecoregions are essentially coincident with the Cape Faunal Center (CFC), a discrete zoogeographic zone characterized by the phylogenetic antiquity of much of its invertebrate fauna (Struckenberg 1962). One male specimen was noted from an *Aspalathus costulata* Benth. (Fabaceae), South African endemic plant from the Western Cape, with range Bokkeveld Plateau to the Witteberg, arid fynbos on the margins of succulent karoo (Foden & Potter 2009).

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Authors' declarations

AMB, AS, and JS designed the research, made the observations, documentation and illustrations, prepared the draft and final manuscript; JS and AS conducted the analysis of results, adjusted the illustrations, prepared the draft and final manuscript; AMB, AS and JS commented on the drafts and final manuscript. The authors declare no conflict of interest.

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