Zootaxa 5399 (5): 451–504
https://www.mapress.com/zt/
Copyright © 2024 Magnolia Press

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

https://doi.org/10.11646/zootaxa.5399.5.1
http://zoobank.org/urn:lsid:zoobank.org:pub:ED0CE93C-3235-4DEE-951B-A46CBD3D6AF9

Three new genera of arboreal dark sac spiders from southern Africa (Araneae: Trachelidae)

CHARLES R. HADDAD[1,3*] & ROBIN LYLE[1,2,4]

[1]*Department of Zoology & Entomology, University of the Free State, P.O. Box 339, Bloemfontein 9300, South Africa.*
[2]*Present address: Biosystematics: Arachnology, Plant Health and Protection, Agricultural Research Council, Private Bag X134, Queenswood 0121, South Africa.*
[3] *haddadcr@ufs.ac.za; https://orcid.org/0000-0002-2317-7760*
[4] *Lyler@arc.agric.za; https://orcid.org/0000-0002-5279-5306*
**Corresponding author*

Abstract

As part of a revision of the Afrotropical species of *Trachelas* L. Koch, 1872 (Araneae: Trachelidae), we distinguished three new genera of primarily arboreal spiders from southern Africa that are described here: *Coronarachne* **gen. nov.**, represented by four new species known from both sexes, *C. denticulata* **sp. nov.** (type species), *C. penicillus* **sp. nov.**, *C. setosa* **sp. nov.** and *C. unigena* **sp. nov.**, and *C. neethlingi* **sp. nov.**, known only from the male; *Falcaranea* **gen. nov.**, represented by three new species known from both sexes, *F. amatola* **sp. nov.**, *F. gladius* **sp. nov.** (type species) and *F. maputensis* **sp. nov.**; and *Trachecymbius* **gen. nov.**, represented by five new species, *T. bosselaersi* **sp. nov.** (♀), *T. felis* **sp. nov.** (♂♀), *T. peterwebbi* **sp. nov.** (♂), *T. tyume* **sp. nov.** (type species, ♂♀), and *T. umbella* **sp. nov.** (♀). These three genera share the presence of strongly protruding setal bases on the ventral surfaces of the anterior legs, which are more strongly developed in males and can be mistaken for small ventral cusps that are found in several trachelid genera. Identification keys are provided for each of the three genera and their phylogenetic affinities to other Afrotropical Trachelidae are evaluated based on the cytochrome oxidase c subunit I (COI) gene. Most of the species described here were common in canopy fogging samples, and to a lesser extent beating, but are clearly a prominent component of the arboreal trachelid fauna in savanna and forest habitats in southern Africa.

Key words: Afrotropical, canopy fogging, cytochrome oxidase c subunit I, DNA barcoding, *Trachelas*

Introduction

Until recent decades, tree canopies were one of the largely unexplored habitats of terrestrial ecosystems (Erwin 1983). Since then, there has been a concerted effort to sample this stratum in forest habitats, particularly (Basset *et al.* 2003). The extent to which this largely understudied biota is new and ecologically unique depends on geographical location, tree species and taxonomic history of the country where the sampling is conducted, amongst others (e.g. Stork *et al.* 2008).

In the Afrotropical Region, canopy fogging was first utilized by Moran & Southwood (1982) and Southwood *et al.* (1982) to sample forest arthropods in South Africa in the 1980s, but as the country's spider fauna was relatively understudied at that time (Dippenaar-Schoeman *et al.* 2015) most of the species sampled could not be identified. This was followed by studies of canopy spiders in various South African agroecosystems (Dippenaar-Schoeman *et al.* 2001, 2005; Haddad *et al.* 2005) and forests in Tanzania (Sørensen 2004). Studies reporting on single families have shown that an estimated 75% of linyphiid species (Seyfulina & De Bakker 2008) and 73% of oonopid genera (Fannes *et al*. 2008) from African forest and savannah canopies are undescribed. Considering the vast extent of these habitats on the continent (White 1983), this indicates a massively understudied arthropod fauna that awaits description in the future.

Trachelidae is a medium-sized family currently with 269 species in 20 genera globally (World Spider Catalog 2023). Historically, it was included as a subfamily under Clubionidae (e.g. Simon 1897) and, more recently, as

Accepted by J.-X. Zhang: 24 Nov. 2023; published: 16 Jan. 2024

Licensed under Creative Commons Attribution-N.C. 4.0 International https://creativecommons.org/licenses/by-nc/4.0/

a subfamily of Corinnidae (e.g. Dippenaar-Schoeman & Jocqué 1997; Deeleman-Reinhold 2001; Bosselaers & Jocqué 2002; Jocqué & Dippenaar-Schoeman 2006), but was elevated to family level by Ramírez (2014) in a comprehensive morphological phylogeny of Dionycha spiders. Its monophyly has generally been supported by subsequent molecular phylogenies too (Wheeler *et al.* 2017; Azevedo *et al.* 2022; Kulkarni *et al.* 2023), depending on the sequence data used, usually with a sister-group relationship to Phrurolithidae. Trachelidae shares with Phrurolithidae the following set of morphological synapomorphies (Ramírez 2014): (1) having claw tufts comprised of heavily folded setae; (2) the presence of a claw tuft clasper; (3) the reduced leg spination, especially on the posterior legs and dorsally on all of the femora; and (4) the absence of a median apophysis on the male copulatory bulb. The two families can, however, be distinguished by the absence of a ventral distal hook on the male palpal femur in Trachelidae, although a small distoventral apophysis is present in *Orthobula* Simon, 1897 and *Capobula* Haddad *et al*., 2021 (Haddad *et al.* 2021, 2022).

Although many of the new genera and species of Afrotropical Trachelidae described recently are litter-dwelling or associated with lower vegetative strata (e.g. Haddad 2006; Haddad & Lyle 2008; Lyle & Haddad 2010, 2018; Haddad *et al.* 2021), the genus *Planochelas* Lyle & Haddad, 2009 has been primarily sampled by canopy fogging in forest and savanna habitats in tropical and subtropical Africa (Lyle & Haddad 2009; Khoza & Lyle 2019). In this contribution, we further describe three new genera and thirteen new species of arboreal trachelids from southern Africa, sampled mainly but not exclusively by canopy fogging. All three genera conform to the diagnostic characteristics of the family listed above. These new genera all differ from *Trachelas* L. Koch, 1872 *sensu stricto* in the more robust anterior legs, the posterior median eyes closer to each other than to the laterals (medians closer to laterals than each other in *Trachelas*), the unique conformations of the genitalia, and the lack of a ventrodistal femoral groove in the male palp (see e.g. Bosselaers *et al.* 2009 or Jin *et al.* 2017 for redescriptions of the type species, *T. minor* O. Pickard-Cambridge, 1872). This work highlights the rich undescribed spider fauna occurring in Afrotropical tree canopies and its potential as a rewarding target for intense taxonomic study.

Material and methods

Morphology

All specimens were preserved and observed in 70% ethanol, and were studied for descriptions and measurements using a Nikon SMZ800 stereomicroscope. The epigynes of female paratypes (or the holotype when it was the only specimen) were dissected with 0-size insect pins and cleared in a Labcon 5019U ultrasonic bath in 70% ethanol for 30 seconds, after which they were drawn in 70% ethanol. If soft tissues were not easily removed by ultrasonic clearing, the epigynes were macerated in a pancreatin solution (Álvarez-Padilla & Hormiga 2007) before illustration in 70% ethanol. A left palp of a male paratype was dissected and drawn for each species, unless only a holotype was available.

All measurements are given in millimetres (mm) and were determined from the specimens of both sexes indicated in the descriptions. Eye arrangements are described for the anterior view of the anterior eye row, and the dorsal view of the posterior eye row. The following abbreviations are used in the descriptions:

AER—anterior eye row
AL—abdomen length
ALE—anterior lateral eye(s)
AME—anterior median eye(s)
AW—abdomen width
CL—carapace length
CW—carapace width
FL—fovea length
MOQ—median ocular quadrangle
PER—posterior eye row
PLE—posterior lateral eye(s)
plv—prolateral ventral
PME—posterior median eye(s)
rlv—retrolateral ventral
RTA—retrolateral tibial apophysis
SL—sternum length
ST I—primary spermatheca
ST II—secondary spermatheca
SW—sternum width
TL—total length
vt—ventral terminal

Material for scanning electron microscopy was dehydrated overnight in 100% ethanol and then critical point dried in liquid carbon dioxide. Specimens were mounted onto stubs using thin double-sided tape, sputter coated three times with iridium for two minutes in an argon chamber, and then studied using a JEOL JSM-7800F FE-SEM at 5 kV.

Digital images of somatic characters of males and females of the type species of each of the new genera, as well as the dorsal habitus of all species, were taken using a Nikon D5-L3 camera system attached to a Nikon SMZ800 stereomicroscope. Between five and 30 digital photographs were taken of a particular morphological structure and stacked using the CombineZM imaging software (http://www.hadleyweb.pwp.blueyonder.co.uk) to increase the depth of field of the final images.

Material used in this study was obtained from the following collections (curators are named in parentheses):

BMNH—British Museum of Natural History, London, England (J. Beccaloni).
CAS—California Academy of Sciences, San Francisco, U.S.A. (C. Griswold, L. Esposito).
MACN—Museo Argentino de Ciencias Naturales, Buenos Aires, Argentina (M. Ramírez).
NCA—National Collection of Arachnida, ARC-Plant Protection Research Institute, Pretoria, South Africa (A. Dippenaar-Schoeman, P. Marais).
NMBA—National Museum, Bloemfontein, South Africa (L. Lotz, J. Neethling).
NMSA—Natal Museum, Pietermaritzburg, South Africa (C. Stoffels, M. Ziganira).
TMSA—Ditsong National Museum of Natural History, Pretoria, South Africa (J. Harrison, A. Ndaba).

In some cases, geographical co-ordinates were not provided on specimen labels or were unavailable from data provided in institutional databases. We then searched for such co-ordinates using the Global Gazetteer Version 2.2 (www.fallingrain.com/world/) or Google Earth (www.google.com/earth/) and indicate them in square brackets. All distribution maps were created using the online mapping software SimpleMappr (Shorthouse 2010).

Molecular analysis

To assess the relationships of the three new genera described here, we included mitochondrial cytochrome oxidase c subunit I (COI) sequence data for representative species of each genus of Afrotropical Trachelidae currently available on the Barcode of Life Data system (BOLD; Ratnasingham & Hebert 2007, 2013), specifically sourced from the projects SPIZA, CORAR and SPDAR (Table 1). DNA extraction, PCR and Sanger sequencing for each selected individual were performed at the Canadian Centre of DNA Barcoding (CCDB) using their standard extraction and sequencing protocols (CCDB 2019). Our intention with this analysis was primarily to test for the matching of males and females of several species of the three new genera described here, as several species occur in sympatry, and to get a provisional indication of their relationships to other Afrotropical trachelids. At the same time, we acknowledge that a single-gene phylogeny may perform poorly in providing solid evidence of higher-level relationships (Talavera *et al.* 2022; Gajski *et al.* in press).

All of the specimens included had previously been sampled and identified by the authors, and those of the new genera described here are included in the material examined in this study. The dataset also included sequences of three additional putative new genera that are not included in this study (labelled as Trachelidae genus 1, 2 and 3). Unfortunately, the only representative specimen of *Trachecymbius* **gen. nov.** (the holotype of *T. peterwebbi* **sp. nov.**) did not sequence successfully, and thus, this genus was not included in the results. To avoid overloading the tree with unnecessary sequences, we only included a single species from the non-target genera in our analysis. The tree was rooted with an undescribed *Ilisoa* sp. (Cyatholipidae) from South Africa.

Analysis was performed using the "Sequence analysis" tool in BOLD, using the following settings: Kimura 2 Parameter distance model; Neighbour-joining algorithm; sequences aligned using Muscle (Edgar 2004); and a minimum overall overlap of 200 bp between sequences. As there were often multiple sequences available for each included species, we only included sequences more than 600 bp in length, but wherever possible, we chose optimal sequences with a length of 658 bp. To facilitate specimen recognition and matching, we included the species name, specimen sex, BOLD sequence/process ID, museum accession number and locality details in the sequence tags.

TABLE 1. Summary of the species and South African sampling localities of specimens sequenced for the cytochrome c oxidase subunit 1 (COI) gene included in the phylogenetic analysis.

Species	Locality	**Process ID**	**Catalog Num**	**COI-5P Seq. Length**
Ilisoa sp. (Cyatholipidae) ♀	Laingsburg	SPIZA683-21	NCA 2021/118	632
Afroceto martini ♂	Ndumo Game Reserve	SPIZA391-19	NCA 2019/584	658
Capobula infima ♂	Houw Hoek	SPIZA1582-23	NMBA 18795	658
Coronarachne denticulata ♂	Ndumo Game Reserve	SPDAR2186-19	MACN-Ar 32948	658
Coronarachne denticulata ♀	Ndumo Game Reserve	SPDAR2187-19	MACN-Ar 32949	658
Coronarachne denticulata ♂	Ndumo Game Reserve	SPIZA427-19	NCA 2019/592	618
Coronarachne denticulata ♂	Ndumo Game Reserve	SPIZA428-19	NCA 2019/592	606
Coronarachne setosa ♂	iSimangaliso Wetland Park	SPDAR2160-19	MACN-Ar 31208	658
Coronarachne setosa ♀	Vryheid	SPDAR2165-19	MACN-Ar 31234	658
Coronarachne setosa ♂	Vryheid	SPDAR2166-19	MACN-Ar 31234	658
Falcaranea amatola ♀	Hogsback	SPDAR2167-19	MACN-Ar 31294	658
Falcaranea gladius ♂	Ndumo Game Reserve	SPDAR2184-19	MACN-Ar 32945	658
Falcaranea gladius ♀	Ndumo Game Reserve	SPDAR2185-19	MACN-Ar 32946	658
Falcaranea gladius ♂	Ndumo Game Reserve	SPDAR2188-19	MACN-Ar 32953	658
Falcaranea gladius ♀	Ndumo Game Reserve	SPIZA425-19	NCA 2019/593	658
Falcaranea gladius ♂	Ndumo Game Reserve	SPIZA426-19	NCA 2019/593	603
Falcaranea maputensis ♀	iSimangaliso Wetland Park	SPDAR2161-19	MACN-Ar 31225	658
Falcaranea maputensis ♀	Ndumo Game Reserve	SPIZA421-19	NCA 2019/758	603
Falcaranea maputensis ♂	Ndumo Game Reserve	SPIZA422-19	NCA 2019/758	658
Fuchiba aquilonia ♀	Tembe Elephant Park	SPIZA1603-23	NMBA 18813	657
Fuchibotulus kigelia ♂	Ndumo Game Reserve	SPIZA662-21	NCA 2021/252	658
Jocquestus schenkeli ♂	Ndumo Game Reserve	SPDAR2189-19	MACN-Ar 32956	658
Orthobula radiata ♂	Ndumo Game Reserve	SPIZA401-19	NCA 2019/583	614
Patelloceto secutor ♂	Ndumo Game Reserve	SPIZA405-19	NCA 2019/590	658
Planochelas haddadi ♀	Ndumo Game Reserve	SPIZA430-19	NCA 2019/999	596
Poachelas striatus ♀	Bloemfontein	SPIZA465-19	NCA 2019/1010	658
Spinotrachelas montanus ♀	Royal Natal National Park	SPDAR2079-18	MACN-Ar 34968	658
Thysanina absolvo ♂	Bloemfontein	SPIZA637-21	NCA 2021/233	658
Trachelas canariensis ♂	uKhahlamba Drakensberg Mountains	SPIZA1349-21	NCA 2021/1106	658
Trachelas sp. 1 ♀	Eastern Shores N. R.	CORAR007-13	MACN-Ar 12922	658
Trachelas sp. 1 ♂	Eastern Shores N. R.	CORAR008-13	MACN-Ar 12924	658
Trachelas sp. 1 ♂	uKhahlamba Drakensberg Mountains	SPIZA1348-21	NCA 2021/1105	658
Trachelas sp. 2 ♂	Tembe Elephant Park	SPIZA1600-23	NMBA 18810	657
Trachelidae genus 1 ♀	Queenstown	SPIZA1276-21	NCA 2021/1044	658
Trachelidae genus 2 ♂	Witsand Nature Reserve	SPIZA1476-23	NMBA 18616	658
Trachelidae genus 3 ♀	Ndumo Game Reserve	SPIZA423-19	NCA 2019/757	621
Trachelidae genus 3 ♂	Ndumo Game Reserve	SPIZA424-19	NCA 2019/757	658

Taxonomy

Trachelidae Simon, 1897

Coronarachne gen. nov.

Type species. *Coronarachne denticulata* **sp. nov.**

Etymology. The name is derived from the Latin term *corona*, meaning crown, referring to the denticles at the distal end of the dorsal RTA that resemble a crown, and the Greek αράχνη (arachne), meaning spider. Incidentally, the genus is described amidst the global COVID-19 coronavirus pandemic, so its name should serve as a reminder of this inconvenient event. Gender feminine.

Diagnosis. Males of *Coronarachne* **gen. nov.** can be recognized by the presence of two moderately small RTA, with the dorsal RTA distinguished by the presence of several fine denticles distally that resemble a crown (Figs 57, 61). The palps are further characterized by the absence of femoral, patellar and cymbial apophyses, the embolus coiled and closely associated with a long conductor (Figs 58, 59), and the embolus tip associated with several modified flattened setae on the ventral side of the cymbium in several species (Fig. 63), a trait shared with some species of *Trachecymbius* **gen. nov.** The female epigynes are weakly sclerotized, with a wrinkled integument surrounding the anterior copulatory openings (Fig. 64), and usually with small bilobed posterior ST I.

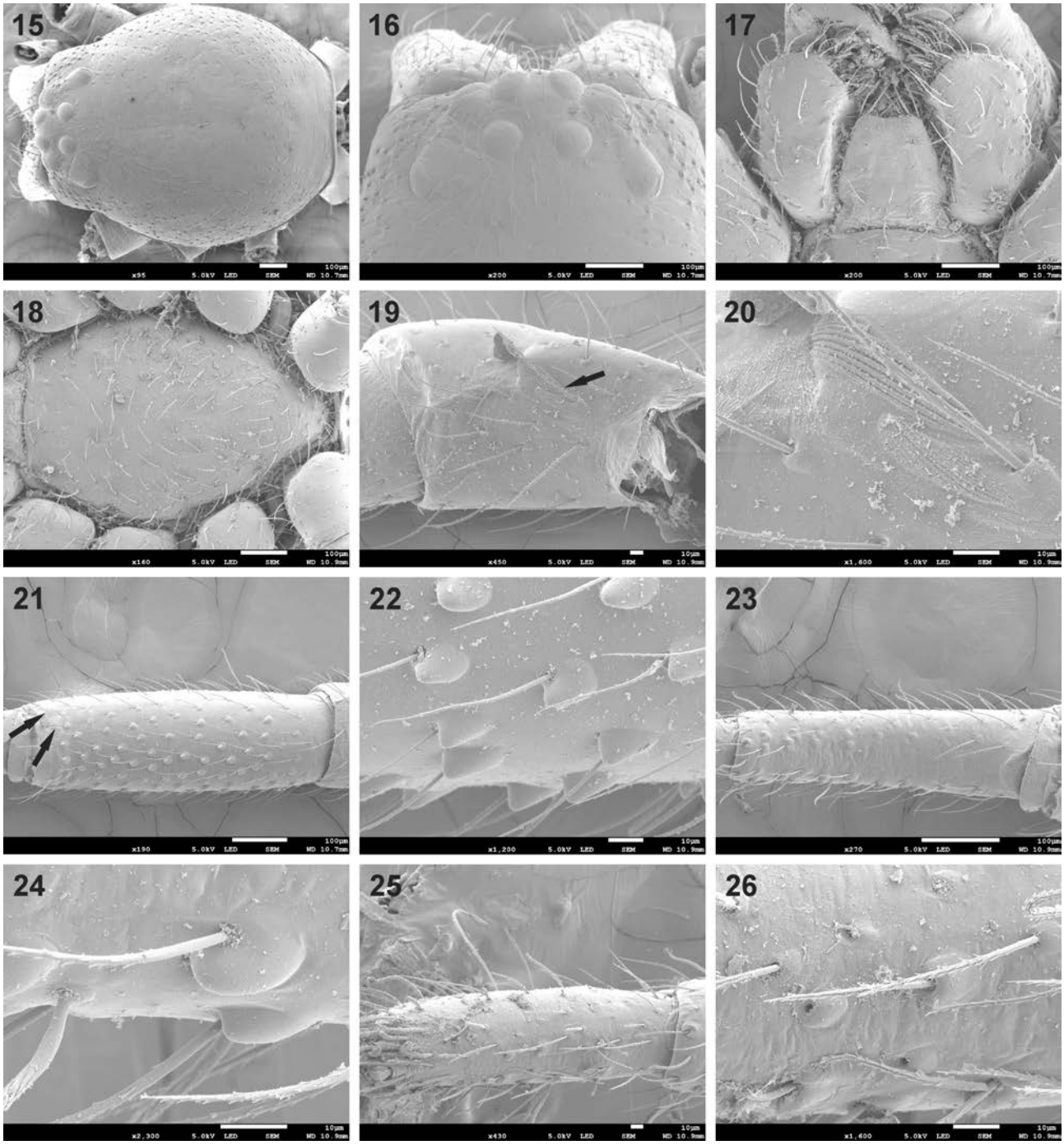
Description. Small spiders, 2.08–3.20 mm in length; carapace bright orange to deep red-brown (Figs 1, 5, 10, 65–73); carapace oval, broadest at posterior of coxae II, gradually narrowed towards eye region (Figs 15, 27); fovea indistinct, a short shallow slit (Figs 5, 10); posterior margin very slightly concave, almost straight; weakly convex in lateral profile, slightly elevated from clypeus to approximately ⅓ carapace length, with steeper slope in posterior

FIGURES 1–4. Habitus photos of live *Coronarachne denticulata* **sp. nov.** male from Gundani Forest (1) and *Falcaranea gladius* **sp. nov.** males from Ndumo Game Reserve (2), Ophathe Game Reserve (3) and Umhlanga Rocks (4). Photos: 1, 4 Peter Webb, 2 Ruan Booysen, 3, Charles Haddad.

quarter (Figs 6, 11); carapace surface finely wrinkled, with scattered short fine curved setae with small tuberculate bases. All eyes surrounded by black rings (Figs 5, 10); AER procurved in anterior view, slightly recurved in dorsal view (Figs 16, 28), AME slightly smaller than ALE; AME separated by approximately ½ their diameter, almost touching ALE; PER strongly recurved in dorsal view, PME slightly oval and flattened, PLE round, PME approximately ¾ times PLE diameter; PME separated by distance equal to their diameter, separated from PLE by approximately 1¼ PME diameter; MOQ narrower anteriorly than posteriorly, posterior width slightly larger

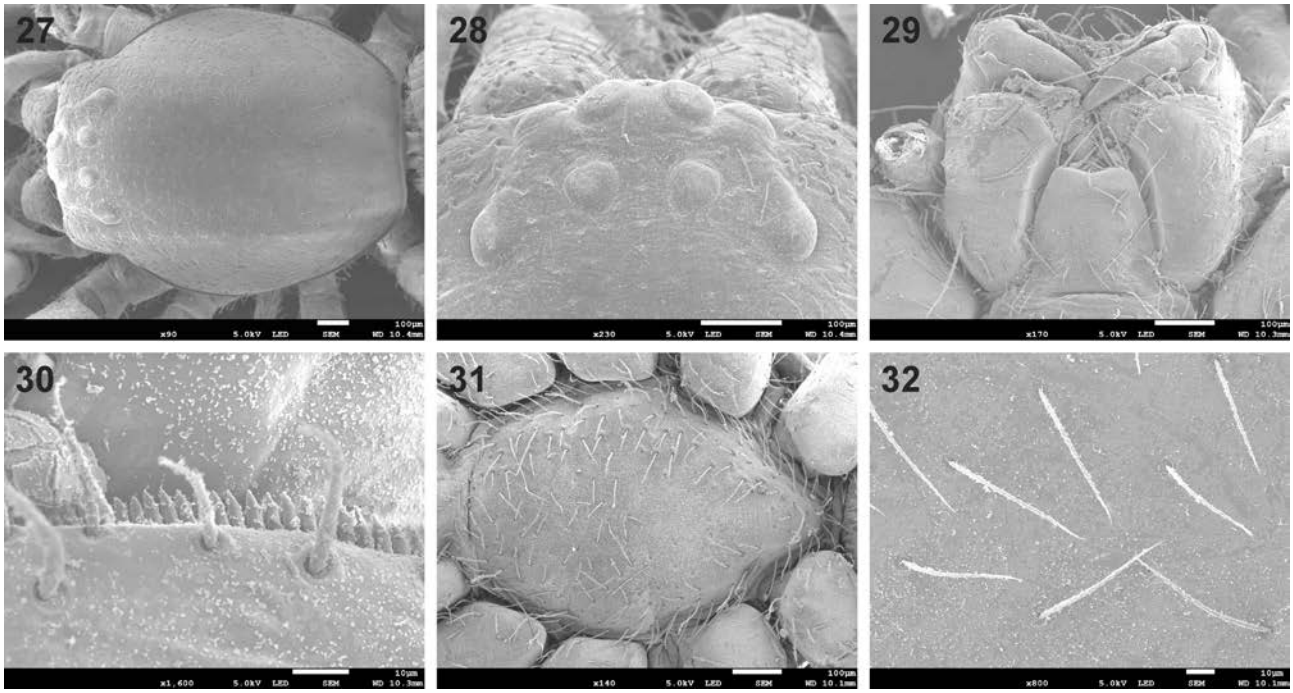
FIGURES 5–14. Digital microscope photographs of somatic morphology of *Coronarachne denticulata* **sp. nov.** male (5–9) and female (10–14). 5, 10. Habitus, dorsal view; 6, 11. Same, lateral view; 7, 12. Same, ventral view; 8, 13. Leg I, prolateral view; 9, 14. Metatarsus and tarsus IV. Scale bars = 1.0 mm (5–7, 10–12), 0.5 mm (8, 9, 13, 14).

than length. Chilum indistinct, a narrow transverse sclerite; cheliceral promargin with two teeth, retromargin with two or three teeth; cheliceral escort seta absent; fang with distinct serrula; endites with parallel lateral margins, mesal margins with longitudinal groove (Figs 17, 29), distal margins with distinct serrula comprising sharp straight denticles (Fig. 30) and dense maxillar hair tuft on mesal margins (Fig. 17); labium trapezoidal, slightly longer than wide, narrower distally than basally (Fig. 17). Pleural bars sclerotised, isolated; sternum pentagonal, longer than



FIGURES 15–26. Scanning electron micrographs of *Coronarachne denticulata* **sp. nov.** male. 15. Carapace, dorsal view; 16. Eye region, dorsal view; 17. Mouthparts; 18. Sternum; 19. Patella I, ventrolateral view, arrow indicating lyriform organ at distal end of patellar indentation; 20. Detail of previous; 21. Tibia I, ventrolateral view; 22. Detail of ventral setae; 23. Metatarsus I, ventrolateral view; 24. Detail of ventral setae; 25. Tarsus I, ventrolateral view; 26. Detail of ventral setae.

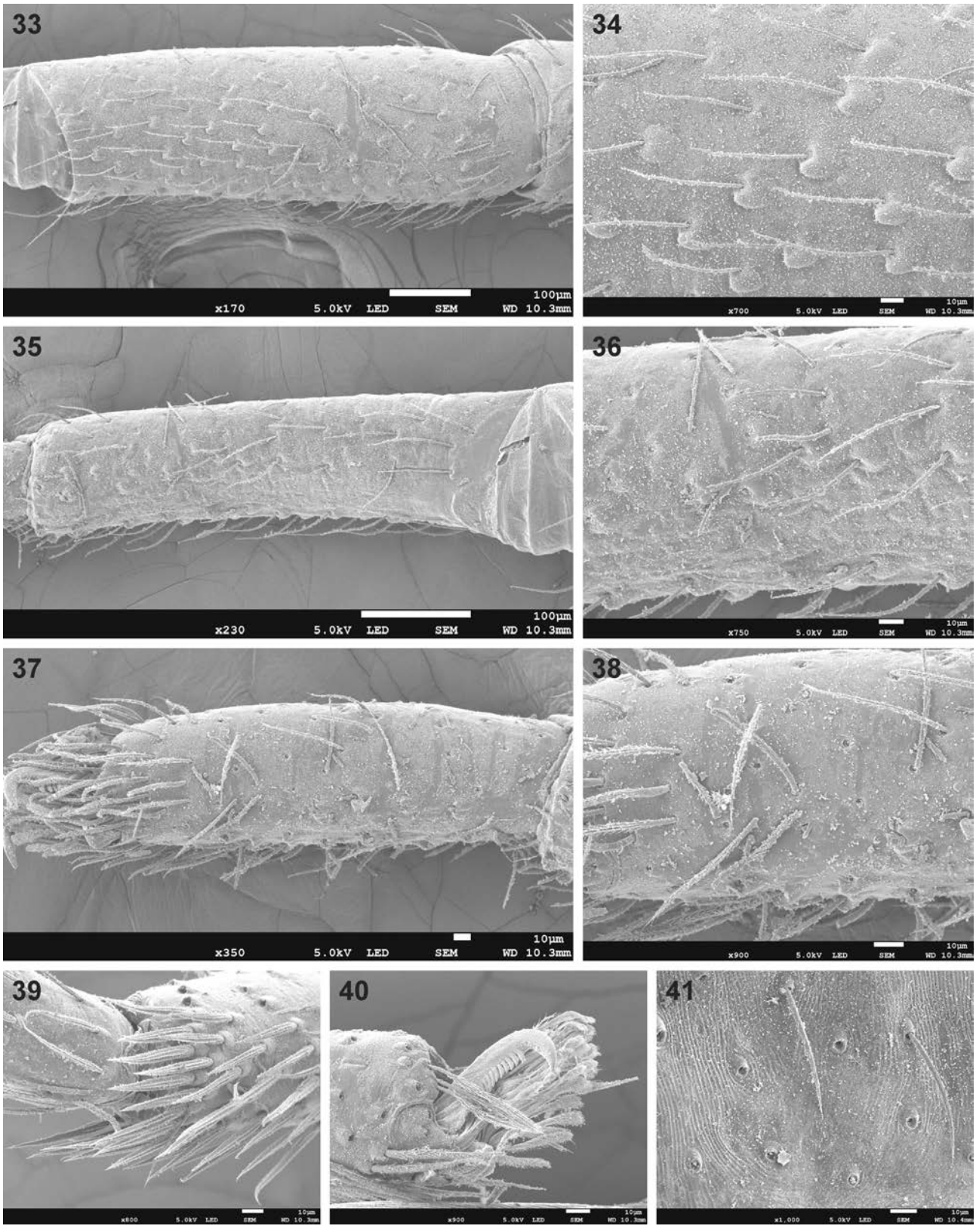
broad, broadest between coxae II and III (Figs 7, 12, 18, 31), surface smooth centrally, sparsely covered in long straight setae, setae with more pronounced tuberculate bases towards borders (Fig. 32); precoxal triangles present, intercoxal sclerites present between all coxal pairs. Leg formula 4123 or 1423, sparsely covered in long fine setae; femora I swollen, with strongly convex dorsal surface, ventral surface slightly convex (Figs 8, 13); all femora strongly constricted proximally (Figs 8, 13); patellar indentation on retrolateral side narrow, with lyriform organ at proximal end (Figs 19, 20); anterior legs of males with pronounced tuberculate setal bases on tibiae and metatarsi, less pronounced on tarsi (Figs 8, 21–26, 33–38), less strongly developed in females (Fig. 13); metatarsi with sparse chemosensory setae and trichobothria dorsally (Figs 42, 43), with strongly developed metatarsal stopper (Fig. 44)



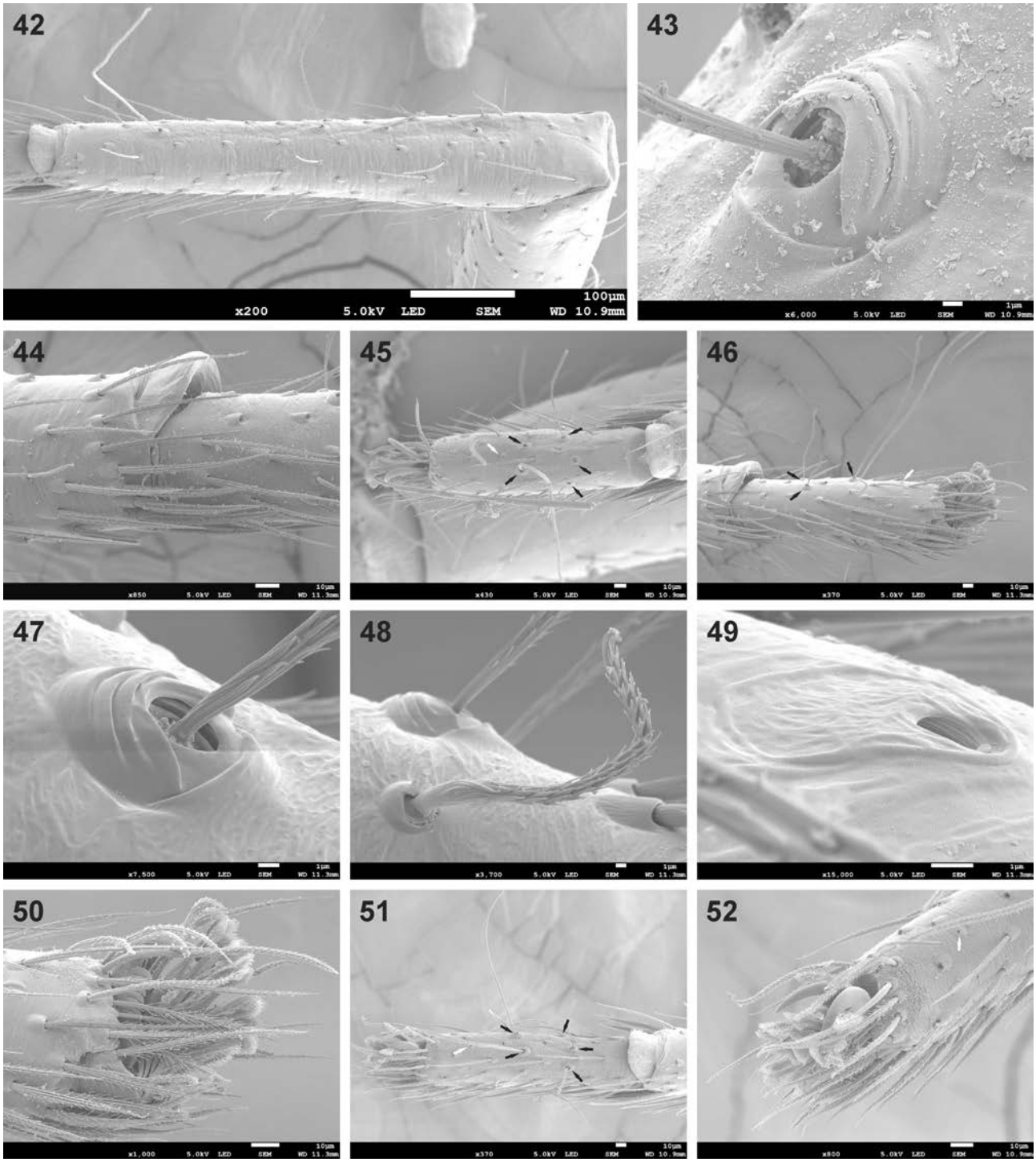
FIGURES 27–32. Scanning electron micrographs of *Coronarachne unigena* **sp. nov.** male (27–30) and female (31, 32). 27. Carapace, dorsal view; 28. Eye region, dorsal view; 29. Mouthparts; 30. Serrula; 31. Sternum; 32. Detail of sternal setae.

and ventral preening comb at distal end (Figs 9, 14, 39); tarsi with sparse tactile hairs, few dorsal trichobothria and chemosensory setae (Figs 25, 37, 45–48, 51); trichobothria with slightly lowered distal plate, distal margin of hood overlapping plate, hood with four curved ridges, roughly concentric (Fig. 47); tarsal organ at approximately ¾ tarsus length, only very slightly elevated from integument, surface finely wrinkled, opening oval and distally placed (Figs 45, 46, 49, 51, 52); paired tarsal claws short, with at least eight (Fig. 50) to twelve (Fig. 40) teeth and dense tenant setae forming claw tufts in between; female palpal claw simple, sharply curved distally. Abdomen oval, with two pairs of cream markings on grey background, clearly larger in females than males, with dorsal scutum in males only (Figs 5, 6, 10, 11); dorsum with very sparse fine setae (Fig. 41) and two pairs of sigilla, distinct in females, barely distinguishable on scutum in males; venter without sclerites or markings (Figs 7, 12), sparsely covered in fine setae (Fig. 53). Spinnerets short, conical, in compact group (Fig. 54), spigot detail not studied. Male palpal femora and patellae without apophyses (Figs 55, 56, 59), patella with retrolateral lyriform organ (Figs 56, 60); palpal tibiae with denticulate dorsal and digitiform ventral retrolateral apophyses (Figs 55, 57, 61); tegulum transversely oval in ventral view (Fig. 62), broader than cymbium, rarely with prolateral tegular apophysis (Fig. 62), with spiralling conductor and embolus (Figs 55, 58, 59, 62); embolus tip slender or sharply hooked, with modified spatulate setae ventrally on cymbium in close proximity (Fig. 63). Female epigyne occupying most of epigastric plate length, with translucent spiralling wrinkles, with at least one corresponding to internal connecting ducts, with copulatory openings near centre of epigyne or anteriorly (Figs 64, 76, 83, 88, 92); posterior of epigyne often with pronounced median lip; copulatory ducts weakly sclerotized, initially spiralling in *C. denticulata* **sp. nov.** (Fig. 76), with single loop in *C. penicillus* **sp. nov.** (Fig. 83), but not in *C. setosa* **sp. nov.** (Fig. 88) and *C. unigena* **sp. nov.** (Fig. 92), continuing around periphery of epigyne to posterior ST I with posteriorly-directed fertilization ducts.

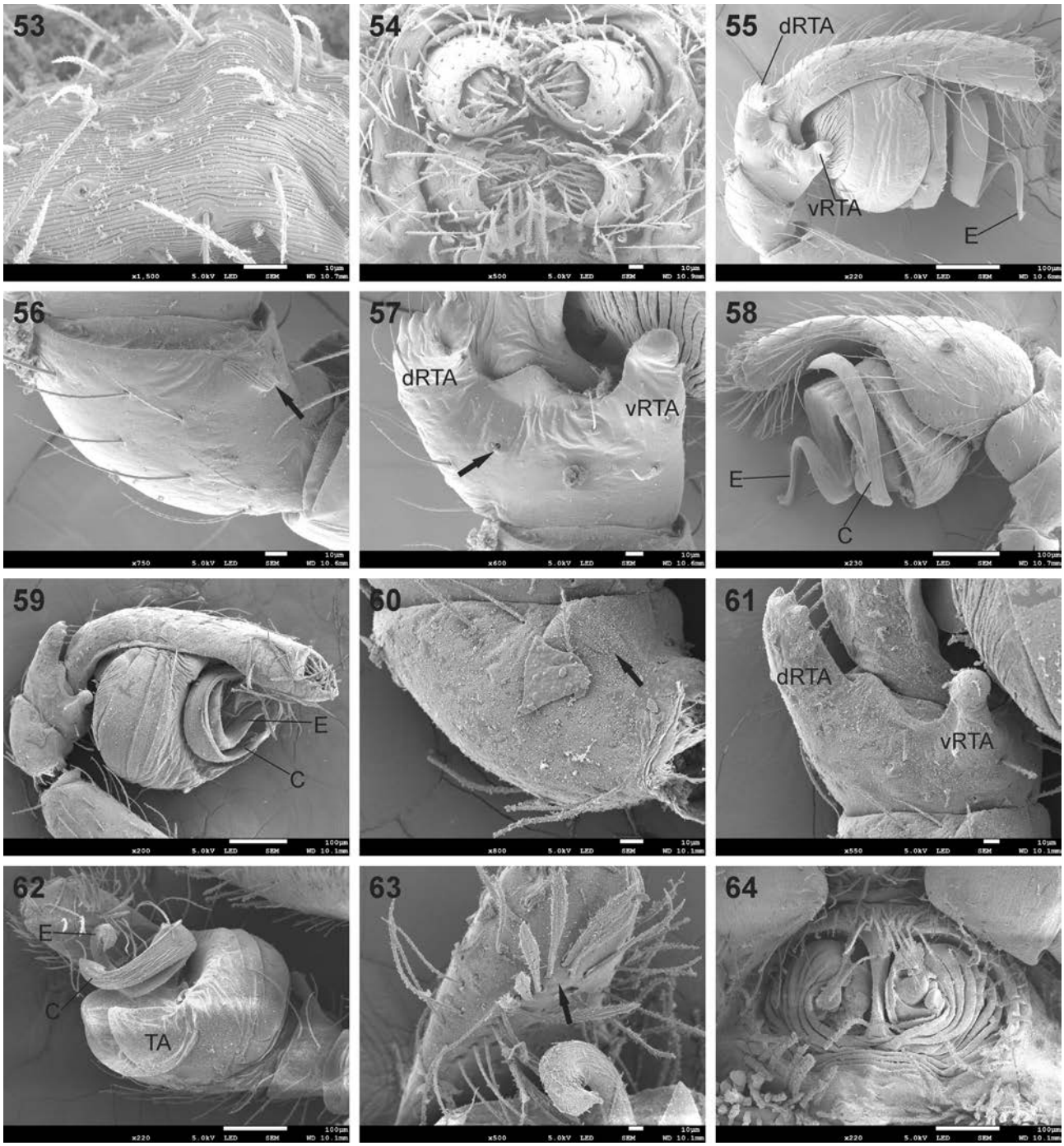
Composition. Five species, all newly described: *C. denticulata* **sp. nov.**, *C. neethlingi* **sp. nov.**, *C. penicillus* **sp. nov.**, *C. setosa* **sp. nov.** and *C. unigena* **sp. nov.**



FIGURES 33–41. Scanning electron micrographs of *Coronarachne unigena* **sp. nov.** male. 33. Tibia I, lateral view; 34. Detail of ventral setae; 35. Metatarsus I, lateral view; 36. Detail of ventral setae; 37. Tarsus I, lateral view; 38. Detail of ventral setae; 39. Mt IV preening comb; 40. Tarsus IV, claws; 41. Dorsal abdominal setae.



FIGURES 42–52. Scanning electron micrographs of *Coronarachne denticulata* **sp. nov.** male. 42, 43. Metatarsus IV, dorsal view (42) and detail of trichobothrium (43); 44. Metatarsus III, lateral view, metatarsal stopper and ventral preening comb; 45–50. Tarsus III, dorsal (45) and lateral (46) views, indicating trichobothria (black arrows) and tarsal organ (white arrow), and detail of trichobothrium (47), chemosensory seta (48), tarsal organ (49) and claws (50); 51, 52. Tarsus IV, dorsal (51) and distolateral views (52), indicating trichobothria (black arrows) and tarsal organ (white arrow).



FIGURES 53–64. Scanning electron micrographs of *Coronarachne denticulata* **sp. nov.** male (53–58) and *C. unigena* **sp. nov.** male (59–63) and female (64). 53. Ventral abdominal setae; 54. Spinnerets; 55, 59. Right palp, retrolateral view; 56, 60. Detail of palpal patella, arrow indicating retrolateral lyriform organ; 57, 61. Detail of palpal tibial, retrolateral view, arrow indicating trichobothrium; 58. Right palp, prolateral view; 62. Left palp, ventral view; 63. Distal end of embolus and cymbium, ventral view, arrow indicating modified setae; 64. Epigyne, ventral view. Abbreviations: C—conductor; dRTA—dorsal retrolateral tibial apophysis; E—embolus; TA—tegular apophysis; vRTA—ventral retrolateral tibial apophysis.

Key to the genus *Coronarachne* gen. nov.

1 Males 2
– Females. 6
2 Palp in retrolateral view with two distinct RTAs, with the dorsal RTA with several denticles along its distal margin (e.g. Fig. 75). 3

–	Palp in retrolateral view without a dorsal RTA, but several isolated denticles on the dorsal surface of the palpal tibia (Fig. 82)	*C. penicillus* **sp. nov.**
3	Base of dorsal RTA close to middle of dorsal length of tibia; embolus not visible basally, fully enclosed in conductor, with tips of both structures fine and hair-like (Figs 79, 80)	*C. neethlingi* **sp. nov.**
–	Dorsal RTA originating terminally, at distal end of tibia (e.g. Fig. 75); embolus and conductor clearly separated, broader and not hair-like.	4
4	Ventral side of cymbium with cluster of distinct flattened setae at end of cymbial excavation; tegulum with distinct prolateral tegular apophysis distally; embolus somewhat S-shaped or looping, with the tip directed distally (Figs 86, 90).	5
–	Ventral side of cymbium without cluster of distinct flattened setae at end of cymbial excavation; tegulum without a prolateral apophysis; embolus forming an almost transverse broad coil, with the tip directed retrodistally (Fig. 74)	*C. denticulata* **sp. nov.**
5	Tegulum with large subtriangular apophysis prolaterally, distal end close to tip of embolus; embolus somewhat S-shaped, basal coil about ⅓ the width of tegulum (Fig. 86).	*C. setosa* **sp. nov.**
–	Tegular apophysis smaller, subrectangular, protruding only slightly beyond distal tegular margin, distal end distant from embolus tip; conductor strongly developed, broader than embolus, with spur-like tip (Fig. 90).	*C. unigena* **sp. nov.**
6	ST I consisting of a single oval lobe; copulatory openings oblique, slit-like, close to middle of epigynal plate (Fig. 83)	*C. penicillus* **sp. nov.**
–	ST I clearly bilobed, visible through integument (Figs 76, 88, 92)	7
7	ST I clearly separated from the copulatory openings and copulatory ducts, by approximately double the length of the ST I (Fig. 88).	*C. setosa* **sp. nov.**
–	ST I situated close to copulatory openings and copulatory ducts, separated by less than their length (Figs 76, 92).	8
8	Copulatory openings small, situated close to anterior of epigyne; copulatory ducts consisting of three tight coils, leading to small oval anterior ST II (Fig. 76)	*C. denticulata* **sp. nov.**
–	Copulatory openings hook-shaped, situated close to centre of epigyne; copulatory ducts short, leading to bilobed ST II (Fig. 92).	*C. unigena* **sp. nov.**

Coronarachne denticulata **sp. nov.**

Figs 1, 5–26, 42–58, 65, 66, 74–78

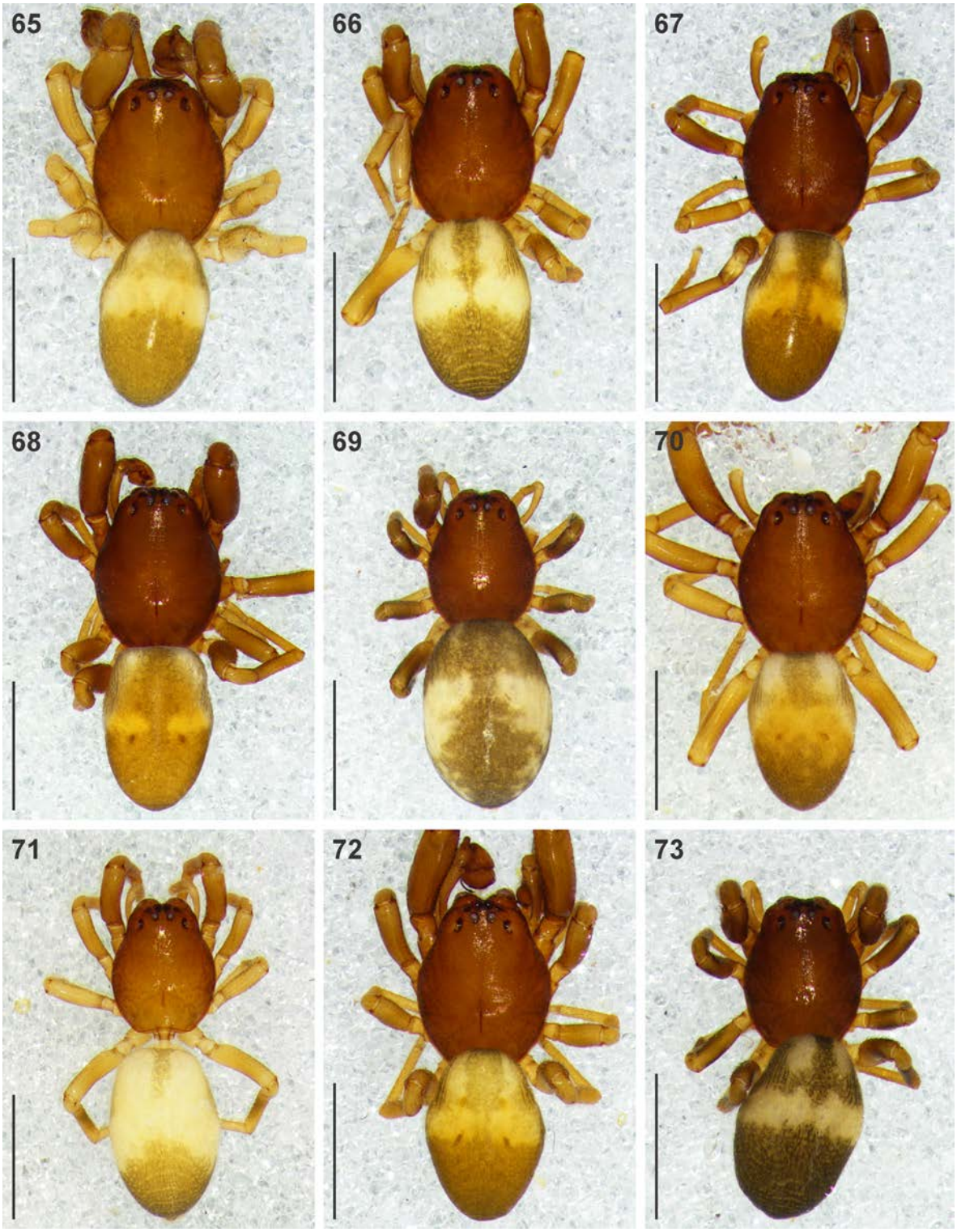
Etymology. This species name is taken from the Latin "*denticulatus/-a/-um*" (Latin for "with small tooth"), and refers to the pronounced denticles on the distal end of the dorsal RTA of males; adjective.

Diagnosis. The male of this species can be recognised by the lack of a tuft of modified setae ventrally on the cymbium (also absent in *C. penicillus* **sp. nov.**) and the broadly coiled conductor and embolus (Figs 58, 74). The female can be recognised by the strongly spiralled copulatory duct, comprising three coils (Fig. 76), while those of congeners are simpler, with at most a single coil.

Male (holotype, Pongola, NCA 84/485). Measurements: CL 1.13, CW 0.93, AL 1.28, AW 0.78, TL 2.20, FL 0.13, SL 0.70, SW 0.53, AME-AME 0.03, AME-ALE 0.01, ALE-ALE 0.18, PME-PME 0.08, PME-PLE 0.10, PLE-PLE 0.33. Length of leg segments (sequence from femur to tarsus, and total): I 0.68 + 0.35 + 0.48 + 0.45 + 0.28 = 2.24; II 0.58 + 0.35 + 0.45 + 0.40 + 0.28 = 2.06; III 0.50 + 0.25 + 0.33 + 0.38 + 0.23 = 1.69; IV 0.70 + 0.33 + 0.53 + 0.53 + 0.23 = 2.32.

Carapace reddish-brown (Fig. 65); surface granulate; fovea short, distinct, at ⅔ CL. AER slightly procurved, almost straight; clypeus height equal to less than ½ AME diameter; ALE slightly larger than AME; AME separated by distance equal to slightly less their diameter; AME separated from ALE by distance equal to slightly less than ½ AME diameter; PER strongly recurved, PLE slightly larger than PME; PME separated by distance equal to slightly more than their diameter; PME separated from PLE by distance slightly larger than PME diameter. Chelicerae brown, anterior surface covered with scattered long, fine setae. Sternum brown, darker towards borders; surface with finely granulate texture, covered with scattered short, fine setae. Abdomen elongate-oval, broad anteriorly, tapering posteriorly; grey dorsally, with large cream patch anteriorly, broken along midline anteriorly by grey streak (Fig. 65); two pairs of brown to grey sigilla, first pair at ¼ AL and second at midpoint of abdomen. Legs I to IV uniform pale yellow-brown, leg I darker than others. Palp brown; embolus long, transversely coiled on palpal axis, accompanied by sclerotized conductor; ventral RTA slender, with pointed tip; dorsal RTA larger, originating distally on tibiae, with several denticles along distal margin (Figs 55–58, 74, 75).

Female (paratype, Pongola, NCA 84/485). Measurements: CL 1.00, CW 0.93, AL 1.18, AW 0.73, TL 2.18, FL 0.03, SL 0.63, SW 0.48, AME-AME 0.05, AME-ALE 0.03, ALE-ALE 0.15, PME-PME 0.05, PME-PLE 0.05, PLE-PLE 0.30. Length of leg segments (sequence from femur to tarsus, and total): I 0.53 + 0.30 + 0.38 + 0.33 + 0.28 = 1.82; II 0.50 + 0.25 + 0.33 + 0.33 + 0.28 = 1.69; III 0.38 + 0.23 + 0.28 + 0.28 + 0.15 = 1.32; IV 0.65 + 0.25 + 0.43 + 0.38 + 0.18 = 1.89.



FIGURES 65–73. Digital microscope photographs of dorsal habitus of *Coronarachne* spp. 65, 66. *C. denticulata* **sp. nov.** male (65) and female (66); 67. *C. neethlingi* **sp. nov.**, male; 68, 69. *C. penicillus* **sp. nov.**, male (68) and female (69); 70, 71, *C. setosa* **sp. nov.**, male (70) and female (71); 72, 73. *C. unigena* **sp. nov.**, male (72) and female (73). Scale bars: 1 mm.

Carapace brown (Fig. 66); surface granulate; fovea short, distinct, at ⅔ CL. AER slightly procurved, almost straight; clypeus height equal to distance approximately ½ AME diameter; AME and ALE equal in size; AME separated by distance equal to approximately ½ their diameter; AME separated from ALE by distance equal to slightly less than ¼ AME diameter; PER strongly recurved, PLE slightly larger than PME; PME separated by distance equal to approximately their diameter; PME separated from PLE by distance approximately 1½ times PME diameter. Chelicerae

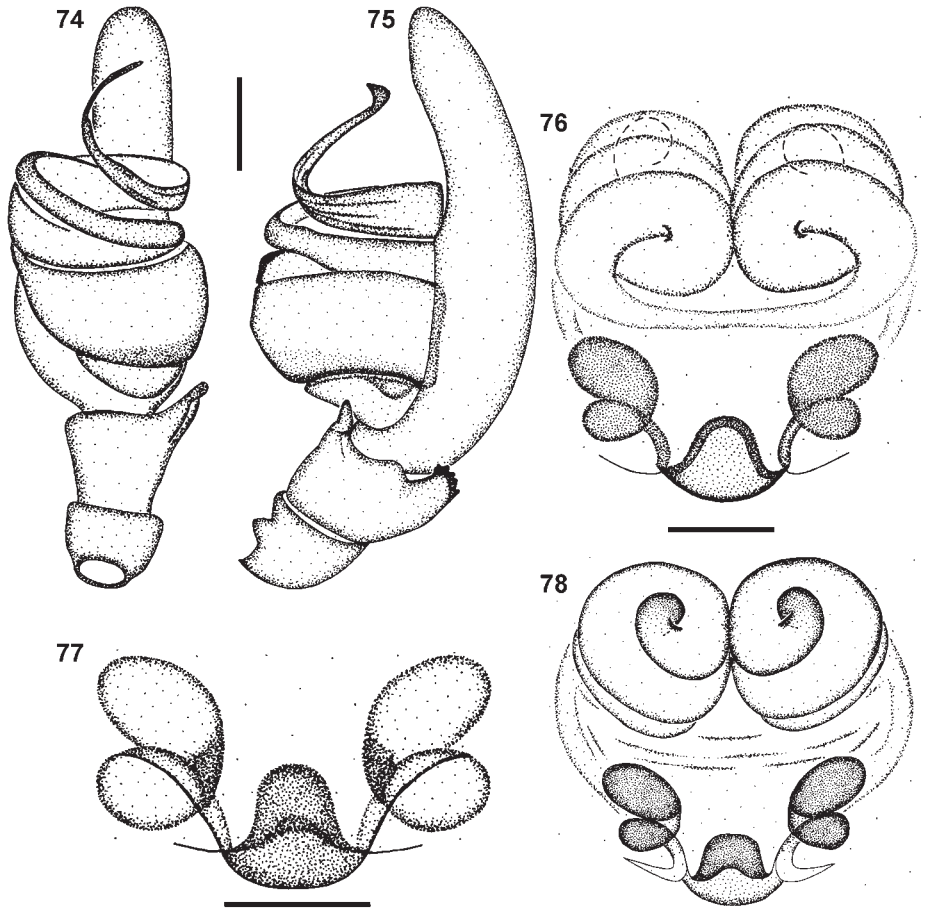
brown, anterior surface covered with scattered long, fine setae. Sternum brown, darker towards borders; surface finely granulate, covered with scattered short, fine setae. Abdomen slightly elongate-oval, broad anteriorly, tapering posteriorly; dorsum dark grey, with paired L-shaped markings in anterior half, separated by narrow grey line along midline; two pairs of brown to grey sigilla, first pair at ¼ AL and second pair just posterior to midpoint of abdomen. Legs I to IV pale brown; anterior legs darker than posteriors. Epigyne with median, tongue-like projection partly covering epigastric fold; copulatory openings small, entering spiralling atrium, with small anterior ST II; narrow duct passing from ST II around lateral periphery of epigyne to bilobed posterior ST I, separated by distance approximately equal to their length (Figs 76–78).

Type material. Holotype ♂ and paratype ♀: **SOUTH AFRICA:** *KwaZulu-Natal*: Pongola, 27°22'S, 31°37'E, 22.IV.1969, leg. A.S. Dippenaar and others (beating) (NCA 84/485).

Paratypes: **SOUTH AFRICA:** *KwaZulu-Natal*: Mkuze, Banghoek Lodge, 27°46.055'S, 32°08.377'E, 131 m a.s.l., 17.V.2012, leg. J.A. Neethling & C. Luwes (canopy fogging 10, bushveld, *Vachellia tortilis*), 4♂ 5♀ (NCA 2012/4268); Ndumo Game Reserve, Hotwe Pan, 26°52.730'S, 32°18.452'E, 22.VI.2005, leg. C. Haddad (fever tree bark), 1♂ (NCA 2006/1510).

Other material examined. SOUTH AFRICA: *KwaZulu-Natal*: Mkuzi Game Reserve, 27°44.818'S, 32°17.456'E, 11.XII.2004, leg. Earthwatch team 8 (blue pan trap 2), 1♀ (NCA 2016/3069); Same locality, 27°39.814'S, 32°16.039'E, 20.I.2005, leg. Earthwatch team 10 (beats, *V. tortilis* and *V. nilotica* woodland), 1♀ (NCA 2016/3070); Ndumo Game Reserve, Banzi Pan, 26°53.066'S, 32°17.218'E, 35 m a.s.l., 7.XII.2018, leg. C. Haddad, R. Booysen & J. Neethling (canopy fogging, *Spirostachys africana*), 2♂ (NCA 2019/592); Same locality, Crocodile Farm, Pongola River Floodplain, 26°54.426'S, 32°19.185'E, 24.I.2006, leg. C. Haddad (*Vachellia xanthophloea* bark), 1♂ (NCA 2014/1476); Same locality, Nyamiti Pan, 26°53.409'S, 32°17.576'E, 35 m a.s.l., 3.XII.2019, leg. C. Haddad & V. Swart (canopy fogging, *Pappea capensis*), 10♀ (NCA 2020/307); Same locality, Road to Shokwe Pan, 26°52.550'S, 32°12.695'E, 30.I.2014, leg. C. Haddad & Z. Mbo (canopy fogging, *Albizia versicolor*), 1♂ 1♀ (MACN-Ar 32949), 1♂ (MACN-Ar 32948), 1♀ (MACN-Ar 32950), 3♂ 3♀ (NCA 2014/923).

Distribution. Restricted to the northern KwaZulu-Natal Province, South Africa (Fig. 85).



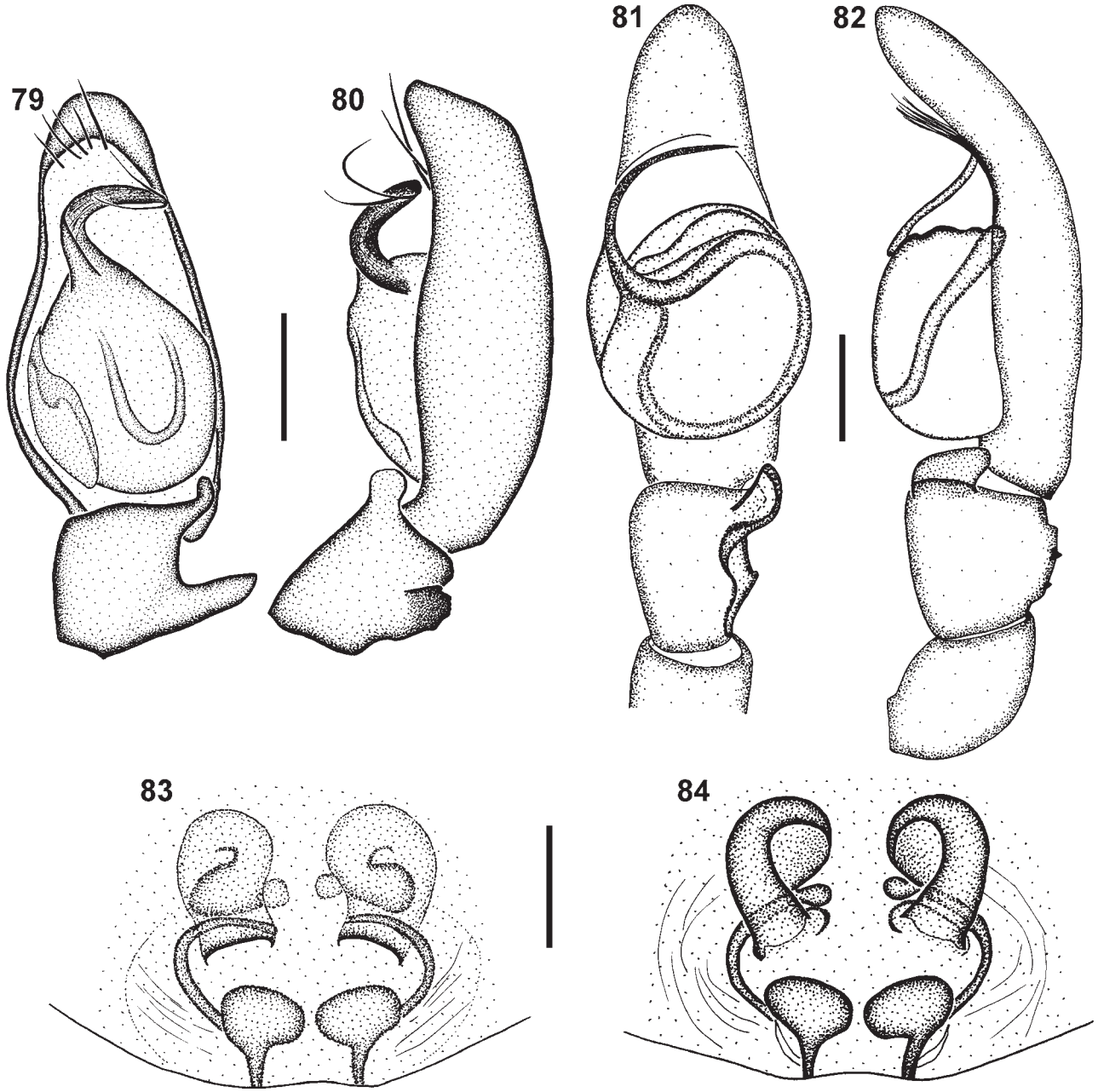
FIGURES 74–78. *Coronarachne denticulata* **sp. nov.** male (74, 75) and female (76–78). 74. Left palp, ventral view; 75. Same, retrolateral view; 76. Epigyne, ventral view; 77. Same, detail of spermathecae; 78. Epigyne, dorsal view. Scale bars = 0.1 mm.

***Coronarachne neethlingi* sp. nov.**
Figs 67, 79, 80

Etymology. This species is a patronym in honour of Jan-Andries Neethling, who collected the type specimen of this species and many other valuable specimens that contributed to this paper.

Diagnosis. The male of this species can be recognised by the tuft of dense setae distally on the tegulum cavity behind the embolus, the broadly curved conductor enclosing the embolus, the tips of both being fine and slender (Fig. 79), and by the dorsal RTA originating medially (Fig. 80) rather than distally, as seen in *C. denticulata* **sp. nov.**, *C. setosa* **sp. nov.** and *C. unigena* **sp. nov.** (Figs 75, 87, 91), or absent and reduced to scattered denticles in *C. penicillus* **sp. nov.** (Fig. 82). Female unknown.

Male (holotype, Hogsback, NCA 2012/1678). Measurements: CL 1.19, CW 0.92, AL 1.22, AW 0.76, TL 2.38, FL 0.15, SL 0.71, SW 0.52, AME-AME 0.02, AME-ALE 0.01, ALE-ALE 0.17, PME-PME 0.06, PME-PLE 0.06, PLE-PLE 0.32. Length of leg segments (sequence from femur to tarsus, and total): I 0.76 + 0.39 + 0.55 + 0.46 + 0.33 = 2.49; II 0.62 + 0.32 + 0.44 + 0.43 + 0.27 = 2.08; III 0.43 + 0.22 + 0.30 + 0.41 + 0.21 = 1.57; IV 0.72 + 0.30 + 0.54 + 0.56 + 0.24 = 2.36.



FIGURES 79–84. *Coronarachne neethlingi* **sp. nov.** male (79, 80) and *C. penicillus* **sp. nov.** male (81, 82) and female (83, 84). 79, 81. Left palp, ventral view; 80, 82. Same, retrolateral view; 83. Epigyne, ventral view; 84. Epigyne, dorsal view. Scale bars = 0.1 mm

Carapace deep orange-brown (Fig. 67); surface finely granulate; fovea short, narrow, slightly posterior to ⅔ CL. AER slightly procurved; clypeus height equal to ⅔ AME diameter; AME slightly larger than ALE; AME separated by distance equal to slightly less than ¼ their diameter; AME separated from ALE by distance approximately ⅛ AME diameter; PER strongly recurved, PLE slightly larger than PME; PME separated by distance equal their diameter; PME separated from PLE by distance equal to PME diameter. Chelicerae orange-brown, anterior surface covered with scattered long, fine setae; endites and labium yellow-brown. Sternum orange-brown, darker towards borders. Abdomen elongate-oval, dorsum covered in orange-brown scutum overlaid on mottled grey, with pair of cream subtriangular L-shaped markings in anterior half (Fig. 67); two pairs of large sigilla, first pair at ¼ AL and second at midpoint of abdomen; venter cream with grey mottling and grey ring around spinnerets. Legs I orange-brown, II to IV yellow-brown, all with faint grey mottling; all femora darker than other segments. Palp orange-brown, cymbium with cluster of flattened setae distally on the tegulum cavity behind embolus tip; tegulum pear-shaped, with sperm duct forming U-shaped loop medially; conductor and embolus originating distally, together forming broad coil; embolus emerging retrolaterally from groove in conductor, tip slender, directed prolatero-distally; ventral RTA short, slender in ventral view, thumb-like in retrolateral view, with rounded tip; dorsal RTA larger, originating in middle of tibia, with a few blunt denticles along distal margin (Figs 79, 80).

Type material. Holotype ♂: **SOUTH AFRICA:** *Eastern Cape*: Amatola mountains, 10 km S of Hogsback on R345, 32°39.247'S, 26°54.928'E, 755 m a.s.l., 1.X.2011, leg. J. Neethling & C. Luwes (canopy fogging, isolated tree, roadside) (NCA 2012/1678).

Other material. None.

Distribution. Only known from the type locality (Fig. 85).

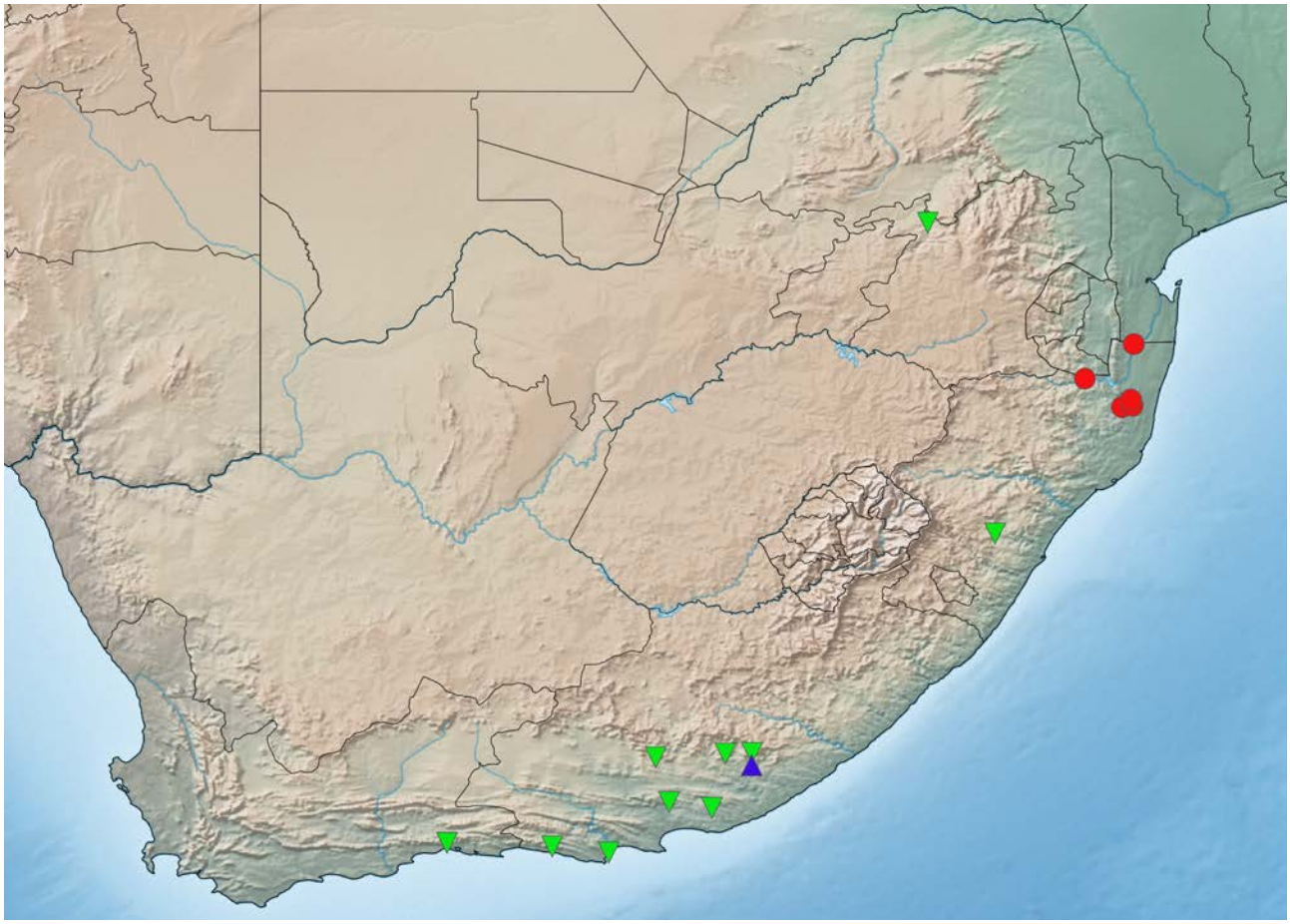


FIGURE 85. Distribution of *Coronarachne denticulata* **sp. nov.** (red circles), *C. neethlingi* **sp. nov.** (blue triangle) and *C. penicillus* **sp. nov.** (green triangles) in southern Africa.

***Coronarachne penicillus* sp. nov.**
Figs 68, 69, 81–84

Etymology. The species name is a noun in apposition of the Latin word for "painters brush", which refers to the shape of the embolus tip in the lateral view.

Diagnosis. This species can be recognized by the sickle-shaped conductor and embolus (Fig. 81), the flattened, broad RTA with a rounded tip, the absence of a dorsal RTA (reduced to a few scattered denticles), and the brush-like appearance of the embolus tip when palp is examined retrolaterally after emerging from the conductor (Figs 81, 82). The female of this species can be recognized by the broad slit-like copulatory openings and the short ducts leading from the ST II to the single-lobed ST I (Figs 83, 84); other known females in the genus have a bilobed ST I (Figs 78, 89, 93).

Male (holotype, Groblersdal, NCA 97/767). Measurements: CL 1.90, CW 1.15, AL 1.30, AW 0.98, TL 3.20, FL 0.13, SL 0.88, SW 0.70, AME-AME 0.05, AME-ALE 0.03, ALE-ALE 0.20, PME-PME 0.08, PME-PLE 0.08, PLE-PLE 0.40. Length of leg segments (sequence from femur to tarsus, and total): I 0.98 + 0.43 + 0.60 + 0.53 + 0.30 = 2.84; II 0.75 + 0.40 + 0.55 + 0.50 + 0.28 = 2.48; III 0.65 + 0.33 + 0.40 + 0.28 + 0.25 = 1.91; IV 0.90 + 0.35 + 0.68 + 0.70 + 0.30 = 2.93.

Carapace dark reddish-brown (Fig. 68); carapace texture finely granular, with short, fine setae; fovea short, thin, distinct, at two-thirds carapace length. AER slightly recurved; clypeus height equal to slightly less than AME diameter; median and lateral eyes equal in size; AME separated by distance equal to their diameter; AME separated from ALE by distance equal to ½ AME diameter; PER recurved, median and lateral eyes equal in size; PME separated by distance equal to twice their diameter; PME separated from PLE by distance equal to PME diameter. Chelicerae orange, anterior surface covered with scattered long, fine setae; three promarginal teeth, median tooth largest, distal tooth smallest; three retromarginal teeth, distal tooth largest, proximal tooth smallest. Sternum brown, darker towards borders. Abdomen mottled grey dorsally, with pair of cream patches anterolaterally and transverse pair at midpoint (Fig. 68); two pairs of brown to pale grey sigilla, one pair anterior to midpoint and second pair posterior to midpoint; abdomen broad anteriorly, tapering posteriorly. Legs I to IV brown, femora dark brown, legs I and II darker than III and IV. Palp brown, sperm duct running along tegulum margin, with sickle-shaped conductor and embolus distally, with embolus tip evidently split into multiple fine hair-like projections; RTA undulating when examined ventrally, broad and rounded when examined retrolaterally, with two small dorsal denticles (Figs 81, 82).

Female (paratype, Fort Beaufort, NCA 2012/1888). Measurements: CL 1.02, CW 0.85, AL 1.47, AW 1.01, TL 2.53, FL 0.06, SL 0.65, SW 0.48, AME-AME 0.02, AME-ALE 0.01, ALE-ALE 0.15, PME-PME 0.05, PME-PLE 0.08, PLE-PLE 0.31. Length of leg segments (sequence from femur to tarsus, and total): I 0.60 + 0.30 + 0.43 + 0.37 + 0.30 = 2.00; II 0.56 + 0.25 + 0.38 + 0.37 + 0.28 = 1.84; III 0.48 + 0.25 + 0.30 + 0.37 + 0.19 = 1.59; IV 0.68 + 0.29 + 0.54 + 0.52 + 0.22 = 2.25.

Carapace orange-brown (Fig. 69); surface finely granulate, more pronounced on slopes; fovea short, narrow, indistinct, at ⅘ CL. AER slightly procurved; clypeus height equal to distance approximately ⅔ AME diameter; ALE slightly larger than AME; AME separated by distance equal to approximately ¼ their diameter; AME separated from ALE by distance equal to approximately ⅛ AME diameter; PER strongly recurved, PME and PLE equal in size; PME separated by distance equal to ¾ their diameter; PME separated from PLE by distance approximately 1¼ times PME diameter. Chelicerae orange-brown, anterior surface covered with scattered long, fine setae; endites yellow-brown, labium dark orange-brown. Sternum yellow-brown, darker along borders. Abdomen oval; dorsum mottled dark grey, with large paired subtriangular cream markings at midpoint, separated by broad grey line along midline, with pale streaks towards anterior and towards spinnerets laterally; two pairs of brown sigilla, first pair at ¼ AL and second pair at midpoint of abdomen; venter mottled grey. Legs yellow-brown, femora, patellae and tibiae with grey mottling laterally; metatarsi and tarsi uniform, without mottling. Epigyne with broad, recurved slit-like copulatory openings separated by their width, entering broad copulatory openings with anterior loop, terminating in small oval ST II with small mesal thumb-like projection, from which ducts loop over copulatory ducts, curving laterally before entering simple oval ST I posteriorly (Figs 83, 84).

Type material. Holotype ♂: **SOUTH AFRICA:** *Limpopo*: 5 km from Groblersdal, 25°10'S, 29°24'E, 20.IV.1979, leg. A.S. Dippenaar (sweeps, grass) (NCA 97/767).

Paratypes: **SOUTH AFRICA:** *Eastern Cape*: 20 km W of Grahamstown on N2 Highway, 33°25.237'S, 26°21.266'E, 13.VIII.2005, leg. C. Haddad & R. Lyle (under *Eucalyptus* bark), 1♂ (NCA 2006/1333); Fort Beaufort,

Mountain View Lodge, 32°39.347'S, 26°32.656'E, 560 m a.s.l., 3.X.2011, leg. J. Neethling & C. Luwes (canopy fogging, *Celtis africana*), 3♂ 3♀ (NCA 2012/1888). *KwaZulu-Natal*: Pietermaritzburg, Town Bush, S slopes of Hogsback, 29°33'S, 30°21'E, 1000 m a.s.l., 20.IX.1984, leg. P.M.C. Croeser, C. & T. Griswold (from leaf litter and shrubs in indigenous forest near Bats Cave), 1♂ (NMSA 21909).

Other material examined. SOUTH AFRICA: *Eastern Cape*: Amatola mountains, 7 km S of Hogsback on R345, 32°38.831'S, 26°55.375'E, 715 m a.s.l., 1.X.2011, leg. J. Neethling & C. Luwes (canopy fogging, isolated tree, roadside), 3♂ 1♀ (NCA 2012/1897); Jeffrey's Bay, 34°03'S, 24°54'E, 15.XII.2005, leg. L. Wiese (on wall in bathroom), 1♂ (NCA 2008/447); Somerset-East, Bestershoek Nature Reserve, 32°42.500'S, 25°33.652'E, 810 m a.s.l., 3.XII.2011, leg. J. Neethling & C. Luwes (canopy fogging, woodland), 1♂ 1♀ (NCA 2012/1902); Suurberg Pass on R335, near Addo, 33°20.447'S, 25°45.028'E, 545 m a.s.l., 6.XII.2011, leg. J. Neethling & C. Luwes (canopy fogging, Afromontane forest), 1♂ 3♀ (NCA 2012/1889). *Western Cape*: Garden Route National Park, Witelsbos, Stormsrivier, 33°58'S, 24°06'E, 22.II.2017, leg. R. Swart (canopy fogging), 1♂ (NCA 2019/963), 1♂ 3♀ (NCA 2019/974), 1♀ (NCA 2019/970), 1♂ (NCA 2019/981); Same locality, Woodville, Wilderness, 33°55'S, 22°37'E, 15.II.2017, leg. R. Swart (canopy fogging), 8♂ 3♀ (NCA 2019/983), 5♂ 5♀ (NCA 2019/966), 4♂ 4♀ (NCA 2019/961).

Distribution. Widely but sporadically distributed in South Africa (Fig. 85).

***Coronarachne setosa* sp. nov.**
Figs 70, 71, 86–89

Etymology. This species name is the Latin *setosus/-a/-um*, meaning bristly, and refers to the tuft of modified spatulate setae situated ventrally on the cymbium behind the embolus; adjective.

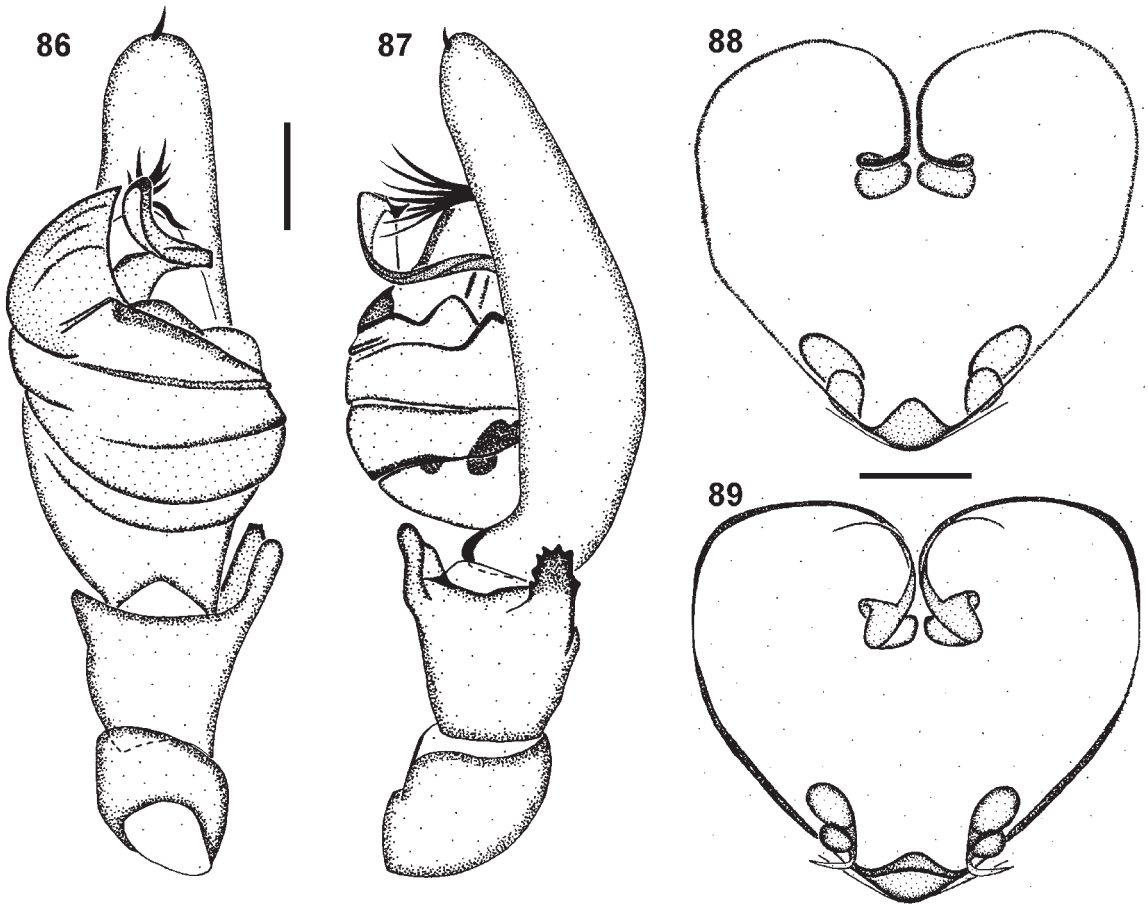
Diagnosis. The male of this species shares with *C. neethlingi* **sp. nov.** and *C. unigena* **sp. nov.** the dense tuft of flattened setae distally on the tegulum cavity behind the embolus, but can be easily distinguished from congeners by the large subtriangular prolateral tegular apophysis (Fig. 86). The female is easily recognised by the small size of the ST I and ST II, and their wide separation, by approximately double the length of the ST II (Figs 88, 89).

Male (holotype, Umlazi Nature Reserve, NMSA 12330). Measurements: CL 1.40, CW 1.12, AL 1.55, AW 0.97, TL 2.89, FL 0.20, SL 0.85, SW 0.63, AME-AME 0.02, AME-ALE 0.03, ALE-ALE 0.21, PME-PME 0.08, PME-PLE 0.11, PLE-PLE 0.39. Length of leg segments (sequence from femur to tarsus, and total): I 0.87 + 0.46 + 0.62 + 0.55 + 0.31 = 2.81; II 0.71 + 0.37 + 0.50 + 0.48 + 0.28 = 2.34; III 0.60 + 0.30 + 0.36 + 0.48 + 0.20 = 1.94; IV 0.78 + 0.31 + 0.59 + 0.60 + 0.21 = 2.49.

Carapace brown (Fig. 70); carapace finely granulate; fovea short, narrow, relatively indistinct, at two thirds CL. AER slightly procurved; clypeus height equal to ½ AME diameter; ALE slightly larger than AME; AME separated by distance equal to their diameter; AME separated from ALE by distance equal to ½ AME diameter; PER recurved, PLE slightly larger than PME; PME separated by distance equal to 1½ times their diameter; PME separated from PLE by distance equal to twice PME diameter. Chelicerae brown, anterior surface covered with scattered long, fine setae; two promarginal teeth, both teeth equal in size, one tooth distal and other proximal situated; two retromarginal teeth, distal tooth largest. Sternum brown, darker at borders. Abdomen oval, mottled grey dorsally, with paired creamy-yellow markings anteriorly merged with transverse band at midpoint, forming U-shaped marking; two pairs of brown to grey sigilla, first pair anterior to midpoint, second pair posterior to midpoint of abdomen; abdomen slightly elongated, broad anteriorly, tapering posteriorly. Legs I to IV brown, anterior legs darker than posteriors. Palp brown, cymbium with cluster of flattened setae distally on the tegulum cavity behind embolus tip; embolus coiled with rounded tip, two RTA, ventral apophysis finger-like and dorsal apophysis rounded with small denticles (Figs 86, 87).

Female (paratype, Sodwana Bay, MACN). Measurements: CL 1.00, CW 0.85, AL 1.45, AW 0.85, TL 2.60, FL 0.05, SL 0.65, SW 0.50, AME-AME 0.03, AME-ALE 0.03, ALE-ALE 0.18, PME-PME 0.60, PME-PLE 0.08, PLE-PLE 0.36. Length of leg segments (sequence from femur to tarsus, and total): I 0.65 + 0.35 + 0.43 + 0.38 + 0.25 = 2.06; II 0.55 + 0.30 +0.40 + 0.38 + 0.23 = 1.86; III 0.55 + 0.25 + 0.38 + 0.40 + 0.23 = 1.81; IV 0.70 + 0.20 + 0.28 + 0.58 + 0.23 = 1.99.

Carapace brown (Fig. 71); carapace texture granular, covered with short, fine setae; fovea short, indistinct, at ⅔ CL. AER slightly procurved; clypeus height equal to slightly more than ½ AME diameter; ALE slightly larger



FIGURES 86–89. *Coronarachne setosa* **sp. nov.** male (86, 87) and female (88, 89). 86. Left palp, ventral view; 87. Same, retrolateral view; 88. Epigyne, ventral view; 89. Same, dorsal view. Scale bars = 0.1 mm.

than AME; AME separated by distance equal to ½ their diameter; AME separated from ALE by distance equal to ½ AME diameter; PER recurved, PLE larger than PME; PME separated by distance equal to twice their diameter; PME separated from PLE by distance equal to 2½ times PME diameter. Chelicerae brown, anterior surface with scattered long, fine setae; two promarginal teeth, proximal tooth largest; three retromarginal teeth, distal tooth largest, proximal tooth smallest. Sternum brown, darker towards border; elongated shield-shaped; surface smooth with short, fine setae scattered throughout sternum. Abdomen oval, pale grey dorsally, with large cream marking covering anterior half, bisected by narrow grey stripe anteriorly; posterior of marking oblique, diverging posteriorly (Fig. 71); two pairs of grey sigilla, first pair anterior to midpoint, second pair posterior to midpoint of abdomen. Legs I to IV uniform brown; anterior legs slightly more robust, darker than posteriors; short, fine setae scattered on all leg segment; moderately dense ventral scopulae found on metatarsi and tarsi of all legs, more prominent on leg III and IV; regular leg spines, cusps absent. Epigyne with ST II anterior to midpoint, with heart-shaped connecting ducts of spermathecae ducts running peripherally, leading from ST II to bilobed posterior median ST I (Figs 88, 89).

Type material. Holotype: ♂: **SOUTH AFRICA:** *KwaZulu-Natal*: 1.5 km E of Mtunzini, Umlazi Nature Reserve, 28°58'S, 31°48'E, XII.1978, leg. R. Miller (indigenous forest) (NMSA 12330).

Paratypes: **MOZAMBIQUE:** Near Marracuene, Marracuene Lodge, 25°46.379'S, 32°41.430'E, 12 m a.s.l., 1.XII.2007, leg. R. Lyle & R. Fourie (beating shrubs, riverine forest), 1♂ (NCA 2008/175). **SOUTH AFRICA:** *KwaZulu-Natal*: iSimangaliso Wetland Park, Fanies Island, 28°06'36.8"S, 32°25'52.5"E, 25–30 m a.s.l., 31.III–4.IV.2001, leg. M. Ramirez, 1♂ (MACN-Ar 30347); Kosi Bay Nature Reserve, 26°57'S, 32°50'E, 10.XII.2010, leg. A.H. Kirk-Spriggs (malaise trap, indigenous dune forest), 1♂ (NMBA 16633); Ndumo Game Reserve, Southern boundary fence, 26°55.664'S, 32°19.038'E, 30.VI.2009, leg. C. Haddad (in rolled-up leaf of short shrub, sand forest), 1♀ (TMSA 23555); Sodwana Bay National Park, Mgoboseleni trail, 27°32'34.9"S, 32°39'48.7"E, 50 m a.s.l., 6–8.IV.2001, leg. M. Ramirez, 1♀ (MACN-Ar 30348); Ubombo district, Phinda Forest Lodge, 27°46'S, 32°21'E,

8.XII.1994, leg. L. Lotz, 2♂ (NMBA 6853). *Mpumalanga*: Kruger National Park, Onder Sabie, Skukuza [25°07'S, 31°55'E], 13.VIII.1991, leg. S. Neser (on plant), 1♂ (NCA 2002/364).

Other material examined. SOUTH AFRICA: *KwaZulu-Natal*: iSimangaliso Wetland Park, Crocodile Centre, 28°21'24.4"S, 32°25'11.0"E, 24 m a.s.l., 12.V.2012, leg. J.A. Neethling & C. Luwes (canopy fogging 1, indigenous bush, *Trichilia emetica*), 2♀ (NCA 2012/4258); Same locality, St Lucia, 28°23'02.3"S, 32°24'25.7"E, 21 m a.s.l., 13.V.2012, leg. J. Neethling & C. Luwes (canopy fogging 4, coastal forest, *Trichilia dregeana*), 1♂ 3♀ (NCA 2013/19), 1♂ (NCA 2012/3990); Same locality, St Lucia, 28°23'04.3"S, 32°24'24.0"E, 22 m a.s.l., 13.V.2012, leg. J. Neethling & C. Luwes (canopy fogging 5, coastal forest, *T. emetica*), 2♂ 5♀ (NCA 2012/3991); Same locality, 14.V.2012, leg. J.A. Neethling & C. Luwes (canopy fogging 7, wetland, *Breonadia salicina*), 2♀ (NCA 2012/4266); Same locality, Eastern Shores Nature Reserve, 28°21.383'S, 32°25.166'E, 3.VII.2007, leg. R. Fourie & C. Haddad (beats, short shrubs), 1♀ (NCA 2007/2909); Same locality, near Mission Rocks Beach, 28°15'53.1"S, 32°28'52.8"E, 83 m a.s.l., 12.V.2012, leg. J.A. Neethling & C. Luwes (canopy fogging 2, indigenous bush, *Albizia adianthifolia*), 2♂ 1♀ (NCA 2012/4267); Same locality, St Lucia, 28°23'03.9"S, 32°24'25.4"E, 24 m a.s.l., 13.V.2012, leg. J. Neethling & C. Luwes (canopy fogging 3, coastal forest, *T. dregeana*), 2♂ (MACN-Ar 31208); Ndumo Game Reserve, Pongola River, water pump, riverine forest, 26°54.309'S, 32°19.444'E, 36 m a.s.l., 2.VII.2009, leg. C. Haddad, R. Lyle & V. Butler (canopy fogging 3, *B. salicina*), 1♂ 3♀ (NCA 2012/4276); Same data as previous but canopy fogging 5, *B. salicina*, 1♀ (NCA 2013/613); Same locality, Ezikebheni, 26°53.389'S, 32°18.878'E, 8.XII.2009, leg. C. Haddad, V. Swart & A. Kirk-Spriggs (pitfalls, *Albizia-Euphorbia* thicket), 1♀ (NCA 2013/488); Oribi Gorge Nature Reserve, Samango Waterfall trail, 30°42.612'S, 30°16.182'E, 200 m a.s.l., 13.I.2011, leg. C. Haddad (canopy fogging, mixed forest trees), 1♂ (TMSA 23989); Vryheid, Vryheid Mountain Nature Reserve, 27°45'41.0"S, 30°46'24.0"E, 1185 m a.s.l., leg. J.A. Neethling & C. Luwes, 24.V.2012 (canopy fogging 14, *Ziziphus mucronata*), 6♂ 2♀ (NCA 2012/4271), 3♂ 3♀ (MACN-Ar 31234). *Western Cape*: Garden Route National Park, Witelsbos, Stormsrivier, 33°58'S, 24°06'E, leg. R. Swart, 22.II.2017 (canopy fogging), 1♂ (NCA 2019/965); Same locality, Woodville, Wilderness, 33°55'S, 22°37'E, leg. R. Swart, 15.II.2017 (canopy fogging), 2♂ 4♀ (NCA 2019/960), 2♂ (NCA 2019/967), 1♂ 2♀ (NCA 2019/984).

Distribution. A disjunct range in the subtropical eastern and mesic southern parts of South Africa (Fig. 94).

Coronarachne unigena sp. nov.

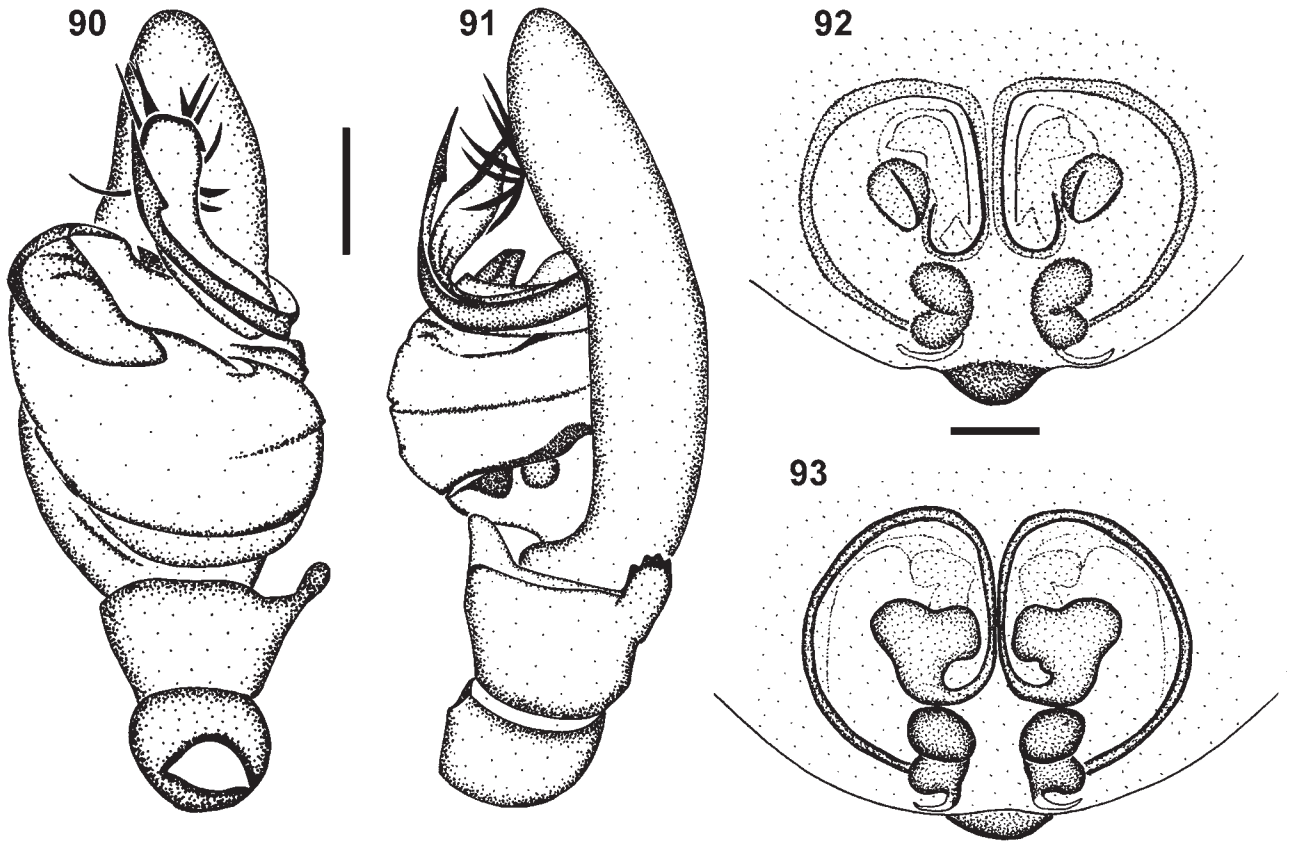
Figs 27–41, 59–64, 72, 73, 90–93

Etymology. This species name is Latin for "sharing both parents", referring to the close similarity between the males of this species and *C. setosa* **sp. nov.**; noun in apposition.

Diagnosis. The male of this species can be distinguished from some congeners by the tuft of dense setae distally on the tegulum cavity behind the embolus (shared with *C. neethlingi* **sp. nov.** and *C. setosa* **sp. nov.**), the pronounced subrectangular prolateral tegular apophysis hiding the base of the embolus and conductor, and the singly coiled embolus and conductor (Fig. 90), the latter ending in a spur-shaped tip. Females can be recognized by the hook-shaped ridges containing the copulatory openings, and by the close proximity of the ST II to these ridges (Fig. 92); the ST II and ridges are clearly separated in congeners.

Male (holotype, Tzaneen, NCA 2013/1911). Measurements: CL 1.00, CW 0.85, AL 1.16, AW 0.76, TL 2.08, FL 0.08, SL 0.62, SW 0.49, AME-AME 0.02, AME-ALE 0.01, ALE-ALE 0.16, PME-PME 0.06, PME-PLE 0.08, PLE-PLE 0.30. Length of leg segments (sequence from femur to tarsus, and total): I 0.67 + 0.35 + 0.46 + 0.42 + 0.29 = 2.19; II 0.53 + 0.29 + 0.37 + 0.38 + 0.25 = 1.82; III 0.47 + 0.22 + 0.29 + 0.38 + 0.18 = 1.54; IV 0.65 + 0.29 + 0.48 + 0.49 + 0.20 = 2.11.

Carapace deep yellow-brown, with faint grey mottling (Fig. 72); surface granulate, more pronounced on lateral slopes; fovea short, indistinct, at ¾ CL. AER slightly procurved; clypeus height equal to distance equal to ⅗ AME diameter; AME and ALE subequal in size; AME separated by distance equal to ¼ their diameter; AME separated from ALE by distance equal to ⅛ AME diameter; PER strongly recurved, PLE slightly larger than PME; PME separated by distance equal to their diameter; PME separated from PLE by distance equal to ⅘ PME diameter. Chelicerae deep yellow-brown; labium, endites and sternum pale yellow-brown, sternum with darker borders; surface with scattered granules, each with short, fine seta. Abdomen subpentagonal, broad anteriorly, tapering posteriorly; dorsum grey, with two pairs of cream patches in anterior half, separated by grey + (Fig. 72); two pairs of brown sigilla, first pair oval, at ¼ AL, second pair elongate and dark grey, at midpoint of abdomen. Legs I yellow-brown, patellae paler, tibiae, metatarsi and tarsi darker than femora; legs II to IV creamy-yellow; all femora and tibiae with faint mottled band in middle. Palp brown, cymbium with cluster of flattened setae distally on the tegulum cavity behind embolus



FIGURES 90–93. *Coronarachne unigena* **sp. nov.** male (90, 91) and female (92, 93). 90. Left palp, ventral view; 91. Same, retrolateral view; 92. Epigyne, ventral view; 93. Same, dorsal view. Scale bars = 0.1 mm.

tip; embolus long, originating prolaterally, transversely coiled on palpal axis, accompanied by broader sclerotized conductor, with tips of both directed distally; tip of embolus rounded and hooked, tip of conductor spur-shaped; ventral RTA slender, with rounded tip; dorsal RTA larger, originating distally on tibiae, with several denticles along distal margin (Figs 59–63, 90, 91).

Female (paratype, Makhado, NCA 2013/1986). Measurements: CL 1.02, CW 0.83, AL 1.33, AW 0.86, TL 2.32, FL 0.06, SL 0.63, SW 0.48, AME-AME 0.02, AME-ALE 0.01, ALE-ALE 0.16, PME-PME 0.06, PME-PLE 0.08, PLE-PLE 0.31. Length of leg segments (sequence from femur to tarsus, and total): I 0.62 + 0.33 + 0.42 + 0.40 + 0.27 = 2.04; II 0.54 + 0.28 + 0.37 + 0.37 + 0.25 = 1.81; III 0.46 + 0.24 + 0.26 + 0.35 + 0.18 = 1.49; IV 0.71 + 0.29 + 0.49 + 0.50 + 0.20 = 2.19.

Carapace deep orange-brown, with grey mottling (Fig. 73); surface finely granulate, except on posterior slope behind fovea; fovea short, distinct, at ¾ CL. AER slightly procurved; clypeus height equal to distance approximately ½ AME diameter; ALE slightly larger than AME; AME separated by distance equal to approximately ⅓ their diameter; AME separated from ALE by distance equal to slightly less than ⅛ AME diameter, almost touching; PER strongly recurved, PLE slightly larger than PME; PME separated by distance equal to approximately their diameter; PME separated from PLE by distance approximately 1¼ times PME diameter. Chelicerae deep orange-brown, anterior surface covered with scattered long, fine setae; labium and endites yellow-brown with faint black mottling. Sternum bright yellow-brown, with brown borders; surface finely granulate, covered with scattered short, fine setae. Abdomen oval; dorsum and sides mottled dark grey, with paired oval markings anteriorly and broad transverse band in front of midpoint (Fig. 73); two pairs of elongate sigilla, first pair indistinct, at ¼ AL, second pair grey, at midpoint of abdomen. Legs yellow-brown, I darker than II to IV, with broad grey mottled banks medially on all femora and tibiae, distolaterally on patellae, uniform and faint on metatarsi and tarsi. Epigynal plate wrinkled, with median, tongue-like projection partly covering epigastric fold; copulatory openings in large hook-shaped sclerotized ridges in middle of epigyne, entering bilobed ST II, with long channel linking ST II to posterior ST I, initially running mesally, then anteriorly and laterally around periphery of epigyne before entering bilobed posterior ST I, separated by approximately their width (Figs 64, 92, 93).

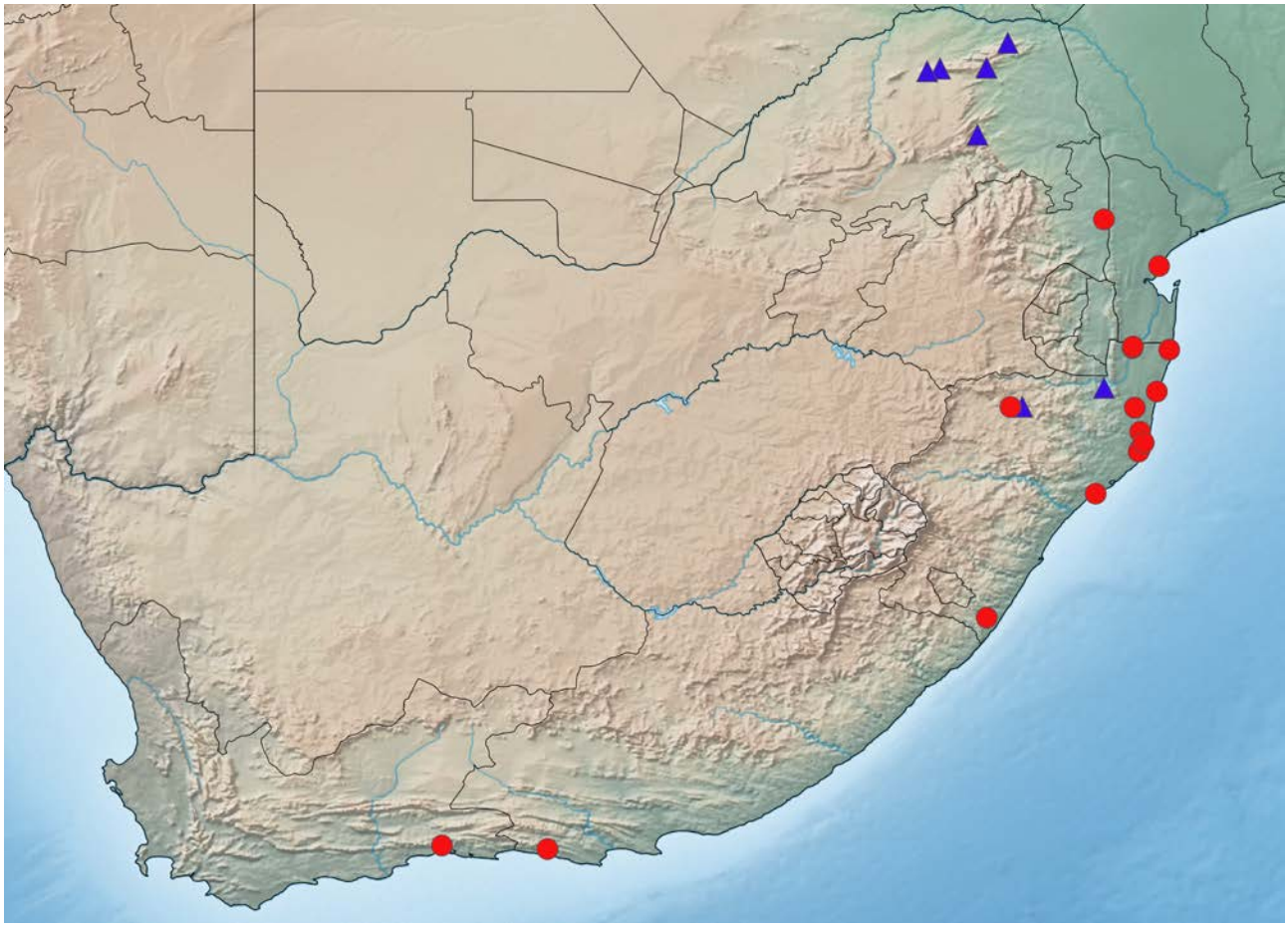


FIGURE 94. Distribution of *Coronarachne setosa* **sp. nov.** (red circles) and *C. unigena* **sp. nov.** (blue triangles) in southern Africa.

Type material. Holotype ♂: **SOUTH AFRICA:** *Limpopo*: Tzaneen, New Agatha Plantation, 23°55.637'S, 30°08.460'E, 1160 m a.s.l., 7.XI.2012, leg. J. Neethling (canopy fogging, Afromontane forest) (NCA 2013/1911).

Paratypes: **SOUTH AFRICA:** *KwaZulu-Natal*: Pongolapoort, Esikhotheni Lodge, 27°29'19.5"S, 31°55'00.5"E, 254 m a.s.l., leg. J. Neethling & C. Luwes, 20.V.2012, 1♀ (NCA 2012/5789); Vryheid Mountain Nature Reserve, 27°45'16.1"S, 30°46'11.6"E, leg. J.A. Neethling & C. Luwes, 24.V.2012, 7♂ 1♀ (NCA 2013/06). *Limpopo*: Soutpansberg Mountains, Gundani Forest, 22°38'S, 30°34'E, leg. P. Webb, 15.VI.2014, 1♂ (NCA 2016/3071); Makhado, Medike Mountain Reserve, 22°59.650'S, 29°36.822'E, 815 m a.s.l., 11.XI.2012, leg. J. Neethling (canopy fogging, *Cassia abbreviata*, montane bushveld), 1♂ 2♀ (NCA 2013/1986).

Other material. SOUTH AFRICA: *KwaZulu-Natal*: Vryheid Mountain Nature Reserve, 27°45'16.1"S, 30°46'11.6"E, 24.V.2012, leg. J.A. Neethling & C. Luwes (canopy fogging 15, thicket, *Vachellia tortilis*), 10♂ 1♀ (NCA 2012/4273); Same locality, 27°45'05.8"S, 30°47'40.8"E, 24.V.2012, leg. J.A. Neethling & C. Luwes (canopy fogging 17, thicket, *Ziziphus mucronatus*), 6♂ 1♀ (NCA 2012/4272). *Limpopo*: Entabeni, 22°59'S, 30°16'E, 12.II.2008, leg. N. Hahn, 1♂ (NCA 2008/2893); Vivo, Lajuma Mountain Retreat, 23°02'S, 29°26'E, 1300 m a.s.l., 10.XI.2012, leg. J. Neethling (canopy fogging, Afromontane forest), 3♀ (NCA 2013/2008), 2♀ (NCA 2013/2006).

Distribution. A disjunct range in the subtropical inland parts of eastern South Africa (Fig. 94).

Falcaranea gen. nov.

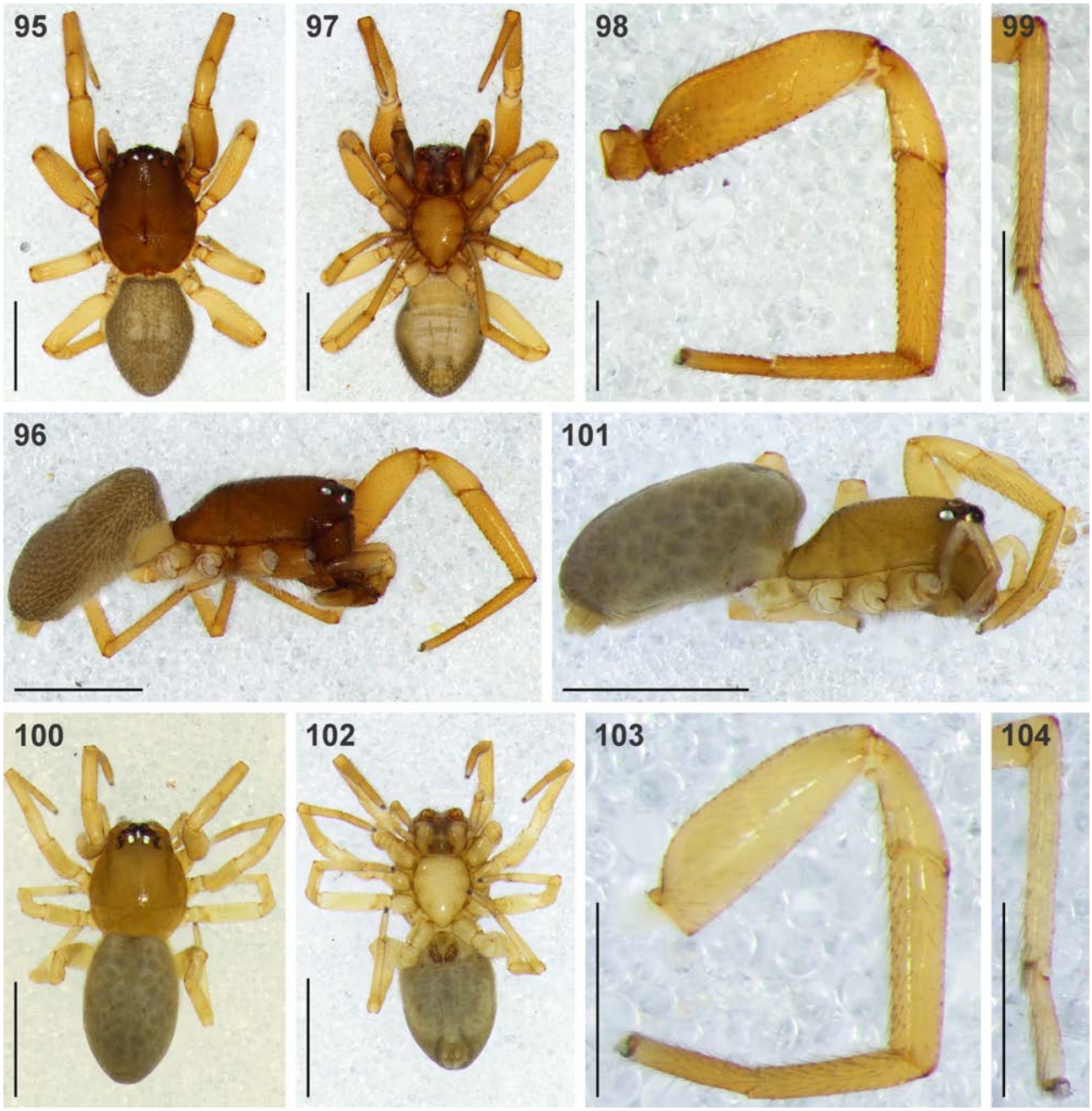
Type species. *Falcaranea gladius* **sp. nov.**

Etymology. The genus name is a contraction of the Latin *falcatus*, meaning sword, referring to the shape of the male embolus, and *aranea*, meaning spider. Gender feminine.

Diagnosis. Males of the genus can be distinguished by the long, curved sword-shaped embolus originating prolaterally on the tegulum, accompanied by a finger-like tegular apophysis, the broad laminate ventral RTA, and the presence of a small retrobasal cymbial process. Females can be distinguished by the anterolateral ST II, with an oblique connecting duct of the spermathecae leading to the posteromedian ST I, and the presence of a membranous scape or smaller anterior hood in the epigyne, the former being a unique character state in Trachelidae.

Description. Small spiders, 2.58–3.80 mm in length; carapace generally yellow-brown, oval, broadest between coxae II and III, eye region narrowed (Figs 95, 100, 105, 117); fovea absent, posterior slope with broad shallow depression (Figs 105, 117), posterior margin straight; slightly convex in lateral profile, elevated from clypeus to behind posterior eyes, highest at midpoint, with steep slope in posterior quarter (Figs 96, 101, 106); carapace surface finely wrinkled, with denticulate setal bases, setae finely barbed (Fig. 118). All eyes surrounded by black rings (Figs 95, 100); AER procurved in anterior view (Fig. 107), recurved in dorsal view (Figs 108, 119), eyes subequal in size, anterior eyes slightly larger than posteriors; AME separated by approximately ½ their diameter, nearly touching ALE (Fig. 107); PME transversely oval, PLE round; PME separated by distance approximately equal to their diameter, separated from PLE by approximately 1¼ times PME diameter; MOQ narrower anteriorly than posteriorly, posterior width slightly greater than length (Fig. 107). Chilum indistinct, a tiny transverse sclerite; cheliceral promargin with two closely spaced teeth, retromargin with two teeth, distal tooth sometimes bifid (Fig. 112); cheliceral promarginal escort seta absent, rake setae present (Fig. 110); fang with distinct serrula (Fig. 111); endites slightly concave or straight laterally (Figs 109, 120), with distinct serrula comprising sharp denticles (Fig. 113); dense maxillar hair tuft on mesal margins; labium trapezoidal, slightly longer than wide (Figs 109, 120). Pleural bars sclerotised, isolated; sternum oval, with straight anterior margin, longer than broad, surface smooth, sparsely covered in long straight setae (Figs 114, 121); precoxal triangles present, intercoxal sclerites present between all coxal pairs, less distinct or absent between coxae III and IV. Leg formula 4123 or 1423, sparsely covered in long fine setae; femora I slightly swollen, with strongly convex dorsal surface, ventral surface almost straight (Figs 98, 103); all femora slightly constricted proximally; patellar indentation on retrolateral side narrow, with lyriform organ at proximal end (Figs 115, 116, 123, 124); anterior legs of males with tuberculate setal bases on tibiae and metatarsi, less pronounced on tarsi (Figs 98, 125–134), less strongly developed in females (Figs 103, 134); tibiae, metatarsi and tarsi with sparse chemosensory setae and trichobothria dorsally, the latter increasing in length distally, ventrally with slightly spatulate scopulate setae (Figs 129–134, 138); metatarsi with weakly developed metatarsal stopper (Figs 132–134) and ventral preening comb at distal end (Figs 99, 104, 137); tarsi with sparse tactile hairs, few dorsal trichobothria and chemosensory setae (Figs 133, 134, 138); trichobothria with slightly lowered distal plate, distal margin of hood overlapping plate, hood with four curved, roughly concentric ridges; tarsal organ terminal (Fig. 134), ovoid in shape, surface finely wrinkled, opening oval and distally placed (Fig. 135); paired tarsal claws short, with approximately seven teeth and dense tenant setae forming claw tufts in between (Figs 133, 139); female palpal claw simple, sharply curved distally, with a few small basal teeth. Abdomen somewhat pentagonal in males, almost straight anteriorly, broadening medially, tapering to a point posteriorly (Fig. 95), more oval and larger in females (Fig. 100), without dorsal scutum or ventral sclerites in either sex, but with two pairs of distinct sigilla. Spinnerets conical, compact (Fig. 140), spigots not studied in detail. Male palpal femora and patellae without apophyses (Figs 142, 148), patella with pro- and retrolateral lyriform organs (Fig. 148); cymbium with dense scopula at distal end (Fig. 141) and retrobasal cymbial process (Figs 156, 161, 166); palpal tibiae with short, broad laminate retrolateral apophysis, almost spanning width of tibia, sometimes with additional adjacent apophysis dorsally (Figs 157, 161, 166); tegulum transversely oval in ventral view (Figs 143, 147), as broad as cymbium, with large digitiform prolateral tegular apophysis; embolus originating mesally near tegular apophysis base, initially directed retrolaterally, bending sharply before tapering to sharp tip distally (Figs 143, 147); conductor absent. Female epigyne occupying most of epigastric plate length, with anterolateral copulatory openings separated by short to long slender median scape (Figs 144–146, 149); copulatory ducts entering almost immediately into ovoid lateral ST II, with long ducts connecting them to posterior mesal ST I initially directed mesally, then posteriorly, converging in V, entering transversely oval ST I along their anteromesal margin; fertilization ducts directed posteriorly, sharply bent laterally.

Composition. Three species, all newly described: *F. amatola* **sp. nov.**, *F. gladius* **sp. nov.** and *F. maputensis* **sp. nov.**



FIGURES 95–104. Digital microscope photographs of somatic morphology of *Falcaranea gladius* **sp. nov.** male (95–99) and female (100–104). 95, 100. Habitus, dorsal view; 96, 101. Same, lateral view; 97, 102. Same, ventral view; 98, 103. Leg I, prolateral view; 99, 104. Metatarsus and tarsus IV. Scale bars = 1.0 mm (95–97, 100–102), 0.5 mm (98, 99, 103, 104).

Key to the genus *Falcaranea* gen. nov.

1 Males 2
– Females. 4
2 Embolus almost straight, base directed distally, with slight undulations along its length; ventral RTA an almost level lamina in retrolateral view; dorsal RTA short and thumb-like (Figs 156, 157) . . . . . *F. amatola* **sp. nov.**
– Embolus distinctly curved, base directed retrodistally, with distinct bend near middle of its length (Figs 160, 165); ventral RTA with rounded or undulating distal margin in retrolateral view; dorsal RTA short and tooth-like (Figs 161, 166). 3
3 Embolus generally S-shaped, with sharp bend immediately after its base and sharp bend near the middle of its length, with basal and distal sections at almost 90 degrees to each other (Fig. 165); cymbium with pronounced digitiform retrobasal process (Fig. 166). . . . . *F. maputensis* **sp. nov.**

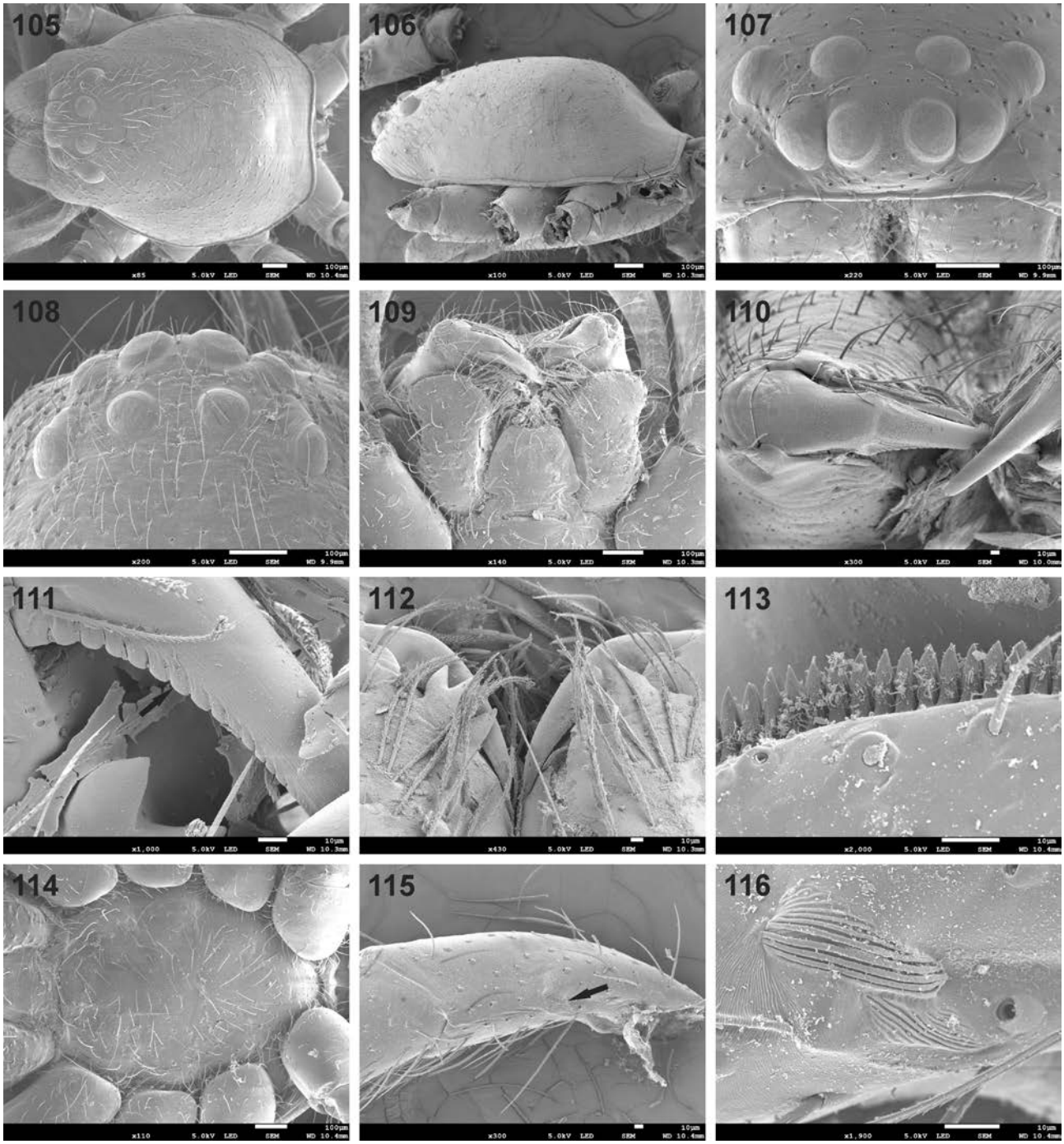
– Embolus straight immediately after its base, with gradual curve near the middle of its length (Fig. 160); cymbium with rounded blunt retrobasal process (Fig. 161). . . . . *F. gladius* **sp. nov.**

4 ST I smaller than ST II (Figs 162–164) . . . . . *gladius* **sp. nov.**

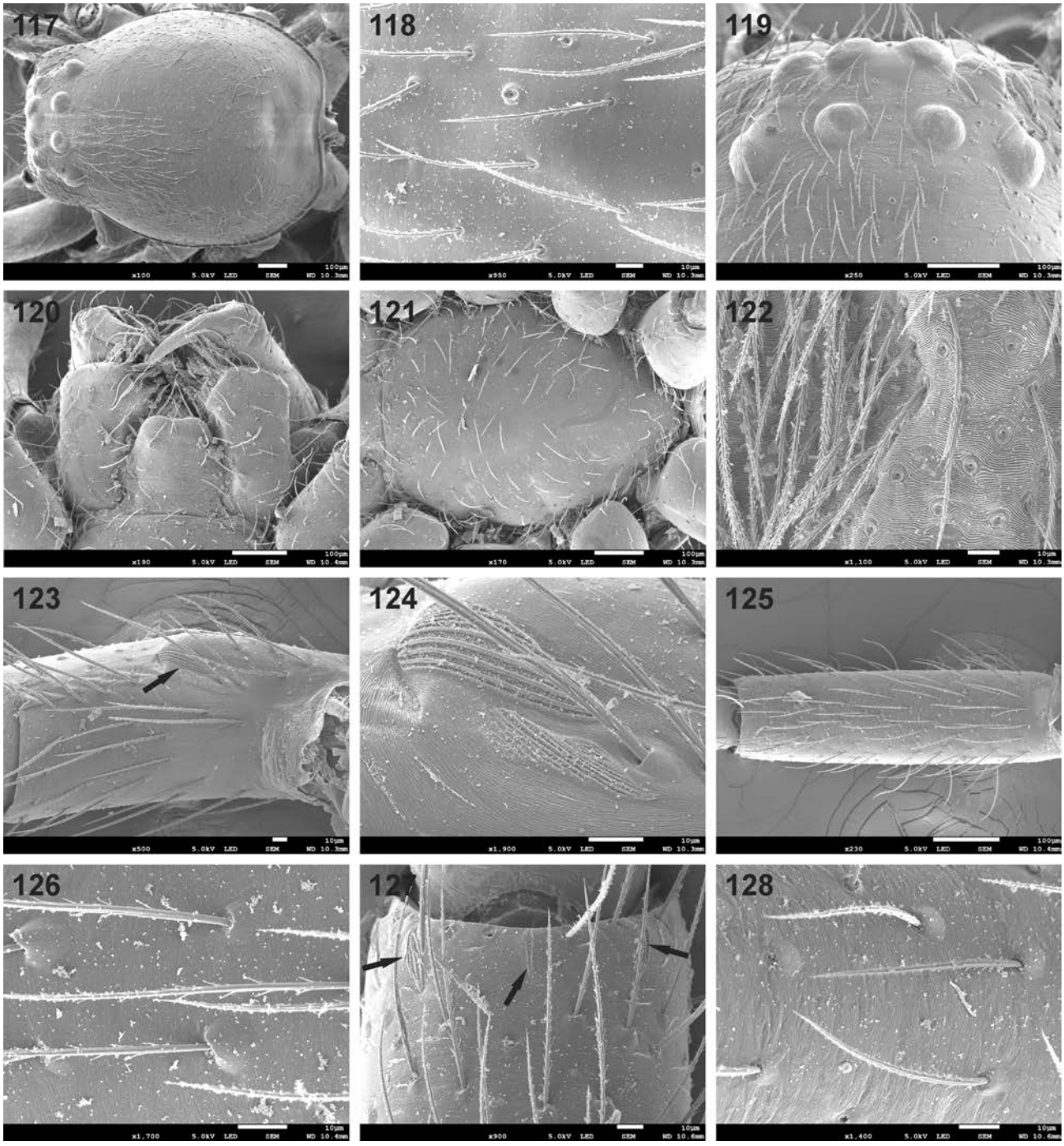
– ST II smaller than ST I (Figs 159, 167) 5

5 Copulatory openings hidden by large, tongue-like hood; ST I and ST II almost touching; ST I large, oval, orientated transversely (Fig. 167). . . . . *F. maputensis* **sp. nov.**

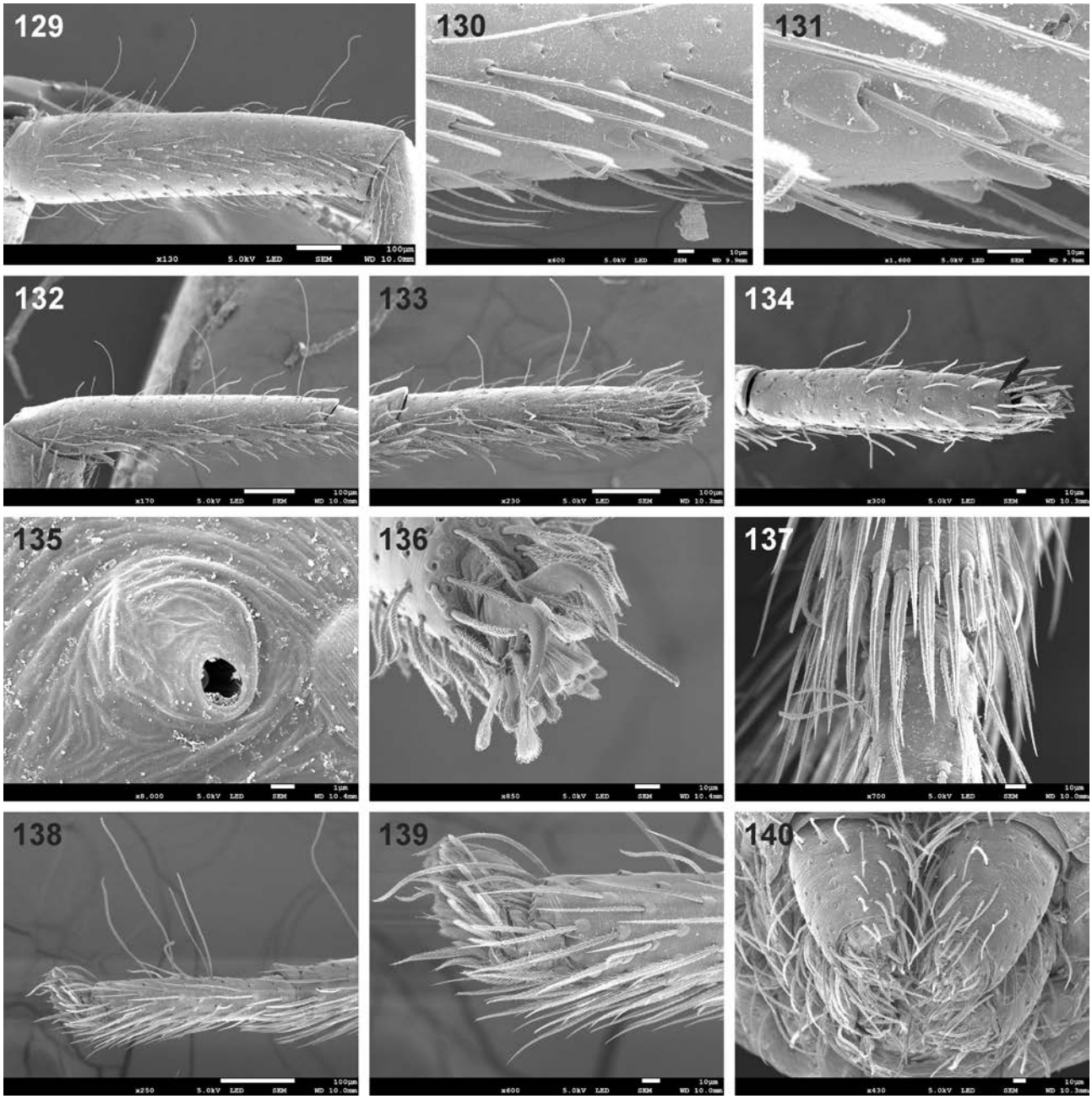
– Copulatory openings not covered, only a small triangular hood present; ST I subrectangular with rounded corners, orientated anterolaterally (Fig. 158) . . . . . .*F. amatola* **sp. nov.**



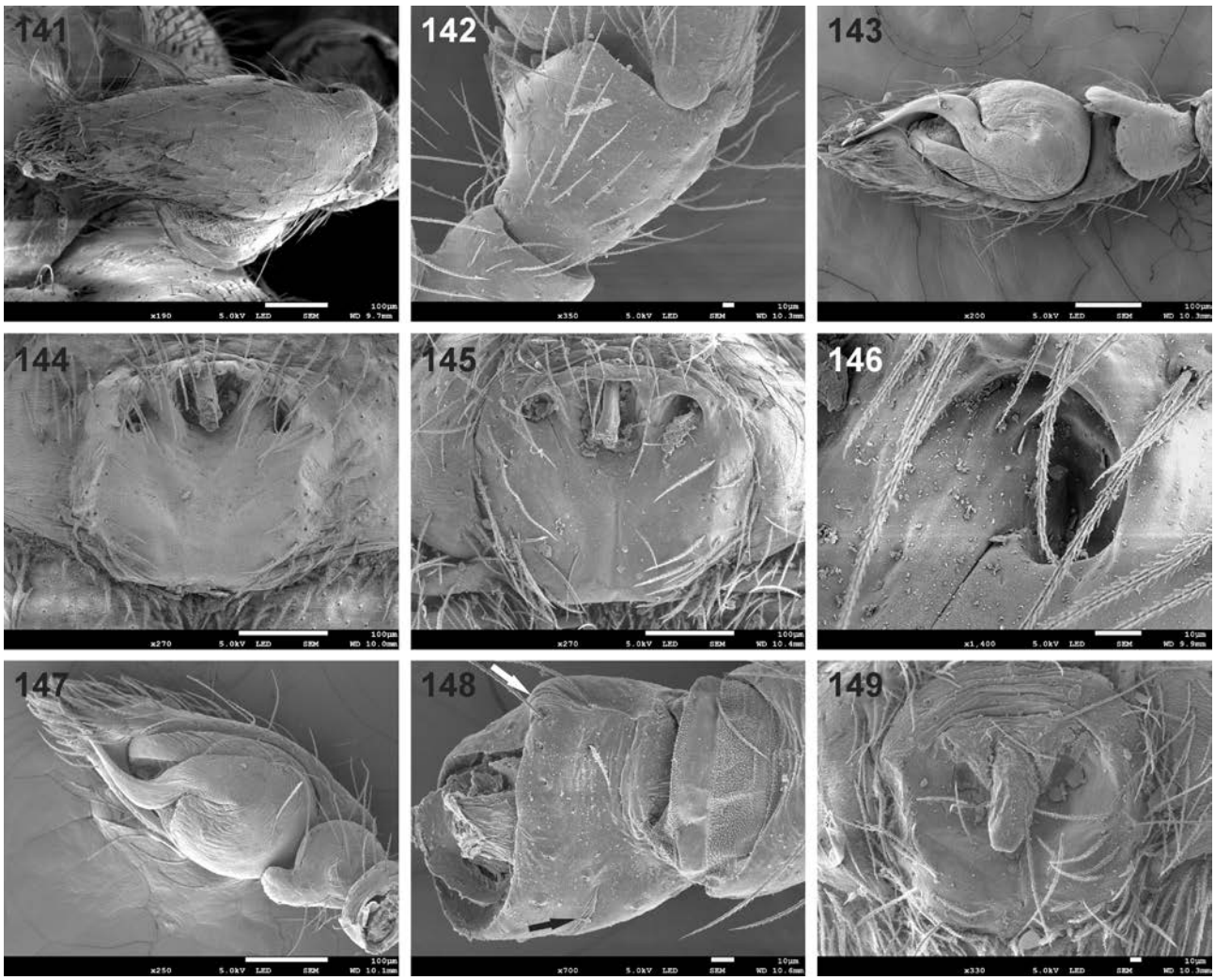
FIGURES 105–116. Scanning electron micrographs of *Falcaranea gladius* **sp. nov.** female (105–107, 112, 115, 116) and male (108–111, 113, 114). 105. Carapace, dorsal view; 106. Same, lateral view; 107. Eye region, anterodorsal view; 108. Same, dorsal view. 109. Mouthparts; 110. Chelicerae, ventral view; 111. Fang, posteroventral view, arrow indicating fang serrula. 112. Cheliceral teeth; 113. Serrula. 114. Sternum; 115. Patella IV, ventrolateral view, arrow indicating lyriform organ at distal end of patellar indentation; 116. Detail of previous.



FIGURES 117–128. Scanning electron micrographs of *Falcaranea maputensis* **sp. nov.** female (117–119, 122) and male (120, 121, 123–128). 117. Carapace, dorsal view; 118. Detail of carapace setae; 119. Eye region, dorsal view. 120. Mouthparts; 121. Sternum; 122. Ventral abdominal setae; 123. Patella IV, ventrolateral view, arrow indicating lyriform organ at distal end of patellar indentation; 124. Detail of previous; 125. Tibia I, dorsal view; 126. Detail of dorsal setae; 127. Dorsodistal end of tibia I, arrows indicating slit sensilla; 128. Metatarsus I, detail of dorsal setae.



FIGURES 129–140. Scanning electron micrographs of *Falcaranea gladius* **sp. nov.** male (129–133, 137–140) and female (134–136). 129–131. Tibia I, prolateral view (129), showing detail of ventral setae (130) and their bases (131); 132. Metatarsus I, prolateral view; 133. Tarsus I, prolateral view; 134–136. Tarsus II, dorsolateral view (134), arrow indicating tarsal organ, showing detail of tarsal organ (135) and tarsal claws (136); 137. Metatarsus IV, ventral preening comb; 138, 139. Tarsus IV, prolateral view (138) and detail of claw tuft (139); 140. Spinnerets.



FIGURES 141–149. Scanning electron micrographs of *Falcaranea gladius* **sp. nov.** male (141–143) and female (144–146) and *F. maputensis* **sp. nov.** male (147, 148) and female (149). 141, 142. Right palp, dorsal (141) and prolateral (142) views; 143, 147. Left palp, ventral view; 144, 145, 149. Epigyne, ventral view; 146. Detail of copulatory opening. 148. Right palpal patella, white and black arrows indicating pro- and retrolateral lyriform organs, respectively.

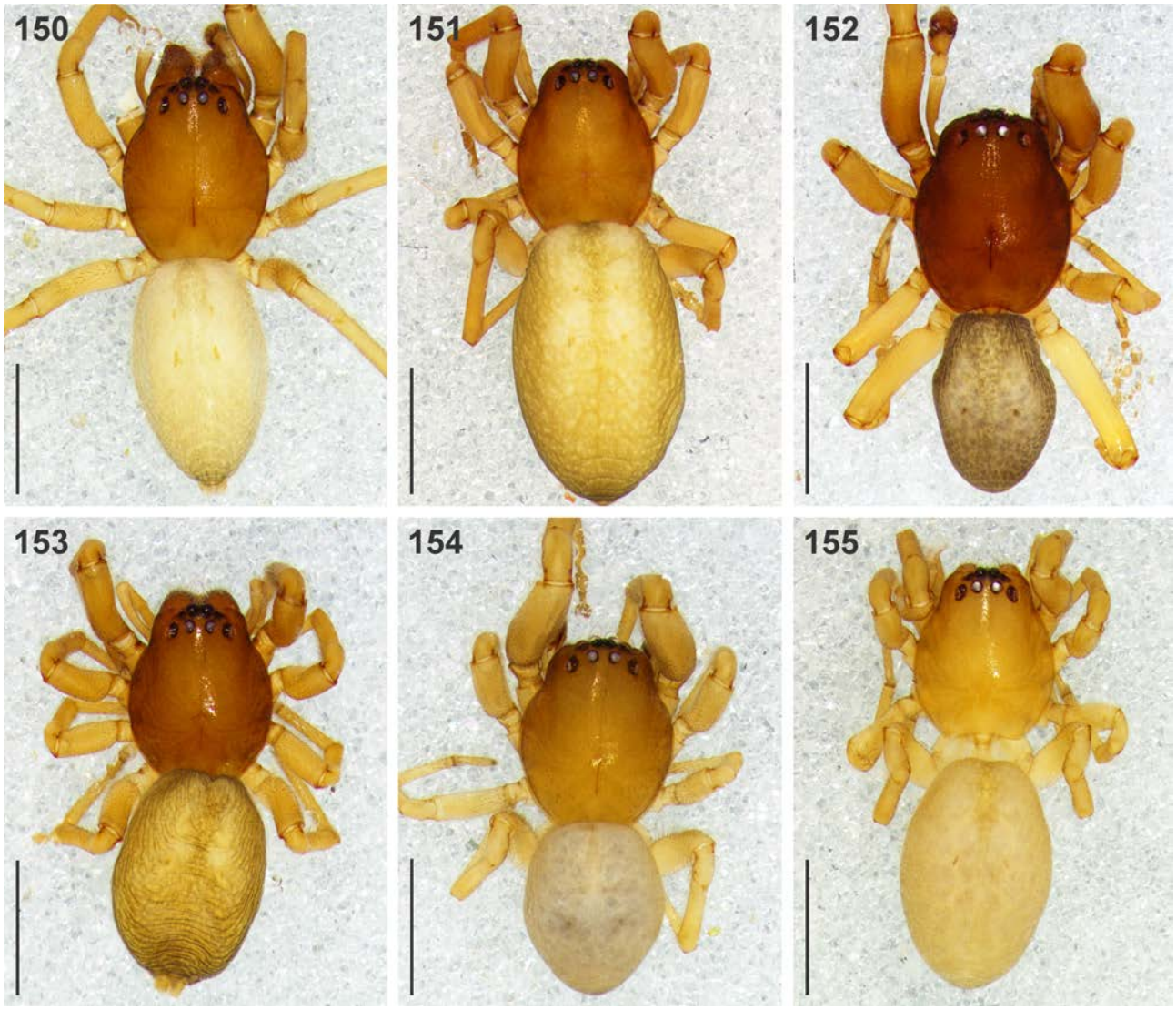
Falcaranea amatola sp. nov.

Figs 150, 151, 156–159

Etymology. This species is a noun in apposition referring to the Amatola Mountains in the Eastern Cape Province, South Africa, where most of the specimens were collected.

Diagnosis. Males of this species can be recognised by the slightly undulating embolus that is directed distally, without a pronounced curve near the middle of its length, and by the short thumb-like dorsal RTA (Figs 156, 157). Females share with *F. maputensis* **sp. nov.** the secondary spermathecae that are clearly smaller than the primary spermathecae, but can be distinguished by the clear space between them (almost touching in *F. maputensis* **sp. nov.**) and by the shape of the secondary spermathecae, almost square in *F. amatola* **sp. nov.** (Fig. 158) but teardrop-shaped in *F. maputensis* **sp. nov.** (Fig. 167). Furthermore, the scape is significantly smaller and not tongue-like in shape like that of *T. gladius* **sp. nov.** (Figs 144, 162) and *T. maputensis* **sp. nov.** (Fig 149, 167).

Male (paratype, Hogsback, TMSA 23867). Measurements: CL 1.37, CW 1.10, AL 1.73, AW 1.03, TL 3.13, FL 0.21, SL 0.86, SW 0.63, AME-AME 0.035, AME-ALE 0.015, ALE-ALE 0.22, PME-PME 0.71, PME-PLE 1.03, PLE-PLE 0.43. Length of leg segments (sequence from femur to tarsus, and total): I 0.98 + 0.54 + 0.76 + 0.61 + 0.39 = 3.28; II 0.84 + 0.44 + 0.67 + 0.59 + 0.37 = 2.91; III 0.71 + 0.36 + 0.49 + 0.60 + 0.29 = 2.45; IV 1.03 + 0.41 + 0.83 + 0.82 + 0.33 = 3.42.



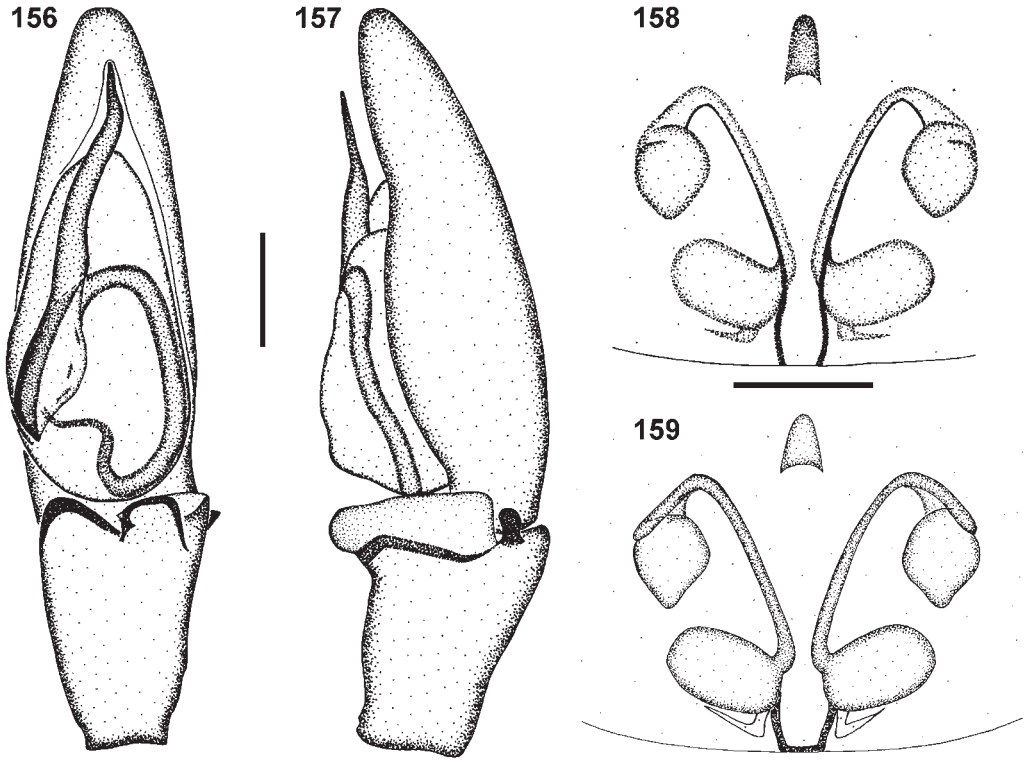
FIGURES 150–155. Digital microscope photographs of dorsal habitus of *Falcaranea* spp. 150, 151. *F. amatola* **sp. nov.**, male (150) and female (151); 152, 153. *F. gladius* **sp. nov.**, male (152) and female (153); 154, 155. *F. maputensis* **sp. nov.**, male (154) and female (155). Scale bars: 1 mm.

Carapace bright yellow-brown (Fig. 150); surface texture finely tuberculate, covered with short, fine setae; fovea long, distinct, deep orange-brown, at ¾ CL. Eye region brown, with black rings around eyes; AER slightly procurved; clypeus height approximately ¾ AME diameter; AME slightly larger than ALE; AME separated by distance equal to ⅓ their diameter; AME separated from ALE by distance equal to ⅙ AME diameter; PER recurved; PLE slightly larger than PME; PME separated by distance equal to ⅘ their diameter; PME separated from PLE by distance equal to 1⅕ PME diameter. Chelicerae orange-brown; labium and endites yellow-brown; sternum yellow-brown, darker around borders. Abdomen elongate-oval, dorsum cream with faint grey mottling, with slightly darker heart mark and fine cream chevrons in posterior third (Fig. 150); two pairs of elongate-oval sigilla, first pair at ¼ AL and second pair at midpoint of abdomen, each comprising two or three ovoid sclerites; dorsum covered in fine appressed brown setae; venter creamy-grey. Legs uniform yellow, I and II darker than III and IV, metatarsi and tarsi slightly darker than other segments. Palp with narrow cymbium tapering distally; embolus originating prolaterally on oval tegulum, slightly curved along its length, sword-like, directed distally; ventral RTA forming a broad shallow lamina, dorsal tibial apophysis short, stout, thumb-like (Figs 156, 157).

Female (holotype, Hogsback, NCA 2007/3838). Measurements: CL 1.30, CW 1.10, AL 1.60, AW 1.08, TL 3.00, FL 0.08, SL 0.83, SW 0.80, AME-AME 0.03, AME-ALE 0.01, ALE-ALE 0.20, PME-PME 0.08, PME-PLE 0.08, PLE-PLE

0.38. Length of leg segments (sequence from femur to tarsus, and total): I 0.98 + 0.53 + 0.68 + 0.63 + 0.40 = 3.22; II 0.88 + 0.48 + 0.68 + 0.60 + 0.25 = 2.89; III 0.73 + 0.33 + 0.50 + 0.63 + 0.30 = 2.35; IV 1.10 + 0.38 + 0.88 + 0.83 + 0.35 = 2.51.

Carapace pale brown (Fig. 151); surface texture finely wrinkled, covered with short, fine setae; fovea short, narrow, indistinct, at two thirds CL. AER slightly recurved; clypeus height equal to less than AME diameter; AME slightly larger than ALE; AME separated by distance approximately equal to ¾ their diameter; AME separated from ALE by distance equal to ½ AME diameter; PER recurved, PLE larger than PME; PME separated by distance equal to their diameter; PME separated from PLE by distance equal to ¾ PME diameter. Chelicerae brown, anterior surface covered in scattered short, fine setae. Sternum pale yellow, slightly darker towards border. Abdomen oval, pale grey dorsally; two pairs of brown sigilla, first pair pale, at approximately ¼ AL, second pair darker, posterior to midpoint. Legs pale brown; anterior legs slightly darker than posteriors. Epigyne with narrow fingernail-like triangular hood anteriorly; small, globular ST II connected to subrectangular ST I by connecting ducts at 60º angle to epigastric fold (Figs 158, 159).



FIGURES 156–159. *Falcaranea amatola* **sp. nov.** male (156, 157) and female (158, 159). 156. Left palp, ventral view; 157. Same, retrolateral view; 158. Epigyne, ventral view; 159. Same, dorsal view. Scale bars = 0.1 mm.

Type material. Holotype: ♀: **SOUTH AFRICA:** *Eastern Cape*: Amatola Mountains, Hogsback, Afromontane forest, 32°36'17.1"S, 26°56'34.8"E, 25.III.2007, leg. C. Haddad (beats, foliage) (NCA 2007/3838).

Paratypes: **SOUTH AFRICA:** *Eastern Cape*: Amatola Mountains, Hogsback, Pine plantation, 32°35.508'S, 26°56.538'E, 1210 m a.s.l., 1.IV.2012, leg. C. Haddad & J. Neethling (canopy fogging, *Podocarpus falcatus*), 4♂ 14♀ (NMBA 16267); Same locality, Never Daunted Guest House, 32°35.6'S, 26°55.5'E, 10.IV.2010, leg. C. Haddad (night collecting), 1♂ 2♀ (TMSA 23867); Fort Fordyce Nature Reserve, 32°41.133'S, 26°29.875'E, 1090 m a.s.l., 30.XI.2013, leg. C. Haddad & J. Neethling (canopy fogging, Afromontane forest, mixed canopy), 3♀ (NCA 2013/4418).

Other material. SOUTH AFRICA: *Eastern Cape*: Amatola Mountains, Hogsback, 32°35.770'S, 26°55.843'E, 1250 m a.s.l., 7.I.2010, leg. C. Haddad, C. Griswold & H. Wood (canopy fogging, exotic chestnut), 4♂ 5♀ (TMSA 23993); Same locality, Arboretum, 32°35.388'S, 26°56.123'E, 1200 m a.s.l., 26.III.2011, leg. C. Haddad, V. Swart, D. Fourie & R. du Preez (canopy fogging 1, *P. falcatus*), 5♀ (TMSA 23994); Same locality, Arboretum, 32°35.283'S, 26°56.151'E, 1250 m a.s.l., 1.IV.2012, leg. C. Haddad & J. Neethling (canopy fogging, *P. falcatus*), 2♀ (NCA 2014/748); Same data but 3.IV.2012, 1♀ (NCA 2014/681), 1♂ 1♀ (NCA 2014/682); Same locality, Pine plantation,

32°35.508'S, 26°56.538'E, 1210 m a.s.l., 1.IV.2012, leg. C. Haddad & J. Neethling (canopy fogging, *P. falcatus*), 2♀ (NCA 2014/748); Same locality, Pine plantation, 32°35.519'S, 26°55.965'E, 1400 m a.s.l., 21.III.2013, leg. C. Haddad & R. du Preez (canopy fogging, *Pinus radiata*), 3♀ (NCA 2014/293); Same locality, Tyume Forest, 32°35.987'S, 26°55.880'E, 1140 m a.s.l., 3.IV.2012, leg. C. Haddad, J. Neethling, A. van Rooyen & R. du Preez (canopy fogging, Afromontane forest, *Xymalos monospora*), 1♂ 2♀ (NCA 2014/453), 2♂ 3♀ (NCA 2014/479); Same locality, Never Daunted guest house, 32°35.683'S, 26°55.854'E, 1250 m a.s.l., 23.IV.2013, leg. C. Haddad, J. Neethling & R. du Preez (night collecting), 1♀ (NCA 2014/409); Amatola Mountains, 7 km S of Hogsback on R345, 32°38.831'S, 26°55.375'E, 715 m a.s.l., 1.X.2011, leg. J. Neethling & C. Luwes (canopy fogging, isolated tree, roadside), 5♂ 2♀ (NCA 2012/1884). *KwaZulu-Natal*: Oribi Gorge Nature Reserve, Samango Waterfall trail, 30°42.612'S, 30°16.182'E, 200 m a.s.l., 13.I.2011, leg. C. Haddad (canopy fogging, mixed forest trees), 1♂ 1♀ (TMSA 23988); Vernon Crookes Nature Reserve, 30°16'S, 30°37'E, 458 m a.s.l., 26.XI.2012, leg. J. Neethling (canopy fogging, *Vepris lanceolata*), 5♂ 6♀ (NCA 2013/936).

Distribution. Known only from the Eastern Cape and southern KwaZulu-Natal provinces, South Africa (Fig. 169).

Falcaranea gladius sp. nov.

Figs 95–116, 129–146, 152, 153, 160–164

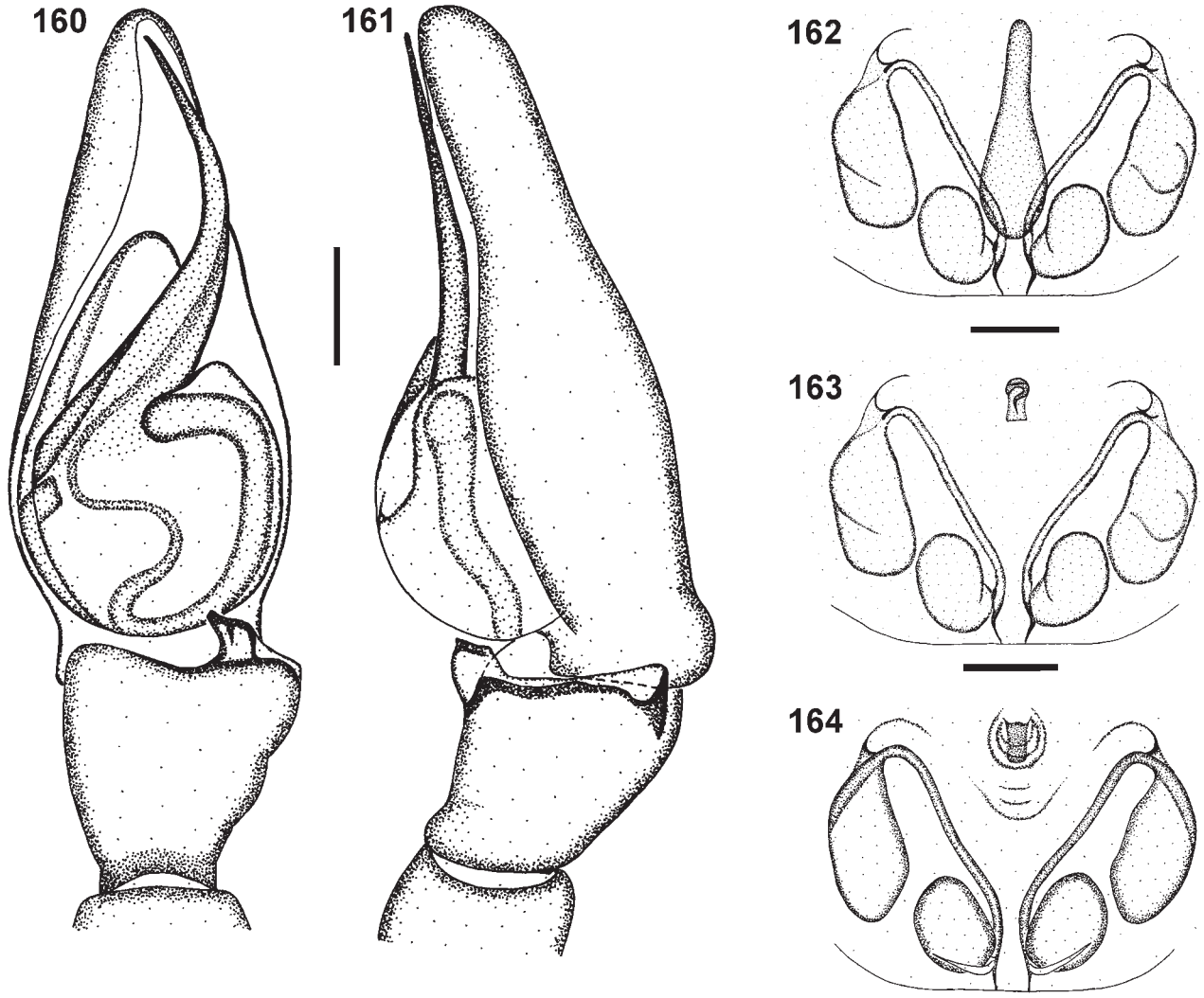
Etymology. This species name is the Latin *gladius*, meaning sword, referring to the shape of the male embolus; noun in apposition.

Diagnosis. The male palp has a tapering, slightly curved sword-like embolus, a short, broad RTA, and a blunt rounded retrobasal cymbial process (Figs 160, 161), while in *F. maputensis* **sp. nov.** the embolus has a sharp bend near the middle, an RTA comprising a rounded lobe and tooth-like dorsal apophysis, and a long digitiform retrocymbial process (Figs 165, 166). The female can be recognised by the sharply curved, small copulatory openings directed laterally, with obliquely orientated ST I (Figs 162–164), while in *F. maputensis* **sp. nov.** the copulatory openings are directed anteriorly and the ST I are transversely orientated (Figs 167, 168).

Male (holotype, Ndumo Game Reserve, NCA 2006/1517). Measurements: CL 1.70, CW 1.35, AL 1.90, AW 1.23, TL 3.65, FL 0.20, SL 0.98, SW 0.80, AME-AME 0.05, AME-ALE 0.03, ALE-ALE 0.28, PME-PME 0.10, PME-PLE 0.13, PLE-PLE 0.50. Length of leg segments (sequence from femur to tarsus, and total): I 1.38 + 0.68 + 1.00 + 1.00 + 0.48 = 4.54; II 1.15 + 0.63 + 0.90 + 0.83 + 0.45 = 3.96; III 0.90 + 0.43 + 0.61 + 0.78 + 0.33 = 3.05; IV 1.28 + 0.53 + 1.03 + 1.08 + 0.38 = 4.30.

Carapace brown to reddish brown (Fig. 152); first three quarters of carapace rounded, with steep decline in last quarter; surface texture moderately granular, covered with short, fine setae; fovea long, distinct, at two thirds CL. Eye region brown with black rings around eyes; AER slightly recurved, almost straight; clypeus height equal to approximately ½ AME diameter; AME and ALE equal in size; AME separated by distance equal to approximately ½ their diameter; AME separated from ALE by distance equal to ¼ AME diameter; PER recurved, PME and PLE equal in size; PME separated by distance equal to their diameter; PME separated from PLE by distance equal to PME diameter. Chelicerae brown; labium and endites yellow-brown. Sternum pale brown to brown, darker towards border; slightly elongated shield-shaped; surface with slightly grainy texture; short, fine setae scattered throughout sternum. Abdomen subpentagonal; pale grey dorsally with grey median stripe, expanding to cover abdomen posterior to midpoint (Fig. 152); two pairs of sigilla, first pair very pale brown, at ¼ AL, second pair darker, just posterior to midpoint. Legs I to IV pale yellow to pale brown; anterior legs darker than posteriors. Palp with cymbium tapering distally, with rounded retrobasal process; embolus originating medially on tegulum, basal section straight, slightly curved, sword-like, tapering to sharp point distally; RTA short, broad (Figs 141–143, 160, 161).

Female (paratype, Ndumo Game Reserve, NCA 2006/1517). Measurements: CL 1.40, CW 1.18, AL 2.30, AW 1.43, TL 3.80, FL 0.18, SL 0.88, SW 0.70, AME-AME 0.03, AME-ALE 0.01, ALE-ALE 0.20, PME-PME 0.08, PME-PLE 0.08, PLE-PLE 0.40. Length of leg segments (sequence from femur to tarsus, and total): I 0.95 + 0.53 + 0.73 + 0.40 + 0.40 = 3.01; II 0.88 + 0.50 + 0.70 + 0.53 + 0.40 = 3.01; III 0.78 + 0.35 + 0.53 + 0.58 + 0.30 = 2.53; IV 1.05 + 0.48 + 0.85 + 0.90 + 0.28 = 3.56.



FIGURES 160–164. *Falcaranea gladius* **sp. nov.** male (160, 161) and female (162–164). 160. Left palp, ventral view; 161. Same, retrolateral view; 162, 163. Epigyne, ventral view, showing variations in scape lengths, whole (162) and broken off (163); 164. Same, dorsal view. Scale bars = 0.1 mm.

Carapace orange-brown (Fig. 153); surface texture moderately granular, covered with short, fine setae; fovea short, relatively distinct, at ⅔ CL. AER slightly procurved; clypeus height approximately equal to ¾ AME diameter; AME larger than ALE; AME separated by distance equal to ¾ their diameter; AME separated from ALE by distance equal to approximately ⅗ AME diameter; PER recurved, PLE slightly larger than PME; PME separated by distance equal to slightly more their diameter; PME separated from PLE by distance equal to ⅗ PME diameter. Chelicerae orange-brown; endites and labium yellow-brown. Sternum yellow-brown, darker towards border. Abdomen oval, dorsum mottled grey; grey median line extending to midpoint of abdomen, covering abdomen posteriorly (Fig. 153); sigilla not always distinct; two pairs of sigilla, first pair pale brown, near ¼ AL, second pair darker, posterior to midpoint. Legs I to IV pale yellow to pale brown; anterior legs slightly darker than posteriors. Epigyne with hook-like copulatory openings posterior to ST II; ST II long, elongated, almost ⅔ epigyne length; thin fertilization ducts, at 45º angle to epigastric fold, leading to small, kidney-shaped ST I; epigynal scape usually tongue-like, often smaller or broken off (Figs 144, 145, 162–164).

Type material. Holotype ♂ and paratype ♀: **SOUTH AFRICA:** *KwaZulu-Natal*: Ndumo Game Reserve, Pongola River floodplain, 26°53'21.7"S, 32°19'53.5"E, 8.VII.2004, leg. C. Haddad (fever tree bark) (NCA 2006/1517).

Paratypes: **SOUTH AFRICA:** *KwaZulu-Natal*: False Bay Park [27°58'S, 32°25'E], 28.I.2004, leg. J. Esterhuizen (tsetse fly survey), 1♀ (NCA 2004/778); Mtunzini, Twin Streams Farm (I.F. Garland), 28°57'S,

31°46'E, 19–29.I.1984, leg. T. & C. Griswold, P. Croeser & P. Reavell, 2♀ (NMSA); Ndumo Game Reserve, W shore of Nyamiti Pan, 26°53.722'S, 32°16.745'E, 7.VII.2002, leg. C. Haddad (fever tree bark), 1♂ (NCA 2002/413); Same locality, Southern boundary fence, 26°55.664'S, 32°19.038'E, 9.II.2005, leg. C. Haddad (sand forest, *Commiphora harveyi* bark), 1♂ (NCA 2005/1); Same locality, Southern boundary fence, 26°55.6'S, 32°19.0'E, 13.VI.2005, leg. C. Haddad (*C. harveyi* bark), 1♂ 2♀ (NCA 2006/1340). *Mpumalanga*: Badplaas, Embuleni Nature Reserve, 25°57'12"S, 30°33'15"E, 1100 m a.s.l., 28.III.2001, leg. D. & S. Ubick (grassveld savannah, in wooded areas), 1♂ (CAS); Same locality, 28.III.2001, leg. M. Ramirez, 1♀, with 1 non-type imm. (MACN-Ar 30346); Same locality, 28.III.2001, leg. A. Russell-Smith, 1♂ (BMNH). *Limpopo*: Phalaborwa [23°57'S, 31°08'E], 13.VIII.2001, leg. S. Neser (from old pods of *Dichrostachys cinerea*), 1♀ (NCA 2002/162).

Other material examined. SOUTH AFRICA: *KwaZulu-Natal*: iSimangaliso Wetlands Park, St Lucia, 28°23'03.9"S, 32°24'25.4"E, 24 m a.s.l., 13.V.2012, leg. J. Neethling & C. Luwes (canopy fogging 3, coastal forest, *Trichilia dregeana*), 1♂ (MACN-Ar 31225); Same locality, St Lucia, 28°23'04.3"S, 32°24'24.0"E, 22 m a.s.l., 13.V.2012, leg. J. Neethling & C. Luwes (canopy fogging 5, coastal forest, *Trichilia emetica*), 1♂ 5♀ (NCA 2012/3984); Same locality, Meersig, 28°14'07.5"S, 32°29'21.0"E, 14 m a.s.l., 14.V.2012, leg. J. Neethling & C. Luwes (canopy fogging 6, coastal forest, *Syzigium cordatum*), 3♀ (NCA 2021/1314); Ithala Game Reserve, Ntshodwe Camp, 27°32.699'S, 31°16.911'E, 27.I.2004, leg. C. Haddad (night collecting), 1♀ (NCA 2013/4962); Mkuze, Banghoek Lodge, 27°46'03.3"S, 32°08'22.3"E, 131 m a.s.l., 17.V.2012, leg. J.A. Neethling & C. Luwes (canopy fogging 9, bushveld, *Berchemia zeyheri*), 1♀ (NCA 2012/4270); Ndumo Game Reserve, Banzi Pan, 26°53.066'S, 32°17.218'E, 35 m a.s.l., 7.XII.2018, leg. C. Haddad, R. Booysen & J. Neethling (canopy fogging, *Spirostachys africana*), 1♂ 1♀ (NCA 2019/593), 4♂ 5♀ (NCA 2019/256); Same locality, Nyamiti Pan, 26°53.409'S, 32°17.576'E, 35 m a.s.l., 3.XII.2019, leg. C. Haddad & V. Swart (canopy fogging, *Pappea capensis*), 11♂ 13♀ (NCA 2020/308); Same locality, Pongola River, Pump station, 26°54.309'S, 32°19.444'E, 36 m a.s.l., 2.VII.2009, leg. C. Haddad, R. Lyle & V. Butler (canopy fogging, *Breonadia salicina*, riverine forest), 1♂ 3♀ (NCA 2013/947); Same locality, Road to Shokwe Pan, 26°52.550'S, 32°12.695'E, 30.I.2014, leg. C. Haddad & Z. Mbo (canopy fogging, *Albizia versicolor*), 1♂ (MACN-Ar 32945), 1♂ 1♀ (MACN-Ar 32946), 1♀ (MACN-Ar 32947); Same locality, Shokwe Pan, 26°52.502'S, 32°12.637'E, 30.I.2014, leg. C. Haddad (*Vachellia xanthophloea* bark), 1♂ (MACN-Ar 32953); Same locality, Southern boundary, 26°53.276'S, 32°11.025'E, 30.I.2014, leg. C. Haddad & Z. Mbo (canopy fogging, *Senegalia nigrescens*), 2♂ (NCA 2013/5239); Ophathe Game Reserve, Ophathe River bed, 28°23.727'S, 31°23.643'E, 455 m a.s.l., 2.X.2008, leg. C. Haddad (active searching), 1♂ (NCA 2008/2884); Same locality, Overgrazed savanna, 28°22.135'S, 31°23.363'E, 560 m a.s.l., 28.IX.2008, leg. C. Haddad (night collecting), 2♀ 1 juv. (NCA 2008/2881); Same locality, Overgrazed savanna, 28°22.135'S, 31°23.363'E, 560 m a.s.l., 28.IX.2008, leg. C. Haddad (active searching), 1♀ (NCA 2008/4133); Same locality, Rocky mountainside, 28°23.202'S, 31°23.077'E, 505 m a.s.l., 1.X.2008, leg. C. Haddad (active searching), 1♀ (NCA 2008/2875); Pongolapoort Nature Reserve, N2 roadside, 27°27'21.6"S, 31°54'37.7"E, 207 m a.s.l., 20.V.2012, leg. J. Neethling & C. Luwes (canopy fogging, *Vachellia karroo*, bushveld), 2♂ 1♀ (NCA 2012/3985).

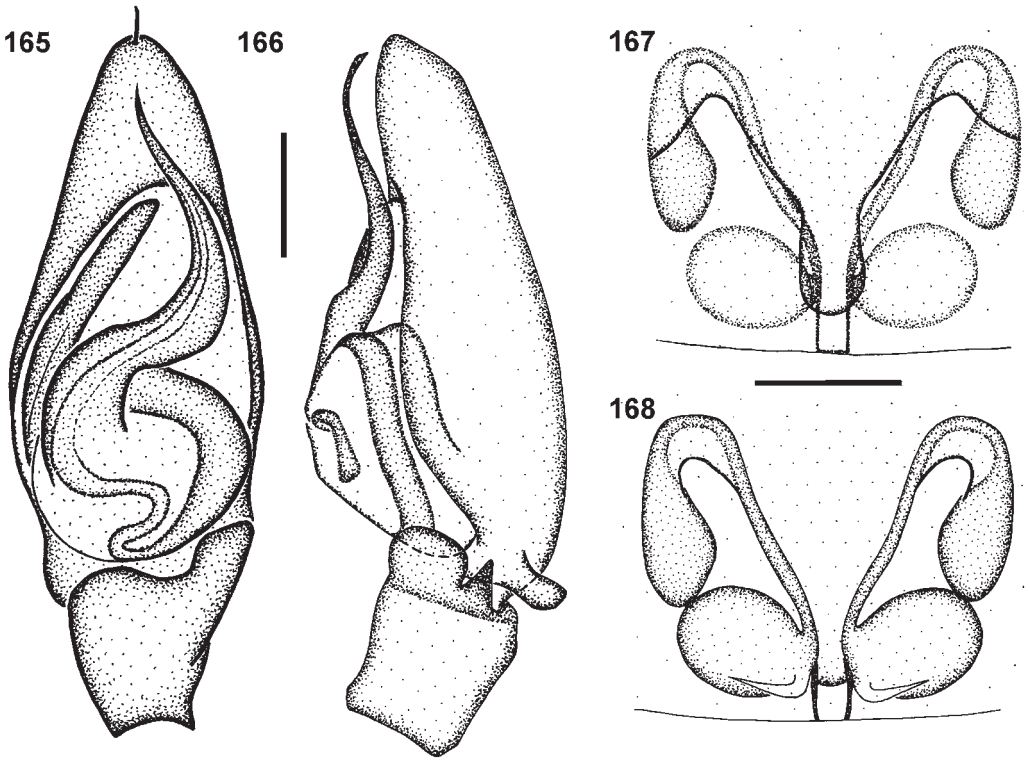
Distribution. Recorded from subtropical eastern South Africa (Fig. 169).

Falcaranea maputensis sp. nov.

Figs 117–128, 147–149, 154, 155, 165–168

Etymology. This species name is derived from the Maputaland ecoregion in northern KwaZulu-Natal Province, South Africa and southern Mozambique, where most of the specimens were collected.

Diagnosis. Males of *F. maputensis* **sp. nov.** can be easily recognized from congeners by the relatively long retrocymbial basal process and the sharp bend near the middle of the embolus (Figs 165, 166). Females share with *F. gladius* **sp. nov.** the presence of a long membranous scape in the epigyne, but can be distinguished by the anterior rather than lateral orientation of the copulatory openings (compare Figs 167 and 162). The ST I are larger, more spherical, and transversely orientated, while those of *F. gladius* **sp. nov.** are smaller and obliquely orientated (compare Figs 168 and 164).



FIGURES 165–168. *Falcaranea maputensis* **sp. nov.** male (165, 166) and female (167, 168). 165. Left palp, ventral view; 166. Same, retrolateral view; 167. Epigyne, ventral view 168. Same, dorsal view. Scale bars = 0.1 mm.

Male (holotype, St Lucia, NCA 2012/3958). Measurements: CL 1.34, CW 1.14, AL 1.43, AW 1.05, TL 2.65, FL 0.22, SL 0.75, SW 0.63, AME-AME 0.04, AME-ALE 0.01, ALE-ALE 0.22, PME-PME 0.08, PME-PLE 0.11, PLE-PLE 0.44. Length of leg segments (sequence from femur to tarsus, and total): I 1.00 + 0.52 + 0.81 + 0.62 + 0.33 = 3.28; II 0.82 + 0.42 + 0.65 + 0.57 + 0.30 = 2.76; III 0.67 + 0.35 + 0.44 + 0.60 + 0.27 = 2.33; IV 1.00 + 0.43 + 0.78 + 0.84 + 0.31 = 3.36.

Carapace bright yellow, with faint grey mottling (Fig. 154); surface finely granulate, more pronounced in slopes; fovea long, distinct, at ⅔ CL. AER slightly procurved; clypeus height slightly less than AME diameter; AME slightly larger than ALE; AME separated by distance equal to ½ their diameter; AME separated from ALE by distance approximately equal to ⅛ AME diameter; PER recurved, PLE slightly larger than PME; PME separated by distance approximately equal to their diameter; PME separated from PLE by distance equal to 1¼ PME diameter. Chelicerae bright yellow; endites and labium pale yellow-brown, with faint grey mottling. Sternum yellow, with faint black mottling, border brown. Abdomen oval, uniform creamy-grey dorsally and ventrally; two pairs of sigilla, first pair indistinct, pale grey, at ¼ AL; second pair distinct, oval, at midpoint. Legs I yellow, II to IV pale yellow, without mottling or markings. Palp with oval cymbium, tapering distally; embolus originating prolaterally on tegulum with broad base, somewhat S-shaped, initially directed distally, bending almost 90 degrees towards retrolateral side, with another sharp retrolateral bend, with distal section gradually narrowing, with tip directed distally; ventral tibial apophysis forming broad, shallow lobe; dorsal RTA adjacent to ventral, triangular, tooth-like; cymbium with distinct finger-like dorsal basal apophysis (Figs 147, 165, 166).

Female (paratype, Inhaca, NCA 93/220). Measurements: CL 1.20, CW 0.90, AL 1.38, AW 0.95, TL 2.58, FL 0.10, SL 0.68, SW 0.60, AME-AME 0.05, AME-ALE 0.03, ALE-ALE 0.20, PME-PME 0.08, PME-PLE 0.08, PLE-PLE 0.40. Length of leg segments (sequence from femur to tarsus, and total): I 0.70 + 0.38 + 0.48 + 0.40 + 0.28 = 2.24; II 0.58 + 0.35 + 0.40 + 0.38 + 0.25 = 1.96; III 0.55 + 0.28 + 0.30 + 0.40 + 0.23 = 1.76; IV 0.83 + 0.35 + 0.48 + 0.63 + 0.25 = 2.54.

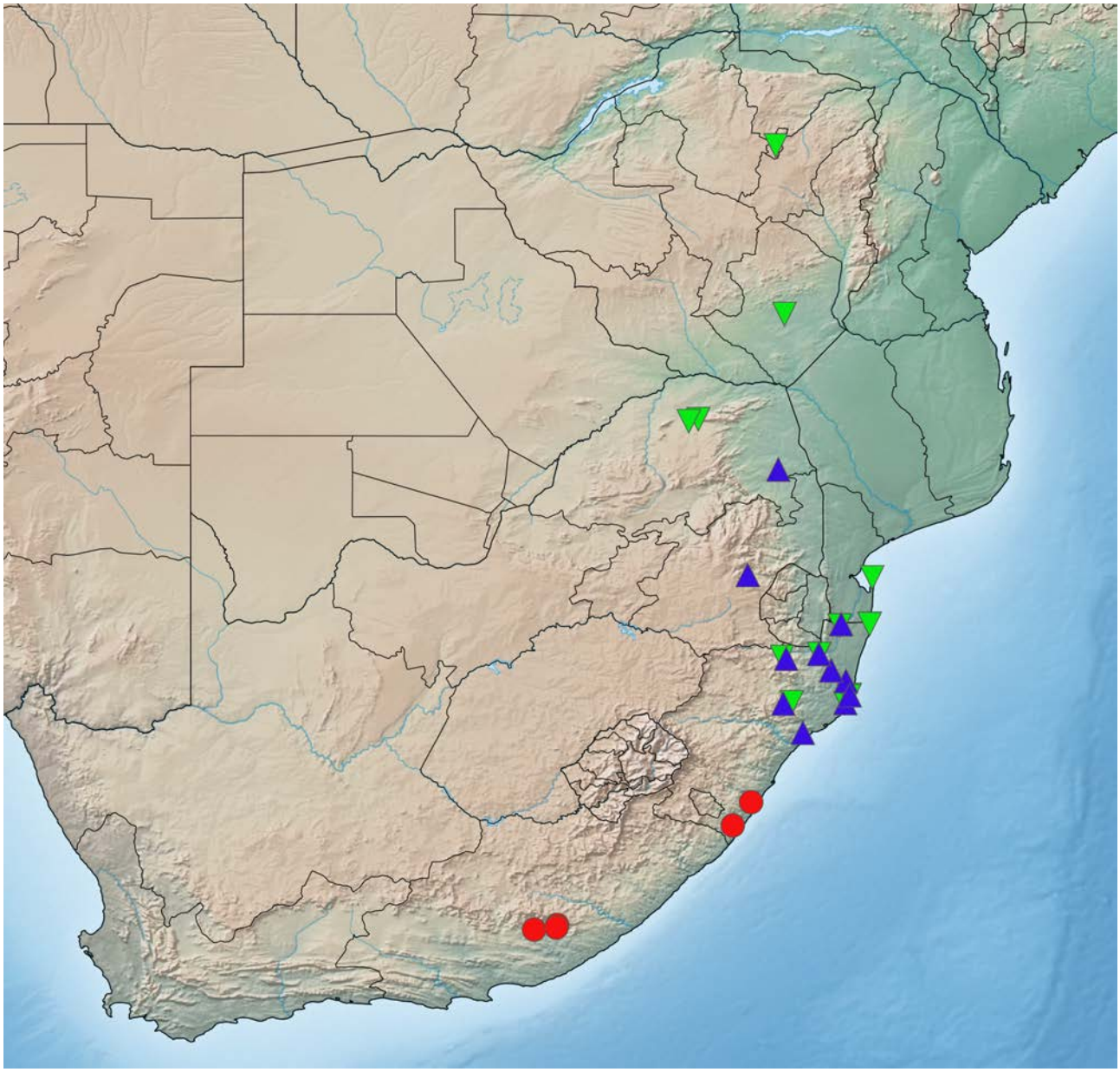


FIGURE 169. Distribution of *Falcaranea amatola* **sp. nov.** (red circles), *F. gladius* **sp. nov.** (blue triangles) and *F. maputensis* **sp. nov.** (green triangles) in southern Africa.

Carapace orange-brown (Fig. 155); surface texture granular, covered with short, fine setae; fovea short, distinct, at two thirds CL. AER slightly recurved; clypeus height equal to approximately ½ AME diameter; AME and ALE equal in size; AME separated by distance equal to ⅖ their diameter; AME separated from ALE by distance equal to ⅖ AME diameter; PER recurved, PLE slightly larger than PME; PME separated by distance equal to their diameter; PME separated from PLE by distance equal to PME diameter. Chelicerae orange, anterior surface scattered with long, fine setae; three promarginal teeth, proximal tooth largest, distal tooth smallest; two retromarginal teeth, distal tooth largest. Sternum pale brown, darker at border. Abdomen pale yellow with pale grey median line dorsally, extending towards midpoint, mottled grey posteriorly (Fig. 155); two pairs of distinct brown sigilla, one pair anterior to midpoint and other pair posterior to midpoint of abdomen; abdomen broad anteriorly, tapering posteriorly. Legs I to IV uniform pale yellow. Epigyne with large, tongue-like hood extending over almost entire length of epigyne; copulatory openings anterolaterally situated, directed anteriorly with spermathecal ducts at 60º angle to epigastric fold; ST II small, subtriangular, anterolaterally situated; ST I larger, oval, near proximal end of epigynal hood (Figs 149, 167, 168).

Type material. Holotype ♂: **SOUTH AFRICA:** *KwaZulu-Natal*: iSimangaliso Wetlands Park, St Lucia, 28°23'02.3"S, 32°24'25.7"E, 21 m a.s.l., 13.V.2012, leg. J. Neethling & C. Luwes (canopy fogging 4, coastal forest, *Trichilia dregeana*) (NCA 2012/3958);

Paratypes: **MOZAMBIQUE:** Inhaca Island, Village Hotel, 26°00'S, 32°55'E, 23.XII.1992, leg. T. Steyn, 1♀ (NCA 93/220). **SOUTH AFRICA:** *KwaZulu-Natal*: iSimangaliso Wetlands Park, St Lucia, 28°23'02.3"S, 32°24'25.7"E, 21 m a.s.l., 13.V.2012, leg. J. Neethling & C. Luwes (canopy fogging 4, coastal forest, *T. dregeana*), 2♂ 3♀ (NCA 2012/4260); Kosi Bay, 26°53'S, 32°52'E, 28.X.1987, leg. M. Filmer (bush beating), 1♀ (NCA 88/506); Ndumo Game Reserve, Staff housing, 26°54.660'S, 32°17.930'E, 130 m a.s.l., 5.XII.2018, leg. C. Haddad, R. Booysen & J. Neethling (canopy fogging, *Commiphora neglecta*), 3♂ 1♀ (NCA 2019/758); Same locality, Nyamiti Pan, 26°53.409'S, 32°17.576'E, 35 m a.s.l., 3.XII.2019, leg. C. Haddad & V. Swart (canopy fogging, *Pappea capensis*), 8♀ (NCA 2020/309). **ZIMBABWE:** Harare, Highlands, 18 Walmer Drive [17°48'S, 31°05'E], 4.I.2006, leg. M. Cumming (running up trunk of *Acacia sieberiana*), 1♂ (BMNH); Lowveld, Triangle, 2131A2, 24.X.1979, leg. M. Saunders, 1♀ (NMZ/A890).

Other material examined. SOUTH AFRICA: *KwaZulu-Natal*: iSimangaliso Wetland Park, Crocodile Centre, 28°21'24.4"S, 32°25'11.0"E, 24 m a.s.l., 12.V.2012, leg. J.A. Neethling & C. Luwes (canopy fogging 1, indigenous bush, *Trichilia emetica*), 1♂ 1♀ (NCA 2012/4267); Same locality, Meersig, 28°14'07.5"S, 32°29'21.0"E, 14 m a.s.l., 14.V.2012, leg. J. Neethling & C. Luwes (canopy fogging 6, coastal forest, *Syzigium cordatum*), 2♂ 6♀ (NCA 2012/4262); Same locality, near Mission Rocks Beach, 28°15'53.1"S, 32°28'52.8"E, 83 m a.s.l., 12.V.2012, leg. J. Neethling & C. Luwes (canopy fogging, *Albizia adianthifolia*, indigenous bush), 3♂ 4♀ (NCA 2013/7); Same locality, St Lucia, 28°23'03.9"S, 32°24'25.4"E, 24 m a.s.l., 13.V.2012, leg. J. Neethling & C. Luwes (canopy fogging 3, coastal forest, *T. dregeana*), 1♂ 1♀ (MACN-Ar 44910); Ithala Game Reserve, Doornkraal Camp, 27°30.735'S, 31°12.231'E, 28.I.2014, leg. C. Haddad & Z. Mbo (canopy fogging, mixed trees), 1♂ (NCA 2013/5271); Ndumo Game Reserve, Nyamiti Pan, 26°53.409'S, 32°17.576'E, 35 m a.s.l., 3.XII.2019, leg. C. Haddad & V. Swart (canopy fogging, *Pappea capensis*), 3♂ 3♀ (S.E.M. preparations); Ophathe Game Reserve, 28°22.135'S, 31°23.363'E, 560 m a.s.l., 28.IX.2008, leg. C. Haddad (active search, overgrazed savanna), 1♀ (NCA 2008/4133); Pongolapoort Nature Reserve, N2 roadside, 27°27'21.6"S, 31°54'37.7"E, 207 m a.s.l., 20.V.2012, leg. J. Neethling & C. Luwes (canopy fogging, *Vachellia karroo*, bushveld), 2♂ 1♀ (NCA 2012/3985). *Limpopo*: Makhado, Medike Mountain Reserve, 22°59.650'S, 29°36.822'E, 815 m a.s.l., 11.XI.2012, leg. J. Neethling (canopy fogging, *Cassia abbreviata*, montane bushveld), 2♂ 1♀ (NCA 2013/1984); Vivo, Lajuma Mountain Retreat, 23°02'S, 29°26'E, 1300 m a.s.l., 10.XI.2012, leg. J. Neethling (canopy fogging, Afromontane forest), 3♀ (NCA 2013/2008), 3♂ 4♀ (NCA 2013/2009).

Distribution. Known from various localities from southern Mozambique, north-eastern South Africa and eastern Zimbabwe (Fig. 169).

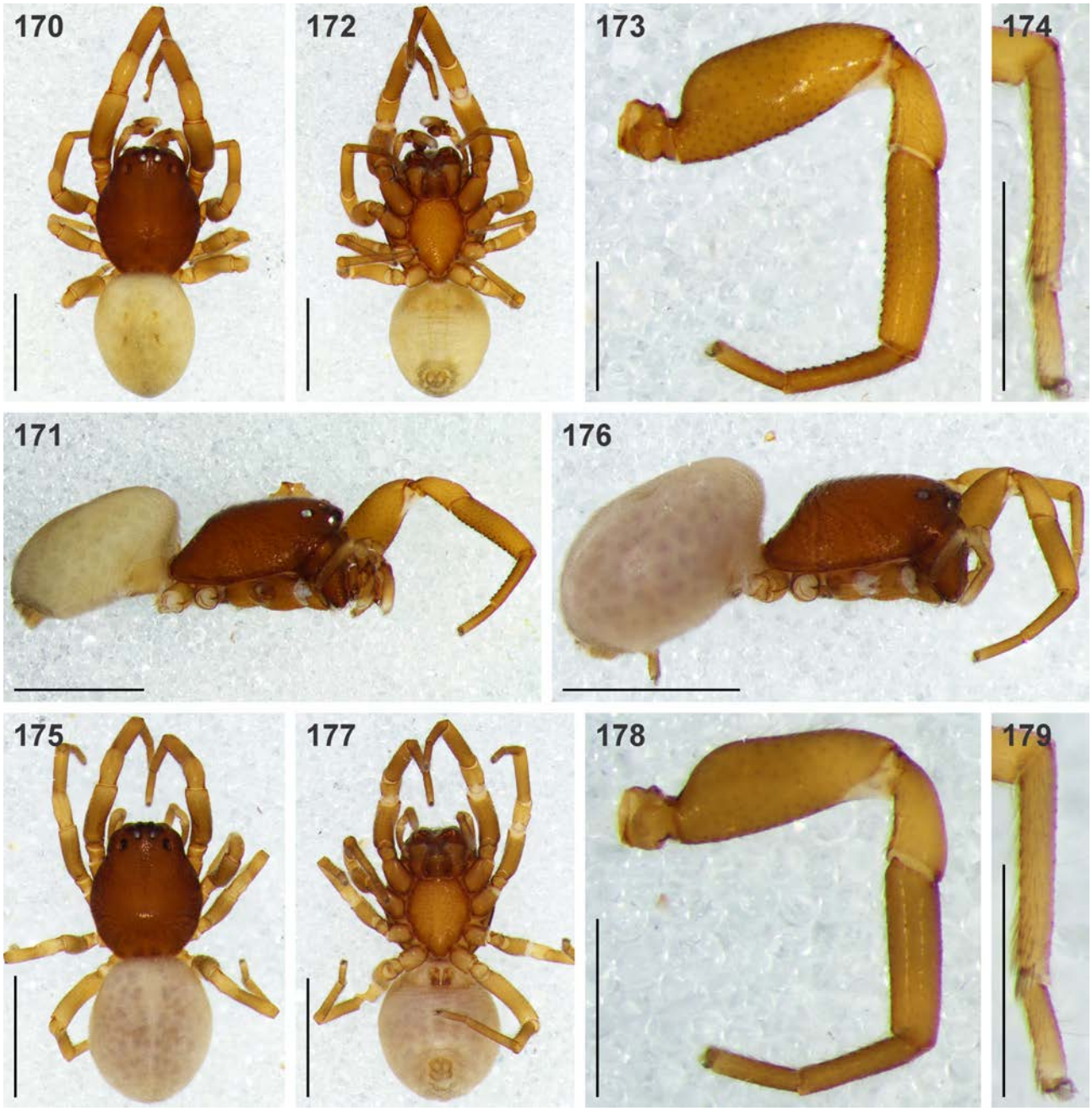
Trachecymbius gen. nov.

Type species. *Trachecymbius tyume* **sp. nov.**

Etymology. The genus name is a contraction of the genus name *Trachelas*, and the morphological structure "cymbium", containing the male copulatory organs, and refers to the strongly developed retrobasal cymbial apophysis in this genus. Gender masculine.

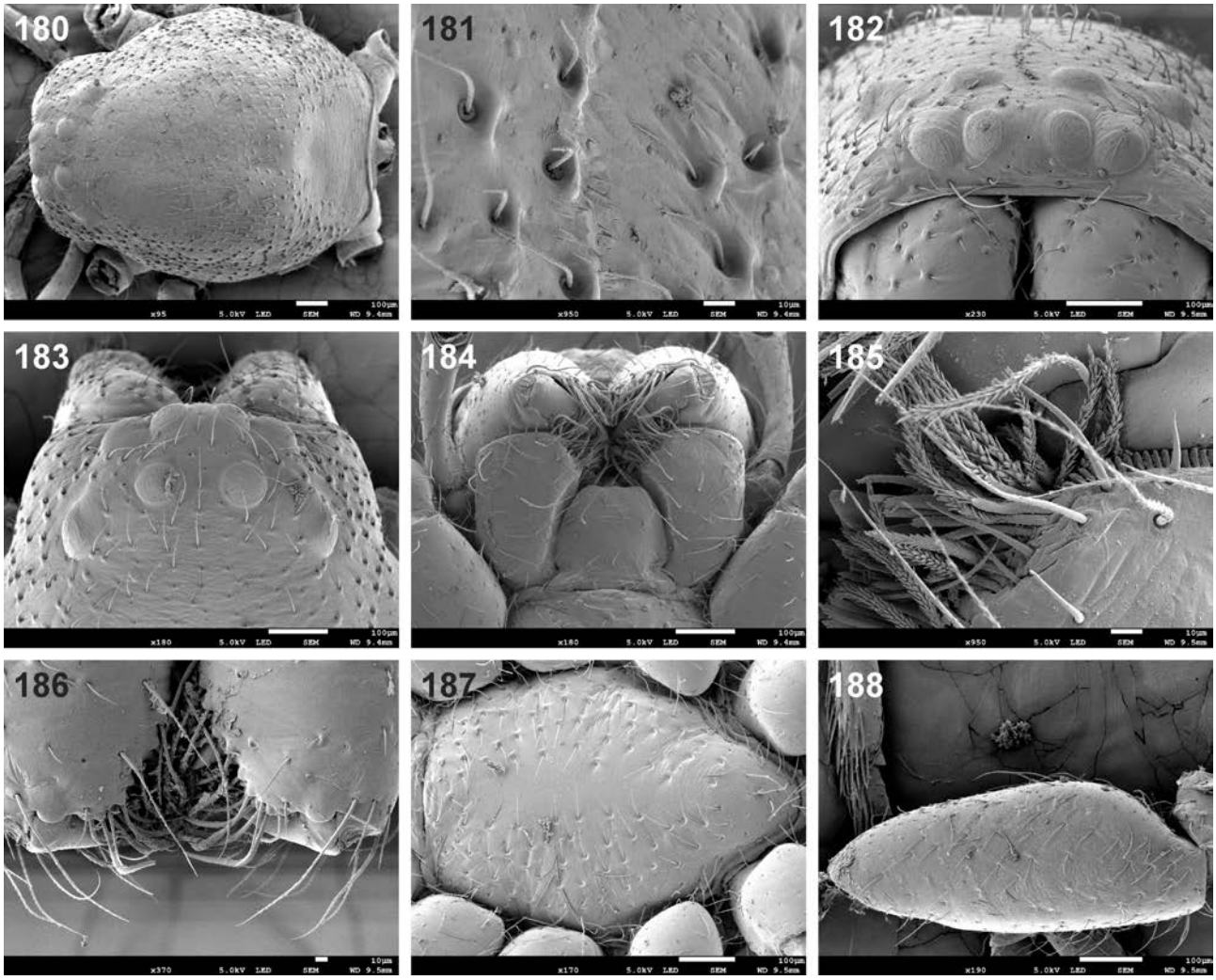
Diagnosis. Males of the new genus share with *Falcaranea* **gen. nov.** the strongly recurved posterior eye row with widely separated eyes and the presence of a retrobasal cymbial process, but this process is considerably larger and the embolus is short and originates distally in *Trachecymbius* **gen. nov.**, while in *Falcaranea* **gen. nov.** the process is small and the embolus is long and slender, originating mesally on the tegulum. Females can be distinguished by the almost parallel connecting ducts of the spermathecae, in their distal section at least, and the bilobed ST I, while in *Falcaranea* **gen. nov.** the connecting ducts are oblique and the ST I are single-lobed and oval in shape.

Description. Small spiders, 2.16–3.24 mm in length; carapace bright orange-brown to dark brown (Figs 170, 175, 215–221); carapace oval, broadest at posterior of coxae II, eye region narrowed; fovea indistinct, a short shallow depression; posterior margin of carapace very slightly concave (Figs 180, 189); carapace surface granulate, more prominent along lateral slopes, with posterior slope usually lacking tubercles (Figs 180–183, 189); carapace elevated from clypeus to behind posterior eyes, slightly convex dorsally, highest at ¾ carapace length, with steep posterior slope (Figs 171, 176). All eyes surrounded by black rings (Figs 170, 175, 215–221); AER procurved in anterior



FIGURES 170–179. Digital microscope photographs of somatic morphology of *Trachecymbius tyume* **sp. nov.** male (170–174) and female (175–179). 170, 175. Habitus, dorsal view; 171, 176. Same, lateral view; 172, 177. Same, ventral view; 173, 178. Leg I, prolateral view; 174, 179. Metatarsus and tarsus IV. Scale bars = 1.0 mm (170–172, 175–177), 0.5 mm (173, 174, 178, 179).

view (Fig. 182), slightly recurved in dorsal view (Figs 183, 190), AME approximately ¾ ALE diameter; AME separated by approximately ½ their diameter, nearly touching ALE (Fig. 182); PER strongly recurved in dorsal view (Figs 183, 190); PME slightly smaller than PLE; PME separated by distance approximately equal to their diameter, from PLE by distance slightly larger than PME diameter; MOQ narrower anteriorly than posteriorly, length and posterior width approximately equal. Chilum indistinct, single, a narrow transverse sclerite; cheliceral promargin and retromargin usually with two teeth each, cheliceral escort seta present (Figs 185, 186); fang with distinct serrula; endites straight or slightly concave laterally (Figs 184, 191), with distinct serrula comprising sharp, straight denticles (Figs 185, 192); dense maxillar hair tuft on mesal margins (Figs 184, 191); labium trapezoidal, slightly wider than

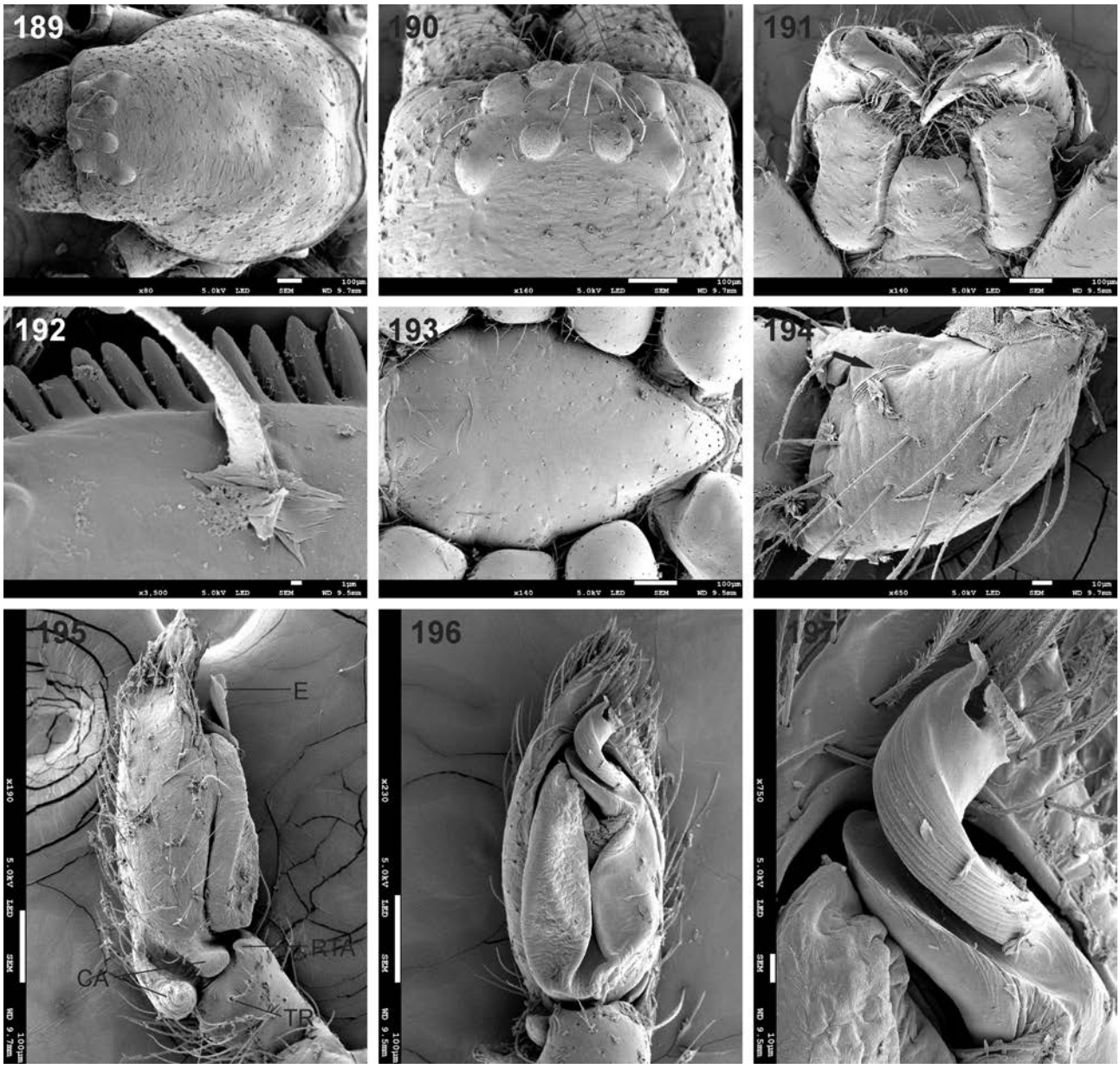


FIGURES 180–188. Scanning electron micrographs of *Trachecymbius tyume* **sp. nov.** female (180, 182–188) and male (181). 180. Carapace, dorsal view; 181. Detail of carapace texture; 182. Eye region, dorsal view; 183. Same, anterior view; 184. Mouthparts; 185. Maxillar hair tuft and serrula; 186. Chelicerae, anterior view; 187. Sternum; 188. Femur I, retrolateral view.

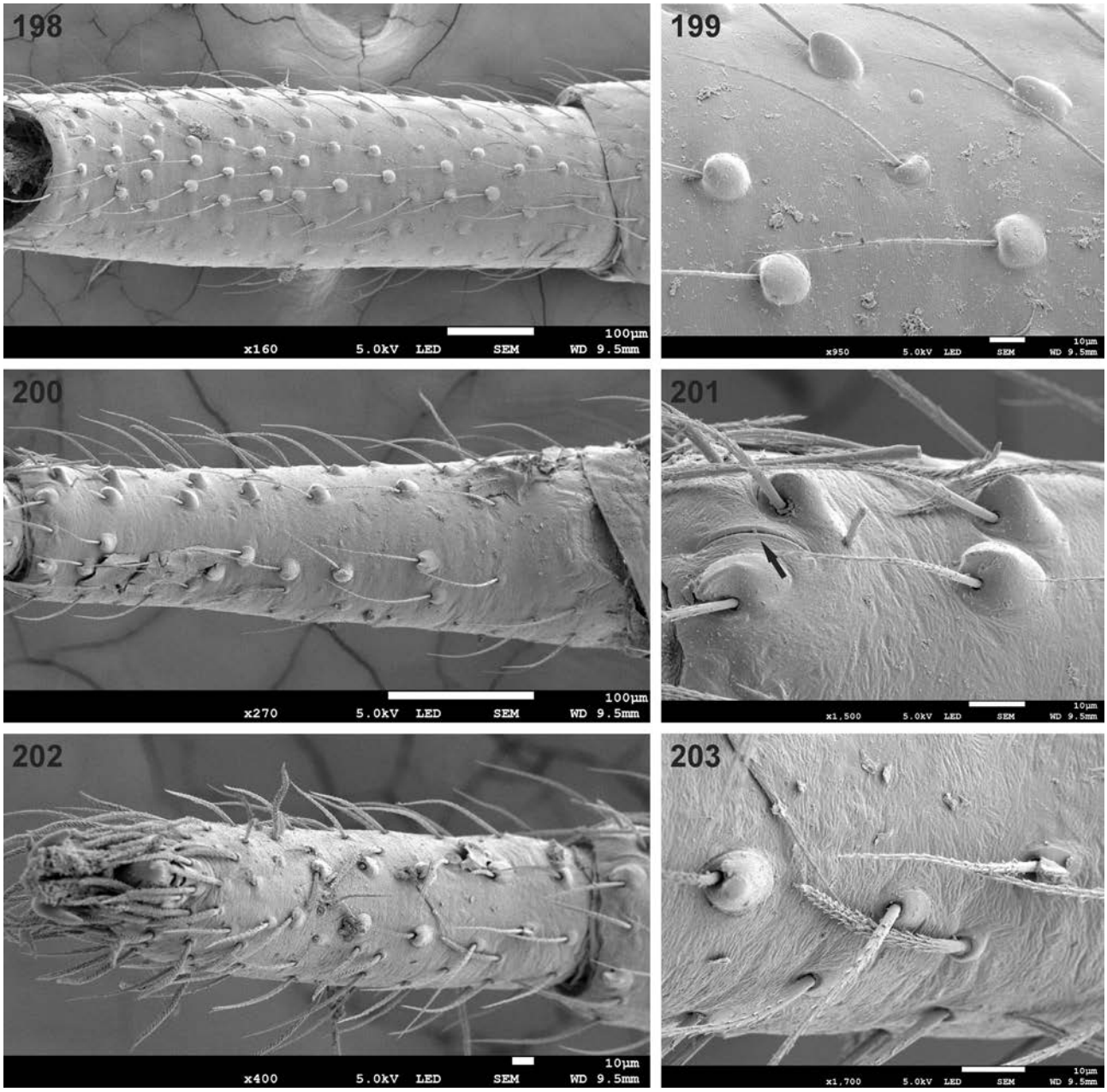
long. Pleural bars sclerotised, isolated; sternum subpentagonal, ¾ as broad as long; surface smooth, setal bases in shallow pits, with more distinct ridges laterally, each containing a short straight seta (Figs 187, 193); precoxal triangles present, intercoxal sclerites present between coxae I and II and II and III only. Leg formula 1423 in males, 4132 in females, all segments sparsely covered in long fine setae; femora I with mesal convex curvature, all femora strongly constricted proximally (Figs 173, 178, 188); patellar indentation on retrolateral side narrow, with lyriform organ at proximal end; anterior legs with strong tubercles with setae on tibiae, metatarsi and tarsi, more pronounced ventrally (Figs 198–203); metatarsi with sparse chemosensory setae and trichobothria dorsally, weakly developed dorsal metatarsal stopper, and ventral preening brush at distal end of legs III and IV (Figs 204–206); tarsi with sparse tactile hairs, few dorsal trichobothria and chemosensory setae (Figs 207–210); trichobothria with sunken distal plate, distal margin of hood overlapping plate, hood with four curved ridges, roughly concentric (Fig. 210); tarsal organ oval, at distal end of tarsi, very slightly elevated from integument, surface finely wrinkled, opening oval and distally placed (Figs 207–209); paired tarsal claws short, with two teeth and moderately dense tenant setae forming claw tufts in between (Fig. 208); female palpal claw simple, sharply curved distally. Abdomen oval, clearly larger in females than males, without dorsal scutum in either sex, with or without markings; dorsum with very sparse fine setae and two pairs of sigilla (Figs 215–221). Spinnerets conical, short, spigots not observed in detail. Male palpal femora and patellae without apophyses, patella with lyriform organ associated with apophysis (Fig. 194); palpal tibia with small ventral RTA, cymbium with one or two distinct basal apophyses, when two, then dorsal apophysis

larger than ventral (Figs 195, 213, 214); tegulum oval, broadest basally, slightly narrower than cymbium, with simple peripheral U-shaped sperm duct (e.g. Fig. 224); embolus originating prodistally, variable in shape, curving retrodistally, associated with sclerotized tegular apophysis (Figs 196, 197, 213). Female epigyne with broad paired copulatory openings positioned anteriorly or centrally in epigyne; copulatory ducts directed anteriorly, entering small anterior or lateral ST II; connecting ducts of spermathecae narrow, converging or running parallel to each other to posterior of epigyne, entering bilobed ST I on their mesal margin.

Composition. Five species, all newly described: *Trachecymbius bosselaersi* **sp. nov.**, *T. felis* **sp. nov.**, *T. peterwebbi* **sp. nov.**, *T. tyume* **sp. nov.** and *T. umbella* **sp. nov.**



FIGURES 189–197. Scanning electron micrographs of *Trachecymbius felis* **sp. nov.** male. 189. Carapace, dorsal view; 190. Eye region, dorsal view; 191. Mouthparts; 192. Detail of serrula; 193. Sternum; 194. Right palp, retrolateral view of patella, arrow indicating lyriform organ; 195. Same, retrolateral view of tibiae and tarsus; 196. Right palp, ventral view of tarsus; 197. Same, detail of embolus. Abbreviations: CA—cymbial apophyses; E—embolus; RTA—retrolateral tibial apophysis; TR—trichobothrium.



FIGURES 198–203. Scanning electron micrographs of *Trachecymbius tyume* **sp. nov.** male. 198. Tibia I, lateral view; 199. Detail of ventral setae; 200. Metatarsus I, lateral view; 201. Detail of ventral setae, arrow indicating slit sensilla; 202. Tarsus I, lateral view; 203. Detail of ventral setae.

Key to the genus *Trachecymbius* gen. nov.

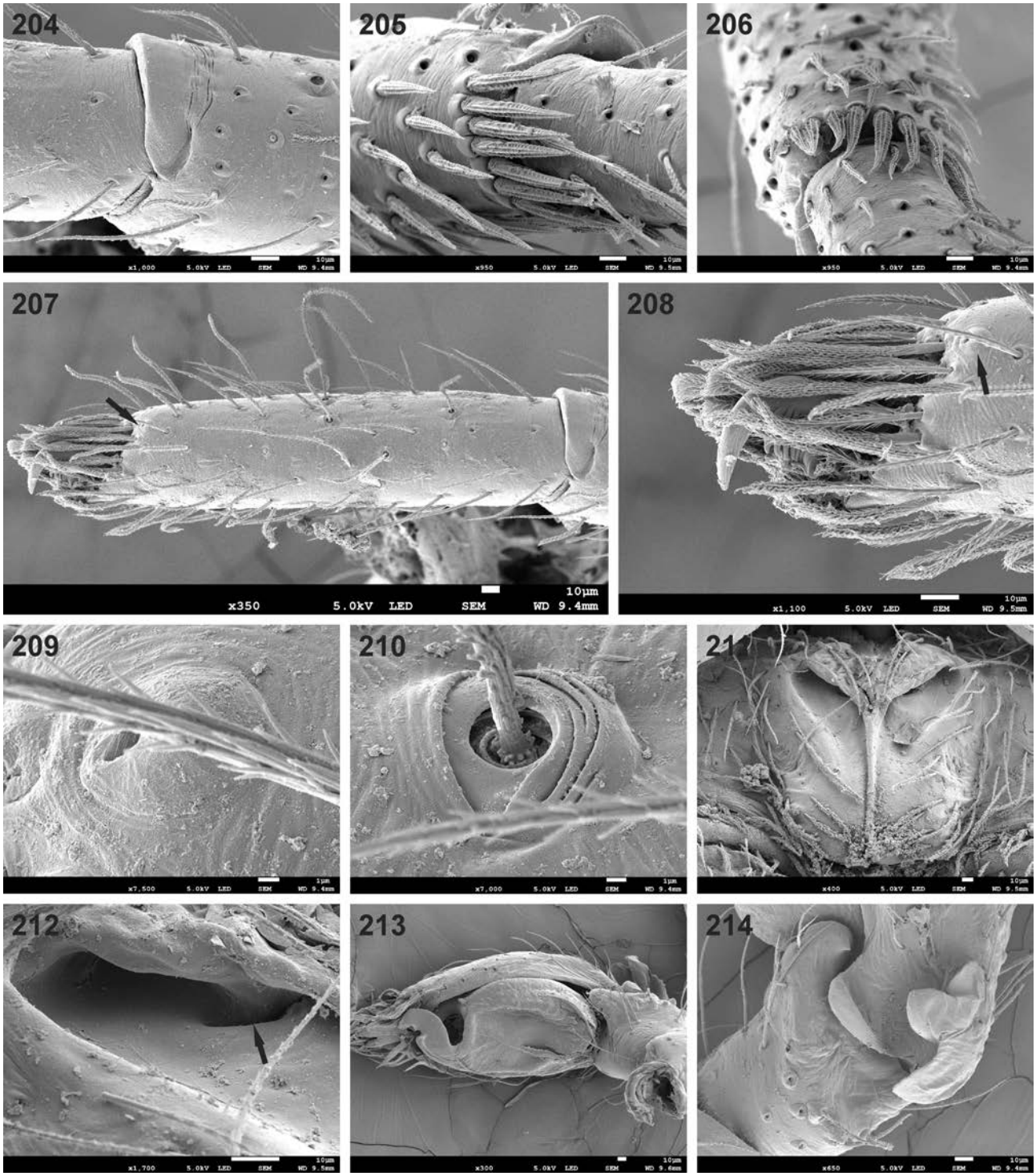
1	Males (♂ of *T. bosselaersi* **sp. nov.** and *T. umbella* **sp. nov.** unknown)	2
–	Females	4
2	RTA very short and inconspicuous (Figs 224, 225)	*T. felis* **sp. nov.**
–	RTA distinct, at least ¼ tibia length (Figs 228, 230)	3
3	RTA thumb-like, with rounded tip; tegulum with massive subtriangular prolateral apophysis; embolus narrow, long, with tip directed prodistally (Figs 228, 229)	*T. peterwebbi* **sp. nov.**
–	RTA triangular, with bent tip in lateral view; tegular apophysis absent; embolus short, stout, with rounded tip directed retrodistally (Figs 230, 231)	*T. tyume* **sp. nov.**
4	Copulatory openings near centre of epigyne in longitudinal curved ridges, forming heart-shaped atrium centrally (Fig. 226)	*T. felis* **sp. nov.**
–	Copulatory openings positioned anteriorly or anterolaterally, in recurved ridges (Figs 222, 232, 234)	5
5	Copulatory openings situated in broad, semicircular ridges, with long copulatory ducts leading to lateral ST II near midpoint of	

epigyne, proximate to ST I (Fig. 234) . . . . . *T. umbella* **sp. nov.**

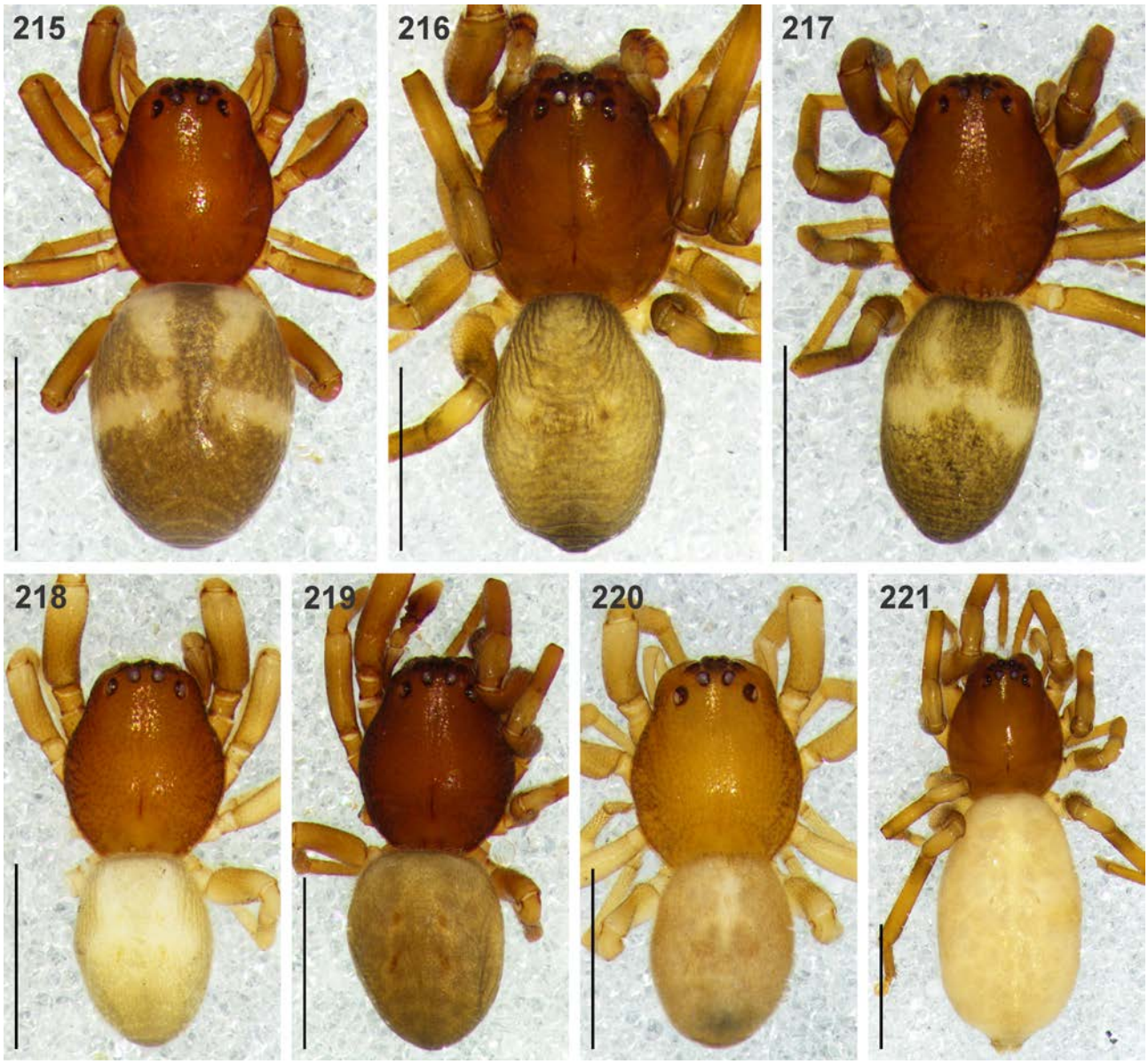
– Copulatory openings situated in relatively narrow ridges, with short copulatory ducts leading to ST II anteriorly in epigyne; ST I and II widely separated (Figs 222, 232). 6

6 ST II situated anterolaterally; connecting ducts of spermathecae originating anterolaterally, converging towards posterior (Figs 222, 223). . . . . *T. bosselaersi* **sp. nov.**

– ST II situated anteromedially; connecting ducts of spermathecae almost parallel, running either side of midline of epigyne (Figs 232, 233). . . . . *T. tyume* **sp. nov.**



FIGURES 204–214. Scanning electron micrographs of *Trachecymbius tyume* **sp. nov.** female (204–212) and male (213, 214). 204. Metatarsus I, dorsolateral view; 205, 206. Metatarsus IV, ventral preening comb in prolateral (205) and ventral (206) views; 207–210. Tarsus I, prolateral view (207), showing details of claws (208), tarsal organ (209), trichobothrium base (210), with black arrows indicating tarsal organ; 211. Epigyne; 212. Detail of anterior pockets, black arrow indicating copulatory opening; 213. Left palp, retrolateral-ventral view; 214. Detail of retrolateral and cymbial apophyses.



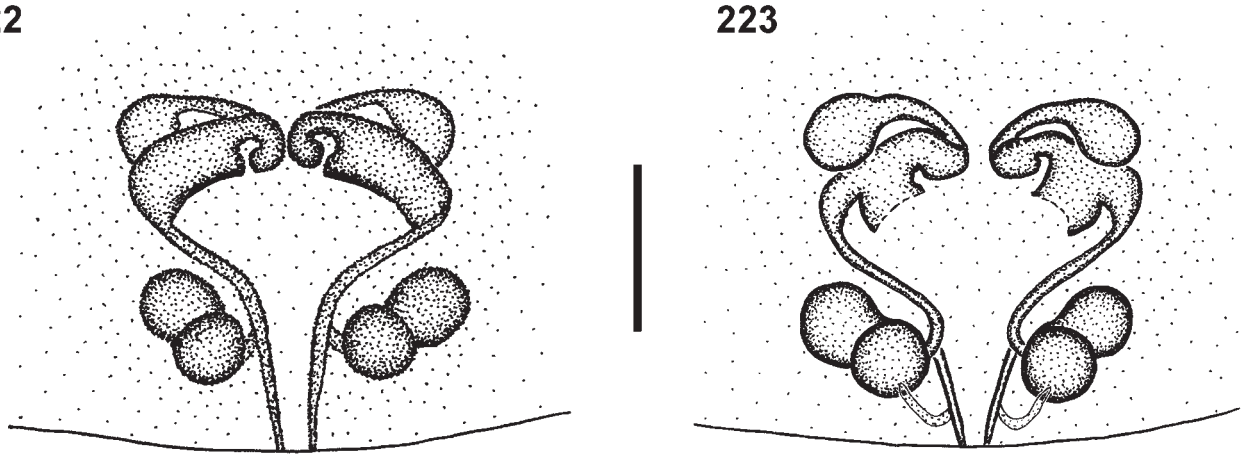
FIGURES 215–221. Digital microscope photographs of dorsal habitus of *Trachecymbius* spp. 215. *T. bosselaersi* **sp. nov.**, female; 216, 217. *T. felis* **sp. nov.**, male (216) and female (217); 218. *T. peterwebbi* **sp. nov.**, male; 219, 220. *T. tyume* **sp. nov.**, male (219) and female (220); 221. *T. umbella* **sp. nov.**, female. Scale bars = 1.0 mm.

***Trachecymbius bosselaersi* sp. nov.**
Figs 215, 222, 223

Etymology. This species is named for Jan Bosselaers, in recognition of his pioneering systematic research on Trachelidae and related spiders.

Diagnosis. The female is easily recognised by the Y-shaped arrangement of the connecting ducts of the spermathecae and the peculiar shape of the ST II, comprising a long slender stalk originating from the copulatory duct and terminating in a globose receptacle anterolaterally (Figs 222, 223). Male unknown.

Female (holotype, Hogsback, NCA 2014/607). Measurements: CL 1.06, CW 0.85, AL 1.32, AW 1.08, TL 2.47, FL 0.05, SL 0.64, SW 0.52, AME-AME 0.03, AME-ALE 0.02, ALE-ALE 0.17, PME-PME 0.08, PME-PLE 0.07, PLE-PLE 0.33. Length of leg segments (sequence from femur to tarsus, and total): I 0.70 + 0.38 + 0.52 + 0.44 + 0.30 = 2.34; II 0.62 + 0.33 + 0.46 + 0.41 + 0.29 = 2.11; III 0.51 + 0.27 + 0.32 + 0.40 + 0.21 = 1.71; IV 0.68 + 0.32 + 0.56 + 0.57 + 0.24 = 2.37.



FIGURES 222–223. *Trachecymbius bosselaersi* **sp. nov.**, female epigyne in ventral (222) and dorsal (223) views. Scale bars = 0.1 mm.

Carapace deep orange-brown, with faint grey mottling (Fig. 215); carapace surface granulate, more pronounced on slopes; fovea indistinct, shallow, at ⅕ CL. AER procurved; clypeus height equal to ¾ AME diameter; ALE larger than AME; AME separated by distance equal to ½ their diameter; AME separated from ALE by distance equal to ¼ AME diameter; PER strongly recurved; PLE larger than PME; PME separated by distance equal to ⅕ their diameter; PME separated from PLE by distance approximately equal to PME diameter. Chelicerae orange-brown, with faint black mottling; labium and endites pale orange-brown; sternum bright yellow-orange, with black mottling, brown around borders. Abdomen oval, dorsum mottled grey, with pair of comma-shaped cream patches anteriorly and pair of narrow transverse cream bands at midpoint, merging with anterior markings but separated mesally (Fig. 215); five slender cream chevrons in posterior ¼ above spinnerets; two pairs of orange-brown sigilla, first pair oval, at ¼ AL, second pair elongate-oval, at midpoint of abdomen; venter uniform creamy-grey. Legs yellow-brown, I darker than others; all with faint grey mottling. Epigyne with broad, recurved oblique ridges anterolaterally in epigyne, entering shallow atrium, with short copulatory duct bending back on itself and narrowing mesally, entering racket-shaped ST II comprising proximal stalk and globose distal receptacle; connecting ducts emerging from atrium laterally, slender, converging mesally towards posterior, making lateral bend before entering bilobed ST I (Figs 234, 235).

Type material. Holotype ♀: **SOUTH AFRICA:** *Eastern Cape*: Amatola mountains, Hogsback, Amatola Forestry Company offices, 32°35.276'S, 26°55.911'E, 1270 m a.s.l., 22.IV.2012, C. Haddad (active search, under overhanging vegetation) (NCA 2014/607).

Other material. None.

Distribution. Only known from the type locality (Fig. 236).

Remark. Males and additional female specimens were collected in a canopy fogging sample from Hogsback and imaged, but these specimens seem to have been lost. The male clearly possesses a dorsal scutum, and has a far larger and more pronounced cymbial apophysis than congeners. The shape of the embolus is not dissimilar to *T. tyume* **sp. nov.**, but is shorter and opposes a small distal tooth-like tegular apophysis. Description of the male requires the discovery of fresh material.

Trachecymbius felis sp. nov.

Figs 189–197, 216, 217, 224–227

Etymology. The species name is derived from the Latin for "cat", and refers to the type locality, Katberg, which is Afrikaans for "cat mountain"; noun in apposition.

Diagnosis. The male of this species can be recognised by the tuft of dense setae distally on the tegulum cavity behind the embolus, the gentle curvature of the distally-tapering embolus and the short, blunt RTA (Figs 195–197, 224, 225). The female is easily recognised by the strongly curved ridges of the copulatory openings that form a heart-shaped atrium in the centre of the epigynal plate (Fig. 226), with the connecting ducts of the spermathecae running over the ventral surface of the copulatory ducts internally, close to the copulatory opening (Fig. 227).

Male (holotype, Katberg, TMSA 23904). Measurements: CL 1.29, CW 1.11, AL 1.43, AW 1.02, TL 2.67, FL 0.12, SL 0.84, SW 0.64, AME-AME 0.03, AME-ALE 0.015, ALE-ALE 0.21, PME-PME 0.08, PME-PLE 0.08, PLE-PLE 0.37. Length of leg segments (sequence from femur to tarsus, and total): I 1.21 + 0.58 + 0.94 + 0.78 + 0.47 = 3.98; II 0.94 + 0.45 + 0.76 + 0.67 + 0.42 = 3.24; III 0.75 + 0.36 + 0.56 + 0.62 + 0.33 = 2.62; IV 1.08 + 0.43 + 0.94 + 0.93 + 0.41 = 3.79.

Carapace deep yellow-brown, with faint black mottling (Fig. 216); carapace finely wrinkled dorsally, with small tubercles on slopes; fovea short, narrow, at ⅔ CL. Eye region with black rings around eyes; AER procurved; clypeus height equal to ¾ AME diameter; ALE slightly larger than AME; AME separated by distance equal to ½ their diameter; AME separated from ALE by distance equal to ¼ AME diameter; PER strongly recurved; PLE slightly larger than PME; PME separated by distance equal to their diameter; PME separated from PLE by distance equal to PME diameter. Chelicerae and labium deep yellow-brown, sternum and endites yellow-brown, sternum darker around borders; surface smooth, sparsely covered with short, fine setae. Abdomen subhexagonal, dorsum creamy-grey with dense grey mottling, darker on anterior surface and along midline in posterior half (Fig. 216); dorsal scutum absent; two pairs of elongate-oval sigilla, first pair at ¼ AL and second pair at midpoint of abdomen; dorsum covered in fine appressed setae, longer along midline; venter creamy-grey, with grey mottling. Legs I to IV yellow-brown, I and II darker than III and IV; femora and patellae with broad grey mottled bands in distal half, mottling also proximally and distally on tibiae and dorsal surface of metatarsi. Palp brown; embolus originating distally on tegulum, curving gently anticlockwise, with tip directed distally; with closely associated finger-like pale conductor; patch of dense thickened setae distally on the tegulum cavity behind embolus tip; RTA ventrally positioned, a short blunt tubercle; cymbial apophysis large, with protruding triangular tip in ventral view (Figs 195–197, 224, 225).

Female (paratype, Hogsback, NCA 2012/1887). Measurements: CL 1.09, CW 0.85, AL 1.29, AW 0.79, TL 2.40, FL 0.10, SL 0.71, SW 0.54, AME-AME 0.02, AME-ALE 0.01, ALE-ALE 0.16, PME-PME 0.06, PME-PLE 0.09, PLE-PLE 0.32. Length of leg segments (sequence from femur to tarsus, and total): I 0.65 + 0.33 + 0.43 + 0.40 + 0.27 = 2.08; II 0.56 + 0.29 + 0.38 + 0.38 + 0.24 = 1.85; III 0.48 + 0.25 + 0.29 + 0.37 + 0.19 = 1.58; IV 0.65 + 0.29 + 0.46 + 0.51 + 0.21 = 2.12.

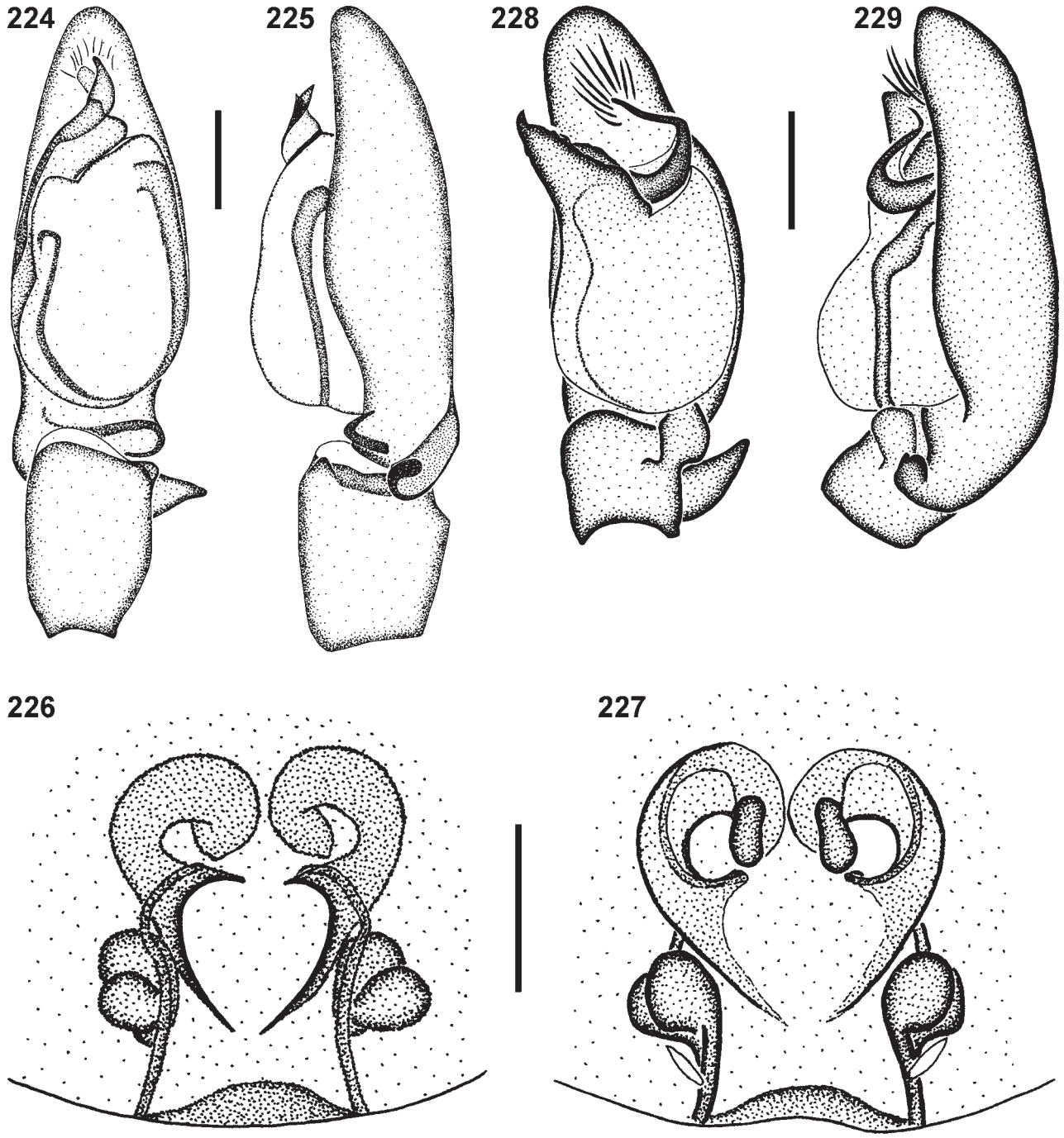
Carapace yellow-brown, with black mottling (Fig. 217); carapace surface winkled dorsally, finely granulate on slopes; fovea indistinct, shallow, at ¾ CL. AER procurved; clypeus height equal to ½ AME diameter; ALE larger than AME; AME separated by distance slightly larger than ¼ their diameter; AME separated from ALE by distance equal to ⅓ AME diameter; PER strongly recurved; PLE larger than PME; PME separated by distance equal to ⅞ their diameter; PME separated from PLE by distance approximately equal to 1¼ PME diameter. Chelicerae deep yellow-brown, with faint black mottling; labium and endites pale yellow-brown; sternum bright yellow-orange, with black mottling, yellow-brown around borders. Abdomen oval, dorsum mottled dark grey, with pair of narrow longitudinal cream lines anteriorly, converging with transverse cream band at midpoint (Fig. 217); two pairs of oval orange-brown sigilla, first pair at ¼ AL, second pair at midpoint of abdomen; venter uniform pale creamy-grey. Legs I yellow-brown, II to IV yellow; all segments with black mottling, except at bases of femora and tarsi. Epigyne with broad, strongly curved oblique ridges medially in epigyne, forming shallow heart-shaped atrium, with broad copulatory duct curving laterally, bending back mesally, terminating in small elongate-oval ST II; connect ducts of spermathecae curving along anterior margin of copulatory duct, looping over anterior corner at copulatory opening, continuing over ventral side of copulatory duct before entering bilobed lateral ST I, separated by almost double their width (Figs 226, 227).

Type material. Holotype ♂: **SOUTH AFRICA:** *Eastern Cape*: Katberg State Forest, 32°28.220'S, 26°40.028'E, 1240 m a.s.l., 8.I.2011, leg. C. Haddad, C. Griswold & H. Wood (canopy fogging, indigenous forest) (TMSA 23984).

Paratypes: **SOUTH AFRICA:** *Eastern Cape*: 2♂, together with holotype (TMSA 23984); Amatola mountains, Ashfield-on-Hogsback, Hogsback, 32°34.993'S, 26°55.472'E, 1330 m a.s.l., 30.IX.2011, leg. J. Neethling & C. Luwes (canopy fogging, Afromontane forest), 3♀ (NCA 2012/1887); Same locality, Pine plantation, 32°35.508'S, 26°56.538'E, 1210 m a.s.l., 1.IV.2012, leg. C. Haddad & J. Neethling (canopy fogging, *Podocarpus falcatus*), 3♂ (NMBA 16268); Same locality, Amatola Forestry Company offices, 32°35.276'S, 26°55.911'E, 1270 m a.s.l., 22.IV.2012, C. Haddad (active search, under overhanging vegetation), 1♂ (NCA 2014/607); Mpofu Nature Reserve, 32°36.383'S, 26°35.846'E, 27.I.2009, leg. S.L. Peinke (beating, thornveld, SLP9), 1♀ (NCA 2011/827).

Other material. None.

Distribution. Recorded from three localities in the Amatola Mountains (Fig. 236).



FIGURES 224–229. *Trachecymbius felis* **sp. nov.**, male (224, 225) and female (226, 227), and *T. peterwebbi* **sp. nov.** male (228, 229): 224, 228. Left palps, ventral view; 225, 229. Same, retrolateral view; 226. Epigyne, ventral view; 227. Same, dorsal view. Scale bars = 0.1 mm.

***Trachecymbius peterwebbi* sp. nov.**
Figs 218, 228, 229

Etymology. This species is named for the late Peter Webb, collector of the type specimen, in recognition of his sampling contributions to the South African National Survey of Arachnida and his comprehensive photography of the country's spider fauna.

Diagnosis. The male of this species can be easily recognised by the strongly protruding prolateral tegular

apophysis and the long, strongly curved embolus, with the tip directed prolatero-distally (Fig. 228). Female unknown.

Male (holotype, Umhlanga, NCA 2016/3068). Measurements: CL 1.01, CW 0.87, AL 1.10, AW 0.76, TL 2.16, FL 0.11, SL 0.63, SW 0.51, AME-AME 0.02, AME-ALE 0.015, ALE-ALE 0.17, PME-PME 0.06, PME-PLE 0.08, PLE-PLE 0.35. Length of leg segments (sequence from femur to tarsus, and total): I 0.71 + 0.38 + 0.51 + 0.42 + 0.29 = 2.31; II 0.61 + 0.33 + 0.40 + 0.38 + 0.25 = 1.97; III 0.49 + 0.27 + 0.30 + 0.37 + 0.21 = 1.64; IV 0.67 + 0.30 + 0.52 + 0.54 + 0.21 = 2.24.

Carapace yellow-brown (Fig. 218); carapace finely granulate throughout except on posterior slope behind fovea; fovea short, narrow, at ⅕ CL. Eye region with black rings around eyes; AER slightly procurved; clypeus height approximately ¾ AME diameter; ALE slightly larger than AME; AME separated by distance equal to ¼ their diameter; AME separated from ALE by distance equal to ⅕ AME diameter; PER strongly recurved; PLE slightly larger than PME; PME separated by distance equal to ⅘ their diameter; PME separated from PLE by distance equal to PME diameter. Chelicerae yellow-brown, labium and endites creamy-brown, sternum pale yellow-brown, darker around borders; surface smooth, sparsely covered with short, fine setae. Abdomen elongate-oval, dorsum mottled pale grey, with faint X-shaped cream marking anteriorly (Fig. 218); dorsal scutum absent; two pairs of elongate-oval sigilla, first pair at ¼ AL and second pair at midpoint of abdomen; dorsum covered in fine appressed brown setae; venter creamy-grey. Legs uniform creamy-yellow, femora slightly darker. Palp yellow-brown; large subtriangular tegular apophysis protruding prolaterally, distal margin with fine denticles; embolus originating prolaterally, base hidden behind tegular apophysis, initially directed retrolaterally, forming broad curve with tip directed prolatero-distally; RTA broad, thumb-like; cymbial apophysis large, with gradual bend, protruding retrolaterally in ventral view, tip with small denticles in retrolateral view (Figs 228, 229).

Type material. Holotype ♂: **SOUTH AFRICA:** *KwaZulu-Natal*: Umhlanga Rocks Lagoon Nature Reserve [29°42'S, 31°05'E], 11.VII.2014, leg. P. Webb (sweeping) (NCA 2016/3068).

Other material. None.

Distribution. Only known from the type locality (Fig. 236).

Trachecymbius tyume sp. nov.

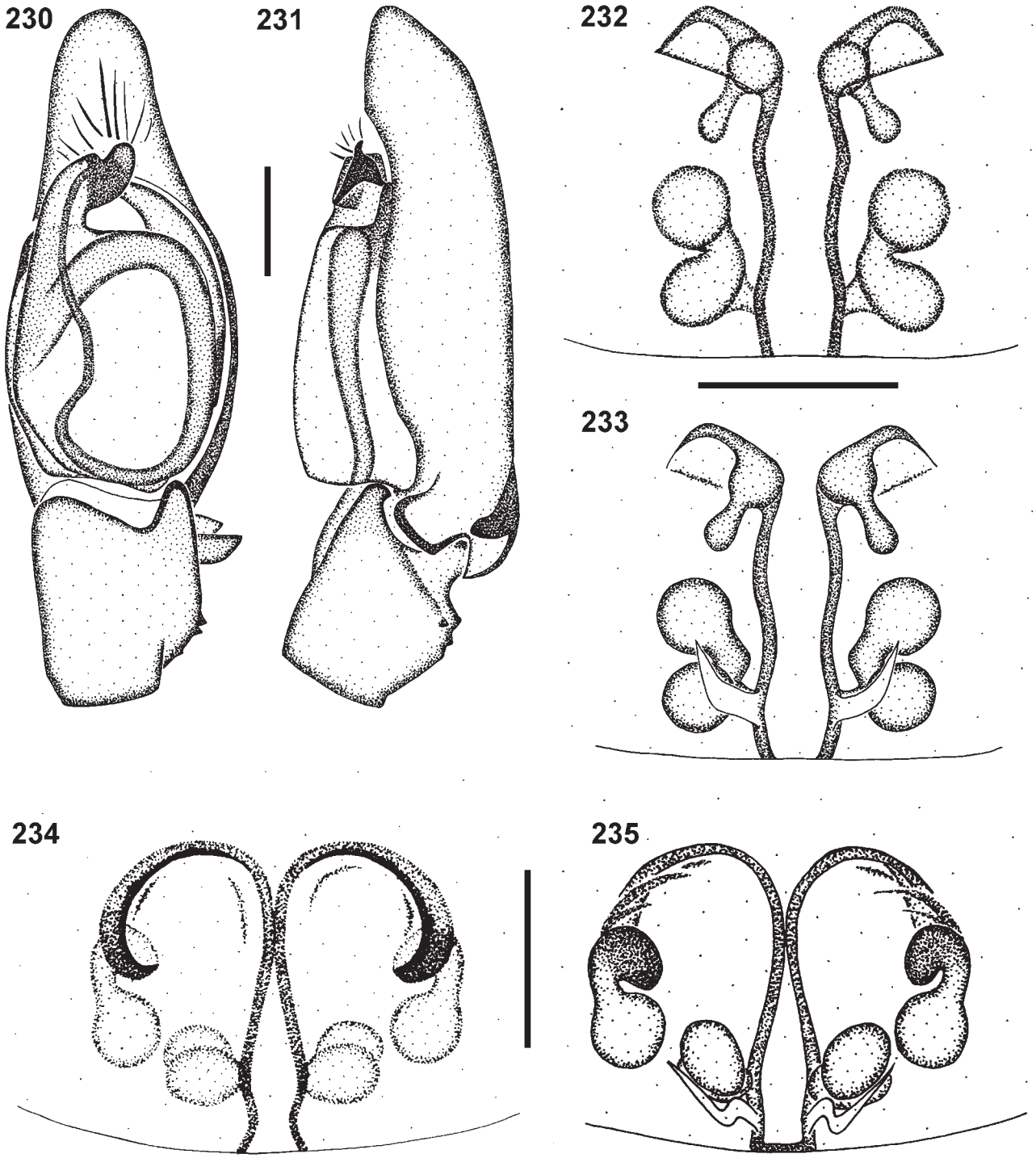
Figs 170–188, 198–214, 219, 220, 230–233

Etymology. The species name is a noun in apposition of Tyume Forest, the indigenous forest where the species was first discovered and where many of the known specimens were collected.

Diagnosis. The male of this species can be recognised by the short, strongly bent embolus with a rounded tip, and the presence of a pointed RTA and several small denticles on the dorsal surface of the palpal tibia (Figs 230, 231). As in *T. felis* **sp. nov.**, the cymbium contains two basal apophyses, but it can be distinguished by the dorsal apophysis being subdivided into two lobes and the ventral lobe being broad (Fig. 214), while in *T. felis* **sp. nov.** the dorsal lobe is not divided and is finger-like, as is its ventral lobe (Fig. 195). The female is easily recognised by the relatively narrow epigynal field compared to congeners (clearly longer than wide, as opposed to almost as long as wide) and the almost parallel connecting ducts of the spermathecae (Figs 232, 233).

Male (holotype, Hogsback, NCA 2014/378). Measurements: CL 1.14, CW 0.93, AL 1.30, AW 0.95, TL 2.44, FL 0.17, SL 0.70, SW 0.55, AME-AME 0.03, AME-ALE 0.015, ALE-ALE 0.19, PME-PME 0.08, PME-PLE 0.10, PLE-PLE 0.37. Length of leg segments (sequence from femur to tarsus, and total): I 0.73 + 0.44 + 0.56 + 0.52 + 0.29 = 2.54; II 0.62 + 0.32 + 0.44 + 0.40 + 0.28 = 2.06; III 0.52 + 0.25 + 0.29 + 0.40 + 0.21 = 1.67; IV 0.70 + 0.29 + 0.51 + 0.52 + 0.23 = 2.25.

Carapace deep orange-brown, with faint black mottling (Fig. 219); carapace finely granulate throughout, more pronounced on lateral slopes, absent on posterior slope behind fovea; fovea short, narrow, at ¾ CL. AER slightly procurved; clypeus height approximately ¾ AME diameter; ALE larger than AME; AME separated by distance equal to ½ their diameter; AME separated from ALE by distance equal to ¼ AME diameter; PER strongly recurved; PLE slightly larger than PME; PME separated by distance equal to their diameter; PME separated from PLE by distance equal to 1½ times PME diameter. Chelicerae and labium deep orange-brown, endites yellow; sternum bright yellow-orange, brown around borders. Abdomen oval, dorsum mottled grey, with indistinct pale yellowish scutum covering dorsum (Fig. 219); two pairs of orange-brown sigilla, first pair oval, at ¼ AL, second a series of



FIGURES 230–235. *Trachecymbius tyume* **sp. nov.**, male (230, 231) and female (232, 233), and *T. umbella* **sp. nov.** female (234, 235): 230. Left palp, ventral view; 231. Same, retrolateral view; 232, 234. Epigynes, ventral view; 233, 235. Same, dorsal view. Scale bars = 0.1 mm.

4–5 oval sclerites at midpoint of abdomen; venter creamy-grey. Legs uniform yellow-brown, leg I slightly darker; all femora slightly darker and patellae slightly paler than tibiae, metatarsi and tarsi; all segments covered in faint grey mottling. Palp brown; embolus originating prolaterally, broad at base, initially directed distally, bending nearly 90 degrees retrolaterally before small bend at rounded tip, directed distally; RTA small, triangular in ventral view, with hooked tip in retrolateral view; several small denticles on dorsal surface of palpal tibia in retrolateral view; cymbium with two apophyses, ventral lobe round and flat, dorsal lobe hook-like, protruding in ventral view, with two distinct lobes (Figs 214, 230, 231).

Female (paratype, Hogsback, NMBA 16270). Measurements: CL 1.13, CW 0.97, AL 1.25, AW 1.06, TL 2.49, FL 0.06, SL 0.68, SW 0.55, AME-AME 0.03, AME-ALE 0.01, ALE-ALE 0.17, PME-PME 0.07, PME-PLE 0.10, PLE-PLE 0.35. Length of leg segments (sequence from femur to tarsus, and total): I 0.62 + 0.37 + 0.46 + 0.40 + 0.28 = 2.13; II 0.57 + 0.33 + 0.40 + 0.38 + 0.26 = 1.94; III 0.55 + 0.29 + 0.34 + 0.41 + 0.19 = 1.78; IV 0.68 + 0.29 + 0.52 + 0.51 + 0.24 = 2.24.

Carapace deep orange-brown, with faint black mottling (Fig. 220); carapace granulate, more pronounced on lateral slopes, absent on posterior slope behind fovea; fovea short, indistinct, at Ō CL. AER slightly procurved; clypeus height approximately ¾ AME diameter; ALE slightly larger than AME; AME separated by distance slightly less than ½ their diameter; AME separated from ALE by distance less than ⅛ AME diameter, almost touching; PER strongly recurved; PLE slightly larger than PME; PME separated by distance equal to their diameter; PME separated from PLE by distance equal to 1⅓ times PME diameter. Chelicerae deep orange-brown, labium and endites pale orange-brown; sternum bright yellow-orange, orange-brown around borders. Abdomen oval, dorsum uniform creamy-grey (Fig. 220); two pairs of indistinct oval sigilla, first pair at ¼ AL and second at midpoint of abdomen; venter creamy-grey. Legs uniform pale yellow-brown, with black mottling, leg I slightly darker; all patellae slightly paler than other segments. Epigyne with anterior copulatory openings in short recurved ridges; copulatory ducts short, directed mesally, entering globose ST II with finger-like posterior extension; connecting ducts of spermathecae almost parallel, running posteriorly either side of midline of epigyne, with short lateral branch entering dumbbell-shaped posterior ST I (Figs 232, 233).

Type material. Holotype ♂: **SOUTH AFRICA:** *Eastern Cape*: Amatola Mountains, Hogsback, Arboretum, 32°35.305'S, 26°55.153'E, 22.III.2013, leg. C. Haddad, J. Neethling & R. du Preez (sifting leaf litter) (NCA 2014/378).

Paratypes: **SOUTH AFRICA:** *Eastern Cape*: Amatola mountains, Hogsback, Pine plantation, 32°35.508'S, 26°56.538'E, 1210 m a.s.l., 1.IV.2012, leg. C. Haddad & J. Neethling (canopy fogging 2, *Podocarpus falcatus*), 9♂ 7♀ (NMBA 16270), 1♂ 2♀ (NCA 2014/529); Same locality, Tyume Forest, 32°35.987'S, 26°55.880'E, 1140 m a.s.l., 3.IV.2012, leg. C. Haddad, J. Neethling, A. van Rooyen & R. du Preez (canopy fogging 7, Afromontane forest, *Xymalos monospora*), 3♂ 1♀ (NCA 2014/517); Same locality, Tyume Forest, 32°35.960'S, 26°55.865'E, 1145 m a.s.l., 3.IV.2012, leg. C. Haddad, J. Neethling, A. van Rooyen & R. du Preez (canopy fogging 8, Afromontane forest, *X. monospora*), 3♂ 1♀ (NCA 2014/457); Same locality, near Never Daunted Guest House, 32°35.770'S, 26°55.843'E, 1250 m a.s.l., 7.I.2010, leg. C. Haddad, C. Griswold & H. Wood (canopy fogging, exotic chestnut), 2♀ (TMSA 23992); King William's Town State Forest, 32°58.331'S, 27°16.990'E, 450 m a.s.l., 29.XI.2013, leg. C. Haddad (beats, mixed forest), 1♂ 2♀ (NCA 2013/4338).

Other material. SOUTH AFRICA: *Eastern Cape*: Amatola Mountains, Hogsback, Arboretum, 32°35.388'S, 26°56.123'E, 1200 m a.s.l., 26.III.2011, leg. C. Haddad, V. Swart, D. Fourie & R. du Preez (canopy fogging 1, *P. falcatus*), 2♂ 3♀ (TMSA 23997); Same locality, Arboretum, 32°35.283'S, 26°56.151'E, 1250 m a.s.l., 1.IV.2012, leg. C. Haddad & J. Neethling (canopy fogging, *P. falcatus*), 5♂ 3♀ (NCA 2014/750); Same locality, Arboretum, 32°35.283'S, 26°56.151'E, 1250 m a.s.l., 2.IV.2012, leg. C. Haddad, J. Neethling, V. Swart & R. du Preez (canopy fogging, *P. falcatus*), 1♂ 1♀ (NCA 2014/599); Same locality, Arboretum, 32°35.331'S, 26°56.115'E, 1250 m a.s.l., 3.IV.2012, leg. C. Haddad, J. Neethling, V. Swart, D. Fourie & R. du Preez (canopy fogging 5, *P. falcatus*), 7♂ 4♀ (NCA 2014/864); Same locality, Arboretum, 32°35.356'S, 26°56.147'E, 1235 m a.s.l., 2.IV.2012, leg. C. Haddad, J. Neethling & R. du Preez (canopy fogging 6, *Quercus* sp.), 8♂ 7♀ (NCA 2014/552); Same locality, Pine plantation, 32°35.519'S, 26°55.965'E, 1400 m a.s.l., 21.III.2013, leg. C. Haddad & R. du Preez (canopy fogging, *Pinus radiata*), 4♂ 2♀ (NCA 2014/294); Same locality, Hobbiton Lodge, 32°36'S, 26°58'E, 6.IV.2010, leg. A.H. Kirk-Spriggs & V.R. Swart (malaise trap, Afromontane forest), 1♂ (NMBA 16723); Fort Fordyce Nature Reserve, 32°41.133'S, 26°29.875'E, 1090 m a.s.l., 30.XI.2013, leg. C. Haddad & J. Neethling (canopy fogging, Afromontane forest, mixed canopy), 1♂ 6♀ (NCA 2013/4417); Katberg State Forest, 32°28.220'S, 26°40.028'E, 1240 m a.s.l., 8.I.2011, leg. C. Haddad, C. Griswold & H. Wood (canopy fogging, indigenous forest), 6♂ 18♀ (TMSA 23983); Mkambathi Nature Reserve, 31°16.399'S, 30°01.373'E, 10 m a.s.l., 27.I.2008, leg. III-UKZN (tree beats, forest, ECMF13), 1♂ (NCA 2008/2903); Same locality, 31°17.416'S, 29°59.415'E, 50 m a.s.l., 26.I.2008, leg. III-UKZN (tree beats, forest, ECMF-11), 1♂ (NCA 2008/2902); Suurberg Pass on R335, near Addo, 33°20.447'S, 25°45.028'E, 545 m a.s.l., 6.XII.2011, leg. J. Neethling & C. Luwes (canopy fogging, Afromontane forest), 1♂ 3♀ (NCA 2012/1889). *KwaZulu-Natal*: Oribi Gorge Nature Reserve, Samango Waterfall trail, 30°42.612'S, 30°16.182'E, 200 m a.s.l., 13.I.2011, leg. C. Haddad (canopy fogging, mixed forest trees), 1♀ (TMSA 23985).

Distribution. Widespread in the southern parts of the Eastern Cape and southern KwaZulu-Natal provinces, South Africa (Fig. 236).

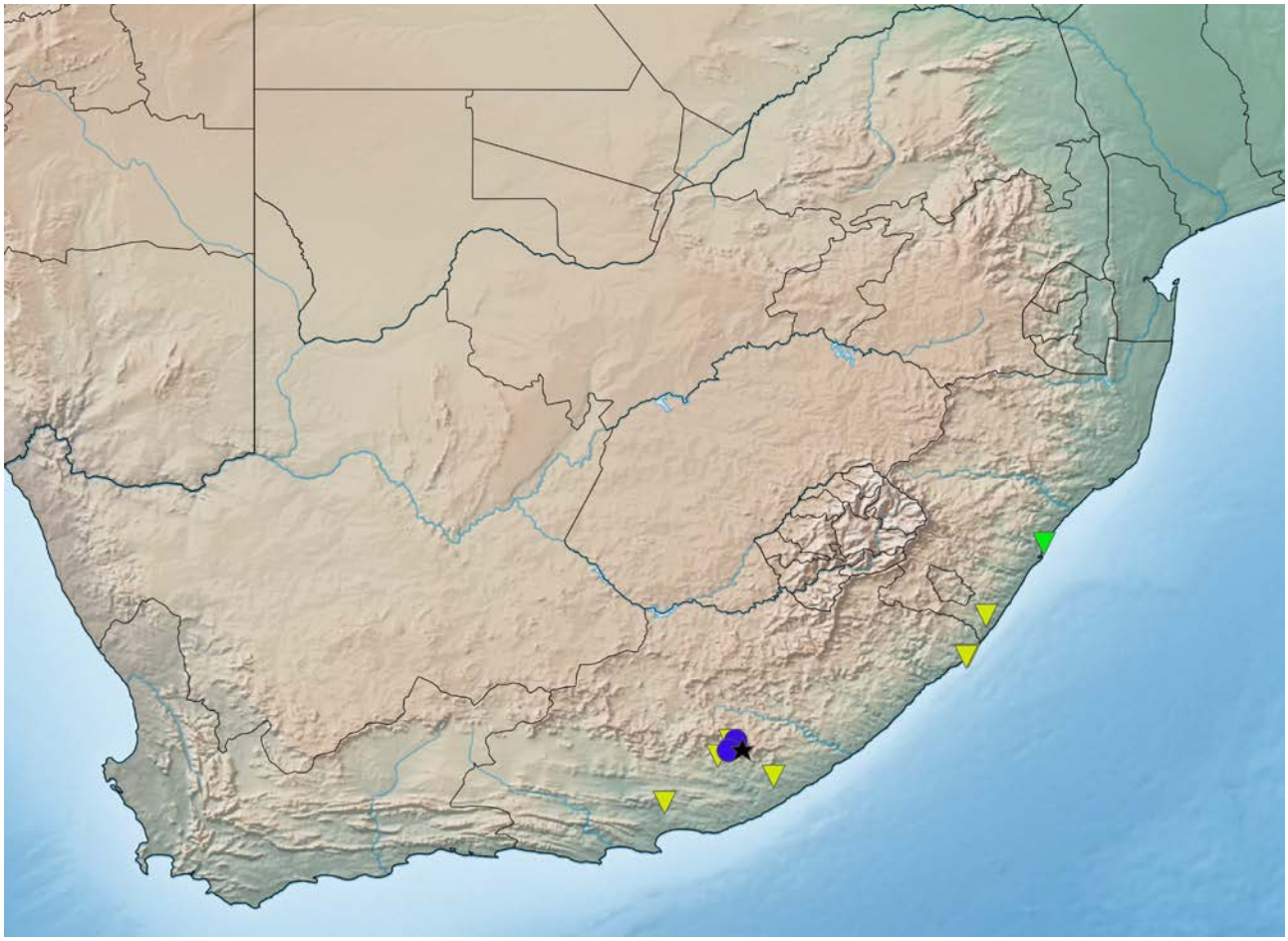


FIGURE 236. Distribution of *Trachecymbius felis* **sp. nov.** (blue circles), *T. peterwebbi* **sp. nov.** (green triangle) and *T. tyume* **sp. nov.** (yellow triangles) in southern Africa. Black star indicates Hogsback, where *T. bosselaersi* **sp. nov.**, *T. felis* **sp. nov.**, *T. tyume* **sp. nov.** and *T. umbella* **sp. nov.** occur sympatrically.

Trachecymbius umbella sp. nov.

Figs 221, 234, 235

Etymology. This species name is the Latin noun *umbella*, meaning umbrella or sun-shade, referring to the shape of the epigynal anterior ridges; noun in apposition.

Diagnosis. The female can be easily recognised by the large semicircular ridges surrounding the copulatory openings that converge mesally, giving the appearance of an umbrella, and by the relatively posteriorly positioned ST II compared to congeners (Fig. 234). Male unknown.

Female (holotype, Hogsback, TMSA 23995). Measurements: CL 1.14, CW 0.97, AL 2.11, AW 1.21, TL 3.24, FL 0.08, SL 0.74, SW 0.60, AME-AME 0.03, AME-ALE 0.01, ALE-ALE 0.19, PME-PME 0.06, PME-PLE 0.06, PLE-PLE 0.31. Length of leg segments (sequence from femur to tarsus, and total): I 0.87 + 0.46 + 0.67 + 0.59 + 0.40 = 2.99; II 0.79 + 0.39 + 0.60 + 0.56 + 0.38 = 2.72; III 0.68 + 0.33 + 0.44 + 0.56 + 0.30 = 1.91; IV 1.00 + 0.43 + 0.84 + 0.82 + 0.38 = 3.47.

Carapace deep yellow-brown (Fig. 221); carapace finely wrinkled dorsally, finely granulate on slopes; fovea short, narrow, dark brown, at ¾ CL. Eye region with black rings around eyes; AER procurved; clypeus height equal to ¾ AME diameter; ALE slightly larger than AME; AME separated by distance equal to ½ their diameter; AME separated from ALE by distance equal to ⅛ AME diameter, almost touching; PER strongly recurved; PLE slightly larger than PME; PME separated by distance equal to ¾ their diameter; PME separated from PLE by distance approximately ¾ PME diameter. Chelicerae deep yellow-brown, labium and endites pale yellow-brown, with grey mottling; sternum yellow, with faint grey mottling, yellow-brown around borders; surface smooth, sparsely

covered with short, fine setae. Abdomen elongate-oval, dorsum and venter uniform creamy-grey (Fig. 221); two pairs of indistinct slender sigilla, first pair at ¼ AL and second pair at midpoint of abdomen; dorsum covered in fine appressed setae, longer along midline. Legs yellow, with darker yellow-brown bands with faint grey mottling distally on femora and patellae, and proximally and distally on tibiae; metatarsi and tarsi with uniform faint grey mottling. Epigyne with broad, recurved semicircular ridges at anterior of epigyne, converging mesally; copulatory openings situated laterally in ridges, with short looping copulatory duct entering lateral globose ST II; long duct linking ST II and posterior bilobed ST I, initially corresponding to external ridges, converging anteromesally and running posteriorly, where they diverge slightly before entering ST II (Figs 234, 235).

Type material. Holotype ♀: **SOUTH AFRICA:** *Eastern Cape*: Amatola Mountains, Hogsback, Arboretum, 32°35.388'S, 26°56.123'E, 1200 m a.s.l., 26.III.2011, leg. C. Haddad, V. Swart, D. Fourie & R. du Preez (canopy fogging 1, *Podocarpus falcatus*) (TMSA 23995).

Paratypes: **SOUTH AFRICA:** *Eastern Cape*: Amatola Mountains, Hogsback, Arboretum, 32°35.356'S, 26°56.147'E, 1235 m a.s.l., 2.IV.2012, leg. C. Haddad, J. Neethling & R. du Preez (canopy fogging 6, *Quercus* sp.), 2♀ (NCA 2014/550); Same locality, Arboretum, 32°35.283'S, 26°56.151'E, 1250 m a.s.l., 2.IV.2012, leg. C. Haddad, J. Neethling, V. Swart & R. du Preez (canopy fogging, *P. falcatus*), 2♀ (NCA 2014/680).

Other material. SOUTH AFRICA: *Eastern Cape*: Amatola mountains, Hogsback, Arboretum, 32°35.283'S, 26°56.151'E, 1250 m a.s.l., 2.IV.2012, leg. C. Haddad, J. Neethling, V. Swart & R. du Preez (canopy fogging, *P. falcatus*), 5♀ (NCA 2014/600); Same locality, Tyume Forest, 32°35.987'S, 26°55.880'E, 1140 m a.s.l., 3.IV.2012, leg. C. Haddad, J. Neethling, A. van Rooyen & R. du Preez (canopy fogging, Afromontane forest, *Xymalos monospora*), 1♀ (NCA 2014/455).

Distribution. Only known from the type locality (Fig. 236).

Phylogenetic relationships

Previous studies investigating the phylogenetic relationships of Trachelidae and other Corinnidae *sensu lato* have either been based on morphological (Bosselaers & Jocqué 2002; Haddad *et al.* 2009; Ramírez 2014) or multigene (Wheeler *et al.* 2017; Azevedo *et al.* 2022; Kulkarni *et al.* 2023) analyses. Only recently was a first phylogeny produced based solely on COI sequences (Haddad *et al.* 2021). The present analysis builds on this previous work, but focuses on the relationships between the currently known trachelid genera from the Afrotropical Region, including two described in the current study.

Consistent with Haddad *et al.* (2021), our analysis found that *Orthobula* and *Capobula* formed a monophyletic group, sister to all of the other trachelid terminals (Fig. 237). Among the remaining trachelids, *Planochelas haddadi* Khoza & Lyle, 2019 was sister to all other trachelids, with *Trachelas sensu stricto* (including five specimens representing *T. canariensis* Wunderlich, 1987 and two undescribed species) sister to *Jocquestus schenkeli* (Lessert, 1923), consistent with the relationship proposed in Haddad *et al.* (2021), where *T. japonicus* Bösenberg & Strand, 1906 was included to represent *Trachelas sensu stricto*. The relationships of the remaining taxa were generally inconsistent, possibly due to the inclusion of sequences of an additional three undescribed genera from South Africa (Trachelidae genus 1, 2 and 3).

The two new genera described here, *Coronarachne* **gen. nov.** and *Falcaranea* **gen. nov.**, showed a sister group relationship in this analysis, consistent with the pattern in Haddad *et al.* (2021), where they formed part of "Clade F". Curiously, in both analyses, *Falcaranea* **gen. nov.** was not monophyletic, with *F. maputensis* **sp. nov.** (sequences SPIZA421-19 and 422-19 shared between the analyses) forming a clade sister to two clades, one containing *C. setosa* **sp. nov.** and *C. denticulata* **sp. nov.**, and the other containing *F. amatola* **sp. nov.** and *F. gladius* **sp. nov.** (Fig. 237), despite the strong morphological evidence, particularly genitalic, supporting the monophyly of each genus. These results thus confirm the limitations of relying on a single barcoding gene to elucidate higher relationships in spiders.

The result of the analysis confirmed the conspecificity of males and females of several species that occur in sympatry, or at least partly so: *C. setosa* **sp. nov.** and *C. denticulata* **sp. nov.**, and by implication also the males and females of the partly sympatric *C. unigena* **sp. nov.**, and *F. maputensis* **sp. nov.** and *F. gladius* **sp. nov.** Such analyses do, therefore, have some value in supporting basic taxonomic findings on poorly studied groups, particularly where material may be scarce or where the opposing sexes have been sampled at different localities (e.g. Magalhaes *et al.* 2017), or to identify genera with cryptic species diversity (Robertson *et al.* 2009).

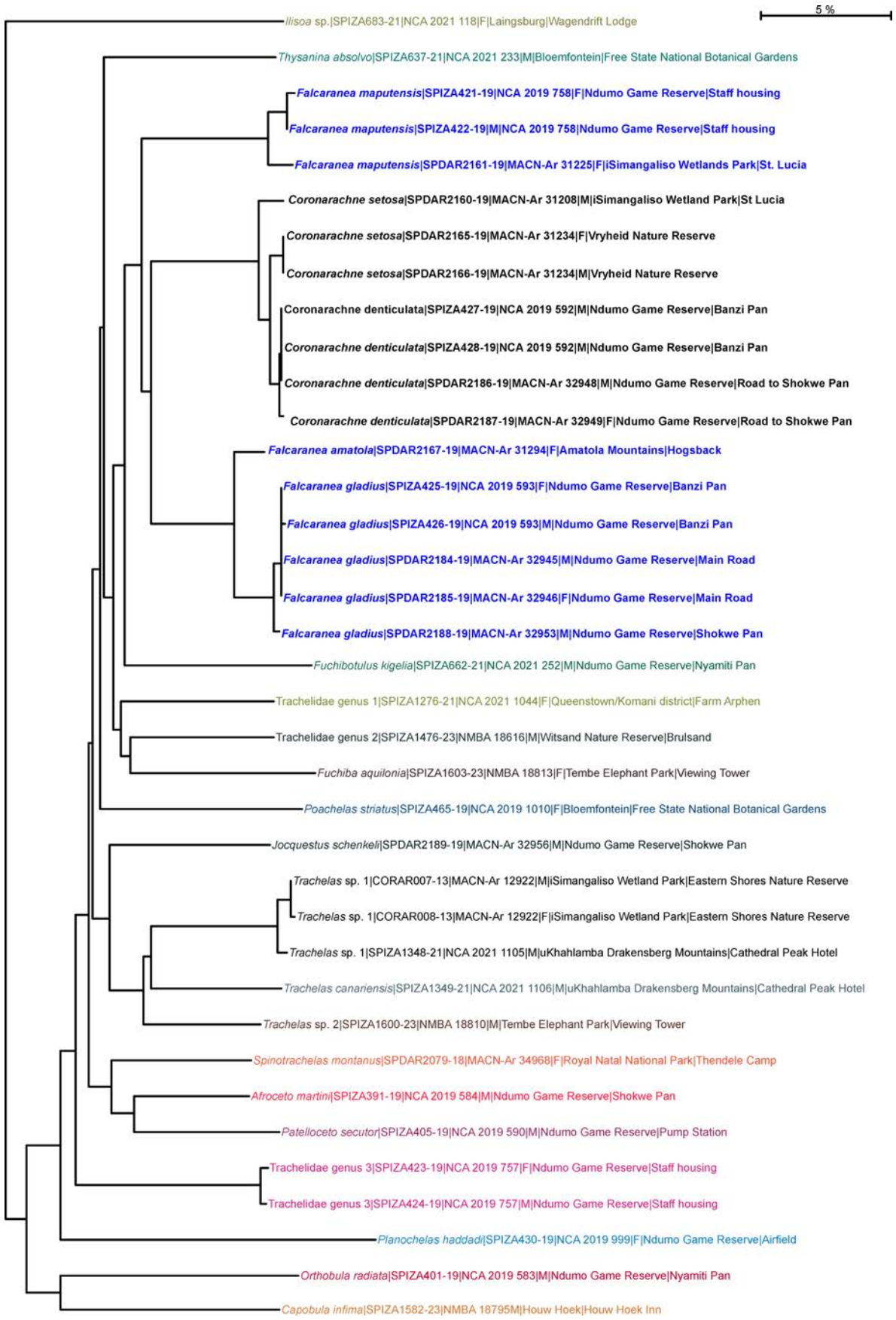


FIGURE 237. Phylogenetic tree of Afrotropical Trachelidae based on cytochrome c oxidase subunit 1 (COI) sequences, with genera indicated in different colours. *Ilisoa* sp. (Cyatholipidae) was used as the outgroup to root the tree.

Acknowledgments

We are grateful to all of the curators for the loans of material that made this study possible, and the various colleagues and students that participated in canopy fogging surveys over the years that contributed much of the material to this study, particularly Jan-Andries Neethling, Vaughn Swart, Vivian Butler and Ruan Booysen. Hanlie Grobler and Edward Lee of the Centre for Microscopy at the University of the Free State are thanked for preparing the material for scanning electron microscopy. We also thank the Eastern Cape Department of Economic Development, Environmental Affairs and Tourism (CRO 38/13Cr, CRO39/13CR, CRO 4/15Cr, CRO5/15CR, 202003000011586, and HO/RSH/5121/2021) and the Eastern Cape Parks and Tourism Agency (RA-0201) for collecting permits that facilitated fieldwork in the Eastern Cape, and Ezemvelo KZN Wildlife for collecting permits for KwaZulu-Natal (OP 2612/2009, OP 2012/2012, OP 5254/2013, OP 1869/2018 and OP 3923-2019). We are particularly grateful to Maria Eugenia Gonzalez Marquez, Martín Ramírez and Cristian Grismado for sequencing specimens provided to them and for permitting their inclusion in this study, and to the latter for confirming the identifications of the specimens in the MACN. This work was funded through various grants from the National Research Foundation of South Africa (SABI # FA2005040700016, TTK #2008050500003, CFRR #95569, CFRR #112127, IFRR #95902 and FBIP #129108). Lastly, we would like to thank the reviewers, Jan Bosselaers and Martín Ramírez, and subject editor Junxia Zhang, for their valuable inputs that enabled us to make substantial improvements to the manuscript.

References

Álvarez-Padilla, F. & Hormiga, G. (2007) A protocol for digesting internal soft tissues and mounting spiders for scanning electron microscopy. *Journal of Arachnology*, 35, 538–542.
https://doi.org/10.1636/Sh06-55.1

Azevedo, G.H.F, Bougie, T., Carboni, M., Hedin, M. & Ramírez, M.J. (2022) Combining genomic, phenotypic and sanger sequencing data to elucidate the phylogeny of the two-clawed spiders (Dionycha). *Molecular Phylogenetics and Evolution*, 166, 107327.
https://doi.org/10.1016/j.ympev.2021.107327

Basset, Y., Novotny, V., Miller, S.E. & Kitching, R.L. (2003) Canopy entomology, an expanding field of natural science. In: Basset, Y., Novotny, V., Miller, S.E. & Kitching, R.L. (Eds.), *Arthropods of tropical forests: Spatio-temporal dynamics and resource use in the canopy*. Cambridge University Press, Cambridge, pp. 4–6.

Bosselaers, J. & Jocqué, R. (2002) Studies in Corinnidae: cladistic analysis of 38 corinnid and liocranid genera, and transfer of Phrurolithinae. *Zoologica Scripta*, 31, 241–270.
https://doi.org/10.1046/j.1463-6409.2002.00080.x

Bosselaers, J., Urones, C., Barrientos, J.A. & Alberdi, J.M. (2009) On the Mediterranean species of Trachelinae (Araneae, Corinnidae) with a revision of *Trachelas* L. Koch 1872 on the Iberian Peninsula. *Journal of Arachnology*, 37, 15–38.
https://doi.org/10.1636/a08-33.1

Canadian Centre for DNA Barcoding [CCDB] (2019) *CCDB Protocols. Cited 1 November 2019*. CCDB [Internet], Guelph. Available from: http://ccdb.ca/site/wp-content/uploads/2016/09/CCDB_Amplification.pdf (accessed 19 December 2023)

Deeleman-Reinhold, C.L. (2001) *Forest spiders of South East Asia: with a revision of the sac and ground spiders (Araneae: Clubionidae, Corinnidae, Liocranidae, Gnaphosidae, Prodidomidae and Trochanterriidae [sic])*. Brill, Leiden, 591 pp.
https://doi.org/10.1163/9789004475588

Dippenaar-Schoeman, A.S., Haddad, C.R., Foord, S.H., Lyle, R., Lotz, L.N. & Marais, P. (2015) South African National Survey of Arachnida (SANSA): review of current knowledge, constraints and future needs for documenting spider diversity (Arachnida: Araneae). *Transactions of the Royal Society of South Africa*, 70, 245–275.
https://doi.org/10.1080/0035919X.2015.1088486

Dippenaar-Schoeman, A.S. & Jocqué, R. (1997) *African spiders: an identification manual. Plant Protection Research Institute handbook No. 9*. Agricultural Research Council, Pretoria, 392 pp.

Dippenaar-Schoeman, A.S., Van den Berg, A.M., Van den Berg, M.A. & Foord, S.H. (2005) Spiders in avocado orchards in the Mpumalanga Lowveld of South Africa: species diversity and abundance (Arachnida: Araneae). *African Plant Protection*, 11, 8–16.

Dippenaar-Schoeman, A.S., Van den Berg, M.A. & Van den Berg, A.M. (2001) Spiders in macadamia orchards in the Mpumalanga Lowveld of South Africa: species diversity and abundance (Arachnida: Araneae). *African Plant Protection*, 7, 39–46.

Edgar, R.C. (2004) MUSCLE: a multiple sequence alignment method with reduced time and space complexity. *BMC Bioinformatics*, 5, 113.
https://doi.org/10.1186/1471-2105-5-113

Erwin, T.L. (1983) Tropical forest canopies: the last biological frontier. *Bulletin of the Entomological Society of America*, 19, 14–19.
https://doi.org/10.1093/besa/29.1.14

Fannes, W., De Bakker, D., Loosveldt, K. & Jocqué, R. (2008) Estimating the diversity of arboreal oonopid spider assemblages (Araneae, Oonopidae) at Afrotropical sites. *Journal of Arachnology*, 36, 322–330.
https://doi.org/10.1636/CT07-128.1

Gajski, D., Wolff, J.O., Melcher, A., Weber, S., Prost, S., Krehenwinkel, H. & Kennedy, S.R. (in press) Facilitating taxonomy and phylogenetics: An informative and cost-effective protocol integrating long amplicon PCRs and third generation sequencing. *Molecular Phylogenetics & Evolution.* [published online]
https://doi.org/10.1016/j.ympev.2023.107988

Haddad, C.R. (2006) *Spinotrachelas*, a new genus of tracheline sac spiders from South Africa (Araneae: Corinnidae). *African Invertebrates*, 47, 85–93.

Haddad, C.R., Dippenaar-Schoeman, A.S. & Pekár, S. (2005) Arboreal spiders (Arachnida: Araneae) in pistachio orchards in South Africa. *African Plant Protection*, 11, 32–41.

Haddad, C.R., Jin, C. & Platnick, N.I. (2022) A revision of the spider genus *Orthobula* Simon, 1897 (Araneae: Trachelidae in the Afrotropical Region. I. Continental species. *Zootaxa*, 5133 (3), 355–382.
https://doi.org/10.11646/zootaxa.5133.3.3

Haddad, C.R., Jin, C., Platnick, N.I. & Booysen, R. (2021) *Capobula* gen. nov., a new Afrotropical dark sac spider genus related to *Orthobula* Simon, 1897 (Araneae: Trachelidae). *Zootaxa*, 4942 (1), 41–71.
https://doi.org/10.11646/zootaxa.4942.1.2

Haddad, C.R. & Lyle, R. (2008) Three new genera of tracheline sac spiders from southern Africa (Araneae: Corinnidae). *African Invertebrates*, 49, 37–76.
https://doi.org/10.5733/afin.049.0204

Haddad, C.R., Lyle, R., Bosselaers, J. & Ramírez, M.J. (2009) A revision of the endemic South African spider genus *Austrachelas*, with its transfer to the Gallieniellidae (Arachnida: Araneae). *Zootaxa*, 2296 (1), 1–38.
https://doi.org/10.11646/zootaxa.2296.1.1

Jin, C., Yin, X.C. & Zhang, F. (2017) Four new species of the genus *Trachelas* L. Koch, 1872 and the first record of *T. vulcani* Simon, 1896 from south-west China (Araneae: Trachelidae). *Zootaxa*, 4324 (1), 23–49.
https://doi.org/10.11646/zootaxa.4324.1.2

Jocqué, R. & Dippenaar-Schoeman, A.S. (2006) *Spider families of the world.* Royal Museum for Central Africa, Tervuren, 336 pp.

Khoza, T.T. & Lyle, R. (2019) Four new species of the sac spider genus *Planochelas* Lyle & Haddad, 2009 (Araneae, Trachelidae) from central and southern Africa. *African Invertebrates*, 60, 147–162.
https://doi.org/10.3897/AfrInvertebr.60.35269

Kulkarni, S., Wood, H.M. & Hormiga, G. (2023) Advances in the reconstruction of the spider tree of life: a roadmap for spider systematics and comparative studies. *Cladistics*, 39, 479–532.
https://doi.org/10.1111/cla.12557

Lyle, R. & Haddad, C.R. (2009) *Planochelas*, a new genus of tracheline sac spiders from West and Central Africa. *Annals of the Transvaal Museum*, 46, 91–100.

Lyle, R. & Haddad, C.R. (2010) A revision of the tracheline sac spider genus *Cetonana* Strand, 1929 in the Afrotropical Region, with descriptions of two new genera (Araneae: Corinnidae). *African Invertebrates*, 51, 321–384.
https://doi.org/10.5733/afin.051.0206

Lyle, R. & Haddad, C.R. (2018) *Jocquestus* gen. nov., a new genus of trachelid sac spiders from the Afrotropical Region (Arachnida: Araneae). *Zootaxa*, 4471 (2), 309–333
https://doi.org/10.11646/zootaxa.4471.2.4

Magalhaes, I.L.F., Martins, P.H., Nogueira, A.A. & Santos, A.J. (2017) Finding hot singles: matching males to females in dimorphic spiders (Araneidae: *Micrathena*) using phylogenetic placement and DNA barcoding. *Invertebrate Systematics*, 31, 8–36.
https://doi.org/10.1071/IS15062

Moran, V.C. & Southwood, T.R.E. (1982) The guild composition of arthropod communities on trees. *Journal of Animal Ecology*, 51, 289–306.
https://doi.org/10.2307/4325

Ramírez, M.J. (2014) The morphology and phylogeny of dionychan spiders (Araneae: Araneomorphae). *Bulletin of the American Museum of Natural History*, 390, 1−374.
https://doi.org/10.1206/821.1

Ratnasingham, S. & Hebert, P.D.N. (2007) BOLD: The Barcode of Life Data System (www.barcodinglife.org). *Molecular Ecology Notes*, 7, 355–364.
https://doi.org/10.1111/j.1471-8286.2006.01678.x

Ratnasingham, S. & Hebert, P.D.N. (2013) A DNA-based registry for all animal species: the Barcode Index Number (BIN) system. *PLoS ONE*, 8, e66213.
https://doi.org/10.1371/journal.pone.0066213

Robinson, E.A., Blagoev, G.A., Hebert, P.D.N. & Adamowicz, S.J. (2009) Prospects for using DNA barcoding to identify spiders in species-rich genera. *ZooKeys*, 16, 27–46.
https://doi.org/10.3897/zookeys.16.239

Seyfulina, R.R. & De Bakker, D. (2008) Linyphiid spiders (Araneae, Linyphiidae) from African forest canopies. *Revista Iberica de Arachnologia*, 15, 67–79.
Shorthouse, D.P. (2010) SimpleMappr, an online tool to produce publication-quality point maps. Available from: http://www.simplemappr.net (accessed 27 September 2023)
Simon, E. (1897) *Histoire naturelle des araignées. Tome Second. Deuxième Édition*. Roret, Paris, 192 pp. https://doi.org/10.5962/bhl.title.51973
Sørensen, L.L. (2004) Composition and diversity of the spider fauna in the canopy of a montane forest in Tanzania. *Biodiversity and Conservation*, 13, 437–452. https://doi.org/10.1023/B:BIOC.0000006510.49496.1e
Southwood, T.R.E., Moran, V.C. & Kennedy, C.E.J. (1982) The richness, abundance and biomass of the arthropod communities on trees. *Journal of Animal Ecology*, 51, 635–649. https://doi.org/10.2307/3988
Stork, N.E., Grimbacher, P.S., Storer, S., Oberprieler, R.G., Reid, C. & Slipinski, S.A. (2008) What determines whether a species of insect is described? Evidence from a study of tropical forest beetles. *Insect Conservation and Diversity*, 1, 114–119. https://doi.org/10.1111/j.1752-4598.2008.00016.x
Talavera, G., Lukhtanov, V., Pierce, N. & Vila, R. (2022) DNA barcodes combined with multilocus data of representative taxa can generate reliable higher-level phylogenies. *Systematic Biology*, 71, 382–395. https://doi.org/10.1093/sysbio/syab038
Wheeler, W.C., Coddington, J.A., Crowley, L.M., Dimitrov, D., Goloboff, P.A., Griswold, C.E., Hormiga, G., Prendini, L., Ramírez, M.J., Sierwald, P., Almeida-Silva, L.M., Álvarez-Padilla, F., Arnedo, M.A., Benavides, L.R., Benjamin, S.P., Bond, J.E., Grismado, C.J., Hasan, E., Hedin, M., Izquierdo, M.A., Labarque, F.M., Ledford, J, Lopardo, L., Maddison, W.P., Miller, J.A., Piacentini, L.N., Platnick, N.I., Polotow, D., Silva-Dávila, D., Scharff, N., Szűts, T., Ubick, D., Vink, C., Wood, H.M. & Zhang, J.X. (2017) The spider tree of life: phylogeny of Araneae based on target-gene analyses from an extensive taxon sampling. *Cladistics*, 33, 576–616. https://doi.org/10.1111/cla.12182
White, F. (1983) *The Vegetation of Africa.* UNESCO, Paris, 373 pp.
World Spider Catalog (2023) *World Spider Catalog. Version 24.5*. Natural History Museum Bern, Bern. Available from: http://wsc.nmbe.ch (accessed 13 November 2023) https://doi.org/10.24436/2