

Research Article

And they just keep coming: four new genera of dark sac spiders from southern Africa (Araneae, Trachelidae)

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Abstract

As part of ongoing revisions of the Afrotropical Trachelidae, four new genera are described from southern Africa: *Foordana* **gen. nov.**, with *F. distincta* **sp. nov.** from South Africa (Eastern Cape, Free State, KwaZulu-Natal and Western Cape) as the type species, *F. flavipoda* **sp. nov.** from the Free State, *F. kasouga* **sp. nov.** from the Eastern Cape and KwaZulu-Natal, and a fourth undescribed species from Zimbabwe; the monotypic *Mushimane* **gen. nov.**, with *M. tswibilinki* **sp. nov.** from KwaZulu-Natal as the type species; *Namaquella* **gen. nov.**, with *N. arida* **sp. nov.** from the Northern Cape as the type species and *N. samanthae* **sp. nov.** from the Western Cape; and *Rukuluk* **gen. nov.** from South Africa, with *R. gramineus* **sp. nov.** from the Northern Cape as the type species and a second undescribed species from KwaZulu-Natal known only from juveniles.

Key words: Grass, new species, tree canopies

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Introduction

The last two decades have seen a massive resurgence in taxonomic work on dark sac spiders, Trachelidae, with more than 68% of the genera (17) and 43% of the global species richness (124 spp.) described during this period (World Spider Catalog 2024). In the Afrotropical Region specifically, the number of genera has increased from five at the end of the last century (Dippenaar-Schoeman and Jocqué 1997) to the current 16 (World Spider Catalog 2024), and the species richness has increased from 24 to the currently known 100 species.

As continuous sampling has been undertaken in South Africa during the last three decades as part of the South African National Survey of Arachnida (Dippenaar-Schoeman et al. 2023), many new spider taxa have been discovered, particularly in historically poorly sampled areas. Contributing to these discoveries has been the application of various sampling methods that have been rarely used in the past, such as canopy fogging, litter sifting and hand collecting in a range of microhabitats, such as grass tussocks, termitaria and tree bark. As a result, eight new genera of trachelids have been described from southern Africa alone during the last two decades (Haddad 2006; Haddad and Lyle 2008, 2024; Haddad et al. 2021), with four other genera more widespread in the Afrotropical Region also de-

scribed (Lyle and Haddad 2009, 2010, 2018). In the current contribution, a further four new genera are described from southern Africa, each represented by no more than four species.

Materials and methods

Morphology

The material examined in this study is deposited in the following collections (curators in parentheses):

- AMNH** American Museum of Natural History, New York, U.S.A. (L. Prendini).
BMNH British Museum of Natural History, London, U.K. (J. Beccaloni).
NCA National Collection of Arachnida, ARC–Plant Health and Protection, Pretoria, South Africa (R. Lyle).
NMBA National Museum, Bloemfontein, South Africa (J. Neethling).
NMSA KwaZulu-Natal Museum, Pietermaritzburg, South Africa (M. Ziganira).
NMZ National Museum of Zimbabwe, Bulawayo, Zimbabwe (M. FitzPatrick).

All specimens studied for descriptions and measurements were observed in 70% ethanol using a Nikon SMZ800 stereomicroscope. The epigynes of one or more female paratypes were dissected with 0-size insect pins and then cleared overnight by maceration in a pancreatin solution (Álvarez-Padilla and Hormiga 2007). After clearing, they were transferred to fresh 70% ethanol for illustration. A left palp of a male paratype was dissected and drawn for each species, unless only a holotype was available.

All measurements are presented in millimetres (mm) and are provided for the type specimens indicated in the descriptions. Eye arrangements are described for the anterior and dorsal views of the anterior and posterior eye rows, respectively. Leg measurements are given as the sequence from the femur to the tarsus, and the total. The following abbreviations are used in the text:

- Ac** aciniform gland spigot(s)
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
Cy cylindrical gland spigot(s)
dRTA dorsal retrolateral tibial apophysis
FL fovea length
MOQ median ocular quadrangle [l - length; AW - anterior width; PW - posterior width]
mAmp minor ampullate gland spigot(s)
MAmp major ampullate gland spigot(s)
Nu nubbin
PER posterior eye row

Pi	piriform gland spigot(s)
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
Ta	tartipore
TL	total length
vRTA	ventral retrolateral tibial apophysis
vt	ventral terminal

For the type species of *Foordana* gen. nov., *Mushimane* gen. nov., *Namaquel-la* gen. nov. and *Rukuluk* gen. nov., material for scanning electron microscopy was dehydrated overnight in 100% ethanol, critical point dried in liquid carbon dioxide and then mounted onto aluminium stubs using double-sided tape. Thereafter, the samples were sputter coated three times with iridium for two minutes each in an argon chamber and then studied using a JEOL JSM-IT200 scanning electron microscope at 5 kV.

Various somatic characters of males and females of the type species of each new genus, as well as the dorsal habitus of most species, were taken using a Nikon D5-L3 camera system attached to a Nikon SMZ800 stereomicroscope. Depending on the structure, between five and 30 digital images were taken and stacked using the CombineZM imaging software (<http://www.hadleyweb.pwp.blueyonder.co.uk>) to increase the depth of field. For *Mushimane tswibilinki* sp. nov. and *Rukuluk gramineus* sp. nov., the cleared female epigynes were temporarily mounted on slides, stained with crystal blue, examined under a Nikon Eclipse 80i compound microscope and imaged with an attached Nikon DS-Fi2 camera. A series of images was taken and stacked as described above. The distribution map was created using the online mapping software SimpleMappr (Shorthouse 2010).

Molecular analysis

The relationships of the four new genera described here were evaluated using mitochondrial cytochrome oxidase c subunit I (COI) sequence data. Representative species of each genus of Afrotropical Trachelidae currently available on the Barcode of Life Data system (BOLD; Ratnasingham and Hebert 2007, 2013) in the SPIZA project were selected for the analysis. Material allocated to this project was prepared by the author and all DNA extraction, PCR and Sanger sequencing was performed at the Canadian Centre of DNA Barcoding (CCDB) using their standard extraction and sequencing protocols (CCDB 2019). Although single-gene phylogenies may perform poorly in providing solid evidence of higher-level relationships (Talavera et al. 2022; Gajski et al. 2024).

The material included in this COI analysis (Table 1) was sampled and identified by the author, and that of the new genera described herein is included in the material examined in this study. To avoid overloading the tree with unnecessary

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. *Moggridgea loistata* (Migidae) was used as the outgroup to root the tree.

Species	Locality	Process ID	Catalog Num	COI-5P Seq. Length
<i>Moggridgea loistata</i> ♀	Betty's Bay	SPIZA1821-24	NMBA18901	658 bp
<i>Afroceto africana</i> ♀	Namaqua National Park	SPIZA613-21	NCA 2021/214	658 bp
<i>Afroceto martini</i> ♂	Ndumo Game Reserve	SPIZA391-19	NCA 2019/584	658 bp
<i>Afroceto plana</i> ♀	Ndumo Game Reserve	SPIZA388-19	NCA 2019/582	658 bp
<i>Afroceto</i> sp. 1 ♂	Nigramoep Slow Living Gues Farm	SPIZA905-21	NCA 2021/526	658 bp
<i>Afroceto</i> sp. 2 ♂	Akkerendam Nature Reserve	SPIZA1173-21	NCA 2021/947	658 bp
<i>Capobula infima</i> ♂	Marloth Nature Reserve	SPIZA2119-24	NMBA 19184	658 bp
<i>Capobula montana</i> ♂	Bankfontein Farm	SPIZA402-19	NCA 2019/887	658 bp
<i>Capobula neethlingi</i> ♂	Jonkershoek Nature Reserve	SPIZA1805-24	NMBA 18895	658 bp
<i>Coronarachne denticulata</i> ♂	Ndumo Game Reserve	SPIZA427-19	NCA 2019/592	618 bp
<i>Falcaranea gladius</i> ♀	Ndumo Game Reserve	SPIZA425-19	NCA 2019/593	658 bp
<i>Falcaranea maputensis</i> ♂	Ndumo Game Reserve	SPIZA422-19	NCA 2019/758	658 bp
<i>Foordana distincta</i> ♀	Queenstown	SPIZA1276-21	NCA 2021/1044	658 bp
<i>Fuchiba aquilonia</i> ♀	Tembe Elephant Park	SPIZA1603-23	NMBA 18813	657 bp
<i>Fuchiba capensis</i> ♂	Garcia Nature Reserve	SPIZA2257-24	NMBA 19264	658 bp
<i>Fuchibotulus haddadi</i> ♀	Golden Gate Highlands National Park	SPIZA652-21	NCA 2021/244	658 bp
<i>Fuchibotulus kigelia</i> ♂	Bankfontein Farm	SPIZA652-21	NCA 2021/244	658 bp
<i>Jocquestus schenkeli</i> ♂	Ndumo Game Reserve	SPIZA399-19	NCA 2019/581	658 bp
<i>Mushimane tswibilinki</i> ♀	Ndumo Game Reserve	SPIZA423-19	NCA 2019/757	621 bp
<i>Mushimane tswibilinki</i> ♂	Ndumo Game Reserve	SPIZA424-19	NCA 2019/757	658 bp
<i>Namaquella arida</i> ♂	Akkerendam Nature Reserve	SPIZA931-21	NCA 2021/229	658 bp
<i>Namaquella arida</i> ♀	Akkerendam Nature Reserve	SPIZA932-21	NCA 2021/229	658 bp
<i>Orthobula radiata</i> ♂	Vernon Crookes Nature Reserve	SPIZA1399-21	NCA 2021/1202	614 bp
<i>Patelloceto secutor</i> ♂	Ndumo Game Reserve	SPIZA405-19	NCA 2019/590	658 bp
<i>Planochelas haddadi</i> ♀	Ndumo Game Reserve	SPIZA430-19	NCA 2019/999	596 bp
<i>Poachelas montanus</i> ♀	Kogelberg Biosphere Reserve	SPIZA1975-24	NMBA 18989	658 bp
<i>Poachelas striatus</i> ♀	Platberg Nature Reserve	SPIZA365-19	NCA 2019/422	658 bp
<i>Spinotrachelas</i> sp. 1 ♀	Marloth Nature Reserve	SPIZA2120-24	NMBA 19185	658 bp
<i>Thysanina absolve</i> ♂	Bloemfontein	SPIZA637-21	NCA 2021/233	658 bp
<i>Trachelas canariensis</i> ♂	uKhahlamba Drakensberg Mountains	SPIZA1349-21	NCA 2021/1106	658 bp
<i>Trachelas pusillus</i> ♂	Tembe Elephant Park	SPIZA1600-23	NMBA 18810	658 bp
<i>Rukuluk gramineus</i> ♂	Witsand Nature Reserve	SPIZA1505-23	NMBA 18661	658 bp
<i>Rukuluk</i> sp. 1 Tembe imm.	Tembe Elephant Park	SPIZA410-19	NCA 2019/760	658 bp
<i>Rukuluk</i> sp. 1 Tembe imm.	Tembe Elephant Park	SPIZA411-19	NCA 2019/760	658 bp
<i>Thysanina gracilis</i> ♂	Richtersveld National Park	SPIZA875-21	NCA 2021/491	658 bp
<i>Thysanina transversa</i> ♂	Karkkloof Canopy Tours	SPIZA1381-21	NCA 2021/1135	658 bp

sequences, we only included a single specimen of species from the non-target genera in our analysis. The tree was rooted with *Moggridgea loistata* Griswold, 1987 (Migidae) from South Africa.

The phylogenetic analysis was performed on the BOLD platform using the "Sequence analysis" tool, using the Kimura 2 Parameter distance model, Neighbour-joining algorithm and a minimum overall overlap of 200 bp between sequences. The sequences were aligned using Muscle (Edgar 2004). For the representative species, only sequences more than 600 bp in length were included; wherever possible, sequences with an optimal length of 658 bp were selected. For each terminal, the species name, specimen sex, BOLD process ID, museum accession number and locality details were included as sequence tags.

Taxonomy

Trachelidae Simon, 1897

Foordana gen. nov.

<https://zoobank.org/F9FB23D4-3F7B-450D-BACA-A31FAE5769A8>

Type species. *Foordana distincta* sp. nov.

Diagnosis. *Foordana* gen. nov. superficially represent *Afroseto* by their size and *Thysanina* Simon, 1910 *sensu stricto* by the lack of leg spines, but can be recognized from the former by the heavily scopulate tibiae, metatarsi and tarsi of the anterior legs (Figs 2D, I, 4A–F, 5A–C, G, H), the absence of leg spines (Figs 2A, F, 9A–C), the paired subtriangular RTA on the male palps (one dorsal and one ventral; Figs 8B, 10A, 11B), which are generally single or irregularly shaped in *Afroseto* (see Lyle and Haddad 2010 and Lyle 2015), and the lack of a large median atrium in the female epigyne (cf. Fig. 9G–J and Lyle and Haddad 2010). They can be distinguished from *Thysanina* by their larger size and the genitalic structure: the male palp has two well-developed subtriangular retrolateral tibial apophyses, one dorsal and one ventral (usually singular or irregularly shaped in *Thysanina* when two are present; see Lyle and Haddad 2006) and the female epigynes are quite heavily sclerotized, with central paired curved atria housing the copulatory organs (weakly sclerotized and with atria and copulatory openings usually in the anterior half of the epigyne; see Lyle and Haddad 2006).

Description. Small spiders, 4.72–5.60 mm in length; carapace bright orange to deep red-brown; carapace oval, broadest at coxae II, gradually narrowed towards eye region (Figs 1A–C, 2A, F, 3A); fovea distinct, a short narrow slit; posterior margin slightly concave, almost straight (Fig. 3A); convex in lateral profile, slightly elevated from clypeus to approximately $\frac{2}{5}$ carapace length, with steeper slope in posterior quarter (Fig. 2B, G); carapace surface finely wrinkled, with sparse very short fine curved setae with weakly tuberculate bases (Fig. 3B). All eyes surrounded by black rings; AER slightly procurved in anterior view, slightly recurved in dorsal view; PER strongly recurved in dorsal view (Fig. 3C); MOQ narrower anteriorly than posteriorly, posterior width slightly larger than length. Chilum distinct, a single transverse sclerite; cheliceral promargin and retromargin each with three teeth; fang with distinct serrula; endites with parallel lateral margins, mesal margins with longitudinal groove and dense maxillar hair tuft (Fig. 3E), distal margins with distinct serrula comprising elongate, distally rounded denticles (Fig. 3F); labium trapezoidal, slightly longer than wide, narrower distally than basally, distal margin with concavity (Fig. 3E). Pleural bars sclerotized, isolated; sternum shield-shaped, slightly longer than broad, broadest at coxa II (Fig. 3G), surface smooth centrally, covered in long straight setae with more pronounced tuberculate bases towards borders (Fig. 3G); precoxal triangles present, intercoxal sclerites present between all coxal pairs. Leg formula 4123 or 1423; all legs densely covered in very short fine setae (Fig. 2D, E, I, J); leg I not strongly thickened, very slightly so in males only (Fig. 2A–C, F–H); dorsal femoral surface very slightly concave at $\frac{1}{2}$ its length, ventral surface straight (Fig. 2D, I); all femora strongly constricted proximally (Fig. 2D, I); patellar indentation narrow, on retrolateral side, with lyriform organ at proximal end (Fig. 3H, I); anterior legs of males with distinct small ventral cusps on tibiae, metatarsi and

tarsi I and II in *F. distincta* sp. nov. (Figs 4A–I, 8A) and metatarsi and tarsi in *F. kasouga* sp. nov. (Fig. 11A), absent in *F. flavipoda* sp. nov. and all females; tibiae, metatarsi and tarsi I and II of both sexes with very dense scopulae (Figs 4A–F, 5A–C, F–H), with oval pored organs among the scopulate setae (Fig. 5D); metatarsi with strongly developed metatarsal stopper, posteriors with ventral preening brush and comb at distal end (Fig. 5E); tarsi with sparse tactile hairs, few dorsal trichobothria and chemosensory setae (Fig. 5G, J); trichobothria with slightly lowered distal plate, distal margin of hood overlapping plate, hood with three roughly concentric curved ridges (Fig. 5I); tarsal organ at approximately $\frac{5}{6}$ tarsus length (Fig. 5G), flush with integument, surface finely wrinkled, opening oval and distally placed (Fig. 5J); paired tarsal claws short, with four teeth and dense tenant setae forming claw tufts in between (Fig. 5H). Abdomen oval, with distinct black chevron markings on creamy-grey background (Figs 1A–C, 2A, F) or without markings (Fig. 9A–C); dorsal scutum in males only, covering entire dorsum, absent in females; dorsum covered in scattered short fine setae, with two pairs of sigilla in both sexes; venter without large sclerites, only with markings in *F. distincta* sp. nov. (Fig. 2C, H), covered in scattered short fine setae. Spinnerets short, conical, in compact group (Fig. 6A), spigot detail only studied in detail in female *F. distincta* sp. nov.: ALS with two MAmp and 22 Pi (Fig. 6B); PMS with single mAmp, four Cy, 13 Ac and one Ta (Fig. 6C); PLS with two Cy and 10 Ac (Fig. 6D). Male palpal femora and patellae without apophyses, patella with retrolateral lyriform organ (Fig. 7A); palpal tibiae with ventral and dorsal retrolateral apophyses (Fig. 7B, C), variable in shape and size between species; tegulum generally oval in ventral view, as broad as cymbium (Fig. 9D–F), convex in lateral view (Fig. 7B); embolus curved, with base flattened and broad, gradually narrowing distally (Fig. 9D–F). Female palpal claw simple, straight, with six ridge-like transverse denticles (Fig. 7D); palp also with tarsal organ (Fig. 7E). Female epigyne quite heavily sclerotized, with copulatory openings near centre of epigyne in C-shaped ridges (Fig. 7F); epigyne without (Fig. 9G, H) or with (Fig. 9I, J) small hood in anterior half; copulatory ducts directed anteriorly, entering anterior ST II; connecting ducts leading to posterolateral ST I.

Etymology. The genus name is a patronym in honour of the late Stefan Foord, in recognition of his distinguished career and contribution to the development of African arachnology, with the suffix alluding to its superficial resemblance to *Cetonana*. Gender feminine.

Composition. *Foordana distincta* sp. nov., *F. flavipoda* sp. nov., *F. kasouga* sp. nov. and an undescribed species from Zimbabwe.

***Foordana distincta* sp. nov.**

<https://zoobank.org/54A664C5-2149-48F1-837D-85C5E0BD8CBF>

Figs 1A–C, 2–8, 9D, G, H

Material examined. Holotype. SOUTH AFRICA • ♂; Free State Province; Clocolan, Amahelo-ho-Spitskop; 28°48.561'S, 27°39.255'E; 17 Mar. 2010; C. Haddad leg.; base of grass tussocks; NCA 2010/349.

Paratypes. SOUTH AFRICA • 4 ♀; together with holotype • Eastern Cape Province; 1 ♀; Queenstown/Komani district, Farm Arphen; 31°51.546'S, 26°34.112'E; 1160 m a.s.l.; 4 Apr. 2021; C. Haddad leg.; hand collecting; NCA 2021/1044

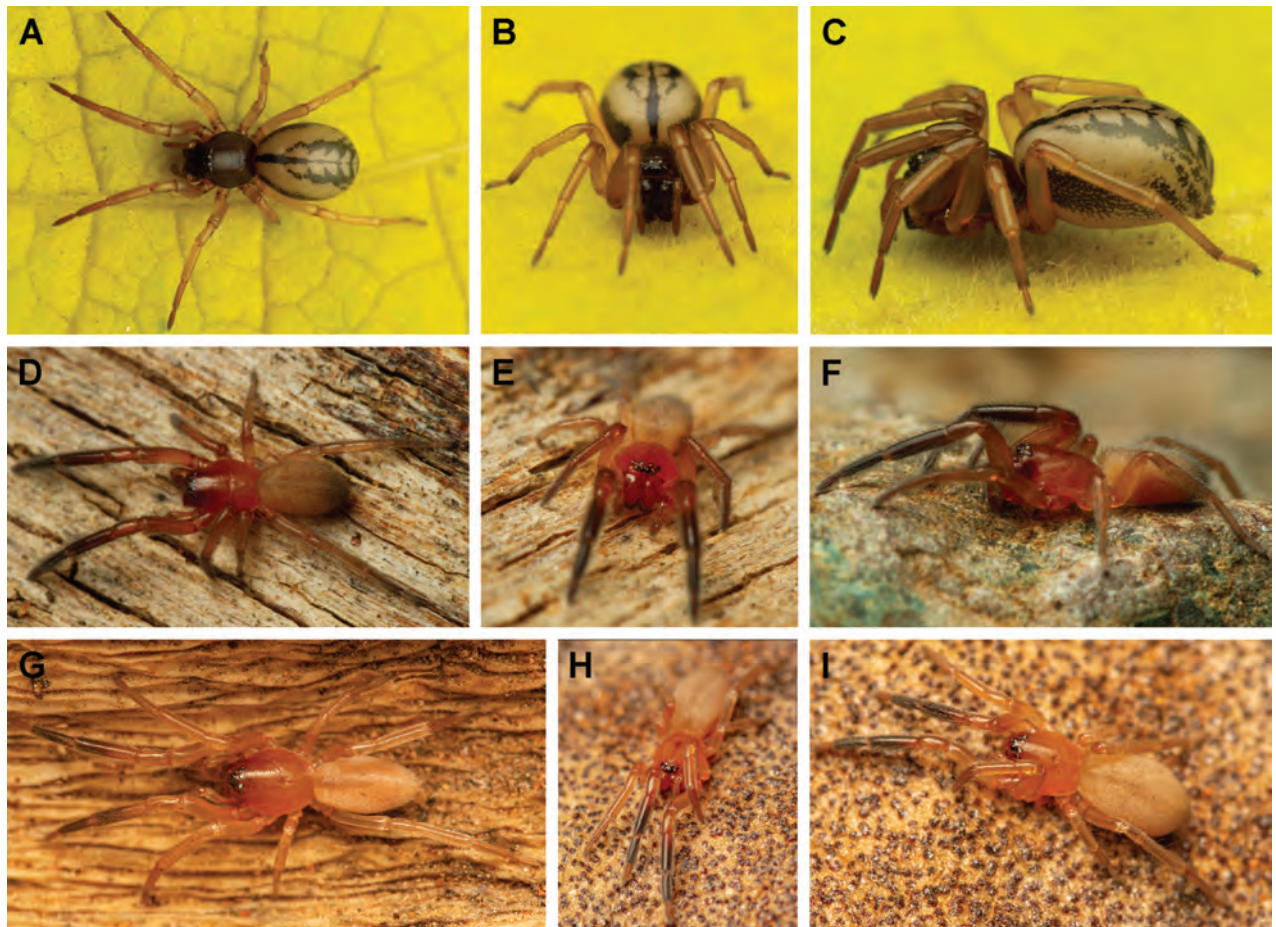


Figure 1. General habitus of live *Foordana distincta* sp. nov., female from Komani, Eastern Cape (A–C), *Namaquella arida* sp. nov., male from Akkerendam Nature Reserve, Northern Cape (D–F), and *Rukuluk gramineus* sp. nov., female from Witsand Nature Reserve, Northern Cape (G–I). A, D, G Dorsal view B, E, H Anterior view C, F Lateral view I Dorsolateral view. Photos by Ruan Booysen.

• 1 ♂ 2 ♀; Amatola Mountains, Hogsback, Amatole Forestry Company; 32°33.727'S, 26°54.924'E; 1460 m a.s.l.; 23 Mar. 2013; C. Haddad leg.; active search, grass tussocks and fynbos in grassland; NCA 2014/321 • Free State Province: 1 ♂ 2 ♀; Clocolan, Amahelo-ho-Spitskop; 28°48'S, 27°39'E; 9 Mar. 2007; C. Haddad leg.; *Rhus* litter; NCA 2007/1334 • 2 ♀; same collection data as for preceding; 8 Mar. 2007; dense grass; NCA 2007/1336 • 1 ♀; same collection data as for preceding; grassy litter near dam; NCA 2008/2897 • 1 ♀; same collection data as for preceding; *Eucalyptus* litter; NCA 2007/1335 • 1 ♀; Clocolan, Amahelo-ho-Spitskop; 28°48.561'S, 27°39.255'E; 2010; A. Jones leg.; in garden and around house; NCA 2010/328 • 3 ♀; Wepener district, Farm Dereham, 29°52.671'S, 27°04.456'E; 1520 m a.s.l.; 31 Mar. 2024; C. Haddad leg.; hand collecting in grassland; NMBA 19614 • KwaZulu-Natal Province; 3 ♀; Pietermaritzburg, Town Bush; 29°33'S, 30°21'E; 15 Apr. 1976; F. Wanless & A. Russell-Smith leg.; ground layer in grassland; BMNH • Western Cape Province: 1 ♀; Houw Hoek, Houw Hoek Inn; -34.2046, 19.1537; 275 m a.s.l.; 25 Nov. 2021; C. Haddad leg.; hand collecting in fynbos; NMBA 18796.

Diagnosis. The male of this species shares with *F. flavipoda* sp. nov. a simple curved embolus in ventral view (Figs 8B, 10A), whereas it is S-shaped with a distal loop in *F. kasouga* sp. nov. (Fig. 11B). Furthermore, it can be recognised

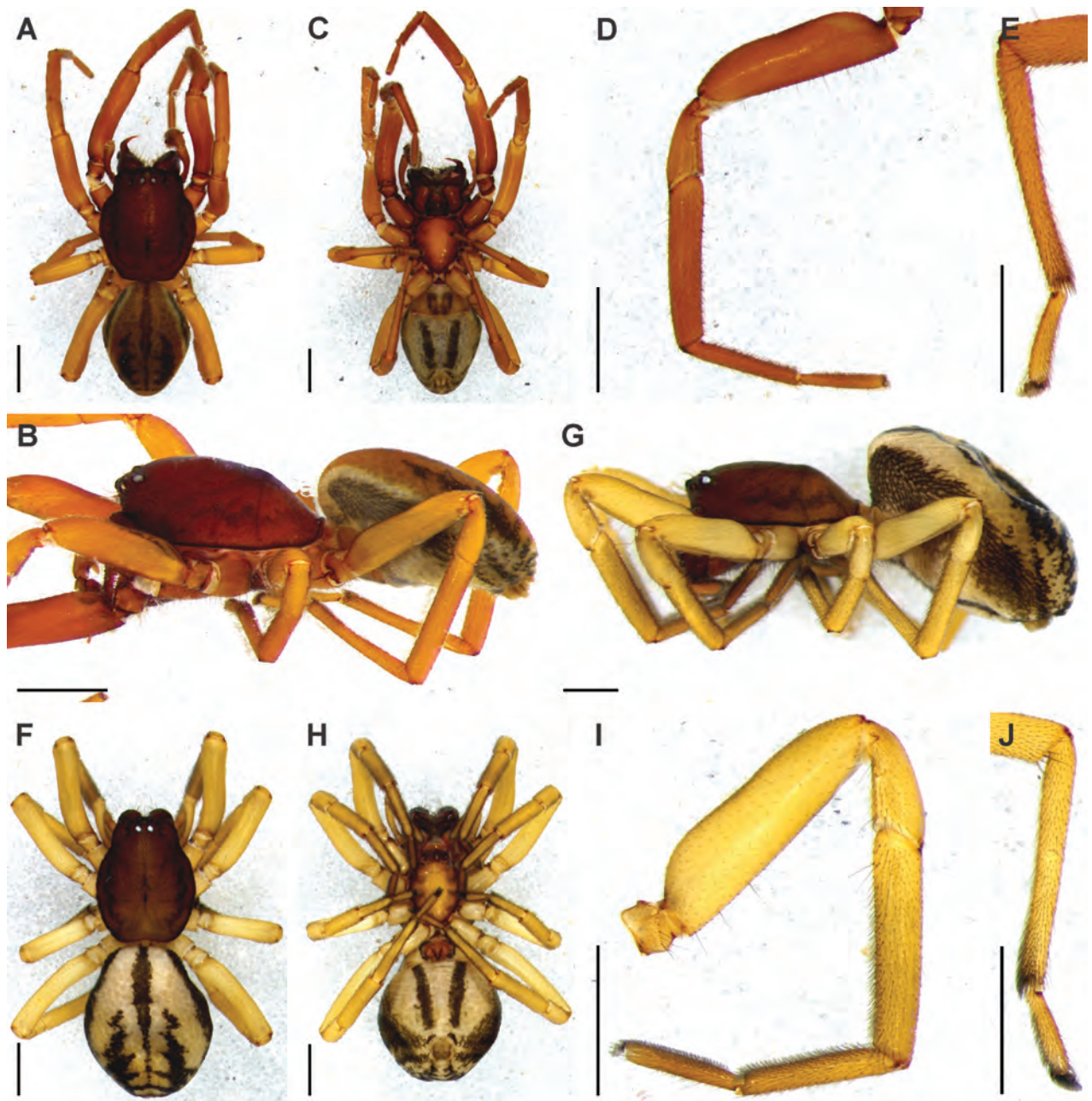


Figure 2. Digital microscope photographs of somatic morphology of *Foordana distincta* sp. nov., male (A–E) and female (F–J). A, F habitus, dorsal view B, G same, lateral view C, H same, ventral view D, I leg I, prolateral view E, J metatarsus and tarsus IV. Scale bars: 1.0 mm (A–C, F–H); 0.5 mm (D, E, I, J).

by the generally similar size of the dorsal and ventral retrolateral tibial apophyses in lateral view (Fig. 8C), whereas the ventral is far larger than the dorsal in *F. flavipoda* sp. nov. (Fig. 10B) and the dorsal is larger than the ventral in *F. kasouga* sp. nov. (Fig. 11C). Females can be separated from *F. flavipoda* sp. nov. and an undescribed species from Zimbabwe by the absence of a median hood (compare Fig. 9G–J).

Description. Male (holotype, Amahelo-ho-Spitskop, NCA 2010/349): Measurements: CL 2.36, CW 2.03, AL 2.77, AW 1.87, TL 5.15, FL 0.14, SL 1.33, SW 1.15, AME-AME 0.07, AME-ALE 0.04, ALE-ALE 0.41, PME-PME 0.11, PME-PLE 0.19, PLE-PLE 0.68, MOQ: AW 0.35, PW 0.36, L 0.40. Length of leg segments: I

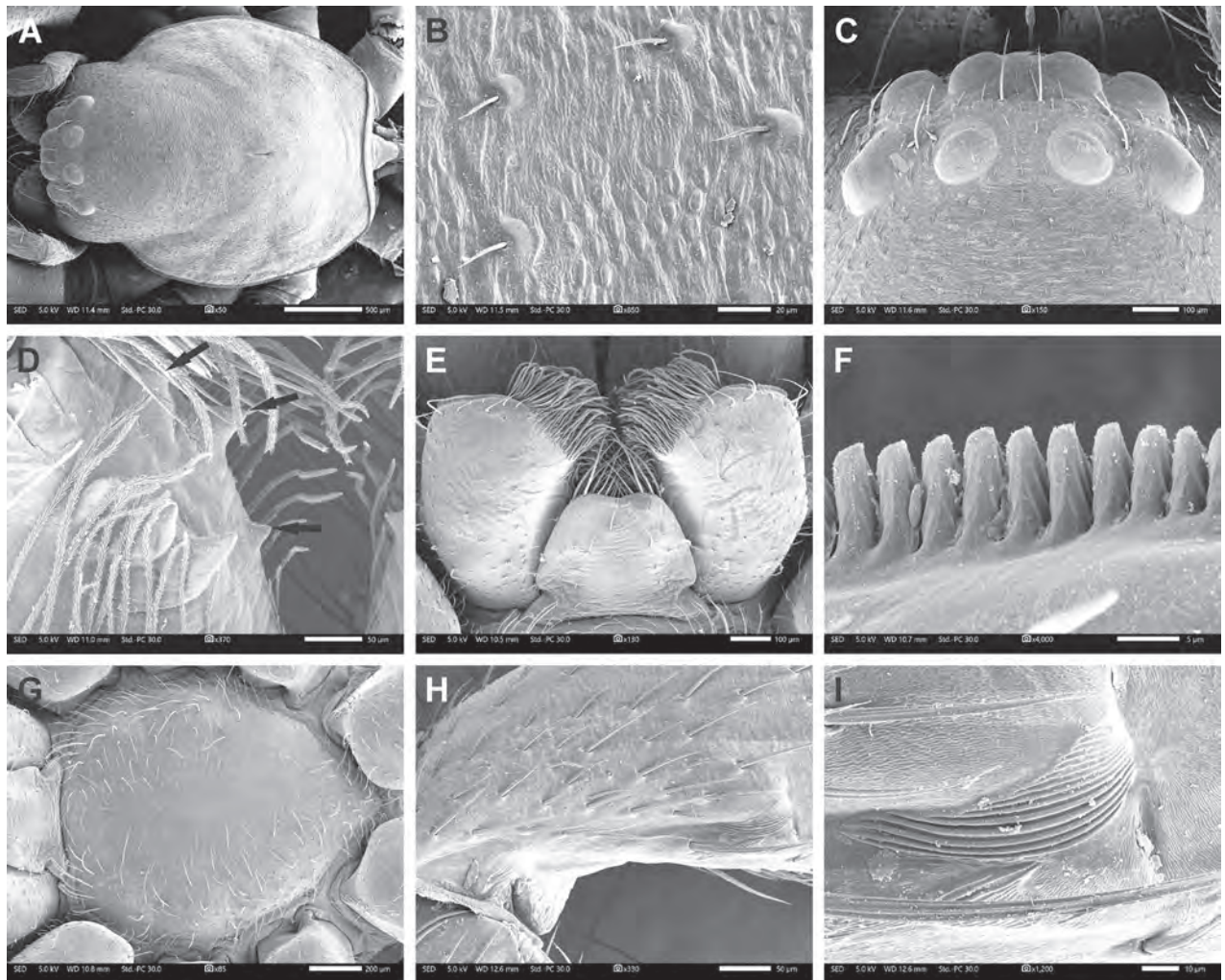


Figure 3. Scanning electron micrographs of *Foordana distincta* sp. nov., female **A** carapace, dorsal view **B** same, surface texture and setae **C** eye region, dorsal view **D** chelicerae, arrows indicating promarginal teeth **E** mouthparts **F** detail of endite serrula **G** sternum **H** patellar indentation, leg IV **I** same, detail of lyriform organ.

$2.05 + 0.95 + 1.61 + 1.22 + 0.81 = 6.64$; II $1.80 + 0.88 + 1.35 + 1.12 + 0.76 = 5.91$;
 III $1.32 + 0.63 + 0.88 + 1.07 + 0.43 = 4.33$; IV $1.92 + 0.85 + 1.60 + 1.78 + 0.63 = 6.78$.
 Carapace deep red-brown, with four pairs of mediolateral mottled markings, corresponding to palps and first three pairs of legs (Fig. 2A); surface finely wrinkled, appearing asetose but with very short sparse setae (Fig. 3B); fovea short, distinct, at $\frac{2}{3}$ CL. AER slightly procurved, almost straight; clypeus height equal to AME diameter; AME very slightly larger than ALE; AME separated by distance equal $\frac{1}{2}$ their diameter; AME separated from ALE by distance equal to slightly less than $\frac{1}{3}$ AME diameter; PER slightly recurved, PLE slightly larger than PME; PME separated by distance equal to slightly more than $\frac{4}{5}$ their diameter; PME separated from PLE by distance equal to $1\frac{1}{2}$ PME diameter. Chelicerae, endites and labium dark orange-brown; anterior surface of cheliceral paturon covered with fairly dense long, fine setae mesally, sparse laterally; promargin with three slightly separated teeth, median tooth largest; retromargin with three adjacent teeth on common base, decreasing in size distally; endites slightly paler. Sternum dark orange, with faint black mottled patches laterally, border dark orange-brown; surface smooth, with scattered erect setae. Abdomen elongate-oval, creamy-grey dorsally, with narrow yellow-brown dorsal scutum, leav-

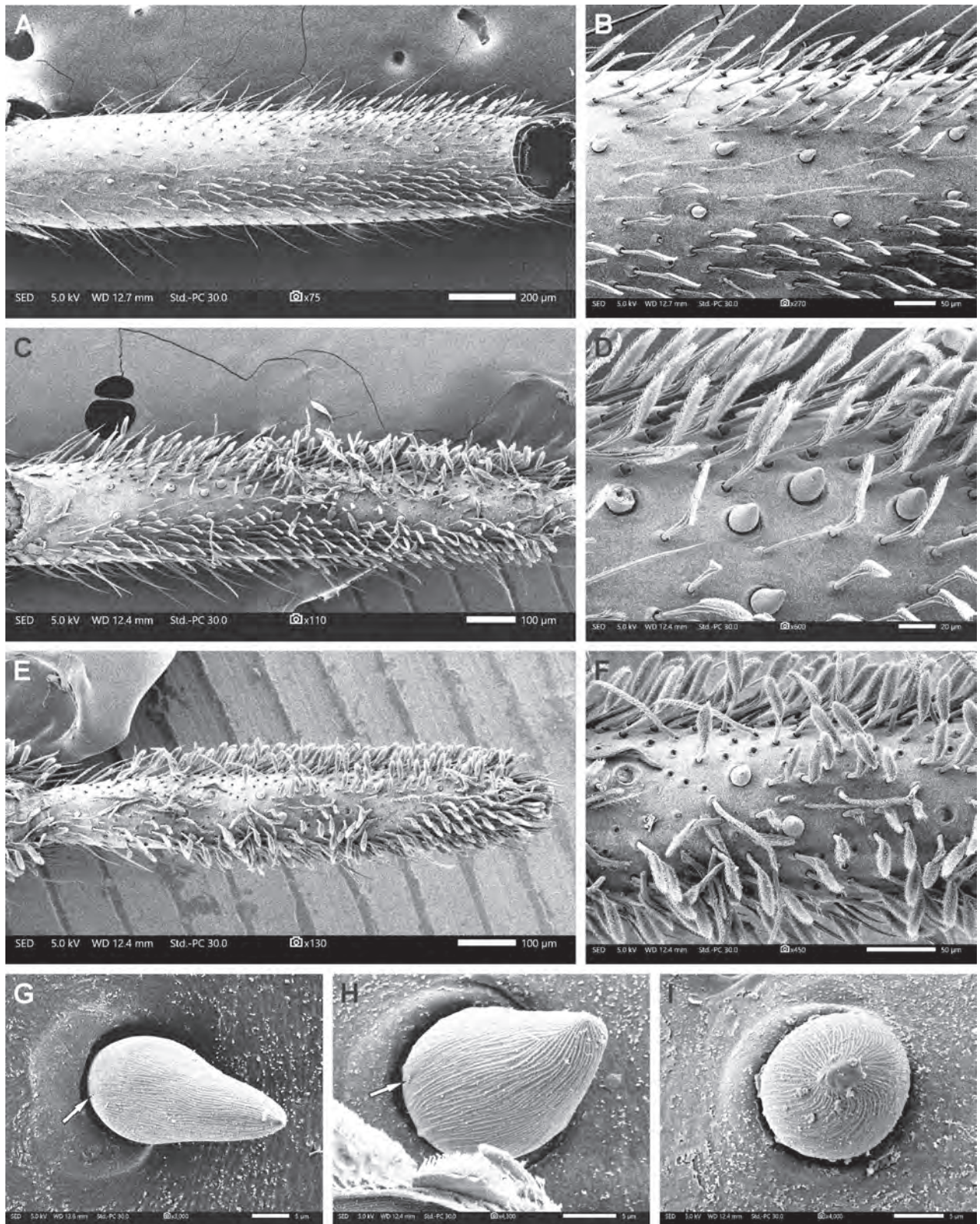


Figure 4. Scanning electron micrographs of *Foordana distincta* sp. nov., male **A** tibia I, ventral view **B** same, detail of cusps and scopulae **C** metatarsus I, ventral view **D** same, detail of cusps and scopulae **E** tarsus I, ventral view **F** same, detail of cusps and scopulae **G–I** detail of cusp structure on the tibia (**G**), metatarsus (**H**) and tarsus (**I**), arrows indicating triad of pores at base of cusp on proximal side.

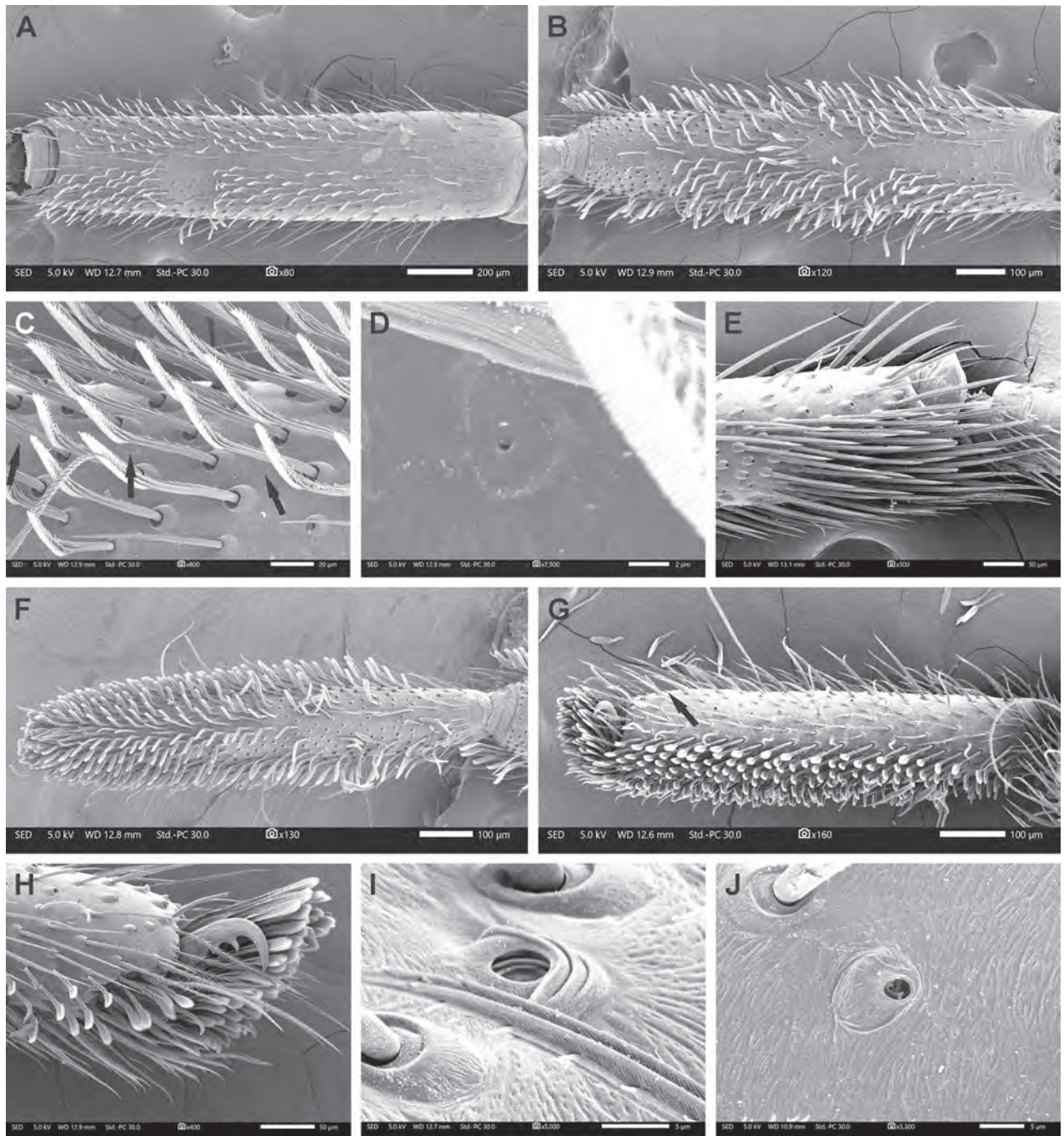


Figure 5. Scanning electron micrographs of *Foordana distincta* sp. nov., female **A** tibia I, ventral view **B** metatarsus I, ventral view **C** same, detail of scopulate setae, arrows indicating ovoid pores between scopulate setae **D** same, detail of ovoid pores **E** metatarsus IV, lateral view **F** tarsus I, ventral view **G** same, lateral view, arrow indicating position of tarsal organ **H** tarsus IV, detail of claw tuft and claws **I** tarsus I, base of dorsal trichobothrium **J** same, detail of tarsal organ.

ing narrow sliver between scutum and black lateral markings (Fig. 2A); dorsum with continuous black line from anterior to posterior, with pair of narrow lines in posterior half of abdomen, joined by six faint transverse chevron markings; sides black (Fig. 2B); venter creamy-grey, with pair of black mediolateral lines from epigastric fold to spinnerets (Fig. 2C). Legs I to IV dark yellow-orange, I darker than others; ventral cusps present on tibiae, metatarsi and tarsi I and II

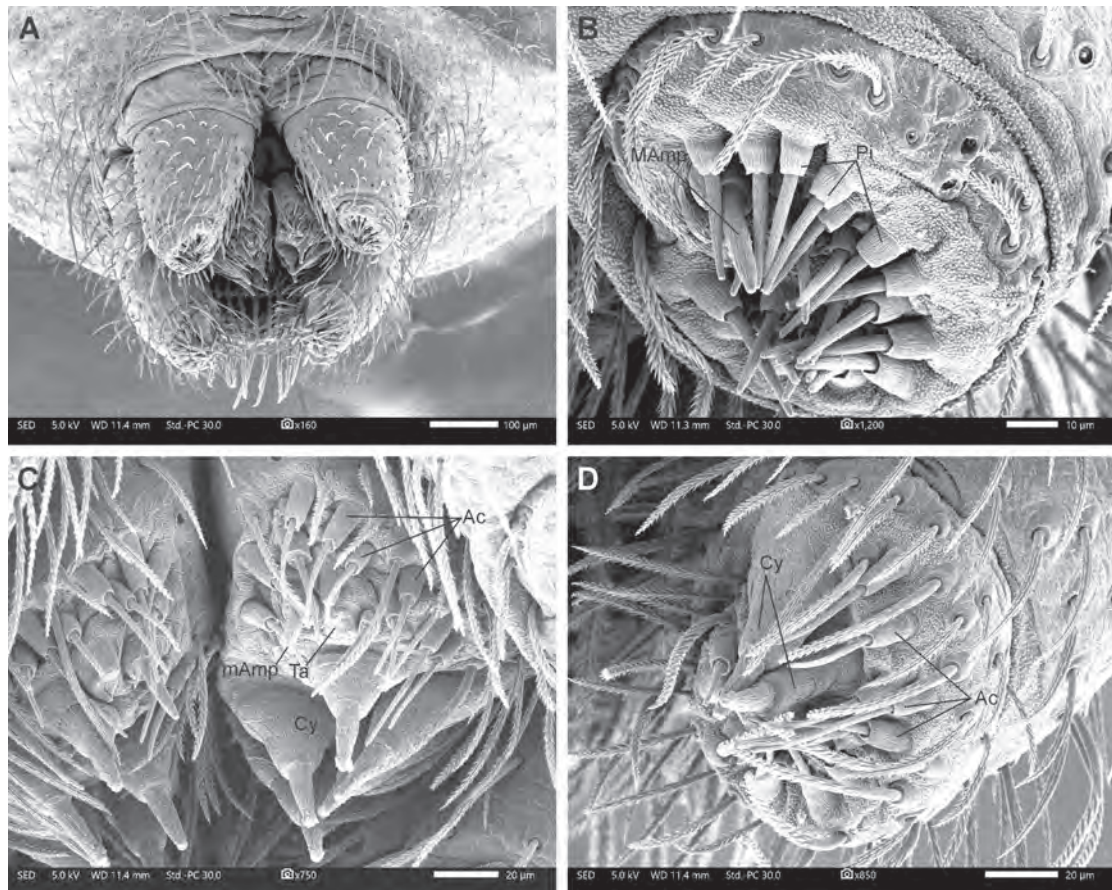


Figure 6. Scanning electron micrographs of *Foordana distincta* sp. nov., female **A** spinnerets, general view **B** anterior lateral spinnerets **C** posterior median spinnerets **D** posterior lateral spinnerets. Abbreviations: Ac – aciniform gland spigot(s); Cy – cylindrical gland spigot(s); mAMP – minor ampullate gland spigot; MAMP – major ampullate gland spigot; Pi – piriform gland spigot(s); Ta – tartipore.

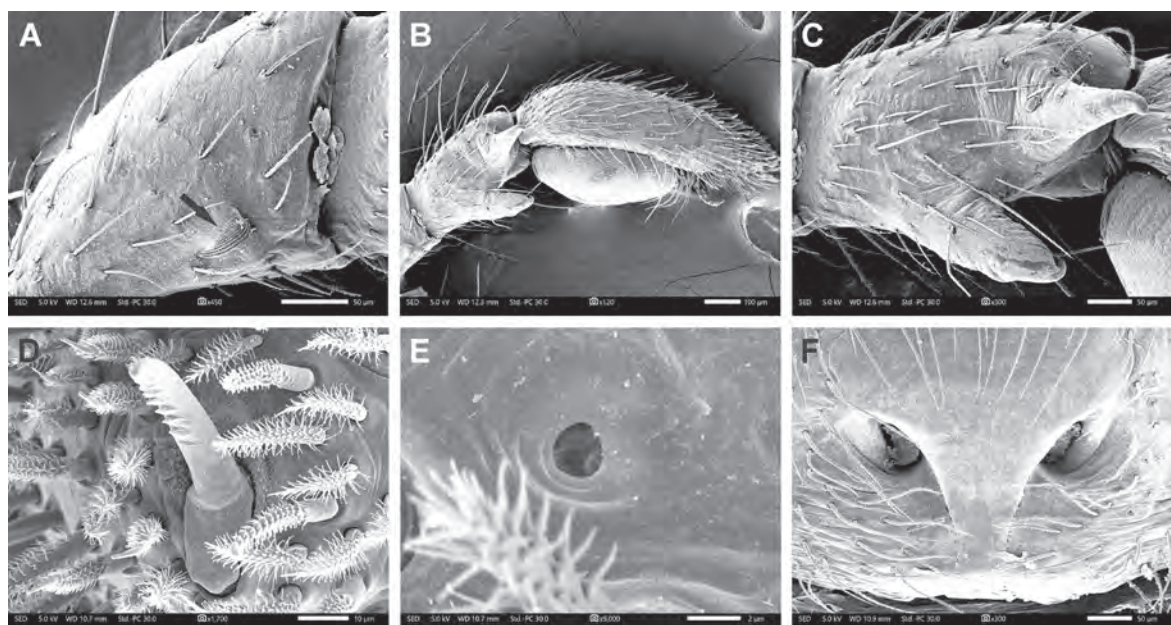


Figure 7. Scanning electron micrographs of *Foordana distincta* sp. nov., male (**A–C**) and female (**D–F**) **A** palpal patella, retrolateral view, arrow indicating lyriform organ **B** palpal tibia and tarsus, retrolateral view **C** same, detail of tibia **D** palpal claw **E** palpal tarsal organ **F** epigyne, ventral view.

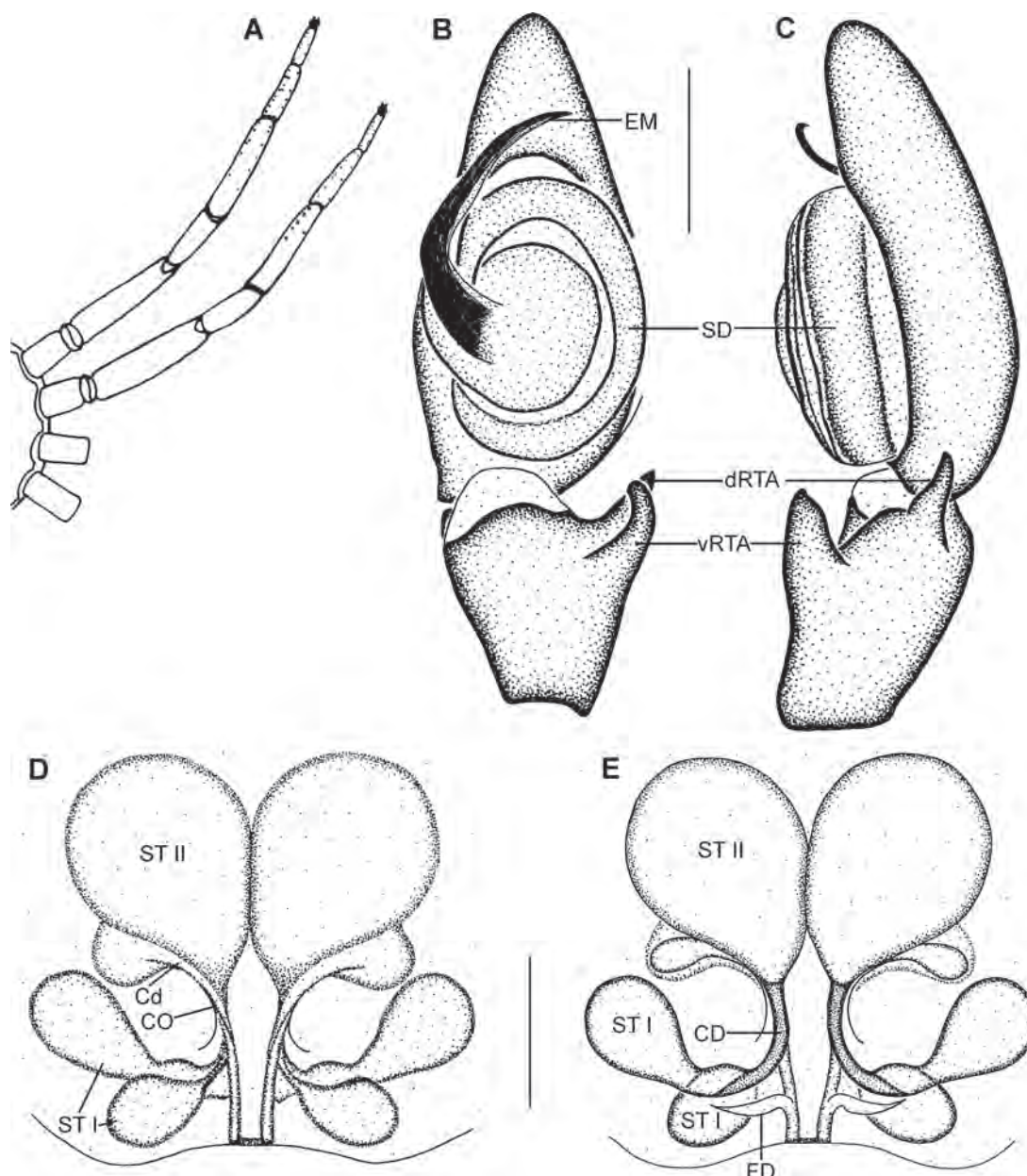


Figure 8. *Foordana distincta* sp. nov., male (A–C) and female (D, E). A schematic representation of cusp arrangement on legs I and II B palp, ventral view C same, retrolateral view D epigyne, ventral view E same, dorsal view. Abbreviations: CD – connecting duct; Cd – copulatory duct; CO – copulatory opening; dRTA – dorsal retrolateral tibial apophysis; EM – embolus; FD – fertilization duct; SD – sperm duct; ST I – primary spermatheca; ST II – secondary spermatheca; vRTA – ventral retrolateral tibial apophysis. Scale bars: 0.25 mm.

(Fig. 8A). Palp (Figs 7A, B, 8B, C, 9D) dark red-brown; tegulum oval, with embolus originating mesally, initially with broad base directed prolaterally, bending sharply before gradually curving to tip, directed at 2 o'clock; vRTA slender, subtriangular, with rounded tip pointed inwards in ventral view; dRTA slightly smaller with sharp tip, triangular in lateral view.

Female (paratype, Amahelo-ho-Spitskop, NCA 2010/349): Measurements: CL 2.48, CW 2.05, AL 3.58, AW 2.35, TL 5.60, FL 0.24, SL 1.32, SW 1.05, AME-AME 0.06, AME-ALE 0.03, ALE-ALE 0.37, PME-PME 0.13, PME-PLE 0.14, PLE-PLE 0.65, MOQ: AW 0.31, PW 0.40, L 0.35. Length of leg segments: I 2.12 + 1.02 + 1.52 + 1.20 + 0.86 = 6.72; II 1.90 + 0.92 + 1.35 + 1.02 + 0.80 = 5.99; III 1.47 +

0.77 + 1.00 + 1.12 + 0.55 = 4.91; IV 2.25 + 0.98 + 1.80 + 1.95 + 0.70 = 7.68. Carapace deep orange-brown, with three paired mediolateral mottled grey markings and mottled patch in front of fovea (Fig. 2F); AER slightly procurved, almost straight; clypeus height equal to ALE diameter; AME slightly larger than ALE; AME separated by distance approximately $\frac{2}{5}$ their diameter; AME separated from ALE by distance equal to $\frac{1}{5}$ AME diameter; PER slightly recurved, PME and PLE subequal; PME separated by distance equal to their diameter; PME separated from PLE by distance equal to PME diameter. Chelicerae, endites and labium orange-brown; cheliceral promargin with three slightly separated teeth, median tooth largest; retromargin with three adjacent teeth on common base, decreasing in size distally. Sternum deep yellow-brown, borders darker, with mottled lateral markings near coxal bases; surface finely wrinkled, covered with scattered short, fine setae. Abdomen without scutum, dorsal, lateral and ventral markings as for male (Fig. 2F–H). Legs I to IV creamy-yellow, tibiae, metatarsi and tarsi I and II yellow-brown. Epigyne (Figs 7F, 8D, E, 9G, H) with broad, sharply curved atria mesally, with copulatory openings entering short lateral copulatory ducts before entering large teardrop-shaped anterior ST II, each with oval lateral accessory gland; connecting ducts exiting ST II posteromesally, curving laterally, making a twist before entering bilobed posterolateral ST I, with short channel leading to fertilization ducts.

Etymology. The species name is the Latin for “distinct, clear”, referring to the well-defined abdominal markings of this species.

Distribution. Widespread across the southern half of South Africa (Fig. 12).

***Foordana flavipoda* sp. nov.**

<https://zoobank.org/5DFE2773-1173-4D43-B97B-07BE3F7BED7C>

Figs 9A, B, E, I, 10

Material examined. Holotype. SOUTH AFRICA • ♂; Free State Province; Bloemfontein district, Farm Hopefield; 28°51.683'S, 26°09.788'E; 1275 m a.s.l.; 28 Oct. 2001; C. Haddad leg.; *Eucalyptus* bark; NMBA 19613.

Paratypes. 2 ♀; together with holotype.

Other material. SOUTH AFRICA • 1 ♀; Free State Province; Harrismith, Platberg Nature Reserve, Platberg, near cross; 28°15.136'S, 29°09.958'E; 2215 m a.s.l.; 11 Mar. 2006; C. Haddad leg.; under rocks, mountainside; NCA 2006/863.

Diagnosis. The male of this species can be recognised from congeners by the lack of ventral leg cusps on the anterior legs and the short broad dRTA (Fig. 10B), which is longer in *F. distincta* sp. nov. and *F. kasouga* sp. nov. (Figs 8C, 11C). The female can be separated from *F. distincta* sp. nov. by the strongly spiralled copulatory duct and small anterior secondary spermathecae, which are short and straight, and large, respectively, in the latter species (cf. Figs 10D and 8E). Furthermore, *F. flavipoda* sp. nov. has a median hood in the epigyne (Fig. 10C), whereas *F. distincta* sp. nov. does not (Fig. 8D).

Description. Male (holotype, Hopefield, NMBA 19613): Measurements: CL 2.27, CW 1.91, AL 2.45, AW 1.77, TL 4.72, FL 0.18, SL 1.20, SW 1.03, AME-AME 0.07, AME-ALE 0.04, ALE-ALE 0.38, PME-PME 0.14, PME-PLE 0.13, PLE-PLE 0.61, MOQ: AW 0.30, PW 0.37, L 0.33. Length of leg segments: I 1.90 + 1.02 + 1.53 + 1.20 + 0.62 = 6.27; II 1.57 + 0.78 + 1.56 + 1.03 + 0.60 = 5.54; III 1.21

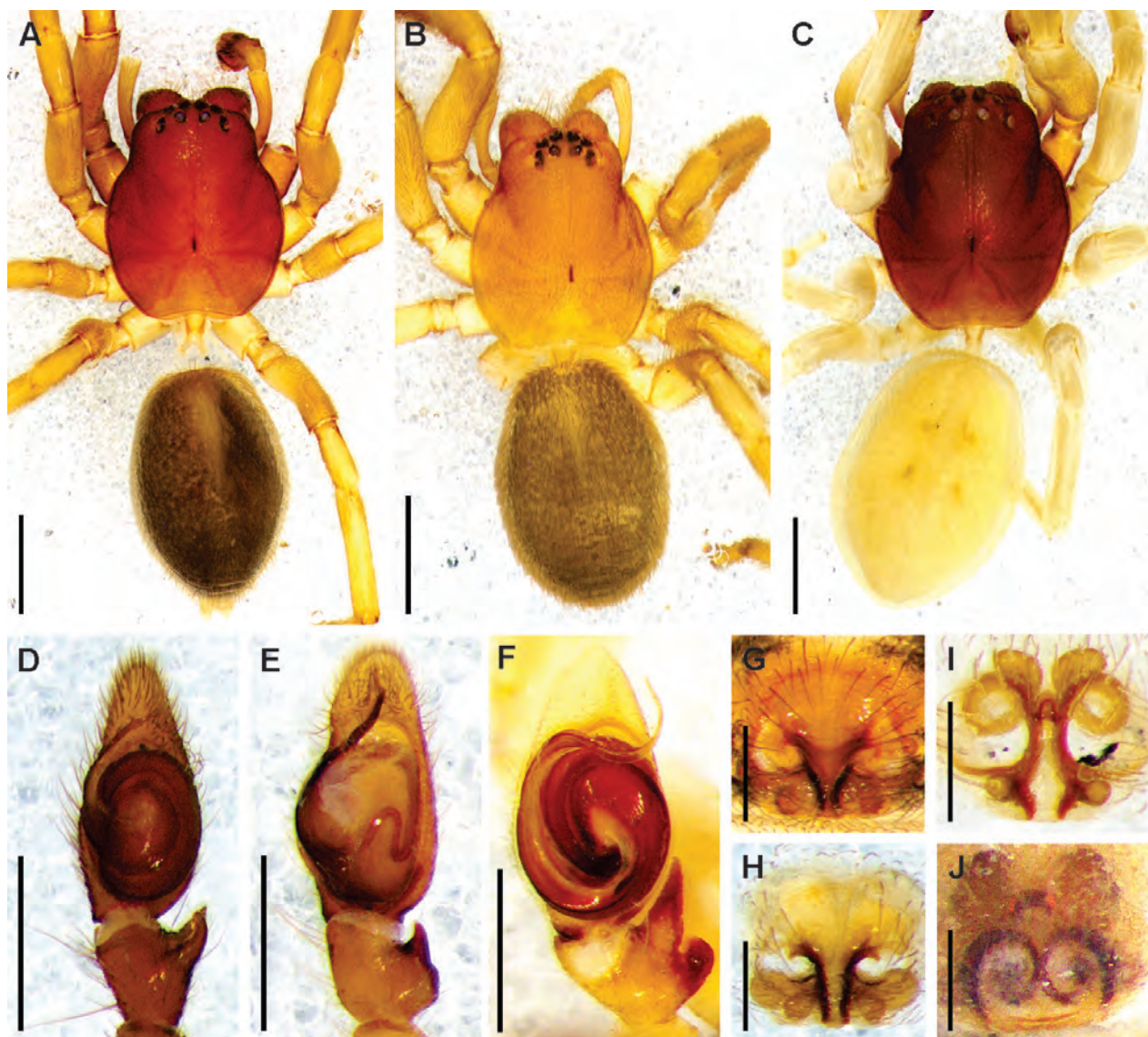


Figure 9. Digital microscope photographs of somatic morphology of *Foordana flavipoda* sp. nov., male (A, E) and female (B, I), *F. kasouga* sp. nov., male (C, F), *F. distincta* sp. nov., male (D) and female (G, H), and undescribed *Foordana* sp. from Zimbabwe, female (J). A–C habitus, dorsal view D–F palps, ventral view G, J uncleared epigynes, ventral view H, I cleared epigynes, ventral view. Scale bars: 1.0 mm (A–C), 0.5 mm (D–F), 0.25 mm (G–J).

+ 0.64 + 0.88 + 0.98 + 0.45 = 4.16; IV 1.65 + 0.85 + 1.43 + 1.55 + 0.60 = 6.08. Carapace orange-brown, slightly paler on posterior slope (Fig. 9A); surface finely wrinkled; fovea short, distinct, at $\frac{2}{3}$ CL. AER very slightly procurved, almost straight; clypeus height equal to $1\frac{1}{8}$ AME diameter; AME very slightly larger than ALE; AME separated by distance equal to $\frac{3}{5}$ their diameter; AME separated from ALE by distance equal to $\frac{1}{3}$ AME diameter; PER recurved, PLE slightly larger than PME; PME separated by distance equal to slightly more than $\frac{3}{4}$ their diameter; PME separated from PLE by distance equal to PLE diameter. Chelicerae orange-brown, anterior surface covered with scattered long, fine setae, denser mesally; promargin with three slightly separated teeth, median tooth largest; retromargin with three adjacent teeth on common base, decreasing in size distally; endites and labium slightly paler. Sternum bright yellow, orange-brown at borders, with faint mottling laterally between coxal pairs; surface

smooth, covered with scattered short, fine setae. Abdomen oval, broadest at half its length; dark grey dorsally, with narrow cream stripe along midline in anterior half, fading posteriorly (Fig. 9A); dorsal scutum weakly sclerotized, yellow-brown, covering most of dorsum; two pairs of indistinct sigilla present, at $\frac{1}{4}$ and $\frac{1}{2}$ AL; sides dark grey; slightly paler ventrally, with two paired lines of tiny sclerites from epigastric furrow to spinnerets. Legs I pale yellow-brown, II–IV uniform yellow; ventral cusps absent on anterior legs; tibia I and II and all metatarsi and tarsi densely scopulate. Palp (Figs 9E, 10A, B) yellow-brown; tegulum oval, broadest medially; embolus originating prolaterally and proximally, long and slender, running along prolateral margin of tegulum, with tip directed at 1 o'clock; vRTA subtriangular, with sharp tip angled inwards in ventral view; dRTA very short and broad, subtriangular in lateral view.

Female (paratype, Hopefield, NMBA 19613): Measurements: CL 1.80, CW 1.58, AL 2.10, AW 1.52, TL 4.05, FL 0.13, SL 1.12, SW 0.98, AME-AME 0.06, AME-ALE 0.02, ALE-ALE 0.30, PME-PME 0.11, PME-PLE 0.11, PLE-PLE 0.51 MOQ: AW 0.28, PW 0.32, L 0.29. Length of leg segments: I $1.50 + 0.84 + 1.04 + 0.98 + 0.58 = 4.94$; II $1.25 + 0.71 + 0.91 + 0.80 + 0.47 = 4.14$; III $0.92 + 0.54 + 0.60 + 0.80 + 0.48 = 3.34$; IV $1.75 + 0.80 + 1.42 + 1.52 + 0.59 = 6.08$. Carapace yellow-brown, paler on posterior slope (Fig. 9B); surface finely wrinkled, sparsely covered in short straight setae; fovea short, distinct, at $\frac{2}{3}$ CL. AER slightly procurved, almost straight; clypeus height equal to distance approximately $\frac{3}{4}$ AME diameter; AME very slightly larger than ALE; AME separated by distance slightly larger than $\frac{1}{2}$ their diameter; AME separated from ALE by distance equal to $\frac{1}{4}$ ALE diameter; PER recurved, PME slightly larger than PLE; PME separated by distance equal to their diameter; PME separated from PLE by distance equal to PME diameter. Chelicerae yellow-brown, anterior surface covered with scattered long, fine setae; labium and endites slightly paler. Sternum creamy-yellow, with yellow-brown borders; surface finely wrinkled, covered with scattered short, fine setae. Abdomen oval, broadest medially, dark grey dorsally and laterally, slightly paler ventrally; two pairs of brown to grey sigilla, first pair at $\frac{1}{4}$ AL and second pair just posterior to midpoint of abdomen. Legs with all femora creamy-yellow, remaining segments all pale yellow-brown, anterior legs slightly darker. Epigyne (Figs 9I, 10C, D) with large, back-to-back C-shaped atria, with copulatory openings positioned anteromedially in them; small arched hood between atria; copulatory duct initially directed anteriorly, forming single spiralling loop before entering small transverse finger-shaped ST II; connecting ducts running mesally from ST II, diverging posteriorly before entering globose ST I, with short duct leading to fertilization ducts.

Etymology. This species is a contraction of the Latin *flavus* (yellow) and *poda* (legs), referring to the colouration of the legs of both sexes.

Distribution. Only known from two localities in central South African grasslands (Fig. 12).

Remark. The placement of this species in *Foordana* gen. nov. is tentative, as the lack of leg cusps in males, position of the sperm duct in the male palpal tegulum and the presence of a small hood in the female epigyne differ from the type species. Furthermore, the condition of the type material is not ideal, as the specimens are somewhat damaged and may have lost some of their colouration. As such, finding fresh material and incorporating sequence data into future analyses will be an essential step in resolving its placement.

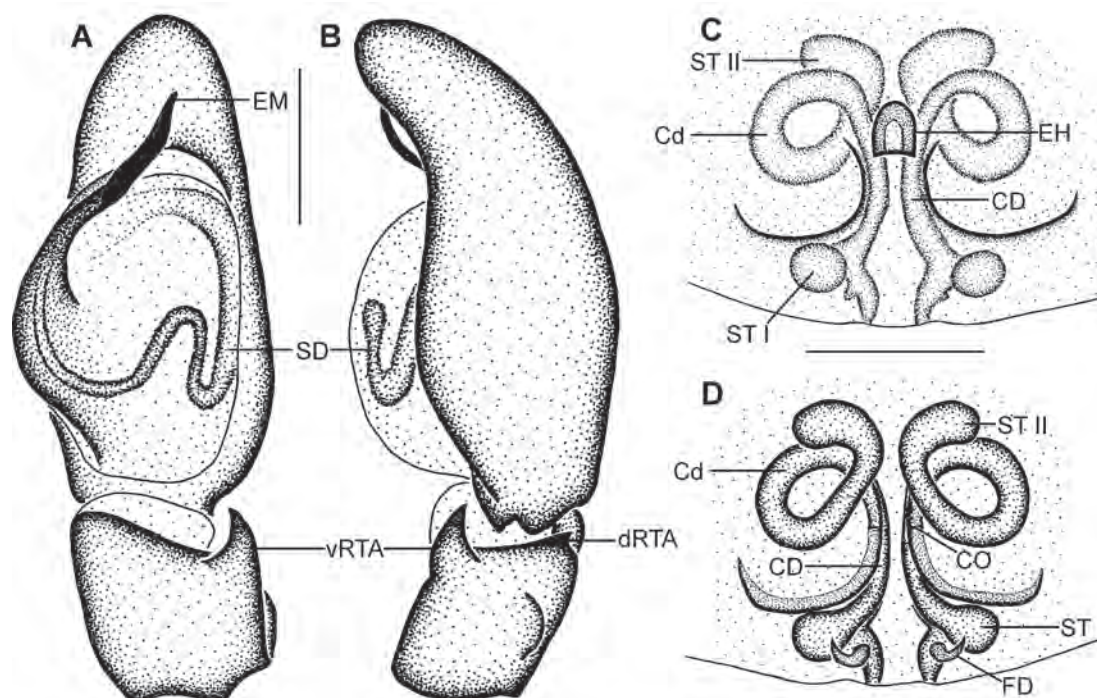


Figure 10. *Foordana flavipoda* sp. nov., male (A, B) and female (C, D). A palp, ventral view B same, retrolateral view C epigyne, ventral view D same, dorsal view. Abbreviations: CD – connecting duct; Cd – copulatory duct; CO – copulatory opening; dRTA – dorsal retrolateral tibial apophysis; EM – embolus; FD – fertilization duct; SD – sperm duct; ST I – primary spermatheca; ST II – secondary spermatheca; vRTA – ventral retrolateral tibial apophysis. Scale bars: 0.25 mm.

***Foordana kasouga* sp. nov.**

<https://zoobank.org/BE85F426-7A0C-46E9-802F-0CDFFC3DEAA3>

Figs 9C, F, 11

Material examined. Holotype. SOUTH AFRICA • ♂; Eastern Cape Province; Kasouga, 16 km WSW of Port Alfred; 33°39'S, 25°45'E; Jan. 1940; J. Omer-Coo-per leg.; NMSA 5346.

Paratype. 1 ♂; SOUTH AFRICA • KwaZulu-Natal Province; 75 km WSW of Estcourt, Cathedral Peak Forest Station, Meteorology Station, Little Berg; 28°59'S, 29°11'E; 1860 m a.s.l.; 13–31 Dec. 1979; S. & J. Peck leg.; pan trap; AMNH ICZ 00357882.

Other material. SOUTH AFRICA • 8 ♂ 1 ♀; KwaZulu-Natal Province; 75 km WSW of Estcourt, Cathedral Peak Forest Station, Meteorology Station, Little Berg; 28°59'S, 29°11'E; 1860 m a.s.l.; 21–31 Dec. 1979; S. & J. Peck leg.; veld, Malaise trap; AMNH ICZ 00357881.

Diagnosis. The male of this species can be recognised by the distinctive loop of the embolus and the far longer dRTA, which extends to more than a quarter of the tegulum length. In comparison, the emboli of *F. distincta* sp. nov. and *F. flavipoda* sp. nov. are only slightly curved, and the dRTA is clearly larger than the vRTA in lateral view (compare Figs 8C, 9D–F, 10B, 11C). Female unknown.

Description. Male (holotype, Kasouga, NMSA 5346): Measurements: CL 2.64, CW 2.11, AL 2.92, AW 2.00, TL ~5.56, FL 0.27, SL 1.40, SW 1.10, AME-AME 0.11, AME-ALE 0.05, ALE-ALE 0.45, PME-PME 0.13, PME-PLE 0.17, PLE-PLE 0.79 MOQ: AW 0.40, PW 0.44, L 0.41. Length of leg segments: I 2.20 + 1.03 + 1.80 + 1.28 + 0.80 = 7.11; II 1.85 + 1.00 + 1.52 + 1.22 + 0.78 = 6.37; III 1.40 + 0.72 + 0.92 + 1.10 + 0.53 = 4.67; IV 1.98 + 0.87 + 1.55 + 1.62 + 0.62 = 6.64.

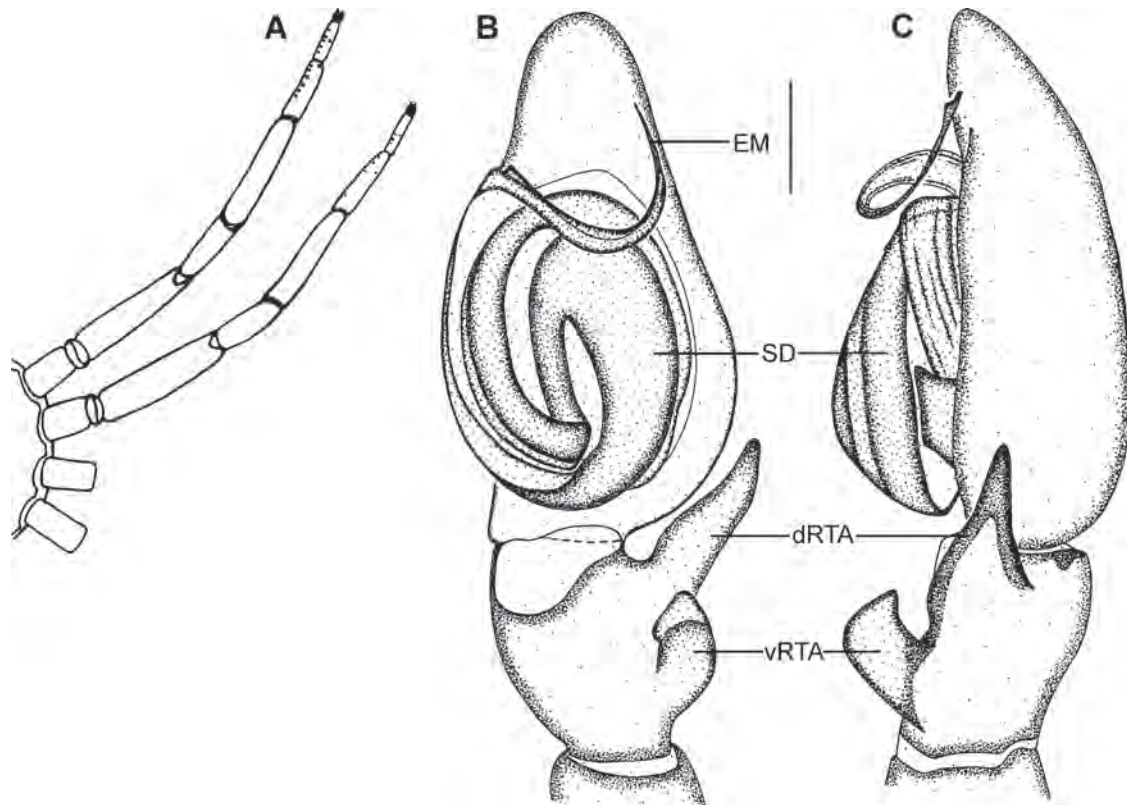


Figure 11. *Foordana kasouga* sp. nov., male **A** schematic representation of cusp arrangement **B** palp, ventral view **C** same, retrolateral view. Abbreviations: dRTA – dorsal retrolateral tibial apophysis; EM – embolus; SD – sperm duct; vRTA – ventral retrolateral tibial apophysis. Scale bar: 0.25 mm.

Carapace orange-brown, with faint traces of striae radiating from fovea (Fig. 9C); surface finely wrinkled; fovea short, distinct, at $\frac{2}{3}$ CL. AER slightly procurved, almost straight; clypeus height equal to $\frac{1}{5}$ AME diameter; AME and ALE subequal in size; AME separated by distance equal to $\frac{2}{3}$ their diameter; AME separated from ALE by distance slightly larger than $\frac{1}{4}$ their diameter; PER recurved, PLE slightly larger than PME; PME separated by distance very slightly less than their diameter; PME separated from PLE by distance almost equal to PLE diameter. Chelicerae orange-brown, anterior surface with long, fine setae, particularly along mesal surface; dentition not examined; endites and labium yellow-brown. Sternum yellow-brown, with orange-brown borders; surface with finely granulate texture, covered with scattered short, fine setae. Abdomen oval, pale grey, with faint dorsal scutum covering entire dorsum; two pairs of faint grey sigilla, at $\frac{1}{4}$ and $\frac{1}{2}$ AL. Legs all creamy-yellow, faded in alcohol, anterior pair slightly darker. Palp (Figs 9F, 11B, C) yellow, tegulum cream with red-brown sperm duct; embolus originating proximally on the retrolateral side, curving clockwise around almost circular tegulum, with distal section making large S-shaped loop, with tip directed distally; vRTA short, finger-like, with tip bent slightly dorsally; dRTA long, triangular in ventral view, extending to approximately $\frac{1}{4}$ tegulum length.

Etymology. The species is named after the type locality; noun in apposition.

Distribution. Only known from single localities in the Eastern Cape and Kwa-Zulu-Natal provinces, South Africa (Fig. 12).

Mushimane gen. nov.

<https://zoobank.org/ABABF53D-B6D4-4503-9565-32FD9B502678>

Type species. *Mushimane tswibilinki* sp. nov.

Diagnosis. This genus includes possibly the smallest known trachelids, with adults only ~1.8 mm in total length. Both sexes superficially resemble *Falcaranea* Haddad & Lyle, 2024 but are smaller, lighter in colour and have very different genitalic morphology. Males can be distinguished by from all other trachelids by the distinctive spiralling loop in the distal section of the sperm duct of the palp, close to the base of the embolus, which is short and spike-like (Fig. 15A), whereas long, curved and sword-like in *Falcaranea* (Haddad and Lyle 2024: figs 143, 147). Females can be easily recognized by the broad diamond-shaped epigynal atrium, flanked by sclerotized ridges along its posterior margin (Fig. 15C).

Description. Small spiders, 1.79–1.84 mm in length; carapace creamy-yellow, yellow-brown in eye region (Fig. 13A, B, F, G); carapace oval, broadest near middle of coxae II, gradually narrowed towards eye region, posterior margin straight (Fig. 13A, F); fovea absent, reduced to broad shallow depression at $\frac{3}{4}$ carapace length (Fig. 14A); carapace convex in lateral profile, slightly elevated from clypeus, highest just anterior to midpoint, with steeper slope in posterior quarter (Fig. 13B, G); carapace surface smooth, with sparse short fine curved setae with small tuberculate bases (Fig. 14A, B). All eyes surrounded by black rings (Fig. 13A, F); AER slightly procurved in males, strongly procurved in females; clypeus height slightly larger than $\frac{1}{2}$ AME diameter at AME, slightly less than $\frac{1}{2}$ ALE diameter at ALE in males and slightly less than $\frac{1}{3}$ ALE diameter in females; ALE slightly larger than AME in males, clearly larger in females; AME separated by distance equal to slightly less than $\frac{1}{2}$ their diameter in males, equal to $\frac{1}{3}$ their diameter in females; AME separated from ALE by narrow sliver, almost touching; PER slightly recurved, PLE slightly larger than PME in males, $1\frac{1}{3}$ PME diameter in females; PME separated by distance equal to slightly less than their diameter; PME separated from PLE by distance equal to $\frac{2}{3}$ PLE diameter. Chilum and cheliceral dentition not observed; endites with parallel lateral margins, mesal margins with yellow-brown longitudinal groove, distal margins with distinct serrula and dense maxillar hair tuft on mesal margins; labium hexagonal, slightly longer than wide, with broad base and rounded distal margin. Pleural bars sclerotised, isolated; sternum elongate shield-shaped, longer than broad, broadest between coxae II and III (Fig. 13C, H), surface smooth centrally, sparsely covered in short straight setae; precoxal triangles present, intercoxal sclerites only observed between coxae I and II. Leg formula 1423 in both sexes, sparsely covered in long fine setae; leg I clearly longer and more robust in males (Fig. 13A), only slightly more so in females (Fig. 13F); ventral cusps absent on anterior legs and scopulate setae and spines absent on all legs in both sexes; femora I very slightly swollen in both sexes, with slightly convex dorsal surface, ventral surface straight (Fig. 13D, I); patellar indentation on retrolateral side narrow; metatarsi III and IV with ventral preening comb at distal end (Fig. 13E, J); tarsi with sparse tactile hairs, one basal and two medial pairs of trichobothria and numerous chemosensory setae (Fig. 14C); trichobothria with slightly lowered distal plate, distal margin of hood overlapping plate, hood with four curved ridges, roughly concentric (Fig. 14E); tarsal organ distal, at approximately $\frac{7}{8}$ tarsus length (Fig. 14C, D), only very slightly elevated from integument, surface finely wrinkled, opening oval and distally placed (Fig. 14F); paired tarsal claws long, stout, with at least

eight long, broad teeth and numerous tenant setae forming claw tufts in between (Fig. 14D). Abdomen oval, cream, with two pairs of indistinct sigilla, with dorsal scutum in neither sex (Fig. 13A, F); dorsum with very sparse fine setae; venter without sclerites or markings, sparsely covered in fine setae (Fig. 13C, H); abdomen of both sexes with tip directed ventrally (Fig. 13B, G), which is especially accentuated in the female studied by S.E.M.. Spinnerets short, conical, in compact group (Fig. 13C, H), spigot detail only studied in female *M. tswibilinki* sp. nov.: ALS with one MAmp, one Nu and six Pi (Fig. 14G); PMS with single mAmp, two Cy and six Ac (Fig. 14H); PLS with two Cy and eight Ac (Fig. 14I). Male palpal femur and patella without apophyses; palpal tibia with simple distal retrolateral apophysis (Fig. 15A); tegulum oval in ventral view, with basal section of cymbium covering tegulum retrolaterally (Fig. 15A, B), with short spike-like embolus originating prolaterally at distal end of tegulum (Fig. 15A); sperm duct unique among Trachelidae, forming distinct spiralling loop internally in distal half of tegulum near base of embolus (Fig. 15A). Female epigyne weakly sclerotised, occupying half of epigastric plate length (Fig. 13H), with broad diamond-shaped atrium (Fig. 15C); copulatory openings in lateral corners of atrium, with short copulatory ducts leading to anterolateral ST II; connecting ducts initially directed laterally, converging to globose posterolateral ST I, with fertilization ducts on their mesal margin (Fig. 15D).

Etymology. The name is a noun in the indigenous African Sesotho language for “boy” or “little man”, referring to the diminutive size of the type species. Gender masculine.

Composition. Monotypic.

***Mushimane tswibilinki* sp. nov.**

<https://zoobank.org/F1C2C424-9C79-44D0-B78F-FF9AFDF9D124>

Figs 13–15

Material examined. Holotype. SOUTH AFRICA • ♂; KwaZulu-Natal Province; Ndumo Game Reserve, Staff housing; 26°54.660'S, 32°17.930'E; 130 m a.s.l.; 5 Dec. 2018; C. Haddad, R. Booysen & J. Neethling leg.; canopy fogging, *Commiphora neglecta*; NCA 2019/757.

Paratype. 1 ♀; together with holotype.

Other material. 1 ♀; Same data as types; S.E.M. preparations, epigyne cleared and retained preserved with types.

Diagnosis. As for the genus diagnosis.

Description. Male (holotype, Ndumo, NCA 2019/757): Measurements: CL 0.97, CW 0.75, AL 0.98, AW 0.59, TL 1.79, SL 0.56, SW 0.41, AME-AME 0.03, AME-ALE 0.01, ALE-ALE 0.16, PME-PME 0.06, PME-PLE 0.05, PLE-PLE 0.27, MOQ: AW 0.14, PW 0.18, L 0.16. Length of leg segments: I 0.67 + 0.35 + 0.48 + 0.47 + 0.27 = 2.24; II 0.54 + 0.30 + 0.39 + 0.40 + 0.25 = 1.88; III 0.40 + 0.24 + 0.21 + 0.29 + 0.16 = 1.30; IV 0.60 + 0.27 + 0.46 + 0.40 + 0.18 = 1.91. Carapace creamy-yellow, slightly darker in eye region (Fig. 13A). For eye arrangement see genus description. Chelicerae yellow-brown, anterior surface coarsely wrinkled, with strongly tuberculate setae proximally on anterior surface and laterally, each with a long, fine seta; dentition not examined; endites and labium cream. Sternum creamy-yellow, with yellow-brown margins; surface smooth, with scattered fine long curved setae, denser near margins. Abdomen elongate-oval, caudal section slightly curved ventrally,

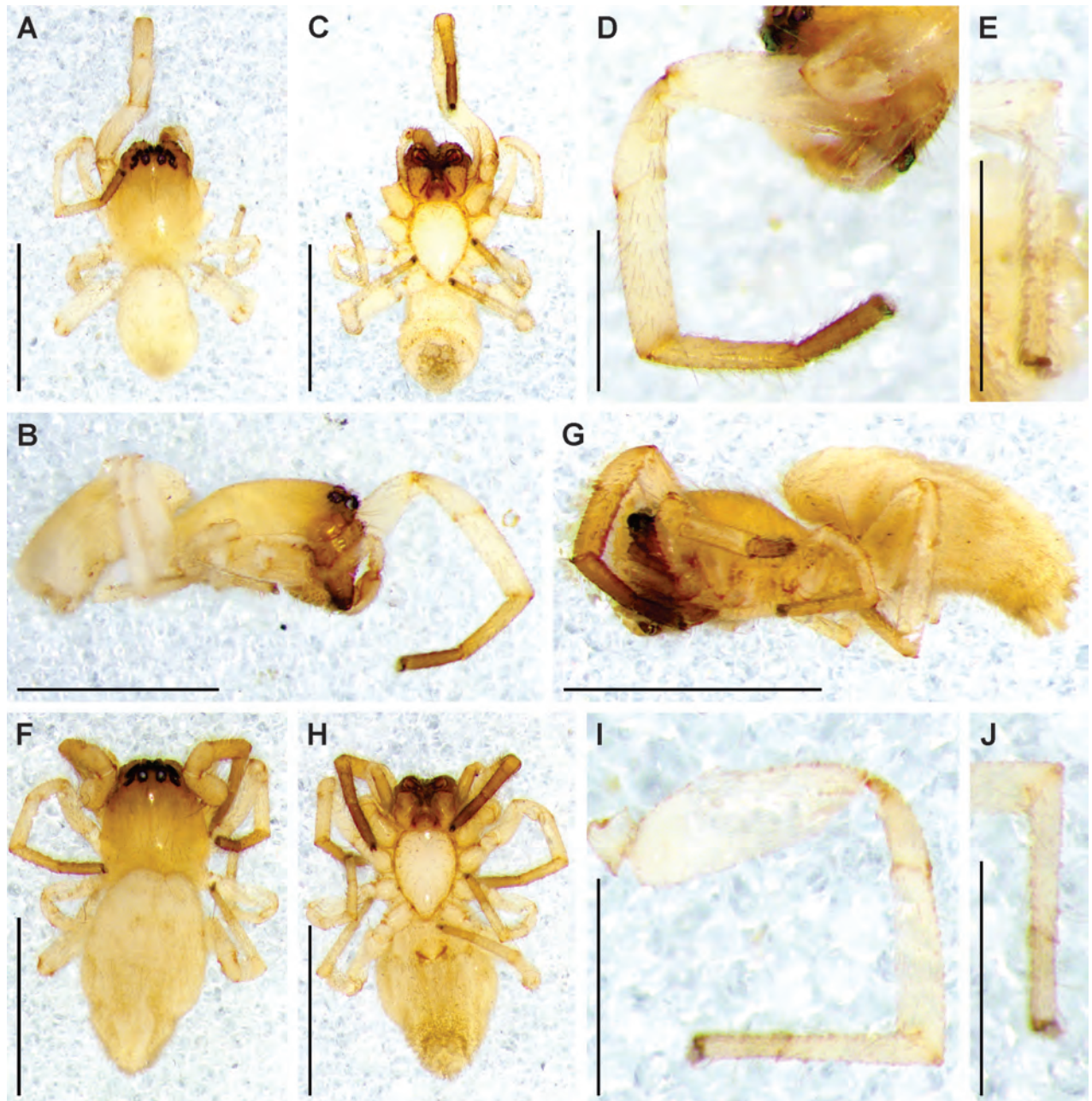


Figure 13. Digital microscope photographs of somatic morphology of *Mushimane tswibilinki* sp. nov. male (A–E) and female (F–J). A, F habitus, dorsal view B, G same, lateral view C, H same, ventral view D, I leg I, prolateral view E, J metatarsus and tarsus IV. Scale bars: 1.0 mm (A–C, F–H); 0.5 mm (D, E, I, J).

broadest just behind $\frac{1}{2}$ its length; creamy-grey dorsally, laterally and ventrally (Fig. 13A–C); without dorsal scutum; two pairs of distinct sigilla present, at $\frac{1}{3}$ and $\frac{2}{3}$ abdomen length. Legs cream, metatarsi I and II and all tarsi yellow-brown, darker on anterior legs. Palp (Fig. 15A, B) yellow-brown; tegulum oval, broadest medially, with subtegulum protruding prolaterally; sperm duct broad proximally in tegulum, initially directed distally, forming distinctive looping coil, with distal section narrowed, running above median section; embolus originating prolaterally and distally, short, stout and straight, directed approximately 45° to longitudinal axis of palp; RTA simple, short and distally rounded in ventral view, in retrolateral view with dorsal surface triangular, with sharp tip directed dorsally.

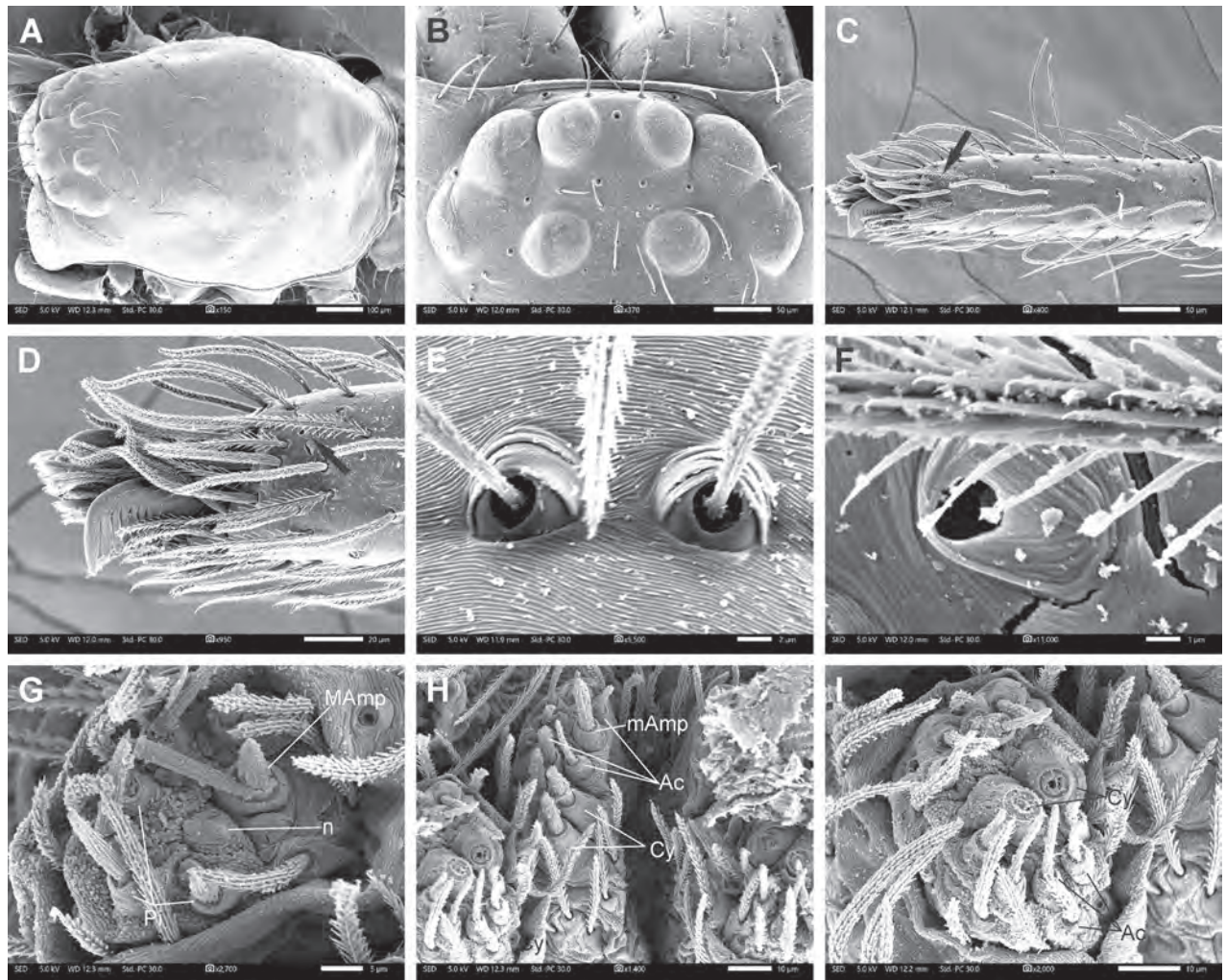


Figure 14. Scanning electron micrographs of *Mushimane tswibilinki* sp. nov. female **A** carapace, dorsolateral view **B** eye region, anterodorsal view **C** tarsus I, dorsolateral view, arrow indicating position of tarsal organ **D** same, enlargement of claws, dorsolateral view, arrow indicating tarsal organ **E** same, paired dorsal trichobothria **F** same, enlargement of tarsal organ **G** anterior lateral spinneret **H** posterior median spinnerets **I** posterior lateral spinneret. Abbreviations: Ac: aciniform gland spigot(s); Cy: cylindrical gland spigot(s); mAmP: minor ampullate gland spigot; MAmP: major ampullate gland spigot; n: nubbin; Pi: piriform gland spigot(s).

Female (paratype, Ndumo, NCA 2019/757): Measurements: CL 0.83, CW 0.63, AL 1.27, AW 0.75, TL 1.84, SL 0.52, SW 0.37, AME-AME 0.02, AME-ALE < 0.01, ALE-ALE 0.14, PME-PME 0.05, PME-PLE 0.05, PLE-PLE 0.25, MOQ: AW 0.13, PW 0.17, L 0.16. Length of leg segments: I $0.54 + 0.30 + 0.33 + 0.34 + 0.25 = 1.76$; II $0.46 + 0.26 + 0.31 + 0.30 + 0.24 = 1.57$; III $0.38 + 0.21 + 0.25 + 0.27 + 0.16 = 1.27$; IV $0.54 + 0.25 + 0.44 + 0.38 + 0.17 = 1.78$. Carapace yellow-brown (Fig. 13F); surface finely wrinkled, glossy, with scattered short straight setae throughout, sparse on posterior slope; fovea reduced to broad shallow depression at $\frac{3}{4}$ CL. For eye arrangement see genus description. Chelicerae deep yellow-brown, anterior surface finely wrinkled, clearly less rugose than male, with tuberculate setae on anterior and lateral surfaces; dentition not examined; endites creamy and labium yellow-brown, paler proximally. Sternum creamy-yellow, with yellow-brown margins; surface smooth, with fine long curved setae throughout. Abdomen elongate oval, caudal section strongly curved ventrally, broadest at midpoint; creamy-grey dorsally and laterally, with grey mottling ventrally (Fig. 13F–H), without dorsal scutum; two pairs of

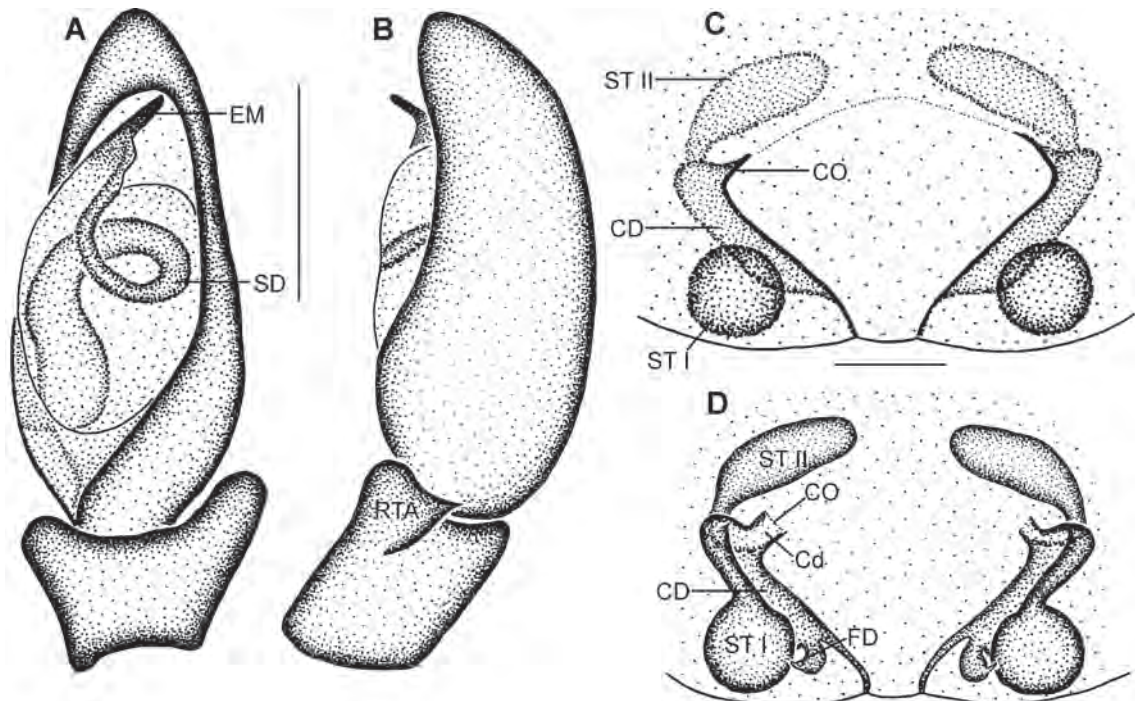


Figure 15. *Mushimane tswibilinki* sp. nov., male (A, B) and female (C, D). A palp, ventral view B same, retrolateral view C epigyne, ventral view D same, dorsal view. Abbreviations: CD – connecting duct; Cd – copulatory duct; CO – copulatory opening; EM – embolus; FD – fertilization duct; RTA – retrolateral tibial apophysis; SD – sperm duct; ST I – primary spermatheca; ST II – secondary spermatheca. Scale bars: 0.1 mm.

indistinct sigilla present, at $\frac{1}{4}$ and $\frac{1}{2}$ AL. All femora cream, patellae to tarsi I and metatarsi and tarsi II–IV yellow-brown, remaining segments cream. Epigyne (Fig. 15C, D) weakly sclerotized; copulatory openings small, positioned in lateral corners of atrium; copulatory ducts short, initially curving sharply to enter weakly sclerotized sausage-shaped oblique ST II anteriorly; connecting ducts converging towards posterior, entering globose ST I, with extension leading to small fertilization ducts.

Etymology. This species name is a derogatory slang term in the indigenous African Sesotho, mocking a man with a small penis, in reference to the short embolus of the type species.

Distribution. Only known from the type locality in northeastern KwaZulu-Natal, South Africa (Fig. 12).

Remarks. Due to the limited number of specimens available, one female was sacrificed for scanning electron microscopy; its epigyne was cleared prior to preparation of the material for S.E.M., used for the illustrations, and has been retained in the same vials as the types. In addition, this female had an even more strongly ventrally curved abdomen than the paratype.

***Namaquella* gen. nov.**

<https://zoobank.org/C09DA6C1-8CFC-47F7-B4AB-C5598ACE1A0B>

Type species. *Namaquella arida* sp. nov.

Diagnosis. Both sexes of *Namaquella* gen. nov. resemble *Poachelas* Haddad & Lyle, 2008 and *Rukuluk* gen. nov., with a pale body to support a lifestyle associated with grasses, although the body proportions are less elongate than in these

genera. Males of *Namaquella* gen. nov. can be recognized from these and other trachelid genera by the oval tegulum with a simple, slightly curved distal embolus directed retrodistally and the simple sperm duct and RTA (Figs 19B, 20B). The female epigyne is weakly sclerotized and can be distinguished by the central heart-shaped atrium formed by two convex ridges and the laterally looping copulatory ducts (Fig. 19D, E), whereas the epigynal atrium of *Poachelas* and *Rukuluk* gen. nov. are subrectangular and extend to the epigastric furrow (Fig. 27D; Haddad and Lyle 2008: fig. 94) [*P. montanus* Haddad & Lyle, 2008 has a different epigyne structure and is likely misplaced; Haddad and Lyle 2008: fig. 98].

Description. Small spiders, 2.18–3.52 mm in length; carapace creamy-yellow in *N. arida* sp. nov. to bright yellow-orange in *N. samanthae* sp. nov.; carapace oval, broadest near posterior of coxae II, gradually narrowed towards eye region (Figs 16A, F, 17A); fovea indistinct, replaced by a shallow depression in *N. arida* sp. nov., a short shallow slit in *N. samanthae* sp. nov.; posterior carapace margin concave; carapace somewhat flattened, weakly convex in lateral profile, slightly elevated from clypeus to approximately $\frac{1}{3}$ carapace length, with steeper slope in posterior quarter (Fig. 16B, G); carapace surface finely wrinkled, with scattered short fine straight setae with small weakly tuberculate bases (Fig. 17B). All eyes surrounded by black rings (Fig. 16A, F); AER procurved in anterior view, slightly recurved in dorsal view (Fig. 17C), AME slightly smaller than ALE or subequal in size; AME separated by less than their diameter, almost touching ALE; PER recurved in dorsal view, PME smaller than PLE or subequal; PME-PME and PME-PLE interdistances variable; MOQ narrower anteriorly than posteriorly, posterior width slightly larger than length. Chilum distinct, split; cheliceral promargin with three separated teeth, retromargin with three teeth on common base (Fig. 17D); fang with distinct serrula; endites with parallel lateral margins, mesal margins with longitudinal depression (Fig. 17E), distal margins with distinct serrula comprising short sharp denticles (Fig. 17G) and dense maxillar hair tuft on mesal margins (Fig. 17E); labium trapezoidal, slightly wider than long, narrower distally than basally (Figs 16C, 17E). Pleural bars weakly sclerotised, isolated; sternum oval, longer than broad, widest at anterior of coxa II, anterior with two concave excavations at lateral corners of labium, surface smooth, sparsely covered in long curved setae (Fig. 16C); precoxal triangles present, intercoxal sclerites present between coxae I and II and II and III only. Leg formula 4123 or 1423, sparsely covered in long fine setae; legs I slightly swollen compared to others, with distinct convex dorsal and ventral surfaces (Fig. 16D, I); all femora strongly constricted proximally; patellar indentation on retrolateral side narrow, with lyriform organ at proximal end (Fig. 17H, I); tibiae to tarsi I and II densely scopulate ventrally, with ventral cusps in males on metatarsi and tarsi I at least, sometimes also on metatarsi II (Figs 19A, 20A), absent on tibiae and in females; metatarsi III and IV with distal preening brush and comb ventrally (Figs 16E, J, 18D); metatarsi with short metatarsal stopper (Fig. 18D); tarsi with sparse tactile hairs, few dorsal trichobothria and chemosensory setae, tarsal organ at approximately $\frac{3}{4}$ tarsus length (Fig. 18E), distinctly ovoid and rebordered, slightly elevated from integument, surface smooth, opening oval and distally placed (Fig. 18F); tarsal claws quite slender, with five teeth and dense tenant setae forming claw tufts in between (Fig. 18 G, H); trichobothria with slightly lowered distal plate, distal margin of hood overlapping plate, hood with four curved ridges, roughly concentric (Fig. 18I). Abdomen oval, with

dorsal scutum absent or present in males, absent in females; dorsum densely covered in long fine setae, with two pairs of distinct sigilla (Fig. 16A, F); venter without large sclerites or markings, sparsely covered in fine setae (Fig. 16C, H). Spinnerets short, conical, in compact group, spigot detail not studied. Male palpal femora and patellae without apophyses; palpal tibiae with single simple retrolateral apophysis with pointed dorsal tip (Figs 19C, 20C); tegulum simple, oval in ventral view, slightly narrower than cymbium, with simple slightly curved embolus originating distally (Figs 19B, 20B). Female epigyne with central heart-shaped atrium, with copulatory openings positioned laterally (Fig. 19D); copulatory ducts directed laterally, looping to anterolateral ST II, with short connecting ducts leading to ovoid posterolateral ST I, with fertilization ducts on their posteromesal surface (Fig. 19E).

Etymology. The name is derived from the Namaqualand region in arid western South Africa, from which the type species originates. Gender feminine.

Composition. Two species, *Namaquella arida* sp. nov. and *N. samanthae* sp. nov.

***Namaquella arida* sp. nov.**

<https://zoobank.org/F570A18E-C86F-4A41-8760-B41E1BD5F2C6>

Figs 16–19

Material examined. Holotype. SOUTH AFRICA • ♂; Northern Cape Province; Calvinia, Akkerendam Nature Reserve; 31°24.425'S, 19°46.823'E; 1170 m a.s.l.; 18 Jan. 2021; C. Haddad & R. Booysen leg.; hand collecting, grass tussocks; NCA 2021/229.

Paratype. 2 ♀; together with holotype.

Other material. 1 subadult ♂ 2 subadult ♀; same data as types; S.E.M. preparations.

Diagnosis. The male of this species can be recognised by the orientation of the embolus, at approximately 45° to the longitudinal axis of the palp (approximately 30° in *N. samanthae* sp. nov.) and the shape of the RTA, which is rounded and more strongly bent distally, with the tip directed dorsally, whereas the tip is directed dorso-distally in *N. samanthae* sp. nov. (compare Figs 19B, C with 20B, C). The sperm duct has a distinct undulation along its prolateral course, while it is almost straight in *N. samanthae* sp. nov.. The female is distinctive amongst Afrotropical trachelids by the weakly sclerotized epigyne with a central heart-shaped atrium formed by opposing curved ridges (Fig. 19D).

Description. Male (holotype, Akkerendam, NCA 2021/229): Measurements: CL 1.45, CW 1.22, AL 1.60, AW 1.07, TL 3.02, SL 0.87, SW 0.64, AME-AME 0.03, AME-ALE 0.03, ALE-ALE 0.25, PME-PME 0.08, PME-PLE 0.10, PLE-PLE 0.44, MOQ: AW 0.20, PW 0.25, L 0.21. Length of leg segments: I 1.25 + 0.65 + 1.06 + 0.85 + 0.49 = 4.30; II 0.90 + 0.54 + 0.73 + 0.61 + 0.41 = 3.19; III 0.68 + 0.40 + 0.44 + 0.51 + 0.30 = 2.33; IV 0.98 + 0.48 + 0.81 + 0.82 + 0.37 = 3.46. Carapace creamy-yellow (Fig. 16A); surface finely wrinkled; fovea absent, replaced by broad shallow depression at $\frac{2}{3}$ CL. AER procurved, clypeus height slightly larger than $\frac{1}{2}$ AME diameter at AME, slightly more than $\frac{1}{4}$ ALE diameter at ALE; ALE slightly larger than AME; AME separated by distance approximately $\frac{1}{3}$ their diameter; AME separated from ALE by distance equal to $\frac{1}{3}$ ALE diameter; PER slightly recurved, PLE slightly larger than PME; PME separated by distance

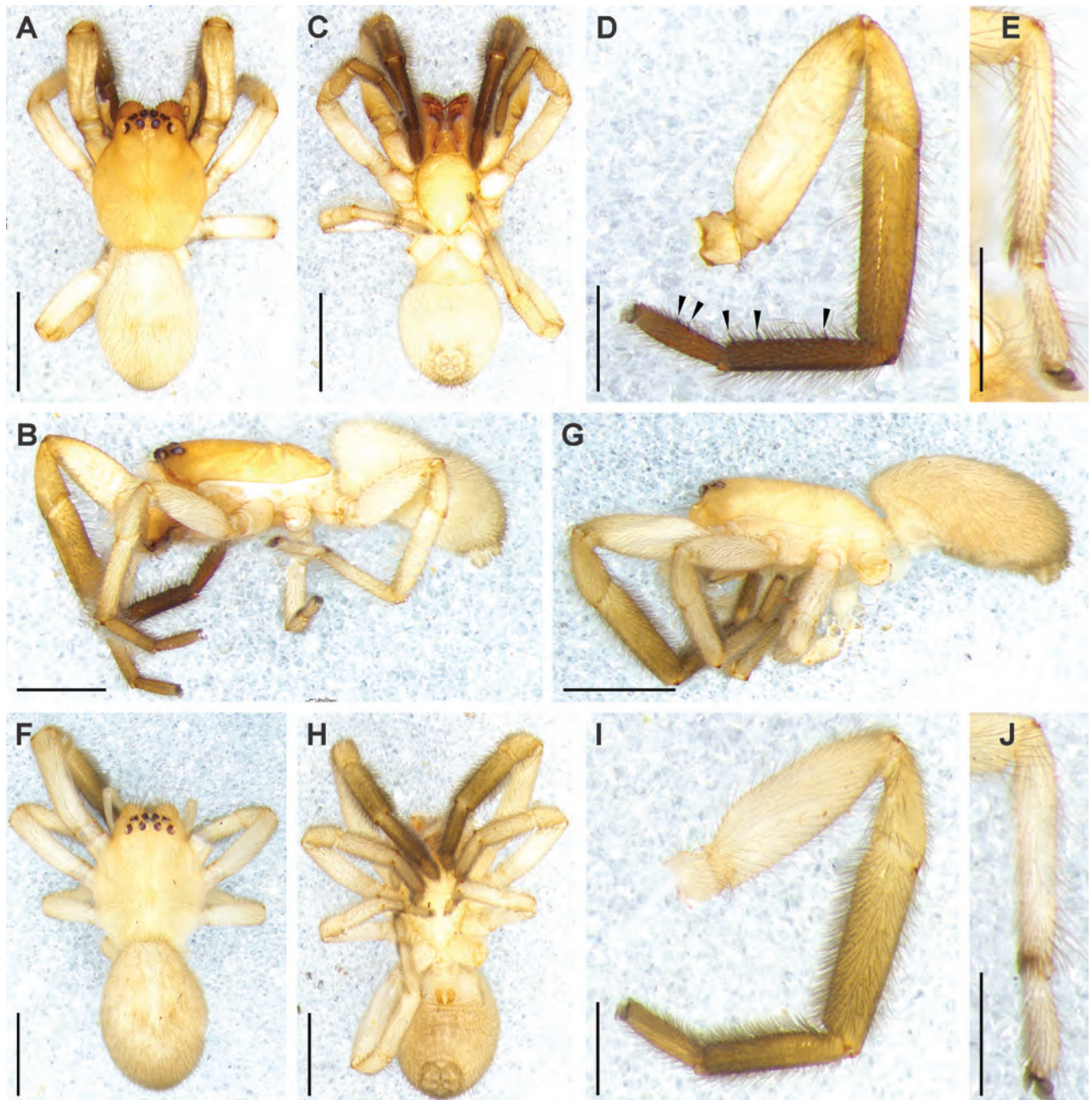


Figure 16. Digital microscope photographs of somatic morphology of *Namaquella arida* sp. nov., male (A–E) and female (F–J). A, F habitus, dorsal view B, G same, lateral view C, H same, ventral view D, I leg I, prolateral view, arrowheads in D indicating ventral cusps E, J metatarsus and tarsus IV. Scale bars: 1.0 mm (A–C, F–H); 0.5 mm (D, E, I, J).

slightly less than their diameter; PME separated from PLE by distance slightly larger than PLE diameter. Chelicerae yellow-orange, anterior surface covered with scattered long, fine setae; promargin with three widely separated teeth, decreasing slightly in size distally; retromargin with three adjacent teeth on common base, proximal tooth slightly larger than subequal median and distal teeth; endites and labium yellow-orange. Sternum pale creamy-yellow, yellow-brown at borders; surface smooth, sparsely covered with short, fine setae; precoxal triangles present, intercoxal sclerites weakly sclerotised but between all coxal pairs. Abdomen oval, broadest at half its length; cream dorsally, with faint grey mottling in posterior half, without distinct scutum (Fig. 16A); two pairs of large

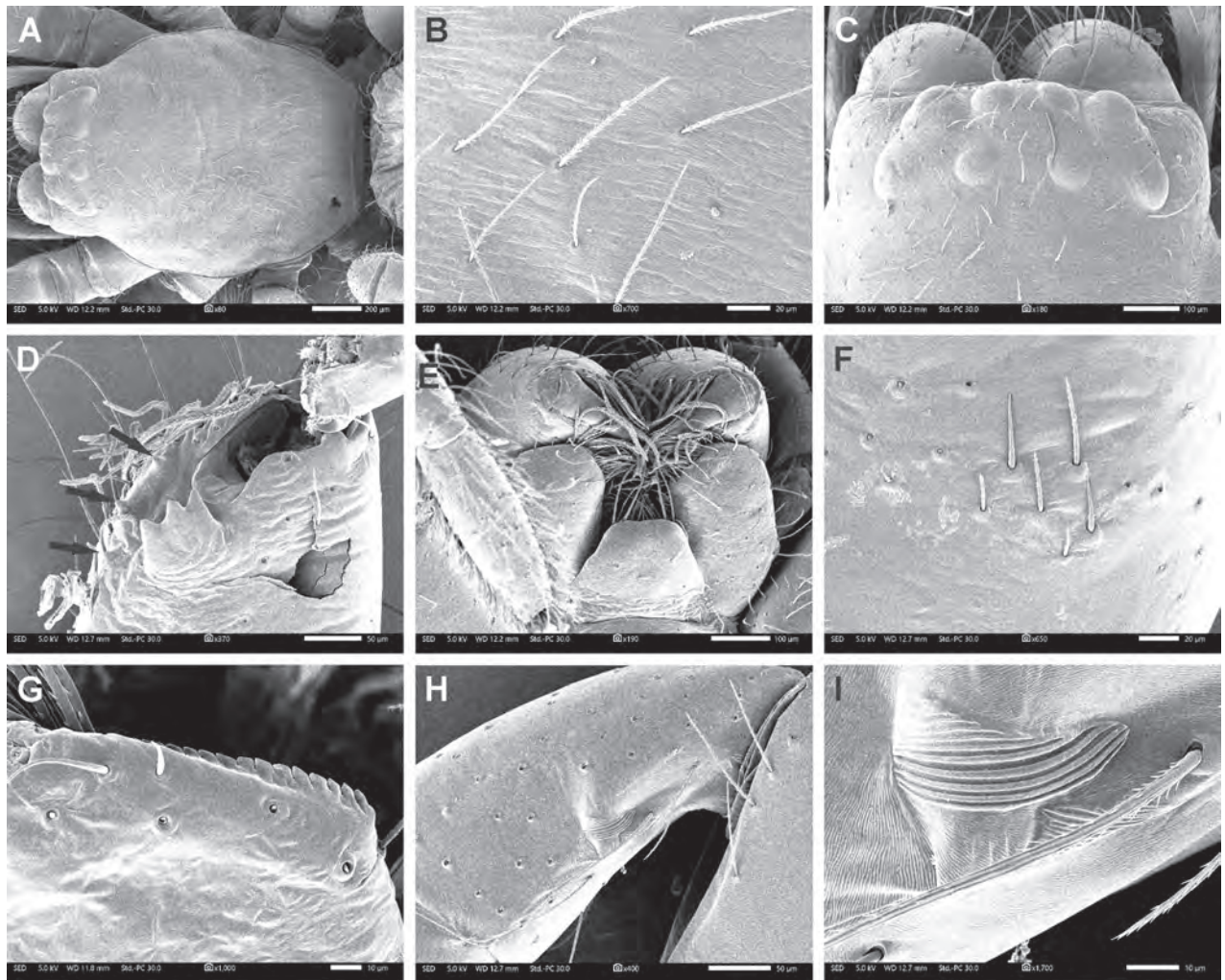


Figure 17. Scanning electron micrographs of *Namaquella arida* sp. nov., subadult male **A** carapace, dorsal view **B** same, surface texture and setae **C** eye region, dorsal view **D** chelicerae, arrows indicating promarginal teeth **E** mouthparts **F** modified setae on posterior surface of paturon **G** detail of serrula **H** patellar indentation, leg IV **I** same, detail of lyriform organ.

oval sigilla present, at $\frac{1}{4}$ and $\frac{1}{2}$ AL; sides faint mottled grey posteriorly (Fig. 16B); slightly paler ventrally, with faint grey mottling around spinnerets (Fig. 16C); single paired lines of tiny sclerites from epigastric furrow to spinnerets. Legs creamy-yellow, anterior pairs darker than posteriors; patellae to tarsi I with dark grey mottling, darkening distally on each segment, on tibiae with pair of dorsolateral pale lines with reduced mottling; ventral cusps present on metatarsi I and II and tarsus I (Fig. 19A); tibia I and II and all metatarsi and tarsi densely scopulate. Palp (Fig. 19B, C) yellow-brown; embolus short, originating distally, base broad but narrowing to slender slightly curved distal section at approximately 45° to longitudinal axis of palp; single RTA present, triangular in ventral view, in retrolateral view short and stout, rounded distally, with short abrupt tip directed dorsally.

Female (paratype, Akkerendam, NCA 2021/229): Measurements: CL 1.67, CW 1.18, AL 1.96, AW 3.53, TL 2.18, SL 1.05, SW 0.76, AME-AME 0.06, AME-ALE 0.03, ALE-ALE 0.29, PME-PME 0.10, PME-PLE 0.13, PLE-PLE 0.52, MOQ: AW 0.21, PW 0.28, L 0.24. Length of leg segments: I $1.30 + 0.70 + 1.05 + 0.87 + 0.48 = 4.40$; II $1.03 + 0.61 + 0.80 + 0.69 + 0.44 = 3.57$; III $0.78 + 0.50 + 0.52 + 0.60 + 0.30 = 2.70$; IV $1.25 + 0.65 + 1.08 + 1.10 + 0.42 = 4.50$. Carapace creamy-yellow

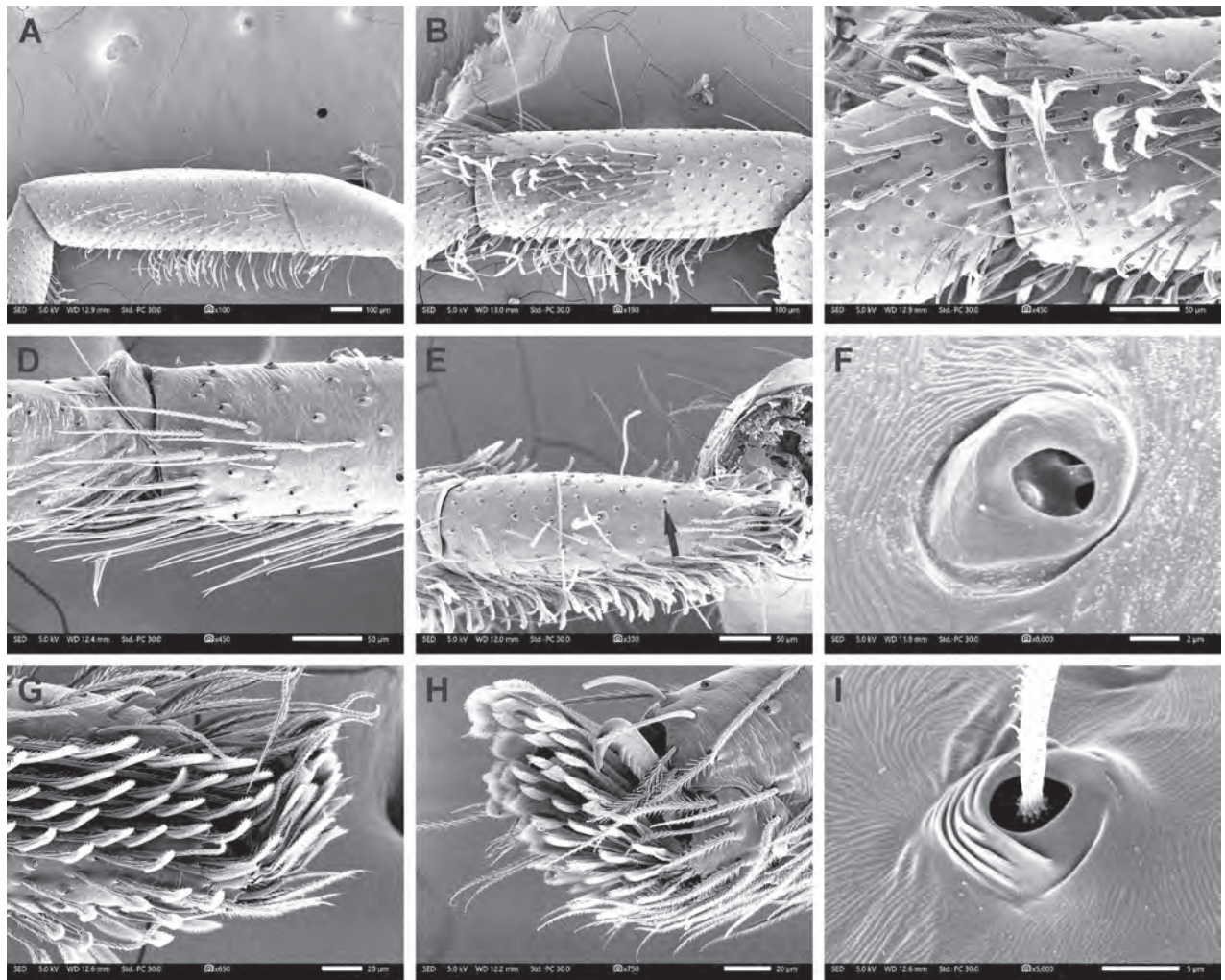


Figure 18. Scanning electron micrographs of *Namaquella arida* sp. nov., subadult male **A** tibia I, lateral view **B** metatarsus I, lateral view **C** same, metatarsal stopper **D** metatarsus IV, metatarsal stopper and preening comb **E** tarsus I, lateral view, arrow indicating position of tarsal organ **F** same, detail of tarsal organ **G** same, detail of claw tuft and claws, ventrolateral view **H** same, distolateral view **I** same, base of dorsal trichobothrium.

(Fig. 16F); surface finely wrinkled; fovea absent, replaced by broad shallow depression at $\frac{2}{3}$ CL. AER strongly procurved, clypeus height equal to AME diameter at AME, $\frac{2}{5}$ ALE diameter at ALE; ALE diameter $1\frac{1}{5}$ AME diameter; AME separated by distance slightly less than their diameter; AME separated from ALE by distance equal $\frac{1}{2}$ AME diameter; PER slightly recurved, PLE slightly larger than PME; PME separated by distance equal to $1\frac{1}{4}$ their diameter; PME separated from PLE by distance approximately $1\frac{3}{5}$ PME diameter. Chelicerae creamy-yellow, anterior surface covered with scattered long, fine setae; dentition as for male; endites and labium pale yellow-brown. Sternum pale creamy-yellow, slightly darker at borders; surface smooth, covered with scattered short, fine setae, particularly marginally. Abdomen oval, broadest at half its length; creamy-grey dorsally, laterally and ventrally (Fig. 16F–H), without dorsal scutum; two pairs of indistinct sigilla present, at $\frac{1}{4}$ and $\frac{1}{2}$ AL; two paired lines of indistinct tiny sclerites from epigastric furrow to spinnerets. Legs cream, tibia to tarsus I and tarsus II with grey mottling. Epigyne (Fig. 19D, E) weakly sclerotized, with pair of curved central ridges forming heart-shaped atrium containing broad copulatory

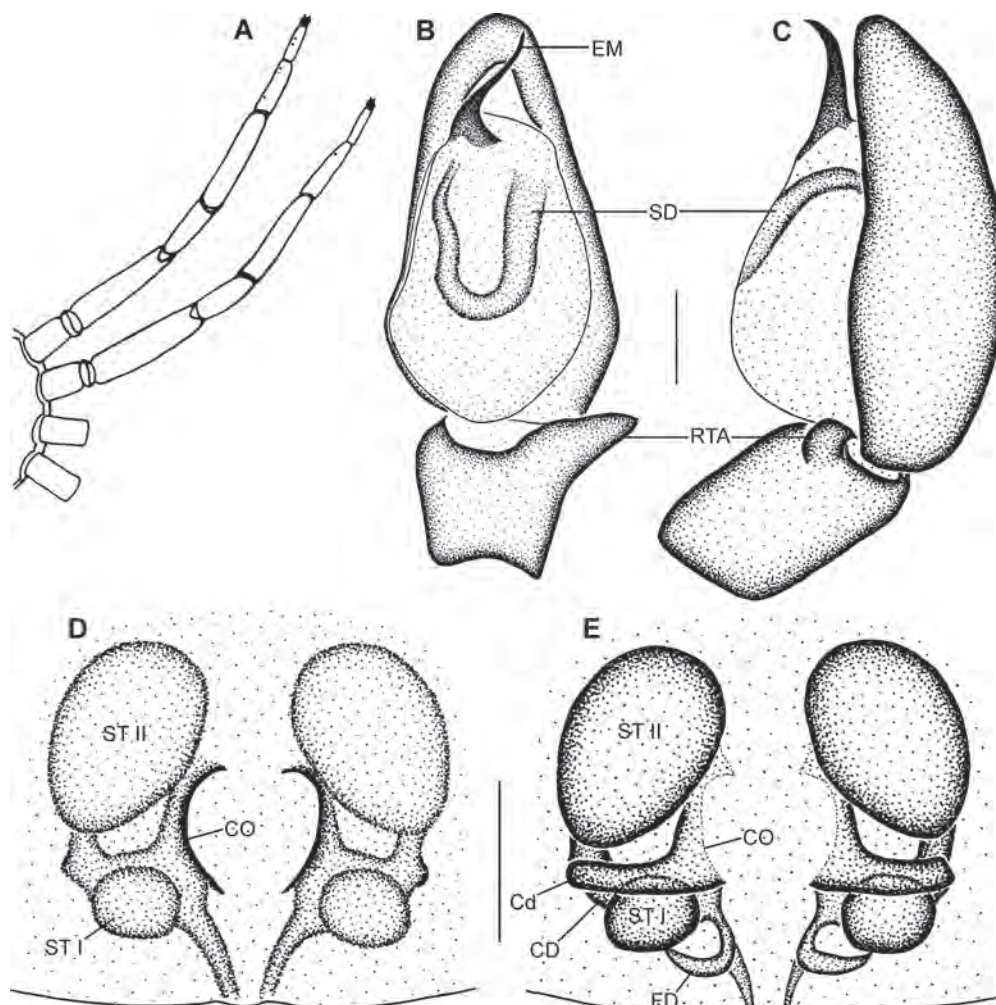


Figure 19. *Namaquella arida* sp. nov., male (A–C) and female (D, E). **A** schematic representation of cusp arrangement on legs I and II **B** palp, ventral view **C** same, retrolateral view **D** epigyne, ventral view **E** same, dorsal view. Abbreviations: CD – connecting duct; Cd – copulatory duct; CO – copulatory opening; EM – embolus; FD – fertilization duct; RTA – retrolateral tibial apophysis; SD – sperm duct; ST I – primary spermatheca; ST II – secondary spermatheca. Scale bars: 0.1 mm.

openings; copulatory duct initially funnel-shaped, narrowing rapidly from broad copulatory opening, looping laterally to enter oval anterolateral ST II on their posterolateral margin; connecting ducts short, lateral, entering small oval posterolateral ST I, with fertilization ducts forming on short mesal extension of ST I.

Etymology. This species name refers to the arid Succulent Karoo environments that it was collected from; adjective.

Distribution. Only known from the type locality (Fig. 12).

***Namaquella samanthae* sp. nov.**

<https://zoobank.org/4B0C9C83-007C-444D-8645-3811D6634A69>

Fig. 20

Material examined. Holotype. SOUTH AFRICA • ♂; SOUTH AFRICA; Western Cape Province; Fisherhaven, nr Hermanus; 34°21.430'S, 19°07.557'E; 24 Mar. 2008; S. Oliver leg.; walking on pathway during day; NCA 2008/573.

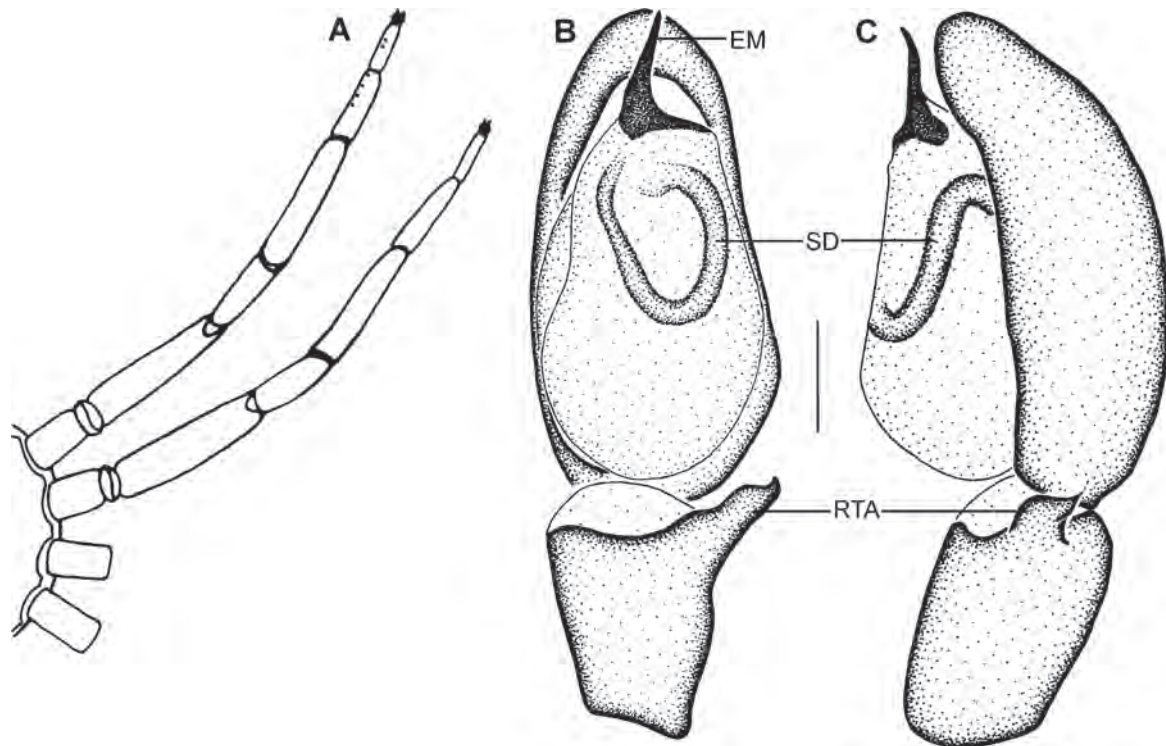


Figure 20. *Namaquella samanthae* sp. nov., male **A** schematic representation of cusp arrangement on legs I and II **B** palp, ventral view **C** same, retrolateral view. Abbreviations: EM – embolus; RTA – retrolateral tibial apophysis; SD – sperm duct. Scale bars: 0.1 mm.

Diagnosis. For detailed diagnosis, see *N. arida* sp. nov. above. Female unknown.

Description. Male (holotype, Fisherhaven, NCA 2008/573): Measurements: CL 1.70, CW 1.43, AL 1.73, AW 1.17, TL 3.52, FL 0.12, SL 0.98, SW 0.79, AME-AME 0.06, AME-ALE 0.03, ALE-ALE \sim 0.27, PME-PME 0.11, PME-PL 0.09, PLE-PL 0.56 MOQ: AW 0.26, PW \sim 0.32, L 0.27. Length of leg segments: I $1.38 + 0.73 + 1.12 + 0.92 + 0.50 = 4.65$; II $1.08 + 0.59 + 0.79 + 0.73 + 0.45 = 3.64$; III $0.72 + 0.47 + 0.50 + 0.61 + 0.30 = 2.60$; IV $1.15 + 0.57 + 0.91 + 0.98 + 0.40 = 4.01$. Carapace deep yellow-brown, with faint grey mottling; surface finely wrinkled; fovea short, distinct, at $\frac{2}{3}$ CL. AER slightly procurved, almost straight; clypeus height equal to approximately $\frac{1}{2}$ AME diameter; AME and ALE subequal in size; AME separated by distance approximately $\frac{1}{2}$ their diameter; AME separated from ALE by distance slightly less than $\frac{1}{3}$ AME diameter; PER recurved, PME and PLE subequal; PME separated by distance approximately equal to their diameter; PME separated from PLE by distance equal to their diameter. Chelicerae deep yellow-brown, anterior surface covered with quite dense long, fine setae; promargin with three slightly separated teeth, retromargin with three adjacent teeth on common base; endites and labium orange. Sternum shield-shaped, yellow-brown, with orange-brown borders; surface finely wrinkled, covered with scattered short, fine setae. Abdomen elongate-oval, broadest in posterior half; creamy-yellow dorsally, with yellow dorsal scutum from $\frac{1}{4}$ AL to posterior; broad grey mottled stripe along midline, sides of abdomen also mottled grey, markings separated by pair of cream mediolateral strips; two pairs of distinct round sigilla, first and second pairs respectively just

behind $\frac{1}{4}$ and $\frac{1}{2}$ AL. Legs I to IV with yellow femora, remaining segments progressively darker to yellow-brown tarsi; cusps only present on metatarsi and tarsi I (Fig. 20A). Palp (Fig. 20B, C) yellow-brown; tegulum pear-shaped, with U-shaped sperm duct; embolus simple, straight, with pointed tip directed at 1 o'clock; RTA simple, subtriangular, directed slightly dorsally.

Etymology. This species is named for my wife Samantha, who collected the holotype.

Distribution. Only known from the type locality.

***Rukuluk* gen. nov.**

<https://zoobank.org/97D3036F-9324-48E8-93D1-FC073E23BCF1>

Type species. *Rukuluk gramineus* sp. nov.

Diagnosis. Members of *Rukuluk* gen. nov. share with *Namaquella* gen. nov. and *Poachelas* the pale body with adaptations to grass-living but can be distinguished from the former by the very different genitalic morphology and more elongate body, and from the latter by the lack of paired spines ventrally on the anterior legs. Males of *Rukuluk* gen. nov. can be recognized from all other trachelid genera by the distinctive palpal morphology, particularly the presence of retrolateral grooves in the cymbium that correspond to the RTA and distal section of the embolus (Figs 26A, 27C) and the long membranous basal section of the embolus, which gradually narrows to a long, whip-like tip (Figs 21K–N, 26A, B); the latter trait is most similar to the embolus morphology of *Poachelas* (Haddad and Lyle 2008: figs 91, 97). Females are distinguished by the elongate subrectangular atrium that extends almost the entire length of the epigynal plate (Figs 26E, 27D), with long looping membranous copulatory ducts and small posterolateral spermathecal structures internally (Figs 27E, 28D).

Description. Small spiders, 3.06–3.20 mm in length; carapace bright creamy-yellow to yellow-brown; carapace oval, broadest at posterior of coxae II, gradually narrowed towards eye region (Fig. 21A, F); fovea distinct, a short narrow slit (Fig. 22A); posterior margin very slightly concave, almost straight (Fig. 22A); carapace weakly convex in lateral profile, slightly elevated from clypeus to approximately $\frac{1}{2}$ carapace length, with steeper slope in posterior quarter (Fig. 21B, G); carapace surface finely wrinkled, densely covered in short fine curved setae with small tuberculate bases (Fig. 22A–C). All eyes surrounded by black rings (Fig. 21A, F); AER strongly procurved in anterior view (Fig. 22B), slightly recurved in dorsal view (Fig. 22C); clypeus height slightly larger than $\frac{4}{5}$ AME diameter at AME in males, $\frac{2}{3}$ AME diameter at AME in female, $\frac{1}{2}$ ALE diameter at ALE in males, slightly less than $\frac{2}{3}$ ALE diameter at ALE in females; AME slightly larger than ALE; AME separated by distance approximately $\frac{1}{3}$ their diameter; AME separated from ALE by narrow sliver, almost touching; PER slightly recurved, PME and PLE equal in diameter in males, PME very slightly larger than PLE in females; PME separated by distance equal to $\frac{5}{6}$ their diameter; PME separated from PLE by distance approximately $\frac{1}{2}$ PME diameter. Chilum distinct, split; cheliceral promargin and retromargin each with two teeth (Fig. 22D, E); fang with distinct serrula; endites with lateral margins converging slightly distally, mesal margins with longitudinal groove and dense maxillar hair tuft (Fig. 22F), distal margins with distinct serrula comprising sharp straight denticles (Fig. 22G); labium trapezoidal, slightly

longer than wide, narrower distally than basally (Fig. 22F). Pleural bars sclerotised, isolated; sternum oval, with straight anterior margin (Fig. 22H), two pairs of slit sensilla present between first two coxal pairs (Fig. 22I); longer than broad, broadest at posterior of coxa II, surface smooth centrally, densely covered in long, slightly curved setae with small tuberculate bases (Fig. 22H, I); precoxal triangles present, intercoxal sclerites present between coxae I and II and II and III only. Leg formula 1423 in males, 4123 in females, densely covered in short fine setae with tuberculate bases (Figs 21D, E, I, J, 23A–D, I, J); legs I swollen, more so in males (Fig. 21A) than females (Fig. 21F), femora with slightly convex dorsal surface, ventral surface almost straight (Fig. 21D, I); all femora strongly constricted proximally; patellar indentation on retrolateral side narrow, with lyriform organ at proximal end (Fig. 23B, C); anterior legs of both sexes with dense ventral scopulae in paired strips separated by strip with sparse setae, denser in females (Fig. 23A, D–J) than males (Fig. 24A–F); tibiae (at least) with ovoid pore-containing sensilla laterally (Fig. 24G, H); males with ventral cusps on metatarsi and tarsi I and II (Figs 24C, E, 25A, B, 27A), absent on tibiae and in females; metatarsi with strongly developed metatarsal stopper (Figs 23H, I, 24F, I), metatarsi III and IV with weak distal preening brush and distinct comb (Figs 21E, J, 24I); tarsi with numerous long and short dorsal trichobothria and chemosensory setae (Fig. 23I, J); trichobothria with slightly lowered distal plate, distal margin of hood overlapping plate, hood with four curved ridges, roughly concentric (Fig. 25D, E); tarsal organ at approximately $\frac{4}{5}$ tarsus length on anterior tarsi (Fig. 23J), ovoid, only very slightly elevated from integument, surface finely wrinkled, opening oval and distally placed (Fig. 25F, G), possibly absent on tarsus IV (Fig. 25C); tarsal claws short, with nine teeth, of which the basal two are broad and spatulate and the distal seven slender and elongate (Fig. 23L), with dense tenant setae forming claw tufts in between (Fig. 23I–L). Abdomen oval, clearly larger in females (Fig. 21F) than males (Fig. 21A), with dorsal scutum in males only (Fig. 25H); dorsum covered in fine setae, two pairs of distinct sigilla in both sexes; venter without large sclerites or markings (Fig. 21C, H), covered in fine setae (Fig. 25I). Spinnerets short, conical, in compact group, only studied in detail in females: ALS with two MAmp and 10 Pi (Fig. 25J); PMS partly obscured, with only two mAmp, one Cy and three Ac distinguished (Fig. 25K); PLS partly obscured, with two Cy and nine Ac distinguished (Fig. 25L). Male palpal femora and patellae without apophyses (Fig. 26A), patella with retrolateral lyriform organ (Fig. 26D); palpal tibiae with retrolateral trichobothrium (Fig. 26A, C), thumb-like vRTA and long slender dRTA that corresponds with retrobasal groove on cymbium (Fig. 26A); tegulum V-shaped, narrower proximally and broader distally; embolus very long, originating retrolaterally, with membranous looping base and midsection, narrowing to long slender whip-like tip (Figs 26B, 27B, C), part of its length corresponding to retrodistal cymbial groove (Fig. 26A). Female epigyne very weakly sclerotized, with large subrectangular keyhole-shaped atrium, with median split visible under S.E.M. (Fig. 26E) but not light microscopy (Fig. 27D), weakly distinguishable under compound microscopy (Fig. 28); copulatory openings situated at anterior of atrium; copulatory ducts membranous, entirely translucent, their path only visible after staining, curving anteriorly and laterally, before bending back along their interior margin before looping towards posterior, running along margin of atrium before entering lateral ST II near midpoint of epigyne, with short duct connecting them to posterior ST I.

Etymology. The name is an arbitrary combination of letters. Gender feminine.

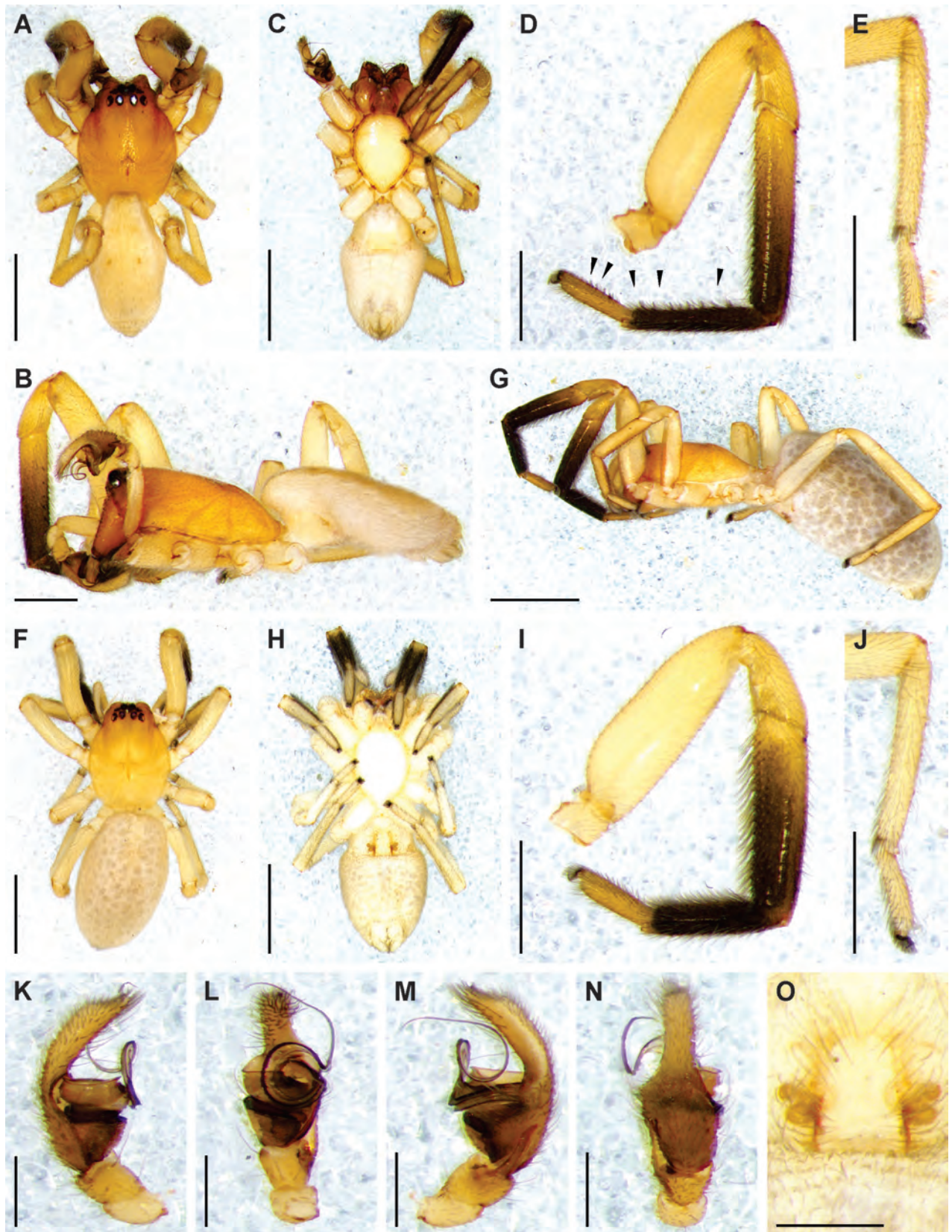


Figure 21. Digital microscope photographs of somatic morphology of *Rukuluk gramineus* sp. nov., male (A–E, K–N) and female (F–J, O). A, F habitus, dorsal view B, G same, lateral view C, H same, ventral view D, I leg I, prolaternal view E, J metatarsus and tarsus IV K–N left male palp in prolaternal (K), ventral (L), retrolateral (M) and dorsal (N) views; O epigyne, ventral view. Scale bars: 1.0 mm (A–C, F–H); 0.5 mm (D, E, I, J); 0.25 mm (K–O).

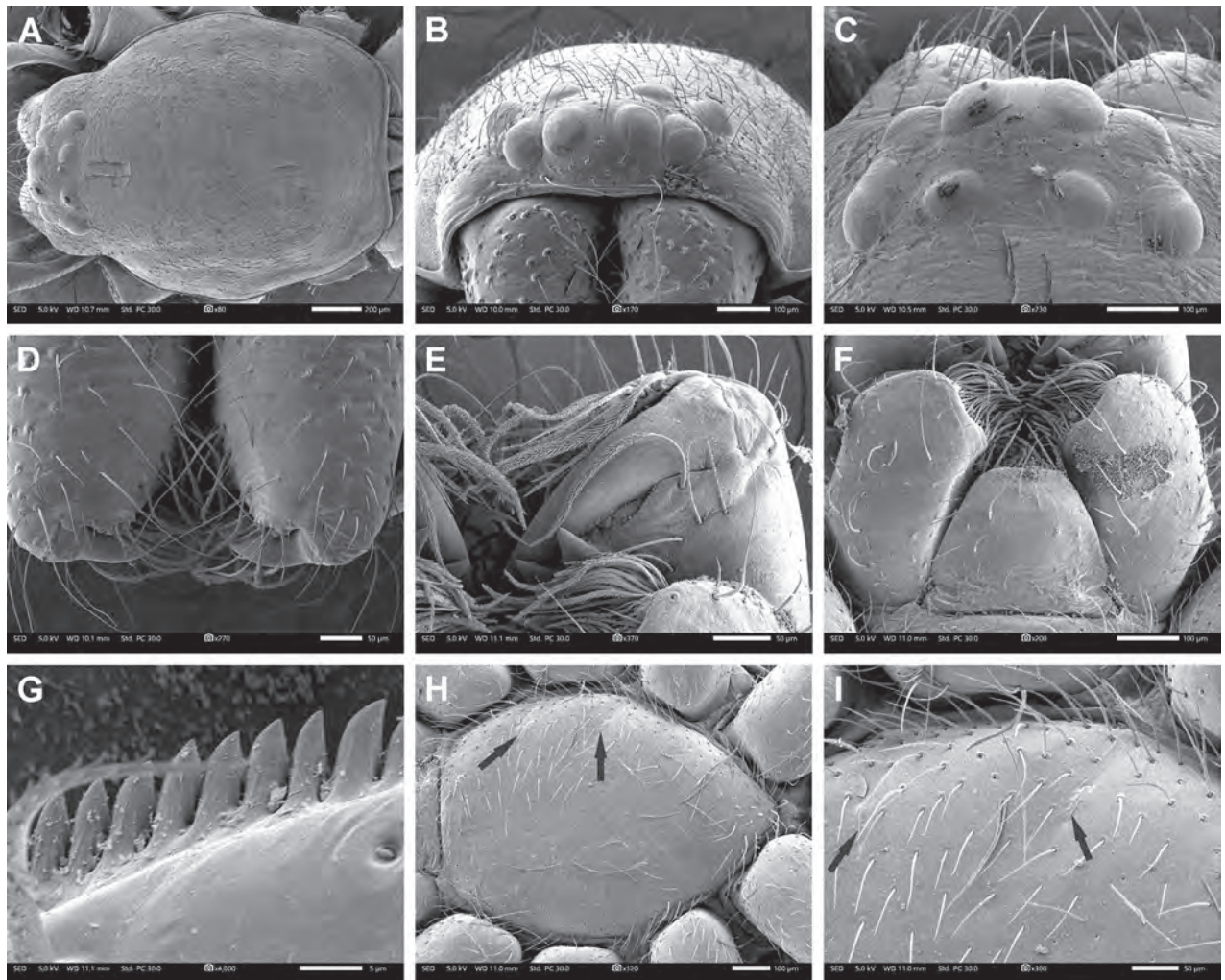


Figure 22. Scanning electron micrographs of *Rukuluk gramineus* sp. nov., female (A, C, D, F–I) and male (B, E). A carapace, dorsal view B eye region, anterior view C same, dorsal view D chelicerae, anterior view E distal end of chelicerae, ventral view F mouthparts, ventral view G detail of serrula H sternum, arrow indicating slit sensilla I same, enlarged.

***Rukuluk gramineus* sp. nov.**

<https://zoobank.org/EE978F1A-2E23-4944-B398-E507023CC3F7>

Figs 21–28

Material examined. Holotype. SOUTH AFRICA • ♂; Northern Cape Province; Witsand Nature Reserve, Brulsand; 28°34.688'S, 22°27.769'E; 1210 m a.s.l.; 23 Mar. 2023; C. Haddad & R. Booysen leg.; grass tussocks on sand dunes; NMBA 18616.

Paratypes. SOUTH AFRICA • 2 ♀; together with holotype NMBA 18616 • 1 ♂ 1 ♀; Northern Cape Province; Witsand Nature Reserve, Viewing Point; 28°33.584'S, 22°29.568'E; 1225 m a.s.l.; 25 Mar. 2023; C. Haddad & R. Booysen leg.; grass tussocks on sand dunes; NMBA 18636 • 1 ♀; Witsand Nature Reserve, Rest Camp; 28°33.773'S, 22°29.095'E; 1195 m a.s.l.; 25 Mar. 2023; C. Haddad & R. Booysen leg.; grass tussocks, woodland; NMBA 18661 • 1 ♀; same collection data as for preceding; MACN.

Other material. SOUTH AFRICA • 1 ♂ 2 ♀; Northern Cape Province; Witsand Nature Reserve, Rest Camp; 28°33.773'S, 22°29.095'E; 1195 m a.s.l.; 25 Mar. 2023; C. Haddad & R. Booysen leg.; grass tussocks, woodland; S.E.M. preparations.

Diagnosis. As for the genus diagnosis.

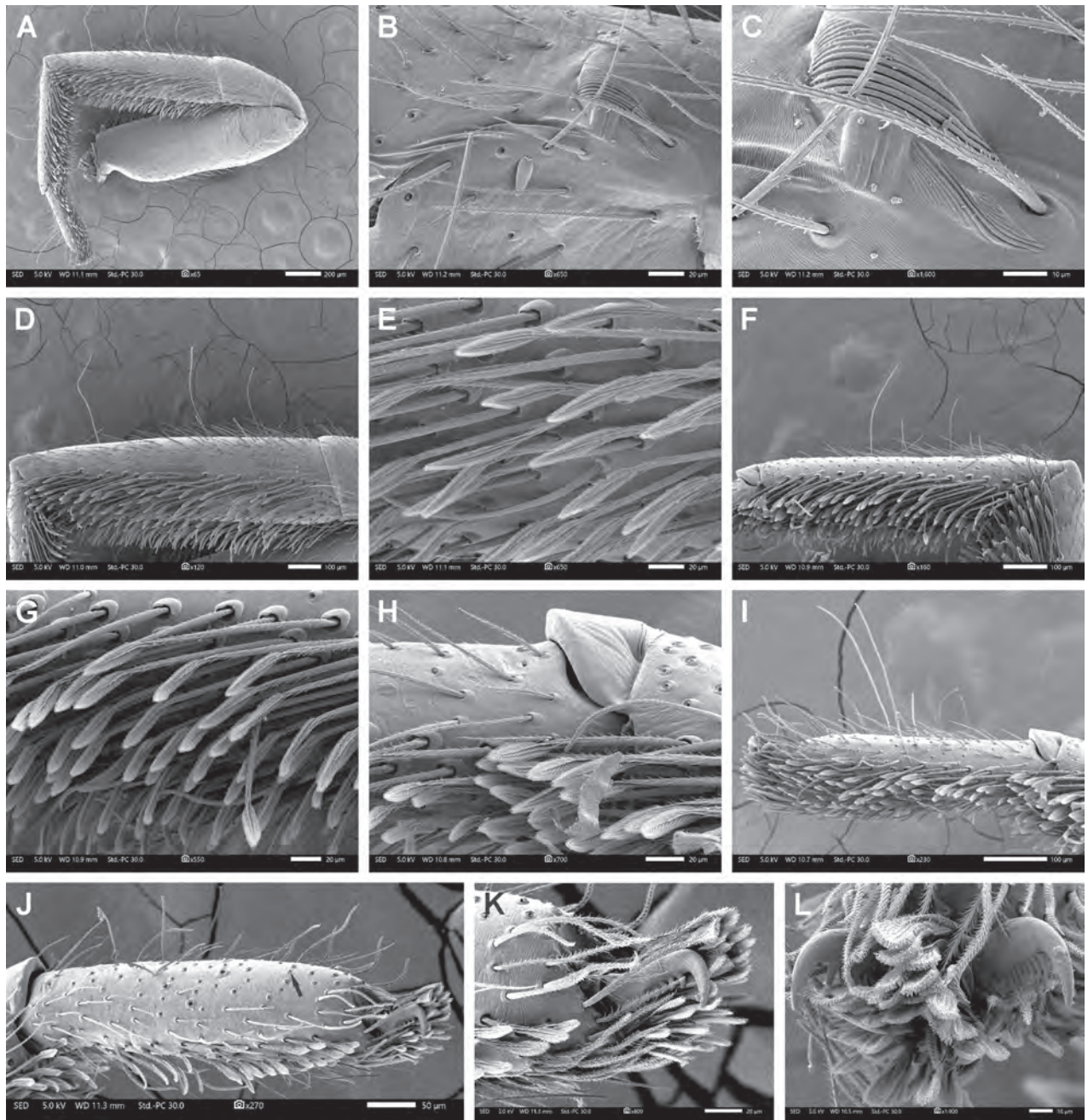


Figure 23. Scanning electron micrographs of *Rukuluk gramineus* sp. nov., female **A** leg I, prolatral view **B** patellar indentation and lyriform organ, leg I **C** same, detail of lyriform organ **D** tibia I, prolatral view **E** same, detail of scopulate setae **F** metatarsus I, prolatral view **G** same, detail of scopulate setae **H** same, detail of metatarsal stopper **I** tarsus I, prolatral view **J** same, retrodistal view, black arrow indicating position of tarsal organ **K** same, enlargement of tarsal claws **L** same, tarsal claws in distal view.

Description. Male (holotype, Witsand, NMBA 18616): Measurements: CL 1.53, CW 1.20, AL 1.72, AW 0.96, TL 3.06, FL 0.10, SL 1.36, SW 1.05, AME-AME 0.03, AME-ALE 0.02, ALE-ALE 0.23, PME-PME 0.08, PME-PLE 0.05, PLE-PLE 0.38, MOQ: AW 0.24, PW 0.26, L 0.25. Length of leg segments: I $1.30 + 0.62 + 1.13 + 0.90 + 0.45 = 4.40$; II $1.07 + 0.51 + 0.88 + 0.77 + 0.42 = 3.65$; III $0.70 + 0.41 + 0.50 + 0.63 + 0.33 = 2.57$; IV $1.15 + 0.52 + 1.02 + 1.05 + 0.40 = 4.14$. Carapace bright yellow-orange, with black mottled pentagonal marking in front of fovea (Fig. 21A); fovea short and broad, distinct, at $\frac{2}{3}$ CL. For eye arrangement see genus description.

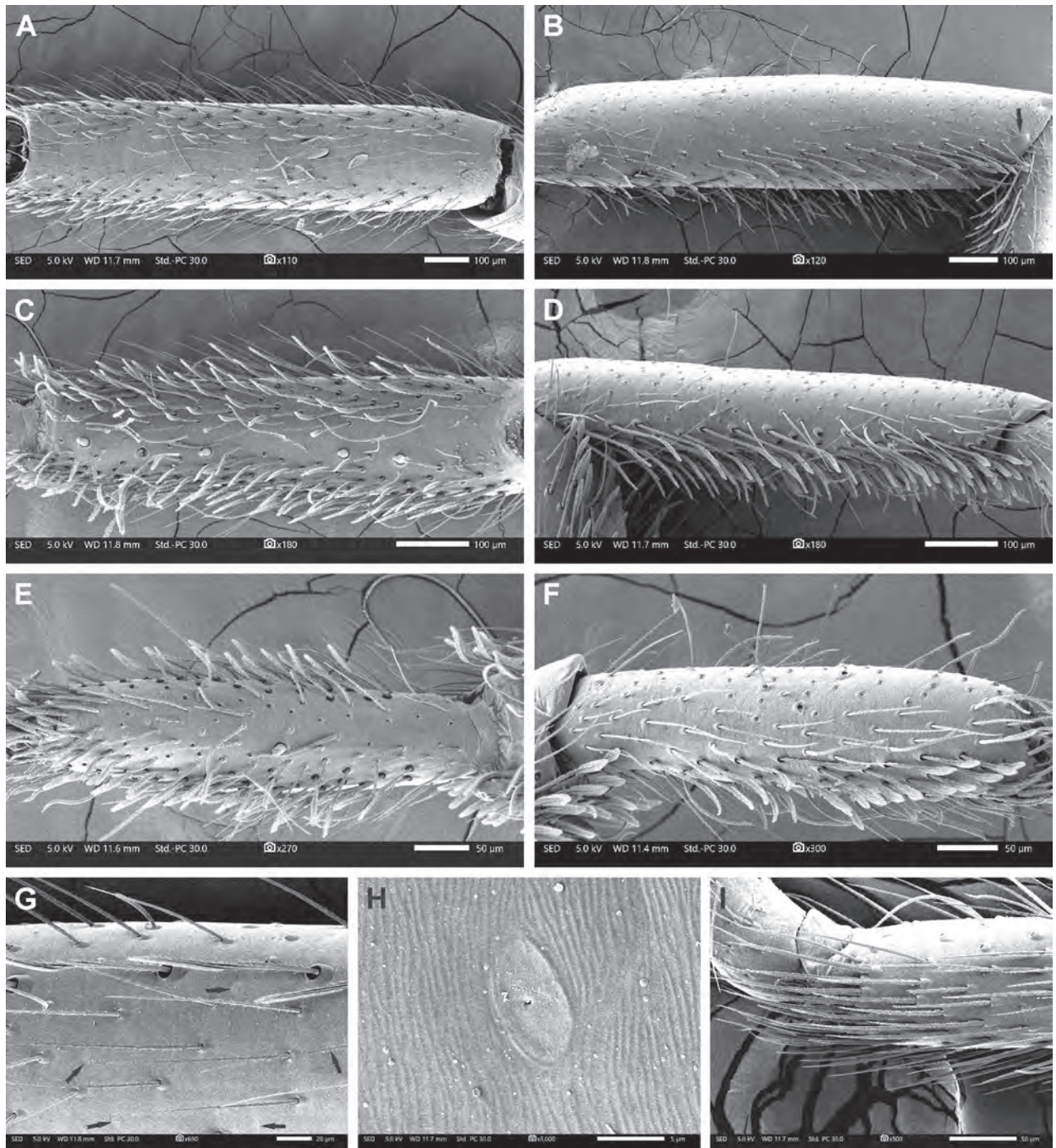


Figure 24. Scanning electron micrographs of *Rukuluk gramineus* sp. nov., male (A–H) and female (I). **A** tibia I, ventral view **B** same, prolateral view **C** metatarsus I, ventral view **D** same, prolateral view, arrow indicating distal slit sensillum **E** tarsus I, ventral view **F** same, prolateral view **G** tibia II, lateral view, black arrows indicating ovoid sensory pores **(H)** **I** metatarsus IV, stopper and distal comb/brush.

Chelicerae pale orange-brown, anterior and lateral surfaces covered with short, fine setae with small tuberculate bases; promargin with two slightly separated teeth, proximal tooth largest; retromargin with two larger subequal teeth placed closed together; endites and labium yellow-brown. Sternum creamy-yellow, yellow-brown at borders; surface smooth, covered with short, fine setae; precoxal triangles present, intercoxal sclerites only between coxae I and II and II and III. Abdomen oval, broadest at $\frac{2}{3}$ its length; creamy-grey dorsally, with large scutum covering most

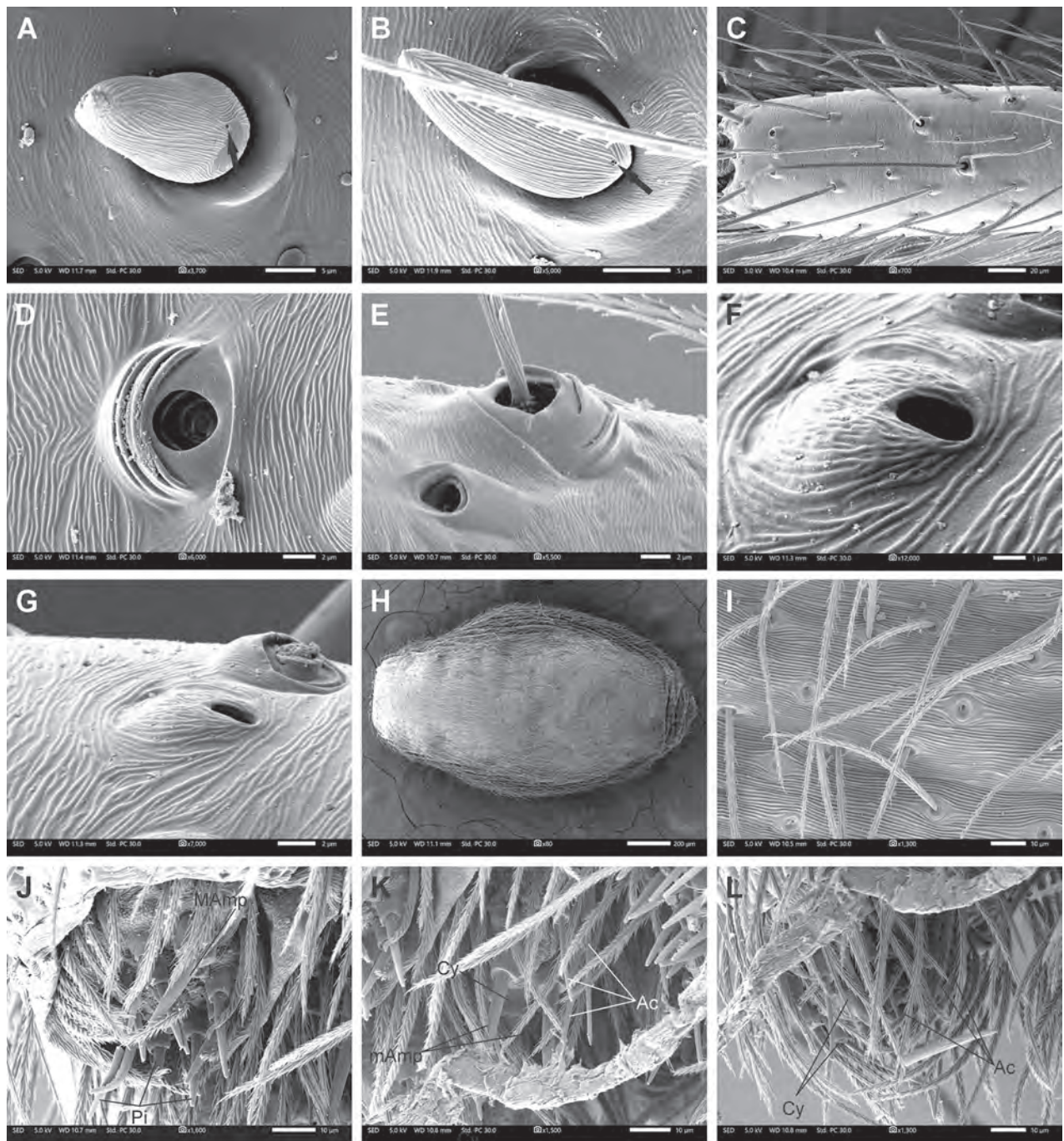


Figure 25. Scanning electron micrographs of *Rukuluk gramineus* sp. nov., male (**A, B, G, H**) and female (**C-F, I-L**). **A, B** metatarsi I (**A**) and II (**B**), ventral cusps, arrows indicating triad of pores at base of cusp on proximal side **C** distal half of tarsus IV, seemingly lacking a tarsal organ **D** tarsus I, lateral trichobothrium base **E** tarsus IV, dorsal trichobothrium **F, G** tarsus I, tarsal organ **H** abdominal dorsum **I** ventral abdominal setae **J** anterior lateral spinneret **K** posterior median spinneret **L** posterior lateral spinneret. Abbreviations: Ac: aciniform gland spigot(s); Cy: cylindrical gland spigot(s); mAmp: minor ampullate gland spigot(s); MAmp: major ampullate gland spigot; Pi: piriform gland spigot(s).

of dorsum (Fig. 21A); two pairs of distinct sigilla present, at $\frac{1}{4}$ and $\frac{1}{2}$ AL; sides and venter mottled creamy-grey (Fig. 21B, C), with two paired lines of indistinct tiny sclerites from epigastric furrow to spinnerets. Legs creamy-yellow, tibiae I with black mottling intensifying distally, metatarsi I black, tarsi I yellow-brown, with faint black mottling; leg II slightly darker than legs III and IV; numerous ventral cusps

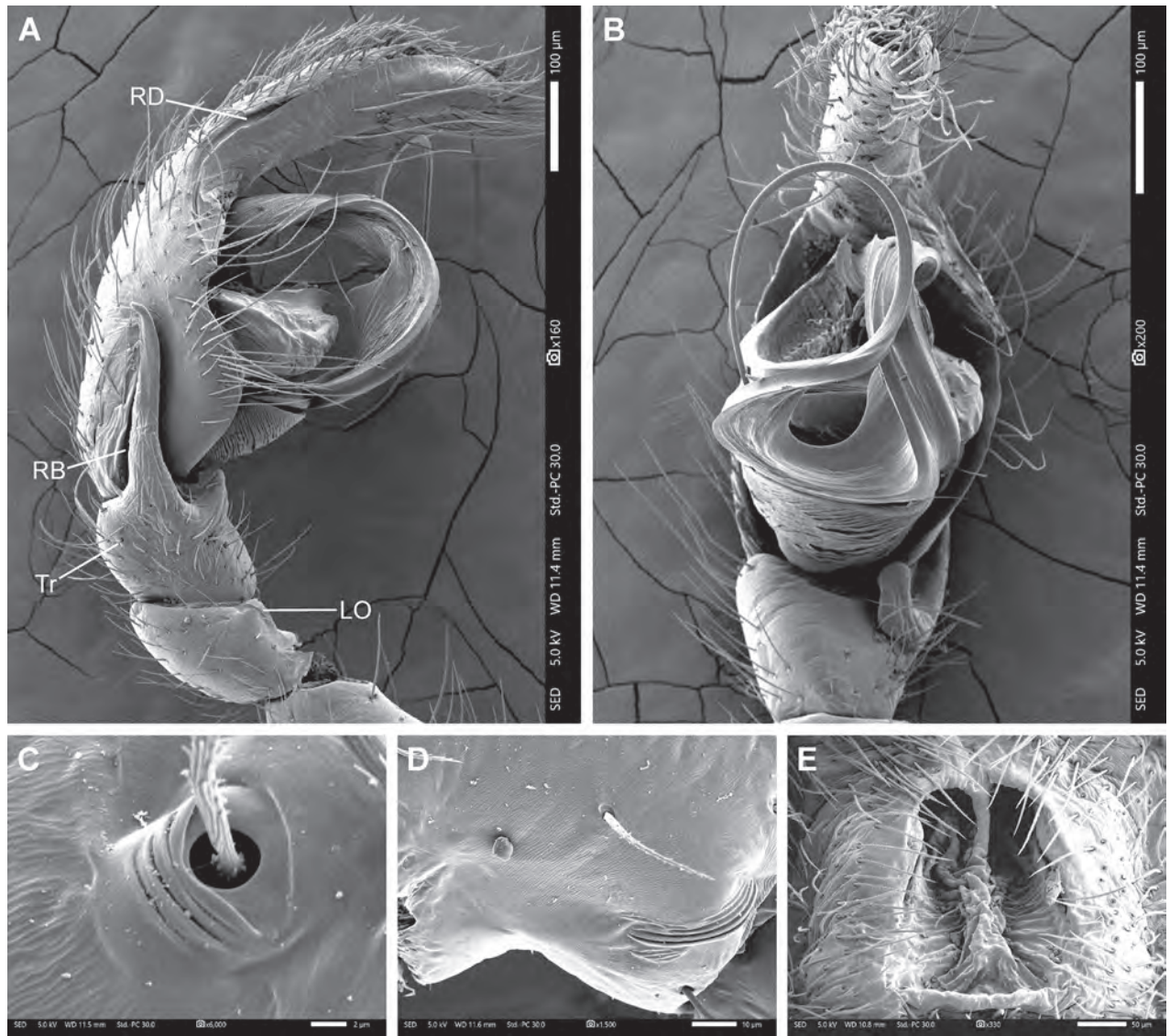


Figure 26. Scanning electron micrographs of *Rukuluk gramineus* sp. nov., male (A–D) and female (E). **A** right palp, retro-lateral view **B** left palp, ventral view **C** detail of dorsal tibial trichobothrium **D** palpal patella, enlargement of retrolateral lyriform organ **E** epigyne, ventral view. Abbreviations: LO – lyriform organ; RB – retrobasal cymbial groove; RD – retrodistal cymbial groove; Tr – trichobothrium.

present on metatarsi and tarsi I and II. Palp (Figs 21K–N, 26A, B, 27B, C) brown; tegulum broadly V-shaped, narrower proximally and broader distally; embolus very long, originating retrolaterally, forming a broad membranous ribbon in its basal section, curving once around tegulum transversely on palpal axis, gradually narrowing to a C-shaped membranous midsection, rapidly narrowing to long, slender, looping whip-like distal section with the tip directed ventrally; ventral RTA thumb-like, with rounded tip; dorsal RTA long, slender, slightly curved distally, closely associated with retrobasal cymbial groove (Figs 26A, 27C).

Female (paratype, Witsand, NMBA 18661): Measurements: CL 1.27, CW 1.06, AL 1.93, AW 1.15, TL 3.20, FL 0.11, SL 1.40, SW 1.05, AME-AME 0.03, AME-ALE 0.02, ALE-ALE 0.21, PME-PME 0.08, PME-PLE 0.05, PLE-PLE 0.37, MOQ: AW 0.22, PW 0.27, L 0.23. Length of leg segments: I 1.12 + 0.57 + 0.92 + 0.70 + 0.40 = 3.71; II 0.95 + 0.50 + 0.70 + 0.61 + 0.36 = 3.12; III 0.62 + 0.38 + 0.48 + 0.55 + 0.29 = 2.32;

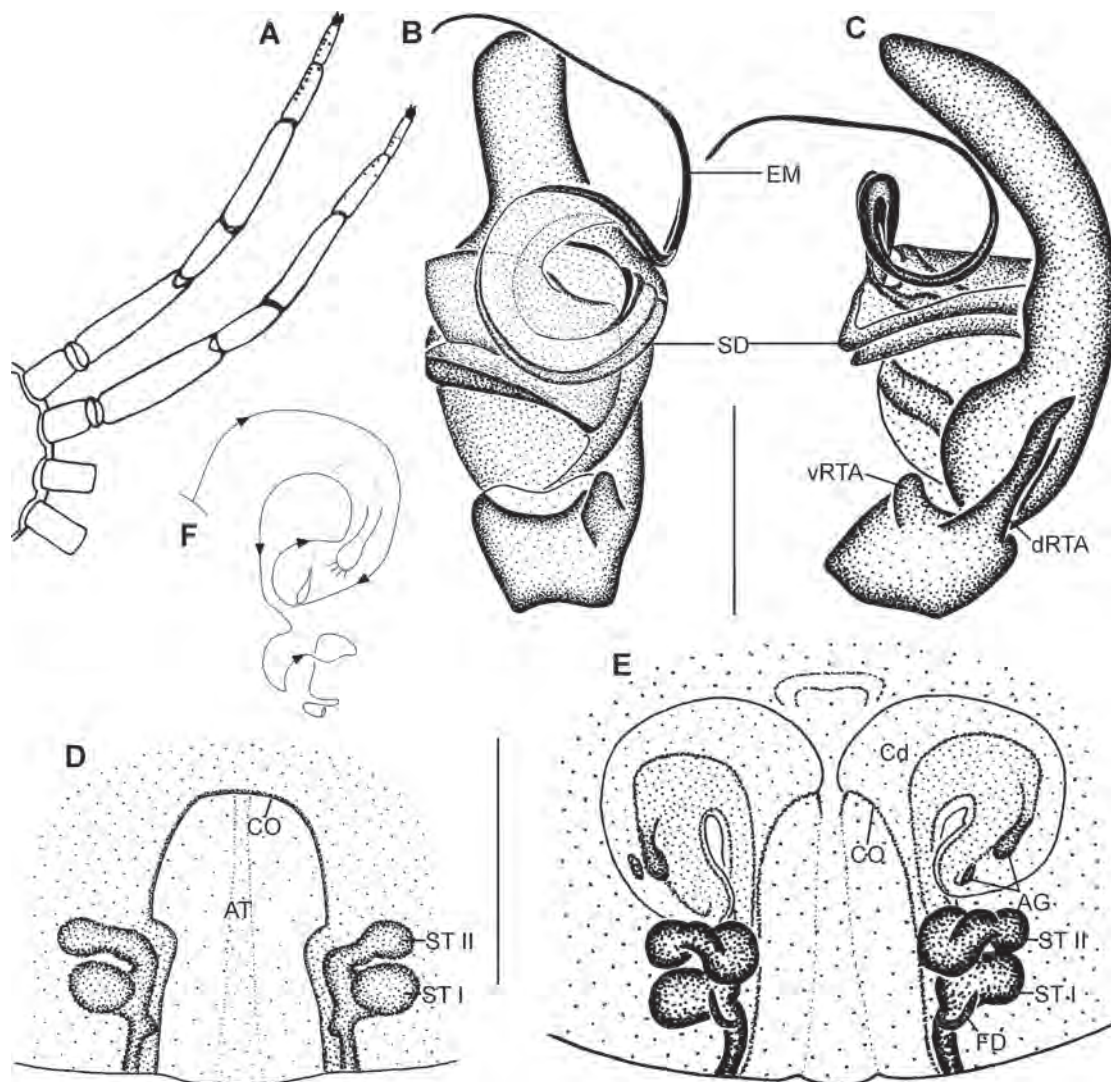


Figure 27. *Rukuluk gramineus* male (A–C) and female (D, E). A schematic representation of cusp arrangement on legs I and II B palp, ventral view C same, retrolateral view D epigyne, ventral view E same, dorsal view F diagrammatic course of the insemination ducts. Abbreviations: AG – accessory glands; AT – atrium; Cd – copulatory duct; CO – copulatory opening; dRTA – dorsal retrolateral tibial apophysis; EM – embolus; FD – fertilization duct; SD – sperm duct; ST I – primary spermatheca; ST II – secondary spermatheca; vRTA – ventral retrolateral tibial apophysis. Scale bars: 0.25 mm.

IV $1.10 + 0.51 + 0.97 + 0.98 + 0.36 = 3.92$. Carapace yellow, with faint black mottled marking in front of fovea (Fig. 21F); fovea short and broad, distinct, at $\frac{2}{3}$ CL. For eye arrangement see genus description. Chelicerae yellow-brown, anterior and lateral surfaces covered with short, fine setae with small tuberculate bases; dentition as in male; endites and labium pale creamy-yellow. Sternum cream, yellow-brown at borders; surface smooth, covered with short, fine setae; precoxal triangles present, intercoxal sclerites only between coxae I and II. Abdomen oval, broadest at $\frac{2}{3}$ its length; mottled creamy-grey dorsally, without scutum, with traces of faint medial grey line (Fig. 21F); two pairs of indistinct sigilla present, at $\frac{1}{4}$ and slightly more than $\frac{1}{2}$ AL; sides and venter mottled creamy-grey (Fig. 21G, H), with two paired lines of indistinct tiny sclerites from epigastric furrow to spinnerets. Legs generally creamy-yellow, tibiae and metatarsi I with dense black mottling, tarsi I yellow-brown, with faint black mottling. Epigyne (Figs 26E, 27D, E, 28) very weakly sclerotized, with large keyhole-shaped atrium; copulatory openings large, situated at anterior of

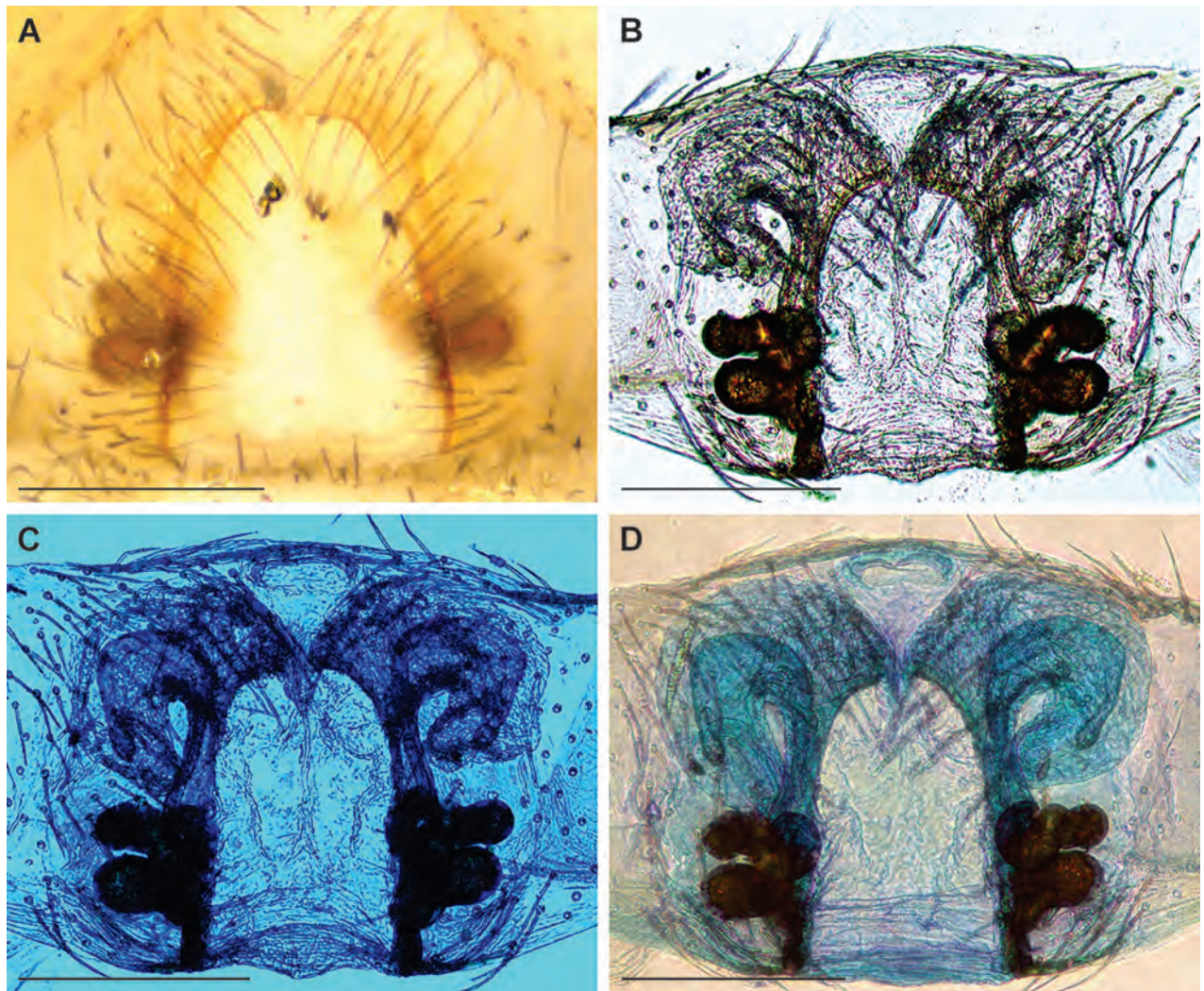


Figure 28. *Rukuluk gramineus* female paratypes, epigynes in ventral (**A, B**) and dorsal (**C, D**) views examined under compound microscope **A** intact uncleared epigyne **B** cleared epigyne **C, D** cleared epigyne stained with crystal blue, slightly diluted in D. Scale bars: 0.2 mm.

atrium, entering initially broad membranous copulatory ducts, each provided with two accessory glands; copulatory ducts curving laterally in progressively narrowing semicircle, folding back along their interior margin, forming narrow duct running along margin of atrium before entering transverse bilobed ST II near midpoint of epigyne, with short duct connecting them to posterior transversely ovoid ST I, with fertilization ducts originating posteromesally.

Etymology. This species name is the Latin word meaning “belonging to grass”, referring to the microhabitat that the species was collected from.

Distribution. Only known from the type locality (Fig. 12).

***Rukuluk* sp.**

Fig. 29

Material examined. SOUTH AFRICA • 2 imm.; KwaZulu-Natal; Tembe Elephant Park, Viewing Tower; 26°02.227'S, 32°24.907'E; 115 m a.s.l.; 5 Dec. 2018; C. Haddad & R. Booyesen leg.; base of grass tussocks; NCA 2019/760.

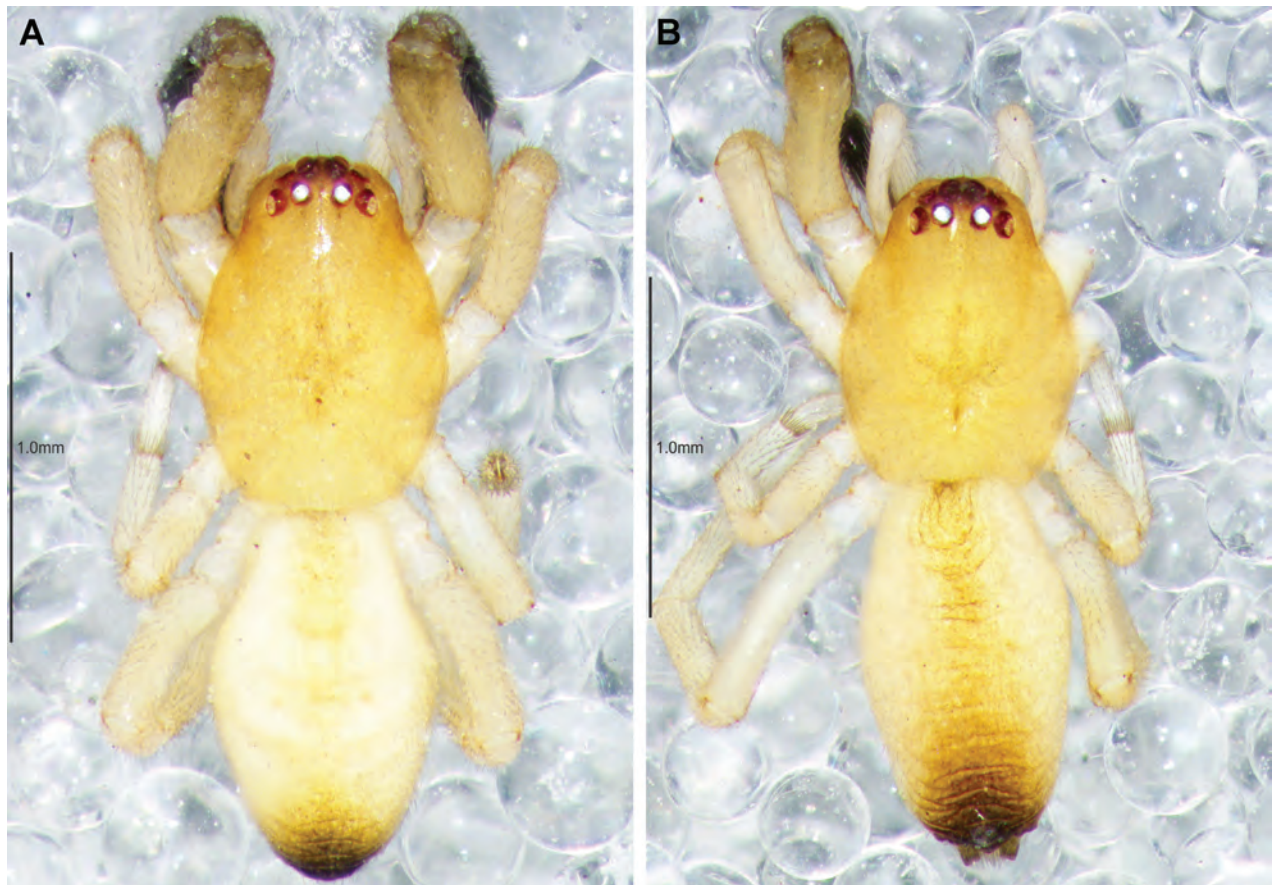


Figure 29. Digital microscope photographs of the dorsal habitus of two *Rukuluk* sp. indet. immatures from Tembe Elephant Park, South Africa.

Remarks. Aside from the type species, another species of *Rukuluk* only known from two juvenile specimens in eastern South Africa was collected. Based on DNA barcode data, both specimens were placed in a monophyletic group with *R. gramineus* sp. nov. (Fig. 30), indicating that the genus is not monotypic. Although this *Rukuluk* was collected in the same biotope as *Poachelas refugus* Haddad, 2010 at Tembe, they clearly have very different markings, a narrower carapace, and lack the spines on the anterior legs present in the latter species (compare Fig. 29 with Haddad 2010: figs 1, 3, 4). Confirmation of this species' generic placement requires the collection of adults from Tembe and a detailed comparison with *R. gramineus* sp. nov. and *P. refugus*.

Discussion

The current contribution takes the diversity of Afrotropical trachelid genera and species to 20 and 107, respectively, making it the biogeographical realm with the richest diversity. It is not entirely surprising that most of these taxa have been described during the last two decades, as this family has become the focus of intensive taxonomic study during this period. Despite these advances, the phylogenetic relationships of the family remain poorly understood, although recent analyses based on the COI gene have provided some preliminary indications (Haddad et al. 2021; Haddad and Lyle 2024).

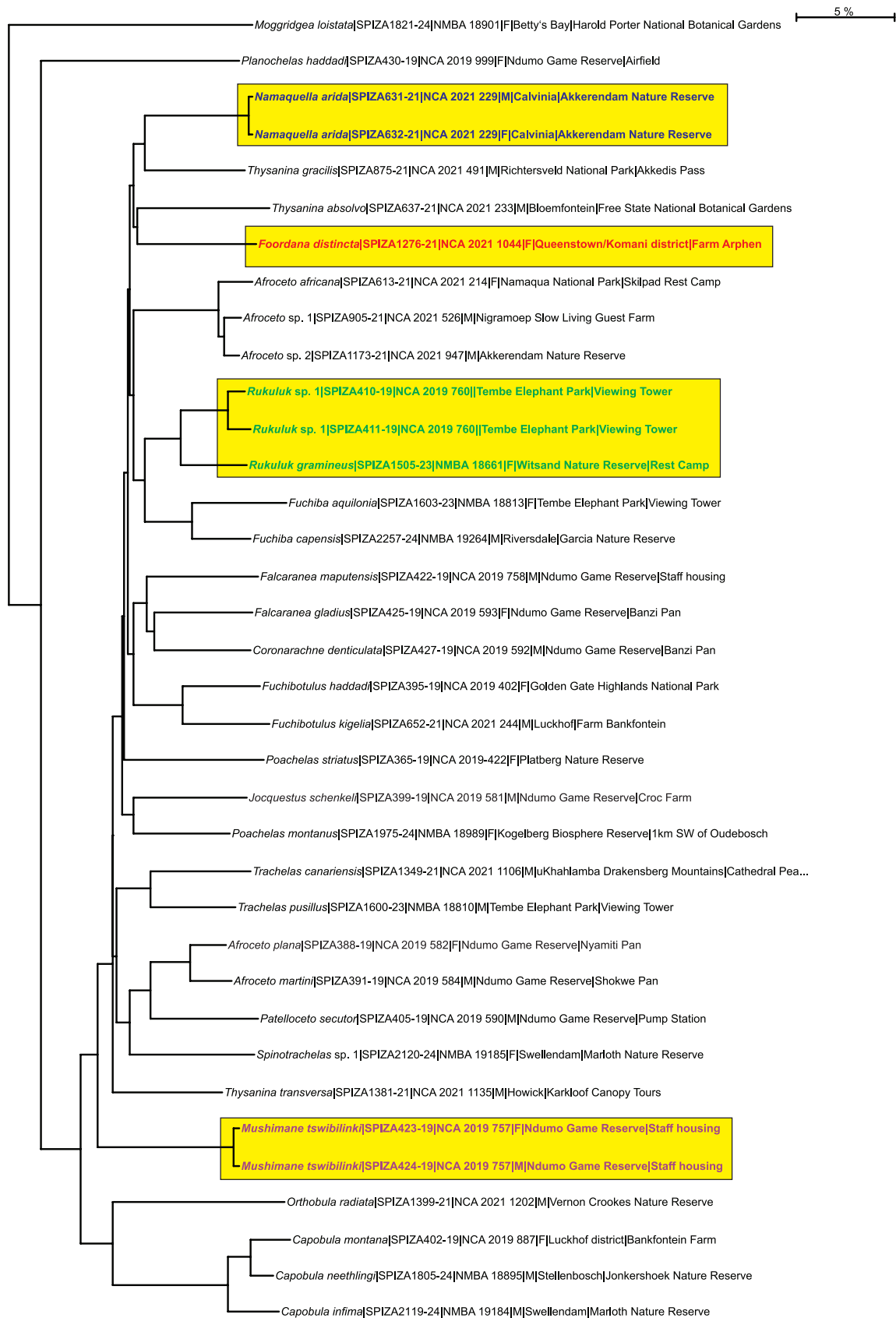


Figure 30. Phylogenetic tree of Afrotropical Trachelidae based on cytochrome c oxidase subunit 1 (COI) sequences, with the four new genera described in this paper indicated in different colours in yellow boxes. *Moggridgea loistata* (Migidae) was used as the outgroup to root the tree.

The analysis conducted in the present study restricted the terminals to a single representative of the described species in the SPIZA project on BOLD, with three terminals (two *Afrocelo* Lyle & Haddad, 2010 and one *Spinotrachelas* Haddad, 2006) represented by undescribed species. In performing the analysis, one *Foordana distincta* sp. nov. individual (a paratype female from Houw Hoek in the Western Cape, SPIZA1583-23, NMBA 18796) consistently grouped together with *Capobula infima* (Simon, 1897), so was assumed to be a contaminated sequence and was removed from the final analysis. The holotype male of *Namaquella samantha* sp. nov. (SPIZA461-19, NCA 2008/573) was submitted for sequencing but this was unsuccessful, so this species could not be included.

As in the previous analyses, *Planochelas haddadi* Khoza & Lyle, 2011 was placed as sister to all other Trachelidae (Fig. 29), and the relationships of this genus remain puzzling. *Orthobula* Simon, 1897 and *Capobula* Haddad et al., 2021 together form a basal clade in Trachelidae *sensu stricto*, sister to a large clade containing the remaining trachelid terminals. Within this clade, *Mushimane* gen. nov. was placed basally, *Rukuluk* gen. nov. as sister to *Fuchiba* Haddad & Lyle, 2008, and *Foordana* gen. nov. and *Namaquella* gen. nov. within a clade containing two species of *Thysanina* Simon, 1910 *sensu stricto* (i.e. *Thysanina* species lacking leg spines and with an oval abdomen). As one of these recent analyses indicates that *Thysanina* is polyphyletic (Haddad et al. 2021), which is supported by this analysis (Fig. 29), clarifying the relationships of this genus to *Foordana* gen. nov. and *Namaquella* gen. nov. would require a more comprehensive set of terminals representing all three genera, but particularly *Thysanina*, which may in fact comprise of three different genera based on differences in genitalic morphology, leg spination and the occurrence of ventral cusps and scopulae on the legs (Haddad unpubl.).

Acknowledgments

This paper pays tribute to the life and career of the late Stefan Foord, who made invaluable contributions to the study of African spider biodiversity. Robin Lyle is thanked for the use of her unpublished illustrations of the male palp of *Foordana kasouga* and female epigyne of *F. distincta*. The collection curators are thanked for the loans of material that made this study possible. The reviewers, Chi Jin and Jan Bosselaers, and editor, Galina Azarkina, are thanked for their valuable inputs that helped improve the manuscript.

Additional information

Conflict of interest

The author has declared that no competing interests exist.

Ethical statement

No ethical statement was reported.

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Author contributions

The author solely contributed to this work.

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Data availability

All of the data that support the findings of this study are available in the main text or Supplementary Information.

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Supplementary material 1

The collecting data and specimen accessions of four new genera of Trachelidae from southern Africa

Authors: Charles R. Haddad

Data type: xlsx

Explanation note: **table S1**. Details of collecting data of four new genera of Trachelidae spiders from southern Africa.

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