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Two new species of the mygalomorph spider genus *Kwonkan* (Mygalomorphae: Anamidae) from the Kimberley region of Western Australia

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Abstract

The trapdoor spider genus *Kwonkan* Main, 1983 (Anamidae) currently contains twelve species. Members of the genus are unusual among the Anamidae in modifying their burrow entrances with turrets and collars. The genus is widespread throughout the Australian arid zone and many species remain to be described, particularly in Western Australia. Here, we describe *Kwonkan fluctellus* sp. nov. and *Kwonkan nemoralis* sp. nov. from the Northern Kimberley bioregion. All specimens of the latter species were collected on a Bush Blitz expedition in 2022. These represent the first species of the genus to be described from northern Australia.

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https://zoobank.org/References/C2395F6E-61F1-4642-9AB0-75B9B0BC752F

Introduction

The Australian endemic mygalomorph spider family Anamidae currently includes 10 genera in two subfamilies, Anaminae and Teylinae (Harvey et al. 2018, 2020; Opatova et al. 2020). Several of these genera have received recent taxonomic attention (e.g. Harvey et al. 2020; Rix et al. 2023; Wilson et al. 2023), but the genus *Kwonkan* Main, 1983 remains largely understudied. Most species of Anamidae construct burrows with relatively simple open entrances, however, *Kwonkan* species are unusual in constructing burrows with highly modified entrances, including turrets made of pebbles (Main, 1977) or supported by foliage (Main, 1994), or burrows with a silken collar around the entrance, which is embedded with substrate and can be pulled closed by the spider. These presumably function to camouflage the burrow, exclude predators such as ants or centipedes, and/or regulate burrow temperature and humidity (Fig. 1).

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Kwonkan currently includes 12 species, all from the southern half of Australia. It was originally described to encompass six species from southern Western Australia and South Australia, including *Dekana wonganensis* Main, 1977 and five species described in Main (1983). Following a molecular analysis by Harvey et al. (2018), the genus *Yilgarnia* Main, 1986 was synonymised with *Kwonkan*, adding two additional species, and another species previously in *Aname* L. Koch, 1873 was also transferred to *Kwonkan*. More recently, three unusual arid-zone species from South Australia and the southern Northern Territory were described by Harvey et al. (2023). Both molecular and morphological data strongly suggest the presence of numerous undescribed species within the genus, with the greatest diversity occurring in Western Australia (Castalanelli et al. 2014; Harvey et al. 2018; MSH, JDW, unpublished data).

In this paper, we describe two new species of *Kwonkan* from the Northern Kimberley bioregion (Fig. 1): *K. fluctellus* sp. nov. (Figs 1A, 2) and *K. nemoralis* sp. nov. (Figs 1A–C, 3). The first of these, a small species with unusual prosomal morphology, is known from one specimen from south of Walcott Inlet. The second species is known from two specimens from Salvodi Gorge, both of which were collected during the 2022 Wilinggin–West Kimberley Bush Blitz expedition. Bush Blitz is a program supported by the Australian government in collaboration with Broken Hill Proprietary Company Limited (BHP) and Earthwatch Australia, aimed at documenting plants and animals in conservation reserves across Australia (Preece et al. 2015). These are the first species of the genus *Kwonkan* to be described from the northern half of the continent.

This research contributes to Taxonomy Australia (2020), a national initiative under the Australian Academy of Science that brings together the taxonomic community to accelerate the discovery, documentation, and naming of new species. The initiative aims to comprehensively document the Australian biota within a generation.

Methods

Specimens examined in this study are housed in the Western Australian Museum, Perth (WAM). Specimens were examined and photographed in 75% ethanol. Auto-montaged images were taken with a Leica DFC500 digital camera attached to a Leica MZ16A stereo microscope, using Leica Application Suite (LAS) version 4.13 software (Leica, Wetzlar, Germany).

The left leg I and either the left or right leg III were dissected off the specimens for imaging (Figs 2, 3). After the ventral abdomen was imaged, setae were shaved off the genital plate before it was dissected from the abdomen and cleared in 95% lactic acid for imaging of the spermathecae. Taxonomic terminology and measurements taken here follow Wilson et al. (2025), with the additional description of the spination pattern on prolateral patella III. The following additional abbreviations are used throughout the text: D = dorsal; Fe = femur; Me = metatarsus; Pa = patella; PL = prolateral; Ta = tarsus; Ti = tibia; V = ventral. All measurements are given in millimetres.

Taxonomy

Family Anamidae Simon, 1899

Subfamily Anaminae Simon, 1899

***Kwonkan* Main, 1983**

Kwonkan Main 1983: 925.

Yilgarnia Main 1986: 396.

Type species

Dekana wonganensis Main, 1977, by original designation.

Yilgarnia currycomboides Main, 1986, by original designation.

Diagnosis

Harvey et al. (2018) provides the following diagnostic information for *Kwonkan*. Males can be diagnosed by the combined presence of a field of spinules on the retrolateral face of the male pedipalpal tibia and by a digitiform (not swollen) tarsus I. Females can be diagnosed by the presence of a small accessory receptaculum on the female spermathecae.

Diagnosis of female *Kwonkan* is complicated by the presence of what might be defined as an 'accessory receptaculum' (that is, a small secondary vesicle on each spermatheca) in other genera including *Swolnpes* Main & Framenau, 2009 and *Aname* L. Koch, 1873. We therefore provide further characteristics here that can be tentatively used to diagnose female *Kwonkan* from other genera.

Females of *Kwonkan* can be further diagnosed from other anamid genera by the presence of any (but not necessarily all) of the following characters: coxae III and/or IV with patches of spine-like setae on posterior half of ventral face (previously used as the diagnostic character of *Yilgarnia* Main, 1986, now a junior synonym of *Kwonkan*); pro-dorsal patalla III with a patch of > 3 thorn-like spines (as noted in Main, 1983, 1986); spines present on the tarsi of at least one pair of legs (Main, 1983, 1986). This diagnosis will likely need to be refined as the true morphological variability within each anamid genus is uncovered.

In the case of the species described here, we consider both to belong in the genus *Kwonkan* based on the presence of patches of > 3 thorn-like setae on the pro-dorsal patella III of both species, and the presence of spine-like, or thicker hair-like, setae on the posterior half of the ventral face of coxae III and IV (Figs 2, 3)

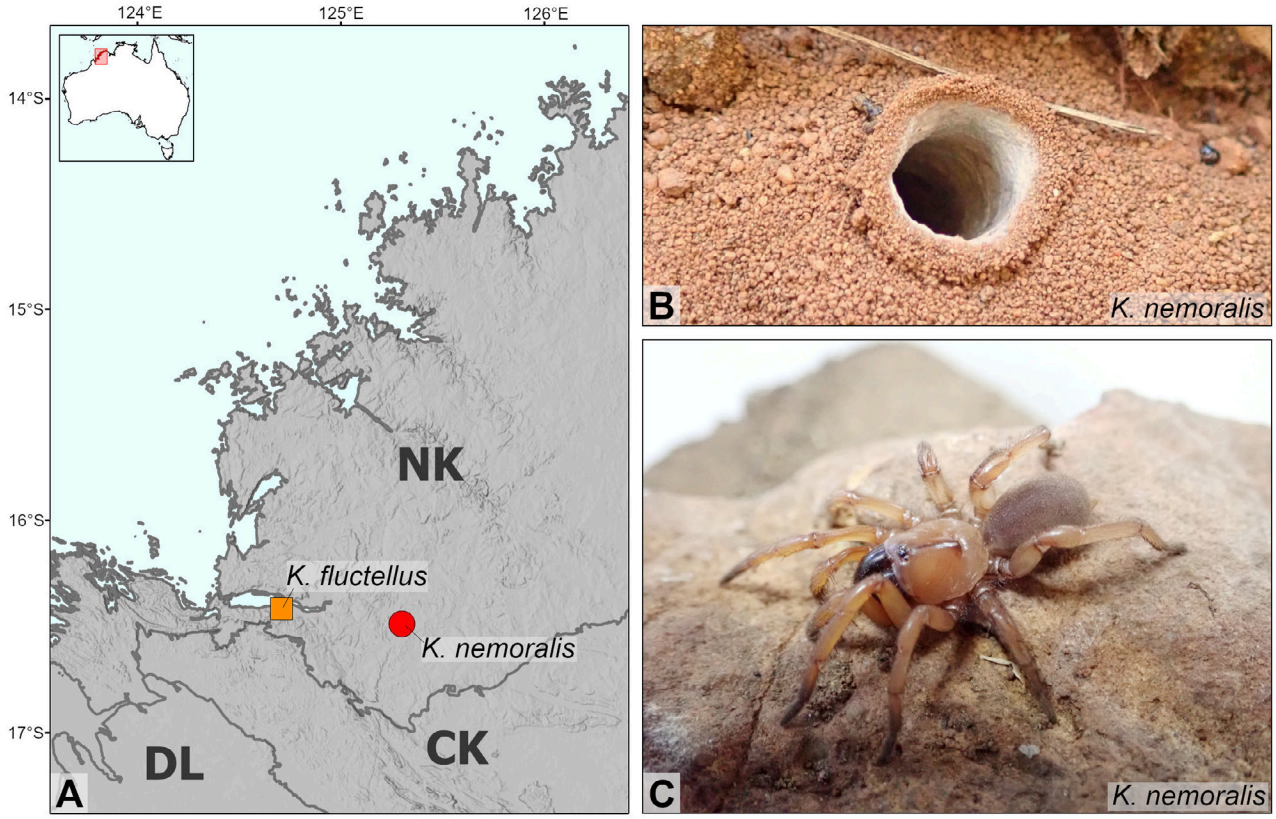

Figure 1. Distributional and natural history information for *Kwonkan fluctellus* sp. nov. and *K. nemoralis* sp. nov. **A**, Map showing the type locality of each species (both species are only known from their respective type localities). Abbreviations and boundaries represent IBRA 7 bioregions (NK, Northern Kimberley; CK, Central Kimberley; DL, Dampierland). **B**, Burrow entrance of *K. nemoralis* sp. nov., taken at the type locality. **C**, Habitus photo of the *K. nemoralis* sp. nov. holotype, WAM T158507.

Description

See Harvey et al. (2018)

Kwonkan fluctellus sp. nov.

Figures 1A, 2

https://zoobank.org/NomenclaturalActs/ec7bbc0c-a9e8-4d7b-8c35-df3640b65e71

Holotype

AUSTRALIA: Western Australia: ♀, Walcott Inlet (South), 16°29'01"S, 124°45'44"E, 1 May 1996, D. & F. Knowles (WAM T34222).

Diagnosis

Kwonkan fluctellus sp. nov. can be distinguished from all other species of *Kwonkan* (for which females are known) by the presence of undulating anterolateral carapace margins that are widest above coxae I and II and constricted between them (Fig. 2A). It can be further distinguished by the presence of strongly antero-medially angled spermathecae (Fig. 2M).

Description: *holotype female (WAM T34222)*

General (Fig. 2A–M). Body length 9.44, in good condition.

Dorsal prosoma (Fig. 2A, E, F). Carapace length 3.09, width 2.29, length/width 1.35, caput width/carapace width 0.75, carapace pale tan, glabrous with few inconspicuous setae, antero-lateral edge of carapace undulating, wider at coxa I and coxa II and constricted between them, fovea slightly procurved, fovea width/carapace length 0.18 (Fig. 2A, F); chelicerae light red-brown, rastellum of many thorn-like setae on small mounds (Fig. 3G); eye group rectangular, width/length 2.00, eye tubercle present but inconspicuous (Fig. 2E).

Abdomen (Fig. 2B, D). Abdomen length 3.92, predominantly pale tan, with mottled brown chevrons posterodorsally, merging to become solid colour towards the anterior, with a consistent covering of short setae.

Ventral prosoma (Fig. 2C, G–I). Labial cuspules absent (Fig. 2H); maxillary heel indistinct, about 40 cuspules present, not extending fully onto posterior heel, blending laterally into short, thorn-like setae that reach the lateral end of the maxillae (Fig. 2G); coxae III and IV with patches of thicker, hair-like setae on posterior half of ventral face (Fig. 2I); small thorn-like setae present on prolateral face of anterior coxae (Fig. 2C); sternum length/width 1.29, covered with a mix of longer and shorter hair-like setae (Fig. 2H); posterior sigilla circular, central sternum to posterior sigilla length/sternum

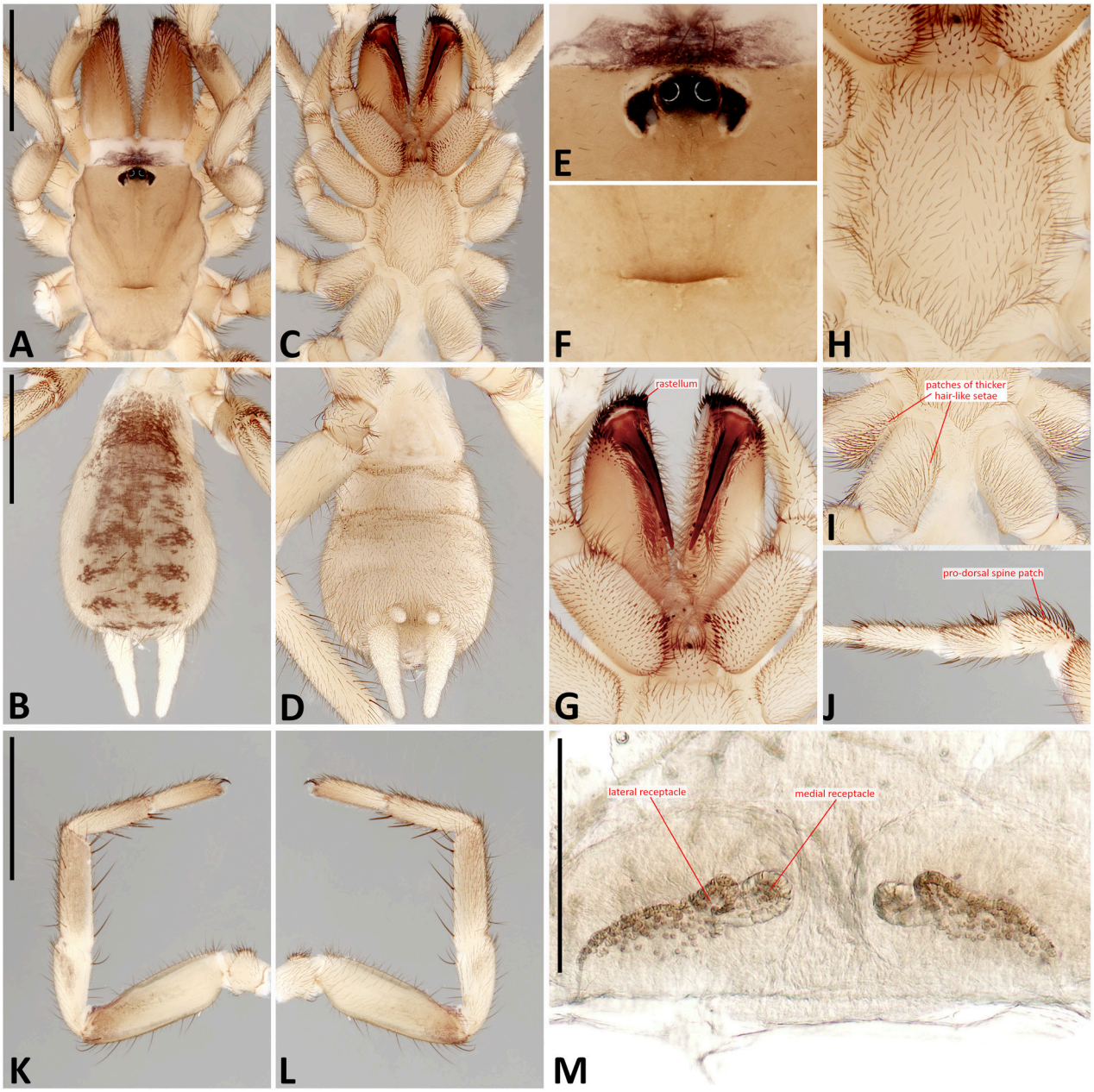

Figure 2. *Kwonkan fluctellus* sp. nov., holotype female (WAM T34222): **A**, cephalothorax, dorsal view; **B**, abdomen, dorsal view; **C**, cephalothorax, ventral view; **D**, abdomen, ventral view; **E**, ocular region, dorsal view; **F**, fovea, dorsal view; **G**, mouthparts, ventral view; **H**, sternum, ventral view; **I**, coxae III, IV, ventral view; **J**, left leg III (image flipped to match right leg, for consistency), prolateral view; **K**, left leg I, prolateral view; **L**, left leg I, retrolateral view; **M**, spermathecae, dorsal view. Scale bars = 2 mm (A, B, K), 0.25 mm (M).

length 0.29, posterior sigilla length/sternum length 0.09; all sigilla small, round and sublateral (Fig. 2H).

Legs (Fig. 2J–L). Leg I pale tan, slightly darker on distal femur, femur length 2.09, patella length 1.32, tibia length 1.55, metatarsus length 1.18, tarsus length 0.93, total length 7.08, leg I length/carapace length 2.29; scopulae on distal metatarsus and tarsus; spine count Fe D 0, Fe PL 1, Pa PL 1, Ti PL 4 (bristle-like), Ti RL 3, Me PL 3, Me RL 3, Ta 0; tibia length/width [TIL/TID] 3.31 (Fig. 2K, L). Leg III with many dorsal spines, patella with pro-dorsal patch of about 6 spines (Fig. 2J).

Genitalia (Fig. 2D, M). Epigastric furrow unmodified; spermathecae with two vesicles each (Fig. 2M); lateral vesicle relatively straight and angled strongly anteromedially, with narrow, relatively indistinct crowns, lateral vesicle length/genitalia width 0.19, base width/genitalia width 0.24, length/width at base 0.81, length/minimum stem width 4.10; medial vesicle globular and projecting medially from ventral face of lateral vesicle, medial vesicle length/genitalia width 0.17, medial vesicle length/lateral vesicle length 0.87.

Distribution

Kwonkan fluctellus sp. nov. is known only from the type locality south of Walcott Inlet, in the Northern Kimberley bioregion (Fig. 1A). Nothing is known about the microhabitat preferences of this species.

Remarks

Kwonkan fluctellus sp. nov. has been previously assigned the WAM code 'MYG897'. Nothing is known about the burrow constructed by this species. The patches of thicker, hair-like setae on the posterior half of the ventral faces of coxae III and IV in this species (Fig. 2I) are probably homologous to the thorn-like setae that diagnose Barbara York Main's concept of *Yilgarnia* Main, 1986. Based on the presence of these setae patches, this species probably falls within or close to the '*Yilgarnia*' clade of *Kwonkan* (see Harvey et al., 2018).

Etymology

The specific epithet *fluctellus* is derived from the Latin *fluctus*, meaning "flow" or "wave", referencing the unusual undulating carapace of this species, combined with the Latin diminuitive suffix *-ellus*, referencing its small size.

Kwonkan nemoralis sp. nov.

Figures 1A–C, 3

https://zoobank.org/NomenclaturalActs/2C2B0C66-A499-46D8-A47C-07DC46129E6E

Holotype

AUSTRALIA: Western Australia: ♀, Charnley River-Artesian Range Wildlife Sanctuary, Salvodi Gorge, 16°29'17"S 125°17'58"E, 24 July 2022, J.D. Wilson & M.S. Harvey (WAM T158507).

Paratype

AUSTRALIA: Western Australia: 1 juvenile, same data as holotype (WAM T158506).

Diagnosis

Kwonkan nemoralis sp. nov. can be distinguished from all other species of *Kwonkan* except *K. currycomboides* and *K. linnaei* by the presence of patches of spine-like setae on the posterior half of the ventral face of coxae III and IV (Fig. 3C, I). Of these two species, females are only known from *K. currycomboides*, and females of *K. nemoralis* sp. nov. can be distinguished from this species by the presence of spermathecae with lateral vesicles with wide, flattened crowns (Fig. 3M).

Description: *holotype female (WAM T158507)*

General (Fig. 3A–M). Body length 17.02, in good condition.

Dorsal prosoma (Fig. 3A, E, F). Carapace length 7.00, width 6.34, length/width 1.10, caput width/carapace width 0.79, carapace pale tan-orange, glabrous with few inconspicuous setae, fovea procurved, fovea width/carapace length 0.21 (Fig. 3A, F); chelicerae red-brown, rastellum of many thorn-like setae on distinct mounds (Fig. 3G); eye group rectangular, width/length 2.55, eye tubercle present but inconspicuous (Fig. 3E).

Abdomen (Fig. 3B, D). Abdomen length 6.68, light brown, with relatively inconspicuous mottled chevrons on the postero-dorsal section and with a consistent covering of short setae.

Ventral prosoma (Fig. 3C, G–I). Labial cuspules absent but with two spine-like setae (Fig. 3H); maxillary heel distinct, many cuspules present (over 100), extending posteriorly onto heel and blending laterally into short, thorn-like setae that reach the lateral end of the maxillae (Fig. 3G); coxae III and IV with patches of spine-like setae on posterior half of ventral face, small thorn-like setae present on prolateral face of all coxae (Fig. 3C, I); sternum length/width 1.01, covered with a mix of longer and shorter hair-like setae (Fig. 3H); posterior sigilla elongate, central sternum to posterior sigilla length/sternum length 0.18, posterior sigilla length/sternum length 0.24; other sigilla small, round and sublateral (Fig. 3H).

Legs (Fig. 3J–L). Leg I pale tan-orange, darker on tarsus and distal metatarsus, femur length 5.47, patella length 3.44, tibia length 3.88, metatarsus length 3.24, tarsus length 1.93, total length 17.97, leg I length/carapace length 2.57; scopulae on distal metatarsus and tarsus; spine count Fe D 0, Fe PL 1, Pa PL 2, Ti PL 3, Ti RL 4, Me PL 2, Me RL 8, Ta 0; tibia length/width [TIL/TID] 3.16 (Fig. 3K, L). Leg III with many dorsal spines, patella with prodorsal patch of about 15 spines (Fig. 3J).

Genitalia (Fig. 3D, M). Epigastric furrow unmodified (Fig. 3D); spermathecae with two vesicles each (Fig. 3M); lateral vesicle relatively straight and angled antero-medially, with a heavily sclerotised, wide and relatively flat crown, lateral vesicle length/genitalia width 0.20, base width/genitalia width 0.14, length/width at base 1.42, length/minimum stem width 2.79; medial vesicle small, globular and projecting medially from base of lateral vesicle, medial vesicle length/genitalia width 0.07, medial vesicle length/lateral vesicle length 0.37.

Distribution

Kwonkan nemoralis sp. nov. is only known from the type locality in Salvodi Gorge, in the Northern Kimberley bioregion (Fig. 1A). The habitat is open woodland with monsoon rainforest/vine thicket patches in areas sheltered by the gorge walls. The burrows of the collected specimens were found in sand on the edge of a dry creek (Fig. 1B).

Remarks

Kwonkan nemoralis sp. nov. has been previously assigned the WAM code 'MYG787'. The specimens were collected from silk-lined burrows with a collapsible silk

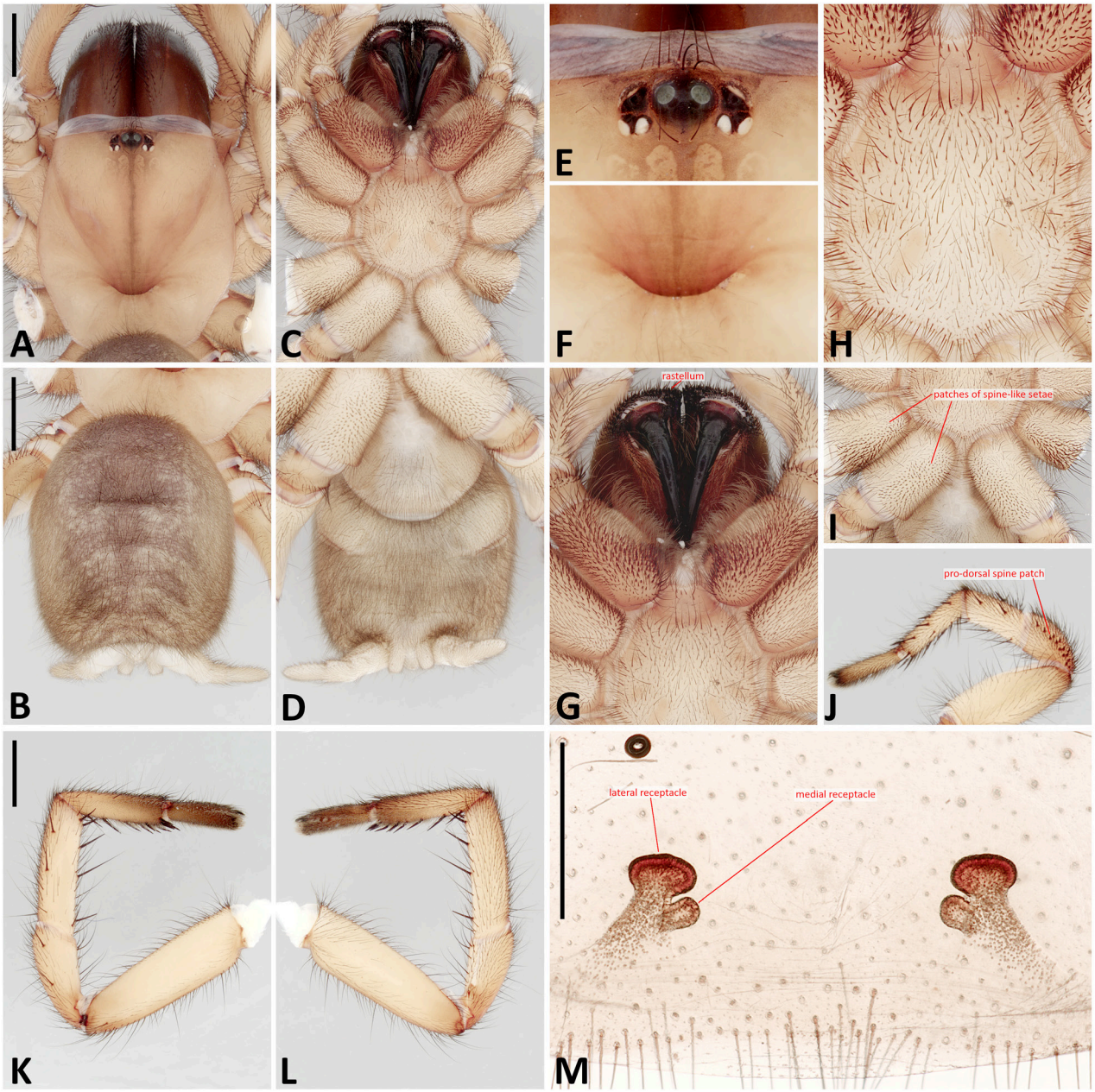

Figure 3. *Kwonkan nemoralis* sp. nov., holotype female (WAM T158507): **A**, cephalothorax, dorsal view; **B**, abdomen, dorsal view; **C**, cephalothorax, ventral view; **D**, abdomen, ventral view; **E**, ocular region, dorsal view; **F**, fovea, dorsal view; **G**, mouthparts, ventral view; **H**, sternum, ventral view; **I**, coxae III, IV, ventral view; **J**, right leg III, prolateral view; **K**, left leg I, prolateral view; **L**, left leg I, retrolateral view; **M**, spermathecae, dorsal view. Scale bars = 2 mm (A, B, K), 0.5 mm (M).

collar at the entrance, which had sand embedded in it (Fig. 1B). The excavated burrows each had several blind side chambers branching off the main burrow shaft. This species fits Barbara York Main's concept of *Yilgarnia* (distinguished by the presence of spine patches on the posterior half of the ventral face of coxae III and IV), a genus that is currently a junior synonym of *Kwonkan*.

Etymology

The specific epithet *nemoralis* is derived from the Latin noun *nemus*, meaning "grove" or "woodland," and translates to "of a grove". It refers to the type locality of the species in the sheltered rainforest/vine thickets and woodland of Salvodi Gorge, which stands in contrast to the savannah outside the gorge.

Disclosures

Mark S. Harvey is the Editor-in-Chief of this journal, and Michael G. Rix is a subject editor.

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Hill Proprietary Company Limited (BHP) and Earthwatch Australia to document Australian flora and fauna. The 2022 Wilinggin–West Kimberley Bush Blitz expedition led to the collection of all known specimens of *Kwonkan nemoralis* sp. nov. This study was supported financially by a Bush Blitz 2024 Taxonomy Research Project (DNP-BCK-2324-030-F) to the authors, and further by an ABRS National Taxonomy Postdoctoral Fellowship (4-H3KOG-BR) on the Anamidae.

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