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Two new species of the goblin spider genus *Cavisternum* from tropical Australia (Araneae: Oonopidae)

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ABSTRACT

Two new species of the Australian endemic goblin spider genus *Cavisternum* are described from the Wongalara Wildlife Sanctuary located in the Northern Territory, Australia. *Cavisternum gillespieae* was found in a gully dominated by rainforest vegetation, and *C. leichhardti* occurred in open woodland environments □ *tropical, goblin spider, new species*.

The goblin spider genus *Cavisternum* Baehr, Harvey and Smith, 2010 was recently described for 19 species of small spiders found throughout tropical northern Australia including three species from Western Australia, four species from the Northern Territory and 12 species from Queensland (Baehr *et al.* 2010). Since then, three additional species from Queensland and Northern Territory have been collected and described (Baehr & Harvey 2010; Baehr *et al.* 2013). Males of this genus are unique amongst goblin spiders by the presence of a sternal depression which is covered with clavate setae, and the elongate fangs with a broadened tip (Baehr *et al.* 2010). Many species have small distributions, and most are only known from one or two locations. The only exceptions to this are *C. clavatum* Baehr, Harvey and Smith, 2010 from the Pilbara region of Western Australia, and *C. ewani* Baehr, Harvey and Smith, 2010 from drier regions of eastern Queensland where it mostly occurs west of the Great Dividing Range.

The purpose of this paper is to describe two new species recently collected from the Northern Territory, bringing the total number of named species of *Cavisternum* to 24, and the number of species recorded from the Northern Territory to seven.

MATERIAL AND METHODS

The specimens examined for this study are lodged in the Museum and Art Gallery of the Northern Territory, Darwin (MAGNT), the Queensland Museum, Brisbane (QM), and the Western Australian Museum, Perth, Australia (WAM). The specimens were examined using a Leica MZ16A microscope. Photomicrographic images were produced using a Leica DFC 500 and the software program AutoMontage Pro Version 5.2 (p). Specimens prepared for scanning electron microscopy were dehydrated in 100% ethanol; sputter coated, and imaged with a Hitachi TM-1000 table top SEM, or a

Zeiss Evo LS15 SEM incorporating a Robinson backscatter detector.

Descriptions were generated with the aid of the Planetary Biodiversity Inventory (PBI) descriptive goblin spider database and shortened where possible. Drawings are done from left palp. Characters and measurements are explained in Figs. 2 and 3. All measurements are in millimeters. Abbreviations are used in the text as follows: ALE, anterior lateral eyes; PLE, posterior lateral eyes; PME, posterior median eyes. Full colour, high-resolution versions of the images will be available on the goblin spider PBI website, at <http://research.amnh.org/oonopidae>.

SYSTEMATICS

Family Oonopidae Simon, 1890

Subfamily Oonopinae Simon, 1890

Cavisternum Baehr, Harvey & Smith, 2010

Cavisternum Baehr, Harvey and Smith, 2010: 4 (type species by original designation *Cavisternum clavatum* Baehr, Harvey & Smith, 2010).

Cavisternum gillespieae, sp. nov.

(Figs. 1 A–J, 2 A–F)

Etymology. This species is named for Kate Gillespie in recognition of her outstanding skills in organising Bush Blitz expeditions and for her enthusiastic collecting of litter-dwelling arachnids at Wongalara.

Material examined. Holotype ♂: **AUSTRALIA: Northern Territory:** Wongalara Wildlife Sanctuary, 14°16'03"S, 134°37'38"E, 3 June 2012, from leaf litter, rainforest gully, M.S. Harvey, K. Gillespie (MAGNT, PBI_OON 00023654). Paratypes: **AUSTRALIA: Northern Territory:** allotype ♀, collected with holotype (MAGNT, PBI_OON 00023655); 1 ♂, 2 ♀, collected with holotype (WAM T125972, PBI_OON 00023656).

Diagnosis. Males of *Cavisternum gillespieae* most closely resemble *C. mayorum* Baehr, Harvey and Smith, 2010 in having a strongly protruding epigastric region (Fig. 1E) and the setal field of the sternum covering $\frac{3}{4}$ or more of the sternum (Fig. 1B). However, the palp of *C. gillespieae* (Fig. 1 H–J) lacks the long, elongate embolus of *C. mayorum*. Females differ from *C. mayorum*

by copulatory duct short not reaching beyond tracheal groove (Fig. 2 F).

Description. *Male (holotype)* (Fig. 1 A–J). Total length 0.96. Prosoma, mouthparts, abdominal scutae and palpal patella pale orange, legs pale yellow; pars cephalica slightly elevated in lateral view, with rounded posterolateral corners, surface smooth, lateral margin rebordered, without denticles. Eyes six, well developed, ALE: 0.045; PME: 0.047; PLE: 0.040, PME largest, ALE circular, PME oval, PLE circular; posterior eye row recurved; ALE separated by their radius to diameter, ALE–PLE touching, PME touching for less than half their length, PLE–PME touching. Sternum longer than wide, median concavity present, occupying most of the sternum length, without radial furrows between coxae I–II, II–III, III–IV, surface smooth, lateral margin with infra-coxal grooves and anterior pores, distance between coxae approximately equal, with oval field of clavate setae, covering about $\frac{3}{4}$ of sternum. Chelicerae straight, anterior face unmodified, without teeth on both promargin and retromargin, fang flattened directed posteriorly, laterally with broadened tip. Labium triangular, fused to sternum, anterior margin indented at middle. Endites distally not excavated, serrula present in single row, anteromedian tip with one strong, tooth-like projection. *Abdomen:* ovoid, without long posterior extension, rounded posteriorly. Book lung covers small, elliptical. Posterior spiracles connected by groove. Pedicel tube short, ribbed, scuto-pedicel region unmodified, scutum not extending far dorsal of pedicel. Dorsal scutum weakly sclerotized, covering full length of abdomen, no soft tissue visible from above, surface smooth. Epigastric scutum weakly sclerotized, surrounding pedicel, strongly protruding. Postepigastric scutum weakly sclerotized, long, semicircular, covering nearly full length of abdominal length, fused to epigastric scutum, with short posteriorly directed lateral apodemes. Spinneret scutum with fringe of stout setae. Colulus represented only by setae. *Genitalia:* Epigastric region with sperm pore small, oval, situated in front of anterior spiracles, rebordered. Palp normal size, not strongly sclerotized, trochanter normal size, unmodified;

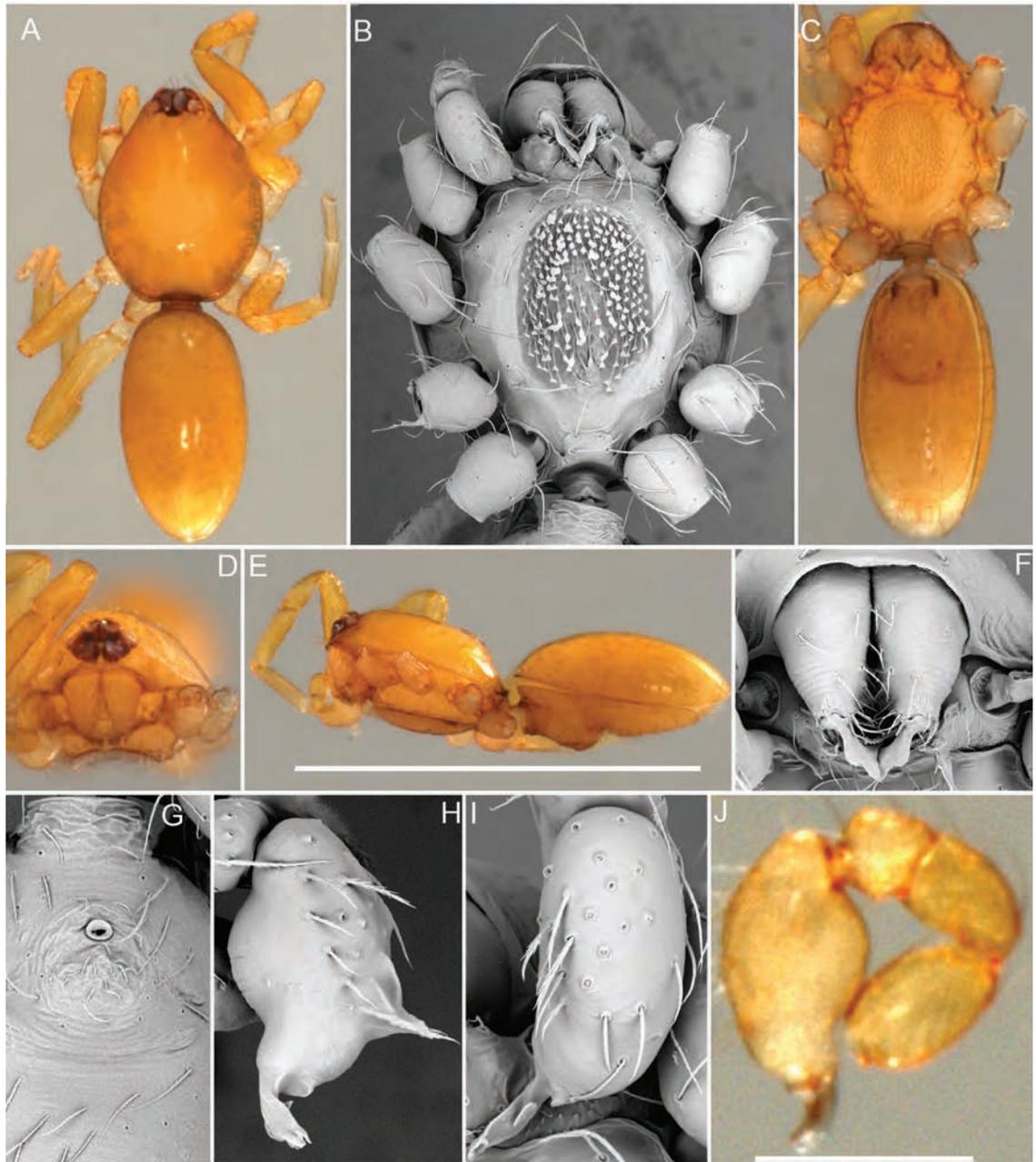


FIG. 1. *Cavisternum gillespieae* sp. nov., male (holotype, PBL_OON 00023654 photographs; SEM): **A**, habitus, dorsal view; **B**, prosoma, ventral view; **C**, habitus, ventral view; **D**, prosoma, anterior view; **E**, habitus, lateral view; **F**, mouthparts, anterior view; **G**, genital region, ventral view; **H**, male palp, prolateral view; **I**, same, dorsal view; **J**, same, retrolateral view.

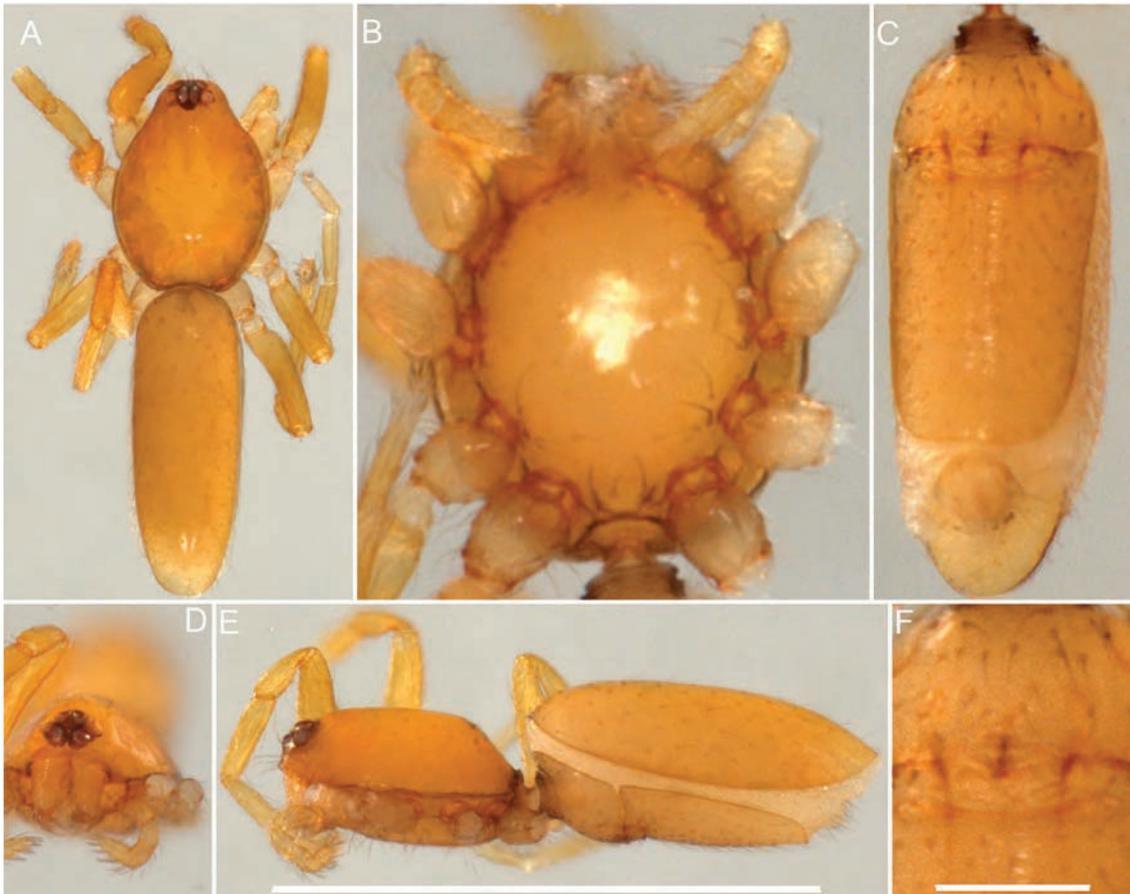


FIG. 2. *Cavisternum gillespieae* sp. nov., female (allotype PBI_OON 00023655): A, habitus, dorsal view; B, prosoma, ventral view; C, abdomen, ventral view; D, prosoma, anterior view; E, habitus, lateral view; F, female epigyne, ventral view. Scale bars = 1.0 mm (Fig. 4E), 0.1 mm (Fig. 4F).

femur normal size, two or more times as long as trochanter, without posteriorly rounded lateral dilation, attaching to patella basally; patella shorter than femur; cymbium, ovoid in dorsal view, fused with bulb but with clearly defined seam between, not extending beyond distal tip of bulb, covered with plumose setae; bulb pear-shaped, bearing a long thin medially bent, embolus with retrolateral tooth-like projection.

Female (allotype) (Fig. 2 A - F). Total length 1.10. As in male except as noted. Eyes ALE: 0.043; PME: 0.039; PLE: 0.032, ALE largest. Sternum median concavity absent. Mouthparts: fangs directed medially, tip unmodified. Endites anteromedian tip unmodified. Female palp claws

absent; spines absent. **Abdomen:** cylindrical. Epigastric scutum not protruding. Postepigastric scutum not fused to epigastric scutum. **Genitalia:** Ventral view: epigastric area widely oval, with dark circular copulatory opening at level close to anterior spiracles. Narrow copulatory duct originating from copulatory opening ending at epigastric fold, not reaching beyond tracheal groove.

Remarks. *Cavisternum gillespieae* was collected from leaf litter in an east-facing gully dominated by rainforest vegetation on Wongalara Wildlife Sanctuary.

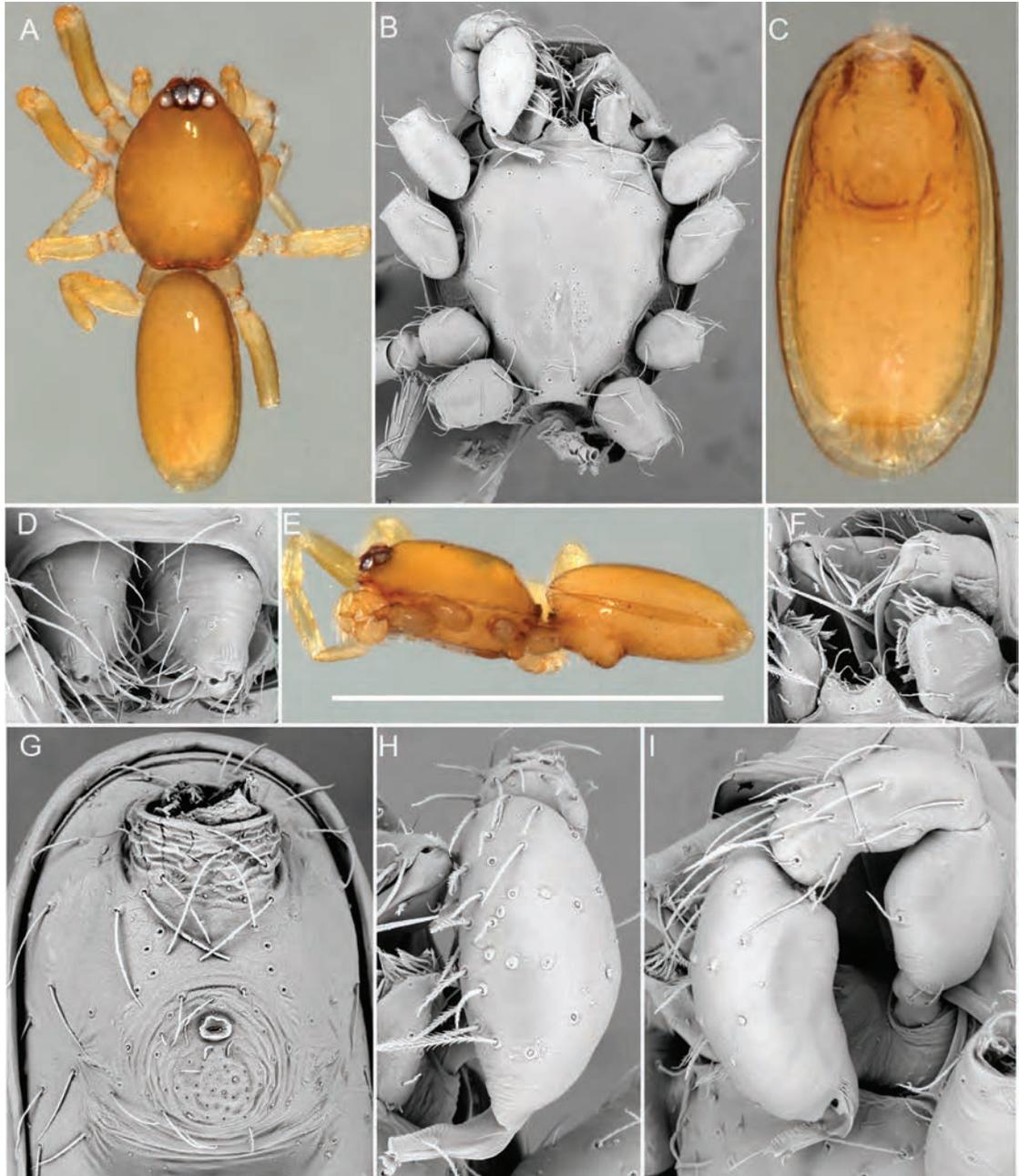


FIG. 3. *Cavisternum leichhardti* sp. nov., male (holotype, PBL_OON 00023702 photographs; PBL_OON 00023704SEM): **A**, habitus, dorsal view; **B**, prosoma, ventral view; **C**, opisthosoma, ventral view; **D**, mouthparts, anterior view; **E**, habitus, lateral view; **F**, mouthparts, ventral view; **G**, abdomen genital region, ventral view; **H**, male palp, dorsal view; **I**, same, retrolateral view.



FIG. 4. *Cavisternum leichhardti* sp. nov., female (allotype PBI_OON 00023703): **A**, habitus, dorsal view; **B**, prosoma, anterior view; **C**, prosoma, posterior view; **D**, abdomen, ventral view; **E**, habitus, lateral view; **F**, female epigyne, ventral view; **G**, female epigyne, dorsal view. Scale bars = 1.0 mm (Fig. 2E), 0.1 mm (Fig. 2F).

Cavisternum leichhardti, sp. nov.
(Figs. 3 A-I, 4 A-G)

Etymology. This species is named for Prussian explorer and naturalist Friedrich Wilhelm Ludwig Leichhardt (1813–ca.1848), who explored parts of northern Australia before his disappearance while attempting to travel from Brisbane to the Swan River Colony.

Material examined. Holotype ♂: **AUSTRALIA: Northern Territory:** Wongalara Wildlife Sanctuary, 14°08'18"S, 134°09'39"E, 211 m, 1–6 June 2012, wet pitfall traps, M. Harvey, R. Raven, B. Baehr (MAGNT, PBI_OON 00023702). Paratypes: allotype ♀: **AUSTRALIA: Northern Territory:** collected with holotype (MAGNT, PBI_OON 00023703); 3 ♂, collected with holotype (MAGNT, PBI 23704); 1 ♂, collected with holotype (QMS95158, PBI_OON 00023705); 1 ♂, collected with holotype (WAM T121155, PBI_OON 00023706).

Diagnosis. Males of *Cavisternum leichhardti* most closely resemble *C. maxmoormanni* Baehr, Harvey and Smith, 2010 in having a strongly protruding epigastric region (Fig. 3E) and the setal field of the sternum covering about $\frac{1}{4}$ of the sternum (Fig. 3B). The fangs of *C. leichhardti* are much longer than those of *C. maxmoormanni* reaching beyond the labium (Fig. 3E) and the long thin medially bent embolus has a prolaterally serrated margin (Fig. 3H, I). Females resemble those of *C. heywoodi* in having the epigastric area large U-shaped field reaching beyond tracheal groove but differs by and narrower U-shaped field not reaching the lateral apodemes.

Description. Male (holotype) (Fig. 3 A, I). Total length 1.02. Prosoma, mouthparts, abdominal scutae and palpal patella pale orange, legs pale yellow; pars cephalica slightly elevated in lateral view, with rounded posterolateral corners, surface smooth; lateral margin rebordered, without denticles. Eyes six, well developed, ALE: 0.056; PME: 0.066; PLE: 0.048, PME largest, ALE circular, PME oval, PLE circular; posterior eye row recurved from above; ALE separated by less than their radius, ALE-PLE separated by less than ALE radius, PME touching throughout most of their length, PLE-PME touching. Sternum longer than wide, median concavity a small concave pit with oval field of clavate setae in posterior half of sternum, without radial furrows between coxae I-II, II-III, III-IV, surface smooth, lateral margin with infra-coxal grooves and anterior pores. Chelicerae straight, without teeth on both promargin and retromargin, anterior face unmodified, fang laterally flattened with widened tip. Labium rectangular, fused to sternum, anterior margin indented at middle, with 5 setae on anterior margin. Endites distally not excavated, serrula present in single row, anteromedian tip with stout projection. **Abdomen** ovoid, without long posterior extension, rounded posteriorly. Book lung covers large, ovoid. Posterior spiracles connected by groove. Pedicel tube short, ribbed, scuto-pedicel region unmodified, scutum not extending far dorsal of pedicel. Dorsal scutum weakly sclerotized, covering full length of abdomen, no soft tissue visible from

above, not fused to epigastric scutum, surface smooth. Epigastric scutum weakly sclerotized, surrounding pedicel, strongly protruding. Post-epigastric scutum weakly sclerotized, long, almost rectangular, covering nearly full length of abdominal length, fused to epigastric scutum, with short posteriorly directed lateral apodemes. Spinneret scutum present, incomplete ring. **Legs** patella plus tibia I shorter than carapace. **Genitalia:** Epigastric region with sperm pore small, narrow, slit-like, situated in front of anterior spiracles, rebordered. Palpal trochanter normal size, unmodified; femur enlarged, two or more times as long as trochanter, attaching to patella basally; patella shorter than femur, not enlarged, cymbium completely fused with bulb, no seam visible, bulb pear-shaped, bearing a long thin medially bent, embolus with prolaterally serrated margin.

Female (allotype) (Fig. 4 A - G). Total length 1.15. As in male except as noted. Eyes ALE: 0.056; PME: 0.048; PLE: 0.043, ALE largest. Sternum median concavity absent. Mouthparts fangs directed medially, tip unmodified. Endites anteromedian tip unmodified. Female palp claws absent. **Genitalia:** Ventral view: epigastric area widely oval, with dark T-shaped copulatory opening at level close to anterior spiracles; broad copulatory duct originating from copulatory opening reaching behind at epigastric fold like a broadly U-shaped tongue.

Remarks. This species has only been collected at an open woodland site situated at Wongalara Wildlife Sanctuary.

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