



A new species of the spiny trapdoor spider genus *Blakistonia* (Mygalomorphae: Idiopidae) from Kangaroo Island, South Australia

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Abstract

The first species of the Australian spiny trapdoor spider genus *Blakistonia* Hogg, 1902 to be recorded from Kangaroo Island, South Australia, is described from both males and females, bringing the number of described species of *Blakistonia* to 21. *Blakistonia rooinsula* sp. nov. has been recorded from coastal habitats and nearby locations, across a number of sites on Kangaroo Island.

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<https://zoobank.org/References/2f7f9afe-443e-4e7d-a528-9b6da7f07301>

Introduction

The genus *Blakistonia* Hogg, 1902 is a member of the spiny trapdoor spider family Idiopidae Simon, 1889. *Blakistonia* is endemic to Australia, where it is distributed across the southern half of the country; the centre of diversity for the group being in southern South Australia (Rix et al. 2017a,c; Harrison et al. 2018), but with

a range that includes large areas of the arid and semi-arid zones. *Blakistonia* was phylogenetically defined and formally delimited by Rix et al. (2017c) and subsequently revised by Harrison et al. (2018), the latter study elucidating the distribution, biology and diversity of the genus, and expanding the number of described species from one to 20. *Moggridgea rainbowi* (Pulleine, 1919) from the family Migidae Simon, 1889, also occurs on

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Kangaroo Island, and was attributed to *Blakistonia* by Main 1985, however Harrison et al. (2016) unequivocally demonstrated the species to be in the genus *Moggridgea* Simon, 1889.

Blakistonia are small to large idiopids, typically light brown, tan or golden-brown in coloration and often with a chevron pattern on the dorsal abdomen. Individuals build silk-lined burrows with a hinged lid made of soil and silk. The structure of the lid typically shows variation between species and is usually plug-like in form (for images and descriptions of *Blakistonia* burrows, see Harrison et al. 2018, fig. 2). Species are found in a wide range of habitats, from semi-arid woodlands and arid desert areas, to higher rainfall locations in the Mount Lofty and Grampians Ranges. Two of the described species, *B. aurea* Hogg, 1902 and *B. birksi* Harrison, Rix, Harvey & Austin, 2018, are relatively widespread, occurring in multiple states. However, the remaining species are known from more restricted distributions, with most described species of *Blakistonia* recorded from only single collecting localities, or known from only a single specimen (Harrison et al. 2018). For some species these apparently restricted distributions and paucity of specimens likely reflect a lack of collecting effort, especially in remote or hard to access areas. However, one species, *B. bassi* Harrison, Rix, Harvey & Austin, 2018, is almost certainly a short-range endemic in the Mount Lofty Ranges east of Adelaide (Harrison et al. 2018). Short-range endemism (Harvey 2002) in the genus is therefore not unexpected, and indeed, research has shown that Australian mygalomorph spiders contain a high proportion of short-range endemic species (e.g. Rix et al. 2018; Wilson et al. 2019). Given their small distributional ranges, specific habitat requirements and low dispersal abilities, short-range endemic taxa are particularly vulnerable to threatening processes and are of conservation concern (Rix et al. 2017b).

Kangaroo Island is situated approximately 14 km off the south coast of South Australia and around 112 km from Adelaide (Gillam and Urban 2014). It is Australia's third largest island, with an area of around 4,500 km². About a third of the island, or 126,743 ha is conservation estate, as national parks, conservation parks or wilderness protection areas (South Australian Government, Department for Environment and Water 2022). Much of this protected land is situated in the western end of the island, and the central and eastern regions have been extensively cleared of woody vegetation (Robinson and Armstrong 1999). The island has a Mediterranean-type climate, being hot and dry in the summer months (December to February) and milder and wetter in the winter months (June to August).

In this paper we describe a new species of *Blakistonia*, *B. rooinsula* sp. nov., based on males and females, bringing the total number of described species in the genus to 21. The species is only known from Kangaroo Island, South Australia.

Methods

Descriptions of external morphological features and imaging methods follow recent taxonomic treatments of *Blakistonia* by Harrison et al. (2018) and of Idiopidae by Rix et al. (2017c). Specimens examined in this study are lodged in the South Australian Museum, Adelaide (SAMA). Due to the conservation risk posed by the illegal collection of Australian mygalomorph spiders for the hobbyist market and pet trade (see Lassaline et al. 2023; Marshall et al. 2022; Rix et al. 2023), we here refrain from providing precise locality coordinates for each specimen. Specimens examined were fixed and preserved in either 70% or 100% ethanol. Prior to examination, dissected female genitalia was prepared by submersion in lactic acid overnight at room temperature. Morphological examination of specimens was conducted using a Zeiss Stemi 305 stereomicroscope and a Nikon SMZ18 stereomicroscope. Auto-montaged images were taken using a Leica MZ16A microscope and Leica DFC 500 camera with AutoMontage Pro Version 5.2, or with a Canon 7D digital camera, with a K2 lens and P2 attachment, using CamLift, Lightroom, Zerene Stacker and GNU Image Manipulation Program (GIMP 2.10.20, revision 1). Measurements are given in millimeters and were taken digitally using AutoMontage Pro Version 5.2, or LC micro software, downloaded from the Olympus website. Measurements, the notation of macrosetae and paired claw dentition follow Harrison et al. (2018). Specimens were collected under a Permit to Undertake Scientific Research, number U2673-3.

Abbreviations used throughout this text are as follows: RTA, retrolateral tibial apophysis; ALE, anterior lateral eyes; AME, anterior median eyes; PLE, posterior lateral eyes; PME, posterior median eyes; p, prolateral; r, retrolateral; v, ventral; pv, proventral; rv, retroventral.

Taxonomy

Blakistonia rooinsula Marsh, Harrison, Wilson & Rix, sp. nov.

Figures 1–5

<https://zoobank.org/NomenclaturalActs/9b5577b2-9574-4c57-b180-ab8dad846bfa>

Type Material

Holotype male.

AUSTRALIA: *South Australia*: Ironstone Hill walking trail, Baudin Conservation Park, Dudley Peninsula, Kangaroo Island, 35°43'S, 137°57'E, dug from burrow in bank of small creek line with permanent water, 15 May 2019, coll. J. Marsh (SAMA NN30625).

Paratype female.

AUSTRALIA: *South Australia*: Same data as holotype, except 35°43'S, 137°57'E, 4 April 2019 (SAMA NN30626).

Other Material

AUSTRALIA: *South Australia*: Kangaroo Island: ♂, same data as holotype, except 35°43'S, 137°57'E and 4 April 2019 (SAMA NN30627); ♂, Simpson Road, Dudley West, 35°49'S, 137°49'E, under rock in open *Eucalyptus cneorifolia* mallee woodland, 3 July 2018, coll. J. Marsh (SAMA NN30628); ♂, Seal Bay Road, Seddon, 35°58'S, 137°19'E, under rock in old limestone quarry, 28 June 2018, coll. D.A. Young (SAMA NN30629).

Diagnosis

Males of *Blakistonina rooinsula* sp. nov. can be distinguished from those of *B. aurea*, *B. bella* Harrison, Rix, Harvey & Austin, 2018, *B. emmottorum* Harrison, Rix, Harvey & Austin, 2018, *B. gemmelli* Harrison, Rix, Harvey & Austin, 2018, *B. mainae* Harrison, Rix, Harvey & Austin, 2018, *B. pidax* Harrison, Rix, Harvey & Austin, 2018, and *B. tunstilli* Harrison, Rix, Harvey & Austin, 2018 by the absence of paired clasping spurs on tibia I (Fig. 1h–j; cf. Harrison et al. 2018, figs 5g–i, 8g–i, 12g–i, 13g–i, 16b, c, 23g–i, 27g–i); from *B. carnarvon* Harrison, Rix, Harvey & Austin, 2018, *B. olea* Harrison, Rix, Harvey & Austin, 2018, *B. parva* Harrison, Rix, Harvey & Austin, 2018, *B. raveni* Harrison, Rix, Harvey & Austin, 2018 and *B. tariae* Harrison, Rix, Harvey & Austin, 2018 by the presence of one, not two macrosetae (Fig. 1h–j; cf. Harrison et al. 2018, figs 11g–i, 21g–i, 22g–i, 25g–i, 26g–i); and from *B. birksi* and *B. plata* Harrison, Rix, Harvey & Austin, 2018 by the square eye group (Fig. 1d; cf. Harrison et al. 2018, figs 9d, 24d). They can further be distinguished from *B. maryae* Harrison, Rix, Harvey & Austin, 2018 and *B. newtoni* Harrison, Rix, Harvey & Austin, 2018 by the field of spinules on the palpal tibia being broad and not in a rounded crescent-shape (Fig. 2a–c; cf. Harrison et al. 2018, figs 17j–l, 19j–l); and from *B. hortonii* Harrison, Rix, Harvey & Austin, 2018 by the shorter RTA and sparser spinules on the RTA and palpal tibia (Fig. 2a, b; cf. Harrison et al. 2018, fig. 14j–l).

Females can be distinguished from those of *B. aurea* by the distinct chevron markings on the abdomen (Fig. 3b; cf. Harrison et al. 2018, fig. 6a, c); from *B. bassi* and *B. mainae* by the absence of fine gold setae on the carapace and from *B. mainae* by the absence of dark brown on the book lungs (Fig. 3a, b; cf. Harrison et al. 2018, figs 7a, c, 15b, c); from *B. birksi* by the abdominal chevrons being dark golden-brown, with the abdomen golden-brown between chevrons, as opposed to chevrons that are dark brown to almost black, with abdomen dark brown between chevrons (Fig. 3g; cf. Harrison et al. 2018, fig. 10a, c), and by the number of maxillary cuspules, with 11 and 15 in *B. birksi*, but ca. 50 in *B. rooinsula* sp. nov. (Fig. 3e; cf. Harrison et al. 2018, fig. 10f). Females can be differentiated from *B. maryae* by the

presence of cuspules on the labium (Fig. 3e; cf. Harrison et al. 2018, fig. 18f); and from *B. wingellina* Harrison, Rix, Harvey & Austin, 2018 and *B. nullarborensis* Harrison, Rix, Harvey & Austin, 2018 by the square eye group (Fig. 3d; cf. Harrison et al. 2018, figs 20d, 28d).

Description (male holotype)

Total length 8.6.

Color in ethanol: Carapace grey-brown, with darker lines radiating out from the fovea (Fig. 1a, c). Sternum pale cream, maxillae and labium slightly darker than sternum, chelicerae yellow-brown dorsally, ventrally pale orange-brown (Fig. 1a, c, f). Abdomen dorsally pale cream, with six indistinct dark purple-brown chevrons, ventrally uniform pale cream (Fig. 1b, g). Legs and pedipalps yellow-brown with distinct darker grey-brown longitudinal markings.

Cephalothorax: 3.6 long, 4.6 wide, 4.0 high. Fovea straight, with irregular patches of setae radiating out from fovea. With a row of longer setae extending between fovea and PME, longer and thicker toward eyes; fringe of thickened setae on lateral margins of carapace (Fig. 1a). Caput only slightly raised, ocular area on mound; clump of setae between PME, two long thick setae between AME and two smaller, thinner setae on clypeus (Fig. 1c, d). Eye group: 0.9 long, 1.0 wide, 0.2 of cephalothorax width; ALE-ALE/PLE-PLE ratio 1:1.2; square; anterior eye group strongly procurved, posterior eye group slightly recurved, AME slightly smaller than ALE and separated by about half diameter of AME, PLE about half ALE and separated from ALE by about twice PLE, PME about half PLE and separated from PLE by less than the diameter of PME, PME and PLE pale, oval (Fig. 1d). Labium with four cuspules, around 27 cuspules on each maxilla (Fig. 1e); sternum with sparse setae, longer and more dense at posterior margins; three pairs of sigilla anterior pair smallest and closest to lateral edge of sternum, posterior two pairs at increasing distances from edge (Fig. 1f).

Legs: Length ratio IV > I > II > III; leg I femur 4.5, patella 2.1, tibia 3.1, metatarsus 2.9, tarsus 2.2, total 14.8; leg II femur 4.2, patella 1.8, tibia 3.1, metatarsus 2.8, tarsus 2.3, total 14.2; leg III femur 3.2, patella 1.4, tibia 2.2, metatarsus 3.0, tarsus 1.9, total 11.7; leg IV femur 4.5, patella 1.8, tibia 4.1, metatarsus 4.0, tarsus 2.1, total 16.5. Setose and spinose; tarsi and distal metatarsi I & II scopulate (Figs 1i–j). Macrosetae: Leg I tibia prolateral macroseta on raised base, r3. Leg II tibia v3. Leg III patella r4 / 5. Remaining segments of leg III and IV setose and spinose with no clear demarcation between macrosetae and spine-like setae. Paired tarsal claws: leg I p8 (4 large, 4 small, basal 2 joined at base) r6 (3 small, 2 large 1 small), leg II p7 (5 large, 2 small) r5 (1 large, 4 small); p5 (2 large, 3 small) r7 (4 large, 3 small); p6 (1 large, 5 small) r7 (1 large, 6 small).

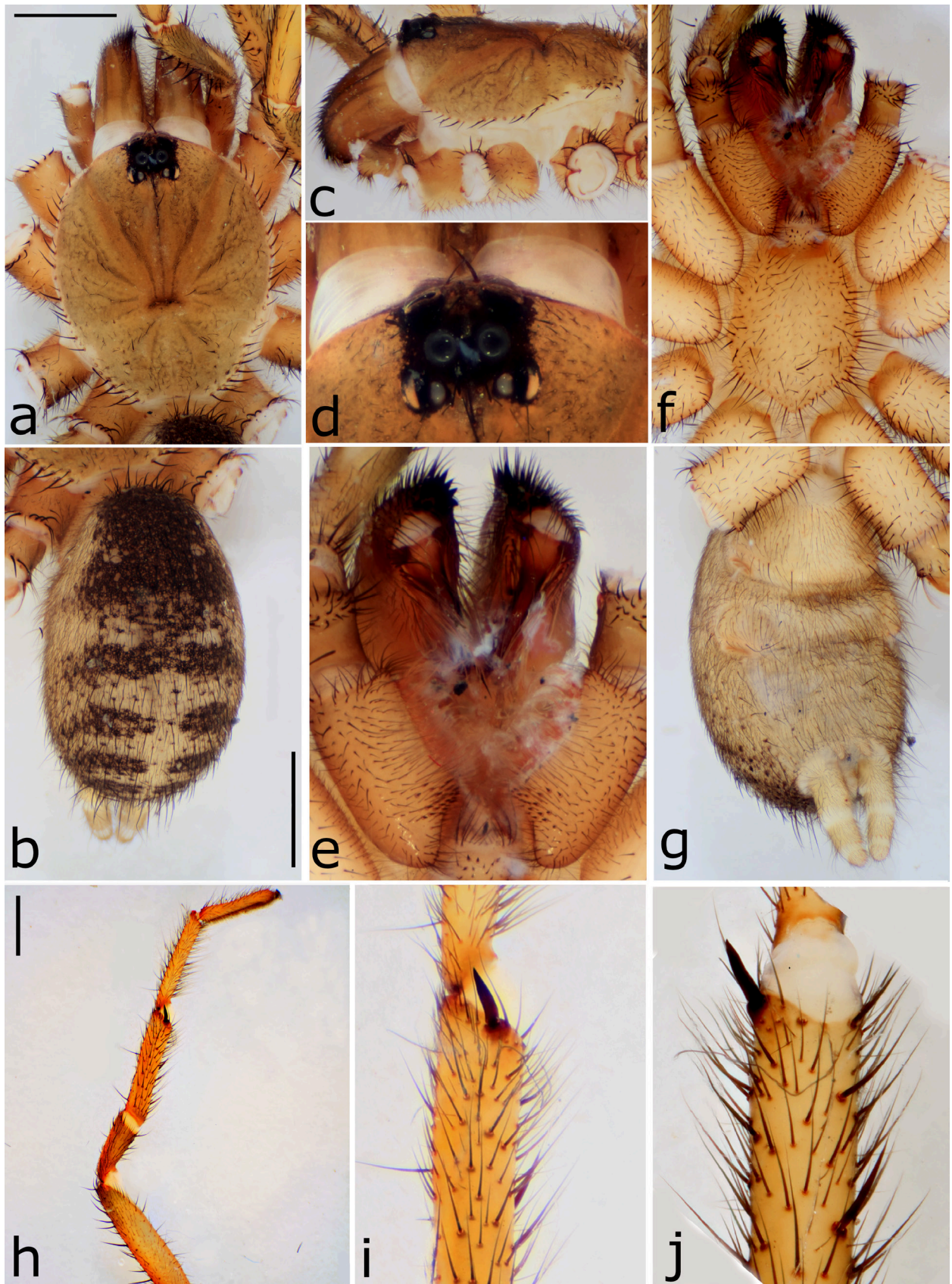


Figure 1a-j. *Blakistonina rooinsula* sp. nov., male holotype, Kangaroo Island, South Australia (SAMA NN30625): a, b, cephalothorax and abdomen, dorsal view; c, cephalothorax, lateral view; d, eyes, dorsal view; e, mouthparts; ventral view; f, g, cephalothorax and abdomen, ventral view; h, leg I, prolateral view; i, distal tibia I, prolateral view; j, distal tibia I, ventral view. Scale bar: a, b = 2 mm, h = 1 mm.



Figure 2a–c. *Blakistonia rooinsula* sp. nov., male holotype, Kangaroo Island, South Australia (SAMA NN30625): Left pedipalp; a, retrolateral view; b, ventral view; c, prolateral view. Scale bar = 1 mm.

Pedipalp: Femur 2.6, patella 1.2, tibia 2.2, tarsus 1.0. Femur with dorsal row of spines, with ventral spines distally; patella with thickened setae ventrally; tibia swollen, RTA very short, pointed, retrolateral side of RTA covered in spinules, extending circa a third of the distance between the base of RTA and distal tibia, prolateral and ventral edges glabrous, edged by a row of thickened, erect macrosetae, thick macrosetae distally on RTA, bulb globular, embolus broad, tapering and curved retrolaterally at the midpoint, twisted apically, cymbium with sparse spinules, becoming longer distally (Fig. 2a–c).

Abdomen: 5.0 long, 3.2 wide. Setose, oval, two pairs of unsclerotised dorsal sigilla (Fig. 1b, g).

Variation: (n=3) 24 / 21 cuspules on each maxilla; leg I tibia with prolateral macroseta on raised base, r1.

Description (female paratype)

Total length 12.8.

Color in ethanol: Carapace yellow-brown, with darker lines radiating from fovea, along chelicerae and longitudinally along legs (Fig. 3a, c). Sternum pale yellow-brown darker posteriorly, maxillae and labium darker golden-brown, chelicerae ventrally red-brown (Fig. 3e, f). Abdomen dorsally pale creamy-brown, with five indistinct dark-brown chevrons, ventrally uniform pale cream with faint dark brown markings on the medial edges of booklungs (Fig. 3b, g). Legs and pedipalps yellow-brown, with darker longitudinal markings along legs.

Cephalothorax: 5.4 long, 4.5 wide, 4.7 high. Oval in shape, cuticle smooth, fovea straight. With sparse, fine

setae diffusely on carapace, concentrated in weak rows extending out from the fovea; thicker setae in a row from midway between fovea and eye group to eye group. A fine, indistinct row of thin, short setae on lateral edges of carapace (Fig. 3a). Caput raised, ocular area flat (Fig. 3c). Thick, long setae clustered between PME and between AME, two medium length setae on clypeus (Fig. 3d). Eye group 1.0 long, 1.1 wide 0.2 of cephalothorax width. ALE-ALE / PLE-PLE ratio 1:1.2; square. Anterior eye group strongly procurved, posterior eye group slightly recurved. ALE separated by about their diameter, AME about half the size of ALE, and separated by about the diameter of AME, PLE and PME oval, PLE about half of ALE, PME about a quarter of ALE, PLE separated from PME by the diameter of PME, PLE and ALE separated by twice PLE (Fig. 3d). Labium with row of four cuspules, maxillae with ca. 50 (right) and ca. 55 (left) cuspules (Fig. 3e). Sternum setose, setae denser, thicker and longer anteriorly, three pairs of sclerotised sigilla, posterior pair larger, anterior pairs located at lateral edge of sternum (Fig. 3f).

Legs: length ratio: IV > I > III > II; leg I femur 2.7, patella 2.0, tibia 1.8, metatarsus 1.3, tarsus 1.2, total 9.0; leg II femur 3.0, patella 1.6, tibia 1.8, metatarsus 1.2, tarsus 1.2, total 8.8; leg III femur 2.7, patella 1.8, tibia 1.6, metatarsus 1.5, tarsus, 1.3, total 8.9; leg IV femur 3.7, patella 2.3, tibia 2.8, metatarsus 2.7, tarsus 1.6, total 13.1. Legs moderately setose and spinose. Scattered spines ventrally on tarsi and metatarsi I and II and a row of long spines retrolaterally on tibia I and II, with two distal spines prolaterally. No dorsal spines on legs I and II, but dense setae dorsally on tarsus and metatarsus I and II and row of thick, erect macrosetae on dorsal part of all leg segments (Fig. 3h, i). Leg III with dorsal spines on

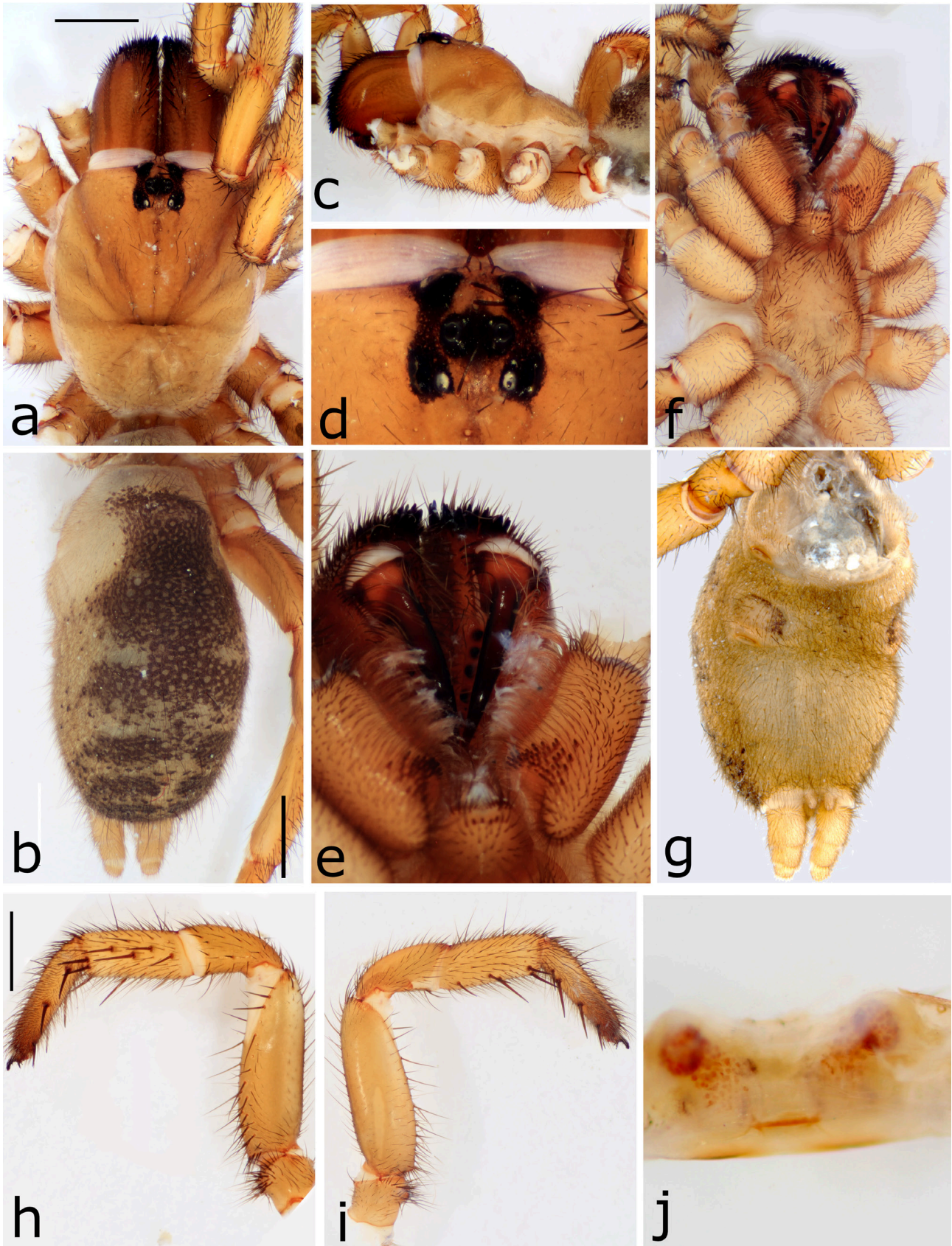


Figure 3a-j. *Blakistonina rooinsula* sp. nov., female paratype, Kangaroo Island, South Australia (SAMA NN30626): a, b cephalothorax and abdomen, dorsal view; c, cephalothorax, lateral view; d, eyes, dorsal view; e, mouthparts, ventral view; f, g, cephalothorax and abdomen, ventral view; h, pedipalp, prolateral view; i, retrolateral view; j, internal genitalia. Scale bar = 2 mm.

all segments minus the femur; tarsi and metatarsi I and II scopulate. Macrosetae: Leg I: patella r1; tibia p2, v1, r4; metatarsus p2, v1, r5; tarsus r3, v1. Leg II: patella 1; tibia p1, v1, r5; metatarsus p3, v1, r5; tarsus r3, v1. Leg



Figure 4. Known distribution records of *Blakistonia rooinsula* sp. nov. on Kangaroo Island, South Australia.

III: patella r2, cluster of spinules dorsally; tibia r2, cluster of spinules dorsally; metatarsus d6, v4; tarsus v8. Leg IV: femur dorsal group of dense spinules apically; patella dorsal group of dense spinules basally; tibia 2r; metatarsus r5, v2; tarsus v7; pedipalp: femur p1; patella p1; tibia p6, r5; tarsus p2, v1, r3. Paired claws: leg I p3 (2 large, 1 small) r1 (large), leg II 2p (1 large, 1 small) r2 (1 large, 1 small), leg III p2 (large), r2(large), leg IV p2 (large) r2 (large), pedipalp claw 5 (2 small individual plus a clump of 3 small on same base).

Abdomen: 7.4 long, 4.2 wide. Setose, oval, two pairs of dorsal sigilla (Figs 3b, g).

Genitalia: Spermathecae paired, simple, unbranched, stout and outward facing at roughly 45 degrees. Crown of spermathecae rounded, slightly wider than stalk and clearly demarcated. Spermathecae covered in mottled brown glandular nodules, more concentrated on spermathecae crowns (Fig. 3j).

Remarks

Blakistonia rooinsula sp. nov. is only known from Kangaroo Island, South Australia, where the known range extends from Baudin Conservation Park on eastern Kangaroo Island to Seal Bay in the mid-south of the island (Fig. 4). Mature males were collected from burrows in late autumn, and from beneath rocks in winter, suggest-

ing the males may disperse in search of females in winter. Specimens dug from burrows were coastal, in the banks of small creek lines (Fig. 5a, b). The burrow has a thickened wafer-like lid, which is round-oval in shape, dimensions of one burrow door measured 12 mm in width, 11 mm in height (Fig. 5c, d). This species is relatively widespread on Kangaroo Island, with a distance of about 80 km between the most easterly and most westerly known sites. However, the eastern population's coastal proximity and situation in creek banks makes it vulnerable to flooding and coastal erosion due to rising sea water, high tide events and climate change. The rhizomatous weed Bridal Creeper (*Asparagus asparagoides* (L.) Druce, 1914), a Weed of National Significance (Weeds Australia, 2011), was present across most of the sites in which the species was found. This ground matting plant produces large areas of dense corms, which impact trapdoor burrows (Marsh & Glatz, 2022). These dense corms persist in the soil after the plant has died and likely prevent construction of new burrows for an extended time period, although further research is needed.

Etymology

The specific epithet was chosen by the students of Ms Emma Bell's Year 8 / 9 class at Kangaroo Island Community Education, Kingscote campus. It is a noun in



Figure 5a–d. Habitat of *Blakistonina rooinsula* sp. nov. a, b, detail of habitat, Kangaroo Island; c Burrow door, photo by Bruno Buzatto; d, detail showing structure of the burrow door.

apposition created from a combination of ‘roo’ meaning kangaroo and *insula*, Latin for ‘island’, referring to the occurrence of the species on Kangaroo Island.

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