



A new species of pelican spider (Araneae: Archaeidae) from the Whitsunday hinterland of central-eastern Queensland



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Abstract

Pelican spiders of the genus *Austrarchaea* Forster & Platnick, 1984 (family Archaeidae) are well represented in the tropical rainforests of central-eastern and north-eastern Queensland, with nine species currently described. However, this monophyletic tropical fauna remains poorly documented relative to other lineages of Archaeidae from subtropical and temperate regions south of the St Lawrence Gap, with numerous additional species likely still unnamed. Here, we describe a new species from the Central Mackay Coast bioregion of central-eastern Queensland. Like other Australian Archaeidae, it is a short-range endemic taxon, known only from upland rainforest habitats in the Whitsunday hinterland near Airlie Beach. We show its clear morphological affinities to a closely related species from Eungella National Park, and further provide live habitus images and habitat information.

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<https://zoobank.org/References/36A94554-D7D1-40CD-B417-694C6A536955>

Introduction

Pelican spiders of the family Archaeidae are an iconic and morphologically bizarre group of araneomorph spiders, with a vicariant modern distribution in Australia, Madagascar and southern Africa, and a deep global evolutionary history dating back to at least the early Jurassic (Wood et al. 2013; Wood and Wunderlich 2023). Sometimes referred to as 'assassin spiders' (Rix and Harvey 2012c), they are specialised araneophagic predators

with a remarkable and highly modified carapace morphology and long, spear-like chelicerae – both likely morphological adaptations for capturing and safely manipulating their spider prey. Australian archaeid species are also extraordinary for the presence of a uniquely bifurcating spermophor and secondary embolus on the male pedipalp – the only known occurrence of a twin intromittent organ in spiders (Rix et al. 2021). In Australia, the 40 currently described species in the genera *Austrarchaea* Forster & Platnick, 1984 (29 species)

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and *Zephyrarchaea* Rix & Harvey, 2012 (11 species) are restricted to the mesic zones of eastern and southern mainland Australia, with all known species usually occurring in complex 'suspended leaf litter' microhabitats in rainforest, wet sclerophyll forest or temperate heathlands (Rix et al. 2022). As niche-conserved, short-range endemic species with highly disjunct distributions in mesic refugia, pelican spiders in Australia are increasingly being recognised for their conservation significance in fire-sensitive ecosystems and other habitats at risk from climate change or other forms of human disturbance (Hyman et al. 2020; Marsh et al. 2021; Rix et al. 2022; Churchill et al. 2023; Gynther et al. 2023; Marsh and Collis 2023).

The taxonomic documentation of Australian Archaeidae has benefitted from recent revisionary monographic treatments of the fauna, with four successive works (see Rix & Harvey 2011, 2012a, b; Rix et al. 2022) having resulted in an order of magnitude increase in the number of described species since 2010. This taxonomic research has revealed a particularly diverse fauna in the genus *Austrarchaea*, the latter distributed along the Great Dividing Range from Cooktown south to the Southern Highlands of New South Wales. Here, species of *Austrarchaea* are restricted to rainforests or other mesic forested habitats, mostly in disjunct upland or otherwise mountainous refugia, and these distributions of largely allopatric species are biogeographically consistent with a latitudinal series of mesic-forest 'islands' along the Great Dividing Range (Rix & Harvey 2012c; Rix et al. 2022; see also Bryant & Krosch 2016). South of the St Lawrence Gap – a major biogeographic barrier to the north of Kroombit Tops National Park (see Rix & Harvey 2012c) – 20 species of *Austrarchaea* have been described, including 11 species endemic to subtropical south-eastern Queensland and the Border Ranges of New South Wales (Rix et al. 2022). In contrast, the tropical fauna from the rainforests of central-eastern and north-eastern Queensland (north of the St Lawrence Gap) currently includes just nine described species, despite all evidence suggesting this region is a hotspot of *Austrarchaea* diversity (Rix et al. 2012b). Indeed, this monophyletic tropical archaeid fauna remains poorly documented relative to other lineages of Australian Archaeidae, with numerous additional species likely still unnamed. To breach this gap in understanding, additional male specimens, numerous molecular exemplars and an enormously challenging field work campaign throughout the Wet Tropics will be required over coming years.

In this study, we take a first step towards better documenting the archaeid diversity of tropical eastern Queensland, since the revisionary treatment by Rix and Harvey (2012b) was published over a decade ago. We describe a new species of *Austrarchaea* from the Central Mackay Coast bioregion of central-eastern Queensland, from specimens collected in the Whitsunday hinterland

near Airlie Beach. This work brings the number of described species of *Austrarchaea* to 30, the total number of described Archaeidae from tropical Queensland to 10, and the total Australian archaeid fauna to 41 species.

Methods

All specimens examined in this study are deposited at the Queensland Museum, Brisbane (QMB), and preserved in 75% ethanol. Digital images were taken at the Queensland Museum Collections and Research Centre (CRC) Hendra, using a Leica M165C stereo microscope with mounted Leica K5C digital camera. Automontage image stacking was performed using Leica Application Suite (LAS) X Industry Core software with Z-control. Other morphological and taxonomic methods, including the format of species descriptions, follow previous revisionary studies of Australian Archaeidae (see Rix & Harvey 2011, 2012a, b; Rix et al. 2022). The following abbreviations are used for descriptions: CH, carapace height; CL, carapace length; HPC, highest point of pars cephalica; HT, abdominal hump-like tubercles; TS1–3, tegular sclerites 1–3.

Taxonomy

Family ARCHAEIDAE Koch & Berendt, 1854

Genus *Austrarchaea* Forster & Platnick, 1984

Type species

Archaea nodosa Forster, 1956, by original designation.

Austrarchaea andersoni Rix, sp. nov. (Whitsunday Hinterland Pelican Spider)

Figures 1–8, 12–21

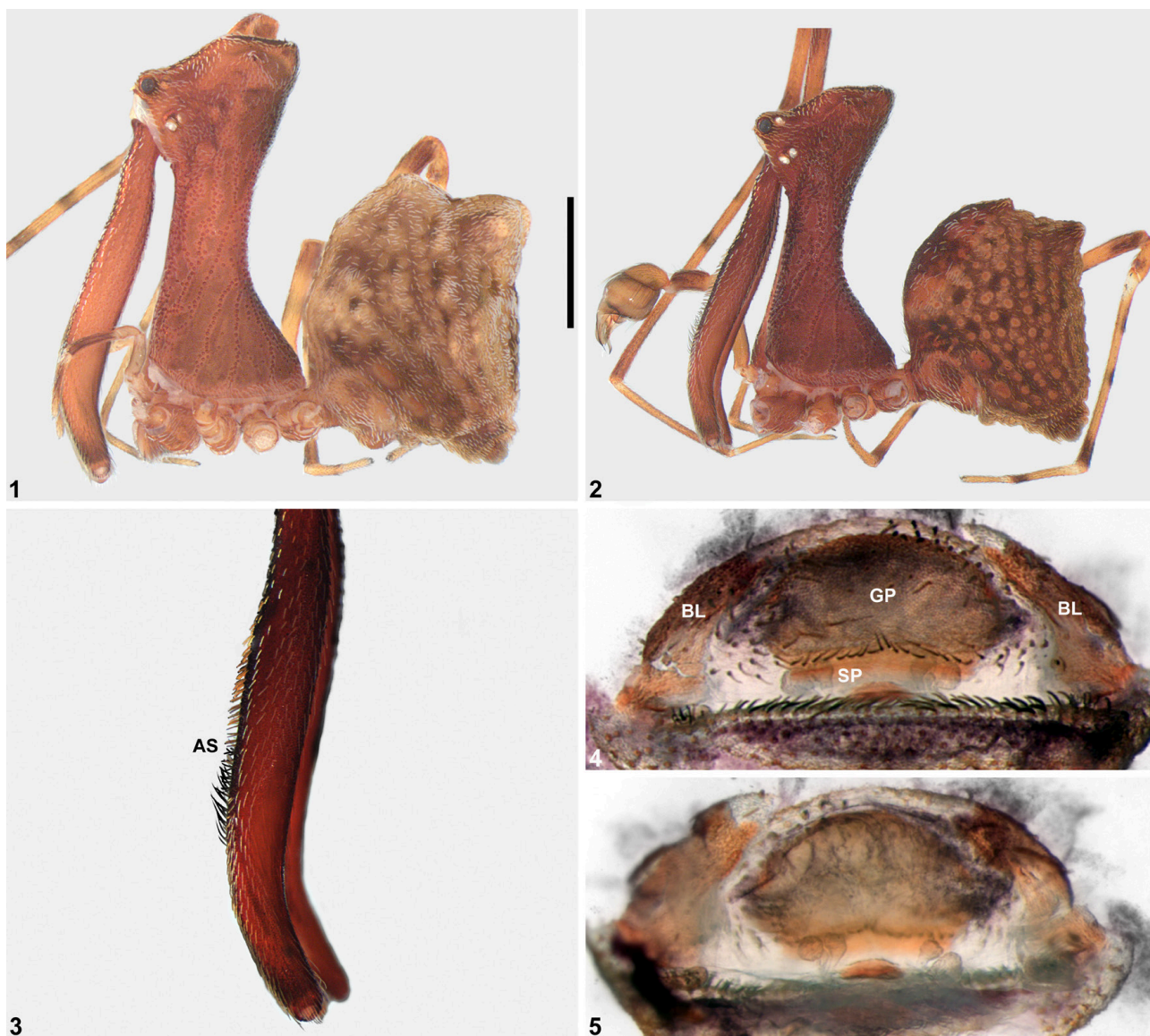
<https://zoobank.org/NomenclaturalActs/EEE56683-78AF-4722-9F16-7B06EDEAC3EF>

Holotype

AUSTRALIA: *Queensland*: ♂, Conway National Park, start (western end) of Whitsundays Great Walk, off Forestry Road (IBRA_CMC), 20°20'20"S, 148°41'26"E, 210 m, 28 March 2024, hand collected from suspended leaf litter, rainforest (notophyll vine forest), M.G. Rix & A.G. Rix (QMB S124036).

Paratypes

AUSTRALIA: *Queensland*: 1 ♂, same data as holotype (QMB S124038); 1 ♀, same data (QMB S124039); 1 juvenile, same data (QMB S124040); 1 juvenile, same data (QMB S124041); 1 ♀, same data except 20°20'21"S, 148°41'26"E, 4 August 2023, hand collected at night, G.J. Anderson (QMB S124037); 1 ♂, Conway National Park, northern end of Whitsundays Great Walk, near junction of Honeyeater Lookout track (IBRA_CMC), 20°17'11"S, 148°42'33"E, 333 m, 29 March 2024, hand collected from suspended leaf litter, rainforest (notophyll vine forest), M.G. Rix & A.G. Rix (QMB S124043); 1 juvenile, same data except 20°17'10"S, 148°42'32"E, 323 m (QMB S124042).



Figures 1–5. *Austrarchaea andersoni* Rix, sp. nov. from Conway National Park: 1, paratype female (QMB S124037) cephalothorax and abdomen, lateral view; 2, holotype male (QMB S124036) cephalothorax and abdomen, lateral view; 3, holotype male chelicerae and accessory setae, lateral view; 4, 5, paratype female (QMB S124039) internal genitalia, cleared (4, postero-ventral view; 5, antero-dorsal view). Abbreviations: AS, accessory setae; BL, book lung cover; GP, genital plate; SP, spermathecae. Scale bar = 1.0 mm (1, 2).

Diagnosis

Austrarchaea andersoni Rix, sp. nov. can be distinguished from all other species of Australian Archaeidae, except *A. griswoldi* Rix & Harvey, 2012, by its 'Type E' pedipalp morphology as defined by Rix and Harvey (2012b, figure 6), with a large bulb (width $\gg 0.30$) (Figures 6–8; see also Figures 2, 17), modified ventro-distal rim of the tegulum forming semi-transparent sub-rectangular opercular plate (Figures 6–8), and large, flattened tegular sclerite 3, the latter extending along the entire retrolateral edge of the conductor (Figure 6) (Rix and Harvey 2012b). This species is further similar to *A. griswoldi* in sharing a short comb of accessory setae on the male chelicerae (Figure 3), and having only two pairs of female spermathecae (Figures 4, 5). *Austrarchaea andersoni* Rix, sp. nov. can be distinguished from *A. griswoldi*

by the shape of the tegulum, which is more pronounced ventrally (Figures 6, 8; cf. Figures 9, 11); by the shape of tegular sclerite 3, which is smaller and more uniformly tapered (Figures 6, 8; cf. Figures 9, 11); and by the shape of the posterior 'head' region of the pars cephalica in both males and females, which is flatter and less inclined downwards in lateral view (Figures 1, 2; cf. Rix and Harvey 2012b, figure 15a, b).

Description - male holotype (QMB S124036)

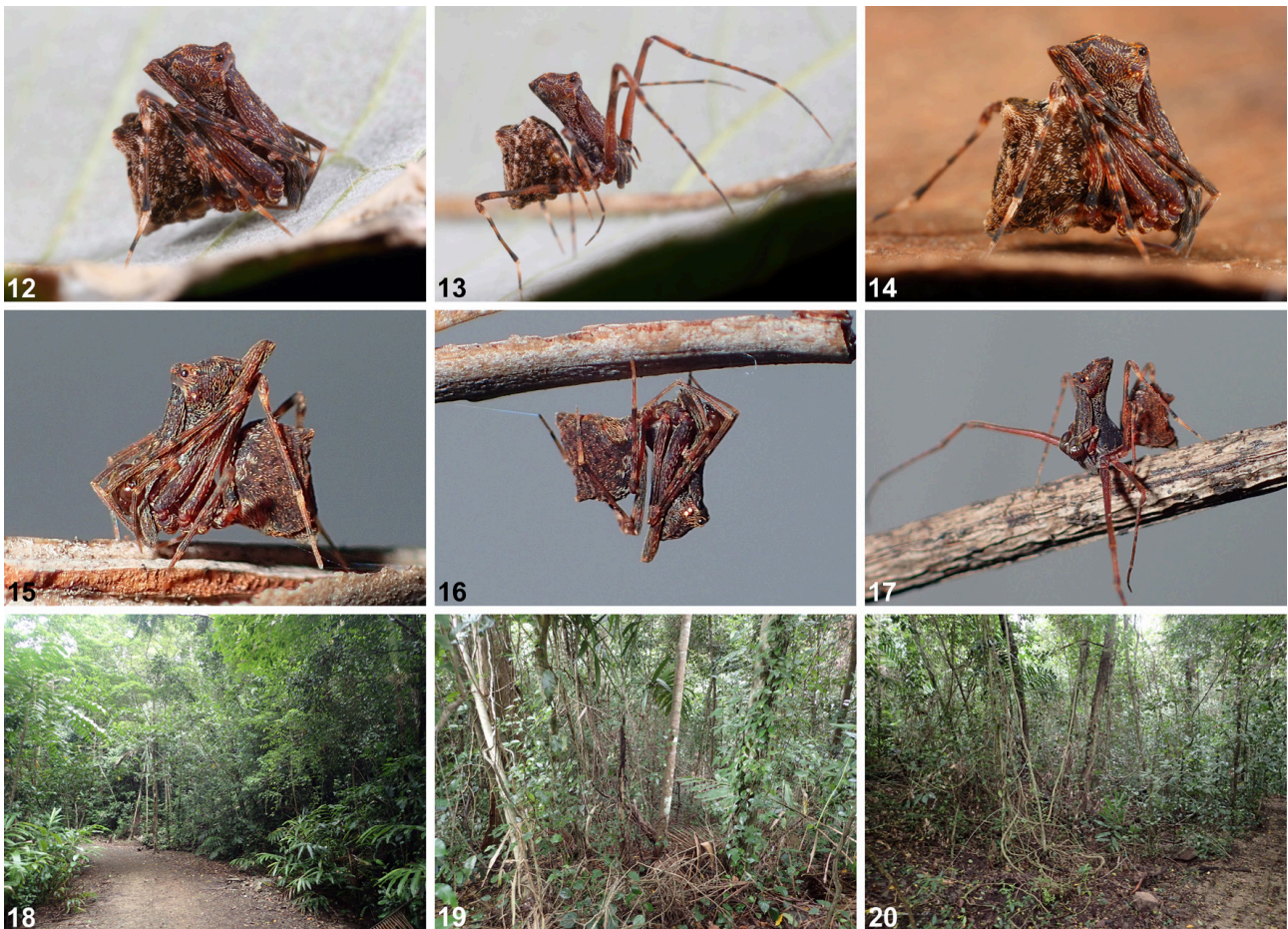
Total length 2.41. Cephalothorax (Figure 2) dark reddish-brown (in life, pars thoracica and 'neck' dark slate grey-brown and 'head' dark reddish-brown; Figures 15–17), covered with rows of reflective, short, white or bronze plumose setae; legs (Figure 2) dark tan-brown with darker annulations (in life, dark reddish-brown with darker



Figures 6–11. Male pedipalps of *Austrarchaea* species from the Central Mackay Coast bioregion: 6–8, *A. andersoni* Rix, sp. nov., holotype (QMB S124036) from Conway National Park (left to right = retrolateral, ventral and prolateral views); 9–11, *A. griswoldi* Rix & Harvey, 2012, holotype (QMB S92212) from Eungella National Park (left to right = retrolateral, ventral and prolateral views). Abbreviations: C, conductor; Cy, cymbium; E, primary embolus; E*, secondary embolus (equivalent to tegular sclerite 2a in Rix & Harvey 2012b; see also Rix et al. 2021); OP, opercular plate; sT, subtegulum; T, tegulum; 3, tegular sclerite 3. Scale bars = 0.25 mm (7, 10).

annulations; Figures 15–17); abdomen (Figure 2) mottled dark reddish-brown and beige-brown, with darker brown dorsal scute and sclerites (in life, variably dark reddish-brown with darker brown dorsal scute and sclerites; Figures 15–17), covered with reflective, short, white or orange-brown plumose setae. Carapace (Figure 2) tall (CH/CL ratio 2.29); 1.03 long, 2.36 high; ‘neck’ 0.46 wide; bearing two pairs of rudimentary horns; dual highest points of pars cephalica (HPC1, 2) near posterior third of ‘head’ (ratio of HPC1 to post-ocular length 0.65) and near posterior margin of ‘head’ (ratio of HPC2 to post-ocular length 0.85), carapace marginally concave between HPC1 and HPC2; ‘head’ moderately elevated postero-dorsally (post-ocular ratio 0.30). Chelicerae (Fig-

ure 3) with short comb of accessory setae on anterior face of paturon. Abdomen (Figure 2) 1.38 long, 1.75 high; with two pairs of dorsal hump-like tubercles (HT1–4); dorsal scute fused anteriorly to epigastric sclerites, extending posteriorly to first pair of hump-like tubercles; HT3, 4 each covered by separate dorsal sclerites. Unexpanded pedipalp (Figures 6–8) of ‘Type E’ morphology (see Rix and Harvey 2012b, figure 6), large in size (width of bulb >> 0.30), with retrolaterally directed, arched conductor; ventro-distal rim of tegulum distally extended to form sub-rectangular opercular plate; primary embolus distally directed, curved, without spur, projecting only slightly beyond distal rim of conductor; tegular sclerite 3 (TS3) large, flattened, uniformly taper-



Figures 12–20. Live habitus and habitat images of *Austrarchaea andersoni* Rix, sp. nov.: 12–14, paratype female (QMB S124037) from Conway National Park; 15, 16, holotype male (QMB S124036) from Conway National Park; 17, paratype male (QMB S124043) from Conway National Park; 18–20, rainforest habitat at the type locality, start of Whitsundays Great Walk, Conway National Park. Images 12–14 by G. Anderson (used with permission); 15–20 by M. Rix.

ing distally and extending along entire retrolateral edge of conductor; secondary embolus (equivalent to TS2/2a in Rix and Harvey 2012b) mostly obscured by opercular plate, projecting beyond distal rim of conductor to just past tip of embolus; TS1 deeply embedded in bulb, obscured by opercular plate, not visible in ventral view.

Description – female paratype (QMB S124037)

Total length 3.00. Cephalothorax (Figure 1) reddish-brown (in life, dark reddish-brown; Figures 12–14), covered with rows of reflective, short, white or orange-brown plumose setae; legs (Figure 1) dark tan-brown with darker annulations (in life, dark reddish-brown with darker annulations; Figures 12–14); abdomen (Figure 1) mottled brown and beige (in life, variably dark reddish-brown; Figures 12–14), covered with reflective, short, white or orange-brown plumose setae. Carapace (Figure 1) tall (CH/CL ratio 2.26); 1.24 long, 2.80 high; ‘neck’ 0.60 wide; bearing two pairs of rudimentary horns; highest point of pars cephalica (HPC) near middle of ‘head’ (ratio of HPC to post-ocular length 0.57), carapace sloping only slightly downwards posterior to HPC; ‘head’ moderately elevated posterodorsally (post-ocular ratio 0.34). Chelicerae without

accessory setae on anterior face of paturon. Abdomen 1.77 long, 2.14 high; with four pairs of dorsal hump-like tubercles (HT1–4). Internal genitalia (of QMB S124039; Figures 4, 5) with pair of pyriform spermathecae on either side of gonopore, each pair widely separated along midline of genital plate.

Distribution and habitat

Austrarchaea andersoni Rix, sp. nov. is a short-range endemic species known only from upland rainforest (notophyll vine forest) in the Conway National Park, in the Whitsunday subregion of Queensland's Central Mackay Coast (CMC) bioregion near Airlie Beach (Figures 18–21). It is currently known from two sites in the north-western sector of the park, but is likely more widespread in suitable habitat. Limited survey effort in lowland habitats in the Whitsunday hinterland indicates it may be absent from semi-evergreen vine thickets at altitudes under 200 m. An indeterminate female specimen (QMB S49380) collected in 1992 from the summit of nearby Mount Dryander (Dryander National Park) likely also belongs to this species (Figure 21).

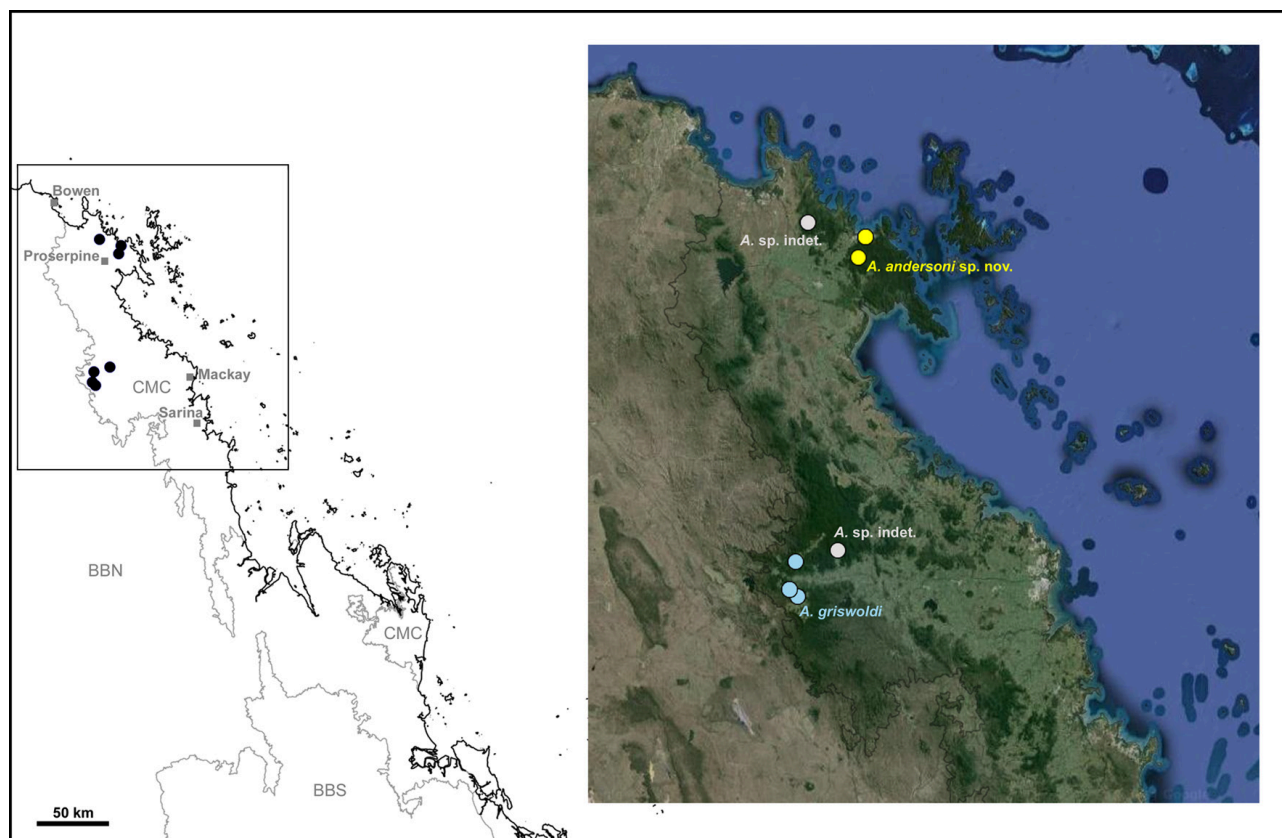


Figure 21. Map of the Central Mackay Coast bioregion, showing known records of Archaeidae (left), and the distributions of *A. andersoni* Rix, sp. nov. and *A. griswoldi* Rix & Harvey, 2012 (right). Interim Biogeographic Regionalisation for Australia (IBRA) Version 7 bioregional abbreviations are as follows: CMC, Central Mackay Coast; BBN, Brigalow Belt North; BBS, Brigalow Belt South. Base maps created using the Atlas of Living Australia website (<https://www.ala.org.au/>), reproduced here under a Creative Commons Attribution 3.0 Australia Licence.

Etymology

This species is named in honour of Dr Greg Anderson, Honorary Research Fellow at Queensland Museum, for his substantial contributions to arachnology, and for first collecting this species at Conway National Park in 2023.

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