



Australian Entomological Society

AES Conservation Committee Species Nomination

Taxonomy

[List scientific name, author, date, synonymies; higher classification (Order: Family); and common name (provide one if not available)]

Scientific name: *Zephyrarchaea austini* Rix & Harvey, 2012 (Araneae: Archaeidae)

Synonymy: N.A.

Common name: Kangaroo Island Assassin Spider

Description

[Provide a brief description, giving diagnostic features for identification; how it is distinguished from similar species; and an image of species]



Holotype female *Zephyrarchaea austini* in lateral view (legs removed). Scale bar = 1.0 mm. Image by M. Rix, used with permission.

Archaeidae are small, haplogyne araneomorph spiders with the carapace distinctively elevated anteriorly and the chelicerae greatly elongated. They are among the most distinctive spiders morphologically, and cannot be confused with any other taxa.

Currently only the female of *Zephyrarchaea austini* is known. The following description of the holotype is derived from Rix & Harvey (2012):

Total length 2.77; leg I femur 1.80; F1/CL ratio 1.80. Cephalothorax pale reddish-brown; legs tan brown with darker annulations; abdomen mottled grey-brown and beige. Carapace short (CH/CL ratio 1.58); 1.00 long, 1.58 high, 0.92 wide; 'neck' 0.55 wide; highest point of pars cephalica (HPC) near posterior third of 'head' (ratio of HPC to post-ocular length 0.67), carapace with pronounced concave depression anterior to HPC; 'head' not strongly elevated dorsally (post-ocular ratio 0.23). Chelicerae without accessory setae on anterior face of paturon. Abdomen 1.49 long, 1.13 wide; almost spherical in lateral profile, without dorsal hump-like tubercles. Internal genitalia with cluster of ≤ 15 sausage-shaped spermathecae fanning out either side of gonopore, clusters widely separated along midline of genital plate.

Similar species: *Zephyrarchaea austini* is the only member of the family Archaeidae known from South Australia. It can be distinguished from other species in the genus by the absence of dorsal tubercles on the abdomen, by its small size and shorter carapace, and by the shape of the post-ocular depression, which is strongly concave in lateral view (Rix & Harvey, 2012).

Distribution

[Provide an overview of the species' known or estimated current and past distribution; IBRA region; land tenure, especially for sites protected within the reserve system; and spatial map]

IBRA region: KAN (Kanmantoo)

Distribution: *Zephyrarchaea austini* is known from only a single population in the Western River Wilderness Protection Area, Western River, Kangaroo Island, South Australia, near Billy Goat Falls (35°41'44"S, 136°54'37"E).



Satellite image showing the single known collection locality of *Z. austini*. Figure by M. Rix, used with permission.

Land tenure: Wilderness Protection Area (i.e. conservation estate).

Biology

[Summarise what is known about the life history, seasonality and life cycle]

Little is known of the biology of *Z. austini*, however a mature female was collected in May. Species of *Zephyrarchaea* (like all Archaeidae) are obligate predators of other small spiders, which they catch with highly modified chelicerae and venom which is extremely fast-acting. What little we do know about their life history indicates that the spiders are long-lived for araneomorphs (likely several years), with very low fecundity, and a breeding period that extends from late autumn to spring.

Ecology

[List any ecological interactions (e.g. food plants, hosts, predators)]

Although little is known of the ecology of *Z. austini*, other closely related species of *Zephyrarchaea* from temperate sub-coastal habitats are known to have a close association with understory vegetation, especially the ‘elevated’ leaf litter matrix that accumulates and stays suspended in low sedges, herbs and grasses; these complex, three-dimensional microhabitats provide the high humidity required by all archaeids, and are home to a complex assemblage of small invertebrates which are similarly neither ground-dwelling nor arboreal. In these habitats, all Australian archaeids are highly susceptible to fire, and populations are now restricted to rainforests, wet sclerophyll forests and mesic temperate heathlands.

Critical habitat

[Summarise breeding habitat or ecological community]

Zephyrarchaea austini was found in ‘elevated’ leaf litter suspended amongst low lying vegetation near a riparian creek line, in a habitat consisting of open eucalypt woodland, with a complex heathland understory of *Xanthorrhoea* and low shrubs (Rix & Harvey, 2012).



Habitat of *Z. austini* at the type locality. Image by M. Rix, used with permission.

Key threatening processes

[If known, list evidence of decline; past, current and potential future threats and their impact]

Evidence of decline: Unknown.

Past threats: Unknown.

Current threats: Like all Australian Archaeidae, *Zephyrarchaea austini* is a short range endemic taxon, making it highly vulnerable to extinction by processes that threaten its habitat. Fire is a key threatening process, and in the 2020 fires on Kangaroo Island the entirety of its known range was burnt. The impact on the species is not currently known, however given that the species is entirely dependent on suspended leaf litter in mesic microhabitats, and is unable to burrow underground during unfavourable summer conditions, it is at an extremely high fire risk. The species is similarly low dispersive and cannot disperse via ballooning (aerial dispersal). This means it is unlikely to be able to escape fire, and its potential for recolonization from unburnt refugia is severely restricted.

Potential future threats: Future fires are a major threat to any remaining *Z. austini* populations, especially to surviving populations that may have survived the 2020 fires in unburnt refugia. Other potential threats include those that affect the health or persistence of the heathland understory, such as dieback caused by *Phytophthora cinnamomi*, overgrazing by herbivores, incursions by weeds and climate change.

Community engagement and conservation management

[Identify relevant stakeholders; and any management plans or recovery teams overseeing threat abatement/mitigation actions, either underway or proposed]

Community engagement: National Parks Rangers and on-ground work teams (DEW) / community groups/ local progress associations / school groups / Friends of Parks groups / private land holders.

Conservation management and actions: There are currently no formalized management plans for *Zephyrarchaea austini*, however suggested actions include: (1) conducting detailed field surveys of north-west Kangaroo Island to map the species' distribution and to determine the impacts of the 2020 fires on the known population and on any new populations discovered; (2) searching near the type locality for any additional populations, to assess the critical habitat for threatening processes and map the distribution of weeds/*Phytophthora* infections; and (3) conducting weeding as required.

Conservation status

[If known or evaluated, give the current listing and relevant conservation schedule or Act]

International (IUCN Red List): N.A.

National (EPBC): N.A.

State: N.A.

Proposed conservation status evaluation

[If recommendations are to be made for threatened status and listing provide justification based on IUCN Red List Criteria. For example, Criterion 2: geographic range is precarious for either extent of occurrence (EOO) and/or area of occupancy (AOO)]

We recommend that the taxon be listed nationally as **Endangered** according to IUCN Red List Criterion B2ab(iii). That is, the area of occupancy (AOO) is estimated to be less than 500 km², the geographic range is severely fragmented, and the extent and/or quality of its habitat continues to decline. These values are highly conservative, and would apply even if additional populations were discovered elsewhere in north-western Kangaroo Island.

EOO: Based on the current known distribution of *M. rainbowi*, the EOO is believed to be no greater than 4,400 km², the land area of Kangaroo Island.

AOO: *Zephyrarchaea austini* is only known from one location at Western River Wilderness Protection Area on the north-west of Kangaroo Island.

Scientific and/or social value

[e.g. relictual, phylogenetically distinct, keystone species, aesthetic, mediagenic, cultural, entomophagy, biophilia, economic, ecotourism]

Archaeidae are an ancient lineage of spiders, known from fossils of Mesozoic age (Rix & Harvey, 2011), and have a phylogenetic position near the base of the Infraorder Araneomorphae. The family has an evolutionary history that dates back to the Pangaeon supercontinent, and a highly restricted, relictual distribution across the southern hemisphere – one of the few spiders for which a Gondwanan vicariance hypothesis has been tested and supported using molecular phylogenetics (Wood et al., 2013). *Zephyrarchaea austini* is also an enigmatic, endemic Kangaroo Island species, and the only member of the family known to occur in South Australia. The combination of its phylogenetic significance, its distinct and charismatic appearance, interesting araneophagic ecology, and restricted distribution and make it both mediagenic and of high scientific and evolutionary value, as well as an iconic island species.

References

[Cite all relevant information]

Harvey, MS (2002) Short-range endemism amongst the Australian fauna: some examples from non-marine environments. *Invertebrate Systematics* **16**, 555-570.

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Rix, MG & Harvey, MS (2011). Australian Assassins, Part I: A review of the Assassin Spiders (Araneae, Archaeidae) of mid-eastern Australia. *ZooKeys* **123**: 1–100.

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Rix, MG & Harvey, MS (2012). Australian assassins, part II: A review of the new assassin spider genus *Zephyrarchaea* (Araneae, Archaeidae) from southern Australia. *ZooKeys* **191**: 1–62. [doi:10.3897/zookeys.191.3070](https://doi.org/10.3897/zookeys.191.3070)

Wood, HM, Matzke, NJ, Gillespie, RG & Griswold, CE (2013). Treating fossils as terminal taxa in divergence time estimation reveals ancient vicariance patterns in the palpimanoid spiders. *Systematic Biology* **62**: 264–284.

Nominator/s

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