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Systematics of the giant spiny trapdoor spiders of the genus *Gaius* Rainbow (Mygalomorphae: Idiopidae: Aganippini): documenting an iconic lineage of the Western Australian inland arid zone

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Abstract. The aganippine spiny trapdoor spiders of the genus *Gaius* Rainbow, 1914 are revised. Seven new species are described from Western Australia: *G. aurora* sp. nov., *G. austini* sp. nov., *G. cooperi* sp. nov., *G. hueyi* sp. nov., *G. humphreysi* sp. nov., *G. mainae* sp. nov. and *G. tealei* sp. nov. The type species, *G. villosus* Rainbow, 1914, is re-illustrated and re-diagnosed, and molecular data for six (of eight) species and six genes are analyzed with Bayesian methods. Species of *Gaius* are iconic denizens of the Western Australian inland arid zone, renowned for their large size and extreme longevity. We here document the known diversity and conservation status of these spiders, and summarize their unusual biology and phenology.

Keywords: Taxonomy, subfamily Arbanitinae, *Anidiops*

http://zoobank.org/?lsid=urn:lsid:zoobank.org:pub:96416C0A-7D1C-4C56-82FE-85A1E46528E1

The giant spiny trapdoor spiders of the Western Australian endemic genus *Gaius* Rainbow, 1914 (Figs. 1–10) are iconic denizens of the inland arid zone, renowned for their large size and extreme longevity. Indeed, excluding Theraphosidae, *G. villosus* Rainbow, 1914 is one of Australia's largest mygalomorph spiders; their ornate burrows (Figs. 6–9) can be found in remnant woodlands throughout much of inland Western Australia, and the very large males (Fig. 3) are often found wandering after summer thunderstorms. *Gaius villosus* is also among the best known of Australia's Idiopidae, thanks to a decades-long demographic study undertaken by Barbara Main in the central Wheatbelt bioregion (e.g., see Main 1978, 1987). Here, burrows were first tagged in 1974, and individual spiders followed thereafter over the course of their lifetimes. As a result of this work, unprecedented in its temporal perspective, we now know that *G. villosus* is one of the world's longest-lived spiders, with some females able to survive for over 40 years in the wild (Main 1978, 1987, unpubl. data). This ability of large individual 'matriarchs' to persist for long periods of time in highly ephemeral arid habitats, is a survival strategy utilized by a number of idiopid taxa, including species of *Idiosoma* Ausserer, 1871. Females breed only when and if conditions are suitable, and when adequate protein is available for the development of eggs. In doing so, they have managed to colonize some of the harshest landscapes in Western Australia, and *Gaius* is one of only four idiopid genera known to occur as far north as the Pilbara bioregion (the others being *Bungulla* Rix, Main, Raven & Harvey, 2017, *Euoplos* Rainbow, 1914 and *Idiosoma*) (see Rix et al. 2017d).

The genus *Gaius* has had a rather confusing taxonomic history, and for 60 years it was not even recognized as valid following its synonymy with *Anidiops* Pocock, 1897 by Main (1957), the latter itself now a synonym of *Idiosoma* (as per Rix et al. 2017d). This synonymy of the then monotypic *Gaius* with the similarly monotypic *Anidiops* was founded on the perceived significance of sclerotized abdominal sigilla, or in the case of *G. villosus* and *A. manstridgei* Pocock, 1897, their absence relative to *Aganippe* O. P.-Cambridge, 1877 (= *Idiosoma*) and *Idiosoma*. We now recognize that unsclerotized sigilla are symplesiomorphic for Arbanitinae, and therefore of no diagnostic or phylogenetic value in most taxa. Indeed, sclerotized sigilla likely evolved only once, in the common ancestor of *Idiosoma* and *Eucanippe* Rix, Main, Raven & Harvey, 2017 (Rix et al. 2017b), and were secondarily lost in the *manstridgei*-group (= *I. manstridgei* and its closest relatives). As a result, Rix et al. (2017d) revised the status of *Gaius* following detailed molecular phylogenetic analysis of the Australasian idiopid fauna (Rix et al. 2017b), and highlighted the affinities of the genus to *Eucyrtops* Pocock, 1897 and *Bungulla* (Fig. 10). By this time, it was also clear that *Gaius* was not just a monotypic branch of Aganippini, as a number of new species were known from collections, and preliminary molecular data similarly pointed to a multi-species lineage that was distributed north to at least the Pilbara (Castalanelli et al. 2014). Documenting this diversity is therefore the aim of our study, not least because the conservation of these large and iconic invertebrate predators (Rix et al. 2017b) is dependent on a robust taxonomy.

This paper is the fifth in a series of revisionary works to describe Western Australia's known species of *Gaius*, *Bungulla* (see Rix et al. 2017d, 2018b), *Cataxia* Rainbow, 1914 (see Rix et al. 2017a), *Eucanippe* (see Rix et al. 2018a), *Eucyrtops*, *Euoplos* and *Idiosoma* (see Rix et al. 2017d, in part). Seven new species of *Gaius* are here described, taking the total number of species in the genus to eight.

Figures 1–9.—Live habitus images and burrows of *Gaius* from Western Australia. 1–3, *G. villosus* Rainbow, 1914, live habitus images: 1, female (WAM T132736) from Minnivale Nature Reserve; 2, female (WAM T141124) from Vermin Proof Fence, NW. of Eurardy; 3, male from Wongan Hills. 4, Live habitus image of female *G. cooperi* sp. nov. (WAM T144017) from Westralia Conservation Park. 5, Live habitus image of female *G. austini* sp. nov. (WAM T116013) from Credo Station. 6–8, Burrows of *G. villosus*: 6, from Minnivale Nature Reserve; 7, from Bungulla Nature Reserve; 8, from Vermin Proof Fence, NW. of Eurardy, with Australian one dollar coin (diameter 25 mm) for scale. 9, Burrow of *G. cooperi* sp. nov. from Westralia Conservation Park, also with one dollar coin for scale; the twig-lines have been mostly burnt in a bushfire but remnants remain. Note the large, heavily-built and dark-colored somatic morphology of the spiders, and the radiating twig-lines characteristic of this genus. Images 1, 2, 4–6, 8, 9 by M. Harvey; 3 by M. Rix; 7 by D. Joliffe, used with permission.

METHODS

Morphological methods.—Morphological methods, including the format of species descriptions and imaging techniques, follow Rix et al. (2017d, 2018a, b), with measurements in millimeters and species presented in alphabetical order (following the type species). All species are distinguished and diagnosed according to a generalized species concept, whereby morphological and (where possible) molecular data are combined to provide the operational criteria for distinguishing "separately evolving metapopulation lineages" (de Queiroz 2007: 880). Most available male specimens of *Gaius* were illustrated for this study, either within the primary numbered plates or, for additional (non-holotype) specimens, as an 'Atlas' series of more rapidly assembled single-shot images in four standard views (see Supplementary File 1, online at http://dx.doi.org/10.1636/JoA-S-17-079.sn1). The latter are included for ease of comparison to the type specimens, to directly illustrate the subtle morphological variation in key characters typical of Mygalomorphae, and to provide a comprehensive digital compendium of the material available in collections. For records with multiple specimens per vial (some vials of which included multiple registration numbers), only a single exemplar specimen was imaged. In the case of *G. villosus*, for which > 100 records were available, a geographically and morphologically representative selection of 30 specimens was imaged (see Supplementary File 1, online at http://dx.doi.org/10.1636/JoA-S-17-079.s1). Females of *Gaius* species are difficult to identify using morphology alone, however sequence data and/or syntopic collection with known

males are usually adequate for identification purposes. Maps were generated using the online Atlas of Living Australia (online at http://www.ala.org.au/), and are reproduced under a Creative Commons Attribution 3.0 Australia license.

Specimens are lodged at the Western Australian Museum, Perth (WAM), the Australian Museum, Sydney (AMS) and the Queensland Museum, Brisbane (QMB), and the following abbreviations are used throughout the text: ALE, anterior lateral eye/s; AME, anterior median eye/s; *COI*, cytochrome *c* oxidase subunit I; *CYB*, cytochrome b; IBRA, Interim Biogeographic Regionalisation of Australia Version 7 (online at https://www.environment.gov.au/land/nrs/science/ibra); ITS1–2, internal transcribed spacer 1–2; *MRPL45*, 39S ribosomal protein L45 mitochondrial; PLE, posterior lateral eye/s; PME, posterior median eye/s; *RPF2*, ribosome production factor 2 homolog; RTA, retrolateral tibial apophysis (of male pedipalp); *XPNPEP3*, probable Xaa-Pro aminopeptidase 3. For readability and ease of diagnosis, 'sp. nov.' epithets are removed from the main text after the key to species.

Molecular methods.—Nucleotide sequences for six genes (*CYB*, ITS1–2, *MRPL45*, *RPF2*, *XPNPEP3*) were generated for 21 specimens of *Gaius* for which tissue was available, using a next-generation parallel tagged amplicon sequencing (TAS) approach, described in detail by Rix et al. (2017b). For six additional specimens (codes: NCB_023–028), sequences were generated using standard bi-directional sequencing of polymerase chain reaction (PCR) amplicons, as per Castalanelli et al. (2017), using the same primers as Rix et al. (2017b). The gene *COI* was excluded from the main analyses (Fig. 13), due to the presence of a possible pseudogene and often multiple banding in PCRs. However, a separate supplementary 'COI' analysis of verifiable legacy *COI* data was performed, to: (i) confirm the identity of the female and juvenile specimens barcoded by Castalanelli et al. (2014); and (ii) to link the male holotype of *G. humphreysi* sp. nov. (WAM T96563), for which a *COI* sequence was successfully amplified, but for which nuclear data were otherwise lacking. This 'COI' analysis included the 46 specimens of *Gaius* sequenced by Castalanelli et al. (2014), the male holotype of *G. humphreysi* sp. nov., and eight other specimens of *Gaius* for which verifiable barcodes were also available (at least one for each of the six sequenced species) (see Supplementary File 5, online at http://dx.doi.org/10.1636/JoA-S-17-079.s5).

Outgroup sequences were obtained from data previously published by Rix et al. (2017b, 2018b). The ultimate outgroup for the molecular analyses was the diplurid spider *Cethegus fugax* (Simon, 1908), and an undescribed species of *Prothemenops* Schwendinger, 1991 was also included in all analyses. For the 'FULL' dataset (all six genes) and 'NUCLEAR' dataset (five nuclear genes), the three specimens of *Bungulla biota* Rix, Main & Harvey, 2018 sequenced by Rix et al. (2018b) were added, as was one specimen of *B. gibba* Rix, Main & Harvey, 2018, the latter also sequenced by Rix et al. (2018b). In total, 27 specimens were analyzed for the 'FULL' dataset (see Supplementary File 2, online at http://dx.doi.org/10.1636/JoA-S-17-079.s2; excluding taxa without mitochondrial *CYB* sequences), 33 specimens were analyzed for the 'NUCLEAR' dataset (see Supplementary File 3, online at http://dx.doi.org/10.1636/JoA-S-17-079.s3), and 56 specimens were analyzed for the supplementary 'COI' dataset (see Supplementary Files 4–5, online at http://dx.doi.org/10.1636/JoA-S-17-079.s4 and http://dx.doi.org/10.1636/JoA-S-17-079.s5). For each specimen sequenced, DNA voucher codes and GenBank accession numbers are provided next to repository registration numbers in the material examined section for each species (below), in the form: [Registration^{DNA_Voucher_Code}; GenB–GENE–No., etc.].

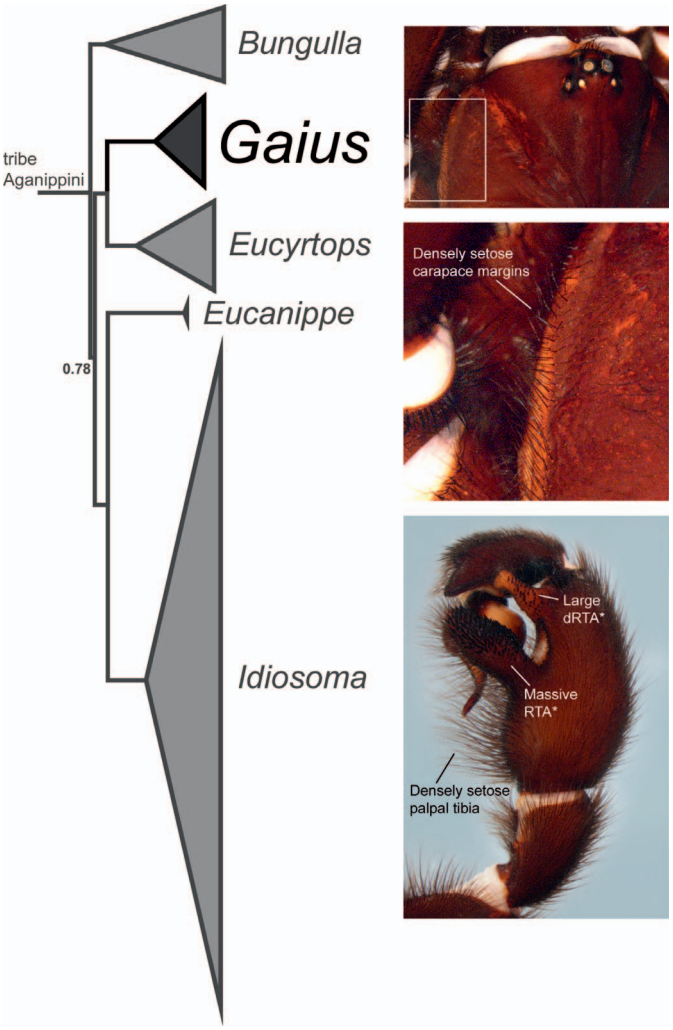


Figure 10.—Summary phylogeny of the tribe Aganippini, from the 'FULL' 12-gene Bayesian analysis of Rix et al. (2017b), showing the phylogenetic position of *Gaius*. Inset images show the male lateral carapace margin (boxed region enlarged in panel 2) and retrolateral pedipalp of *G. villosus* Rainbow, 1914, and the four apomorphies characteristic of males of the genus. Highlighted (*) characters are present in most, but not all, species.

Individual gene alignments were conducted in Geneious R6 (Biomatters Ltd.; online at http://www.geneious.com/) using the MAFFT v7.017 plugin with default parameters (Katoh & Standley 2013), and these alignments for the six genes were concatenated to generate the 'FULL' dataset (Supplementary File 2, online at http://dx.doi.org/10.1636/JoA-S-17-079.s2) which included all available data, and the 'NUCLEAR' dataset (Supplementary File 3, online at http://dx.doi.org/10.1636/JoA-S-17-079.s3) which included only the five nuclear

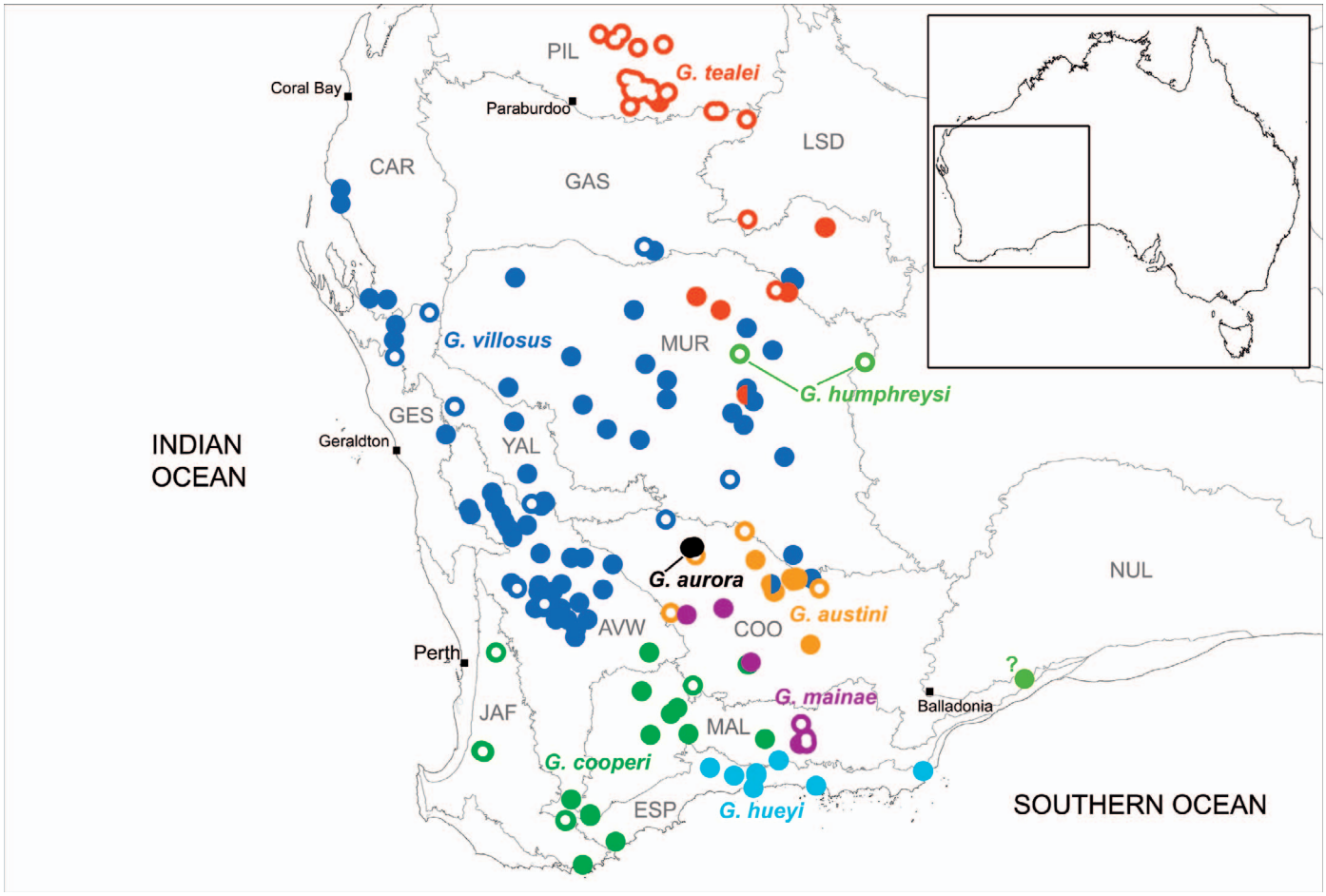


Figure 11.—Map showing collection records of *Gaius* from Australia, color-coded according to species. Open circles denote specimens sequenced for the molecular analyses, and note the specimen from east of Balladonia ('?'), only tentatively assigned to *G. humphreysi* sp. nov. Relevant IBRA 7.0 bioregional acronyms are as follows: AVW, Avon Wheatbelt; CAR, Carnarvon; COO, Coolgardie; ESP, Esperance Plains; GAS, Gascoyne; GES, Geraldton Sandplains; HAM, Hampton; JAF, Jarrah Forest; LSD, Little Sandy Desert; MAL, Mallee; MUR, Murchison; NUL, Nullarbor; PIL, Pilbara; YAL, Yalgoo.

genes. PartitionFinder Version 1.1.1 (Lanfear et al. 2012) was used to choose an optimal partitioning scheme, favoring an eight partition model for the 'FULL' dataset; for the 'NUCLEAR' dataset, two mitochondrial partitions were excluded. For the 'COI' dataset, a parameter-rich (GTR + G) model was applied to each codon position. All three datasets (Supplementary Files 2–4, online at http://dx.doi.org/10.1636/JoA-S-17-079.s2, dx.doi.org/10.1636/JoA-S-17-079.s3, and dx.doi.org/10.1636/JoA-S-17-079.s4) were analyzed in MrBayes Version 3.2.6 (Huelsenbeck & Ronquist 2001; Ronquist & Huelsenbeck 2003) via the CIPRES Science Gateway (Miller et al. 2010), with substitution model parameters estimated independently for each partition ([Unlink tratio = (all) pinvar=(all) shape=(all) statefreq=(all) revmat=(all)]) and rates allowed to vary across partitions ([Prset applyto=(all) ratepr=variable]). Four Markov Chain Monte Carlo (MCMC) chains were run for 10 million generations for each analysis, sampling every 1000 generations, with the first 10% of sampled trees discarded as 'burnin' ([burnin = 1000]). Summary statistics of estimated parameters, including ESS values, were assessed using Tracer Version 1.6 (Rambaut et al. 2014), and FigTree Version 1.4.2 (online at http://tree.bio.ed.ac.uk/software/figtree/) was used to visualize 50% majority-rule consensus trees (Fig. 13, Supplementary File 5, http://dx.doi.org/10.1636/JoA-S-17-079.s5).

Phenology.—Data on the phenology of each species were assembled for those specimens for which a specific month of collection could be ascertained. In total, 189 specimens of *Gaius* were included in the statistics (Fig. 12). Data for each species and for the genus as a whole were analyzed separately by month of collection, with reported *N* values denoting the number of males included in the phenological assessment (i.e., excluding males collected across a range of reported months).

Conservation assessments.—The conservation status of each species of *Gaius* was assessed using a standard International Union for the Conservation of Nature (IUCN) approach, similar to that applied by Harvey et al. (2015) for migid trapdoor spiders of the genus *Bertmainius* Harvey, Main, Rix & Cooper, 2015, and by Rix et al. (2017a) for the idiopid genus *Cataxia* in south-western Australia. As long-term data on population reductions (Criterion A), population sizes or

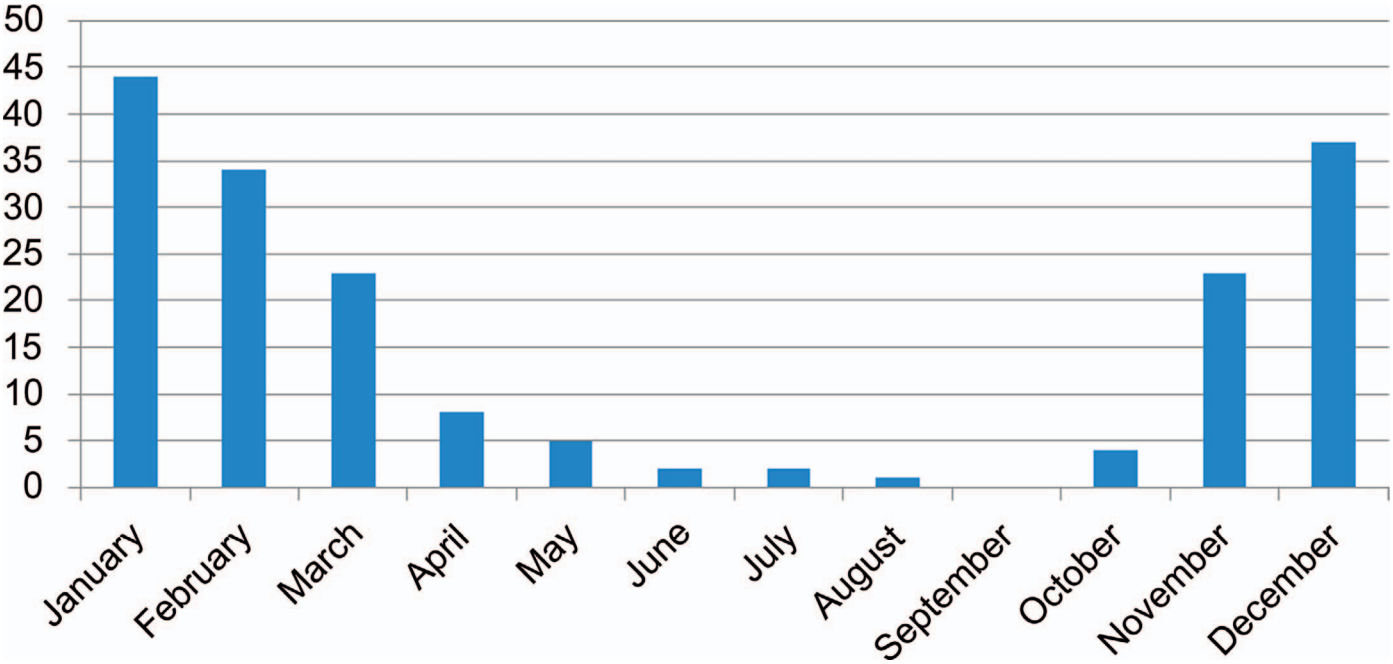


Figure 12.—Graph summarizing phenology data for 183 male specimens of *Gaius* for which an accurate collection month could be ascertained. The y-axis denotes the number of specimens collected per month. Note the peak of activity in the warmest months of November–March.

declines (Criterion C) or the number of mature individuals in any one population (Criterion D) were not available, we assessed all taxa using information on their geographic range (Criterion B) (as per Rix et al. 2017a), the latter calculated using area polygons in Google Earth Pro (Google Inc.). These assessments therefore focused on the extent of occurrence of each species, the area of occupancy within that range, and the health or otherwise of occupied habitats. Individual assessments are listed for each species under their relevant entry in the Systematics section (below).

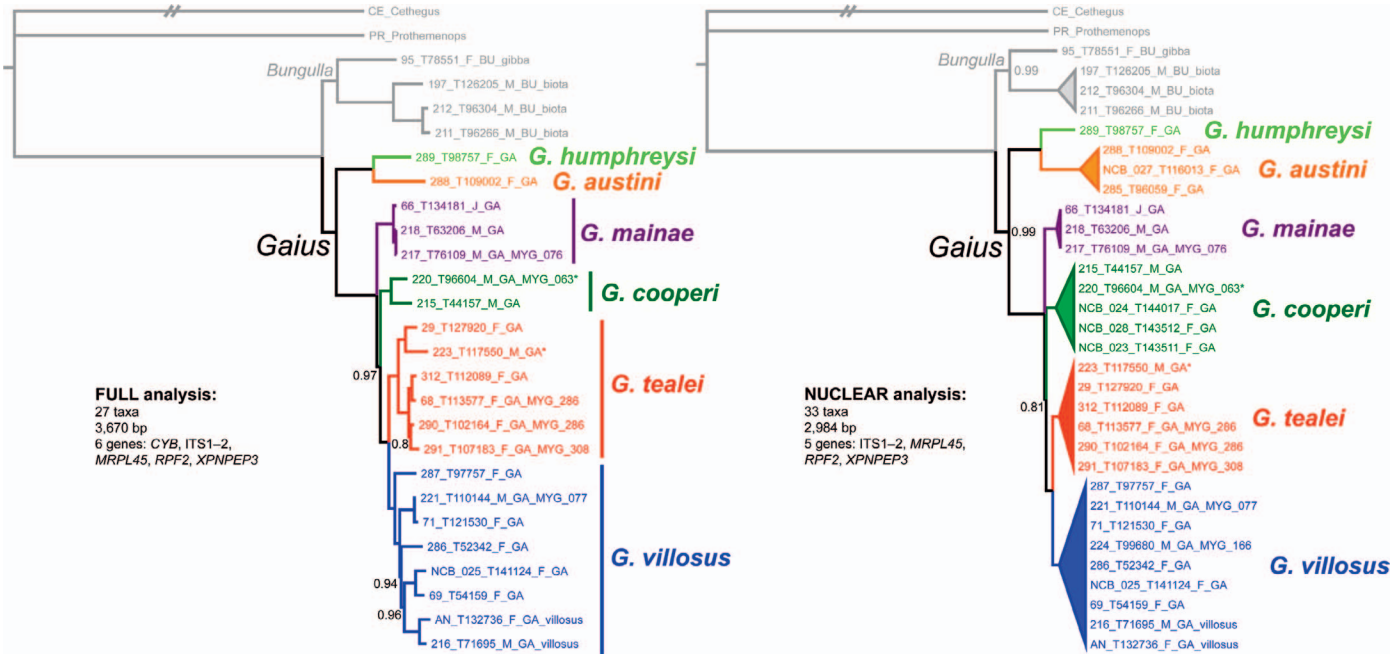


Figure 13.—Bayesian 50% majority-rule consensus trees resulting from partitioned phylogenetic analyses of the 6 gene 'FULL' dataset (at left) and the 5 gene 'NUCLEAR' dataset (at right, with species clades collapsed), color-coded as per Figure 11 and Supplementary File 5, online at http://dx.doi.org/10.1636/JoA-S-17-079.s5. Posterior probabilities < 1.0 are shown adjacent to nodes (all other nodes have a posterior probability of 1.0), and holotype specimens are highlighted (*). Note that sequences were not available for *G. aurora* sp. nov. or *G. hueyi* sp. nov.

RESULTS AND DISCUSSION

Bayesian analyses of the 'FULL' dataset (1 mitochondrial gene, 5 nuclear genes; 3,670 bp) and the 'NUCLEAR' dataset (5 nuclear genes; 2,984 bp) recovered congruent topologies (Fig. 13). Six of the eight species of *Gaius* were sampled for the molecular analyses, and all of these species-group taxa were recovered as well supported monophyletic lineages. *Gaius austini* sp. nov. and *G. humphreysi* sp. nov. consistently formed a deeply divergent clade sister to all other species, and *G. villosus* and *G. tealei* sp. nov. were recovered as sister-species, both results consistent with morphology. Analysis of the expanded 'COI' dataset from Castalanelli et al. (2014) (Supplementary File 5, http://dx.doi.org/10.1636/JoA-S-17-079.s5) also clarified the identification of previously published barcodes, and revealed that *G. tealei* sp. nov. is widespread in the southern-central Pilbara.

While strong mitochondrial phylogeographic structure is evident among populations of *G. tealei* in the Pilbara bioregion (Supplementary File 5, http://dx.doi.org/10.1636/JoA-S-17-079.s5), the deeper phylogeny of *Gaius* is generally characterized by shallow branch lengths (Fig. 13), consistent with late Miocene speciation (as inferred by Rix et al. 2017b). *Gaius* is therefore another example of an aganippine genus which – like *Bungulla* (see Rix et al. 2018b) – has 'broken out' of the semi-arid zone of south-western Australia relatively recently, and is now distributed up to, but not beyond, the Pilbara bioregion. This hypothesis of 'derived xeric adaptation' (see Rix et al. 2015) posits that arid zone taxa are phylogenetically derived relative to their temperate congeners – as *G. villosus* and *G. tealei* sp. nov. are relative to *G. cooperi* sp. nov. and *G. mainae* sp. nov. Unfortunately, sequenceable tissues of *G. hueyi* and *G. aurora* were not available for this study, and future research should focus on sampling and surveying for these rare taxa, both of which may be of conservation significance (see Conservation assessments, below).

SYSTEMATICS

Family Idiopidae Simon, 1889
Subfamily Arbanitinae Simon, 1903
Tribe Aganippini Simon, 1903
Genus *Gaius* Rainbow, 1914

Gaius Rainbow, 1914: 195. Removed from synonymy of *Anidiops* Pocock, 1897 by Rix et al., 2017d: 618 (*contra* Main, 1957: 424).

Type species.—*Gaius villosus* Rainbow, 1914, by monotypy.

Diagnosis.—Species of *Gaius* can be distinguished from all other Aganippini by the densely setose body and appendages (especially the lateral margins of the carapace and the ventral palpal tibia of males) (Fig. 10), by the presence in all but two species (i.e., *G. austini* sp. nov. and *G. humphreysi* sp. nov.) of a very strongly developed distal retrolateral tibial apophysis (dRTA) (Fig. 10), and by the presence in all but three species (i.e., *G. aurora* sp. nov., *G. austini* sp. nov. and *G. humphreysi* sp. nov.) of a massive RTA (Fig. 10) (see also Rix et al. 2017d). Females of *Gaius* can be distinguished from most other Aganippini by their large size and highly setose body and appendages, and by the absence of sclerotized sigilla on the dorsal abdomen (Figs. 1, 2, 4, 5).

Description.—Large to very large idiopid spiders (female body length ca. 30–42 mm; males ca. 20–35 mm), usually dark chocolate-brown to black in life (Figs. 1–5). Carapace oval to almost hexagonal in some species; lateral margins with dense fringe of setae; fovea procurved. Eye group trapezoidal, anterior eye row strongly procurved; ALE relatively widely spaced, usually separated by dense cluster of filiform setae in males. Chelicerae with rastellum; maxillae with cuspules confined to inner corner; labial cuspules absent. Abdomen oval, densely setose; sclerotized sigilla absent. Legs of both sexes with scopulae on tarsi I–II and also on metatarsi I–II of females and some males; male tibia I usually with prolateral clasping spurs. Male pedipalp with RTA, in most species forming a massive spinulate process which extends to near retro-distal tip of cymbium; short to very large distal retrolateral tibial apophysis (dRTA) also present; cymbium with small to large field of spinules disto-dorsally. Female pedipalp with thick scopula on tarsus. Female genitalia with pair of simple, widely spaced spermathecae.

Distribution.—The genus *Gaius* is endemic to Western Australia, with a broad distribution that extends largely east of the Jarrah Forest and Geraldton Sandplains bioregions, from Albany, Munglinup, Esperance and Point Dempster in the south, north to Carnarvon and the Fortescue River (Pilbara bioregion) in the north, and east to the eastern margins of the Gascoyne, Murchison, Coolgardie and Mallee bioregions (Fig. 11). Isolated, outlying populations also occur in the more mesic Jarrah Forest bioregion, at Collie and Voyager Quarry, the latter of which may now be extinct (see Remarks under *G. cooperi* sp. nov., below).

Habitat, natural history and phenology.—Thanks to the demographic work undertaken by Barbara Main at North Bungulla Nature Reserve over more than 40 years, we now have a very good understanding of the biology and natural history of *G. villosus* in the central Wheatbelt (Main 1978, 1987, unpubl. data). Being very large and conspicuous (Fig. 3), male *Gaius* are also routinely submitted to the WAM by members of the public, providing a data-rich phenology series for a number of species, and for the genus as a whole. *Gaius* are most common in the mallee and mulga woodlands, *Acacia* shrublands and spinifex (*Triodia*) plains of the Western Australian interior, where they build deep burrows in clay or hard loam soils. Burrow doors are flappy or wafer-like, and burrow entrances are typically adorned with a characteristic radial 'fan' of twig-lines (Figs. 6–9). Burrows are also usually lined with a sock-like silken 'collar' several centimeters below the burrow entrance (see Main 1985, figs. 209, 210). When disturbed, this silken collar can be collapsed and pulled downwards by the spider, creating a physical barrier to protect the inhabitant against predators and flooding (Main 1957, 1985, 1993). Food debris is also stored between this collar and the wall of the burrow proper, and prey consists largely of ants and termites (Main 1978).

Male spiders (at least of *G. villosus*) usually mature around seven or eight years of age (Main 1987), and phenology data for the genus as a whole ($n = 183$) shows that males generally wander in search of females in the warm summer months of November–March (88% of collected specimens), usually after heavy thunderstorms, with nearly half of all specimens (44%) collected in December or January (Fig. 12). If these storms do not occur, then males of *G. villosus* wander with the first

autumn/winter rains (Main 1987); no male specimens of *Gaius* have ever been collected in September. This strategy of summer emergence of males is in stark contrast to most other Idiopidae Australia-wide, which generally emerge in the cooler months from late autumn to early spring (e.g., Main et al. 2000; MGR, RJR & MSH, pers. obs.).

Female spiders (at least of *G. villosus*) mature around eight years of age, but do not reproduce until they are older (Main 1987). Eggs are laid in spring, and prior to egg-laying burrows are plugged with a thick mud barrier beneath the door, thus completely sealing in the mother spider and egg sac (and later spiderlings) during the hot summer and early autumn months (Main 1978). These burrow plugs are not removed until the following autumn, prior to the emergence of the spiderlings with seasonal autumn or winter rains. Females can reproduce at most once every two years (Main 1987), probably due to the energetic requirements of reproduction and maternal aestivation during the summer months when males wander in search of females. However, it is not known whether un-molted females can store sperm between successive broods, or whether a new mating is required prior to egg-laying.

The longevity of *G. villosus* is well documented, and this species is undoubtedly one of the longest-lived spiders in the world, with some specimens persisting for over 40 years in the wild (Main 1987, unpubl. data). It is therefore likely that large, reproductive 'matriarchs' of all *Gaius* species routinely live to over 20 years of age.

Composition and remarks.—*Gaius* was found to be the sister-genus to *Eucyrtops* by Rix et al. (2017b; Fig. 10), and includes eight known species, seven of which are newly described in this study. All species are large to very large, highly setose and dark brown to black in color (Figs. 1–5), and the genus includes some of the largest mygalomorph spiders in Australia, excluding Theraphosidae and perhaps some specimens of *Hadronyche formidabilis* (Rainbow, 1914) (Atracidae), *Xamiatus* Raven, 1981 (Nemesiidae) and *Idiosoma* (Idiopidae). Unlike the co-occurring and highly diverse aganippine genera *Bungulla* and *Idiosoma*, species of *Gaius* are largely absent from Western Australia's coastal and inland sandplains, and are conspicuously absent from the Swan Coastal Plain, Geraldton Sandplains and much of the southern Carnarvon Basin (Fig. 11).

KEY TO THE AUSTRALIAN SPECIES OF *GAIUS* (MALES ONLY)

NB. See also Supplementary File 1, online at http://dx.doi.org/10.1636/JoA-S-17-079.s1, for additional images of relevant character states.

1. Prolateral tibia I with clasping spurs (Figs. 23, 57, 79, 101, 114, 154) 2
– Prolateral tibia I without clasping spurs, replaced by comb of distal macrosetae (Figs. 45, 133) 7
2. Palpal tibia with massive RTA, extending to near retro-distal tip of cymbium (Figs. 25, 81, 103, 156) 3
– RTA much smaller, without grossly enlarged morphology (Figs. 59, 116) 6
3. Palpal tibia proximal to RTA short and stout, with bulging, convex ventral margin in retrolateral view (Figs. 25, 156); leg I tibia relatively long, with clasping spurs occupying distal quarter of tibia (Figs. 22, 153) 4
– Palpal tibia proximal to RTA longer and less bulging in retrolateral view (Figs. 81, 103); leg I tibia shorter, with clasping spurs occupying distal third of tibia (Figs. 78, 100) 5
4. Distal retrolateral tibial apophysis (dRTA) very large, 'ladle-shaped' (Fig. 25); base of dRTA separated from base of RTA by crescent-shaped retro-ventral margin of palpal tibia (Fig. 25); pro-ventral tarsus I usually with row of prominent, stout macrosetae protruding from surrounding scopulate setae (Fig. 22) ..... ***G. villosus*** Rainbow, 1914
– dRTA much shorter, 'tongue-shaped' (Fig. 156); base of proximal flange of dRTA positioned closely adjacent to base of RTA (Fig. 156); pro-ventral tarsus I without row of protruding macrosetae (Fig. 153) ..... ***G. tealei*** sp. nov.
5. dRTA hooked, with proximal 'stem' and variably-shaped, distally widened 'knob' (Figs. 81, 82) ..... ***G. cooperi*** sp. nov.
– dRTA not hooked, forming simple, rounded, disto-ventrally directed process (Figs. 103, 104) ..... ***G. hueyi*** sp. nov.
6. ALE separated by approximately their own diameter (Fig. 109); dRTA broad, subquadrate in retrolateral view (Fig. 116); embolic apophysis positioned distally (Figs. 116, 118) ..... ***G. humphreysi*** sp. nov.
– ALE separated by approximately twice their own diameter (Fig. 52); dRTA slightly longer and more tapered in retrolateral view (Fig. 59); embolic apophysis positioned sub-distally (Figs. 59–61) ..... ***G. austini*** sp. nov.
7. Palpal tibia with very large RTA, extending to near retro-distal tip of cymbium (Fig. 134) ..... ***G. mainae*** sp. nov.
– RTA much smaller (Fig. 46) ..... ***G. aurora*** sp. nov.

Gaius villosus Rainbow, 1914
(Figs. 1–3, 6–8, 10, 11, 14–36)

Gaius villosus Rainbow, 1914: 195, figs. 6–8.
Anidiops villosus (Rainbow): Main, 1957: 426, figs. 3C, 5B; Main, 1985: 16, figs. 20, 21, 192.
Gaius villosus Rainbow: Rix et al., 2017d: 620, figs. 238, 239, 242, 246, 248, 252, 253.
Gaius sp. 'Wiluna' Rix et al., 2017d: 619, figs. 244, 251.

Type material.—*Holotype female*. AUSTRALIA: *Western Australia*: Minnivale (IBRA_AVW), 31°08′S, 117°11′E, hand collected, 31 March 1913, J.P. Harris (AMS KS6259; not examined).

Paratype. AUSTRALIA: *Western Australia*: 1 ♀, same data as holotype except 1 March 1913 (WAM T261; examined).

Other material examined.—AUSTRALIA: *Western Australia*: 1 ♂, Minnivale (IBRA_AVW), 31°08′S, 117°11′E, 1 March 1976, L. & T. Cooke (WAM T27036); 1 ♂, same data except lot 10 Dowell Street, 20 March 1999, R.J. Larkin (WAM T41700); 1 ♂, same locality data except Mardu, 1999 (WAM T143034); 1 ♀, Minnivale Nature Reserve, 19 km WNW. of

Figure 14.—Montage of male pedipalps of species of *Gaius*. Note the variation in the size and shape of the distal retrolateral tibial apophysis (dRTA).

Wyalkatchem (IBRA_AVW), 31°08′11″S, 117°11′22″E, hand collected, mallee woodland, 21 April 2014, M.G. Rix, M.S. Harvey (WAM T132736^{DNA_Voucher_AN}; GenB–COI–KY295234, GenB–CYB–KY295359, GenB–MRPL45–KY295484, GenB–RPF2–KY295600, GenB–XPNPEP3–KY295728, GenB–ITS–KY294978); 1 ♂, Agnew Mining Camp (IBRA_MUR), 27°49′S, 120°41′E, 1 November 1977, A. Schofield (WAM T26996); 1 ♂, Banksia Patch East, c. 13.5 km N. of Kellerberrin on Trayning Road (Colin Wilkins, CSIRO banksia remnant 16) (IBRA_AVW), 31°31′S, 117°44′E, drowned in frog trap, 19 April 2002, R. Davis (WAM T143041); 1 ♂, Beacon townsite (IBRA_AVW), 30°26′S, 117°52′E, hand collected, January 2003, B.R. Kirby (WAM T47876); 1 ♂, Big Bell (IBRA_MUR), 27°19′S, 117°39′E, 16 January 1990, T. Baker (WAM T20548); 1 ♂, Billabong Roadhouse (IBRA_CAR), 26°49′S, 114°37′E, hand collected, 9 December 1994, C. Quinn (WAM T32193); 1 ♂, Blue Hill Range (IBRA_YAL), 29°08′38″S, 116°53′40″E, dry pitfall trap, ironstone ridge in mulga/eucalypt woodland, 13–16 February 2004, M.J. Bamford (WAM T57384); 1 ♂, Bonnie Rock (IBRA_AVW), 30°32′S, 118°22′E, 11 January 1993, G. Borlalse (WAM T26998); 1 ♂, Bulong (IBRA_COO), 30°45′S, 121°48′E, 29 January 1937, M. Jones (WAM T2965); 1 ♂, Buntine (IBRA_AVW), 29°59′S, 116°34′E, 4 February 1935, L.D. Manuel (WAM T2751); 1 ♂, same data except 20 November 1982, K. Wilkin (WAM T27000); 1 ♂, Carnamah (IBRA_AVW), 29°41′25″S, 115°53′01″E, 1 February 1985, S. Forrester (WAM T 21059); 1 ♂, Carnarvon (IBRA_CAR), 24°53′S, 113°40′E, 9 July 1949, Mr. Bosworth (WAM T3515); 1 ♂, same data (WAM T3516); 1 ♂, same data except 2 January 1965, L. Craig (WAM T27002); 1 ♂, same data except 1 November 1989 (WAM T27003); 1 ♂, 50 km SE. of Carnarvon (IBRA_CAR), alive on road at night, 22 February 2008, B. Maryan (WAM T88456); Caron (IBRA_AVW), 29°36′S, 116°20′E, hand collected, 1 October 1953, B.H. Kuhne (WAM T3745); 1 ♀, Charles Darwin Reserve, N. of Smith Well (IBRA_AVW), 29°36′33″S, 116°58′04″E, dug from burrow, 8 May 2009, M.S. Harvey, B. Barnett, C. Hodge, C. Richard (WAM T97757^{DNA_Voucher_287}; GenB–CYB–MG652505, GenB–MRPL45–MG652541, GenB–RPF2–MG652567, GenB–XPNPEP3–MG652587, GenB–ITS–MG652526); Cogla

Figures 15–24.—*Gaius villosus* Rainbow, 1914, male (WAM T41700) from Minnivale (Western Australia; AVW), somatic morphology: 15–16, carapace and abdomen, dorsal view; 17, cephalothorax, lateral view; 18, eyes, dorsal view; 19, mouthparts, ventral view; 20–21, cephalothorax and abdomen, ventral view; 22, leg I, prolateral view; 23, leg I tibia, clasping spurs, prolateral view; 24, leg I tibia, proventral view. Scale bars = 5.0.

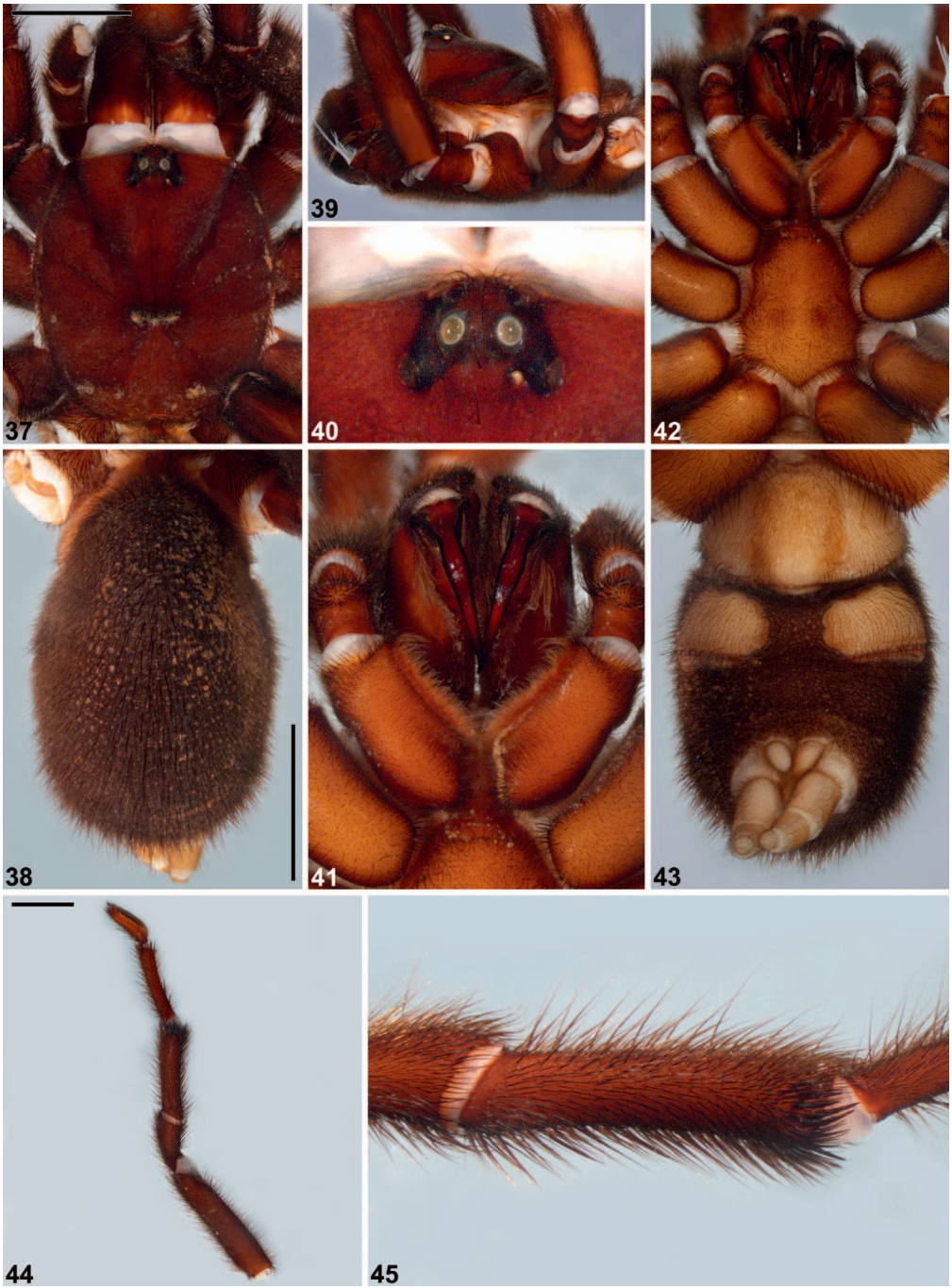
Downs Station, 70 miles NNW. of Sandstone (IBRA_MUR), 27°26′S, 118°56′E, 1 January 1981, A.R. Humphries (WAM T27004); 1 ♂, Deception Hill, 112.71 km NNW. of Koolyanobbing (IBRA_COO), 29°50′59″S, 119°16′58″E, dry pitfall trap, 7 December 2010, R. Teale, Z. Hamilton, V. Cartledge (WAM T110144^{DNA_Voucher_221}; GenB–CYB–MG652504, GenB–MRPL45–MG652539, GenB–RPF2–MG652559, GenB–XPNPEP3–MG652576, GenB–ITS–MG652521); Dowerin (IBRA_AVW), 31°12′S, 117°02′E, hand collected, 26 January 1940, D. Jones (WAM T3208); 1 ♂, same data except 1 January 1948, P. O'Shaughnessy (WAM T3479); 1 ♂, same data except 12 January 1981, P. Emmott (WAM T27012); 1 ♂, same data except indoor basketball courts, 28 February 1997, J. Pickering, N. Northey (WAM T41701); 1 ♂, 25 miles NE. of Dowerin (IBRA_AVW), 30°57′S, 117°20′E, 22 January 1973, L.F. Bear (WAM

Figures 25–27.—*Gaius villosus* Rainbow, 1914, male (WAM T41700) from Minnivale (Western Australia; AVW), pedipalp: 25, retrolateral view (arrow to embolic apophysis); 26, retroventral view; 27, prolateral view. Scale bar = 5.0.

T27011); 1 ♂, Durokoppin Nature Reserve, site B4 (IBRA_AVW), 31°30′S, 117°44′E, 6–16 January 1989, G. Friend et al. (WAM T63225); 1 ♂, same data except site DKR G2, wet pitfall trap (WAM T41518); 1 ♂, Elashgin Nature Reserve, N. side on Maitland Road (IBRA_AVW), 31°19′35″S, 117°26′41″E, wet pitfall traps, 29 November 1999–17 March 2000, M.S. Harvey, J.M. Waldock, B.Y. Main (WAM T44162); 1 ♂, Gnaweeda Siding via Meekatharra (IBRA_MUR), 26°35′S, 118°44′E, hand collected, 7 November 1938, W. Doubtfire (WAM T3098); 1 ♂, corner of Great Northern Highway and Mount Gibson Road (IBRA_AVW), 29°38′30″S, 117°07′56″E, 21 November 2010, R. Ellis (WAM T109379); 1 ♂, Hamelin Pool, Telegraph Station (IBRA_CAR), 26°24′S, 114°10′E, 1 May 1994, D. Taylor (WAM T31062); 1 ♂, Kalannie (IBRA_AVW), 30°22′S, 117°07′E, found at night on house doorstep, 3 April 1987, M. Tierney (WAM T27019); 1 ♂, same locality data, 17 February 1996, B. & J. Davies (WAM T42167); 1 ♀, ca. 154 km NE. of Kalbarri, N. of Toolonga Nature Reserve (IBRA_CAR), 26°37′19″S, 115°11′56″E, from pipeline trench, 27 October 2007, P. Hinchy (WAM T54159^{DNA_Voucher_69}; GenB–CYB–KY295431, GenB–MRPL45–KY295551, GenB–RPF2–KY295677, GenB–XPNPEP3–KY295805, GenB–ITS–KY295058); 1 ♂, Kellerberrin (IBRA_AVW), 31°38′S, 117°43′E, 1 January 1992, A.F. & J.L. Morley (WAM T27024); 1 ♂, Koorda (IBRA_AVW), 30°50′S, 117°29′E, 15 January 1935, V.J. Geraghty (WAM T2741); 1 ♂, same locality data, 2 November 1949 (WAM T3551); 1 ♂, same data except bushland around house, 28 January 1991, L. Henning (WAM T22530); 1 ♂, same locality data, 16 November 1972, S. Cornish (WAM T27025); 1 ♂, same data except 11 January 1973, C.D. Strahan (WAM T27026); 1 ♂, same data except 15 December 1978, B. Kennewell (WAM T27027); 1 ♂, same data except June 1954, L. Glauert (WAM T143042); 1 ♂, Korrelocking (IBRA_AVW), 31°12′S, 117°28′E, 10 December 1951, J.C. Pearson (WAM T3659); 1 ♂, Lake Goorly, north-west, site WU 8 (IBRA_AVW), 29°56′08″S, 116°53′09″E, wet pitfall traps, 15 September 1998–25 October 1999, P. Van Heurck, CALM Survey (WAM T143043); 1 ♂, Lake Maitland mine lease, ca. 22 km SW. of Wonganoo Homestead, site LM01 (IBRA_MUR), 27°12′54.8″S, 121°07′57.1″E, dry pitfall trap, 12 December 2007, P. Bolton et al. (WAM T136897); 2 ♂, Lake Mason, near Sandstone (IBRA_MUR), 27°41′17.3″S, 119°18′15.5″E, dry pitfall trap, 3 December 2008, S. Tomlinson (WAM T143060); 1 ♂, same data (WAM T136899); 1 ♂, Latham (IBRA_AVW), 29°45′28″S, 116°26′36″E, 1 January 1976, P. Bercene (WAM T27029); 1 ♂, same data (WAM T27030); 1 ♂, Leinster (IBRA_MUR), 27°55′S, 120°41′E, 21 December 1994, D. Murphy (WAM T143062); 1 ♂, 27 km SE. of Leinster Downs Homestead (IBRA_MUR), 28°01′S, 120°48′E, 5 November 1999, G. Harold (WAM T40232); 1 ♂, Leonora (IBRA_MUR), 28°53′S, 121°20′E, 17 January 1965, A.J. Fox (WAM T27032); 1 ♂, same data except 1 January 1987, C.N. Collard (WAM T27033); 1 ♂, same locality data, 21 December 1999 (WAM T41549); 1 ♂, NW. of Leonora (IBRA_MUR), 28°53′S, 121°20′E, 1 December 1988, S. Gilligan (WAM T27031); 1 ♂, Lorna Glen Station, quadrat 21 (IBRA_GAS), 26°04′09″S, 121°26′54″E, dry pitfall trap, 25 November–1 December 2004, M.A. Cowan et al. (WAM T66406); 2 ♂, same data except quadrat 23, 26°06′46″S, 121°30′15″E (WAM T66409); 1 ♂, Manmanning (IBRA_AVW), 30°51′S, 117°06′E, 31 March 1960, B.H. Smith (WAM T27034); 1 ♂, same data (WAM T27035); 1 ♂, Manmanning town reserve (IBRA_AVW), 30°51′14″S, 117°05′48″E, wet pitfall trap, 14 January–21 April 1997,

Figures 28–36.—*Gaius villosus* Rainbow, 1914, female (WAM T132736) from Minnivale Nature Reserve (Western Australia; AVW): 28–29, carapace and abdomen, dorsal view; 30, cephalothorax, lateral view; 31, eyes, dorsal view; 32, mouthparts, ventral view (partly obscured by dried hemolymph); 33, cephalothorax, ventral view (partly obscured by dried hemolymph); 34, leg I, prolateral view; 35, leg I, retrolateral view; 36, spermathecae, dorsal view. Scale bars = 5.0 (28–29, 34–35), 1.0 (36).

J.M. Waldock, E.S. Volschenk (WAM T40233); Manmanning Dam Nature Reserve, south-east, site WH 8 (IBRA_AVW), 30°54′53″S, 117°05′41″E, wet pitfall traps, 15 September 1998–25 October 1999, L. King, CALM Survey (WAM T143038); 1 ♂, Maya (IBRA_AVW), 29°53′S, 116°30′E, hand collected, 27 December 1999, C. McLevie (WAM T40230); 1 ♂, ca. 130 km N. of Meekatharra, site 2B-P6 (IBRA_GAS), 25°34′37.84″S, 118°54′37.83″E, pitfall trap, 12 November 2009, M. Peterson (WAM T99680^{DNA_Voucher_224}; GenB–COI–KJ745514, GenB–MRPL45–MG652540, GenB–RPF2–MG652560, GenB–XPNPEP3–MG652575, GenB–ITS–MG652527); 1 ♂, same data except site 5B-P6, 25°38′30.28″S, 119°04′50.02″E, 14 November 2009, K. George (WAM T99681); 1 ♂, Meeline Station, Mount Magnet (IBRA_MUR), 28°27′S, 118°16′E, 7 January 2001, K. Morrisey (WAM T143063); 2 ♂, same data except 3 October 1999 (WAM T143065); 1 ♂, Milly Milly Station (IBRA_MUR), 26°04′S, 116°41′E, 1 December 1992, M. Broad (WAM T26994); 1 ♂, Moonijin, 14 miles N. of Cadoux (IBRA_AVW), 30°57′S, 117°05′E, 12 December 1969, J.L. Emmott (WAM T27039); 1 ♂, same data except 28 November 1987, P.L. Emmott (WAM T27038); 1 ♂, same data except 18 December 1979, R.H. Harvey (WAM T27037); 1 ♂, Mount Burges Station (IBRA_COO), 30°50′S, 121°06′E, 1 March 1988, Warburton (WAM T27042); 1 ♂, Mount Gibson area (IBRA_AVW), pitfall trap, February 2008, B. Maryan (WAM T88457); 1 ♂, Mount Gibson mining lease, site E4 (IBRA_AVW), 29°35′17.64″S, 117°12′04.14″E, dry pitfall trap, eucalypt woodland, 6 February 2008, S. Thompson et al. (WAM T86669); 2 ♂, same data except site E6 + 8, 29°34′S, 117°11′E (WAM T86675); 1 ♀, Mount Ida, 80 km NW. of Menzies (IBRA_MUR), 29°14′04″S, 120°23′44″E, hand foraging, *Acacia* shrubland, 4 October 2011, V. Saffer (WAM T121530^{DNA_Voucher_71}; GenB–CYB–KY295429, GenB–MRPL45–KY295549, GenB–RPF2–KY295675, GenB–XPNPEP3–KY295803, GenB–ITS–KY295056); 1 ♂, Mount Magnet (IBRA_MUR), 28°04′S, 117°51′E, 1 January 1986, Thompson (WAM T27043); 2 ♂, Mount Vetters Station, Black Swan Nickel Mine, 50 km NE. of Kalgoorlie, control 5 (IBRA_MUR), 30°23′29″S, 121°29′10″E, wet pitfall trap, 11 December 2003–5 January 2004, P.R. Langlands (WAM T53311); 1 ♂, Muckinbudin (IBRA_AVW), 30°55′S, 118°12′E, 17 November 2001, H. Adamson (WAM T143040); 1 ♂, Mullewa (IBRA_AVW), 28°32′S, 115°29′E, in house, August 1966, S.R. White, J. O'Brien (WAM T143039); 1 ♂,



Figures 37–45.—*Gaius aurora* sp. nov., male holotype (WAM T16076) from Bungalbin Hill, Helena-Aurora Range (Western Australia; COO), somatic morphology: 37–38, carapace and abdomen, dorsal view; 39, cephalothorax, lateral view; 40, eyes, dorsal view; 41, mouthparts, ventral view; 42–43, cephalothorax and abdomen, ventral view; 44, leg I, prolateral view; 45, leg I tibia, prolateral view. Scale bars = 5.0.

Nerren Nerren Station, site NE1 (IBRA_YAL), 27°03′23.6″S, 114°35′21.3″E, wet pitfall trap, 16 October 1994–11 January 1995, N.L. McKenzie, J. Rolfe (WAM T48301); 1 ♂, North Baandee (IBRA_AVW), 31°22′S, 117°56′E, 3 February 1985, M. Enright (WAM T21070); 1 ♂, North Cleary, Shire of Mount Marshall (IBRA_AVW), 30°26′S, 117°39′E, 1 February 1979, A. Putt (WAM T27047); 1 ♀, junction of North-West Coastal Highway and Vermin Proof Fence (IBRA_YAL), 27°19′00″S, 114°36′11″E, hand collected from burrow, 18 August 2016, M.S. Harvey, M.E. Blosfelds (WAM T141124^{DNA_Voucher_NCB_025}; GenB–CYB–MG652499, GenB–MRPL45–MG652537, GenB–RPF2–MG652557, GenB–XPNPEP3–MG652578, GenB–ITS–MG652520); 1 ♂, Nulla Nulla, Yorkrakine (IBRA_AVW), 31°22′S, 117°35′E, 29 November 1965, N. Naughton (WAM T27048); 1 ♂, The Overlander [Road House], Shark Bay Road (IBRA_CAR), 26°25′S, 114°28′E, February 1970 (WAM T143050); 1 ♂, Perenjori (IBRA_AVW), 29°26′35″S, 116°17′07″E, 15 January

Figures 46–48.—*Gaius aurora* sp. nov., male holotype (WAM T16076) from Bungalbin Hill, Helena-Aurora Range (Western Australia; COO), pedipalp: 46, retrolateral view; 47, retroventral view; 48, prolateral view. Scale bar = 5.0.

1993, R. Young (WAM T26995); 1 ♂, same data except 9 February 1974, J. Billinghurst (WAM T27049); 1 ♂, same locality data except 29°26′S, 116°17′E, 25 January 2000, M. Ripper (WAM T40579); 1 ♂, Pinnacles Station (IBRA_MUR), 28°12′S, 120°26′E, 12 November 1987, R. Duncan (WAM T27050); 1 ♂, 28 km SE. of Pinnacles Homestead (IBRA_MUR), 28°23′S, 120°38′E, 3 November 1999, G. Harold (WAM T40234); 1 ♂, Sandstone (IBRA_MUR), 27°59′S, 119°18′E, 1 February 1971, D.B. Ross (WAM T27083); 1 ♀, Tallering Peak (IBRA_YAL), 28°06′S, 115°38′E, 16–19 May 2003, M.J. Bamford (WAM T52342^{DNA_Voucher_286}; GenB–CYB–MG652506, GenB–MRPL45–MG652538, GenB–RPF2–MG652558, GenB–XPNPEP3–MG652586, GenB–ITS–MG652528); 1 ♂, Trayning (IBRA_AVW), 31°06′49″S, 117°47′26″E, 16 December 1988, A. Dugand (WAM T27066); 1 ♂, same data except 1 November 1976, R.W. Hawkes (WAM T27145); SSW. of Trayning (lot 340, loc. 11903), SE. of Yelbeni (IBRA_AVW), 10 January 2000, M. Barnes (WAM T40231); 6 ♂, 30 km S. of Wiluna (IBRA_MUR), 26°52′S, 120°41′E, dry pitfall traps and funnels, mulga woodland, 23 October 2006, S. Thompson (WAM T132589); 1 ♂, Winchester (7 miles from Carnamah) (IBRA_AVW), 29°46′S, 115°55′E, 16 December 1981, C. Chapman (WAM T27070); 1 ♂, Wongan Hills (IBRA_AVW), 30°49′S, 116°37′E, 18 December 1978, H. Taylor (WAM T27071); 1 ♂, same data except outside house, 26 December 1991, S. Mallet (WAM T27072); 1 ♂, Wongan Hills townsite (IBRA_AVW), 30°53′S, 116°43′E, found dead in web of *Latrodectus hasselti* Thorell, 1870, 6 July 1995, D. Smith (WAM T45699); 1 ♂, 1.5 km NNW. of Wongan Hills on Waddington-Wongan Hills Road (IBRA_AVW), 30°54′S, 116°43′E, 8 January 2006, D. Algaba (WAM T71695^{DNA_Voucher_216}; GenB–COI–KY295248, GenB–CYB–KY295372, GenB–MRPL45–KY295496, GenB–RPF2–KY295615, GenB–XPNPEP3–KY295742, GenB–ITS–KY294994); 1 ♂, Woogalong Homestead, Yalgoo (IBRA_MUR), 27°48′S, 116°34′E (WAM T27078); 1 ♂, same data (WAM T27079); 1 ♂, same data (WAM T27080); 1 ♂, Wubin (IBRA_AVW), 30°07′S, 116°38′E, 1 December 1936, H.K. Collins (WAM T2961); 1 ♂, Wubin, Rockdale (IBRA_AVW), 30°07′S, 116°38′E, 15 May 1965, R. Young (WAM T27053); 1 ♂, Wubin, Warrada Street (IBRA_AVW), 30°06′S, 116°38′E, A. Drew (WAM T143044); 1 ♂, Wyalkatchem (IBRA_AVW), 31°11′S, 117°23′E, on basketball court, in town, after storm, 1 January 1969, R. Hammond (WAM T27074); 1 ♂, same data (WAM T27075); 1 ♂, same locality data, 29 December 1970, M.J.C. Watt (WAM T27077); 1 ♂, same data except 17 December 1952, C.G. Jessup (WAM T143035); 1 ♂, same data except January 1981, K. Richards (WAM T143037); 1 ♂, Wyalkatchem, Box 58 (IBRA_AVW), 31°11′S, 117°23′E, 6 February 1960, Mrs. Remmont (WAM T27076); 1 ♂, Wyalkatchem Road, near Minnivale turnoff (IBRA_AVW), 31°11′S, 117°11′E, 22 January 1967, V. Blechendon (WAM T27073); 1 ♂, 20 km S. of Wyalkatchem (IBRA_AVW), 31°22′S, 117°23′E, 13–16 April 1998, K. Maitland (WAM T42165); 1 ♂, Yalgoo (YAL), 28°20′S, 116°40′E, 4 April 1923, S. Oliver (WAM T487); 1 ♂, Youanmi (IBRA_MUR), 28°37′S, 118°50′E, 24 December 1962, M.A. Edwards (WAM T27081).

Diagnosis.—Males of *Gaius villosus* can be distinguished from those of *G. aurora* and *G. mainae* by the presence of prolateral clasping spurs on tibia I (Figs. 22–24; cf. Figs. 45, 133); from *G. austini* and *G. humphreysi* by the size and shape of the RTA, which is grossly enlarged (Fig. 25; cf. Figs. 59, 116); and from *G. cooperi*, *G. hueyi* and *G. tealei* by the size and shape of the distal retrolateral tibial apophysis (dRTA),

Figures 49–58.—*Gaius austini* sp. nov., male holotype (WAM T42166) from Coolgardie (Western Australia; COO), somatic morphology: 49–50, carapace and abdomen, dorsal view; 51, cephalothorax, lateral view; 52, eyes, dorsal view; 53, mouthparts, ventral view; 54–55, cephalothorax and abdomen, ventral view; 56, leg I, prolateral view; 57, leg I tibia, clasping spurs, prolateral view; 58, leg I tibia, proventral view. Scale bars = 5.0.

which is very large and 'ladle-shaped' (Fig. 25; cf. Figs. 81, 103, 156).

Description (male WAM T41700).—Total length 28.7. Carapace 12.2 long, 10.8 wide. Abdomen 10.7 long, 7.9 wide. Carapace (Fig. 15) broadly oval, dark chocolate-brown in color with mostly black ocular region; lateral margins densely setose; fovea slightly procurved. Eye group (Fig. 18) trapezoidal (anterior eye row strongly procurved), 0.6 x as long as wide, PLE–PLE/ALE–ALE ratio 1.6; ALE separated by 2.5 x their own diameter; AME separated by less than their own diameter; PME separated by 3.4 x their own diameter; PME and PLE separated by slightly more than diameter of PME, PME positioned slightly posterior to level of PLE. Maxillae with field of cuspules confined to inner corner; labium without cuspules. Abdomen (Fig. 16) oval, densely setose and dark brown in dorsal view, with paler beige-brown mottling;

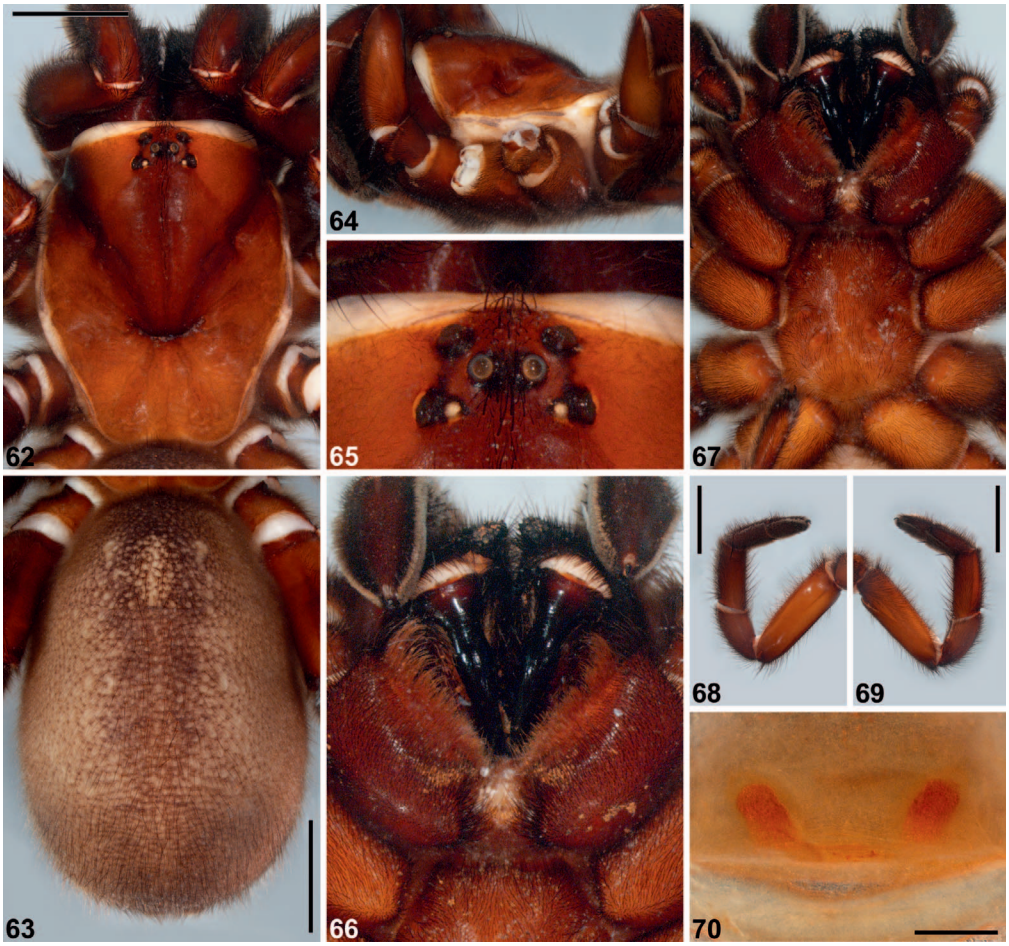
Figures 59–61.—*Gaius austini* sp. nov., male holotype (WAM T42166) from Coolgardie (Western Australia; COO), pedipalp: 59, retrolateral view (arrow to embolic apophysis); 60, retroventral view; 61, prolateral view. Scale bar = 5.0.

sclerotized sigilla absent. Legs (Figs. 22–24) variable shades of dark brown, with light scopulae on tarsi I–II; tibia I with row of 5 long retro-ventral macrosetae and distal pair of prolateral clasping spurs; metatarsus I with 3 pro-ventral and 9 retro-ventral macrosetae; tarsus I with 9 pro-ventral and 14 retro-ventral macrosetae. Leg I: femur 11.7; patella 5.4; tibia 8.2; metatarsus 7.2; tarsus 4.3; total 36.7. Leg I femur–tarsus/carapace length ratio 3.0. Pedipalpal tibia (Figs. 25–27) densely setose, 1.9 x longer than wide, with massive spinulate RTA and very large, 'ladle-shaped' distal retrolateral tibial apophysis (dRTA) also with sparse field of spinules. Cymbium (Figs. 25–27) setose, with field of weakly-developed spinules disto-dorsally. Embolus (Figs. 25–27) relatively broad at base, kinked medially and slightly twisted, with short, triangular embolic apophysis sub-distally.

Description (female WAM T132736).—Total length 38.7. Carapace 14.3 long, 12.4 wide. Abdomen 18.5 long, 16.2 wide. Carapace (Fig. 28) broadly oval, brown in color (dark chocolate-brown in life; Fig. 1) with mostly black ocular region; lateral margins densely setose; fovea procurved. Eye group (Fig. 31) trapezoidal (anterior eye row strongly procurved), 0.5 x as long as wide, PLE–PLE/ALE–ALE ratio 1.7; ALE separated by 2.3 x their own diameter; AME separated by approximately their own diameter; PME separated by 3.7 x their own diameter; PME and PLE separated by approximately 1.5 x diameter of PME, PME positioned slightly posterior to level of PLE. Maxillae with field of cuspules confined to inner corner; labium without cuspules. Abdomen (Fig. 29) broadly oval, beige-brown in dorsal view with darker cardiac marking (grey in life, with slate-grey cardiac region; Fig. 1); sclerotized sigilla absent. Legs (Figs. 34, 35) variable shades of dark brown, with thick scopulae on tarsi and metatarsi I–II; tibia I with cluster of 3 pro-distal macrosetae and row of 5 long retro-ventral macrosetae; metatarsus I with 4 ventral macrosetae; ventral tarsus I with distal cluster of 6 short macrosetae. Leg I: femur 9.9; patella 5.9; tibia 6.0; metatarsus 5.1; tarsus 3.5; total 30.5. Leg I femur–tarsus/carapace length ratio 2.1. Pedipalp dark brown, spinose on tibia, with thick tarsal scopula. Genitalia (Fig. 36) with pair of large, widely spaced, bud-shaped spermathecae on stalks (see also Main 1985, fig. 193).

Distribution and remarks.—*Gaius villosus* (formerly known, in part, by WAM identification codes 'MYG077' and 'MYG166') is a very large species with an extremely widespread distribution in arid Western Australia, extending from the central Wheatbelt, north through the southern Carnarvon, Murchison and southern Gascoyne bioregions, east to near Kalgoorlie (Fig. 11). Males ($n = 101$) generally wander in search of females in the warm (mostly summer) months of November–February (82% of collected specimens), usually after heavy thunderstorms, with a peak of activity in December and January (51% of collected specimens). If these storms do not occur, then males emerge with the first autumn/winter rains (Main 1987); no male specimens have ever been collected in September. For a detailed summary of the habits and natural history of this species, see Remarks under *Gaius* (above).

Conservation assessment.—This species has a known extent of occurrence of $> 400{,}000$ km^2, and is therefore not considered threatened under Criterion B. However, preliminary evidence suggests that population declines may have occurred in recent decades (Rix et al. 2017c), and further assessment under Criterion A is warranted in the future.



Figures 62–70.—*Gaius austini* sp. nov., female (WAM T96059) from Marvel Loch (Western Australia; COO): 62–63, carapace and abdomen, dorsal view; 64, cephalothorax, lateral view; 65, eyes, dorsal view; 66, mouthparts, ventral view; 67, cephalothorax, ventral view; 68, leg I, prolateral view; 69, leg I, retrolateral view; 70, spermathecae, dorsal view. Scale bars = 5.0 (62–63, 68–69), 1.0 (70).

Gaius aurora sp. nov.
http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:A5F52EB9-8D05-4EDB-9F1D-AFBD454D488B
(Figs. 11, 14, 37–48)

Type material.—*Holotype male*. AUSTRALIA: *Western Australia*: Bungalbin Hill, Helena-Aurora Range, site BHR5 (IBRA_COO), 30°17′S, 119°43′E, hand collected, 1 December 1980, Goldfields Survey (WAM T16076).

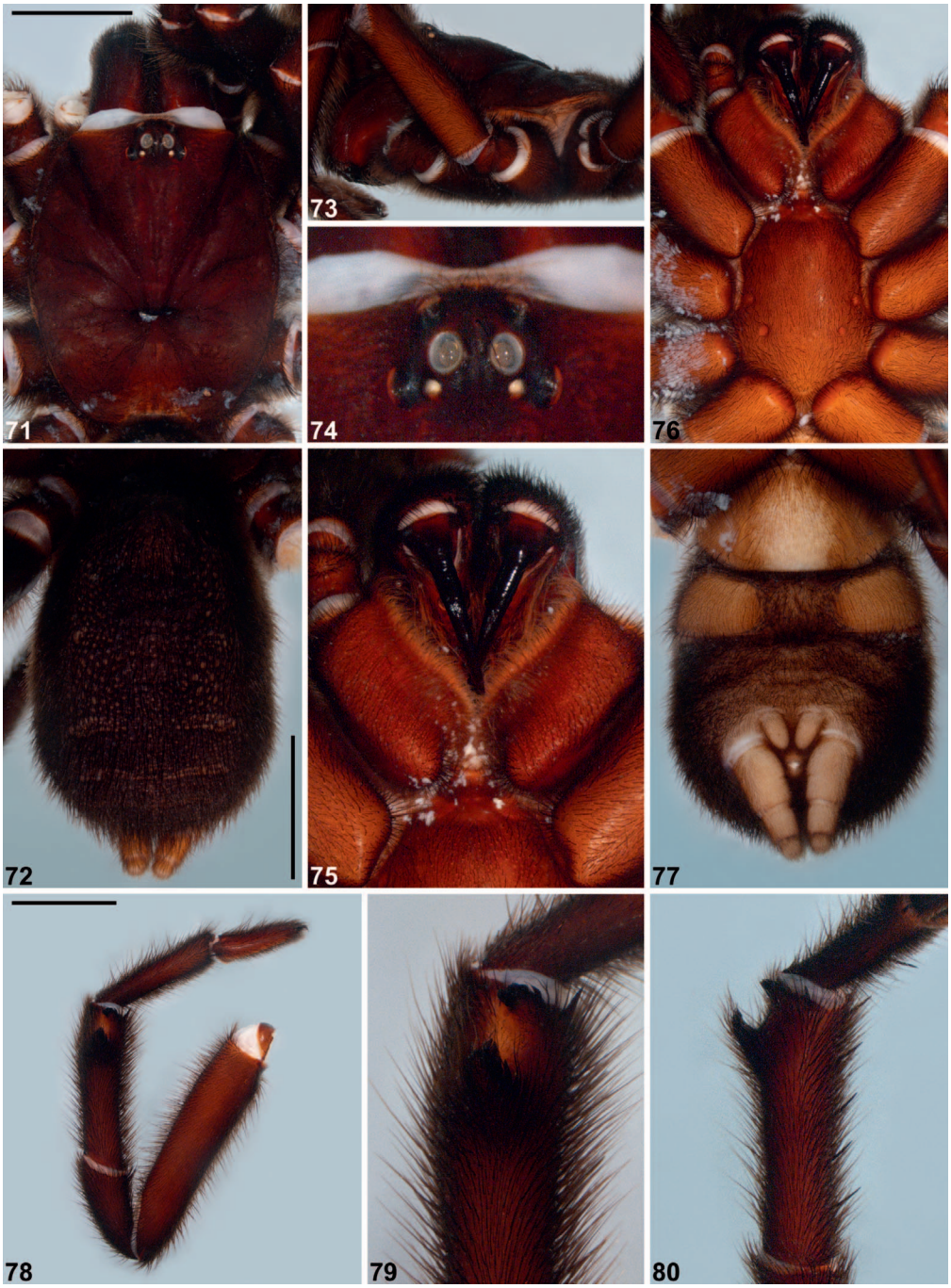
Paratypes. AUSTRALIA: *Western Australia*: 1 ♂, same data as holotype except 1 April 1980 (WAM T16067); 1 ♂, same data (WAM T16068); 1 ♂, same data (WAM T16069); 1 ♂, same data (WAM T16070); 1 ♂, same data except site BHR3 (WAM T16065); 1 ♂, same data (WAM T16066).

Other material examined.—AUSTRALIA: *Western Australia*: 1 ♂, Bungalbin Hill, Helena-Aurora Range (IBRA_COO), 30°16′11″S, 119°46′30″E], wet pitfall trap, November 1995, M.A. Cowan (WAM T34265); 1 ♂, same data (WAM T34266); 1 ♂, Bungalbin Hill, 25 km N. of sandplain (IBRA_COO), 20 February 1989, C. Dickman (WAM T143059).

Etymology.—The specific epithet is a noun in apposition, in reference to the type locality of this species.

Diagnosis.—Males of *Gaius aurora* can be distinguished from those of all other congeners except *G. mainae* by the absence of prolateral clasping spurs on tibia I (Figs. 44–45; cf. Figs. 23, 57, 79, 101, 114, 154); and from *G. mainae* by the size and shape of the RTA, which is much smaller (Fig. 46; cf. Fig. 134).

Description (male holotype).—Total length 29.2. Carapace 11.5 long, 10.0 wide. Abdomen 12.3 long, 7.6 wide. Carapace (Fig. 37) oval, dark chocolate-brown in color with mostly black ocular region; lateral margins densely setose; fovea slightly procurved. Eye group (Fig. 40) trapezoidal (anterior eye row strongly procurved), 0.6 x as long as wide, PLE–PLE/ALE–ALE ratio 1.5; ALE separated by 1.9 x their own diameter; AME separated by less than their own diameter; left PME missing; right PME and PLE separated by approximately 2.0 x diameter of right PME, right PME positioned in line with level of PLE. Maxillae with field of cuspules confined to inner corner; labium without cuspules. Abdomen (Fig. 38) oval, densely setose and dark grey-brown in dorsal view, with paler beige-brown mottling; sclerotized sigilla absent. Legs (Figs. 44, 45) variable shades of dark brown, with light scopulae on tarsi I–II; tibia I with pro-distal comb of macrosetae and row of 7 long retro-ventral macrosetae;



Figures 71–80.—*Gaius cooperi* sp. nov., male holotype (WAM T96604) from Forrestania, 84.3 km E. of Hyden (Western Australia; COO), somatic morphology: 71–72, carapace and abdomen, dorsal view; 73, cephalothorax, lateral view; 74, eyes, dorsal view; 75, mouthparts, ventral view; 76–77, cephalothorax and abdomen, ventral view; 78, leg I, prolateral view; 79, leg I tibia, clasping spurs, prolateral view; 80, leg I tibia, proventral view. Scale bars = 5.0.

metatarsus I with 2 pro-ventral and 5 retro-ventral macrosetae. Leg I: femur 10.6; patella 5.1; tibia 7.1; metatarsus 6.7; tarsus 4.1; total 33.6. Leg I femur–tarsus/carapace length ratio 2.9. Pedipalpal tibia (Figs. 46–48) densely setose, 2.2 x longer than wide, with relatively small spinulate RTA and large, 'finger-like' distal retrolateral tibial apophysis (dRTA) also with sparse field of spinules. Cymbium (Figs. 46–48) setose, with field of weakly-developed spinules disto-dorsally. Embolus (Figs. 46–48) slightly twisted and gently tapered, with very short, triangular embolic apophysis sub-distally.

Distribution and remarks.—*Gaius aurora* is a large species with a restricted distribution in the Helena-Aurora Range (northern Coolgardie bioregion) of Western Australia, with most specimens known from the vicinity of Bungalbin Hill (approximately 115 km NNE. of Southern Cross) (Fig. 11). Nothing is known of the biology of this species, other than

Figures 81–83.—*Gaius cooperi* sp. nov., male holotype (WAM T96604) from Forrestania, 84.3 km E. of Hyden (Western Australia; COO), pedipalp: 81, retrolateral view; 82, retroventral view; 83, prolateral view. Scale bar = 5.0.

that the known male specimens ($n = 10$) were collected wandering in search of females in November–December (30%), February (10%) and April (60%). Females are unknown.

Conservation assessment.—This rare species has a known extent of occurrence (EOO) of < 200 km^2, and an area of occupancy (AOO) within that range of < 10 km^2. While both of these figures are undoubtedly underestimates due to fairly limited sampling in the greater Helena-Aurora Range, good sampling from surrounding areas suggests that the EOO is likely to be $< 10{,}000$ km^2, and almost certainly $<< 20{,}000$ km^2. Similarly, based on those surveys that have occurred in the region, the likely AOO is calculated at < 500 km^2. Given this geographic range, the occurrence of the species at < 10 known sites, and the continuing decline in the area, extent and/or quality of habitat due to current or proposed mining exploration in surrounding areas, this species is considered Vulnerable (B1ab[iii] + B2ab[iii]).

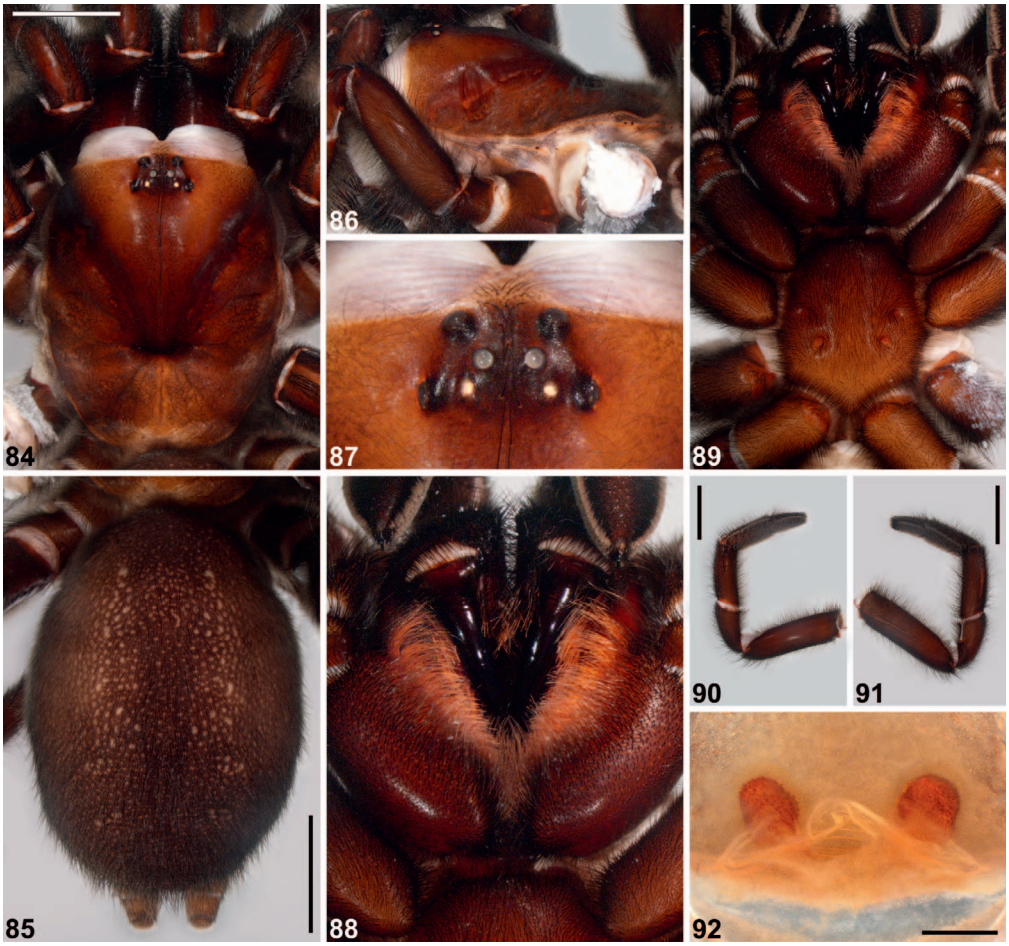
Gaius austini sp. nov.
http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:AACDBBEE-53C5-44FD-8E9A-64DEED6D7123
(Figs. 5, 11, 14, 49–70)

Gaius sp. 'Kalgoorlie' Rix et al., 2017d: 619, figs. 240, 241, 243, 247, 249.

Type material.—*Holotype male*. AUSTRALIA: *Western Australia*: Coolgardie, 32 Hunt Street (IBRA_COO), 30°57′S, 121°09′E, 16 December 1996, R. & J. Kippin (WAM T42166).

Paratypes. AUSTRALIA: *Western Australia*: 1 ♂, Coolgardie (IBRA_COO), 30°57′S, 121°10′E, 11 January 1987, M. Charlton (WAM T27007); 1 ♂, same data except hand collected, 29 December 1993, R. Edwards (WAM T29775); 1 ♂, same locality data, 13 January 2000, I. Keally (WAM T41550); 1 ♂, same locality data except 71 Forrest Street, 28 January 2001, W. Moore (WAM T44217); 1 ♂, same locality data except Forrest Street, 21 February 1997, M. Billing (WAM T44178); 1 ♂, same locality data except 8 King Street, 30°57′S, 121°09′E, 18 December 1996, S. Moore (WAM T41697).

Other material examined.—AUSTRALIA: *Western Australia*: 1 ♂, Boulder (IBRA_COO), 30°47′S, 121°29′E, hand collected, 18 March 1993, R. Ugle (WAM T27981); 1 ♂, same locality data except 193 Western Road, 22 December 1995, J. Hutchinson (WAM T44177); 1 ♂, Chalice Goldmine, ca. 50 km N. of Norseman (IBRA_COO), 31°45′S, 121°47′E, 1 February 1999, M. Ryan (WAM T38858); 1 ♂, Credo Station (IBRA_COO), 30°28′S, 120°50′E, December 1985, E. Halford (WAM T27009); 1 ♀, same locality data except 30°01′43″S, 120°39′00″E, dug from burrow, 3 September 2011, M.S. Harvey (WAM T116013^{DNA_Voucher_NCB_027}; GenB–COI–MG652494; GenB–MRPL45–MG652548, GenB–RPF2–MG652568, GenB–XPNPEP3–MG652588, GenB–ITS–MG652530); 1 ♀, Woodland south of Helena Aurora Range, ca. 80 km NE. of Bullfinch (IBRA_COO), 30°23′49.55″S, 119°47′51.32″E, 17 November 2015, M.K. Curran, D. Harms (WAM T140952^{DNA_Voucher_NCB_026}; GenB–COI–MG652495); 1 ♂, Kalgoorlie (IBRA_COO), 30°45′S, 121°28′E, 30 December 1991, P. Tregatt (WAM T26991); 1 ♂, same data (WAM T26992); 1 ♂, same data except found at night in defensive posture, 30 November 1987, R. Black (WAM T27020); 1 ♂, same locality data, January 1986, D. Pearson (WAM T27021); 1 ♂, same data except 25 February 1994, Dept. of CALM (WAM T29939); 1 ♂, same data except 19 January 1994 (WAM T30021); 1 ♂, same data except 19 January 1995, Museum of The Goldfields (WAM T31789); 1



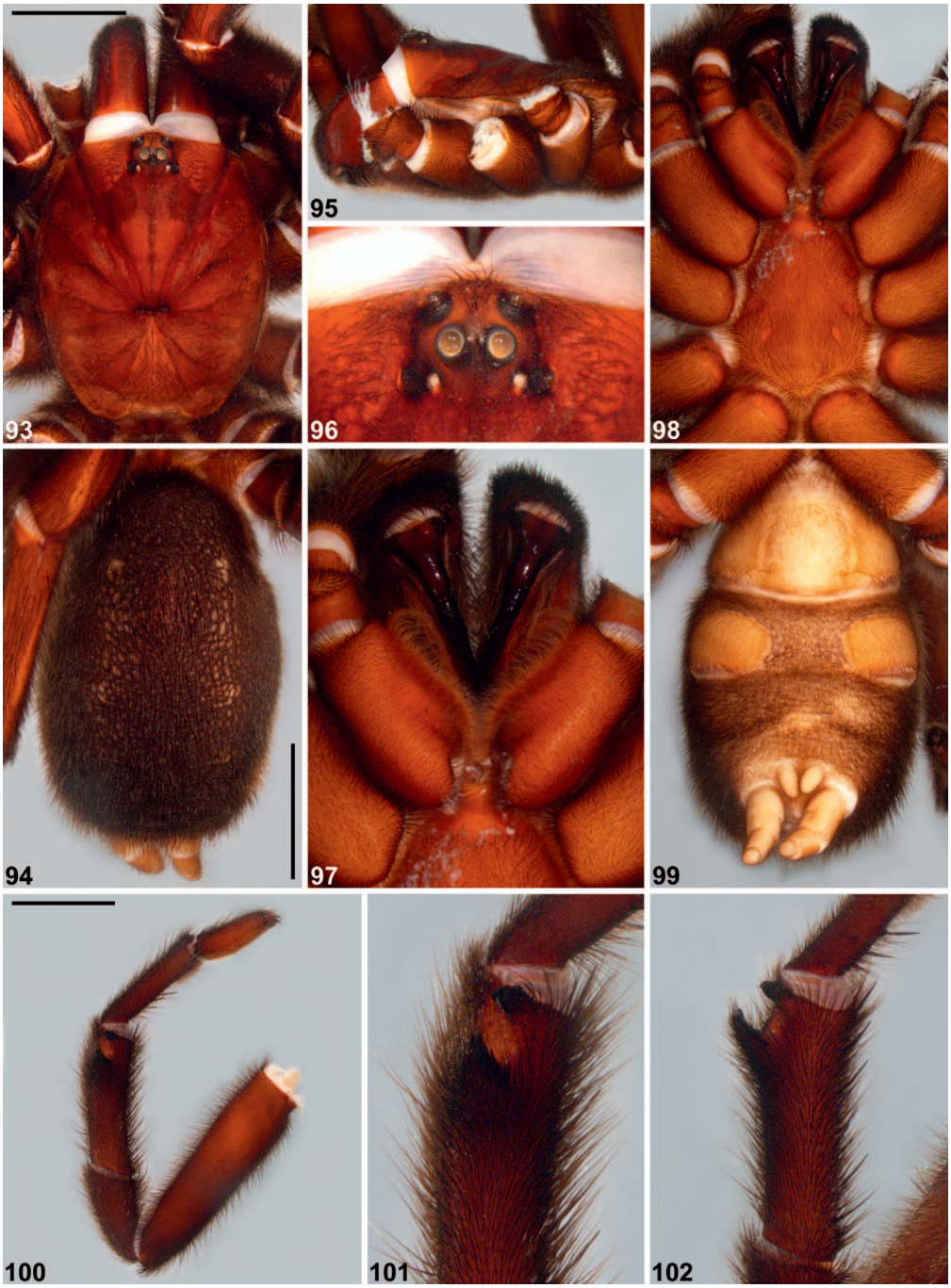
Figures 84–92.—*Gaius cooperi* sp. nov., female (WAM T144017) from Westralia Conservation Park (Western Australia; JAF): 84–85, carapace and abdomen, dorsal view; 86, cephalothorax, lateral view; 87, eyes, dorsal view; 88, mouthparts, ventral view; 89, cephalothorax, ventral view; 90, leg I, prolateral view; 91, leg I, retrolateral view; 92, spermathecae, dorsal view. Scale bars = 5.0 (84–85, 90–91), 1.0 (92).

♂, same locality data except Dugan Street, 7 December 1996, T. Moller (WAM T41699); 1 ♂, same locality data except Hannan Subdivision, inside house, 5 December 1994, D. Brams (WAM T31788); 1 ♂, same locality data, 6 January 1989, K. Parker (WAM T38857); 1 ♂, same locality data except Hare Street, 22 December 1995, E. Robertson (WAM T44171); 1 ♂, same locality data except rubbish tip, 5 December 1994, R. Utterson (WAM T31787); 1 ♂, 10 km E. of Kalgoorlie (IBRA_COO), 30°43′55″S, 121°31′55″E, dry pitfall trap, salmon gum low woodland, dwarf scrub on loam, 29 November 2014, G.P. Harewood (WAM T136255); 1 ♂, same data except 30°44′40″S, 121°34′01″E, blackbutt low woodland over open scrub on loam, 30 January 2014 (WAM T136256); 1 ♂, same data except 30°46′06″S, 121°33′44″E, sheoak forest tree mallee over low scrub on loam (WAM T136257); 1 ♀, ca. 50 km ESE. of Kalgoorlie (IBRA_COO), 30°53′58″S, 121°56′15″E, 8–12 November 2010, S.A. Thompson (WAM T109002^{DNA_Voucher_288}; GenB–CYB–MG652512, GenB–MRPL45–MG652549, GenB–RPF2–MG652570, GenB–XPNPEP3–MG652590, GenB–ITS–MG652532); 1 ♀, Marvel Loch, St Barbara Operation, Cornishman area, site 18 (IBRA_COO), 31°16′16″S, 119°22′12″E, dug from burrow, 1 August 2008, P. Cullen, P. Langlands (WAM T96059^{DNA_Voucher_285}; GenB–MRPL45–MG652550, GenB–RPF2–MG652569, GenB–XPNPEP3–MG652589, GenB–ITS–MG652531); 1 ♂, Mount Burges Station Homestead (IBRA_COO), 30°50′S, 121°06′E, eucalypt woodland on red clay soil, 15 December 1987, D. Egerton-Warburton (WAM T27041).

Etymology.—This species is named in honor of Professor Andy Austin (of the University of Adelaide), in recognition of his contributions to idiopid systematics, and his role in developing and overseeing the Australian Research Council (ARC) idiopid project.

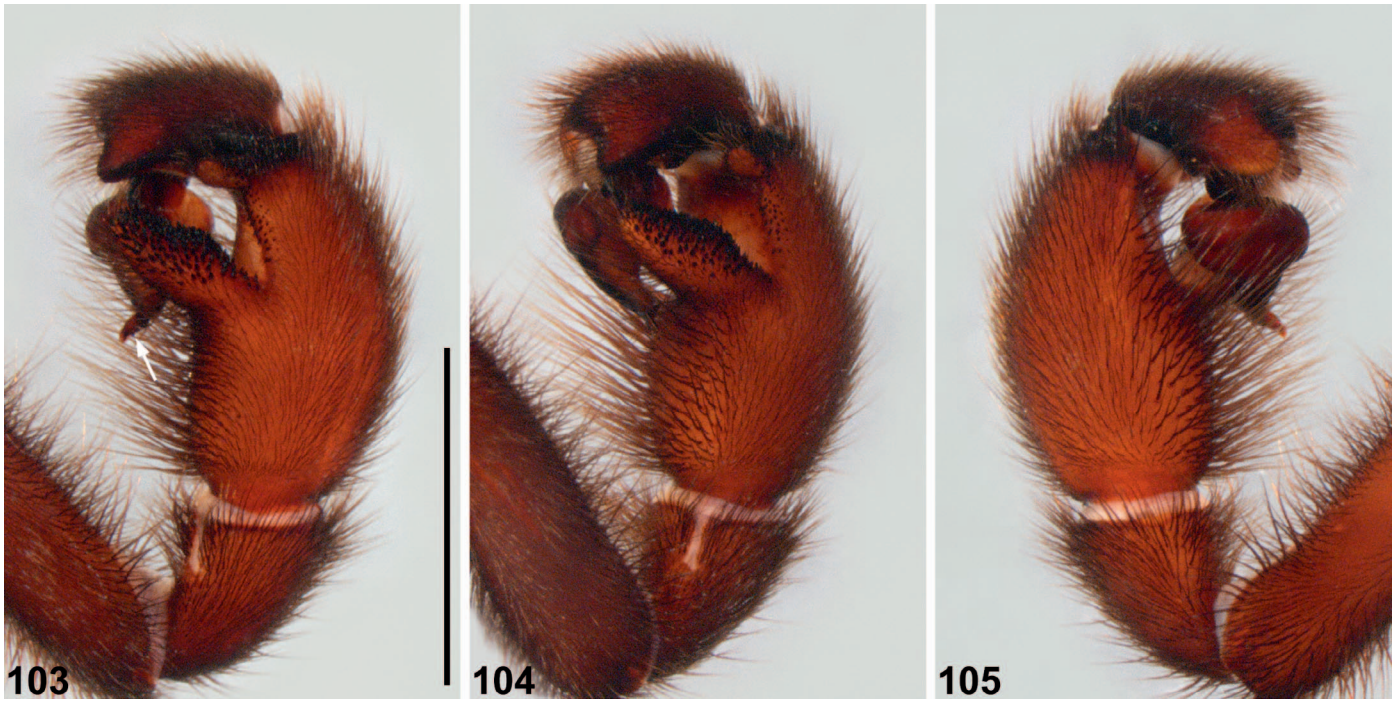
Diagnosis.—Males of *Gaius austini* can be distinguished from those of *G. aurora* and *G. mainae* by the presence of prolateral clasping spurs on tibia I (Figs. 56–58; cf. Figs. 45, 133); from *G. cooperi*, *G. hueyi*, *G. tealei* and *G. villosus* by the size and shape of the RTA, which is not grossly enlarged (Fig. 59; cf. Figs. 25, 81, 103, 156); and from *G. humphreysi* by the inter-distance of the ALE, which are separated by approximately twice their own diameter (Fig. 52; cf. Fig. 109), combined with the morphology of the embolic apophysis, which is positioned sub-distally (Figs. 59–61).

Description (male holotype).—Total length 33.4. Carapace 12.6 long, 10.0 wide. Abdomen 14.7 long, 9.9 wide. Carapace



Figures 93–102.—*Gaius hueyi* sp. nov., male holotype (WAM T32171) from Munglinup (Western Australia; ESP), somatic morphology: 93–94, carapace and abdomen, dorsal view; 95, cephalothorax, lateral view; 96, eyes, dorsal view; 97, mouthparts, ventral view; 98–99, cephalothorax and abdomen, ventral view; 100, leg I, prolateral view; 101, leg I tibia, clasping spurs, prolateral view; 102, leg I tibia, proventral view. Scale bars = 5.0.

(Fig. 49) roughly hexagonal, dark tan-brown in color with mostly black ocular region; lateral margins densely setose; fovea procurved. Eye group (Fig. 52) trapezoidal (anterior eye row strongly procurved), 0.6 x as long as wide, PLE–PLE/ALE–ALE ratio 1.4; ALE separated by 2.0 x their own diameter; AME separated by less than their own diameter; PME separated by 4.6 x their own diameter; PME and PLE separated by approximately 1.5 x diameter of PME, PME positioned in line with level of PLE. Maxillae with field of cuspules confined to inner corner; labium without cuspules. Abdomen (Fig. 50) oval, densely setose and dark grey-brown in dorsal view, with paler beige-brown mottling; sclerotized sigilla absent. Legs (Figs. 56–58) variable shades of dark brown, with light scopulae on tarsi I–II; tibia I with distal pair of prolateral clasping spurs; metatarsus I with 2 pro-ventral and 4 retro-ventral macrosetae. Leg I: femur 10.6; patella 5.5;



Figures 103–105.—*Gaius hueyi* sp. nov., male holotype (WAM T32171) from Munglinup (Western Australia; ESP), pedipalp: 103, retrolateral view (arrow to embolic apophysis); 104, retroventral view; 105, prolateral view. Scale bar = 5.0.

tibia 7.5; metatarsus 6.8; tarsus 4.1; total 34.5. Leg I femur–tarsus/carapace length ratio 2.7. Pedipalpal tibia (Figs. 59–61) densely setose, 1.9 x longer than wide, with proximally-widened, spinulate RTA and broad, subrectangular distal retrolateral tibial apophysis (dRTA) also with field of spinules. Cymbium (Figs. 59–61) setose, with field of spinules disto-dorsally. Embolus (Figs. 59–61) curved, gently tapered, with short, triangular embolic apophysis sub-distally.

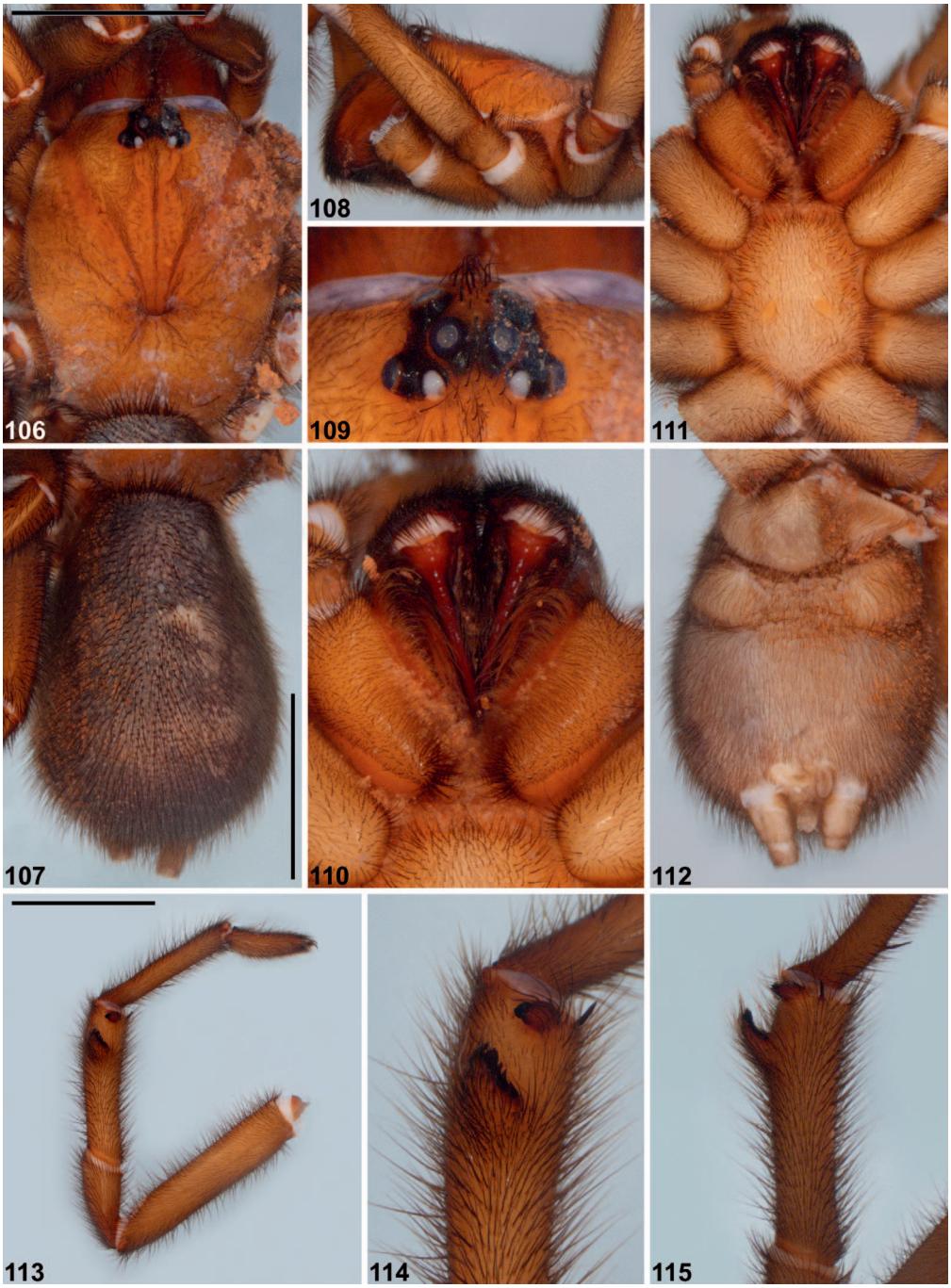
Description (female WAM T96059).—Total length 36.9. Carapace 13.7 long, 10.7 wide. Abdomen 19.1 long, 12.9 wide. Carapace (Fig. 62) roughly hexagonal, dark tan-brown in color with mostly black ocular region; lateral margins densely setose; fovea procurved. Eye group (Fig. 65) trapezoidal (anterior eye row strongly procurved), 0.5 x as long as wide, PLE–PLE/ALE–ALE ratio 1.3; ALE separated by 2.0 x their own diameter; AME separated by approximately their own diameter; PME separated by 5.8 x their own diameter; PME and PLE separated by approximately diameter of PME, PME positioned in line with level of PLE. Maxillae with field of cuspules confined to inner corner; labium without cuspules. Abdomen (Fig. 63) oval, grey-brown in dorsal view, with paler beige-brown mottling and darker cardiac marking; sclerotized sigilla absent. Legs (Figs. 68, 69) variable shades of dark brown, with thick scopulae on tarsi and metatarsi I–II; tibia I with cluster of 2 pro-distal macrosetae and row of 5 long retro-ventral macrosetae; metatarsus I with 6 ventral macrosetae; ventral tarsus I with distal cluster of approximately 7 short macrosetae. Leg I: femur 8.1; patella 5.0; tibia 4.7; metatarsus 3.8; tarsus 2.9; total 24.4. Leg I femur–tarsus/carapace length ratio 1.8. Pedipalp dark brown, spinose on tibia, with thick tarsal scopula. Genitalia (Fig. 70) with pair widely spaced, bud-shaped spermathecae.

Distribution and remarks.—*Gaius austini* is a large species with a widespread distribution in the Coolgardie bioregion of southern inland Western Australia, from Southern Cross and the Helena-Aurora Range east to at least Kalgoorlie and Lake Cowan (Fig. 11). Based on collection records, this species is not uncommon around Coolgardie and Kalgoorlie, where its range overlaps the south-eastern extent of the range of *G. villosus*. In the west of its range, *G. austini* also overlaps with *G. mainae* and possibly also *G. aurora*. *Gaius austini* is closely related to *G. humphreysi* from the northern Murchison (Fig. 13), with which it shares a relatively small RTA and small spermathecae (compared to most other species of *Gaius*). Males ($n = 23$) wander in search of females in the warm (mostly summer) months of November–March (100% of collected specimens), presumably after heavy rain, with a peak of activity in December (43% of collected specimens).

Conservation assessment.—This species has a known extent of occurrence of $> 30{,}000$ km^2, and is therefore not considered threatened under Criterion B. However, preliminary evidence suggests that population declines may have occurred among arid zone Idiopidae in recent decades (Rix et al. 2017c), and further assessment under Criterion A is warranted in the future.

Gaius cooperi sp. nov.
http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:C24017B1-127B-4D9A-AAA8-957D459062F3
(Figs. 4, 9, 11, 14, 71–92)
Gaius sp. 'Collie' Rix et al., 2017d: 619, figs. 245, 250.

Type material.—*Holotype male*. AUSTRALIA: *Western Australia*: Forrestania, 84.3 km E. of Hyden (IBRA_COO), 32°21′50″S, 119°45′30″E, dug from burrow, 18–25 January 2008, P. Runham (WAM T96604^{DNA_Voucher_220}; GenB–



Figures 106–115.—*Gaius humphreysi* sp. nov., male holotype (WAM T96563) from Mount Keith Mine (Western Australia; MUR), somatic morphology: 106–107, carapace and abdomen, dorsal view; 108, cephalothorax, lateral view; 109, eyes, dorsal view; 110, mouthparts, ventral view; 111–112, cephalothorax and abdomen, ventral view; 113, leg I, prolateral view; 114, leg I tibia, clasping spurs, prolateral view; 115, leg I tibia, proventral view. Scale bars = 5.0.

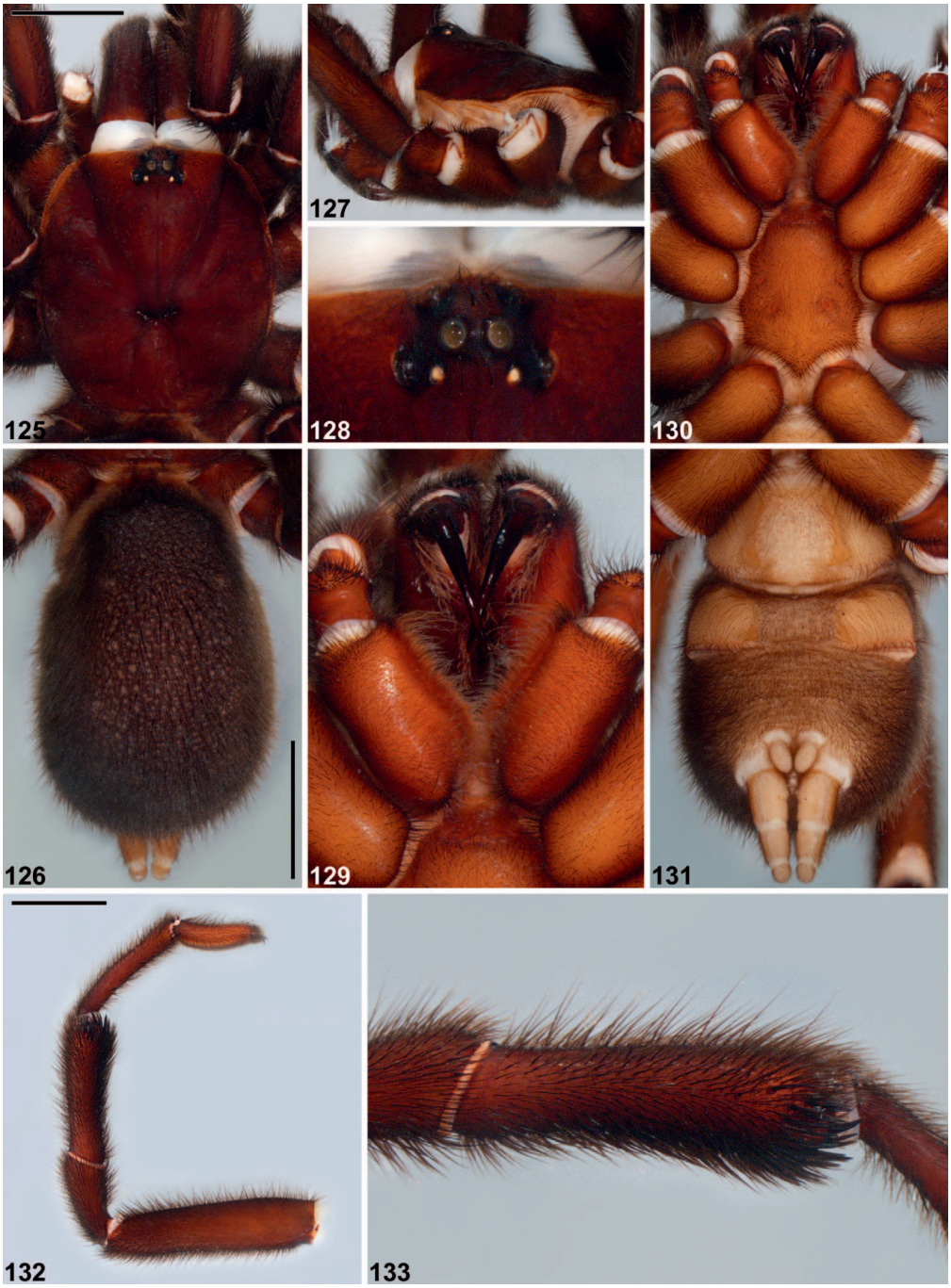
CYB–MG652509, GenB–MRPL45–MG652535, GenB–RPF2–MG652554, GenB–XPNPEP3–MG652574, GenB–ITS–MG652515).

Other material examined.—AUSTRALIA: *Western Australia*: 1 ♂, Allanson (IBRA_JAF), 33°20′S, 116°06′E, February 1992, W. Pool (WAM T27085); 1 ♂, 80 km E. to SE. of Bruce Rock (IBRA_AVW), 31°52′S, 119°00′E, 21 January 1982, M. Gray (WAM T26999); 1 ♂, Camel Lake Nature Reserve, east, site ST 7 (IBRA_ESP), 34°15′59″S, 117°58′44″E, wet pitfall traps, 15 October 1999–1 November 2000, P. Van Heurck et al., CALM Survey (WAM T143054); 1 ♂, same data except south, site ST 4, 34°17′34″S, 117°58′51″E, 15 October 1999–25 November 2000, B. Durrant, CALM Survey (WAM T143055); 1 ♂, same data (WAM T143056); 1 ♂, Collie (IBRA_JAF), 33°21′S, 116°09′E, 16 January 1971, Br. Kelly (WAM T27005); 1 ♂, same locality data, on lawn, March

Figures 116–118.—*Gaius humphreysi* sp. nov., male holotype (WAM T96563) from Mount Keith Mine (Western Australia; MUR), pedipalp: 116, retrolateral view (arrow to embolic apophysis); 117, retroventral view; 118, prolateral view. Scale bar = 5.0.

Figures 119–124.—*Gaius humphreysi* sp. nov., female (WAM T98757) from De La Poer Nature Reserve (Western Australia; MUR): 119, carapace, dorsal view; 120, cephalothorax, lateral view; 121, eyes, dorsal view; 122, leg I, prolateral view; 123, leg I, retrolateral view; 124, spermathecae, dorsal view. Note that the abdomen of this specimen is severely damaged and the ventral cephalothorax is obscured by dried hemolymph. Scale bars = 5.0 (119, 122–123), 1.0 (124).

1987, D. Peters (WAM T27006); 1 ♂, same locality data except Park Street, April 2006, C. Letica (WAM T143045); 1 ♂, Cordinup, Green Range, 6328 (IBRA_ESP), 34°40′S, 118°25′E, 23 March 1982, B. Long (WAM T27015); 1 ♂, Gulson Lake, site HY 8 (IBRA_MAL), 32°47′11″S, 119°22′07″E, wet pitfall traps, 30 October 1997–20 May 1998, E. Ladhams, CALM Survey (WAM T143053); 1 ♂, Hyden (IBRA_MAL), 32°27′S, 118°52′E, 22 February 1979, P.A. Mulcahy (WAM T27017); 1 ♂, same data except 9 March 1988, N. Fotheringham (WAM T27018); 1 ♂, Lake King (IBRA_MAL), 33°05′08″S, 119°40′42″E, 24 January 1990, C. Kimbler (WAM T20546); 1 ♂, 10 km E. of Lake Varley (IBRA_MAL), 32°42′S, 119°29′E, 5 February 1976, G. Barron (WAM T27084); 1 ♂, McDermid Rock, site MRR2 (IBRA_COO), 32°03′S, 120°42′E, pitfall trap, *Callitris campestris*/heath, 11–17 February 1981, W.F. Humphreys et al. (WAM T16177); 1 ♂, same data except site MRR3, shrubland (WAM T16178); 1 ♂, same data (WAM T16199); 1 ♂, same data (WAM T16200); 1 ♂, Newdegate (IBRA_MAL), 33°06′S, 119°01′E, 7 April 1989, C. Thompson (WAM T26990); 1 ♂, same data except 5 March 1974, E.T. Richardson (WAM T27046); 1 ♂, Orana, Albany Highway



Figures 125–133.—*Gaius mainae* sp. nov., male holotype (WAM T40696) from Grass Patch (Western Australia; MAL), somatic morphology: 125–126, carapace and abdomen, dorsal view; 127, cephalothorax, lateral view; 128, eyes, dorsal view; 129, mouthparts, ventral view; 130–131, cephalothorax and abdomen, ventral view; 132, leg I, prolateral view; 133, leg I tibia, prolateral view. Scale bars = 5.0.

near Anson Road (IBRA_JAF), 35°00′S, 117°51′E, 10 January 2006, A.D. Brown (WAM T76089); 1 ♂, Pinjalup Road, E. of Tenterden, site ST 2 (IBRA_JAF), 34°21′44″S, 117°34′07″E, wet pitfall traps, 15 October 1999–30 November 2000, B. Durrant, CALM Survey (WAM T143046); 1 ♂, same data except site ST 3, 34°21′38″S, 117°33′43″E, 15 October 1999–1 November 2000, P. Van Heurck et al., CALM Survey (WAM T143047); 1 ♂, same data (WAM T143048); 1 ♂, same data (WAM T143049); 1 ♂, Pyramid Lake, east, ca. 14 km NW. of Grass Patch, site GP 4 (IBRA_MAL), 33°09′31″S, 121°00′03″E, wet pitfall traps, 15 October 1999–26 November 2000, B. Durrant, CALM Survey (WAM T143052); 1 ♂, Tambellup (IBRA_AVW), 34°03′S, 117°39′E, hand collected, June 1953, R. Mawsen (WAM T3725); 1 ♂, same locality data, 16–17 February 1989, J. Cavanagh (WAM T27082); 1 ♂, Tenterden (IBRA_JAF), 34°22′S, 117°33′E, hand collected, 25

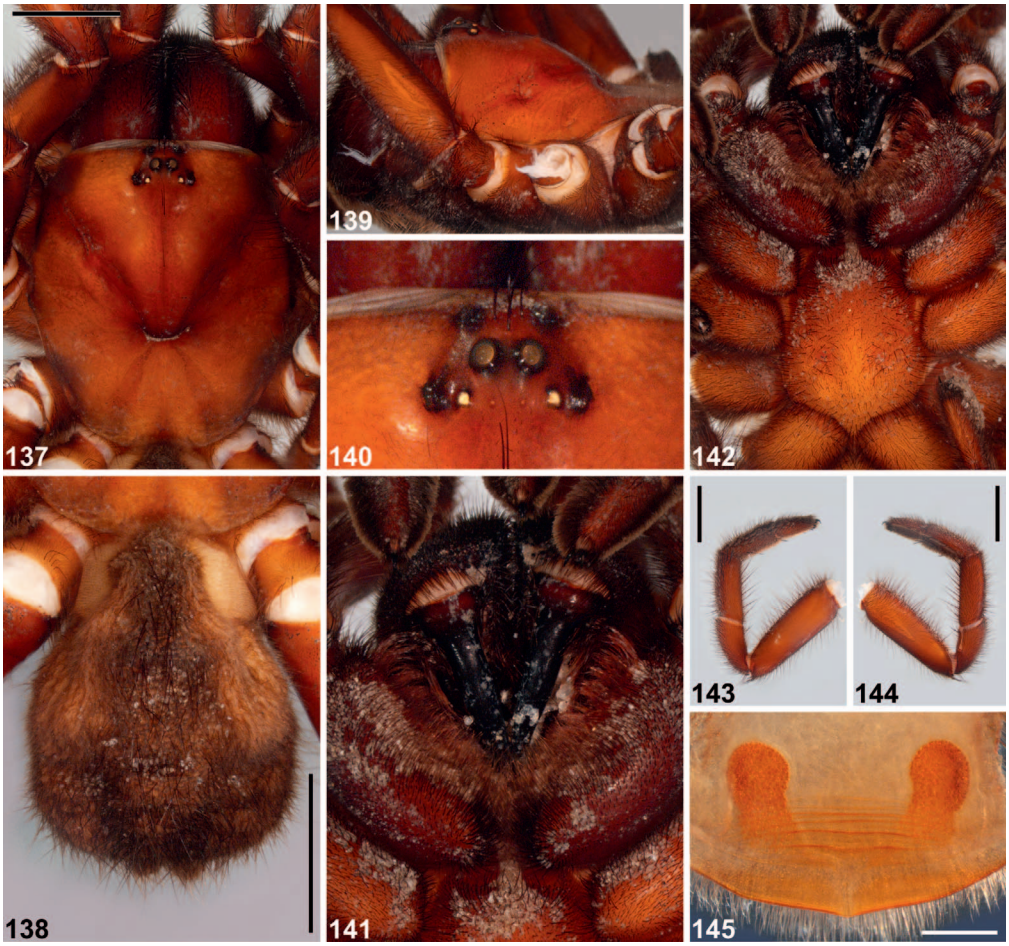
Figures 134–136.—*Gaius mainae* sp. nov., male holotype (WAM T40696) from Grass Patch (Western Australia; MAL), pedipalp: 134, retrolateral view; 135, retroventral view; 136, prolateral view. Scale bar = 5.0.

March 1993, D.M. Sandstrom (WAM T27983); 1 ♂, same locality data, 9 March 2001, J. Cavanagh (WAM T44157[DNA_Voucher_215]; GenB–CYB–MG652510, GenB–MRPL45–MG652536, GenB–RPF2–MG652556, GenB–XPNPEP3–MG652585, GenB–ITS–MG652517); 1 ♀, Voyager Quarry, Mundaring Shire, ca. 3 km NE. of The Lakes (IBRA_JAF), 31°51′59.7″S, 116°21′03.2″E, dug from burrow, 11 July 2007, P. Runham, T. Schmidt (WAM T143511[DNA_Voucher_NCB_023]; GenB–COI–MG652496, GenB–RPF2–MG652553, GenB–XPNPEP3–MG652573, GenB–ITS–MG652514); 1 juvenile, same data (WAM T143521); 1 ♀, same data except 31°51′59.5″S, 116°21′03.1″E (WAM T143512[DNA_Voucher_NCB_028]; GenB–MRPL45–MG652533, GenB–RPF2–MG652552, GenB–XPNPEP3–MG652572, GenB–ITS–MG652513); 1 ♀, same data except 31°51′59.3″S, 116°21′03.2″E (WAM T143516); 1 juvenile, same data except 31°51′59.1″S, 116°21′03.1″E (WAM T143513); 1 juvenile, same data (WAM T143514); 1 juvenile, same data except 31°51′59.7″S, 116°21′03.3″E (WAM T143515); 1 juvenile, same data except 31°51′59.3″S, 116°21′03.1″E (WAM T143517); 1 juvenile, same data except 31°51′59.2″S, 116°21′03.2″E (WAM T143519); 1 juvenile, same data except 31°51′59.8″S, 116°21′03.2″E (WAM T143520); 1 ♀, Westralia Conservation Park, ca. 5 km W. of Collie (IBRA_JAF), 33°20′56″S, 116°06′55″E, from burrow, ca. 40 cm deep, 10 August 2017, J.A. Huey, M.S. Harvey (WAM T144017[DNA_Voucher_NCB_024]; GenB–MRPL45–MG652534, GenB–RPF2–MG652555, GenB–XPNPEP3–MG652582, GenB–ITS–MG652516).

Etymology.—This species is named in honor of Professor Steve Cooper (of the South Australian Museum), in recognition of his contributions to idiopid systematics, and his role in developing the Australian Research Council (ARC) idiopid project.

Diagnosis.—Males of *Gaius cooperi* can be distinguished from those of *G. aurora* and *G. mainae* by the presence of prolateral clasping spurs on tibia I (Figs. 78–80; cf. Figs. 45, 133); from *G. austini* and *G. humphreysi* by the size and shape of the RTA, which is grossly enlarged (Fig. 81; cf. Figs. 59, 116); and from *G. hueyi*, *G. tealei* and *G. villosus* by the size and shape of the distal retrolateral tibial apophysis (dRTA), which is hooked, with a constricted proximal 'stem' and variably-shaped, distally widened 'knob' (Fig. 81; cf. Figs. 25, 103, 156).

Description (male holotype).—Total length 35.1. Carapace 12.7 long, 10.4 wide. Abdomen 12.9 long, 8.4 wide. Carapace (Fig. 71) broadly oval, dark chocolate-brown in color with mostly black ocular region; lateral margins densely setose; fovea slightly procurved. Eye group (Fig. 74) trapezoidal (anterior eye row strongly procurved), 0.6 x as long as wide, PLE–PLE/ALE–ALE ratio 1.5; ALE separated by 1.8 x their own diameter; AME separated by less than their own diameter; PME separated by 3.8 x their own diameter; PME and PLE separated by approximately 2.0 x diameter of PME, PME positioned in line with level of PLE. Maxillae with field of cuspules confined to inner corner; labium without cuspules. Abdomen (Fig. 72) oval, densely setose and dark grey-brown in dorsal view, with paler beige-brown mottling and two pairs of faint posterior chevrons; sclerotized sigilla absent. Legs (Figs. 78–80) variable shades of dark brown, with light scopulae on tarsi I–II and distal third of metatarsi I–II; tibia I with row of 5 long retro-ventral macrosetae and distal pair of prolateral clasping spurs; metatarsus I with 2 pro-ventral and 3 retro-ventral macrosetae. Leg I: femur 11.2; patella 5.7; tibia

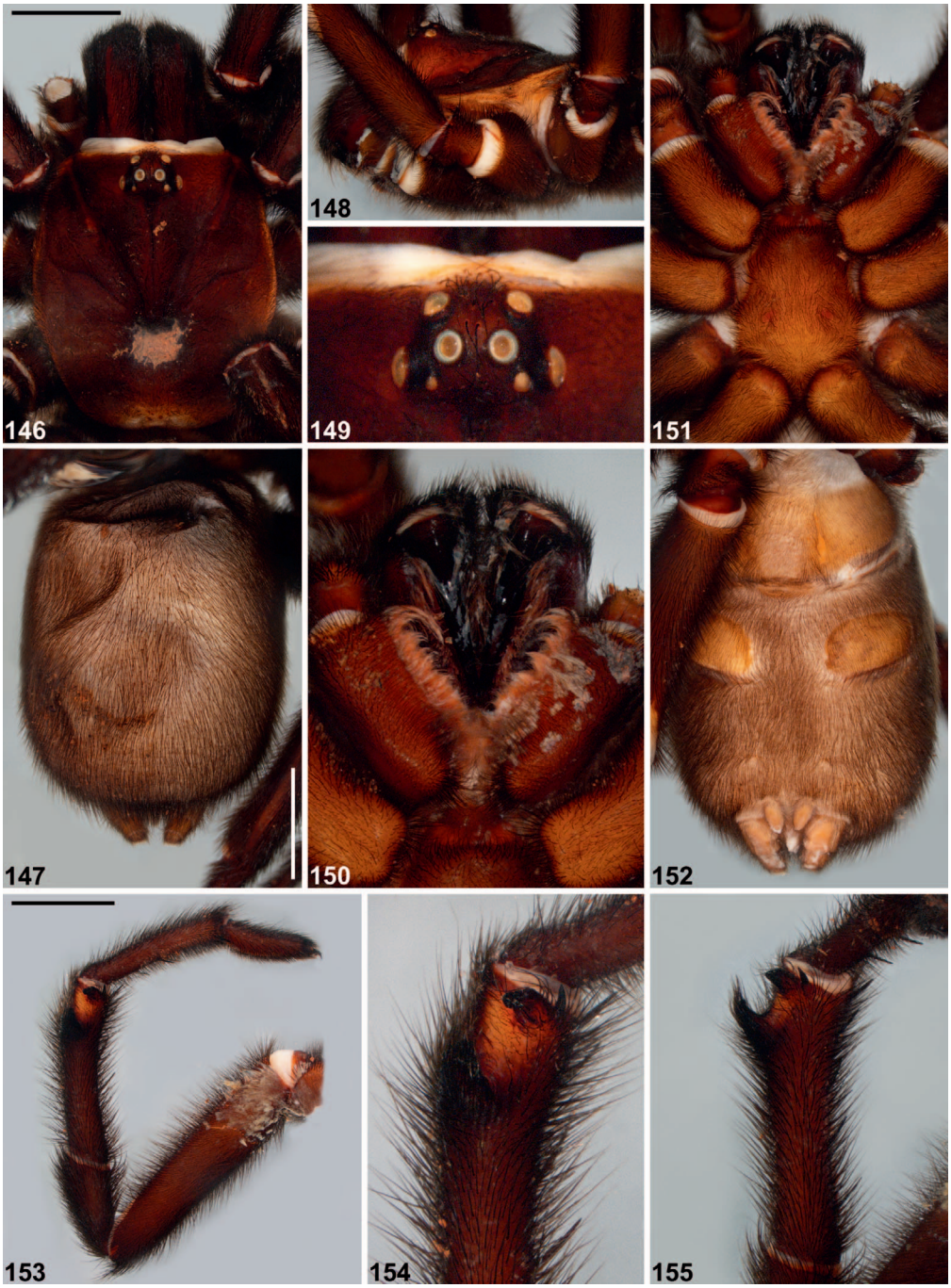


Figures 137–145.—*Gaius mainae* sp. nov., female paratype (WAM T41380) from Grass Patch (Western Australia; MAL): 137–138, carapace and abdomen, dorsal view; 139, cephalothorax, lateral view; 140, eyes, dorsal view; 141, mouthparts, ventral view; 142, cephalothorax, ventral view; 143, right leg I, prolateral view (flipped horizontal); 144, right leg I, retrolateral view (flipped horizontal); 145, spermathecae, dorsal view. Scale bars = 5.0 (137–138, 143–144), 1.0 (145).

7.5; metatarsus 6.6; tarsus 4.1; total 35.1. Leg I femur–tarsus/carapace length ratio 2.8. Pedipalpal tibia (Figs. 81–83) densely setose, 2.0 x longer than wide, with massive spinulate RTA and large, hooked distal retrolateral tibial apophysis (dRTA) with proximal 'stem', distally widened 'knob' and sparse field of spinules. Cymbium (Figs. 81–83) setose, with field of weakly-developed spinules disto-dorsally. Embolus (Figs. 81–83) relatively broad at base and twisted, with short, triangular embolic apophysis sub-distally.

Description (female WAM T144017).—Total length 36.8. Carapace 13.7 long, 11.2 wide. Abdomen 16.5 long, 11.7 wide. Carapace (Fig. 84) oval, dark brown in color (dark brown-black in life; Fig. 4) with mostly black ocular region; posterior pars cephalica and lateral margins densely setose; fovea procurved. Eye group (Fig. 87) trapezoidal (anterior eye row strongly procurved), 0.6 x as long as wide, PLE–PLE/ALE–ALE ratio 1.4; ALE separated by 2.8 x their own diameter; AME separated by slightly more than their own diameter; PME separated by 4.4 x their own diameter; PME and PLE separated by approximately 2.0 x diameter of PME, PME positioned in line with level of PLE. Maxillae with field of cuspules confined to inner corner; labium without cuspules. Abdomen (Fig. 85) oval, dark brown in dorsal view (dark brown in life; Fig. 4), with paler beige-brown mottling and two pairs of faint posterior chevrons; sclerotized sigilla absent. Legs (Figs. 90, 91) variable shades of dark brown, with thick scopulae on tarsi and metatarsi I–II; tibia I with cluster of 7 pro-distal and 2 retro-ventral macrosetae; metatarsus I with 1 pro-ventral and 3 retro-ventral macrosetae; ventral tarsus I with distal cluster of 4 short macrosetae. Leg I: femur 9.3; patella 5.3; tibia 5.4; metatarsus 5.2; tarsus 3.2; total 28.5. Leg I femur–tarsus/carapace length ratio 2.1. Pedipalp dark brown, spinose on tibia, with thick tarsal scopula. Genitalia (Fig. 92) with pair of large, widely spaced, bud-shaped spermathecae.

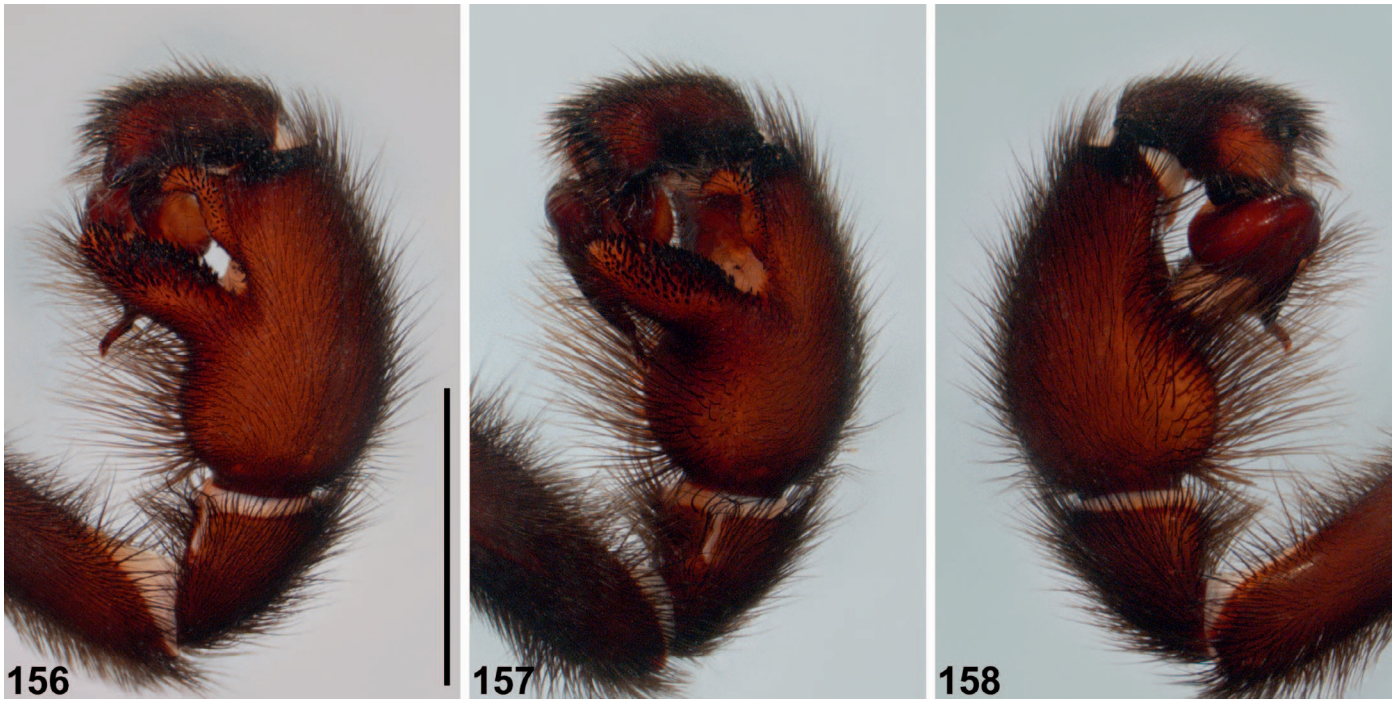
Distribution and remarks.—*Gaius cooperi* (formerly known by WAM identification code 'MYG063') is a large species with a widespread distribution in the Mallee and surrounding bioregions of southern Western Australia, from Collie, Tenterden and Albany in the west, north to Voyager Quarry and Holleton, and east to McDermid Rock and Pyramid Lake (Fig. 11). However, based on collection records, this species appears to occur in three disjunct zones: around Collie and Voyager Quarry in the Jarrah Forest; around Albany,



Figures 146–155.—*Gaius tealei* sp. nov., male holotype (WAM T117550) from Lorna Glen Station (Western Australia; MUR), somatic morphology: 146–147, carapace and abdomen, dorsal view; 148, cephalothorax, lateral view; 149, eyes, dorsal view; 150, mouthparts, ventral view; 151–152, cephalothorax and abdomen, ventral view; 153, leg I, prolateral view; 154, leg I tibia, clasping spurs, prolateral view; 155, leg I tibia, proventral view. Scale bars = 5.0.

Tenterden, Tambellup and Cordinup in the Great Southern region; and in the zone demarcated by Newdegate, Holleton, McDermid Rock and Pyramid Lake (Fig. 11). Males ($n = 21$) wander in search of females in the warm (mostly summer) months of January–April (95% of collected specimens), presumably after heavy rain, with a peak of activity in February and March (62% of collected specimens).

Conservation assessment.—This species has a known extent of occurrence of approximately 100,000 km^2, and is therefore not considered threatened under Criterion B. However, preliminary evidence suggests that population declines may have occurred among arid zone Idiopidae in recent decades (Rix et al. 2017c), and further assessment under Criterion A is warranted in the future. Indeed, the Voyager Quarry



Figures 156–158.—*Gaius tealei* sp. nov., male holotype (WAM T117550) from Lorna Glen Station (Western Australia; MUR), right pedipalp (flipped horizontal for comparison): 156, retrolateral view; 157, retroventral view; 158, prolateral view. Scale bar = 5.0.

population, near The Lakes (east of Perth), is possibly now extinct due to expanded mining activity at the only known location.

Gaius hueyi sp. nov.
http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:C3C3714E-5306-4B49-8ED9-9CC0B7B2A1B7
(Figs. 11, 14, 93–105)

Type material.—*Holotype male*. AUSTRALIA: *Western Australia*: Munglinup (IBRA_ESP), 33°42′S, 120°51′E, hand collected, 12 January 1995, R. Davis (WAM T32171).

Paratypes. AUSTRALIA: *Western Australia*: 1 ♂, Munglinup Beach (IBRA_ESP), 33°53′S, 120°48′E, hand collected under *Melaleuca*, 25 March 1995, M. Jeffery (WAM T32555); 1 ♂, 3 km N. of mouth of Munglinup River (W. of Esperance) (IBRA_ESP), 33°40′S, 120°51′E, at night, moving over dead grass/granite, 8 March 1988, P.J. Fuller (WAM T27045).

Other material examined.—AUSTRALIA: *Western Australia*: 1 ♂, Esperance (IBRA_ESP), 33°51′S, 121°53′E, 5 March 1974, P.K. Arlidge (WAM T29850); 1 ♂, Esperance area (IBRA_ESP), 33°51′S, 121°53′E, 5 February 1999, S. Perks (WAM T41698); 1 ♂, Fields Road, S. of Griffiths Road, site GP 12 (IBRA_MAL), 33°28′31″S, 121°14′10″E, wet pitfall traps, 15 October 1999–1 November 2000, P. Van Heurck et al., CALM Survey (WAM T143051); 2 ♂, Jerdacuttup, location 829 (IBRA_ESP), 33°42′S, 120°28′E, 23 February 1987, G. Boothey (WAM T143057); 1 ♂, 11 km W. of Point Dempster (IBRA_ESP), 33°38′S, 123°44′E, 11 March 1984, R.A. How (WAM T27051); 1 ♂, Ravensthorpe, Springvale Road (IBRA_ESP), 33°35′S, 120°03′E, hand collected, 22 March 1993, G. Boothey (WAM T27982).

Etymology.—This species is named in honor of Dr. Joel Huey (of the Western Australian Museum), in recognition of his contributions to mygalomorph systematics, and for assisting with the sequencing component of this study.

Diagnosis.—Males of *Gaius hueyi* can be distinguished from those of *G. aurora* and *G. mainae* by the presence of prolateral clasping spurs on tibia I (Figs. 100–102; cf. Figs. 45, 133); from *G. austini* and *G. humphreysi* by the size and shape of the RTA, which is grossly enlarged (Fig. 103; cf. Figs. 59, 116); and from *G. cooperi*, *G. tealei* and *G. villosus* by the size and shape of the distal retrolateral tibial apophysis (dRTA), which is not hooked, and forms a simple, rounded, disto-ventrally directed process (Fig. 103; cf. Figs. 25, 81, 156).

Description (male holotype).—Total length 31.6. Carapace 12.7 long, 10.3 wide. Abdomen 13.9 long, 8.9 wide. Carapace (Fig. 93) oval, dark tan-brown in color with mostly black ocular region; lateral margins densely setose; fovea slightly procurved. Eye group (Fig. 96) trapezoidal (anterior eye row strongly procurved), 0.7 x as long as wide, PLE–PLE/ALE–ALE ratio 1.5; ALE separated by 1.5 x their own diameter; AME separated by less than their own diameter; PME separated by 5.0 x their own diameter; PME and PLE separated by approximately 1.5 x diameter of PME, PME positioned in line with level of PLE. Maxillae with field of cuspules confined to inner corner; labium without cuspules. Abdomen (Fig. 94) oval, densely setose and dark grey-brown in dorsal view, with paler beige-brown mottling and two pairs of faint posterior chevrons; sclerotized sigilla absent. Legs (Figs. 100–102) variable shades of dark brown, with light scopulae on tarsi I–II and distal third of metatarsi I–II; tibia I with row of 6 long retro-ventral macrosetae and distal pair of prolateral clasping spurs; metatarsus I with 6 pro-ventral and 5 retro-ventral macrosetae. Leg I: femur 10.8; patella 5.3; tibia

7.1; metatarsus 6.2; tarsus 3.9; total 33.3. Leg I femur–tarsus/carapace length ratio 2.6. Pedipalpal tibia (Figs. 103–105) densely setose, 1.9 x longer than wide, with massive spinulate RTA and large, rounded, disto-ventrally directed distal retrolateral tibial apophysis (dRTA) also with sparse field of proximal spinules. Cymbium (Figs. 103–105) setose, with field of weakly-developed spinules disto-dorsally. Embolus (Figs. 103–105) relatively broad at base and twisted, with short, triangular embolic apophysis sub-distally.

Distribution and remarks.—*Gaius hueyi* is a large species with a restricted distribution in the Esperance Plains bioregion of southern Western Australia, from Ravensthorpe east to Point Dempster (Fig. 11). Males ($n = 8$) generally wander in search of females in the warm (mostly summer) months of January–March (100% of collected specimens), presumably after heavy rain, with a possible peak of activity in March (63% of collected specimens). Females are unknown.

Conservation assessment.—This rare species has a known extent of occurrence (EOO) of approximately 14,000 km^2, and an estimated area of occupancy (AOO) within that range of $<$ 2,000 km^2. Given this geographic range, the occurrence of the species at $<$ 10 severely fragmented sites, and the continuing decline in the area, extent and/or quality of habitat due largely to fungal dieback disease (caused by *Phytophthora*), this species is considered Vulnerable (B1ab[iii] + B2ab[iii]).

Gaius humphreysi sp. nov.
http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:82765493-426E-4809-840B-D655D4113802
(Figs. 11, 14, 106–124)

Type material.—*Holotype male*. AUSTRALIA: *Western Australia*: Mount Keith Mine, 82.5 km SE. of Wiluna (IBRA_MUR), 27°16′32″S, 120°33′48″E, 12 November 2006, R. Teale, Z. Hamilton (WAM T96563^{DNA_Voucher_222}; GenB–COI–MG652497).

Other material examined.—AUSTRALIA: *Western Australia*: 1 ♀, De La Poer Nature Reserve (IBRA_MUR), 27°24′18.97″S, 122°43′33.85″E, 10 September 2009, B. Durrant, M. Hoskins (WAM T98757^{DNA_Voucher_289}; GenB–COI–MG652498, GenB–CYB–MG652511, GenB–MRPL45–MG652551, GenB–RPF2–MG652571, GenB–XPNPEP3–MG652591, GenB–ITS–MG652529).

Other material examined (tentatively assigned).—AUSTRALIA: *Western Australia*: 1 ♂, Caiguna (IBRA_COO), 32°16′S, 125°29′E, 4 March 1971, E.A. Odell (WAM T26984).

Etymology.—This species is named in honor of Garth Humphreys (of Biota Environmental Sciences), in recognition of his support of the Australian Research Council (ARC) idiopid project since its commencement in 2012.

Diagnosis.—Males of *Gaius humphreysi* can be distinguished from those of *G. aurora* and *G. mainae* by the presence of prolateral clasping spurs on tibia I (Figs. 113–115; cf. Figs. 45, 133); from *G. cooperi*, *G. hueyi*, *G. tealei* and *G. villosus* by the size and shape of the RTA, which is not grossly enlarged (Fig. 116; cf. Figs. 25, 81, 103, 156); and from *G. austini* by the inter-distance of the ALE, which are separated by approximately their own diameter (Fig. 109; cf. Fig. 52), combined with the morphology of the embolic apophysis, which is positioned distally (Figs. 116, 118). See remarks below for information regarding an aberrant male specimen from Caiguna (WAM T26984), which may not be conspecific with this species.

Description (male holotype).—Total length 20.1. Carapace 8.4 long, 6.6 wide. Abdomen 9.7 long, 6.7 wide. Carapace (Fig. 106) oval, tan-brown in color with mostly black ocular region; lateral margins densely setose; fovea slightly procurved. Eye group (Fig. 109) trapezoidal (anterior eye row strongly procurved), 0.6 x as long as wide, PLE–PLE/ALE–ALE ratio 1.5; ALE separated by 1.3 x their own diameter; AME separated by less than their own diameter; PME separated by 2.8 x their own diameter; PME and PLE separated by approximately diameter of PME, PME positioned slightly posterior to level of PLE. Maxillae and labium without cuspules. Abdomen (Fig. 107) oval, densely setose and dark grey in dorsal view, with paler beige-grey mottling; sclerotized sigilla absent. Legs (Figs. 113–115) variable shades of tan-brown, with light scopulae on tarsi I–II; tibia I with distal pair of prolateral clasping spurs; metatarsus I with 2 pro-ventral and 2 retro-ventral macrosetae. Leg I: femur 7.5; patella 3.7; tibia 5.2; metatarsus 5.4; tarsus 2.7; total 24.5. Leg I femur–tarsus/carapace length ratio 2.9. Pedipalpal tibia (Figs. 116–118) densely setose, 1.8 x longer than wide, with porrect, spinulate RTA and broad, subquadrate distal retrolateral tibial apophysis (dRTA) also with field of spinules. Cymbium (Figs. 116–118) setose, with field of spinules disto-dorsally. Embolus (Figs. 116–118) curved, gently tapered, with distal, triangular embolic apophysis forming distinctly expanded tip.

Description (female WAM T98757).—Total length approximately 32.0 (abdomen severely damaged). Carapace 12.2 long, 9.4 wide. Abdomen approximately 14.7 long (severely damaged). Carapace (Fig. 119) roughly hexagonal, dark tan-brown in color with mostly black ocular region; lateral margins densely setose; fovea procurved. Eye group (Fig. 121) trapezoidal (anterior eye row strongly procurved), 0.6 x as long as wide, PLE–PLE/ALE–ALE ratio 1.5; ALE separated by approximately their own diameter; AME separated by approximately their own diameter; PME separated by 3.6 x their own diameter; PME and PLE separated by approximately diameter of PME, PME positioned slightly posterior to level of PLE. Maxillae and labium obscured by dried hemolymph. Abdomen severely damaged. Legs (Figs. 122, 123) variable shades of dark brown, with thick scopulae on tarsi and metatarsi I–II; tibia I with cluster of 2 pro-distal and 2 ventral macrosetae, and row of 5 long retro-ventral macrosetae; metatarsus I with 6 ventral macrosetae; ventral tarsus I with distal cluster of short macrosetae, obscured by dried hemolymph. Leg I: femur 7.7; patella 4.7; tibia 4.4; metatarsus 4.1; tarsus 2.8; total 23.7. Leg I femur–tarsus/carapace length ratio 1.9. Pedipalp dark brown, spinose on tibia, with thick tarsal scopula. Genitalia (Fig. 124) with pair widely spaced, bud-shaped spermathecae on short stalks.

Distribution and remarks.—*Gaius humphreysi* (formerly known by WAM identification code 'MYG061') is a rare, medium-large species with a poorly known distribution in the north-eastern Murchison bioregion, from Mount Keith east to at least the De La Poer Nature Reserve (Fig. 11). A single isolated specimen from Caiguna in the far eastern Coolgardie bioregion (Fig. 11), which has a very similar pedipalp morphology to the holotype (see Supplementary File 1, online at http://dx.doi.org/10.1636/JoA-S-17-079.s1), is also tenta-

tively included here, but is larger, with more widely spaced ALEs; additional specimens and/or molecular data are required to confirm the identification of this population. *Gaius humphreysi* is closely related to *G. austini* from the Coolgardie bioregion (Fig. 13), with which it shares a relatively small RTA and small spermathecae (compared to most other species of *Gaius*). Nothing is known of the biology of this species, other than that the holotype male specimen was collected in November, and the tentatively assigned Caiguna specimen was collected in March.

Conservation assessment.—Due to the known occurrence of this species at only two (or possibly three; see above) widely separated localities, we consider it data deficient for the purposes of conservation assessment.

Gaius mainae sp. nov.
http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:E6C6090E-8217-4388-B00B-47D09A76471F
(Figs. 11, 14, 125–145)

Type material.—*Holotype male*. AUSTRALIA: *Western Australia*: Grass Patch (IBRA_MAL), 33°14′S, 121°43′E, on toilet floor, 19 December 1995, B. & P. Starcevich (WAM T40696).

Paratypes. AUSTRALIA: *Western Australia*: 1 ♂, same locality data as holotype, 31 March 2005, C. & M. Longbottom (WAM T63207); 1 ♂, same locality data except grain bin area, 10 May 1987, J. Durbridge (WAM T26988); 1 ♂, same locality data except Grass Patch Primary School, on verandah, cool, wet, 8 May 1987, A.F. Longbottom (WAM T26987); 1 ♂, same locality data except Grass Patch townsite, on verandah at night, stormy, 28 March 2005, S. & D. Jacka (WAM T63206^{DNA_Voucher_218}; GenB–CYB–MG652507, GenB–MRPL45–MG652546, GenB–RPF2–MG652565, GenB–XPNPEP3–MG652583, GenB–ITS–MG652518); 1 ♂, same data except on verandah in morning, 25 February 2001, A.F. Longbottom (WAM T65456); 1 ♀, same locality data except 'Sieda', dead on ground near shed, 3 December 1996, A.F. Longbottom (WAM T26986).

Other material examined.—AUSTRALIA: *Western Australia*: 1 ♂, Boorabbin Rock (IBRA_COO), 31°12′S, 120°17′E, pitfall trap, 1 March 1969, R. Jones (WAM T143058); 1 ♂, 8 km S. of Grass Patch, at Colemans (IBRA_MAL), 33°14′S, 121°43′E, hand collected at night on lawn, 22 December 1978, G. Finton (WAM T26983); 1 ♂, "The Glen", ca. 10 km W. of Grass Patch (IBRA_MAL), 33°14′S, 121°36′E, 25 February 2001, L. & C. Bowman (WAM T65457); 1 ♂, 300 m E. of railway line on Starcevich Road, ca. 2 km NE. of Grass Patch (IBRA_MAL), 33°13′09″S, 121°43′11″E, walking on road at night, 30 March 2005, A.F. Longbottom (WAM T63208); 1 ♂, McDermid Rock, site MRR6 (IBRA_COO), 32°01′00″S, 120°45′25″E, pitfall trap, *Eucalyptus salubris* woodland, 11–17 February 1981, W.F. Humphreys et al. (WAM T16190); 1 ♂, Red Lake (IBRA_MAL), 33°09′20″S, 121°42′45″E, climbing shade cloth at night, cool damp, 23 May 2006, L. Guest (WAM T76109^{DNA_Voucher_217}; GenB–CYB–MG652508, GenB–MRPL45–MG652547, GenB–RPF2–MG652566, GenB–XPNPEP3–MG652584, GenB–ITS–MG652519); 1 ♂, same data except 33°08′S, 121°42′E, in toilet at farm, at night, 14 February 1979, M. Guest (WAM T26982); 1 juvenile, 5 km NNW. of Salmon Gums, on Coolgardie-Esperance Highway (IBRA_MAL), 32°56′22″S, 121°37′29″E, dug from burrow, 24 August 2014, S.E. Harrison, M.S. Harvey (WAM T134181^{DNA_Voucher_66}; GenB–CO1–KY295313, GenB–CYB–KY295434, GenB–MRPL45–KY295554, GenB–RPF2–KY295680, GenB–XPNPEP3–KY295808, GenB–ITS–KY295061); 1 ♂, Yellowdine (IBRA_COO), 31°18′S, 119°39′E, hand collected, 21 January 1987, I. Land (WAM T29851).

Etymology.—This species is named in honor of Emeritus Professor Barbara Main (of the University of Western Australia), in recognition of her seminal contributions to mygalomorph systematics, and to our understanding of giant spiny trapdoor spiders of the genus *Gaius*.

Diagnosis.—Males of *Gaius mainae* can be distinguished from those of all other congeners except *G. aurora* by the absence of prolateral clasping spurs on tibia I (Figs. 132–133; cf. Figs. 23, 57, 79, 101, 114, 154); and from *G. aurora* by the size and shape of the RTA, which is very large (Fig. 134; cf. Fig. 46).

Description (male holotype).—Total length 31.0. Carapace 12.2 long, 10.5 wide. Abdomen 13.2 long, 8.6 wide. Carapace (Fig. 125) oval, dark chocolate-brown in color with mostly black ocular region; lateral margins densely setose; fovea slightly procurved. Eye group (Fig. 128) trapezoidal (anterior eye row strongly procurved), 0.7 x as long as wide, PLE–PLE/ALE–ALE ratio 1.5; ALE separated by 1.2 x their own diameter; AME separated by less than their own diameter; PME separated by 5.0 x their own diameter; PME and PLE separated by slightly more than 2.0 x diameter of PME, PME positioned in line with level of PLE. Maxillae with field of cuspules confined to inner corner; labium without cuspules. Abdomen (Fig. 126) oval, densely setose and dark grey-brown in dorsal view, with paler beige-brown mottling; sclerotized sigilla absent. Legs (Figs. 132, 133) variable shades of dark brown, with light scopulae on tarsi I–II; tibia I with pro-distal comb of macrosetae and row of numerous retro-ventral macrosetae; metatarsus I with 7 pro-ventral and 7 retro-ventral macrosetae. Leg I: femur 11.1; patella 5.3; tibia 7.3; metatarsus 7.5; tarsus 4.3; total 35.5. Leg I femur–tarsus/carapace length ratio 2.9. Pedipalpal tibia (Figs. 134–136) densely setose, 2.0 x longer than wide, with massive spinulate RTA and long, 'finger-like' distal retrolateral tibial apophysis (dRTA) also with sparse field of spinules. Cymbium (Figs. 134–136) setose, with field of weakly-developed spinules disto-dorsally. Embolus (Figs. 134–136) slightly twisted and gently tapered, with very short, triangular embolic apophysis sub-distally.

Description (female WAM T41380).—Total length 30.0. Carapace 14.2 long, 12.2 wide. Abdomen 10.7 long, 8.4 wide. Carapace (Fig. 137) broadly oval, dark tan-brown in color with mostly black ocular region; lateral margins densely setose; fovea procurved. Eye group (Fig. 140) trapezoidal (anterior eye row strongly procurved), 0.7 x as long as wide, PLE–PLE/ALE–ALE ratio 1.7; ALE separated by 2.0 x their own diameter; AME separated by approximately their own diameter; PME separated by 6.0 x their own diameter; PME and PLE separated by approximately 1.5 x diameter of PME, PME positioned in line with level of PLE. Maxillae with field of cuspules confined to inner corner; labium without cuspules. Abdomen (Fig. 138) oval, shriveled, brown in dorsal view;

sclerotized sigilla absent. Legs (Figs. 143, 144) variable shades of dark brown, with thick scopulae on tarsi and metatarsi I–II; tibia I with cluster of 8 pro-distal macrosetae and row of 6 long retro-ventral macrosetae; metatarsus I with 4 ventral macrosetae; ventral tarsus I with distal cluster of 4 short macrosetae. Leg I: femur 10.0; patella 5.9; tibia 5.9; metatarsus 5.5; tarsus 3.7; total 31.0. Leg I femur–tarsus/carapace length ratio 2.2. Pedipalp dark brown, spinose on tibia, with thick tarsal scopula. Genitalia (Fig. 145) with pair of large, widely spaced, mushroom-shaped spermathecae on broad stalks.

Distribution and remarks.—*Gaius mainae* (formerly known by WAM identification code 'MYG076') is a large species with a somewhat restricted distribution in the southern Coolgardie and eastern Mallee bioregions of southern inland Western Australia, from Southern Cross south to Grass Patch (Fig. 11). Males ($n = 14$) generally wander in search of females in the warm (mostly summer) months of December–March (79% of collected specimens), presumably after heavy rain, with a possible peak of activity in February and March (57% of collected specimens).

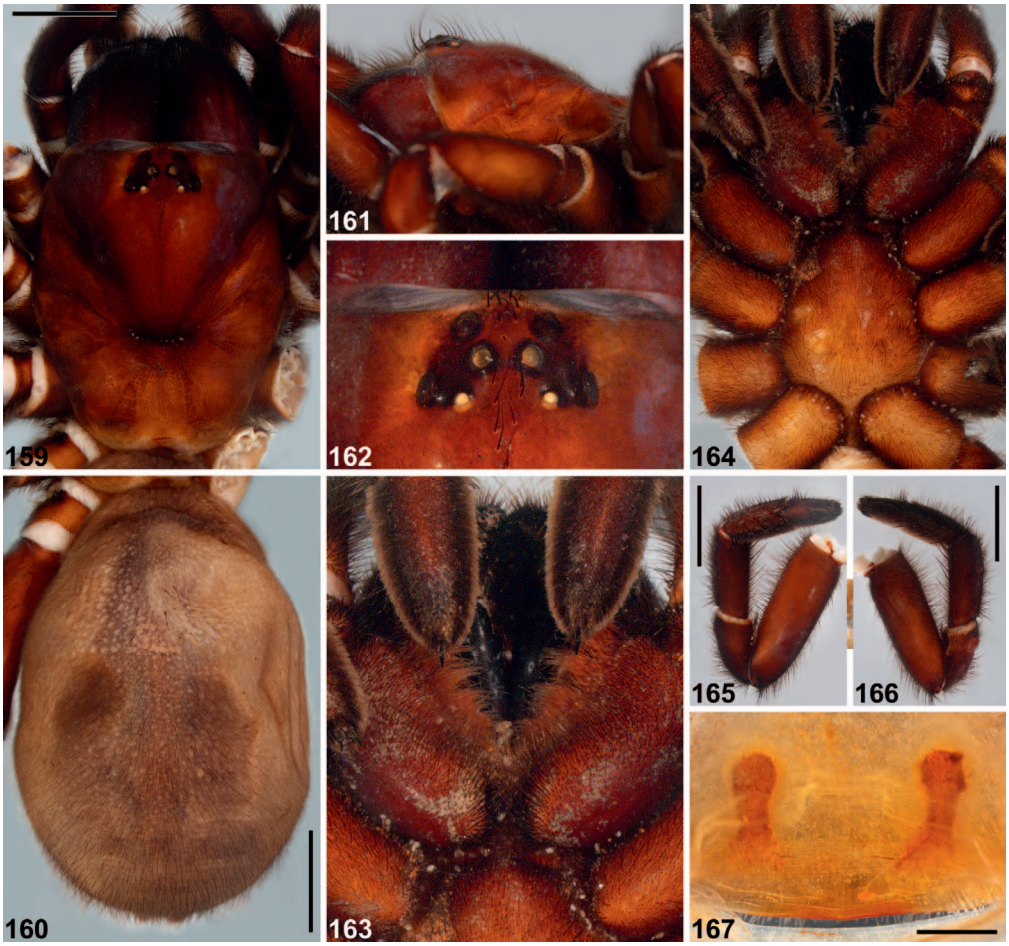
Conservation assessment.—This species has a known extent of occurrence (EOO) of approximately 20,000 km^2, and is therefore not considered threatened under Criterion B. However, preliminary evidence suggests that population declines may have occurred among arid zone Idiopidae in recent decades (Rix et al. 2017c), and given that the EOO of this species is approaching that which would render it potentially vulnerable under IUCN criteria, it is possible that future changes to EOO and area of occupancy may render this species threatened or near threatened. As a result, further ongoing assessment under both Criterion A and Criterion B is warranted.

Gaius tealei sp. nov.
http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:5A32A02E-D2DB-4BC3-86F5-90E359110BBA
(Figs. 11, 14, 146–167)

Type material.—*Holotype male*. AUSTRALIA: *Western Australia*: Lorna Glen Station (IBRA_MUR), 26°16′21″S, 121°11′34″E, dry pitfall trap, 31 October 2011, K.E.C. Brennan (WAM T117550^{DNA_Voucher_223}; GenB–CYB–MG652503, GenB–MRPL45–MG652545, GenB–RPF2–MG652564, GenB–XPNPEP3–MG652577, GenB–ITS–MG652525).

Paratype. AUSTRALIA: *Western Australia*: 1 ♂, Lorna Glen Station, cat survey site 1-8 (IBRA_MUR), 26°18′12″S, 121°23′33″E, dry pitfall trap, 27 November 2004, M.A. Cowan et al. (WAM T66391).

Other material examined.—AUSTRALIA: *Western Australia*: 1 juvenile, Area C, 92.1 km NW. of Newman (IBRA_PIL), 23°00′37″S, 118°55′06″E, dug from burrow, 15 August 2010, R. Teale, J. Cairnes (WAM T105868^{DNA_Voucher_T105868}; GenB–COI–KJ744620); 1 juvenile, same data (WAM T105869^{DNA_Voucher_T105869}; GenB–COI–KJ744621); 1 ♀, same data except 23°00′38″S, 118°55′07″E, 16 August 2010 (WAM T105870^{DNA_Voucher_T105870}; GenB–COI–KJ744622); 1 juvenile, Area C, 98 km NW. of Newman (IBRA_PIL), 23°00′30″S, 118°51′13″E, dug from burrow, R. Teale, M. Greenham (WAM T103186^{DNA_Voucher_T103186}; GenB–COI–KJ744497); 1 ♀, Davidson Creek, ca. 75 km E. of Newman, site 9 (IBRA_GAS), hand collected, spinifex plain on gentle hill, *Acacia*, eucalypts, 9 April 2010, J. Clark (WAM T102164^{DNA_Voucher_290}; GenB–COI–KJ744437, GenB–CYB–MG652501, GenB–MRPL45–MG652544, GenB–RPF2–MG652562, GenB–XPNPEP3–MG652581, GenB–ITS–MG652523); 1 ♀, Fortescue Marsh (IBRA_PIL), 22°18′26.82″S, 119°14′26.40″E, 2–5 June 2010, P. Roberts, L. Quinn (WAM T107183^{DNA_Voucher_291}; GenB–COI–KJ744652, GenB–CYB–MG652502, GenB–MRPL45–MG652543, GenB–RPF2–MG652561, GenB–XPNPEP3–MG652580, GenB–ITS–MG652524); 1 ♂, Giles, ca. 55 km W. of Newman (IBRA_PIL), 23°15′S, 119°10′E, 23 December 1983 (WAM T27013); 1 ♂, Glen Ayle Homestead, 200 miles NE. of Wiluna (IBRA_GAS), 25°16′S, 122°02′E, 3 December 1975, W.K. Youngson (WAM T27014); 1 ♂, Glen Ayle Station (IBRA_GAS), 25°16′S, 122°03′E, 1999, T. Davis (WAM T143064); 1 ♀, Hope Downs 4, ca. 100 km NW. of Newman, HD4-8 (IBRA_PIL), 23°05′11.6″S, 119°19′06.1″E, 10 May 2008, J. Francesconi (WAM T91708^{DNA_Voucher_T91708}; GenB–COI–KJ745347); 1 ♀, same data except 12 May 2008 (WAM T91709^{DNA_Voucher_T91709}; GenB–COI–KJ745348); 1 ♀, Hope Downs 4, ca. 30 km NW. of Newman, HD4-11, 38-39 (IBRA_PIL), 23°06′05.22″S, 119°17′30.48″E, *Acacia* woodland over *Ptilotus* and *Triodia*, 24 September 2008, Francesconi Consulting (WAM T93466^{DNA_Voucher_T93466}; GenB–COI–KJ745379); 1 specimen (age unknown), same data except HD4-11, 40 (WAM T93464^{DNA_Voucher_T93464}; GenB–COI–KJ745377); 1 ♀, Jimblebar, 40 km ESE. of Newman (IBRA_PIL), 23°23′29.9″S, 120°06′34.4″E, 26 August 2008, C. Weston, G. Murray (WAM T92459^{DNA_Voucher_T92459}; GenB–COI–KJ745372); 1 specimen (age unknown), same data (WAM T92461^{DNA_Voucher_T92461}; GenB–COI–KJ745373); 1 ♀, same data except 22 August 2008 (WAM T92463^{DNA_Voucher_T92463}; GenB–COI–KJ745374); 1 ♀, Jimblebar, ca. 35 km E. of Newman (IBRA_PIL), 23°23′39″S, 120°11′58″E, 9 February 2009, P. Bolton, C. Weston (WAM T96024^{DNA_Voucher_T96024}; GenB–COI–KJ745411); 1 specimen (age unknown), Koodaideri Corridor West, 71.8 km NE. of Tom Price (IBRA_PIL), 22°08′08.3″S, 118°08′10.3″E, 20–26 February 2012, C. Cole (WAM T122239^{DNA_Voucher_T122239}; GenB–COI–KJ745001); 1 specimen (age unknown), same data except 22°08′09.9″S, 118°08′09.7″E (WAM T122249^{DNA_Voucher_T122249}; GenB–COI–KJ745005); 1 specimen (age unknown), same data except 72.4 km NE. of Tom Price, 22°08′08.4″S, 118°08′10.3″E (WAM T122240^{DNA_Voucher_T122240}; GenB–COI–KJ745002); 1 specimen (age unknown), same data except 82.5 km NE. of Tom Price, 22°13′56.8″S, 118°24′52.7″E (WAM T122253^{DNA_Voucher_T122253}; GenB–COI–KJ745009); 1 specimen (age unknown), same data except 82.4 km NE. of Tom Price, 22°13′57″S, 118°24′52.2″E, M. Greenham (WAM T122255^{DNA_Voucher_T122255}; GenB–COI–KJ745011); 1 specimen (age unknown), Koodaideri Western Corridor, 146.3 km NW. of Newman (IBRA_PIL), 22°21′28.7″S, 118°48′05.3″E, Mulga woodland, 2 April 2012, L. Alexander, J. Cairnes (WAM T125345^{DNA_Voucher_T125345}; GenB–COI–KJ745128); 1 juvenile, same data except 184.5 km NW. of Newman, 22°14′00.1″S, 118°23′47.4″E, low open Mulga woodland over *Triodia epactia* grassland, 31 March 2012, G. Humphreys, J.



Figures 159–167.—*Gaius tealei* sp. nov., female (WAM T127920) from 93 km E. of Marymia Airstrip (Western Australia; LSD): 159–160, carapace and abdomen, dorsal view; 161, cephalothorax, lateral view; 162, eyes, dorsal view; 163, mouthparts, ventral view; 164, cephalothorax, ventral view (note the presence of numerous presumably phoretic mites); 165, leg I, prolateral view; 166, leg I, retrolateral view; 167, spermathecae, dorsal view. Scale bars = 5.0 (159–160, 165–166), 1.0 (167).

King (WAM T125333^{DNA_Voucher_T125333}; GenB–COI–KJ745120); 1 specimen (age unknown), same data except 185.3 km NW. of Newman, 22°14′00.2″S, 118°23′47.5″E (WAM T125334^{DNA_Voucher_T125334}; GenB–COI–KJ745121); 1 specimen (age unknown), same data except 185.6 km NW. of Newman, 22°14′00.38″S, 118°23′45″E, G. Humphreys, S. Werner (WAM T125331^{DNA_Voucher_T125331}; GenB–COI–KJ745119); 1 ♂, Leinster (IBRA_MUR), 27°55′S, 120°41′E, 15 February 1995, D. Murphy (WAM T143061); 1 ♀, 93 km E. of Marymia airstrip (IBRA_LSD), 25°08′22″S, 120°41′55″E, hand collected, ex. burrow with trapdoor lid & twig-lines, 66 cm deep, 16 August 2012, N.A. Guthrie (WAM T127920^{DNA_Voucher_29}; GenB–CYB–KY295471, GenB–MRPL45–KY295590, GenB–RPF2–KY295717, GenB–XPNPEP3–KY295845, GenB–ITS–KY295098); 1 specimen (age unknown), Mudlark, 102 km W. of Newman (IBRA_PIL), 23°05′25″S, 118°48′38″E, dug from burrow, 3 July 2011, C. Cole, N. Watson (WAM T116840^{DNA_Voucher_T116840}; GenB–COI–KJ744885); 1 specimen (age unknown), same data except 108 km W. of Newman, 23°02′33″S, 118°43′45″E, 2 July 2011, C. Cole, J. Cairnes (WAM T116789^{DNA_Voucher_T116789}; GenB–COI–KJ744866); 1 specimen (age unknown), same data except 112 km W. of Newman, 23°02′16″S, 118°40′56″E, 1 July 2011, M. Greenham, J. Cairnes (WAM T116766^{DNA_Voucher_T116766}; GenB–COI–KJ744853); 1 specimen (age unknown), same data except 113 km W. of Newman, 23°02′17″S, 118°40′57″E (WAM T116772^{DNA_Voucher_T116772}; GenB–COI–KJ744855); 1 specimen (age unknown), Murray Hill, Mulga Downs Station, Ecologia project 1142 (IBRA_PIL), 22°07′28.89″S, 118°31′04.98″E, 21 April–25 May 2009, N. Dight, L. Quinn (WAM T97639^{DNA_Voucher_T97639}; GenB–COI–KJ745447); 1 specimen (age unknown), same data (WAM T97640^{DNA_Voucher_T97640}; GenB–COI–KJ745448); 1 specimen (age unknown), 81.5 km NW. of Newman (IBRA_PIL), 23°01′24″S, 119°01′15″E, dug from burrow, 6 November 2011, M. Delaney (WAM T127197^{DNA_Voucher_T127197}; GenB–COI–KJ745171); 1 ♀, 111.6 km NW. of Newman (IBRA_PIL), 22°53′30″S, 118°45′50″E, dug from burrow, mulga woodland, 29 March 2012, N. Watson, P. Brooshooft (WAM T122819^{DNA_Voucher_T122819}; GenB–COI– KJ745047); 1 ♀, 117.2 km NW. of Newman (IBRA_PIL), 22°53′26″S, 118°42′22″E, dug from burrow, mulga woodland, 1 April 2012, C. Cole (WAM T122857^{DNA_Voucher_T122857}; GenB–

COI–KJ745081); 1 ♀, 118.6 km NW. of Newman (IBRA_PIL), 22°52′49″S, 118°41′16″E, dug from burrow, mulga woodland, 1 April 2012, P. Brooshooft (WAM T122868[DNA_Voucher_T122868]; GenB–COI–KJ745091); 1 ♀, 127.3 km NW. of Newman (IBRA_PIL), 22°51′37″S, 118°36′15″E, dug from burrow, mulga woodland, 29 March 2012, J. Tatler, N. Watson (WAM T122827[DNA_Voucher_T122827]; GenB–COI–KJ745055); 1 ♀, South Parmelia, 52 km NW. of Newman (IBRA_PIL), 23°05′12″S, 119°19′07″E, dug from burrow, 12 April 2011, R. Teale, M. Greenham (WAM T113577[DNA_Voucher_68]; GenB–COI– KJ744741, GenB–CYB–KY295432, GenB–MRPL45–KY295552, GenB–RPF2–KY295678, GenB–XPNPEP3–KY295806, GenB–ITS–KY295059); 1 specimen (age unknown), same data except 23°05′11″S, 119°19′07″E, 16 April 2011 (WAM T113592[DNA_Voucher_T113592]; GenB–COI–KJ744752); 1 ♀, West Angelas, 113 km SE. of Tom Price (IBRA_PIL), 23°19′09″S, 118°40′01″E, dug from burrow, 27 June 2010, E. Harris, C. Cole (WAM T103909[DNA_Voucher_T103909]; GenB–COI–KJ744574); 1 ♀, West Angelas, 31.6 km SE. of Juna Downs Homestead, site WES (IBRA_PIL), 23°05′06″S, 118°42′17″E, dug from burrow, 7 September 2005, R. Teale (WAM T77524[DNA_Voucher_T77524]; GenB–COI–KJ745258); 1 ♀, same data (WAM T77526[DNA_Voucher_T77526]; GenB–COI–KJ745259); 1 ♀, same data (WAM T77539[DNA_Voucher_T77539]; GenB–COI–KJ745264); 1 ♀, same data except 41 km SE. of Juna Downs Homestead, 23°06′01″S, 118°48′38″E, 10 September 2005 (WAM T77535[DNA_Voucher_T77535]; GenB–COI–KJ745262); 1 ♀, same data (WAM T77536[DNA_Voucher_T77536]; GenB–COI–KJ745263); 1 ♀, same data except 46.2 km ESE. of Juna Downs Homestead, 23°04′08″S, 118°53′24″E, 9 September 2005 (WAM T77532[DNA_Voucher_T77532]; GenB–COI–KJ745261); 1 ♀, same data (WAM T77543[DNA_Voucher_T77543]; GenB–COI–KJ745265); 1 ♀, same data (WAM T77544[DNA_Voucher_T77544]; GenB–COI–KJ745266); 1 ♂, Wiluna (IBRA_MUR), 26°35′S, 120°14′E, 1 March 1955 (WAM T27068); 1 ♂, same data (WAM T27069); 1 ♀, Wonmunna (IBRA_PIL), 23°08′02.14″S, 119°02′51.48″E, burrow excavation, 23 May–2 July 2011, J. Clark (WAM T112089[DNA_Voucher_312]; GenB–CYB–MG652500, GenB–MRPL45–MG652542, GenB–RPF2–MG652563, GenB–XPNPEP3–MG652579, GenB–ITS–MG652522); 1 ♂, Wonmunna, ca. 73 km heading 291° from Newman (IBRA_PIL), 23°07′06.78″S, 119°03′53.55″E, wet pitfall trap, south facing creek side slope, 20 May–22 June 2011, P.R. Langlands (WAM T115829); 1 ♂, Yandil Station (IBRA_MUR), 26°22′S, 119°49′E, hand collected, 7 February 1957, P. Molloy (WAM T3937); 1 ♂, same data (WAM T3938).

Etymology.—The specific epithet is named in honor of Roy Teale (of Biota Environmental Sciences), in recognition of his support of the Australian Research Council (ARC) idiopid project since its commencement in 2012, and for his considerable efforts in collecting Idiopidae from remote areas of Western Australia (including numerous specimens of this species).

Diagnosis.—Males of *Gaius tealei* can be distinguished from those of *G. aurora* and *G. mainae* by the presence of prolateral clasping spurs on tibia I (Figs. 153–155; cf. Figs. 45, 133); from *G. austini* and *G. humphreysi* by the size and shape of the RTA, which is grossly enlarged (Fig. 156; cf. Figs. 59, 116); and from *G. cooperi*, *G. hueyi* and *G. villosus* by the size and shape of the distal retrolateral tibial apophysis (dRTA), which is 'tongue-shaped' (Fig. 156; cf. Figs. 25, 81, 103).

Description (male holotype).—Total length 34.6. Carapace 12.8 long, 11.8 wide. Abdomen 15.8 long, 11.8 wide. Carapace (Fig. 146) broadly oval, dark chocolate-brown in color with mostly black ocular region; lateral margins densely setose; fovea slightly procurved. Eye group (Fig. 149) trapezoidal (anterior eye row strongly procurved), 0.6 x as long as wide, PLE–PLE/ALE–ALE ratio 1.6; ALE separated by 2.0 x their own diameter; AME separated by less than their own diameter; PME separated by 4.5 x diameter of right PME (left PME reduced); PME and PLE separated by slightly more than diameter of right PME, PME positioned slightly posterior to level of PLE. Maxillae with field of cuspules confined to inner corner; labium without cuspules. Abdomen (Fig. 147) oval, densely setose and grey-brown in dorsal view; sclerotized sigilla absent. Legs (Figs. 153–155) variable shades of dark brown, with light scopulae on tarsi I–II; tibia I with row of 5 long retro-ventral macrosetae and distal pair of prolateral clasping spurs; metatarsus I with 4 ventral and 5 retro-ventral macrosetae; tarsus I with 6 pro-ventral and 6 retro-ventral macrosetae. Leg I: femur 11.8; patella 5.6; tibia 8.6; metatarsus 7.9; tarsus 4.5; total 38.4. Leg I femur–tarsus/carapace length ratio 3.0. Pedipalpal tibia (Figs. 156–158) densely setose, 1.7 x longer than wide, with massive spinulate RTA and large, 'tongue-shaped' distal retrolateral tibial apophysis (dRTA) also with field of spinules. Cymbium (Figs. 156–158) setose, with field of weakly-developed spinules disto-dorsally. Embolus (Figs. 156–158) relatively broad at base, kinked medially and slightly twisted, with very short, triangular embolic apophysis sub-distally.

Description (female WAM T127920).—Total length 41.6. Carapace 15.0 long, 12.5 wide. Abdomen 21.4 long, 14.7 wide. Carapace (Fig. 159) oval, dark brown in color with mostly black ocular region; lateral margins densely setose; fovea procurved. Eye group (Fig. 162) trapezoidal (anterior eye row strongly procurved), 0.5 x as long as wide, PLE–PLE/ALE–ALE ratio 1.8; ALE separated by 2.9 x their own diameter; AME separated by approximately their own diameter; PME separated by 4.4 x their own diameter; PME and PLE separated by slightly more than 1.5 x diameter of PME, PME positioned slightly posterior to level of PLE. Maxillae with field of cuspules confined to inner corner; labium without cuspules. Abdomen (Fig. 160) oval, beige-brown in dorsal view; sclerotized sigilla absent. Legs (Figs. 165, 166) variable shades of dark brown, with thick scopulae on tarsi and metatarsi I–II; tibia I with cluster of 6 pro-distal macrosetae and row of 7 long retro-ventral macrosetae; metatarsus I with 1 pro-ventral and 4 retro-ventral macrosetae; ventral tarsus I with distal cluster of partially-obscured short macrosetae. Leg I: femur 9.4; patella 5.2; tibia 5.1; metatarsus 4.7; tarsus 3.3; total 27.7. Leg I femur–tarsus/carapace length ratio 1.8. Pedipalp dark brown, spinose on tibia, with thick tarsal scopula. Genitalia (Fig. 167) with pair of large, widely spaced spermathecae on long stalks.

Distribution and remarks.—*Gaius tealei* (formerly known by WAM identification codes 'MYG286' and 'MYG308') is a

very large species with a widespread distribution in northern inland Western Australia, from the Pilbara bioregion (mostly south of the Fortescue Marsh) south to Leinster and east to the Little Sandy Desert and eastern Gascoyne bioregion (Fig. 11). The range of this species overlaps that of *G. villosus* in the northern Murchison and southern Gascoyne bioregions, and also overlaps the range of *G. humphreysi* at its southern limit between Wiluna and Leinster. Males ($n = 9$) wander in search of females in the warm (mostly summer) months of December–March (78% of collected specimens), presumably after heavy monsoonal rain.

Conservation assessment.—This species has a known extent of occurrence of $> 100{,}000$ km^2, and is therefore not considered threatened under Criterion B. However, preliminary evidence suggests that population declines may have occurred among arid zone Idiopidae in recent decades (Rix et al. 2017c), and further assessment under Criterion A is warranted in the future.

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