

Revision of the New Australian Wolf Spider Genus *Kangarosa* (Araneae: Lycosidae: Artoriinae)

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> Abstract

The new Australian wolf spider genus *Kangarosa* is revised to include ten species: *Kangarosa alboguttulata* (L. Koch, 1878) comb. nov., *K. focarius* sp. nov., *K. ludwigi* sp. nov., *K. nothofagus* sp. nov., *K. ossea* sp. nov., *K. pandura* sp. nov., *K. properipes* (Simon, 1909) comb. nov. (= *Trochosa tristicula phegeia* (Simon, 1909) new synonymy) (type species), *K. tasmaniensis* sp. nov., *K. tristicula* (L. Koch, 1877) comb. nov., and *K. yannicki* sp. nov. The presence of a basoembolic apophysis and the apical orientation of the tegular apophysis in the male pedipalp identify *Kangarosa* as member of the subfamily Artoriinae Framenau, 2007. *Kangarosa* differs from all other artoriine genera by the distinct shape of the tegular apophysis, which forms an elongated hook. The female epigyne has a simple, shallow atrium that extends into a posterior lip. *Kangarosa* is a typical representative of the Bassian fauna as its representatives occur in the southeastern Australian mainland states, Tasmania and in southwest Western Australia. Here, members of the genus are commonly found in mesic areas, for example along watercourses and in swampy areas, although some species appear to prefer forested habitats. Male pedipalp morphology suggests close affinities of *Kangarosa* to *Tetrallycosa* Roewer, 1960 in a clade that also includes *Diahogna* Roewer, 1960 and potentially a further undescribed Australian artoriine genus. *Kangarosa* is of Gondwanan origin and all but one species are restricted to eastern Australia suggesting the genus diversified after an aridification of Australia in the late Tertiary provided a barrier for dispersal between the eastern and western temperate regions.

> Key words

Taxonomy, new species, *Trochosa*, Australasia, Gondwana.

1. Introduction

With more than 2,300 named species in 110 genera, Lycosidae (wolf spiders) is one of the most diverse spider families world-wide (PLATNICK 2010). Whilst the taxonomy of the Holarctic region is comparatively well resolved (e.g., HEIMER & NENTWIG 1991; YIN et al. 1997; DONDALE 2005), the fauna of the southern continents, with the exception of New Zealand (VINK 2002), remains poorly known (e.g., ALDERWEIRELDT & JOCQUÉ 2005; PIACENTINI & GRISMADO 2009). Australian wolf spiders have received some taxonomic and systematic attention in recent years and include representatives of four subfamilies (MURPHY et al. 2006): the Zoicinae Lehtinen & Hippa, 1979 (e.g., YOO & FRAMENAU 2006; FRAMENAU et al. 2009), the Venoni-

inae Lehtinen & Hippa, 1979 (e.g., VINK 2001; FRAMENAU 2006a, 2008; YOO & FRAMENAU 2006), the Lycosinae Sundevall, 1833 (e.g., FRAMENAU & VINK 2001; FRAMENAU 2006b,c; FRAMENAU & YOO 2006; FRAMENAU & BAEHR 2007; LANGLANDS & FRAMENAU 2010), and the Artoriinae Framenau, 2007 (e.g., FRAMENAU 2002, 2005, 2006d, 2007). The Artoriinae are apparently of Gondwanan origin and are restricted to the Australasian, Oriental and Pacific regions. The subfamily currently includes eight described and at least two unnamed genera (FRAMENAU 2007). FRAMENAU (2007) listed three species in one of these unnamed genera, his “New Genus 2” – *Trochosa alboguttulata* (L. Koch, 1878), *Trochosa tristicula* (L. Koch, 1877)

and *Lycosa properipes* Simon, 1909 – and suggested that at least another three undescribed species belong in this genus.

McKAY (1979) included *T. alboguttulata* and *T. tristicula* (with the two subspecies *T. t. tristicula* and *T. t. phegeia* (Simon, 1909)) in a review of the Australian species of *Trochosa* C.L. Koch, 1847 within the subfamily Lycosinae. McKAY (1979) based the inclusion of these species in *Trochosa* on somatic characters, mainly on the arrangement of the eyes (first row of eyes wider than the second), and the colour pattern of the cephalothorax (presence of two short longitudinal light lines in cephalic area behind eyes). He ignored the much more informative structures of the genitalia (e.g., DONDALE 1986). The general configuration of the male pedipalp and female epigyne of the abovementioned three species clearly shows no resemblance to the genitalia of *Trochosa* or any other lycosine genus. The presence of a basoembolic apophysis and the apically directed median apophysis indicate that these species belong to the Artoriinae. Likewise, most other species treated in McKAY's (1979) *Trochosa* review have been shown to belong to the Artoriinae, namely to the genera *Artoria* Thorell, 1877, *Artoriopsis* Framenau, 2007, *Diahogna* Roewer, 1960 and *Tetralycosa* Roewer, 1960 (FRAMENAU 2005, 2006d, 2007; FRAMENAU et al. 2006).

This study proposes a new artoriine wolf spider genus, *Kangarosa*, to accommodate ten Australian species, including the abovementioned ones formerly assigned to *Trochosa* as well as seven species that are here described as new.

2. Methods

The treatment of the new genus *Kangarosa* is based on an exhaustive examination of all major Australian museum collections and critical historical collections overseas that resulted in a database of more than 20,000 records of Australian wolf spiders (more than 40,000 specimens examined). Descriptions are based on specimens preserved in 70% EtOH. Female internal genitalia were prepared for examination by submersion in 10% KOH for 2–10 hrs. For clarity, the illustrations of male pedipalps and female epigynes omit the setae. The morphological nomenclature follows FRAMENAU (2006d) and SIERWALD (2000); however, the central part of the epigyne ('middle field' in SIERWALD 2000) is here divided into the 'atrium' and a 'posterior lip'. All measurements are given in millimetres (mm).

Images were taken with a Leica DFC500 digital camera that that was attached to a Leica MZ16A stereo microscope. Photographs were taken in different focal planes and combined with the Leica Application Suite version 2.5.0R1. Prior to photography, spiders were cleaned for ca. 1 min in an ultrasonic cleaner (Soniclean 30A, Transtek Systems, South Australia) (except for *K. yannicki*, of which the specimens were considered too brittle).

The plates have been arranged to facilitate the use of the identification key rather than simply placing all illustrations for a single species on a separate plate. Simplified illustrations with key characters of male pedipalps and female epigynes are assembled in two plates accompanying the keys, whereas species specific plates of digital photographs, which may not always show details for identification but morphological variation, are placed with each species description. This arrangement avoids the necessity to constantly browse through the paper when using the key. Species are treated in alphabetical order in the taxonomic part of this study.

3. Abbreviations

Morphology

AL, AW	abdomen length / width
CL, CW	carapace length / width
AE, ALE, AME	anterior / anterior lateral / anterior median eyes
PE, PLE, PME	posterior / posterior lateral / posterior median eyes
PL, PW	prosoma length / width
TL	total length

Australian states and territories

ACT	Australian Capital Territory
NSW	New South Wales
NT	Northern Territory
Qld	Queensland
SA	South Australia
Tas	Tasmania
Vic	Victoria
WA	Western Australia

Collections

AM	Australian Museum, Sydney
ANIC	Australian National Insect Collection, Canberra
MNHP	Museum National d'Histoire Naturelle, Paris (France)

NMV	Museum Victoria, Melbourne
QM	Queensland Museum, Brisbane
QVMAG	Queen Victoria Museum and Art Gallery, Launceston
SAM	South Australian Museum, Adelaide
SMF	Senckenberg Museum, Frankfurt (Germany)
TMAG	Tasmanian Museum and Art Gallery, Hobart
WAM	Western Australian Museum, Perth
ZMB	Museum für Naturkunde, Zentralinstitut der Humboldt-Universität, Berlin (Germany)
ZMH	Zoologisches Institut und Zoologisches Museum, Universität Hamburg (Germany)
ZMUC	Zoological Museum, University of Copenhagen (Denmark)

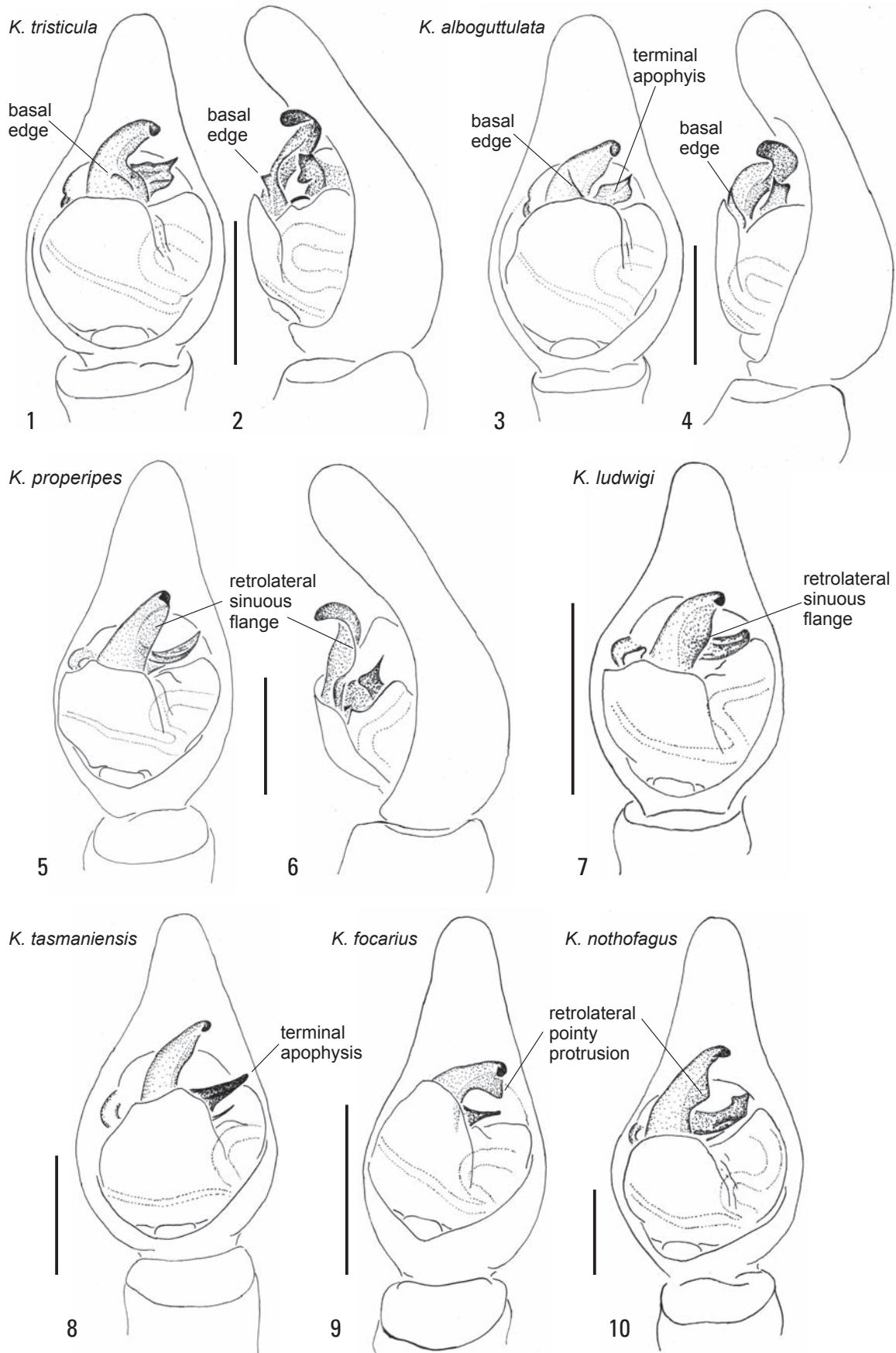
4. Taxonomy

4.1. Key to *Kangarosa* species

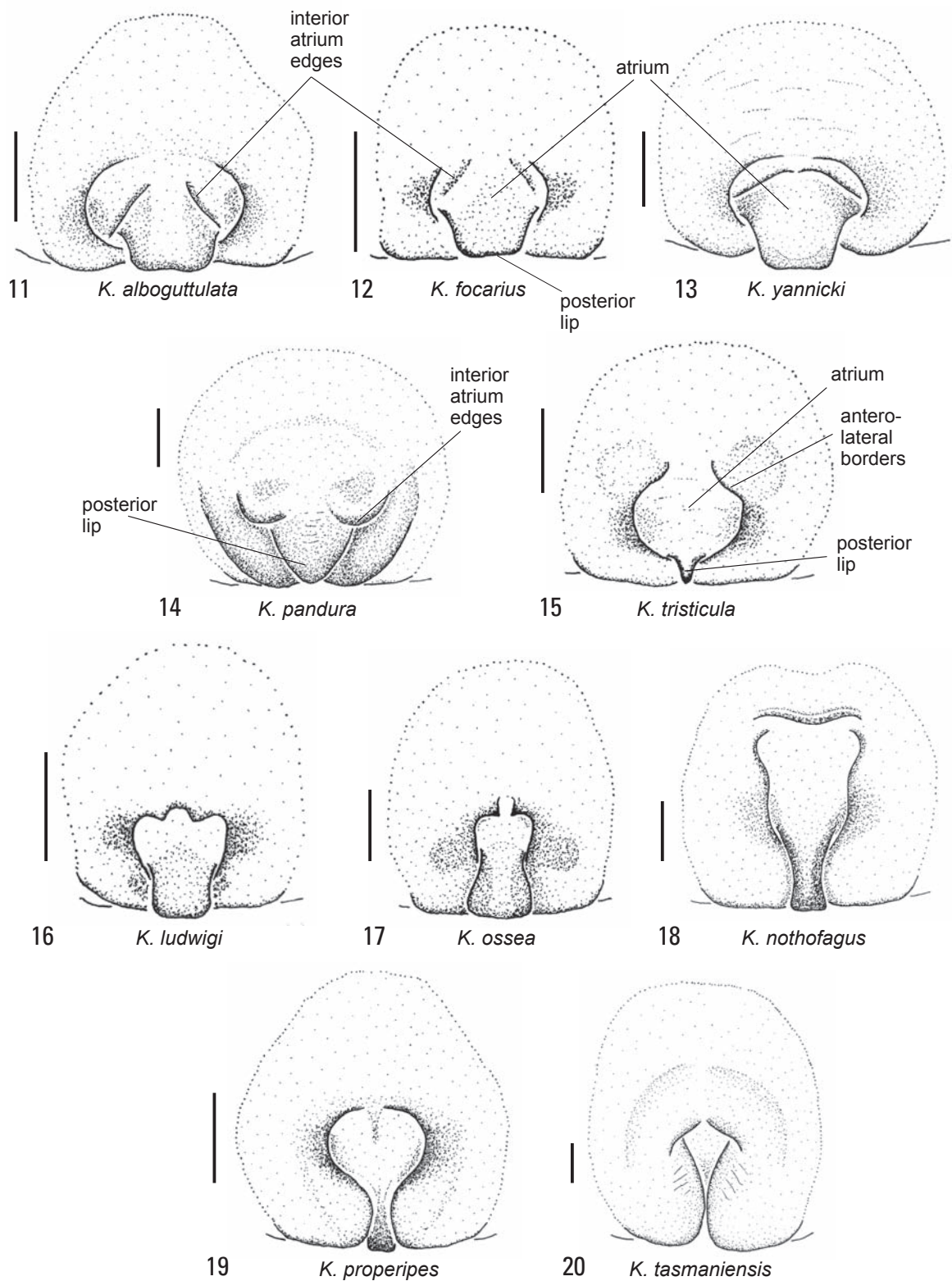
Males of *K. ossea*, *K. pandura* and *K. yannicki* are unknown. The distribution given in this key may aid in identification (see also Tab. 1), but species may be distributed more widely than currently known.

1. Males 2
 - Females 8
 2. Tegular apophysis in ventral view with distinct basal edge (Figs. 1, 3) 3
 - Tegular apophysis without basal edge (e.g., Figs. 5, 7–10) 4
 3. Basal edge forming a pointy protrusion in retrolateral view (Fig. 2), base of tegular apophysis wide; NSW, Qld *K. tristicula*
 - Basal edge not forming a pointy protrusion in retrolateral view (Fig. 4); base of tegular apophysis narrow; NSW, Qld *K. alboguttulata*
- [Some *K. tasmaniensis* males may have an indistinct basal edge on the tegular apophysis (e.g., Fig. 72) and may key out here, however this species has a vastly different terminal apophysis, see Fig. 3 vs. Fig. 8.]
4. Tegular apophysis with dark retrolateral flange along its whole length (Figs. 5–7); this flange has a sinuous edge in retrolateral view (e.g., Fig. 6) 5
 - Tegular apophysis without retrolateral sinuous flange 6
 5. Cymbium length <1.0 mm; distinct wide light patch in posterior half of cephalothorax, legs with distinct dark annulations (Fig. 36); Qld, NSW *K. ludwigi*

- Cymbium length >1.0 mm; indistinct narrow light median band along cephalothorax, legs without or very indistinct dark annulations (Fig. 61); all states except NT *K. properipes*
 - 6. Tegular apophysis without retrolateral protrusion; terminal apophysis strongly sclerotised and pointy, almost reaching to the edge of cymbium (Fig. 8); Tas *K. tasmaniensis*
 - Tegular apophysis with distinct pointy protrusion on retrolateral edge (Figs. 9, 10) 7
 - 7. Retrolateral pointy protrusion of tegular apophysis situated apically and pointing ventrally; terminal apophysis pointy (Fig. 9); Vic *K. focarius*
 - Retrolateral pointy protrusion of tegular apophysis situated centrally and pointing retrolaterally; terminal apophysis broad (Fig. 10); Vic *K. nothofagus*
 - 8. Epigyne about as long as wide, often with interior atrium edges (Figs. 11–15) 9
 - Epigyne distinctly longer than wide (Figs. 16–20) 13
 - 9. Posterior lip wide at posterior edge (Figs. 11–13) 10
 - Posterior lip narrow at posterior edge (Figs. 14–15) 12
 - 10. Interior atrium edges almost horizontal (Fig. 13; see also Figs. 87–88); NSW *K. yannicki*
 - Interior atrium edges steep, forming an open, inverted ‘V’ (Figs. 16–17) 11
 - 11. Interior atrium edges very distinct (Fig. 11, also Fig. 26); atrium width >0.3mm; NSW, Qld *K. alboguttulata*
 - Interior atrium edges indistinct (Fig. 12; also Figs. 29, 30); atrium width <0.3 mm; Vic ... *K. focarius*
- [Some *K. tristicula* females have a wide posterior lip (see Fig. 84) and may key out as *K. alboguttulata*. However, the strong interior atrium ridges of *K. alboguttulata* are very diagnostic (Fig. 26).]
12. Antero-lateral borders poorly defined, not narrowing anteriorly (Fig. 14); ACT, NSW, Vic *K. pandura*
 - Antero-lateral border of epigyne distinct, narrowing anteriorly (Fig. 15); NSW, Qld *K. tristicula*
 13. Posterior lip comparatively wide, i.e. more than twice as wide as atrium (Figs. 16–17) 14
 - Posterior lip narrow, i.e. less than half width of atrium (Figs. 18–20) 15
 14. Distinct irregular light patch on carapace, legs distinctly dark annulated (Fig. 37); epigyne with wide posterior lip and often pointy protrusion at anterior edge (Fig. 16; also Fig. 41) (but see Fig. 42 for variation); NSW, Qld *K. ludwigi*
 - Carapace without distinct irregular wide patch and without distinct dark leg annulations (Fig. 53); Qld *K. ossea*



Figs. 1–10. Male pedipalp morphology of *Kangarosa*: left pedipalp in ventral (1, 3, 5, 7–10) and retrolateral (2, 4, 6) view. 1–2: *Kangarosa tristicula* (AM KS44505). 3–4: *Kangarosa alboguttulata* (QM S87716). 5–6: *Kangarosa properipes* (AM KS39743). 7: *Kangarosa ludwigi* (WAM W5933). 8: *Kangarosa tasmaniensis* (holotype). 9: *Kangarosa focarius* (holotype). 10: *Kangarosa nothofagus* (holotype). Scale bars: 0.5 mm.



Figs. 11–20. Female epigyne morphology of *Kangarosa*, ventral view. 1–2: *K. tristicula* (AM KS44505). 3–4: *K. alboguttulata* (QM S87716). 5–6: *K. properipes* (AM KS39743). 7: *K. ludwigi* (WAM W5933). 8: *K. tasmaniensis* (holotype). 9: *K. focarius* (holotype). 10: *K. nothofagus* (holotype). Scale bars: 0.25 mm.

Tab. 1. Distribution of the species of *Kangarosa* in Australia.

Species	Distribution	Remarks
<i>K. alboguttulata</i> (L. Koch, 1878)	NSW, Qld	
<i>K. focarius</i> sp. nov.	Vic	
<i>K. ludwigi</i> sp. nov.	NSW, Qld	
<i>K. nothofagus</i> sp. nov.	Vic	
<i>K. ossea</i> sp. nov.	Qld	male unknown, known from type locality only
<i>K. pandura</i> sp. nov.	ACT, NSW, Vic	male unknown, habitat specialist (riparian gravel banks)
<i>K. properipes</i> (Simon, 1909)	NSW, Vic, SA, Qld, Tas, WA (possibly ACT)	type species
<i>K. tasmaniensis</i> sp. nov.	Tas	
<i>K. tristicula</i> (L. Koch, 1877)	NSW, Qld	
<i>K. yannicki</i> sp. nov.	Qld	male unknown, known from type locality only

15. Epigyne atrium with waved lateral edges (Fig. 18) *K. nothofagus*
 – Epigyne without waved lateral edges (Figs. 19–20) **16**
 16. Epigyne atrium width more than half the epigyne length; all states except NT *K. properipes*
 – Epigyne atrium width generally less than half epigyne length (Fig. 20); Tas *K. tasmaniensis*

4.2. Family Lycosidae Sundevall, 1833 Subfamily Artoriinae Framenau, 2007

Type genus: *Artoria* Thorell, 1877.

Remarks. The proposed synapomorphy for the subfamily Artoriinae is the presence of a basoembolic apophysis in the male pedipalp (FRAMENAU 2007). The subfamily contains small to medium-sized spiders and is currently known from the Australasian, Oriental and Pacific regions only. Two recently described genera from South America may also belong here, which supports a Gondwanan origin of the subfamily, although they also show morphological features characteristic for the Venoniinae (PIACENTINI & GRISMADO 2009).

Included genera. *Anoteropsis* L. Koch, 1878 (New Zealand); *Artoria* Thorell, 1877 (Australia, New Zealand, South-east Asia, Pacific region); *Artoriopsis* Framenau, 2007 (Australia); *Diahogna* Roewer, 1960 (Australia, New Caledonia); *Kangarosa* **gen. nov.** (Australia); *Lycosella* Thorell, 1890 (Sumatra, Hawai'i); *Notocosa* Vink, 2002 (New Zealand); *Syruloma* Simon, 1900 (Hawai'i); *Tetralycosa* Roewer, 1960 (Australia). Also possibly *Lobizon* Piacentini & Grismado, 2009 (Argentina) and *Navira* Piacentini & Grismado, 2009 (Argentina) (PIACENTINI & GRISMADO 2009).

4.3. Genus *Kangarosa* gen. nov.

Type species: *Lycosa properipes* Simon, 1909; designated here. Gender feminine.

Diagnosis. The basoembolic apophysis is reduced to a sclerotised rim in most *Kangarosa* (e.g., Figs. 25, 34, 48) but its presence in combination with the apical tegular apophysis identifies *Kangarosa* as member of the lycosid subfamily Artoriinae (see FRAMENAU 2007). Within this subfamily, the length of the AE row, which is greater than that of the PME row, places the genus close to *Diahogna* and some *Tetralycosa*. However, *Kangarosa* differs from these genera in the shape of the tegular apophysis that forms an elongated hook (here considered the synapomorphy for the genus). The tegular apophysis of *Tetralycosa* is also hook-shaped, but much shorter (FRAMENAU et al. 2006). In contrast, the tegular apophysis of *Diahogna* is short and straight (FRAMENAU 2006d).

Description. Small to medium-sized wolf spiders (TL 4.5–17.0). Males smaller than females. Carapace longer than wide, dorsal profile straight in lateral view. Carapace colouration uniformly yellow-brown to dark brown, generally with narrow light median band and irregular light submarginal bands (*K. ludwigi* with distinct, irregular wide light patch in posterior half). Labium longer than wide. AME larger than ALE, row of AE wider than row of PME, row of AE straight or slightly recurved. Chelicerae generally with three pro-marginal and three retromarginal teeth, but 2–4 teeth on individual chelicerae possible on both margins. Leg formula VI>I>II>III. Abdomen generally uniformly light to dark olive-brown with light lanceolate cardiac mark in anterior half. Venter often with indistinct longitudinal light bands.

Male pedipalp with divided tegulum. Tegular apophysis located apically at tegulum and forming an elongated hook; its retrolateral border has species specific modifications such as pointed protrusions or a

sinuous flange. Palea well-developed. Embolus originating prolaterally on and curving ventrally around palea, long and generally slim, sometimes with lobe or digitiform process in apical half (e.g., Figs. 25, 48). Basoembolic apophysis reduced to a sclerotised rim. Terminal apophysis well-developed, heavily sclerotised and variable in shape; generally visible in ventral view of the pedipalp. Cymbium without or with only a few apical macrosetae.

Female epigyne with shallow atrium and sometimes with median guide that forms a posterior tongue. Spermathecae globular (e.g., Figs. 27, 33, 56) or narrow (e.g., Figs. 51, 60) and with short, sometimes branched processes; spermathecal stalks comparatively short and slightly bent.

Etymology. The generic name is derived from one of the most iconic of all Australian animals, the Kangaroo, in combination with a generic ending for wolf spiders, *-osa*.

Included species. *Kangarosa* includes ten species from all Australian states except Northern Territory (Tab. 1). *Kangarosa properipes* is the most widespread species and the only one that occurs in South and Western Australia. It also occurs in Tasmania, together with *K. tasmaniensis*, which is endemic to the island state.

4.4. *Kangarosa alboguttulata* (L. Koch) comb. nov.

Figs. 3, 4, 11, 21–27, 35

Lycosa albo-guttulata Koch, 1878: 975–976,
plate 85, figs. 3, 3a.

Lycosa alboguttulata L. Koch: HOGG 1900: 77;
BONNET 1957: 2632.

Lycosa albo-guttata L. Koch: RAINBOW 1911:
265 (misspelled).

Arctosippa alboguttulata (L. Koch): ROEWER 1955: 231;
RACK 1961: 36.

Arctosippa alboguttata (L. Koch): ROEWER 1960: 759
(misspelled).

Diapontia alboguttulata (L. Koch): MCKAY 1973: 381.

Trochosa alboguttulata (L. Koch): MCKAY 1979: 294–295,
figs. 2I, 4F; MCKAY 1985: 85; PLATNICK 1989: 390.

Type material. *Holotype* of *Lycosa alboguttulata* L. Koch, 1878: ♀, Bowen [20°00'S 148°14'E, Queensland], Museum Godeffroy Nr. 14558 (ZMH, RACK (1961)-catalogue 446) (examined).

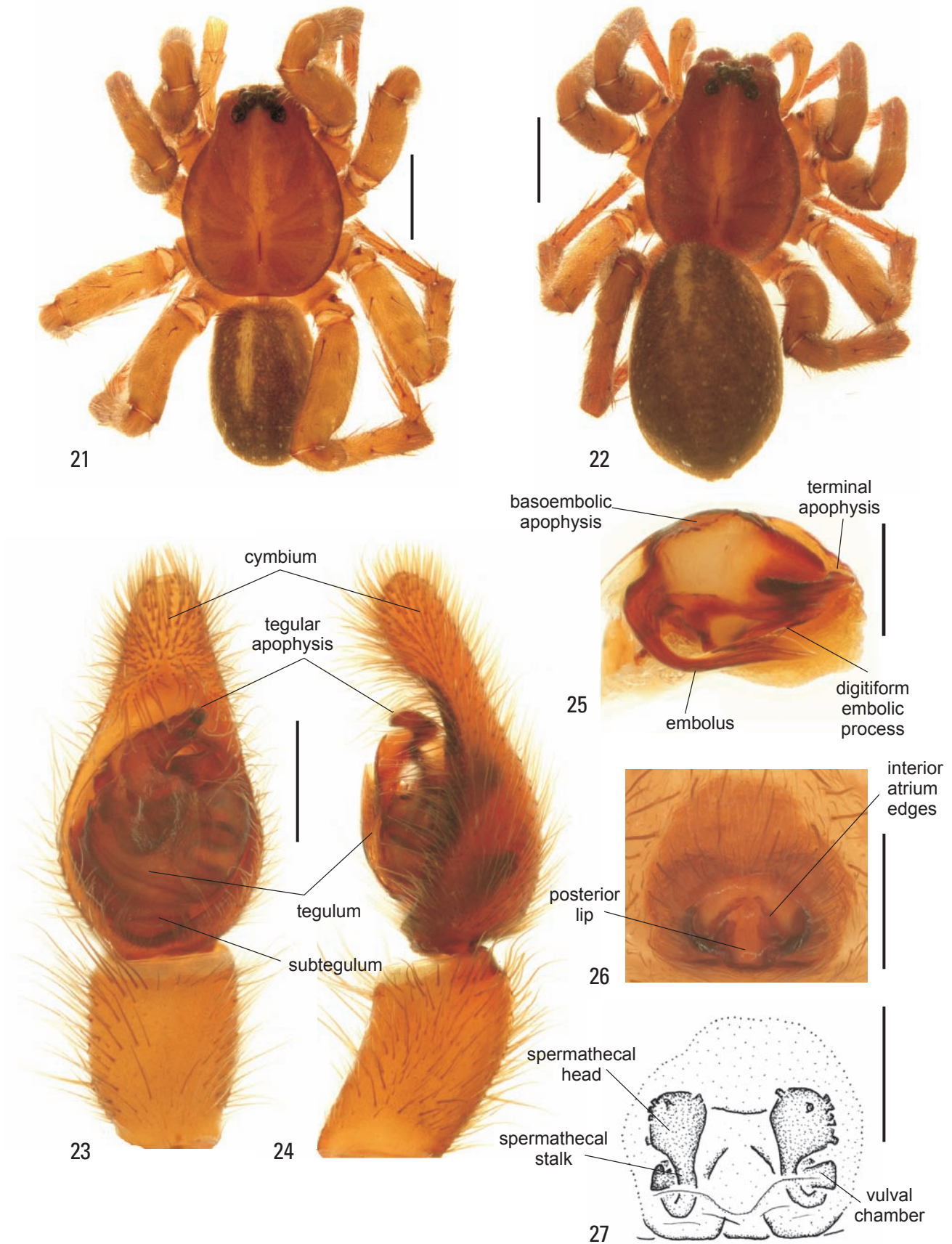
Other material examined. AUSTRALIA: New South Wales: 1 ♀, Stotts Island, Tweed River, 28°14'S 153°31'E (QM S66395); 2 ♀♀, 2 juv., same locality (QM S66393); 1 ♀, same locality (QM S66403); 5 ♀♀, 4 juv., same locality (QM S66399); 2 ♀♀, 2 juv., Turners Dip, 28°11'S 153°26'E (QM S66394); 7 ♀♀, 3 juv., Wolgan, 33°15'S 150°10'E (QM S66396); 1 ♂, 1 ♀, same locality (QM S87716). Queensland: 2 ♀♀, no exact

locality (QM S87715); 2 ♀♀, Boondall Wetlands, 27°20'21"S 153°04'27"E (QM S62277); 1 ♂, Brisbane, 27°28'S 153°01'E (QM S66419); 1 ♀, Myora Creek, North Stradbroke Island, 27°29'S 153°25'E (QM S23); 2 ♀♀, North Stradbroke Island, Point Lookout, 27°26'S 153°32'E (QM S24); 1 ♀, Teewah Creek, Cooloola, 26°05'S 153°02'E (QM W5784).

Diagnosis. *Kangarosa alboguttulata* is most similar to *K. tristicula*. Males of both species have a basal edge on the tegular apophysis, however it forms a pointy protrusion in retrolateral view only in *K. tristicula* (Fig. 2 vs. Fig. 4). The embolus of *K. alboguttulata* males have a unique digitiform process on the apical edge (Fig. 25). Females differ in the presence of interior atrium edges in form of an inverted 'V' which are absent or very weak in *T. tristicula* (Fig. 26 vs. Figs. 41, 42).

Description, male (based on QM S87716 from Wolgan, New South Wales). Carapace reddish-brown, with narrow light median band (Fig. 21); lateral margins with irregular light submarginal and dark brown marginal bands; indistinct darker radial pattern; covered with short dark-brown setae and few short white setae in median and submarginal bands; longer brown bristles around eyes. Chelicerae brown, basally slightly darker; few brown setae basally; three promarginal teeth, with the median largest; three retromarginal teeth, with the basal the smallest. Sternum yellow-brown; brown setae of increasing length towards margins. Labium brown, darker basally; front margin truncated and white. Pedipalps: tegular apophysis with basal edge (Figs. 3, 4, 23), terminal apophysis heavily sclerotised and pointy, embolus with digitiform process in terminal half (Fig. 25). Abdomen dorsally dark olive-brown with distinct light brown median lanceolate cardiac mark (Fig. 21); covered with short brown setae and, less dense, brown macrosetae. Venter olive-grey with two light brown, irregular lateral longitudinal bands and a light brown median band that widens anteriorly; light brown setae, white in longitudinal bands. Spinnerets light brown. Legs: femora and patellae brown, tibiae, metatarsi and tarsi somewhat darker; leg formula IV > I > II > III; spination of leg I: femur: three dorsal, one apico-prolateral; tibia: three ventral pairs, two prolateral; metatarsus: three ventral pairs, one prolateral, one apico-ventral.

Description, female (based on QM S87716 from Wolgan, New South Wales). The female agrees in general detail with the male, however the abdomen is somewhat lighter both dorsally and ventrally. In addition: chelicerae with three promarginal teeth, with the median largest; four retromarginal teeth, with the basal and the apical the smallest. Epigyne with distinct interior atrium ridges (Figs. 11, 26); spermathecal heads globular with scattered antero-lateral protrusions. Legs: spination of leg 1: femur: three dorsal (right leg two), two apico-prolateral; tibia: three ven-



Figs. 21–27. *Kangarosa alboguttulata* (L. Koch). **21:** Male (QM S87716), dorsal view. **22:** Female (QM S66396), dorsal view. **23–24:** Male (QM S87716) left pedipalp (23 ventral, 24 retrolateral view). **25:** Apical part of bulb of male left pedipalp, ventral view (QM S87716). **26:** Female (QM S87716) epigyne, ventral view. **27:** Female (S87716) epigyne, dorsal view. Scale bars: **21–22,** 2 mm; **23–24, 26–27,** 0.5 mm; **25,** 0.25 mm.

tral pairs; metatarsus: three ventral pairs, one apico-ventral.

Measurements. ♂ QM S87716 (♀ QM S87716): TL 9.13 (9.90), CL 4.94 (4.86), CW 3.75 (3.81). Eyes: AME 0.15 (0.20), ALE 0.13 (0.17), PME 0.33 (0.35), PLE 0.27 (0.27). Row of eyes: AE 0.88 (1.00), PME 0.40 (0.54), PLE 1.31 (1.46). Sternum length/width 2.25/1.75 (2.09/1.90). Labium length/width 0.79/0.67 (0.90/0.91). AL 4.38 (4.47), AW 2.94 (3.24). Legs: lengths of segments, femur + patella + tibia + metatarsus + tarsus = total length: pedipalp 1.75 + 0.88 + 1.00 + – + 1.50 = 5.13, I 3.25 + 1.75 + 2.75 + 2.63 + 1.38 = 11.75, II 3.13 + 1.63 + 2.38 + 2.50 + 1.25 = 10.88, III 2.75 + 1.38 + 2.00 + 2.50 + 1.13 = 9.75, IV 3.63 + 1.50 + 3.13 + 4.00 + 1.50 = 13.75 (pedipalp 2.00 + 0.94 + 1.13 + – + 0.69 = 4.75, I 3.50 + 1.88 + 2.88 + 2.63 + 1.38 = 12.25, II 3.13 + 1.63 + 2.50 + 2.38 + 1.25 = 10.88, III 3.13 + 1.38 + 2.13 + 2.63 + 1.19 = 10.44, IV 4.13 + 1.75 + 3.38 + 4.38 + 1.38 = 15.00).

Variation. ♂, n = 6 (♀, n = 11) (range, mean ± SD): TL 9.88–11.25, 10.38 ± 0.52 (9.00–14.38, 12.24 ± 1.53); CL 5.25–6.13, 5.52 ± 0.35 (5.00–6.88, 5.91 ± 0.63); CW 3.75–4.63, 4.06 ± 0.32 (3.63–5.13, 4.38 ± 0.49).

Remarks. The holotype female of *Lycosa alboguttulata* is in poor condition and therefore this species is here re-described based on more recently collected material. The elongated hook-shaped tegular apophysis of the male clearly identifies this species as *Kangarosa*, to which this species is transferred here, *K. alboguttulata* (L. Koch, 1878) comb. nov.

Habitat and life history. This species appears to prefer vegetated habitats such as heathland, open forest or rainforest, often near freshwater or the beach (see also MCKAY 1979). Adult males of *K. alboguttulata* were found in late winter and early summer (June–November) whereas adult females were collected into late summer (June–April).

Distribution. New South Wales and Queensland (Fig. 35).

4.5. *Kangarosa focarius* sp. nov.

Figs. 9, 12, 28–35

Type material. *Holotype*: ♂, Point Cook [37°54'S 144°45'E, Victoria], 17.–24.vii.1992, pitfall trap, Western Regions Survey PC3 (NMV K9087). *Paratype*: ♀, same data as holotype (NMV K10727).

Other material examined. AUSTRALIA: Victoria: 1 ♂, 1 ♀, Barmah Forest, 35°54'S 145°00'E (WAM T48044); 1 ♂, Goulburn River, 12 km SSE Nathalia, 36°10'S 145°14'E (NMV K9060).

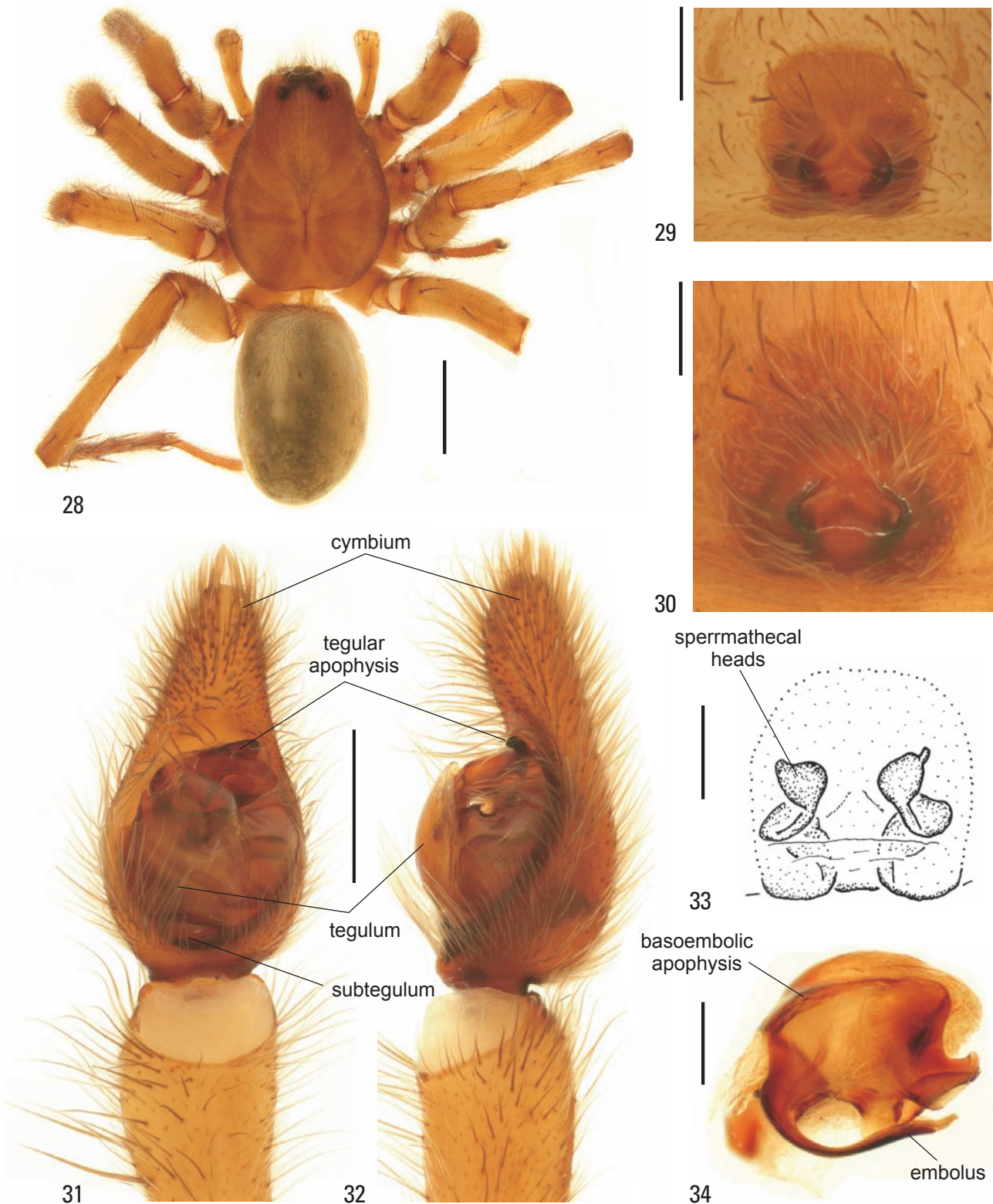
Diagnosis. Male *K. focarius* are unique within the genus as their tegular apophysis has an apico-retrolateral pointy protrusion (central protrusion is present in

K. nothofagus) (Fig. 9). The female epigyne is most similar to that of *K. tristicula* and *K. alboguttulata*, but it is much narrower.

Description, male (based on holotype from Point Cook, Victoria). Carapace brown, with faint narrow light median and faint irregular submarginal bands (Fig. 28); indistinct darker radial pattern; covered with short brown setae and few short white setae in median and submarginal bands; longer brown bristles around eyes. Chelicerae brown, basally slightly darker; few brown setae basally; three promarginal teeth, with the median largest; three retromarginal teeth, with the basal smallest. Sternum light brown; brown setae of increasing length towards margins. Labium brown, darker basally; front margin truncated and white. Pedipalps: tegular apophysis with apico-retrolateral pointy protrusion (Figs. 9, 31), terminal apophysis somewhat duckbill-shaped and with ventral laminar flange (Fig. 34). Abdomen dorsally light olive-brown with light brown median lanceolate cardiac mark and faint triangular patches in posterior half (Fig. 28); laterally lighter; covered irregularly with short brown setae and few brown macrosetae. Venter uniformly very light brown; light brown setae. Spinnerets light brown. Legs: femora and patellae brown, tibiae, metatarsi and tarsi dark brown; leg formula IV > I > II > III; spination of leg I: femur: two dorsal, one apico-prolateral; tibia: three ventral pairs; metatarsus: three ventral pairs, one apico-ventral.

Description, female (based on paratype from Point Cook, Victoria). The female agrees in general detail with the male; however the spider is somewhat darker (not illustrated here as in poor condition). In addition: chelicerae dark reddish-brown; dentition as male. Epigyne comparatively small, roundish; interior atrium ridges very indistinct (Fig. 12, 29, 30); spermathecal heads globular with single anterior protrusion (Fig. 33). Legs: spination of leg 1: femur: two dorsal, one apico-prolateral; tibia: three ventral pairs; metatarsus: three ventral pairs, one apico-ventral.

Measurements. ♂ holotype (♀ paratype): TL 9.63 (12.50), CL 4.63 (5.25), CW 3.50 (3.75). Eyes: AME 0.15 (0.20), ALE 0.13 (0.12), PME 0.27 (0.25), PLE 0.21 (0.23). Row of eyes: AE 0.79 (0.86), PME 0.58 (0.61), PLE 1.04 (1.19). Sternum length/width 2.13/1.50 (2.25/1.88). Labium length/width 0.79/0.65 (1.00/0.83). AL 4.38 (6.25), AW 2.63 (4.13). Legs: lengths of segments, femur + patella + tibia + metatarsus + tarsus = total length: pedipalp 1.50 + 0.81 + 0.94 + – + 1.13 = 4.38, I 3.38 + 1.75 + 3.00 + 2.75 + 1.38 = 12.25, II 3.25 + 1.75 + 2.75 + 2.75 + 1.31 = 11.81, III 2.88 + 1.38 + 2.50 + 2.63 + 1.25 = 10.63, IV 3.63 + 1.50 + 3.25 + 4.00 + 1.50 = 13.88 (pedipalp 1.50 + 1.00 + 0.88 + – + 1.25 = 4.63, I 3.38 + 2.00 + 2.88 + 2.63 + 1.38 = 12.25, II 3.25 + 2.00 + 2.63 + 2.50 + 1.38 = 11.75, III 3.00 + 1.63 + 2.38 + 2.88 +



Figs. 28–34. *Kangarosa focarius* sp. nov. **28:** Male (WAM T48044), dorsal view. **29–30:** Female epigyne, ventral view (29 WAM T48044, 30 paratype NMV K10727). **31–32:** Male left pedipalp (holotype) (31 ventral, 32 retrolateral view). **33:** Female epigyne, dorsal view (T48044). **34:** Apical part of bulb of male left pedipalp, ventral view (NMV K9060). Scale bars: **28**, 2 mm; **29–30**, **33–34**, 0.25 mm; **31–32**, 0.5 mm.

1.25 = 11.13, IV 3.88 + 1.63 + 3.38 + 4.25 + 1.63 = 14.75).

Variation. Only two other males (TL 9.38/abdomen missing, CL 4.75/3.88, CW 3.63/3.0) and one other fe-

male (TL 8.50, CL 3.88, CW 2.88) were available for measurements.

Habitat and life history characteristics. Like some other members of the genus, *K. focarius* appears to



Fig. 35. Distribution records of *Kangarosa alboguttulata* (L. Koch) (full circles) and *K. focarius* sp. nov. (open circles).

have some affinities to water as all specimens were either found in riparian environments or near the coast. The species appears to be late summer to winter mature as adult spiders were collected in April, May and July.

Distribution. Currently only recorded from three localities in central southern and northern Victoria (Fig. 35).

Etymology. The specific epithet is noun in apposition derived from the Latin word for cook (*focarius*) in reference to the type locality.

4.6. *Kangarosa ludwigi* sp. nov.

Figs. 7, 16, 36–43, 52

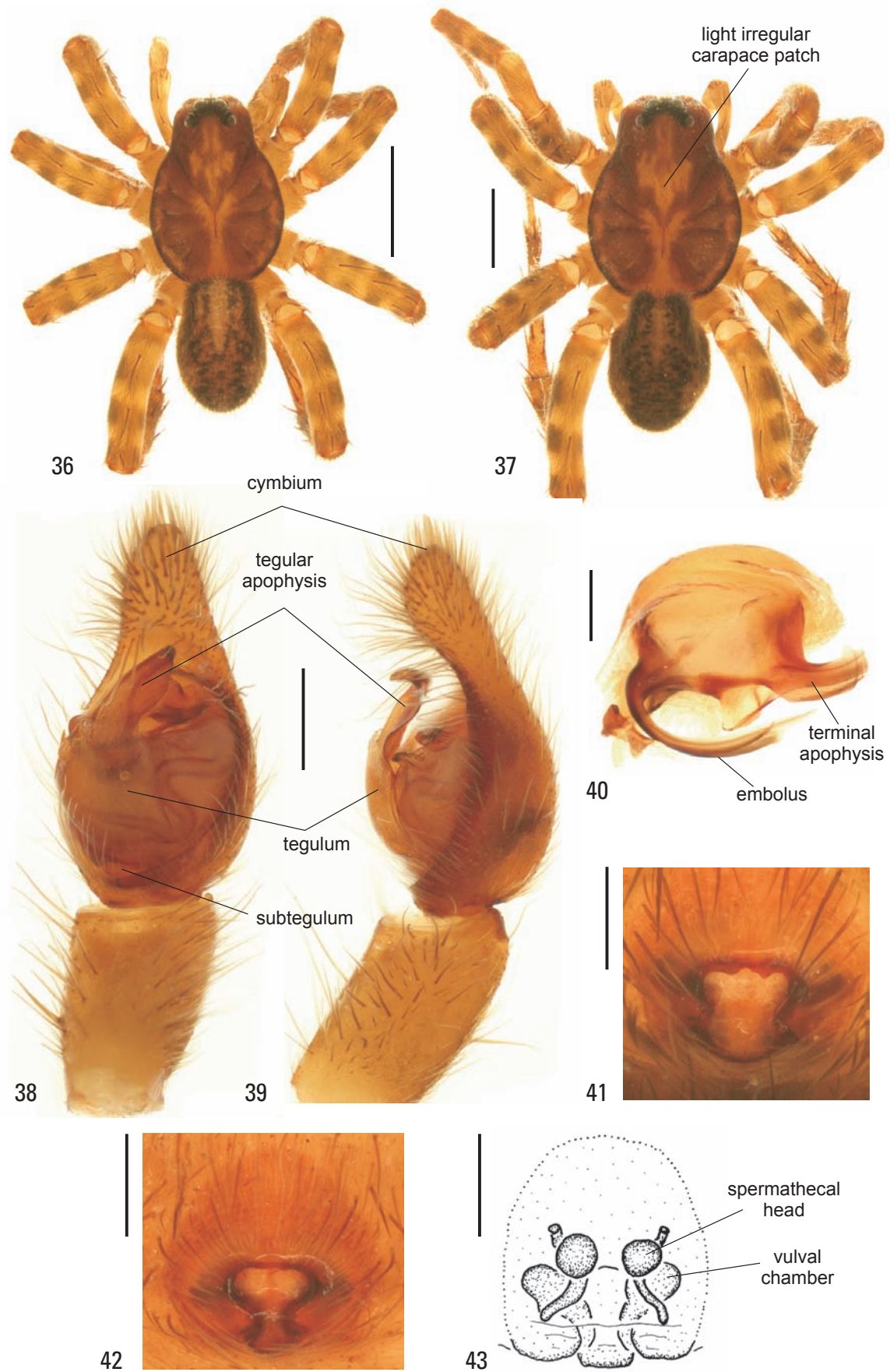
Trochosa tristicula tristicula (L. Koch): MCKAY 1979: 284–286 [misidentified in part, see Remarks below].

Type material. Holotype: ♂, Mary Cairncross Park, via Maleny [26°46'S 152°51'E, Queensland], 29.xii.–27.iii.1975, pitfall trap, 490 m a.s.l., G.B. & S.R. Monteith, GM I B/3 (QM W5797). **Paratype:** ♀, Springbrook [28°11'S 153°16'E, Queensland], 03.vii.1992, pitfall trap, M. & G. de Baar, rainforest (QM S49584).

Other material examined. AUSTRALIA: New South Wales: 1 ♀, Ballengarra State Forest, Cooperabung Range Road, 4.5 km N of Narang Road, 31°11'46"S 152°42'25"E (AMKS40521); 1 ♀, Beaury State Forest, 28°29'S 152°23'E (ANIC); 5 ♂♂, 1 ♀, 31 juv., Beaury State Forest, 1.9 km along Tucker Box Road from Tooloom Rest Area, 28°28'24"S 152°24'01"E (AM KS36115); 6 ♂♂, 1 ♀, 1 juv., Beaury State Forest, Bennetts Road, approx. 10 km NW Urbenville, 28°25'32"S 152°27'46"E (AM KS36078); 1 ♂, 4 ♀♀, Beaury State Forest, Koorelah Range, Tucker Box Road, 1.8 km from Tooloom Lookout, 28°30'54"S 152°21'14"E (AM KS85231); 2 ♂♂, 1 ♀, same locality (AM KS85270); 3 ♂♂, 4 ♀♀, Beaury State Forest, north-

wards along Wallaby Creek Road, 28°24'47"S 152°27'39"E (AM KS36145); 1 ♂, Beaury State Forest, Tooloom Scrub, 28°35'S 152°22'E (AM KS51275); 1 ♂, 1 ♀, same locality (AM KS51296); 1 ♂, same locality (AM KS54481); 3 ♂♂, 1 ♀, 2 juv., Beaury State Forest, unknown distance from top end of Tucker Box Road, 28°28'53"S 152°24'01"E (AM KS37932); 1 ♀, Bellangry State Forest, Wilson River Flora Reserve, 31°18'S 152°29'E (AM KS9700); 2 ♀♀, 6 juv., Bellinger River Station, about 600 m down small track, off Dorrigo Bellinger Highway, 1 km W of Summervilles Road, 30°25'03"S 152°45'30"E (AM KS35658); 1 ♂, 1 ♀, Big Scrub Flora Reserve, Gibbergunyah Ranges Road, 900 m NW of Rocky Creek crossing, Whian Whian State Forest, 28°38'15"S 153°19'34"E (AM KS35926); 1 ♀, Boonoo State Forest, Boonoo Forest Drive, 1.8 km from Mt Lindesay Highway, 28°56'11"S 152°06'11"E (AM KS37002); 2 ♀♀, Boorook State Forest, 1 km NW Boorook Creek junction on Conlongan Road, 28°50'32"S 152°10'18"E (AM KS36997); 7 ♂♂, 1 ♀, Border Ranges National Park, 2.5 km N of Brindle Creek on Brindle Creek Road, 28°22'18"S 153°04'35"E (AM KS35981); 4 ♂♂, 1 ♀, Border Ranges National Park, Brindle Creek Road, 100 m E of Antarctic Beech Picnic Area, 28°22'34"S 153°05'45"E (AM KS35987); 6 ♂♂, 3 ♀♀, 1 juv., Border Ranges National Park, Brindle Creek, where Brindle Creek Road crosses Brindle Creek, 28°22'44"S 153°04'03"E (AM KS35969); 3 ♂♂, 2 ♀♀, Border Ranges National Park, Tweed Range Road, 2 km SSW of junction with Bridle Creek Road, 28°23'52"S 153°03'22"E (AM KS35974); 1 ♂, Border Ranges National Park, Tweed Range Road, 4.6 km SW of Brindle Creek Road, 28°24'25"S 153°02'04"E (AM KS35957); 1 ♀, Border Ranges National Park, Tweed Range Road, 500 m N of sheepstation creek Track, 28°24'51"S 153°01'39"E (AM KS35941); 1 ♀, Bruxner Park Floral Reserve, 30°15'S 153°07'E (AM KS45963); 1 ♂, Cambridge Plateau, Richmond Range State Forest, 28°47'S 152°45'E (AM KS44809); 1 ♂, 1 ♀, same locality (AM KS57711); 1 ♀, Carrai Bat Cave, nearby, 50 m NW Kempsey, 31°01'S 152°20'E (AM KS84116); 6 ♂♂, Dome Mountain, Richmond Range and Yabbra State Forest, 28°28'S 152°43'E (AM KS44113, KS51318, KS53793, KS57751 KS63736–7); 1 ♀, same locality (AM KS53791); 2 ♂♂, 2 ♀♀, 1 juv., Dorrigo National Park, Dome Road, approx. 2 km W Never Never Picnic Area, 30°21'22"S 152°47'12"E (AM KS35656); 11 ♂♂, 5 ♀♀, 3 juv., Dorrigo National Park, Never Never Picnic Area 1 km W on Dome Road, 30°21'35"S 152°47'30"E (AM KS35659); 8 ♂♂, Dorrigo National Park, west bank of Rosewood River, Little North Arm Road, 30°24'06"S 152°46'18"E (AM KS61078); 2 ♂♂, Dorrigo National Park, Wonga Walk, small stream below falls, 30°22'56"S 152°43'38"E (AM KS35657); 2 ♂♂, Dorrigo National Park, 29°06'43"S 152°26'53"E (AM KS85247); 1 ♀, Dorrigo National Park, but 29°06'29"S 152°26'30"E (AM KS39746); 3 ♀♀, Dorrigo National Park, 29°06'42"S 152°26'56"E (AM KS39747); 2 ♀♀, Ewingar State Forest, Ewingar Creek, Elkhorn Road, 29°06'00"S 152°26'20"E (AM KS39744, KS39749); 2 ♀♀, Ewingar State Forest, tributary of Grasree Creek, Nogrigar Road, 29°08'55"S 152°25'53"E (AM KS39748); 2 ♀♀, 6 juv., Gibraltar Range National Park, 29°35'S 152°17'E (QM S66412); 1 ♂, 1 ♀, lower Gibraltar Range, 29°35'S 152°17'E (QM S66414); 1 ♂, same locality (QM S66418); 1 ♂, 2 ♀♀, same locality (QM S66421); 1 ♂, 2 ♀♀, same locality (QM S66440); 7 ♀♀, 13 juv., Gibraltar Range, via Glen Innes, 29°33'S 152°17'E (QM S27511); 1 ♂, Huanbrook, Upper Coopers Creek, 28°42'S 153°24'E (AM KS84115); 1 ♀, Kangaroo River State Forest, 200 m E of a point 550 m along Burns Road, 30°04'36"S 152°52'05"E (AM KS39745); 2 ♂♂, Kempsey, 3 km S of, near picnic area, 31°05'S 152°50'E (AM

KS84114); 2 ♂♂, Koreelah State Forest, Acacia Plateau and Wilson's Peak area, 28°16'S 152°27'E (AM KS52090); 1 ♂, same locality (AM KS52396); 1 ♂, same locality (AM KS57762); 1 ♀, same locality (AM KS63734); 1 ♂, 1 ♀, Kunderang Station Creek, south-westerly branch, 30°48'32"S 152°06'44"E (AM KS39750); 8 ♂♂, 3 ♀♀, London Bridge State Forest, approx. 2.7 km SW of London Bridge Lookout, halfway S along unnamed fire survey track, off London Bridge Road, 29°51'25"S 152°13'20"E (AM KS35958); 1 ♀, same locality (AM KS36958); 1 ♂, Lorne State Forest, near Lorne, 31°35'S 152°38'E (AM KS1565); 1 ♀, same locality (AM KS1970); 1 ♂, Marengo State Forest, 0.4 km SW on Chimney Road from Buckboard and Foamy Creek Roads, 30°06'09"S 152°25'11"E (AM KS35674); 2 ♂♂, 1 ♀, 5 juv., Marengo State Forest, 0.5 km NE on Foamy Creek Road from Chaelundi Road, 30°07'52"S 152°24'55"E (AM KS35663); 1 ♀, Marengo State Forest, 2.2 km NE on Chimney Road from Chaelundi Road, 30°06'21"S 152°24'41"E (AM KS35678); 6 ♂♂, 5 ♀♀, 1 juv., Marengo State Forest, Big Bull Creek, 2.7 km NE of Foamy Creek Road from Chaelundi Road, 30°07'30"S 152°24'51"E (AM KS35667); 8 ♂♂, 5 ♀♀, 1 juv., Marengo State Forest, Opposum Creek, upstream of Foamy Creek Road, 30°06'41"S 152°25'48"E (AM KS35666); 1 ♀, McPherson Range, 28°23'S 152°46'E (AM KS51633); 2 ♂♂, Moonpar State Forest, junction of Moonpar and Mills Roads, 30°14'36"S 152°37'32"E (AM KS61721); 1 ♀, Mt Glennie, 16 km E Woodenbong, 28°23'S 152°46'E (QM S66408); 7 ♂♂, 2 ♀♀, Mt Hyland Nature Reserve, 0.9 km S on Chaelundi Road from Big Bull Road, 30°09'14"S 152°27'58"E (AM KS35670); 5 ♂♂, 7 ♀♀, 2 juv., Mt Hyland Nature Reserve, Obeloe Creek 2 km SW on Obeloe Road from Chaelundi Road, 30°09'50"S 152°27'32"E (AM KS35719); 7 ♂♂, 1 ♀, 1 juv., Mt Nardi, via Nimbin, 28°32'45"S 153°17'14"E (QM S66425); 1 ♂, Mt Warning, 28°25'S 153°17'E (QM W6894); 1 ♂, Never Never, Dorriggo, 30°22'S 152°45'E (QM S66423); 1 ♂, same locality (QM S66429); 1 ♀, Nimboi-Binderay National Park, Norman Jolly Flora Reserve, 30°13'S 152°40'E (AM KS91059); 1 ♂, Poverty Point Hill, 29°08'S 152°19'E (QM S29758); 1 ♂, 1 juv., same locality (QM S66415); 2 ♀♀, Poverty Point, SE of Tenterfield, 29°07'51"S 152°18'11"E (QM S66407); 1 ♂, 1 ♀, same locality (QM S66417); 1 ♀, 1 juv., Richmond Range State Forest, Tunners Road, 28°37'33"S 152°42'19"E (AM KS36036); 2 ♂♂, Scotchman State Forest, Horseshoe Road, 3.5 km SE of Thora, 30°26'25"S 152°47'30"E (AM KS61704); 1 ♂, Styx River State Forest, 30°43'44"S 152°06'32"E (AM KS74668); 19 ♂♂, 2 ♀♀, 5 juv., Tooloom Scrub Flora Reserve, Urbanville-Legume Road, gully in middle of Reserve, 28°28'30"S 152°23'50"E (AM KS36118); 1 ♀, Tweed Range, 28°25'S 153°02'E (AM KS51256); 7 ♂♂, 5 ♀♀, Washpool National Park, Cedar Creek, Cedar trail, 29°28'42"S 152°20'23"E (AM KS37051); 1 ♂, 4 ♀♀, Washpool National Park, track off Cedar Trail, 29°28'00"S 152°20'53"E (AM KS37034); 5 ♂♂, 9 ♀♀, same locality (AM KS37047); 2 ♂♂, Washpool State Forest, 29°16'S 152°22'E (AM KS38756); 1 ♂, 2 juv., same locality (AM KS38758); 1 ♀, same locality (AM KS38759); 2 ♂♂, 1 ♀, Wiangaree, 28°23'S 153°06'E (AM KS12916); 2 ♂♂, 2 ♀♀, 24 juv., Wiangaree State Forest, 28°22'S 153°05'E (ANIC); 1 ♂, 1 ♀, Yabbra Scrub, Yabbra State Forest, 28°38'S 152°30'E (AM KS53797); 1 ♂, same locality (AM KS63742); 1 ♂, same locality (AM KS63744); 1 ♂, same locality (AM KS44819); 1 ♀, same locality (AM KS44831); 1 ♂, same locality (AM KS48751); 1 ♀, Yabbra State Forest, 28°30'32"S 152°40'00"E (AM KS38415); 1 ♂, same locality (AM KS38421); 1 ♀, 1 juv., same locality (AM KS38423). **Queensland:** 1 ♀, no exact locality (QM S66427); 1 ♀, Amamoor Creek, 26°22'S 152°38'E (QM S66442); 5 ♂♂, 1 ♀, same locality (QM W6890); 1 ♂, 1 juv., Bellenden Ker Range, Cableway Base Station, 17°16'S 145°54'E (QM S66432); 1 ♀, Binna Burra Lodge, Lamington National Park, 28°11'S 153°11'E (WAM T55350); 5 ♂♂, 1 ♀, 39 juv., same locality (QM S66413); 1 ♂, 1 ♀, same locality (WAM T77466); 1 ♀, Booloumba Creek, Conondale Range, 26°39'S 152°39'E (QM S66434); 1 ♂, same locality (QM W5933); 2 ♂♂, same locality (QM W5936); 1 ♀, Bunya Mountain National Park, Saddleback Creek, 26°51'S 151°34'E (AM KS54003); 1 ♂, Bunya Mountains, 26°54'S 151°34'E (QM W5790); 1 ♀, same locality (QM W5802); 1 ♂, 1 ♀, same locality (QM W5807); 3 ♂♂, 4 ♀♀, Bunya Mountains National Park, Daranbayan picnic ground, 26°51'S 151°34'E (QM W5786); 5 ♂♂, Casey Creek, via Imbil, 26°28'S 152°41'E (QM W5900); 12 ♂♂, 5 ♀♀, 2 juv., Cold Creek, via Imbil, 26°28'S 152°41'E (QM W5891); 6 ♂♂, 3 ♀♀, 1 juv., same locality (QM W5892); 1 ♂, 1 ♀, same locality (QM S66439); 1 ♂, Cunninghams Gap, 28°03'S 152°24'E (QM W5943); 2 ♀♀, Cunninghams Gap Main Range National Park, 28°03'S 152°24'E (WAM T56218); 1 ♀, Danbulla State Forest, 17°08'S 145°36'E (AM KS69949); 1 ♂, 4 juv., Dawes Range, Kroombit Tops, 17°00'S 145°32'E (QM S66433); 1 ♀, Ewan Maddock Dam, 26°48'S 152°59'E (QM S32190); 2 ♂♂, same locality (QM S47151); 1 ♂, Ewan Maddock Dam, old homesite, 26°48'S 152°59'E (QM S25008); 1 ♀, Gin Gin, 15 km SW, 25°05'S 152°52'E (QM W7161); 1 ♂, 11 juv., Joalah National Park, 27°55'S 153°12'E (ANIC); 2 ♀♀, 6 juv., Joalah National Park, Tambourine Mountain, 27°58'S 152°11'E (ANIC); 1 ♂, Kenilworth State Forest, Sunday Creek Road, 9.8 km W of Charlie Moreland Park, 26°40'11"S 153°36'35"E (AM KS53961); 1 ♀, Kroombit Tops, 24°22'S 151°01'E (QM S66405); 5 ♀♀, 2 juv., Kroombit Tops, Beauty Spot 98, 24°22'S 151°01'E (QM S66410); 1 ♂, 1 ♀, Kroombit Tops, Lower Dry Creek, 24°24'S 151°01'E (QM S66435); 1 ♀, 1 juv., Lamington National Park, Border track, O'Reillys, 28°14'S 153°08'E (QM S25475); 1 ♂, Lamington National Park, O'Reillys, 28°14'10"S 153°08'20"E (QM S66416); 1 ♀, Lamington National Park, near O'Reillys Guesthouse, 28°14'05"S 153°08'13"E (ZMUC); 1 ♂, Lamington National Park, Wishing Tree Circuit, O'Reillys, 28°14'S 153°08'E (QM S66430); 2 ♀♀, Levers Plateau, 28°19'S 152°15'E (QM S66443); 2 ♂♂, 2 ♀♀, 2 juv., Lower Coomera, 28°11'S 153°11'E (QM S51779); 1 ♂, Majors Mountain, 17°38'S 145°32'E (QM S66420); 1 ♀, Manorina National Park, Brisbane Forest Park, 27°23'S 152°48'E (WAM T56216); 1 ♂, same locality (WAM T56399); 1 ♂, Mapleton Falls National Park, 26°38'S 152°51'E (QM S47137); 1 ♀, Mary Cairncross Park, 26°46'S 152°51'E (QM W5794); 1 ♂, 2 juv., same locality (QM W5795); 1 ♀, same locality (QM W5791); 2 ♂♂, 2 ♀♀, Miala Nature Park, 27°20'S 152°46'E (ANIC); 1 ♀, Mistake Mountains (North), 27°59'S 152°23'E (QM S66426); 4 ♀♀, same locality (QM S66428); 1 ♀, same locality (QM S66437); 1 ♀, same locality (QM S66441); 1 ♂, 4 juv., Mooloolah River (Glenview), 26°45'S 153°00'E (QM S66431); 1 ♀, Mt Asplenium, 28°09'S 152°26'E (QM S47322); 1 ♀, Mt Glorious, 27°20'S 152°46'E (QM W7159); 1 ♀, same locality (QM S66406); 6 ♂♂, Mt Nebo, 27°23'S 152°47'E (QM S66424); 1 ♀, Mt Tamborine, 27°56'S 153°12'E (QM W7160); 1 ♂, Mt Tenison-Woods, 27°18'S 152°45'E (QM W5947); 1 ♂, Natural Bridge National Park, 28°14'S 153°15'E (QM S66404); 1 ♂, same locality (QM S66436); 1 ♂, Palmerston National Park, 17°37'S 145°40'E (QM S25869); 1 ♀, Paluma Dam Road, 22°33'S 144°53'E (QM S46860); 1 ♂, 1 ♀, Philip Farm, Levers Plateau, Rathdowney, 28°19'S 152°51'E (QM W6892); 1 ♂, Rozens Lookout, Beechmont, 28°08'S 153°12'E (QM W5899); 3 ♂♂, 1 ♀, Seaview Range, Mt Fox Road, no exact locality (QM



Figs. 36–43. *Kangarosa ludwigi* sp. nov. **36:** Male (WAM T77466), dorsal view. **37:** Female (WAM T77466), dorsal view. **38–39:** Male (QM W5933) left pedipalp (38 ventral, 39 retrolateral view). **40:** Apical part of bulb of male left pedipalp, ventral view (WAM T77466). **41–42:** Female epigyne, ventral view (41 WAM T77466, 42 WAM T56216). **43:** Female epigyne, dorsal view (QM S49584). Scale bars: **36–37,** 2 mm; **38–39, 41–43,** 0.25 mm; **40,** 0.1 mm.

S25018); 1 ♀, 1 juv., South Bell Peak, 17°06'08"S 145°53'37"E (QM S59133); 1 ♂, 2 ♀♀, Springbrook, 28°11'S 153°16'E (QM S23037); 1 ♀, Springbrook, Repeater Station, 28°15'S 153°16'E (QM W5884); 1 ♂, The Palms, via Cooyar, 26°56'S 151°53'E (QM W6897); 1 ♂, same locality (QM W6898); 2 ♂♂, same locality (QM W6899); 1 ♂, Tullawallal, Binna Burra, 28°12'S 153°12'E (QM S51673); 3 ♂♂, 7 ♀♀, 7 juv., Tungi Creek, 26°40'S 152°28'E (QM W5880); 2 ♂♂, 1 ♀, Upper Tallebudgera Valley, 28°15'S 153°16'E (QM S66409); 2 ♂♂, 1 juv., Wallaman Falls Road, junction, 18°39'S 145°52'E (QM S41433); 1 ♀, Wallaman Falls, via Ingham, 18°36'S 145°48'E (QM S66411).

Diagnosis. *Kangarosa ludwigi* is most similar to *K. properipes* and *K. ossea*; male and female genitalia are almost indistinguishable in some cases. However, the colouration of *K. ludwigi* is very distinct as it is the only species in the genus that has an irregular wide light patch in the anterior half of the cephalothorax and distinct dark annulations on the legs (Figs. 36, 37). *Kangarosa ludwigi* is also, on average, the smaller species of the genus (although sizes overlap), with the cymbium distinctly shorter (<1.0 mm) than that of *K. properipes* (>1.0 mm) (males of *K. ossea* are unknown).

Description, male (based on holotype from Mary Cairncross Park, Queensland). Carapace light orange-brown, irregular wide light patch in anterior half behind eyes that narrows at fovea (Fig. 36); distinct light submarginal band and narrow, almost black marginal band; distinct dark grey radial pattern; covered with short dark-brown setae and few short white setae in median and submarginal bands; longer brown bristles around eyes. Chelicerae orange-brown, retrolaterally darker; few brown setae meso-basally and few white setae; three promarginal teeth, with the median largest and the two others very small; three retromarginal teeth, with the basal the smallest. Sternum orange-brown with grey pigmentation in posterior half forming a broad irregular line; brown setae of increasing length towards margins. Labium brown, darker basally; front margin truncated and white. Pedipalps: tegular apophysis with sinuous retrolateral flange (Figs. 7, 38, 39); terminal apophysis comparatively broad; embolus terminating in narrow tip (Fig. 40). Abdomen light yellow-brown with irregular olive-grey pigmentation, yellow-brown lanceolate cardiac mark in anterior half (Fig. 36); covered with short brown setae and, less dense, brown macrosetae; white setae laterally. Venter light yellow-brown with dark grey pigmentation mainly centrally; light brown setae. Spinnerets light yellow-brown. Legs: femora and patellae light brown, femora with distinct dark grey annulations which are particularly distinct ventrally; tibiae, metatarsi and tarsi somewhat darker; leg formula IV>I>II>III; spination of leg I: femur: two dorsal, one apico-prolateral; tibia: three ventral pairs, two

(right leg one) prolateral; metatarsus: three ventral pairs, two prolateral, one apico-ventral.

Description, female (based on paratype from Springbrook, Queensland). The female agrees in general detail with the male, however, it is somewhat darker (Fig. 37). In addition: epigyne atrium generally wider anteriorly than posteriorly, posterior lip wide and anterior margin often with two small posterior protrusions (Figs. 41, 42); spermathecal heads globular with single antero-ventral protrusion (Fig. 43). Legs: dark annulations are also quite distinct on tibiae. Spination of leg 1: femur: three dorsal, one apico-prolateral; tibia: three ventral pairs; metatarsus: three ventral pairs, one apico-ventral.

Measurements. ♂ holotype (♀ paratype): TL 4.97 (7.90), CL 2.85 (3.71), CW 2.12 (2.67). Eyes: AME 0.12 (0.13), ALE 0.11 (0.12), PME 0.19 (0.25), PLE 0.16 (0.21). Row of eyes: AE 0.58 (0.77), PME 0.54 (0.71), PLE 0.83 (1.09). Sternum length/width 1.27/1.09 (1.62/1.43). Labium length/width 0.54/0.42 (0.71/0.55). AL 2.30 (4.28), AW 1.70 (2.76). Legs: lengths of segments, femur + patella + tibia + metatarsus + tarsus = total length: pedipalp 1.09 + 0.55 + 0.55 + – + 0.85 = 3.03, I 1.88 + 0.97 + 1.58 + 1.52 + 0.97 = 6.91, II 1.76 + 0.94 + 1.33 + 1.45 + 0.79 = 6.27, III 1.82 + 0.79 + 1.21 + 1.58 + 0.79 = 6.18, IV 2.30 + 0.97 + 1.88 + 2.61 + 1.06 = 8.82 (pedipalp 1.43 + 0.76 + 0.95 + – + 0.86 = 4.00, I 2.38 + 1.24 + 1.81 + 1.71 + 1.05 = 8.19, II 2.19 + 1.14 + 1.52 + 1.62 + 0.95 = 7.43, III 2.19 + 1.05 + 1.24 + 1.90 + 0.86 = 7.24, IV 3.05 + 1.24 + 2.28 + 3.05 + 1.24 = 10.85).

Variation. ♂, n = 14 (♀, n = 12) (range, mean ± SD): TL 4.75–7.13, 5.52 ± 0.73 (4.50–6.63, 5.68 ± 0.67); CL 2.50–4.25, 2.94 ± 0.43 (2.38–3.13, 2.85 ± 0.25); CW 1.18–3.13, 2.22 ± 0.30 (1.75–2.38, 2.16 ± 0.22).

Remarks. MCKAY (1979: 284–286) listed a large number of specimens of *K. ludwigi* in his “Material examined” when revising *Trochosa tristicula tristicula*, not realizing that two species were present. It remains difficult to assign his illustrations for *Trochosa tristicula tristicula* to either *K. ludwigi* or *K. tristicula* due to the similarities in genitalia of both species and because he did not specify the registration numbers for the specimens illustrated. MCKAY’s (1979) figs. 2J,M,L depict specimens from Bunya Mountain, Qld, an area where both species occur. His fig. 2K illustrates a male from Corio Bay, Qld, a specimen I could not locate in the collection of the Queensland Museum, and his fig. 2N–P sketches unspecified “spermathecae of 3 females from Queensland”.

Habitat and life history characteristics. *Kangarosa ludwigi* was most commonly found in rainforest leaf litter but appears to tolerate other closed, forested habitats such as sclerophyll forests and, rarely, pine plantations. Adult specimens were found generally from October to April, with a peak from February to April.

However, some males and females were collected between May and September indicating some plasticity in the phenology of this species.

Distribution. New South Wales and Queensland (Fig. 52). The WAM collection has a male of *K. ludwigi* labeled “Brentwood Swamp, WA (WAM 71/164)”. It is assumed that this represents a labeling error following McKAY’s (1979) revisionary work, since he also illustrated *K. properipes* from this locality as *T. tristicula phegeia* and possibly mixed up some specimens.

Etymology. The specific epithet is a patronym in honour of Ludwig Koch (1825–1908), who described 43 wolf spider species from Australia between 1865 and 1878 (KOCH 1865, 1867, 1877, 1878).

4.7. *Kangarosa nothofagus* sp. nov.

Figs. 10, 18, 44–52

Type material. Holotype: ♂, Otway Ranges, Young Creek Road, 0.4 km NW Triplet Falls [38°40’S 143°29’E, Victoria], 15.xi.1994–31.i.1995, pitfall trap, G. Milledge, *Eucalyptus* sp. forest (NMV K5615). **Paratype:** ♀ [with spiderlings], same data as holotype (NMV K10728).

Other material examined. AUSTRALIA: Victoria: 1 ♀, Otway Ranges, Phillips track, Young Creek Crossing, 0.5 km N Triplet Falls, 38°40’S 143°29’E (NMV K5622); 2 ♀♀, Otway Ranges, Young Creek Road, 0.2 km NE Cianco Creek Crossing, 38°42’S 143°29’E (NMV K5621); 1 ♀, same locality (NMV K5622); 1 ♀, Otway Ranges, Young Creek Road, 0.4 km NW Triplet Falls, 38°40’S 143°29’E (NMV K5614); 3 ♂♂, same locality (NMV K5617–19).

Diagnosis. *Kangarosa nothofagus* is morphologically similar to *K. tasmaniensis*. Males differ in particular in the shape of the tegular apophysis that has a distinct retrolateral central protrusion, which is absent in *K. tasmaniensis*. In addition, the terminal apophysis is broad in *K. nothofagus* but slim and pointy in *K. tasmaniensis*. The epigyne of *K. nothofagus* is unique as it is broadest anteriorly with waved lateral edges.

Description, male (based on holotype from the Otway Ranges, Victoria). Carapace dark reddish-brown with slightly lighter median band that widens anteriorly; indistinct light submarginal band, carapace margins almost black (Fig. 44); covered with short black setae and few short white setae in submarginal bands and around eyes; two pairs of short radial lines of white setae; longer brown bristles around eyes. Chelicerae dark reddish-brown; few brown long setae meso-basally and some white setae; three promarginal teeth, with the median largest (right chelicera only two teeth, apical reduced); three retromarginal teeth, with the apical the smallest. Sternum dark reddish-brown; fairly dense brown setae of increasing length towards margins. Labium dark reddish brown, basally almost

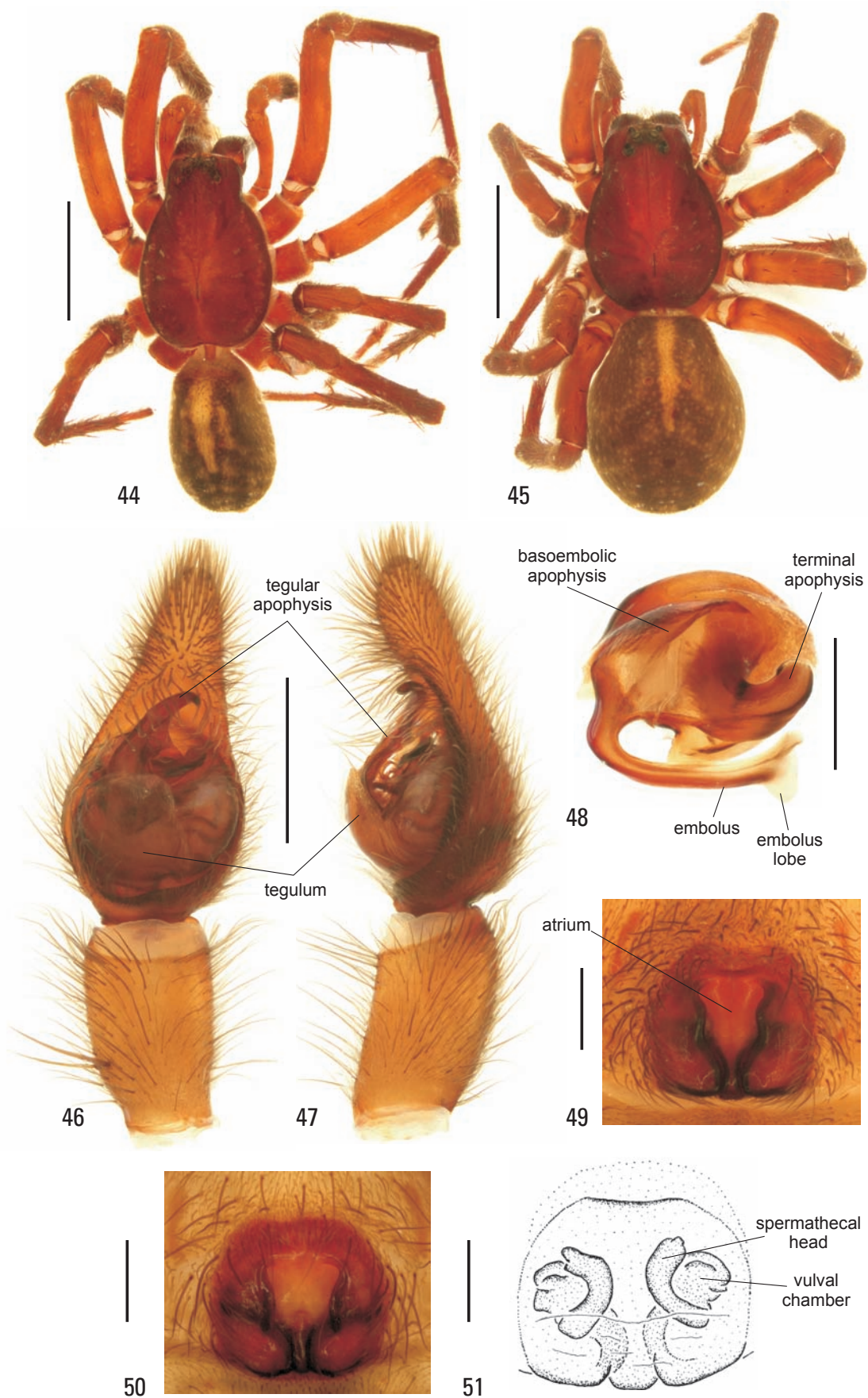
black; front margin truncated and whitish. Pedipalps: tegular apophysis with retrolateral pointy protrusion (Fig. 10, 46, 47), terminal apophysis broad, embolus with apico-ventral lobe (Fig. 48). Abdomen dorsally dark olive-gray with yellow-brown lanceolate cardiac mark in anterior half accompanied on either side by narrow yellow-brown bands that dissolve into spots posteriorly (Fig. 44); covered with short brown setae and, less dense, brown macrosetae; few white setae in light bands; abdomen laterally slightly lighter. Venter olive-brown with two light brown, irregular lateral longitudinal bands and a light brown median band that widens anteriorly; brown setae and fewer brown macrosetae. Spinnerets brown. Legs: femora brown; patellae, tibiae, metatarsi and tarsi dark brown; leg formula IV > I > II > III; spination of leg I: femur: two dorsal, two apico-prolateral; tibia: three ventral pairs, one prolateral; metatarsus: three ventral pairs, one apico-ventral.

Description, female (based on paratype from the Otway Ranges, Victoria). The female agrees in general detail with the male although the abdomen is lighter and the cardiac mark less distinct (Fig. 45). In addition: carapace with five pairs of short radial bands of white setae; no submarginal light band. Epigyne atrium widening anteriorly with waved lateral margins (Figs. 49, 50); spermathecal heads very narrow (Fig. 51).

Measurements. ♂ holotype (♀ paratype): TL 11.88 (14.50), CL 6.25 (6.63), CW 4.25 (4.63). Eyes: AME 0.25 (0.27), ALE 0.19 (0.21), PME 0.40 (0.31), PLE 0.31 (0.29). Row of eyes: AE 1.13 (1.21), PME 0.98 (1.04), PLE 1.57 (1.71). Sternum length/width 2.63/2.38 (2.50/2.25). Labium length/width 1.02/0.86 (1.08/1.00). AL 5.63 (6.63), AW 3.13 (4.25). Legs: lengths of segments, femur + patella + tibia + metatarsus + tarsus = total length: pedipalp 2.38 + 1.25 + 1.13 + – + 2.13 = 6.88, I 4.88 + 2.25 + 4.25 + 4.38 + 2.13 = 17.88, II 6.63 + 2.13 + 3.75 + 4.00 + 2.00 = 16.50, III 4.13 + 2.00 + 3.00 + 4.00 + 1.75 = 14.88, IV 5.63 + 2.13 + 4.38 + 5.88 + 2.38 = 20.38 (pedipalp 2.63 + 1.13 + 1.38 + – + 1.75 = 6.88, I 5.00 + 2.38 + 3.88 + 3.88 + 2.00 = 17.13, II 4.63 + 2.00 + 3.50 + 3.50 + 1.88 = 15.50, III 4.13 + 1.88 + 3.213 + 3.50 + 1.75 = 14.38, IV 5.50 + 2.13 + 4.25 + 5.38 + 2.25 = 19.50).

Variation. ♂, n = 4 (♀, n = 6) (range, mean ± SD): TL 10.00–11.88, 10.84 ± 0.78 (11.38–16.50, 14.00 ± 2.15); CL 5.13–6.00, 5.66 ± 0.43 (6.50–7.00, 6.81 ± 0.22); CW 3.88–4.50, 4.23 ± 0.27 (4.63–5.13, 4.92 ± 0.19).

Habitat and life history characteristics. *Kangarosa nothofagus* was found in *Nothofagus cunninghamii* and *Eucalyptus* sp. forests. Adult males were found in pitfall traps exposed between January and June, females from September to January and also April to June. The paratype female was found with spiderlings, indicating reproduction between November and January.



Figs. 44–51. *Kangarosa nothofagus* sp. nov. **44:** Male (holotype), dorsal view. **45:** Female (NMV K5622), dorsal view. **46–47:** Male (NMV K5617) left pedipalp (46 ventral, 47 retrolateral view). **48:** Apical part of bulb of male left pedipalp, ventral view (NMV K5617). **49–50:** Female epigyne, ventral view (49 paratype, 50 NMV 5622.). **51:** Female epigyne, dorsal view (NMV K10728). Scale bars: **44,** 3 mm; **45,** 5 mm; **46–47,** 1 mm; **48–51,** 0.5 mm.



Fig. 52. Distribution records of *Kangarosa ludwigi* sp. nov. (full circles) and *K. nothofagus* sp. nov. (open circles).

Distribution. Currently known only from the Otway Ranges, Victoria (Fig. 52).

Etymology. The specific epithet is a noun referring to the plant genus *Nothofagus*, the Southern Beech, which characterizes the forests in which this species is found.

4.8. *Kangarosa ossea* sp. nov.

Figs. 17, 53–56, 69

Type material. Holotype: ♀, Bones Knob, 3 km W [17°14'S 145°25'E, Queensland], 09.ii.1996, 1100 m, G.B. Monteith (QM S43259). **Paratype:** ♀, same data as holotype (QM S87717).

Other material examined. AUSTRALIA: Queensland: 7 ♀♀, Bones Knob, 17°13'S 145°25'E (QM S38155).

Diagnosis. The female genitalia of *K. ossea* are very similar to those of *K. ludwigi*, but *K. ossea* lacks the distinctive colouration of the latter. The species differs from *K. properipes* in the generally wider posterior lip of the epigyne. The male of *K. ossea* is currently unknown.

Description, male. Unknown.

Description, female (based on holotype from Bones Knob, Queensland). Carapace orange-brown with some light discolourations centrally (no distinct light median band evident) (Fig. 53); very indistinct and irregular light submarginal band, carapace margins grey; two dark brown small spots in posterior half; covered with short dark brown setae that are less dense centrally and on submarginal bands; few white setae between eyes; indistinct darker radial pattern; longer brown bristles around eyes. Chelicerae dark reddish-brown; few brown long setae meso-basally and some white setae; three promarginal teeth, with the median

largest; three retromarginal teeth, with the basal the smallest. Sternum glabrous orange-brown; brown setae of increasing length towards margins. Labium brown, basally darker; front margin truncated and whitish. Abdomen dorsally uniformly olive-grey with very indistinct yellow-brown lanceolate cardiac mark in anterior half (Fig. 53); covered with short brown setae and, less dense, brown macrosetae. Venter light orange-brown with indistinct darker banding; light brown setae and fewer brown macrosetae. Spinnerets brown. Epigyne atrium wider anteriorly, anterior margin with two protrusions (Figs. 54, 55); spermathecal heads globular with single, slightly branched apical protrusions (Fig. 56). Legs: femora and patellae light brown; tibiae, metatarsi and tarsi brown; leg formula IV>I>II>III; spination of leg I: femur: two dorsal, one apico-prolateral; tibia: three ventral pairs; metatarsus: three ventral pairs, one apico-ventral.

Measurements. TL 9.75, CL 4.88, CW 3.63. Eyes: AME 0.21, ALE 0.13, PME 0.33, PLE 0.27. Row of eyes: AE 0.92, PME 0.83, PLE 1.38. Sternum length/width 2.25/1.75. Labium length/width 0.88/0.71. AL 5.63, AW 4.75. Legs: lengths of segments, femur + patella + tibia + metatarsus + tarsus = total length: pedipalp 1.75 + 0.88 + 1.06 + – + 1.19 = 4.88, I 3.25 + 1.75 + 2.63 + 2.38 + 1.38 = 11.38, II 3.00 + 1.50 + 2.25 + 2.31 + 1.25 = 10.31, III 2.75 + 1.50 + 1.88 + 2.63 + 1.25 = 10.00, IV 3.63 + 1.75 + 3.13 + 4.13 + 1.56 = 14.19.

Variation. ♀, n = 9 (range, mean ± SD): TL 6.00–11.00, 8.76 ± 1.45; CL 3.25–5.13, 4.22 ± 0.58; CW 2.50–3.75, 3.10 ± 0.40. The dark posterior spots on the carapace described for the holotype are not present in any other specimen.

Habitat and life history characteristics. Adult females were found in December and February suggesting summer maturity for *K. ossea*.

Distribution. Currently known from and nearby Bones Knob, Queensland only (Fig. 69).

Etymology. The specific epithet is a Latin adjective (*osseus* – made of bone) and refers to the type locality, Bones Knob.

4.9. *Kangarosa pandura* sp. nov.

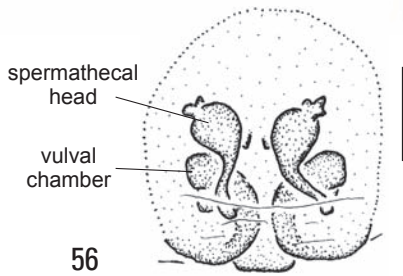
Figs. 14, 57–60, 69

Type material. Holotype: ♀, Fiddlers Green Creek Bridge [37°18'S 149°13'E, Victoria], 03.xii.1998, riparian gravel bank, under rocks, V.W. Framenau (NMV K7768). **Paratype:** ♀, Flat Rock Creek [37°17'S 149°13'E, Victoria], 03.xii.1998, riparian gravel bank, under rocks, V.W. Framenau (NMV K7769).

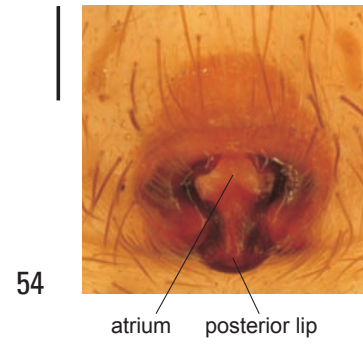
Other material examined. AUSTRALIA: Australian Capital Territory: 1 ♀, Uriarra Forest, 27.1 km WSW Canberra, across Lees Creek, 35°21'12"S 148°50'36"E (ANIC). **New South Wales:** 2 ♀♀, Darkes Forest, 34°14'S 150°55'E (AM



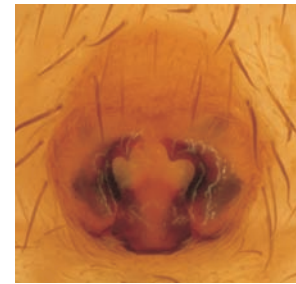
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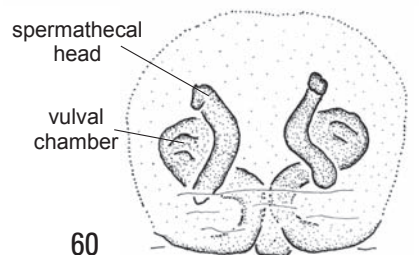


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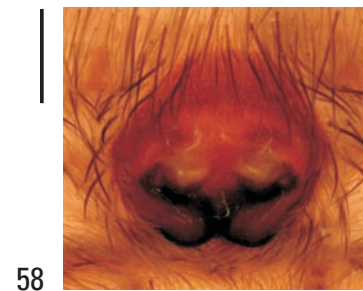
Figs. 53–56. *Kangarosa ossea* sp. nov. **53:** Female (holotype), dorsal view. **54–55:** Female epigyne, ventral view (54 holotype, 55 QM S38155). **56:** Female epigyne, dorsal view (QM S87717). Scale bars: **53,** 3 mm; **54–56,** 0.2 mm.



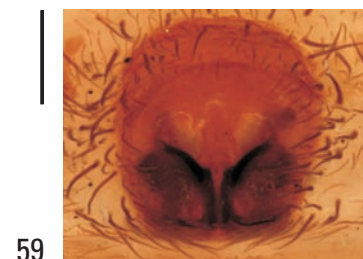
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Figs. 57–60. *Kangarosa pandura* sp. nov. **57:** Female (holotype), dorsal view. **58–59:** Female epigyne, ventral view (58 holotype, 59 AM KS86503). **60:** Female epigyne, dorsal view (NMV K7769). Scale bars: **57,** 4 mm; **58–60,** 0.3 mm.

KS86503–4). **Victoria:** 1 ♀, Avon River near Valencia Creek, 37°48'24"S 146°57'14"E (NMV K7765); 1 ♀, Deddick River, 7.9 km upstream McKillops Bridge, 37°04'S 148°29'E (NMV K7771); 2 ♀♀, Flat Rock Creek, 37°17'S 149°13'E (NMV 7757, 7764); 1 ♀, Lerderderg Gorge, above picnic area, 37°37'S 144°25'E (NMV 7759).

Diagnosis. The wide, almost circular and anteriorly poorly defined epigyne of *K. pandura* is unique within the genus.

Description, male. Unknown.

Description, female (based on holotype from Fiddlers Green Creek Bridge, Victoria). Carapace brown with distinct light median band and distinct irregular light submarginal bands (Fig. 57); covered with short dark brown setae, white setae on median and submarginal bands; white setae between eyes; indistinct darker radial pattern; longer brown bristles around eyes. Chelicerae very dark reddish-brown; few brown long setae meso-basally and some white setae; three promarginal teeth, with the median largest; three retromarginal teeth, with the median slightly larger. Sternum glabrous orange-brown, marginally somewhat darker; brown setae of increasing length towards margins. Labium brown, basally darker; front margin truncated and whitish. Abdomen dorsally olive-grey with distinct yellow-brown lanceolate cardiac mark in anterior half; covered with short brown setae and, less dense, brown macrosetae; light brown setae in cardiac mark. Venter light orange-brown, centrally somewhat darker; light brown setae and fewer brown macrosetae. Spinnerets brown. Epigyne: epigynal plate almost circular, anterior margins or atrium poorly defined (Figs. 58, 59); spermathecal heads narrow, indistinct (Fig. 60). Legs: femora light brown; patellae and tibiae brown; metatarsi and tarsi dark brown; leg formula IV > I > II > III; spination of leg I: femur: two dorsal, one apico-prolateral; tibia: three ventral pairs, one prolateral; metatarsus: three ventral pairs, one apico-ventral.

Measurements. TL 11.88, CL 6.00, CW 4.63. Eyes: AME 0.21, ALE 0.15, PME 0.35, PLE 0.29. Row of eyes: AE 1.11, PME 0.88, PLE 1.48. Sternum length/width 2.63/2.25. Labium length/width 1.15/0.96. AL 5.88, AW 4.00. Legs: lengths of segments, femur + patella + tibia + metatarsus + tarsus = total length: pedipalp 2.25 + 1.00 + 1.25 + – + 1.63 = 6.13, I 4.13 + 2.25 + 3.38 + 3.25 + 2.00 = 15.00, II 3.75 + 2.00 + 2.75 + 3.13 + 1.88 = 13.50, III 3.50 + 1.75 + 2.38 + 3.13 + 1.63 = 12.38, IV 4.50 + 2.00 + 3.63 + 4.75 + 2.25 = 17.13.

Variation. ♀, n = 10 (range, mean ± SD): TL 9.63–12.50, 10.68 ± 1.02; CL 4.88–6.25, 5.38 ± 0.46; CW 3.50–4.75, 4.04 ± 0.40.

Habitat and life history characteristics. *Kangarosa pandura* appears to be a specialist of riparian gravel banks as specimens were found almost exclusively at the margin of creeks under rocks. In Australia, similar habitat requirements are reported for *Venatrix*

lapidosa (McKay, 1974) and *Artoria albopedipalpis* Framenau, 2002 (FRAMENAU 1998, 2002; FRAMENAU et al. 2002). Adult females were found predominantly from September to December suggesting spring to summer maturity; however, single females were also collected in February and July.

Distribution. Mountainous areas in Victoria, the Australian Capital Territory and southern New South Wales (Fig. 69).

Etymology. The specific epithet is a Latin noun in apposition (*pandura* – fiddle); it refers to the type locality, Fiddlers Green Creek Bridge.

4.10. *Kangarosa properipes* (Simon) comb. nov. Figs. 5–6, 19, 61–69

Lycosa properipes Simon, 1909: 189; RAINBOW 1911: 271; BONNET 1957: 2659; MORITZ 1992: 323.

Allohogna properipes (Simon): ROEWER 1955: 212.

Trochosa properipes (Simon): MCKAY 1973: 381; MCKAY 1979: 295–296; MCKAY 1985: 86.

Lycosa phegeia Simon, 1909: 189–190, fig. 8; RAINBOW 1911: 271; BONNET 1957: 2658; MORITZ 1992: 322. **New synonymy.**

Triccosta phegeia (Simon): ROEWER 1955: 298; ROEWER 1960: 867; RACK 1961: 38.

Tricca phegeia (Simon): MCKAY 1973: 381.

Trochosa tristicula phegeia (Simon): MCKAY 1979: 283–284, figs. 2A–H, Q; PLATNICK 1989: 391.

Trochosa tristicula phegeia (Simon): MCKAY 1985: 87 (misspelled).

Type material. Syntypes of *Lycosa properipes* Simon, 1909: 1 ♂, North Subiaco [31°56'S 115°49'E, Western Australia], 'Hamburger südwestaustralische Forschungsreise', Station 109, 10.x.1905 (ZMB 11097); 1 ♂, Guildford [31°54'S 115°58'E, Western Australia], 'Hamburger südwest-australische Forschungsreise', Station 103, 19.v.1905 or 28.viii.1905 (MHNP 24948). **Syntypes** of *Lycosa phegeia* Simon, 1909: 1 ♀, Cannington [32°01'S 115°56'E, Western Australia]. 'Hamburger südwest-australische Forschungsreise', Station 123, 28.vi.1905 (ZMH RACK (1961)-catalogue 473); 1 ♀, same data (MHNP 24361); 1 ♀, 1 juv., same data (ZMB 11095); 1 juv. (cited as adult male in MCKAY 1985), same data (WAM 11/4301).

Other material examined. AUSTRALIA: New South Wales: 1 ♂, Enfield State Forest, Double Dumps Fire Trail, 700 m off Daisy Patch Road, 31°20'49"S 151°54'01"E (AM KS39743); 1 ♀, Ramornie State Forest, Main Creek, Track off Mt Tindal Road, 29°43'01"S 152°38'24"E (AM KS43198); 1 ♀, Windy Gap, Carrai State Forest, 80 km NW of Kempsey, 31°01'S 152°20'E (AM KS4731). **Queensland:** 1 ♂, Mt Aberdeen summit saddle, 20°12'S 147°53'E (QM S40681); **South Australia:** 1 ♀, Adelaide, 34°55'S 138°36'E (SMF); 2 ♀♀, 2 juv., Charlton Gully, 34°33'S 135°47'E (SAM NN16907–8); 1 ♂, Cox Scrub Conservation Park, S tip, 2 km S 35°22'02"S 138°43'52"E (SAM NN16923); 1 ♂, same locality (SAM NN16926); 3 ♀♀, same locality (SAM NN16932–4); 1 ♀, 4 juv., Lake Hawdon, 7.7 km SE Kangaroo Hill, 37°12'21"S 139°55'39"E (SAM NN21613); 1 ♀, Mount Compass, 2.5 km NE, 35°20'09"S 138°38'26"E (SAM NN16909); 8 ♀♀, 1 juv., Mount Compass,

21 km ESE, 35°25'11"S 138°48'08"E (SAM NN16915–22); 1 ♀, Mount Compass, 22 km ESE, 35°25'39"S 138°48'32"E (SAM NN16914); 1 ♂, 1 ♀, Mount Compass, 9 km E, 35°21'35"S 138°43'29"E (SAM NN16910–1); 1 ♀, same locality (SAM NN16935); 3 ♀♀, Mt Compass, 22 km ESE, 35°25'39"S 138°48'32"E (SAM NN16901–3); 5 ♀♀, Mt Compass, 7 km E, 35°21'16"S 138°41'38"E (SAM NN16927–31); 2 ♂♂, 2 ♀♀, Myponga, 35°26'10"S 138°31'16"E (SAM NN16895–8); 1 ♀, Reynella, 35°05'S 138°32'E (SAM NN16900); 3 ♀♀, Strathalbyn, 35°15'S 138°53'E (SAM NN16886–8); 1 ♂, 1 ♀, Victor Harbor, Fraser Reserve, 16 km WSW, 35°34'49"S 138°27'55"E (SAM NN16912–3); 1 ♀, Western River Conservation Park, 35°42'S 136°56'E (SAM NN16889); 1 ♀, same locality, 35°42'S 136°56'E (SAM NN16892); 1 ♀, same locality, 35°42'S 136°56'E (SAM NN16899). **Tasmania:** 1 ♂, 1 ♀, Tasmania (no exact location) (ZMB); 1 ♀, Blackmans Lagoon, 40°54'S 147°35'E (QVMAG 13:44307); 1 ♂, 1 ♀, Brooks Creek, 41°18'S 144°44'E (QVMAG 13:44308); 1 ♂, same locality (QVMAG 13:43084); 1 ♀, Clarke Island, Madaines Creek, 40°32'S 148°10'E (QVMAG 13:25912); 1 ♀, Cockle Creek, 43°35'S 146°52'E (QVMAG 13:44309); 1 ♂, Lake St Clair, 42°07'S 146°10'E (TMAG J3499); 1 ♀, Lake St Clair, Pump House Point, 42°06'S 146°12'E (QVMAG 13:16713); 1 ♀, Launceston, 41°26'S 147°08'E (QVMAG 13:44323); 1 ♀, Little Waterhouse Lake, 40°52'S 147°36'E (QVMAG 13:44310); 1 ♀, 1 juv., Port Davey, 43°25'S 146°09'E (QVMAG 13:42250); 1 ♀, Spreyton, 41°13'S 146°20'E (TMAG J3502); 1 ♂, Strathgordon, 42°46'S 146°03'E (QVMAG 13:43585); 1 ♀, Tregaron Lagoons, 40°46'S 147°58'E (QVMAG 13:42203). **Victoria:** 1 ♂, Avon River at Stratford, 37°58'S 147°04'E (WAM T48040); 1 ♀, Avon River at Stratford, under highway bridge, 37°58'S 147°04'E (NMV K7767); 1 ♀, Avon River at Stratford, under train bridge, 37°58'S 147°04'E (NMV K7766); 1 ♀, Avon River near Valencia Creek, 37°48'24"S 146°57'14"E (WAM T55405); 2 ♀♀, Churchill, 38°19'S 146°26'E (SAM NN16893–4); 1 ♀, Coranderrk Picaninny Swamp, 37°39'S 145°31'E (NMV K7762); 1 ♂, 2 ♀♀, Drifffield, 38°16'S 146°20'E (SAM NN16904–6); 1 ♀, Drifffield, 38°16'S 146°40'E (SAM NN16871); 1 ♀, 1 juv., Errinundra Plateau, Delegate River and Gunmark Road, 37°04'S 148°40'E (AM KS44428); 1 ♀, Mitchell River, below Wuk Wuk Bridge, 37°47'S 147°26'E (NMV K7770); 1 ♀, Roger River, Wrong Creek Trail, East Gippsland, 37°18'S 148°31'E (AM KS12615). **Western Australia:** 1 ♀, Attadale, 32°01'S 115°48'E (WAM T56094); 1 ♀, 1 juv., Australind, 33°16'S 115°43'E (WAM 71/375–6); 1 ♀, Beedelup Falls, 34°25'S 115°52'E (WAM 71/443); 1 ♀, Beraking Brook Crossing, 32°10'S 116°25'E (WAM T56096); 1 ♀, Bibra Lake, 32°06'S 115°49'E (WAM 71/1572); 3 ♂♂, Binnu, SW, Chillmony Road, 28°05'58"S 114°33'43"E (WAM T47157); 1 ♂, Bluff Creek, Cheyne Beach, 34°52'S 118°24'E (WAM T55157); 1 ♀, Boonarring Nature Reserve, Wannamel West Road, N of Gin Gin, 31°11'S 115°50'E (WAM T56092); 1 ♀, Brentwood, 32°02'S 115°51'E (WAM T56095); 2 ♂♂, 3 ♀♀, 1 juv., Brentwood Swamp, High Road, 32°03'S 115°51'E (WAM 71/165–9); 1 ♀, Churchmans Brook, 32°10'S 116°06'E (WAM 71/1571); 1 ♀, same locality (WAM T62447); 5 ♂♂, 2 ♀♀, Coolinup Nature Reserve, SW Esperance, 33°44'9"S 122°17'29"E (WAM T47154); 2 ♂♂, 3 ♀♀, same locality (WAM T47156); 3 ♂♂, Darkin Swamp, 32°06'45"S 116°30'46"E (WAM T47153); 1 ♂, same locality (WAM T47155); 1 ♀, Deepdene Cliff area, 34°15'S 115°03'E (WAM 71/510); 1 ♀, same locality (WAM 71/1570); 1 ♀, Gleneagle, 32°15'S 116°10'E (AM KS52092); 1 ♀, Long Point, Walpole area, 35°02'S 116°34'E (WAM 69/876); 1 ♀, Thomsons Lake (Jilbup Lake), Success, 32°09'S 115°49'E (WAM T55293); 1 ♀, Two Peoples Bay Nature Reserve, 34°58'19"S 118°9'12"E (WAM T75698); 2 ♂♂, 6 ♀♀,

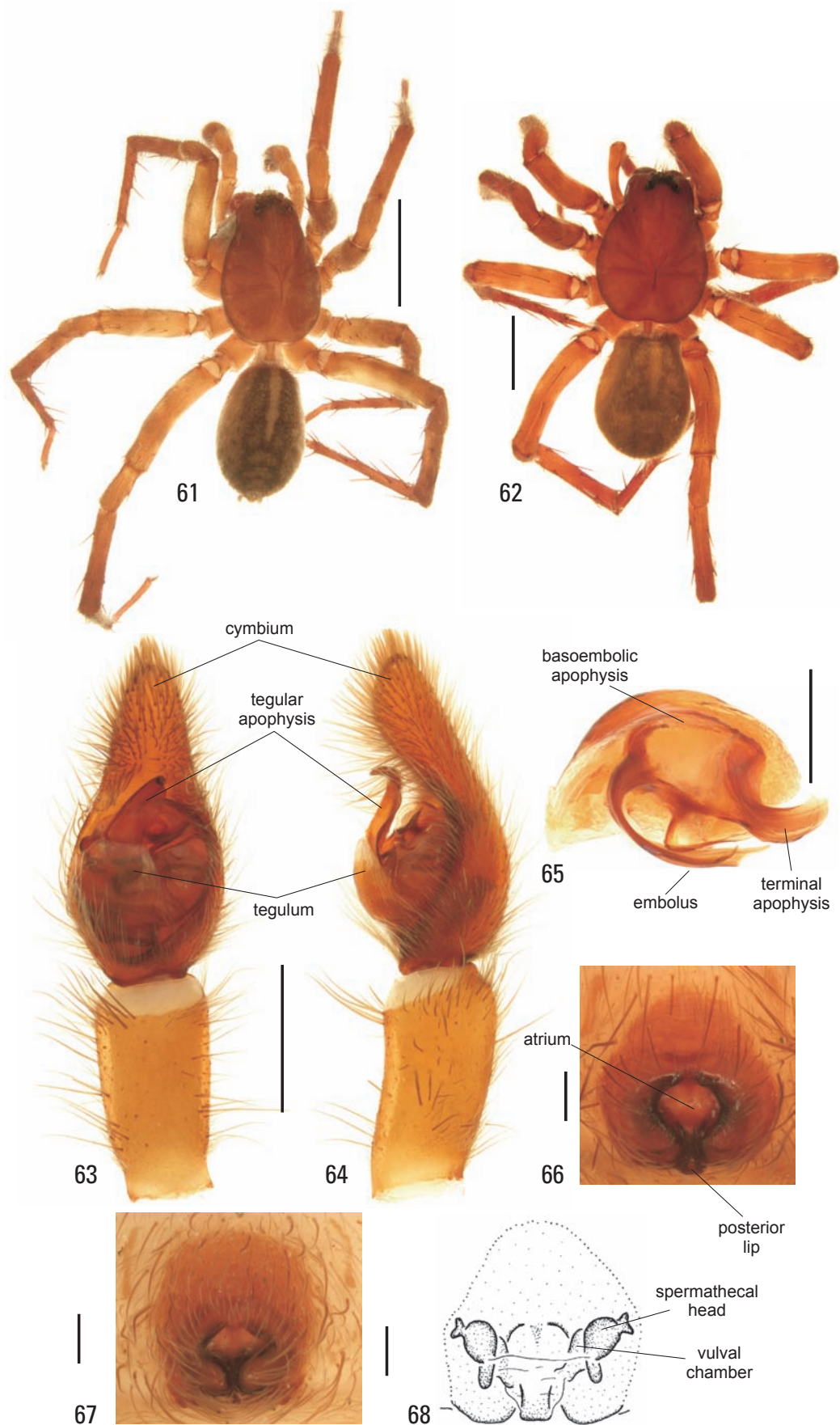
Two Peoples Bay Nature Reserve, Lower Robinsons Valley, 34°59'32"S 118°11'58"E (WAM T67621); 1 ♀, William Bay National Park, 35°01'S 117°09'E (WAM T53529).

Diagnosis. Within the genus most similar to *K. ludwigi* (see Diagnosis there).

Description, male (based on syntype MHNP 24948 from Guildford, Western Australia). Carapace brown, with a light brown indistinctly forked pattern behind eyes; indistinct light brown submarginal bands (Fig. 61); covered with short brown setae; longer brown bristles around eyes. Chelicerae brown; few setae, few brown bristles centrally in basal half; three promarginal teeth, with the median larger; three retromarginal teeth, with the median slightly larger. Sternum light yellow-brown; brown setae of increasing length towards margins. Labium brown, dark brown in basal half; front margin light. Pedipalps: tegular apophysis with retrolateral sinuous flange (Figs. 5–6, 63–64), terminal apophysis broad, embolus with narrow tip (Fig. 65). Abdomen dorsally olive-grey with a light brown median lanceolate cardiac mark (Fig. 61); covered with short setae and, less dense, short brown macrosetae. Venter yellow-brown with olive-grey indistinct patches; setae as dorsally. Spinnerets light brown. Legs brown, femora with indistinct brown annulations; distal segments darker; leg formula IV > I > II > III; spination of leg I: femur: two dorsal, one apico-prolateral; patella: one prolateral (only right leg); tibia: three ventral pairs, two prolateral; metatarsus: three ventral pairs, one apico-ventral.

Description, female (based on female WAM T56095 from Brentwood, Western Australia). The female agrees in general detail with the male although it is overall lighter and the colour pattern, e.g., median and marginal bands, not as distinct (Fig. 62). In addition: chelicerae with three retromarginal teeth (right chelicera only two), with the basal one smallest. Epigyne atrium widens anteriorly (Figs. 66–67); spermathecal heads globular with antero-lateral branched protrusion (Fig. 68).

Measurements. ♂ syntype MHNP 24948 (♀ WAM T56095): TL 8.70 (10.63), CL 3.45 (4.50), CW 4.80 (3.38). Eyes: AME 0.15 (0.21), ALE 0.14 (0.13), PME 0.26 (0.29), PLE 0.21 (0.27). Row of eyes: AE 0.76 (0.94), PME 0.65 (0.81), PLE 1.06 (1.31). Sternum length/width 2.10/1.73 (1.88/1.63). Labium length/width 0.74/0.59 (0.83/0.67). AL 4.20 (6.00), AW 2.55 (3.75). Legs: lengths of segments, femur + patella + tibia + metatarsus + tarsus = total length: pedipalp 2.1 + 1.73 + – + 1.5 = 5.33, I 3.45 + 4.58 + 3.08 + 2.25 = 13.36, II 3.30 + 4.20 + 2.85 + 1.43 = 11.78, III 3.40 + 3.45 + 2.93 + 1.35 = 11.13, IV 3.90 + 4.88 + 4.35 + 1.80 = 14.93 (pedipalp 1.63 + 0.75 + 1.00 + – + 1.00 = 4.38, I 3.13 + 1.50 + 2.38 + 2.38 + 1.31 = 10.69, II 2.75 + 1.38 + 2.13 + 2.25 + 1.19 = 9.69, III 2.63 + 1.25



Figs. 61–68. *Kangarosa properipes* (Simon). **61:** Male (WAM T67021), dorsal view. **62:** Female (AM KS4731), dorsal view. **63–64:** Male (AM KS39743) left pedipalp (63 ventral, 64 retrolateral view). **65:** Apical part of bulb of male left pedipalp, ventral view (AM KS39743). **66–67:** Female epigyne, ventral view (66 AM KS4731, 67 AM KS52092). **68:** Female epigyne, dorsal view (AM KS4731). Scale bars: **61–62**, 3 mm; **63–64**, 0.5 mm; **65**, 0.2 mm; **66–68**, 0.25 mm.

+ 1.75 + 2.38 + 1.13 = 9.13, IV 3.13 + 1.50 + 2.75 + 3.63 + 1.50 = 12.50).

Variation. ♂, n = 17 (♀, n = 16) (range, mean ± SD): TL 6.60–11.25, 9.20 ± 1.28 (7.50–15.00, 10.88 ± 2.16); CL 3.45–5.55, 4.56 ± 0.60 (4.20–6.90, 5.15 ± 0.84); CW 2.85–4.80, 3.64 ± 0.46 (3.00–5.10, 3.92 ± 0.61).

Remarks. SIMON (1909) described *Lycosa properipes* based on males from two localities, “Stat. 103, Guildford; Stat. 109 Subiaco N.” The male lodged at the MHNP is without locality data, but the label [*Lycosa properipes* E.S.; AusK. occid. (Michaelsen)] strongly suggests that it is the syntype from Guildford as the male syntype deposited in the ZMB is clearly labeled “North Subiaco”. SIMON (1909) described *Lycosa phegeia* based on male and female specimens, but the syntypes that were available for study included only female and immature specimens.

Syntypes of both *L. properipes* and *L. phegeia* clearly belong to the same species as there is no perceivable morphological difference between the type material or any other specimens of *Kangarosa* from Western Australia. Therefore I consider *L. phegeia* as junior synonym of *L. properipes* and transfer the species to *Kangarosa*, *K. properipes* (Simon, 1909) comb. nov.

Two specimens listed in MCKAY (1979) as *Trochosa tristicula phegeia* were misidentified: a male in a series from Brentwood is *K. ludwigi* (WAM 71/164). This species does presumably not occur in WA, and it is likely that R.J. McKay accidentally mixed up this spider during his revision of the genus *Trochosa* (MCKAY 1979) (see Remarks under *K. ludwigi*). A female reported by MCKAY (1979) from Chinocup Reserve (WAM 72/331) is *Venatrix tinfos* Framenau, 2006 (FRAMENAU 2006c).

Habitat and life history characteristics. *Kangarosa properipes* has almost always been found in the vicinity of water, such as near creek banks or in swamps or estuaries. MCKAY (1979) described a “shallow burrow or retreat below stones or rotting vegetation”. Adult males were collected from October until June with a peak in December. Adult females were found throughout the year and peak between October and December.

Distribution. *Kangarosa properipes* is the most widely distributed member of the genus and occurs in New South Wales, Queensland, Victoria, Tasmania, South Australia and Western Australia (Fig. 69).

4.11. *Kangarosa tasmaniensis* sp. nov.

Figs. 8, 20, 70–77, 90

Type material. *Holotype*: ♂, King William Creek [42°58'01.20"S 141°23'52.54"E, Tasmania], 21.ii.2001, pitfall trap, M. Driesen (QM S74409). *Paratype*: 1 ♀, Cape Naturaliste [40°50'S

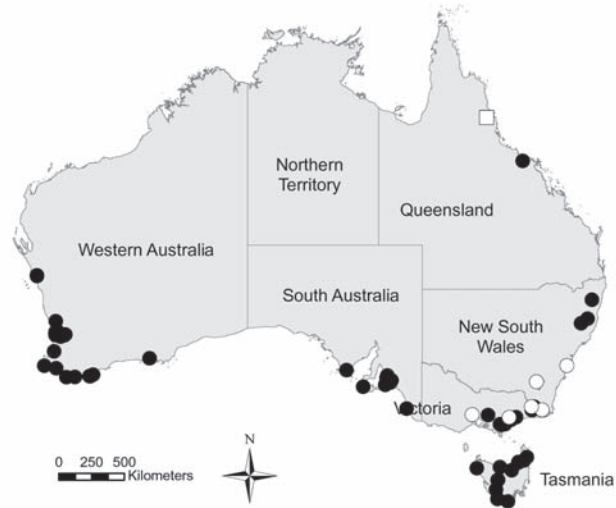


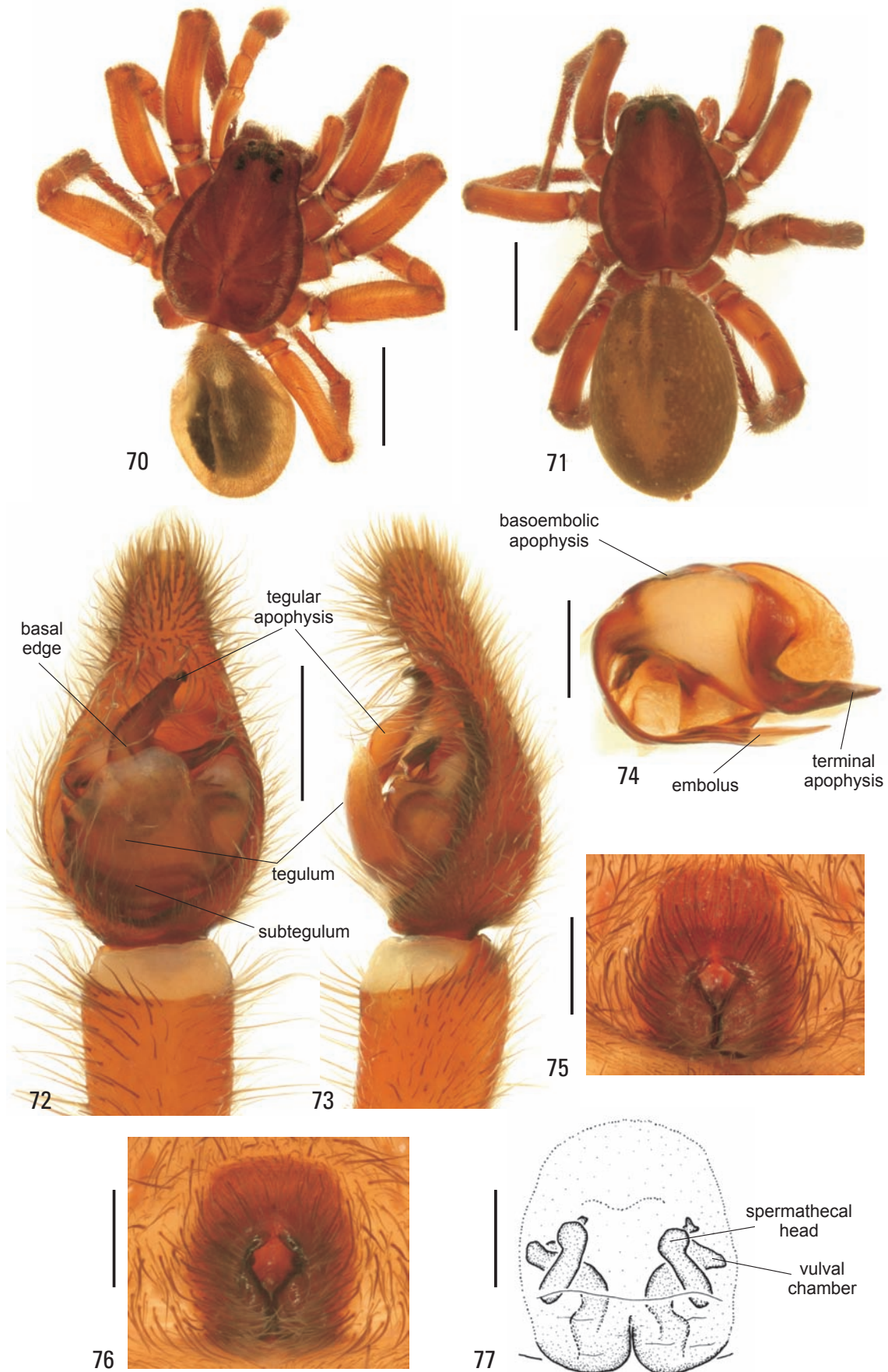
Fig. 69. Distribution records of *Kangarosa ossea* sp. nov. (open square), *K. pandura* (open circles) and *K. properipes* (Simon) (closed circles).

148°13'E, Tasmania], 14.viii.1991, site 2a, FQ 16 775, T.J. Kingston, L.F. McGowan (QVMAG 13:42207).

Other material examined. AUSTRALIA: Tasmania: 1 ♀, 1 juv., Tas WHA L.S.C. vial 244, no exact locality (QM S74408); 1 ♀, Cascades, off Old Farm Road, at base of Mt Wellington, Hobart, 42°53'S 147°17'E (AM KS66113); 1 ♂, King William Creek, 43°06'04"S 146°09'02"E (WAM T58452); 1 ♂, same locality (WAM T58457); 1 ♂, 1 ♀, same locality (WAM T58446); 1 ♂, 3 ♀♀, Lake St Clair, 42°07'S 146°10'E (QM S74411); 1 ♂, 2 ♀♀, same locality (WAM T58454); 2 ♀♀, 1 juv., Lake St Clair, Pump House Point, 42°06'S 146°12'E (QVMAG 13:23565); 1 ♂, McPartlan Pass, 42°51'S 146°11'E (QM S74410).

Diagnosis. Most similar to *K. nothofagus* (see Diagnosis there).

Description, male (based on holotype from King William Creek, Tasmania). Carapace dark reddish-brown, with a light brown median band and indistinctly forked pattern behind eyes (Fig. 70); very distinct light brown submarginal bands; covered with short dark brown setae; white setae in median and submarginal bands and between eyes; longer brown bristles around eyes. Chelicerae dark brown; few brown bristles centrally in basal half; white setae basally three promarginal teeth, with the median larger; three retromarginal teeth, with the basal smallest. Sternum dark reddish-brown; brown setae of increasing length towards margins. Labium dark brown, almost black in basal half; front margin light. Pedipalps: tegular apophysis narrow without retrolateral protrusion or flange, but with indistinct basal edge in some specimen (Figs. 72, 73), terminal apophysis narrow and strongly sclerotised (Fig. 74). Abdomen dorsally very dark olive grey with a light brown median lanceolate cardiac mark (Fig. 70); covered with short brown setae and, less dense, brown macrosetae; white setae in cardiac mark. Venter olive-brown with two light brown lateral bands that converge posteriorly; setae as dorsally. Spinnerets light brown.



Figs. 70–77. *Kangarosa tasmaniensis* sp. nov. **70:** Male (holotype), dorsal view. **71:** Female (WAM T58454), dorsal view. **72–73:** Male (WAM T58446) left pedipalp (**72** ventral, **73** retrolateral view). **74:** Apical part of bulb of male left pedipalp, ventral view (WAM T58446). **75–76:** Female epigyne, ventral view (**75** paratype, **76** WAM T58454). **77:** Female epigyne, dorsal view (paratype). Scale bars: **70–71,** 3 mm; **72–73, 75–77,** 0.5 mm; **74,** 0.25 mm.

Legs: femora and patellae brown; tibiae, metatarsi and tarsi dark reddish-brown; leg formula (IV)>I>II>III (right leg IV regenerated and therefore shorter, left leg IV missing); spination of leg I: femur: two dorsal, one apico-prolateral; tibia: three ventral pairs; metatarsus: three ventral pairs, one apico-ventral.

Description, female (based on paratype from Cape Naturaliste, Tasmania). The female agrees in general detail with the male although the median band on the carapace is more distinct (Fig. 71). In addition: epigyne atrium widens anteriorly; however, it is comparatively narrow (Fig. 75–76); spermathecal heads narrow with antero-dorsal branched protrusion (Fig. 77).

Measurements. ♂ holotype (♀ paratype): TL 9.38 (14.38), CL 4.75 (6.36), CW 3.56 (4.63). Eyes: AME 0.21 (0.29), ALE 0.15 (0.19), PME 0.48 (0.35), PLE 0.27 (0.31). Row of eyes: AE 1.02 (1.19), PME 0.48 (1.02), PLE 1.36 (1.77). Sternum length/width 2.13/1.88 (2.63/2.25). Labium length/width 0.83/0.67 (1.17/0.96). AL 4.38 (7.88), AW 3.13 (5.63). Legs: lengths of segments, femur + patella + tibia + metatarsus + tarsus = total length: pedipalp 1.88 + 0.88 + 0.88 + – + 1.50 = 5.13, I 3.38 + 1.88 + 2.88 + 2.75 + 1.50 = 12.38, II 3.13 + 1.63 + 2.38 + 1.63 + 1.31 = 11.06, III 3.00 + 1.50 + 2.00 + 2.63 + 1.19 = 10.31 (IV right leg regenerated, left leg missing) (pedipalp 2.38 + 1.13 + 1.38 + – + 1.50 = 6.38, I 4.13 + 2.13 + 3.38 + 3.38 + 1.88 = 14.88, II 4.00 + 2.00 + 3.13 + 3.00 + 1.63 = 13.75, III 3.75 + 1.88 + 2.38 + 3.13 + 1.50 = 12.63, IV 4.88 + 2.13 + 3.75 + 5.00 + 2.00 = 17.75).

Variation. ♂, n = 6 (♀, n = 11) (range, mean ± SD): TL 9.38–11.25, 10.38 ± 0.52 (9.00–14.38, 12.24 ± 1.53); CL 4.75–6.13, 4.52 ± 0.35 (5.00–6.88, 5.91 ± 0.63); CW 3.56–4.63, 4.06 ± 0.32 (3.63–5.13, 4.38 ± 0.49).

Habitat and life history characteristics. The single site description for *K. tasmaniensis* reads “moss and grass, bank of myrtle gully rivulet near bridge”. Adult males were collected in November, from February to April and in June. Adult females were found throughout the year with no perceivable phenological pattern.

Distribution. *Kangarosa tasmaniensis* has so far only been recorded from Tasmania (Fig. 90).

Etymology. The specific epithet refers to the Australian state where this species is found, Tasmania.

4.12. *Kangarosa tristicula* (L. Koch) comb. nov.

Figs. 1–2, 15, 78–85, 90

Lycosa tristicula L. Koch, 1877: 892–893, plate 77, figs. 2, 2a; RAINBOW 1911: 273; BONNET 1957: 2667.

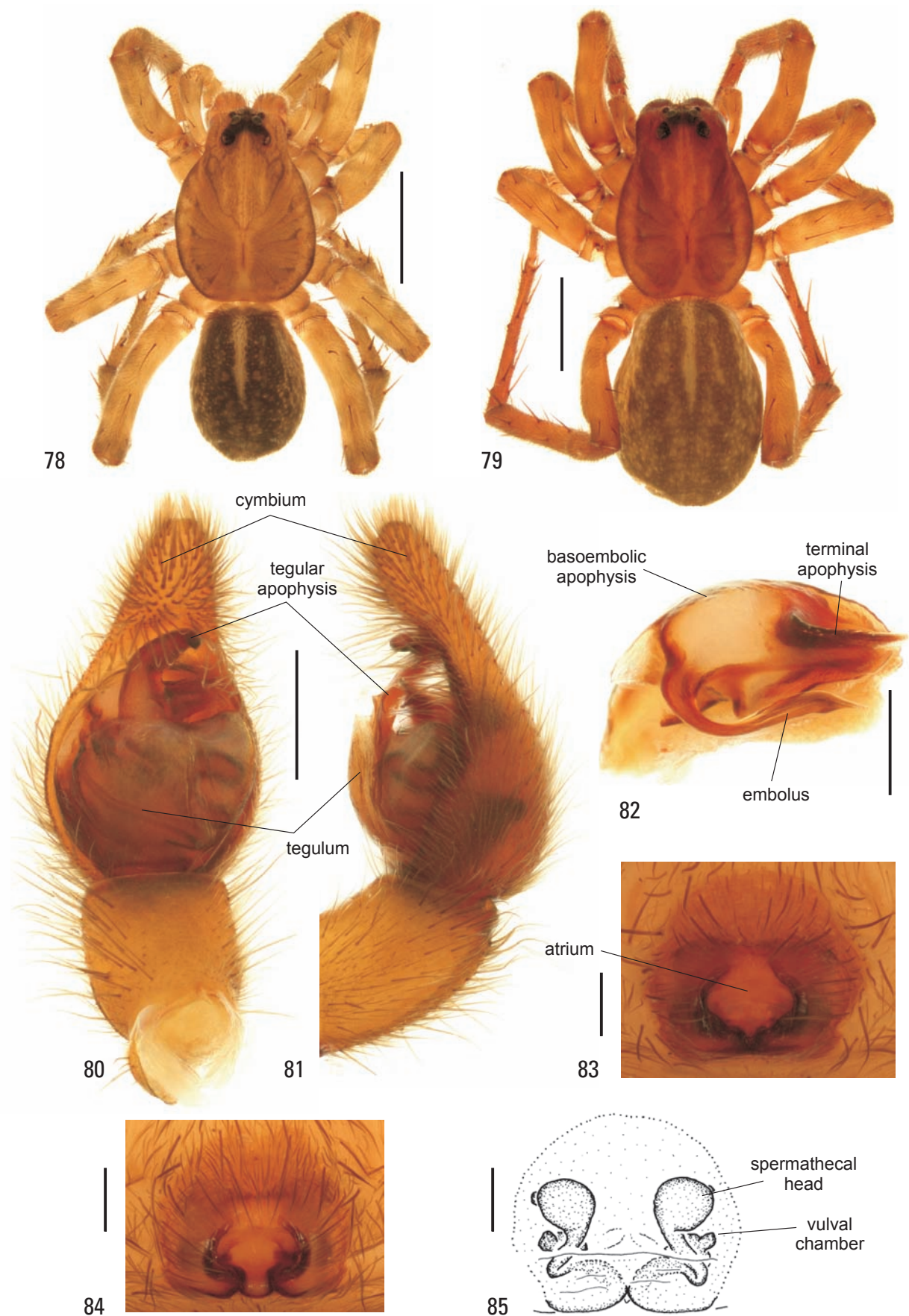
Trochosula tristicula (L. Koch): ROEWER 1955: 304; ROEWER 1960: 859; ROEWER 1961: 4.

Trochosa tristicula (L. Koch): MCKAY 1973: 381; MCKAY 1985: 86; PLATNICK 1989: 391.

Trochosa tristicula tristicula (L. Koch): MCKAY 1979: 284–286, figs. 2J–P, 3A.

Type material. *Holotype* of *Lycosa tristicula* L. Koch, 1877: ♀, Sydney [33°53'S 151°13'E, New South Wales], Bradleys Collection (considered lost: FRAMENAU 2005). Not examined.

Other material examined. AUSTRALIA: New South Wales: 1 ♂, no exact location (AM KS30545); 2 ♂♂, Abercrombie Caves area, near Bushrangers Cave, 33°54'45"S 149°21'28"E (AM KS22492); 1 ♀, same locality (AM KS22474); 1 ♂, same locality (AM KS21685); 1 ♂, 1 ♀, Brindle Creek, Wiangaree, 28°28'S 153°04'E (QM W5989); 1 ♂, Ermington, 33°49'S 151°03'E (AM KS85054); 1 ♀, Hunter River, Scotts Flat at Singleton, 32°35'34"S 151°14'06"E (AM KS91919); 1 ♂, Jamberoo Mountain, 34°40'S 150°43'E (AM KS65665); 1 ♀, Jamieson Park, Narrabeen, 33°43'S 151°18'E (AM KS49747); 1 ♀, same locality (AM KS49766); 5 ♂♂, 5 ♀♀, 10 juv., same locality (AM KS44518); 4 ♂♂, 1 ♀, 8 juv., same locality (AM KS44593); 1 ♂, 1 ♀, 3 juv., same locality (AM KS44505); 1 ♂, 1 ♀, same locality (AM KS108467); 2 ♀♀, same locality (AM KS49736); 8 ♂♂, 8 ♀♀, 16 juv., same locality (AM KS49729); 1 ♀, same locality (AM KS108468); 1 ♀, Mt Keira, Wollongong District, 34°24'S 150°51'E (AM KS85053); 1 ♂, Mt Nardi, via Nimbin, 28°32'S 153°17'E (QM W5809); 1 ♀, Mt Warning, 28°25'S 153°17'E (QM W6893); 1 ♀, Never Never, Dorrigo National Park, 30°02'08"S 152°47'31"E (QM S70727); 1 ♂, 1 ♀, Nightcap Range, via Dunoon, 28°41'S 153°19'E (QM W5903); 1 ♀, same locality (QM W5904); 1 ♂, Oxford Falls, 33°44'S 151°14'E (AM KS53938); 2 ♂♂, 1 ♀, Tweed Lookout, Wiangaree State Forest, 28°31'S 152°58'E (QM W5789); 5 ♂♂, 2 ♀♀, 1 juv., same locality (QM W5793); 3 ♂♂, same locality (QM W5796); 1 ♂, 2 ♀♀, same locality (QM W5804); 1 ♀, Upper Hunter River at Muswellbrook, 32°18'36"S 150°48'53"E (AM KS91916); 1 ♀, same locality (AM KS91917); 1 ♂, same locality (AM KS91918); 1 ♂, Watercourse Road, 6.7 km S of Allambie Bridge, 29°23'38"S 149°26'37"E (AM KS76715); 1 ♀, Wyrrabalong National Park, 33°16'48"S 151°32'45"E (AM KS62078); 1 ♀, Yabba State Forest, 28°40'S 152°45'E (QM S28). Queensland: 2 ♀♀, Ayr, 19°34'S 147°24'E (QM S66400); 1 ♀, 1 juv., Behana Creek, Gordonvale, 17°11'S 145°50'E (QM S91); 6 ♂♂, 8 ♀♀, 2 juv., Binna Burra, Lamington National Park, 28°12'S 153°11'E (QM S29757); 1 ♂, 3 ♀♀, 2 juv., Boggomoss Reserve, Taroom district, 25°26'S 150°01'E (QM S37281); 7 ♂♂, 4 juv., Boggomoss No. 3, Mt Rose, Taroom district, 25°26'S 150°01'E (QM S37205); 1 ♀, same locality (QM S37206); 14 ♂♂, Boggomoss No. 4, Glebe Weir Road, Taroom district, 25°26'S 150°01'E (QM S36654); 1 ♂, Boggomoss No. 7, Taroom district, 25°27'S 150°02'E (QM S37130); 3 ♂♂, Boggomoss No. 8, Taroom district, 25°27'S 150°02'E (QM S37167); 1 ♂, 1 juv., Boggomoss No. 10, Taroom district, 25°31'S 150°03'E (QM S37153); 4 ♂♂, 7 ♀♀, Boggomoss No. 12, Nathan Gorge, Taroom district, 25°27'S 150°08'E (QM S66397); 4 ♂♂, 2 ♀♀, Boggomoss No. 12/1, Nathan Gorge, Taroom district, 25°27'S 150°08'E (QM S66533); 1 ♂, Boggomoss No. 19, Taroom district, 25°25'S 150°01'E (QM S36661); 3 ♂♂, 5 juv., same locality (QM S36798); 1 ♂, 1 ♀, 2 juv., Boggomoss No. 20, Taroom district, 25°25'S 150°01'E (QM S36767); 5 ♂♂, Boggomoss No. 25, Otto's turnoff, Glebe Weir, 25°27'S 150°08'E (QM S36959); 1 ♂, Booloumba Creek, Conondale Range, 26°39'S 152°39'E (QM W5937); 2 ♂♂, same locality (QM W5938); 4 ♂♂, 3 ♀♀, same locality (QM W5939); 1 ♀, same locality (QM W5944); 1 ♀, Bunya Mountains, 26°54'S 151°34'E (QM W5792); 1 ♀, 18 juv., same locality (QM S70707); 1 ♂, 10 juv., Bunya Mountains National Park, Dandabah, 26°54'S 151°34'E (QM S70708); 1 ♂, Cold



Figs. 78–85. *Kangarosa tristicula* (L. Koch). **78:** Male (AM KS108467), dorsal view. **79:** Female (AM KS108467), dorsal view. **80–81:** Male (AM KS108467) left pedipalp (80 ventral, 81 retrolateral view). **82:** Apical part of bulb of male left pedipalp, ventral view (AM KS108467). **83–84:** Female epigyne, ventral view (83 AM KS108467, 84 AM KS108468). **85:** Female epigyne, dorsal view (AM KS108467). Scale bars: **78–79,** 2.5 mm; **80–81,** 0.5 mm; **82–85,** 0.25 mm.

Creek, via Imbil, 26°28'S 152°41'E (QM W5889); 2 ♂♂, 1 ♀, 2 juv., same locality (QM W5893); 1 ♂, 1 ♀, same locality (QM W5897); 4 ♂♂, 1 ♀, same locality (QM W5901); 1 ♀, same locality (QM W5990); 1 ♂, Cunninghams Gap, 28°03'S 152°24'E (QM W5934); 1 ♀, Dawson River, Nathan Gorge, Taroom district, 25°27'08"S 150°08'12"E (QM S37425); 1 ♀, Gattton, 27°34'S 152°17'E (QM S50028); 1 ♂, Dingo Creek, via Traveston, 26°20'S 151°52'E (QM W5896); 1 ♂, same locality (QM W5898); 3 ♂♂, 1 ♀, 1 juv., same locality (QM W5894); 1 ♂, Ewan Maddock Dam, 26°48'S 152°59'E (QM S63648); 3 ♂♂, 1 ♀, 3 juv., Granite Creek, Bulburin State Forest, 24°30'S 151°35'E (QM W5881); 2 ♂♂, 5 ♀♀, 6 juv., same locality (QM W5883); 3 ♂♂, 2 ♀♀, 5 juv., same locality (QM W5885); 1 ♀, 6 juv., Lamington National Park, 28°12'S 153°10'E (QM S70728); 2 ♂♂, 2 ♀♀, 2 juv., Lamington National Park, Nagarigoon, 28°12'S 153°10'E (QM S70721); 1 ♀, Lamington National Park, O'Reillys, 28°14'S 153°08'E (QM W6891); 1 ♀, same locality (QM S70706); 1 ♂, Little Yabba Creek, 26°37'S 152°41'E (QM W5798); 1 ♂, 1 ♀, 1 juv., same locality (QM W5799); 1 ♀, same locality (QM W5800); 1 ♂, 1 ♀, 2 juv., Mary Cairncross Park, 26°46'S 152°51'E (QM W5801); 1 ♀, same locality (QM W5806); 1 ♂, Mt Cabinet, via Jimna, 26°45'S 152°27'E (QM W5808); 2 ♀♀, Mt Fisher, 17°34'S 145°34'E (QM S70725); 1 ♀, Mt Glorious, 27°20'S 152°46'E (QM S121); 1 ♀, Mt Tamborine, 27°56'S 153°12'E (QM S120); 1 ♀, Russell River at Bellenden Ker Landing, 17°16'S 145°55'E (QM S87718); 1 ♂, 1 juv., same locality (QM S66398); 2 ♀♀, same locality, but 17°16'S 145°57'E (QM S66402); 1 ♀, Saddle-tree Creek, Bunya Mountains, 26°52'S 151°39'E (QM W5805); 3 ♂♂, 1 ♀, The Palms, via Cooyar, 26°56'S 151°53'E (QM W6895); 1 ♂, same locality (QM W6896); 1 ♂, 1 ♀, Tungri Creek, 26°40'S 152°28'E (QM W5879); 1 ♂, Water Park Creek, Corio Bay, 22°52'S 150°42'E (QM W5785); 2 ♂♂, 5 ♀♀, Wratens Camp, via Widgee, 26°15'S 152°22'E (QM W5986); 4 ♂♂, same locality (QM W5985); 1 ♂, same locality (QM W5987); 5 ♂♂, 2 ♀♀, 1 juv., same locality (QM W5988).

Diagnosis. Most similar to *K. alboguttulata* (see Diagnosis there).

Description, male (based on male AM KS108467 from Jamieson Park, New South Wales). Carapace yellow-brown, with a narrow, light median band that is accompanied by two shorter bands in anterior half; distinct light submarginal bands; carapace margins grey; distinct dark radial pattern (Fig. 78); covered with short brown setae; white setae in submarginal bands; longer brown bristles around eyes. Chelicerae orange-brown; few brown bristles centrally in basal half; white setae laterally; three promarginal teeth, with the median largest; three retromarginal teeth, with the basal smallest. Sternum light yellow-brown; brown setae of increasing length towards margins. Labium yellow-brown, basally darker; front margin light. Pedipalps: tegular apophysis with basal edge that forms a pointy protrusion in retrolateral view (Figs. 1–2, 80–81); terminal apophysis broad, apical edge strongly sclerotised; embolus centrally widened and with narrow tip (Fig. 82). Abdomen dorsally dark olive-grey with a distinct yellow-brown lanceolate cardiac mark in anterior half accompanied by irregular lighter patches (Fig. 78); covered with short brown setae and, less dense, brown macrosetae; white setae in cardiac mark. Laterally

light olive-green mottled with darker patches. Venter yellow-brown with two dark bands that converge posteriorly; white setae, brown in dark bands. Spinnerets light brown. Legs light brown with indistinct darker annulations in particular ventrally on femora and tibiae; leg formula IV>I>II>III; spination of leg I: femur: two dorsal, two apico-prolateral; tibia: three ventral pairs, one prolateral; metatarsus: three ventral pairs, one prolateral, one apico-ventral.

Description, female (based on female AM KS108467 from Jamieson Park, New South Wales). The female agrees in general detail with the male, but has a reddish tinge and the leg annulations are less distinct (Fig. 79). In addition: epigyne atrium almost circular with heavily sclerotised posterior borders (Figs. 83–84); spermathecal heads globular with simple antero-dorsal protrusion (Fig. 85).

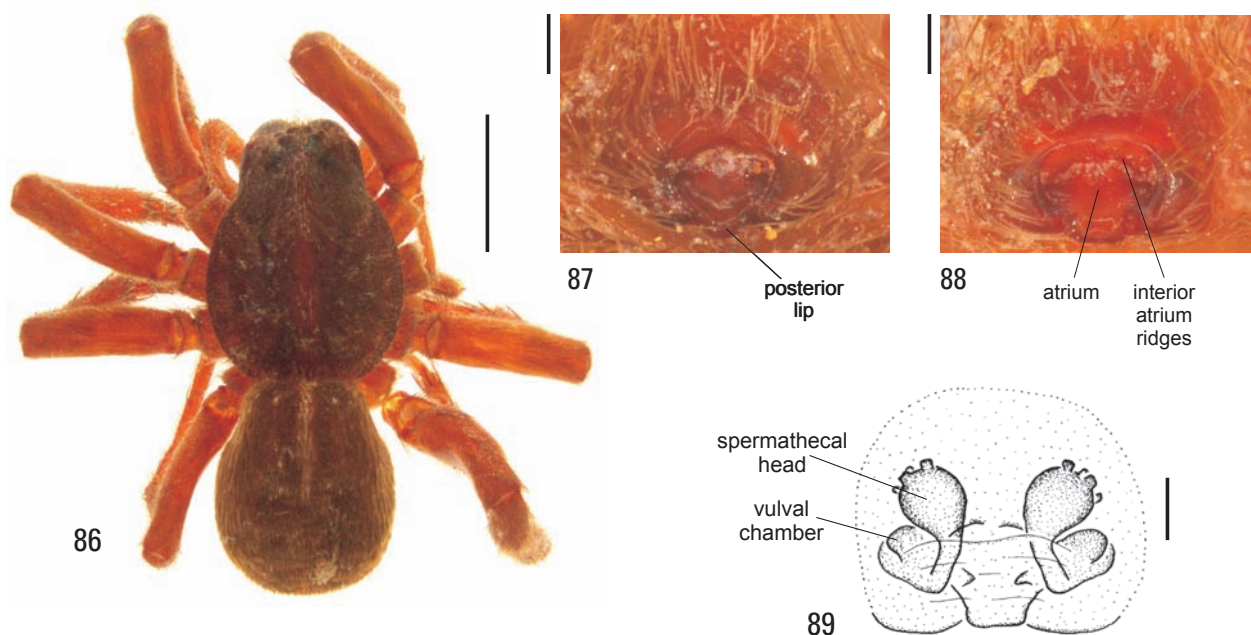
Measurements. ♂ AM KS44505 (♀ AM KS344505): TL 7.50 (10.00), CL 4.13 (4.88), CW 2.88 (3.38). Eyes: AME 0.17 (0.19), ALE 0.13 (0.13), PME 0.25 (0.31), PLE 0.21 (0.27). Row of eyes: AE 0.77 (0.96), PME 0.71 (0.83), PLE 1.11 (1.36). Sternum length/width 1.75/1.38 (1.88/1.63). Labium length/width 0.61/0.54 (0.77/0.67). AL 3.24 (5.25), AW 2.50 (3.75). Legs: lengths of segments, femur + patella + tibia + metatarsus + tarsus = total length: pedipalp 1.50 + 0.88 + 0.75 + – + 1.25 = 4.38, I 3.00 + 1.50 + 2.63 + 2.25 + 1.25 = 10.63, II 2.75 + 1.38 + 2.00 + 2.13 + 1.19 = 9.44, III 2.63 + 1.13 + 1.75 + 2.25 + 1.13 = 8.88, IV 3.38 + 1.38 + 2.75 + 3.25 + 1.50 = 12.25 (pedipalp 1.75 + 0.69 + 1.00 + – + 1.13 = 4.56, I 3.13 + 1.50 + 2.50 + 2.25 + 1.25 = 10.63, II 3.00 + 1.50 + 2.19 + 2.25 + 1.13 = 10.06, III 2.88 + 1.25 + 2.25 + 2.25 + 1.13 = 9.75, IV 3.63 + 1.50 + 3.13 + 4.00 + 1.50 = 13.75).

Variation. ♂, n = 14 (♀, n = 12) (range, mean ± SD): TL 5.88–9.88, 7.66 ± 0.96 (6.75–10.00, 8.99 ± 1.01); CL 3.38–5.38, 4.19 ± 0.57 (3.63–5.63, 4.55 ± 0.53); CW 2.63–3.88, 3.19 ± 0.41 (2.75–4.13, 3.46 ± 0.39).

Remarks. MCKAY's (1979) revision of *Trochosa tristicula tristicula* lists many specimens that are here identified as the new species *K. ludwigi* (see Material examined under *K. ludwigi*).

Habitat and life history characteristics. *Kangarosa tristicula* is a forest species that was mainly collected in rainforests, but also in *Casuarina glauca* open forest and *Araucaria* notophyll vine forest. Adult males and females were collected throughout the year, but mainly in summer between November and March.

Distribution. New South Wales and Queensland (Fig. 90).



Figs. 86–89. *Kangarosa yannicki* sp. nov. **86:** Female (holotype), dorsal view. **87–88:** Female epigyne, ventral view (87 holotype, 88 AM KS108170). **89:** Female epigyne, dorsal view (AM KS108170). Scale bars: **86,** 3 mm; **87–89,** 0.2 mm.

4.13. *Kangarosa yannicki* sp. nov.

Figs. 13, 86–90

Type material. *Holotype:* ♀, McPherson Range, Sandy Hill Road [28°21'S 152°44'E, New South Wales], 23.ii.1989, pitfall trap, Mt Warning Caldera Survey, UNE, T2.59, *Typha* swamp, Smith, Hines, Pugh, Webber (AM KS108469). *Paratypes:* 2 ♀♀, same data as holotype (AM KS57757); 1 ♀, same data as holotype (AM KS108470).

Diagnosis. Females are most similar to those of *K. alboguttulata*, but the interior atrium ridges are not as steep. Males unknown.

Description, male. Unknown.

Description, female (based on holotype from McPherson Range, New South Wales). Carapace dark brown with indistinct light median band and very faint light submarginal bands (Fig. 86); covered with short light brown setae, white setae on median band and patchily on carapace flanks; faint darker radial pattern; longer brown bristles around eyes. Chelicerae very dark reddish-brown; few brown long setae basally; three promarginal teeth, with the median largest; three retromarginal teeth, with the median slightly larger. Sternum brown; brown setae of increasing length towards margins. Labium dark brown; front margin truncated and whitish. Abdomen dorsally brown with distinct light brown lanceolate cardiac mark in anterior half; covered with short brown setae and, less dense, brown macrosetae; white setae in cardiac mark. Venter orange-brown, two darker longitudinal lines restricted to posterior half; light brown setae and fewer brown macrosetae. Spinnerets light brown. Epigyne atrium

with distinct interior ridges (Figs. 87–88); spermathecal heads globular with scattered anterior protrusions (Fig. 89). Legs brown; leg formula IV>I>II>III; spination of leg I: femur: one dorsal, two apico-prolateral; tibia: three ventral pairs; metatarsus: three ventral pairs, one apico-ventral.

Measurements. TL 9.13, CL 5.00, CW 3.81. Eyes: AME 0.21, ALE 0.17, PME 0.33, PLE 0.27. Row of eyes: AE 1.00, PME 0.90, PLE 1.46. Sternum length/width 2.13/1.88. Labium length/width 0.81/0.73. AL 4.38, AW 3.50. Legs: lengths of segments, femur + patella + tibia + metatarsus + tarsus = total length: pedipalp 1.75 + 0.88 + 0.88 + – + 1.31 = 4.81, I 3.38 + 1.88 + 2.63 + 2.50 + 1.38 = 11.75, II 3.19 + 1.81 + 2.31 + 2.25 + 1.25 = 10.81, III 3.00 + 1.63 + 1.88 + 2.25 + 1.00 = 9.75, IV 3.38 + 1.63 + 3.25 + 4.00 + 1.63 = 13.88.

Variation. ♀, n=4 (range, mean±SD): TL 8.75–12.13, 9.81±1.56; CL 4.63–5.63, 5.06±0.41; CW 3.50–4.13, 3.77±0.27.

Habitat and life history characteristics. The type and only material of *K. yannicki* was found in *Typha* swamp in February.

Distribution. *Kangarosa yannicki* is only known from the type locality, the McPherson Range in New South Wales (Fig. 90).

Etymology. The specific epithet is a patronym in honour of Melissa's and my son Yannick Maxwell Framenau.

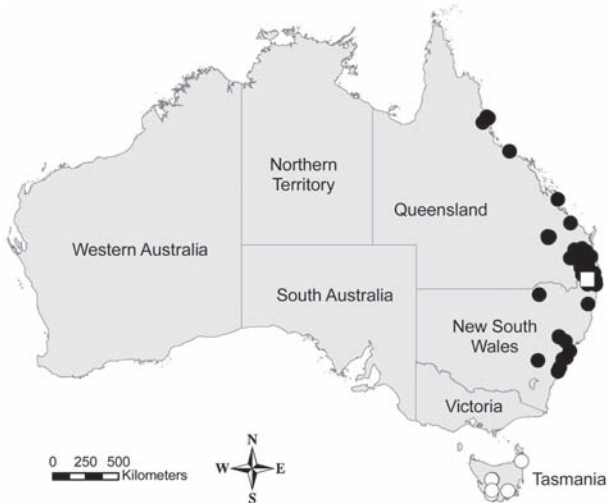


Fig. 90. Distribution records of *Kangarosa tasmaniensis* sp. nov. (open circles), *K. tristicula* (closed circles) and *K. yannicki* (open square).

5. Discussion

5.1. Relationships of *Kangarosa* to other Artoriinae

A comprehensive phylogenetic hypothesis for the genera of the wolf spider subfamily Artoriinae does not exist and therefore the sister genus to *Kangarosa* remains uncertain. A recent molecular study based on two mitochondrial (12S rRNA, NADH1) and one nuclear gene (28S rRNA) (MURPHY et al. 2006) included nine artoriine representatives from Australia and New Zealand in seven genera, including *Anoteropsis*, *Artoria*, *Artoriopsis* (as *Trochosa expolita*; see also FRAMENAU 2007), *Diahogna* (as “New Genus 2 sp.”, see also FRAMENAU & BAEHR 2007), *Notocosa*, *Tetrallycosa* and an undescribed genus (“New Genus 1 sp.”) from eastern Australia. Independent of the analytical approach (Bayesian or maximum parsimony), the Artoriinae formed two distinct clades: one including *Diahogna* and *Tetrallycosa* as sister taxa, and the second consisting of all remaining genera. The affinities of “New Genus 1 sp.” to one of the two clades differed between the Bayesian and maximum parsimony approaches; the Bayesian analysis placed it as sister taxon to *Diahogna/Tetrallycosa* whereas the maximum parsimony placed it as sister to *Artoriopsis expolita* in the remaining Artoriinae. Based on somatic and genitalic morphology it appears likely that *Kangarosa* forms part of the *Diahogna/Tetrallycosa* clade. In contrast to all other Artoriinae, the anterior eye row in spiders of this clade is wider than the sec-

ond row of eyes (FRAMENAU et al. 2006; FRAMENAU & BAEHR 2007). In addition, the basoembolic apophysis of the male pedipalp in these genera, but also in the “New Genus sp. 1”, is reduced and membranous, but strongly sclerotised in all other Artoriinae. Within this clade, a sister group relationship of *Kangarosa* and *Tetrallycosa* is supported by the hook-shaped tegular apophysis in both genera. The shape of this apophysis is vastly different in *Diahogna* and “New Genus 1 sp.” (FRAMENAU 2006d; J.-S. Yoo & V.W. Framenau, unpublished data).

5.2. Relationships within *Kangarosa*

Somatic morphology within the genus *Kangarosa* is very conservative; therefore interpreting relationships between species rests on morphological similarities in male and female genitalia. Three species – *K. ossea*, *K. pandura* and *K. yannicki* – are known from females only excluding them from an interpretation of male pedipalp morphology that is predominantly used to infer phylogenetic relationships in wolf spiders (e.g., DONDALE 1986; ZYUZIN 1993).

Kangarosa can be divided into two groups based on the shape of the tegular apophysis in males. The first group (‘*properipes*-group’) includes those with a lateral sinuous flange on the tegular apophysis, i.e. *K. tristicula*, *K. properipes* and *K. ludwigi*. Here *K. properipes* and *K. ludwigi* appear most closely related; they are almost indistinguishable based on genitalic morphology and lack the basal edge of *K. tristicula* on the tegular apophysis. *Kangarosa ossea* may also belong into the *properipes*-group based on the similarity of the female epigyne with that of *K. ludwigi*. The second group (‘*alboguttulata*-group’) lack a sinuous flange in the male tegular apophysis, but often have a pointy protrusion instead (*K. alboguttulata*, *K. focarius*, *K. nothofagus* and *K. tasmaniensis*). In this group, *K. alboguttulata* and *K. focarius* females have a very similar epigyne characterised by the presence of an interior atrium edge. This character is also present in female *K. yannicki* putatively placing this species into the *alboguttulata*-group with close affinities to *K. alboguttulata* and *K. focarius*. The female of *K. pandura* has a somewhat derived epigyne morphology and it cannot be placed in any of the two major species groups within *Kangarosa*.

These species groups provide only a tentative classification for the genus *Kangarosa*. Only a comprehensive systematic analysis, pending the discovery of the three missing males, can provide a solid phylogenetic hypothesis for the species of this genus.

5.3. Biogeography

An interpretation of fine-scale biogeographical patterns in the Lycosidae is often difficult as these spiders are able to disperse via ballooning (e.g., DECAE 1987) and recent dispersal may potentially mask an underlying biogeographical history. Only a few studies have aimed to explain distributional patterns in wolf spiders based on a rigorous phylogenetic analysis (e.g., YOO & FRAMENAU 2006). While such an analysis is lacking for *Kangarosa*, some general biogeographic patterns emerge. *Kangarosa* appears to be limited to Australia (including Tasmania) suggesting an origin of the genus after New Zealand and New Caledonia split from the remainder of Gondwana (Australia, South America and Antarctica) in the late Cretaceous (ca. 80 MYA) (see SANMARTÍN & RONQUIST 2004). Here, diversification of the genus was limited to the eastern parts of the country and may therefore have only commenced after an aridification of central Australia in the late Tertiary (Pliocene, ca. 5–2 MYA) (e.g., MCLEISH et al. 2007). Earlier diversification would possibly have seen the genus being more widespread in the western parts of the country with the arid interior as vicariance barrier. Such distributions can be seen in *Artoriopsis* and *Artoria* (FRAMENAU 2002, 2005, 2007). However, the only Western Australian species is *K. properipes* and its occurrence there appears to be driven by very good dispersal capabilities as it is at the same time the most widespread species in the genus (e.g., Tab. 1). *Kangarosa* is a typical representative of the Bassian sub-region that mainly covers the temperate climatic region of Australia. Here, *Kangarosa* species appear to have much more restrictive habitat preferences than other Artoriinae, which also limits their dispersal; for example, *K. pandura* is a habitat specialist of riparian gravel banks, restricting dispersal of the species along permanent waterways, and *K. nothofagus* can only be found in wet southern beech (*Nothofagus*) forests in southern Victoria.

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