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Revision of Australian jumping spider genus *Servaea* Simon 1887 (Aranaea: Salticidae) including use of DNA sequence data and predicted distributions

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Abstract

The genus *Servaea* Simon 1887 is revised and redefined. Descriptions and identification keys are provided to the following six species, of which three are described as new: *Servaea incana* (Karsch 1878), *Servaea narraweena* n. sp., *Servaea melaina* n. sp., *Servaea spinibarbis* Simon 1909, *Servaea villosa* (Keyserling 1881) and *Servaea zabkai* n. sp. The type species of the genus, *Servaea vestita* (L. Koch 1879), is proposed here to be a junior synonym of *Servaea incana*. In addition to the diagnoses and descriptions, distributional and nucleotide sequence information are provided. DNA sequence data for the segment of COI used in other salticid studies was obtained for the five species for which suitable material was available. Intraspecific variation in *S. villosa* and *S. incana* were studied in more detail. Within-species divergence was <2% while between-species divergence ranged from 4–8%. The predicted distribution of each species was calculated using BIOCLIM. The two small and similar WA species, *S. melaina* and *S spinibarbis*, had adjacent predicted distributions, one coastal on sandy soils and one inland on other soil types.

Key words: COI, BIOCLIM

Introduction

The genus *Servaea* Simon 1887 is distinctive, and specimens are common, both in the field and in Australian collections. Spiders in this genus can be up to 1.5cm in length and are quite variable in background colour and overlaying colour pattern. They live under loose bark on eucalyptus trees in temperate Australia and hunt insects on the tree trunk. Males and females frequently occur together under the same piece of bark. There are real problems, however, in identifying species within the genus as the female genitalia (compare Figs 11, 49 and 56) and the male palps (compare Figs 15, 27 and 43) show little or no variation between species and the sexes are dimorphic. As well, colour patterns are highly variable within species (e.g. Fig. 1) and the same, very distinctive, patterns may appear intermittently in several species. As a consequence, and in the absence of modern descriptions and keys, most specimens have been placed in *Servaea vestita* (Koch, L. 1879).

The potential usefulness of predicted distribution data in taxonomic studies of Australian salticids follows from Richardson *et al*. (2006) and Richardson (2009), whose studies of the predicted distributions of 52 Australian genera of jumping spiders, showed that predicted distributions were confirmed when new data became available for areas where no specimen data were used in the development of the predictions but the species was predicted to be present. As a consequence, for example, the presence of specimens in an area where no known species are predicted can be taken as supporting evidence of the presence of a new species.

To test the validity of the resulting hypothesised species, DNA sequence data for all forms for which suitable material was available were obtained and compared. Sufficient specimens were typed to allow discrimination between within-species and between-species divergence in two of the species.

The genus *Scaea* was established by L. Koch in 1879 for the species *Scaea vestita* Koch, L. 1879. The name *Scaea*, however, was preoccupied (*Scaea* Phillipi 1844) and Simon proposed the replacement name *Servaea* Simon, 1887. Maddison and Hedin (2003) place *Servaea* in the subfamily Euophrinae thereby identifying potential related genera. Because the genus is distinctive, widespread in temperate Australia, and commonly collected, its distribution on mainland Australia and surrounding islands has been described (Rainbow 1912; Zabka 1990, 1993;

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Patoleta & Zabka 1999; Richardson *et al*. 2006). It also features in popular guides, usually under the name *Servaea vestita* (e.g. Hickman 1967; Mascord 1970; Hawkeswood 2003), irrespective of the species depicted.

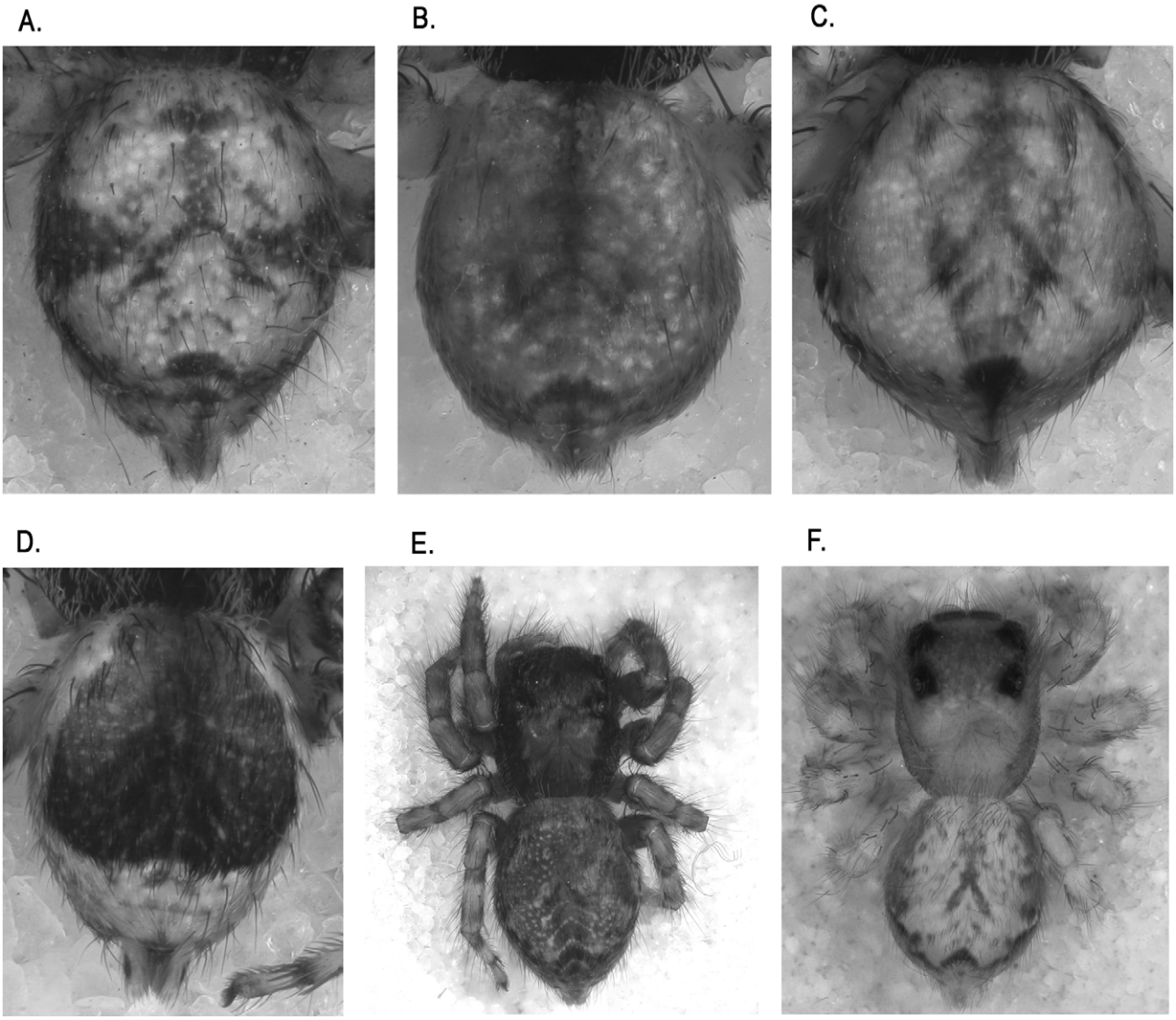

FIGURE 1. Examples of intraspecific variation in abdomen patterning. A–D four specimens of *S. villosa* collected at the same location and showing similar COI sequences (Fig. 5); E–F dark and light forms of *S. incana.*

Seven species-group names based on Australian material are available and could be linked to *Servaea*, thus need to be considered in revising this genus. One of these, *Hasarius barbatissimus* Keyserling, 1881, was moved to *Cytaea* by Keyserling (1883) and then to *Servaea* by Simon (1903). Zabka (1991) returned the species to *Cytaea*, where it clearly belongs and it will not be considered further. *Servaea obscura* Rainbow 1915 is based on immature specimens in poor condition. Other than the fact that it does not belong in *Servaea*, it is impossible to say anything about it and the future use of the name will depend on finding further material from central Australia. It is treated as a *nomen dubium* here.

The remaining available *Servaea* names based on Australian material are *Servaea incana* (Karsch, 1878), *Servaea vestita* (Koch, L. 1879), *Servaea villosa* (Keyserling 1881), *Servaea valida* (Urquhart 1893) and *Servaea spinibarbis* Simon 1909 (Zabka 1991, Richardson & Zabka 2003, Platnick 2012) and will be considered here.

As well as the Australian species, another name, *Servaea murina* Simon 1902, based on material from Java, is available. The Latin description is very short, there are no illustrations, and the location of the type is unknown. *Servaea* is found in temperate not tropical environments in Australia and its presence in Java would be surprising. While there is no diagnosis, the single specimen seems to have been placed in *Servaea* simply on the basis that the

chelicerae are geniculate. Consideration of its identity must await the availability of material and it will not be considered further in this study of the Australian species.

The aim of this work was to redefine the genus and provide keys to, and information on, each species, including the descriptions of three new species, *Servaea melaina* n. sp. *Servaea narraweena* n. sp., and *Servaea zabkai* n. sp. The diagnoses and descriptions include distributional and sequence information as these are essential to the unambiguous identification of each species.

Material and methods

Material in the collections of ANIC (Australian National Insect Collection, CSIRO, Canberra), AM (Australian Museum, Sydney), QM (Queensland Museum, Brisbane), MG (old Museum Godeffroy numbers), SAM (South Australian Museum, Adelaide), WAM (Western Australian Museum, Perth), ZMH (Zoologisches Museum Hamburg) and ZMHB (Museum für Naturkunde, Berlin), were used in the study. Institutional abbreviations follow Evenhuis (2009). Types of new species were deposited in the relevant State Museums. BJR numbers refer to working labels placed in sample tubes by the authors. Location information is given as on the sample label, latitudes and longitudes are given as decimal degrees and the material examined for each species is placed in north/south order within State or Territory. The predicted distribution of each species is shown when sufficient information is available.

Morphology

Meristic characteristics were noted for specimens of each form. As well, a series of measurements was taken, as shown in Richardson (2009b). The following abbreviations are used: AEW — anterior eye row width, AL — abdomen length, AMEW — anterior median eye row width, CL — cephalothorax length, CW — cephalothorax width, EFL — eye field length, PEW — posterior eye row width, L1–4 — legs 1–4, SL — sternum length, P1+T1 — tibia plus patella length of L1. The data for type specimens and the means, standard errors, sample sizes and ranges are given for sets of specimens by species and sex, where available. Wherever possible, only one specimen (of each sex) was measured from a particular locality. The data for each character was examined separately and the combined data set was analysed where relevant (excluding AL, sexes separate) using principal component analysis. Female genitalia were dissected, cleared using 50% lactic acid, and drawn using a camera lucida (Fig. 3). Lateral and ventral views of the male palp and dorsal views of whole specimens were also drawn. Parts of illustrations that are heavily inked indicate more heavily sclerotised or darker areas.

Distributions

The predicted distributions of the genus and of each species were calculated using BIOCLIM (Nix, 1986) as compiled in BIOLINK. Twelve environmental variables were used in the analysis, namely: annual mean temperature (°C), hottest month mean maximum temperature (°C), coldest month mean minimum temperature (°C), annual temperature range (°C), wettest quarter mean temperature (°C), driest quarter mean temperature (°C), annual mean precipitation (mm), wettest month mean precipitation (mm), driest month mean precipitation (mm), annual precipitation range (mm), wettest quarter mean precipitation (mm), driest quarter mean precipitation (mm). These variables provide estimates of total energy and water inputs, seasonal extremes and a measure of conditions prevailing during potential active and dormant seasons (Richardson *et al*. 2006). Conservation status was determined according to IUCN Red Listing Criteria (IUCN, 2001)

DNA Sequences

DNA of *Servaea* spp. was extracted from available tissues, most preserved in 70% EtOH, as per the recommended protocol accompanying the QIAgen DNeasy Kit (QIAGEN Inc., Valencia, California). Due to the non-optimally preserved condition of the extracted DNA, Cytochrome oxidase 1 (COI) was amplified by nested PCR in 25µL reactions containing 17.3µl of Millipore water, 2µl of 10x PCR buffer with 20mM $MgCl_2$ (Scientifix, Victoria, Australia), 2.0µl of dNTPs (10mM), 1.25µl of forward primer (10pmol), 1.25µl of reverse primer (10pmol), 0.2µl of Scientifix Hot Start DNA Polymerase (Scientifix, Victoria, Australia) and 1µl of template DNA. To amplify ~1kb of COI first round PCR was performed using the primers C1-J-1751 (5'-GAGCTCCTGA-

TATAGCTTTTCC-3') and C1-N-2776 (5'-GGATAATCAGAA TATCGTCGAGG-3') (Hedin & Maddison, 2001). The first round PCR product was diluted 1:30 and used as template to amplify the two smaller overlapping fragments using the primer pairs C1-J-1751/ C1-N-2568 (5'-GCTACAACATAATAAGTATCATG-3') and C1-J-2309 (5'-TTTATGCTATAGTTG GAATTGG-3')/ C1-N-2776 (Hedin & Maddison, 2001). Reactions were performed in a DNAdyad (Biorad, California, USA) with an initial denaturation at 94ºC for 2 min, followed by 40 cycles of denaturation at 94 ºC for 25 sec, annealing at 50ºC (first round)/ 44.5ºC (second round) for 25 sec and extension at 65ºC for 2 min (first round)/ 1 min (second round); with a final extension at 72ºC for 10 min. Amplified PCR products were purified using ExoSAP-it as per the recommended protocol (USB Corporation, Ohio USA). Sequencing reactions were performed in both directions following the standard sequencing protocol for ABI Big Dye Terminator (Applied Biosystems) and sent to the ACRF Biomolecular Resource Facility, Canberra, Australia. COI from the taxa sequenced in this study were edited using Sequencher 4.9 (Gene Codes Corporation). An alignment was produced using CLUSTAL W (Thompson et al. 1994), edited by eye and, when trimmed using BioEdit version 7.0.0 (Hall 1999), a 1,053 base alignment was produced. Uncorrected pairwise distances for COI sequences were calculated using PAUP* version 4.0b10 (Swofford 2002). Neighbour Joining (NJ) analyses were conducted in Geneious vol 5.3 (Drummond et al. 2010). The purpose of this analysis was only to estimate the level of genetic divergence between specimens and forms and not to infer phylogenetic relationships. COI sequences from thirteen other euophrine genera, were downloaded from GenBank and used to estimate distances between genera.

Results

Adequacy of the data set

The predicted distribution of the genus (Fig. 2), based on the available material, shows the specimen set was well distributed geographically, covering most of the likely range of the genus. The genus is predicted to be found in all temperate areas. Regions not represented in the data set included western parts of the predicted distribution in South Australia and most of the drier areas of the possible range. While climatically suitable, the genus may be restricted or absent in drier areas due to the limited availability of suitable trees for these under-bark dwellers. The temperate areas of northern Queensland are also under-represented.

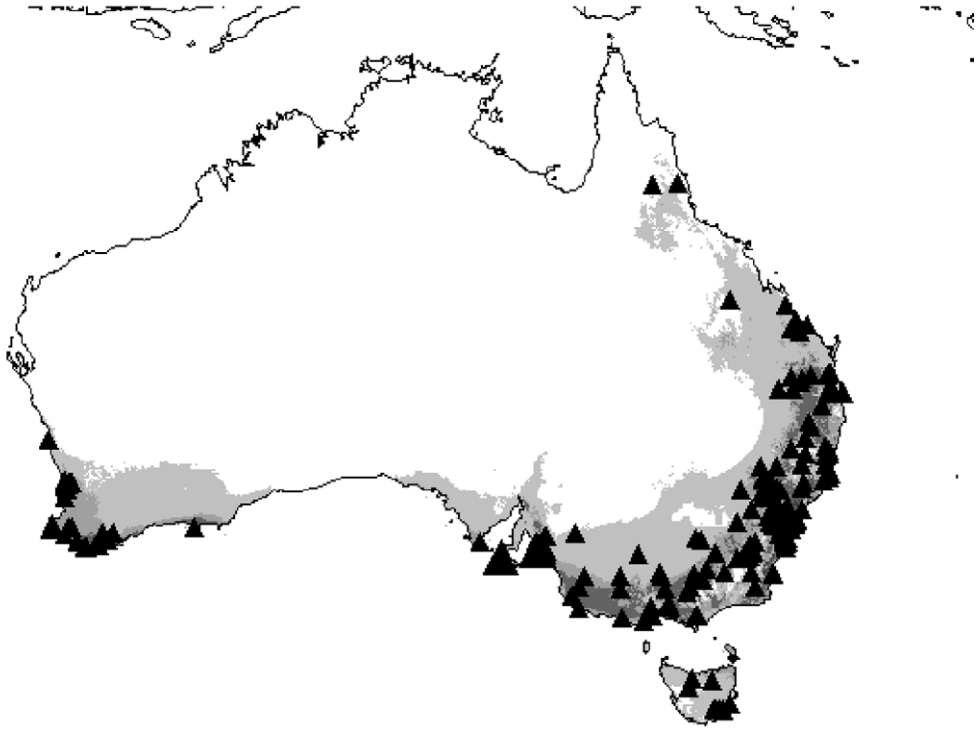

FIGURE 2. Observed and BIOCLIM predicted distributions of the genus *Servaea* based on all available specimens.

Morphology

Examination of colour patterns showed that the background colour of the abdomen can be white, light yellow or orange in drier areas and light or dark brown elsewhere irrespective of species. The abdominal colour patterns can vary from intense black, through browns to light orange and from well marked to almost non-existent. Very similar patterns or distinctive aspects of patterns (eg large, bright 'eye spots' on the sides of the abdomen, as in Fig. 39) can be found on specimens of several species and a range of widely different patterns occur on specimens of the same species taken from a single locality (see Fig. 1). There is also significant sexual dimorphism in size, morphology and colour patterns, with the males being generally smaller and darker, with heavier front legs than the females.

The metrical data are summarised for each species and sex in the species descriptions. The species fall into two groups with respect to size, with the types and related specimens of *S. incana, S. vestita* and *S. zabkai* being on average 30% larger (CL>2.9mm) than the other species (CL<3.0mm).

Consideration of the morphology of the four smaller species showed that *S. villosa* can be easily separated from *S. melaina, S. narraweena* and *S. spinibarbis* by the presence of a short fertilization duct in the former (compare Figs 3, 49 and 25), thus presenting a pattern similar to the larger specimens, e.g. *S. incana* (Fig. 10). *Servaea villosa* is distinguishable from all other species by the distinctive proximal, rather than distal, origin of the embolus in the males (compare Fig. 51 with equivalent figures).

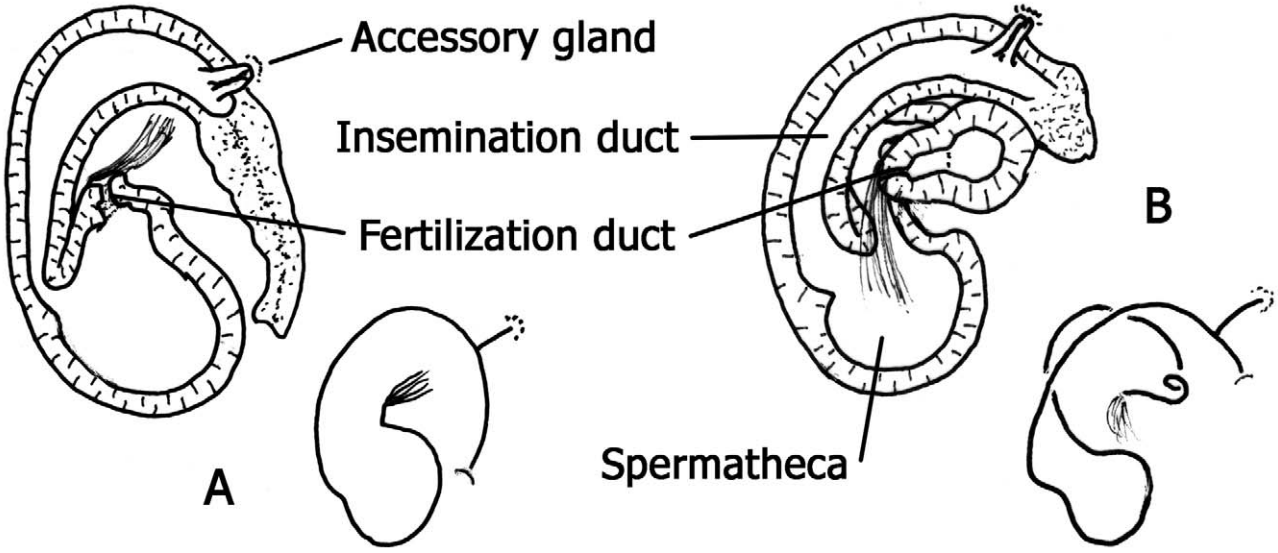

FIGURE 3 General anatomy of the female reproductive tract showing the two patterns observed. A. *Servaea incana, S. vestita, S. villosa* and *S. zabkai*. B. *S. melaina, S. narraweena* and *S. spinibarbis.*

In *S. melaina, S. spinibarbis* and *S. narraweena,* the fertilization duct is long, moving from its origin on the anterior edge of the spermatheca over the ventral surface of the insemination duct before folding back over itself and terminating over the dorsal surface of the spermatheca (see Fig. 3B). Externally, the ventral loop is clearly seen as a mulberry shaped and coloured area in the centre of the epigynum. There is individual variation in the terminal/subterminal position of the accessory gland on the insemination duct in these species. Canonical analysis of the metrical characters in these three species showed, in the males, that the first three eigenvectors explained 74%, 15% and 4% of the variation respectively. Examination of the spinning biplots showed that the first dimension was related to the size of the individuals. The second dimension (Fig. 4) clearly separated *S. melaina*. from *S. narraweena* and *S. spinibarbis* on the basis of the length of the first leg (P1+T1) in the males and the relative length of the eye-field (EFL and SL) in the females. The fourth principal component separated the latter species on the basis of the width of the eyefield (PEW and AEW). Further, in *S. spinibarbis* males, the bulb is as wide as or wider than the cymbium and there is no lateral lobe (Fig. 43), unlike all other species. The three species are also separated geographically, with *S. spinibarbis* found in south-western coastal WA (Fig. 46), *S. melaina* further inland in south-western WA (Fig. 30) and *S. narraweena* in mainland eastern Australia (Fig. 38). The predicted distributions of these three species show that no region of eastern Australia is suitable for the two western Australian species, that

S. narraweena is predicted to overlap with *S. melaina* on the southern coast of WA (though it has not been found there) and that the predicted distributions of *S. melaina* and *S. spinibarbis* in WA only overlap marginally (Figs 30 and 46). These results support the view that these are three different species.

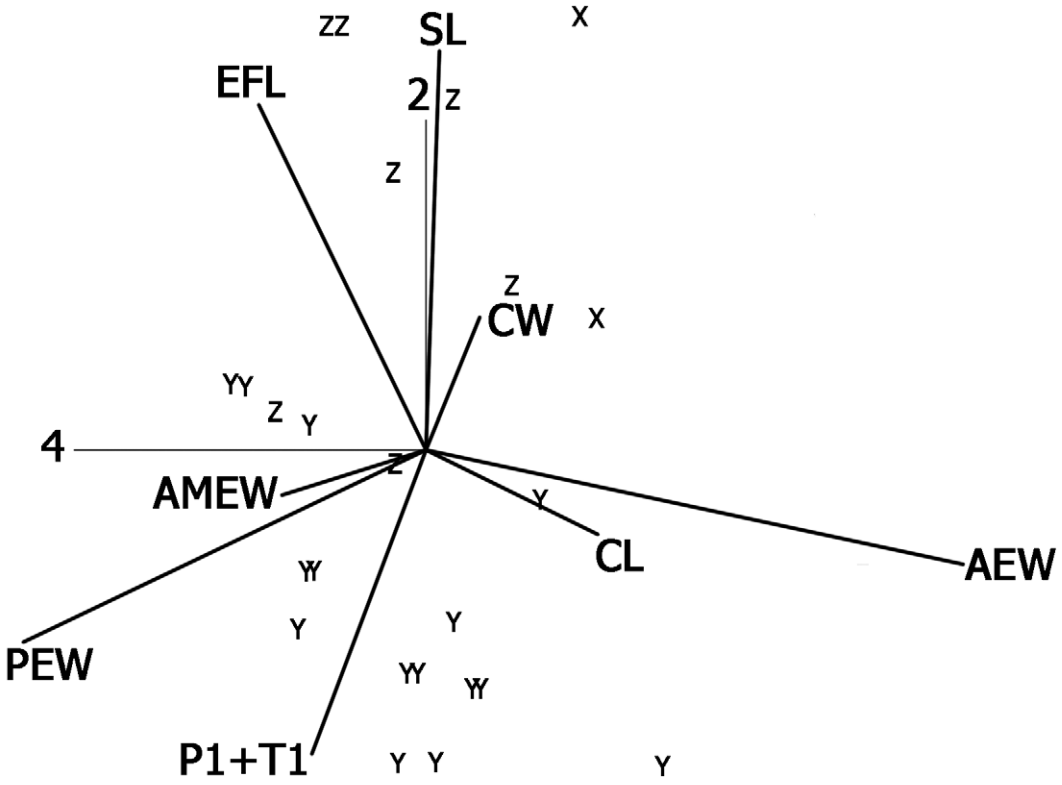

FIGURE 4. Spinning biplot for the males of *S. spinibarbis* (X), *S. narraweena* (Z) and *S. melaina* (Y) based on eight morphological characters showing the second and fourth dimensions.

The material that can be referred to the larger forms, *S. incana*, *S. vestita* and *S zabkai* vary in colour, the pattern of abdominal markings, size and female genital morphology with no consistent correlation between these characters. The lighter forms (Figs 1F, 6 & 8) are, for the moment, referred to as *S. incana*, following present usage, while the darker forms (Figs 1E, 7 & 9) are referred to as *S. vestita*. There are two patterns in the shape of the central marking on the abdomen (Figs 6 & 7) with one form associated with a lighter background colour and patterns, though these characteristics are quite variable. Material from the disjunct populations on the Atherton Tableland in northern Queensland fall into two groups. Two specimens from the drier Mount Pleasant area are very similar to the southern *S. incana* specimens in all respects, including the lighter colour pattern and having small, terminally placed, accessory glands, while the two specimens from the wetter Atherton area (ultimately called *S. zabkai*) are dark and more similar to *S. vestita* in colour pattern. Later examination (see DNA section below) showed however that the accessory gland was larger and more centrally placed on the dorsal surface than in *S. vestita*. As well, the seminal duct passes across the centre of the epigynum in *S. zabka* (Fig. 56) while it generally (but not always) passes closer to the anterior edge of the epigynum in *S. incana* and *S. vestita* (Figs 10 & 12). The guides are indistinct in all cases, vary a great deal in position, shape and number between individuals, and show no consistent species-specific patterns. Otherwise the larger forms are very similar with no consistent differences in palp morphology, female genital morphology (compare Figs 10–13 and Figs 55–57) or metrical characters (separately or through canonical analysis). Comparison of the distributions of the lighter (*S. incana*) and darker (*S. vestita*) forms shows marked differences, with both forms predicted to be found in SE Australia, Tasmania and south-western WA while only the darker form is actually found in the latter two areas. The similar predicted distributions combined with the different observed distributions would support the conclusion that they are different species.

In summary, there is good evidence for four smaller species; the quite distinct *S. villosa*, and three morphologically distinguishable species, *S. melaina*, *S. narraweena*, and *S. spinibarbis*. Evidence for several species based on

the larger specimens is present but quite weak. It is possible however to propose that there are two large species, a lighter *S. incana* and a darker *S. vestita*, plus two specimens from Atherton in north Queensland that may belong to a new species (*S. zabkai*). Such a hypothesis depends on colour patterns and female genital morphology but both of these character sets show sufficient variation between individuals that there is no clear demarcation between specimens of any of the larger 'species'. As a consequence, specimens were sequenced to test the reality of the proposed taxa.

DNA Sequences

Six specimens of the hypothesised species, *S. villosa,* (from a single location but showing highly divergent, individual, colour patterns, Fig. 1A–D), as well as five coastal, intermediate and inland specimens of the hypothesised light form, *S. incana,* and six specimens of the dark form, *S. vestita* were sequenced. An example of *S. zabkai* was also sequenced. Single specimens of *S. spinibarbis*, and *S. narraweena* were successfully sequenced, however attempts to sequence the available but older specimens of *S. melaina* were unsuccessful. The origin of the material and the levels of genetic difference in COI sequences between individuals and species are summarised in tables 1 and 2, and Fig. 5.

Our analysis included replicates of three hypothesised species. Variation in COI sequences of *S. villosa* (n=6) ranged from 0–13 nucleotide differences (0–1.2%), confirming the hypothesis that the extreme variations in colour patterns and minor variation in the morphology of female genitalia are intraspecific. Specimens of *S. incana* (n=5) ranged from 1–16 nucleotide differences (0.1–1.5%) and *S. vestita* (n=6) from 0–18 nucleotide differences (0–1.7%). In all cases intraspecific variation between specimens was less than 2%. The variation between the replicates of *S. incana* and *S. vestita* ranges from 0–20 nucleotides (0–1.9%) with an identical sequence being found for a specimen of *S. incana* (ARA025) and *S. vestita* (ARA047). It can be seen (Fig. 5) that the sequences of specimens of *S. incana* and *S. vestita* are interspersed. In all cases variation between specimens of these two proposed forms was less than 2% while variation between all other pairs of species was greater than 4% (Table 2). As a consequence, the hypothesis made above on the basis of morphological evidence, that *S. vestita* and *S. incana* are different species, must be overturned. The name *S. incana* has priority and *S. vestita* will be considered a synonym hereafter.

TABLE 1 Specimens sequenced showing specimen codes, GenBank accession, collection localities, museum specimen numbers, sex and dates collected.

Lab. No.	Form	GenBank No.	Locality	Institute	Voucher number	Sex	Dates
ARA036	*S. spinibarbis*	JF949740	Parmelia, WA	WAM	T66931	F	15 Oct. 2001
ARA039	*S. narraweena*	JF949741	Aldinga Scrub Cons. Park, SA	SAM	NN22341-4	M	22 Sep. 1987
ARA005	*S. zabkai*	JF949750	Atherton area, Qld	AM	KS 81340	F	18 Oct. 2002
ARA017	*S. villosa*	JF949751	Kidaman Creek, Qld	ANIC	42 001507	F	1 Jul. 2010
ARA018	*S. villosa*	JF949749	Kidaman Creek, Qld	ANIC	42 001507	F	1 Jul. 2010
ARA020	*S. villosa*	JF949734	Kidaman Creek, Qld	ANIC	42 001507	F	1 Jul. 2010
ARA021	*S. villosa*	JF949735	Kidaman Creek, Qld	ANIC	42 001507	F	1 Jul. 2010
ARA022*	*S. villosa*	JF949736	Kidaman Creek, Qld	ANIC	42 001507	F	1 Jul. 2010
ARA023	*S. villosa*	JF949737	Kidaman Creek, Qld	ANIC	42 001507	M	1 Jul. 2010
ARA025	*S. incana*	JF949753	3.8km NW Keyneton, SA	WAM	T66942	F	27 Dec. 2002
ARA026	*S. incana*	JF949752	3.8km NW Keyneton, SA	WAM	T66942	F	27 Dec. 2002
ARA027	*S. incana*	JF949738	Bakers Ck, Bundarra, NSW	AM	KS 75576	F	12 Sep. 2001
ARA030	*S. incana*	JF949739	Eurobodalla N.P., Mystery Bay. NSW	AM	KS 90904	F	26 Dec. 2004
ARA041	*S. incana*	JF949743	Mulligans Flat Nature Reserve, ACT	ANIC	42 001500	im	16 Feb. 2011
ARA042	*S. vestita*	JF949744	Frying Pan, NSW	ANIC	42 001505	im	9 Mar. 2011
ARA043	*S. vestita*	JF949745	Frying Pan, NSW	ANIC	42 001506	M	9 Mar. 2011
ARA044	*S. vestita*	JF949746	Frying Pan, NSW	ANIC	42 001506	im	9 Mar. 2011
ARA045	*S. vestita*	JF949747	Frying Pan, NSW	ANIC	42 001506	im	9 Mar. 2011
ARA046	*S. vestita*	JF949748	Frying Pan, NSW	ANIC	42 001506	im	9 Mar. 2011
ARA047	*S. vestita*	JF949742	Frying Pan, NSW	ANIC	42 001506	im	9 Mar. 2011

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ARA018	*S. villosa*	JF949749	Kidaman Creek, Qld	ANIC	42 001507	F	1 Jul. 2010
ARA020	*S. villosa*	JF949734	Kidaman Creek, Qld	ANIC	42 001507	F	1 Jul. 2010
ARA021	*S. villosa*	JF949735	Kidaman Creek, Qld	ANIC	42 001507	F	1 Jul. 2010
ARA022*	*S. villosa*	JF949736	Kidaman Creek, Qld	ANIC	42 001507	F	1 Jul. 2010
ARA023	*S. villosa*	JF949737	Kidaman Creek, Qld	ANIC	42 001507	M	1 Jul. 2010
ARA025	*S. incana*	JF949753	3.8km NW Keyneton, SA	WAM	T66942	F	27 Dec. 2002
ARA026	*S. incana*	JF949752	3.8km NW Keyneton, SA	WAM	T66942	F	27 Dec. 2002
ARA027	*S. incana*	JF949738	Bakers Ck, Bundarra, NSW	AM	KS 75576	F	12 Sep. 2001
ARA030	*S. incana*	JF949739	Eurobodalla N.P., Mystery Bay. NSW	AM	KS 90904	F	26 Dec. 2004
ARA041	*S. incana*	JF949743	Mulligans Flat Nature Reserve, ACT	ANIC	42 001500	im	16 Feb. 2011
ARA042	*S. vestita*	JF949744	Frying Pan, NSW	ANIC	42 001505	im	9 Mar. 2011
ARA043	*S. vestita*	JF949745	Frying Pan, NSW	ANIC	42 001506	M	9 Mar. 2011
ARA044	*S. vestita*	JF949746	Frying Pan, NSW	ANIC	42 001506	im	9 Mar. 2011
ARA045	*S. vestita*	JF949747	Frying Pan, NSW	ANIC	42 001506	im	9 Mar. 2011
ARA046	*S. vestita*	JF949748	Frying Pan, NSW	ANIC	42 001506	im	9 Mar. 2011
ARA047	*S. vestita*	JF949742	Frying Pan, NSW	ANIC	42 001506	im	9 Mar. 2011

TABLE 2 Uncorrected distance matrix for cytochrome c oxidase subunit1. * Only 497bp of 1053bp alignment was obtained for ARA022. lower triangle represents entire alignment and upper triangle is trimmed to match ARA022.

Lab. No.	Form	36	39	05	17	18	20	21	22*	23	ARA025	26	27	30	41	42	43	44	45	46
ARA036	S. spinibarbis		0.050	0.042	0.061	0.058	0.060	0.058	0.058	0.058	0.061	0.072	0.062	0.054	0.058	0.060	0.060	0.058	0.064	0.058
ARA039	S. narraweena	0.042		0.055	0.079	0.072	0.078	0.076	0.076	0.076	0.068	0.078	0.068	0.060	0.062	0.062	0.062	0.064	0.067	0.064
ARA005	S. zabkai	0.073	0.078		0.032	0.038	0.032	0.030	0.030	0.030	0.035	0.044	0.038	0.034	0.036	0.038	0.044	0.036	0.043	0.036
ARA017	S. villosa	0.081	0.090	0.052		0.014	0.000	0.002	0.002	0.002	0.060	0.063	0.059	0.063	0.061	0.065	0.063	0.061	0.069	0.061
ARA018	S. villosa	0.081	0.087	0.055	0.012		0.014	0.012	0.012	0.012	0.058	0.068	0.058	0.058	0.056	0.060	0.058	0.058	0.065	0.058
ARA020	S. villosa	0.081	0.089	0.052	0.000	0.012		0.002	0.002	0.002	0.059	0.070	0.058	0.062	0.060	0.064	0.062	0.060	0.069	0.060
ARA021	S. villosa	0.080	0.088	0.051	0.001	0.011	0.001		0.000	0.000	0.057	0.068	0.056	0.060	0.058	0.062	0.060	0.058	0.067	0.058
ARA022*	S. villosa	0.058	0.077	0.030	0.002	0.012	0.002	0.000		0.000	0.057	0.068	0.056	0.060	0.058	0.062	0.060	0.058	0.067	0.058
ARA023	S. villosa	0.080	0.088	0.051	0.001	0.011	0.001	0.000	0.000		0.057	0.068	0.056	0.060	0.058	0.062	0.060	0.058	0.067	0.058
ARA025	S. incana	0.079	0.083	0.041	0.060	0.060	0.060	0.060	0.057	0.060		0.000	0.008	0.008	0.010	0.006	0.014	0.002	0.014	0.002
ARA026	S. incana	0.085	0.088	0.047	0.061	0.063	0.065	0.064	0.068	0.063	0.001		0.020	0.020	0.022	0.018	0.026	0.014	0.022	0.014
ARA027	S. incana	0.079	0.084	0.044	0.061	0.061	0.061	0.060	0.056	0.060	0.007	0.013		0.008	0.014	0.006	0.014	0.006	0.018	0.006
ARA030	S. incana	0.077	0.081	0.041	0.065	0.063	0.065	0.064	0.060	0.064	0.009	0.015	0.011		0.014	0.006	0.010	0.006	0.014	0.006
ARA041	S. incana	0.078	0.081	0.045	0.063	0.061	0.063	0.062	0.057	0.062	0.009	0.015	0.013	0.013		0.012	0.020	0.012	0.020	0.012
ARA042	S. vestita	0.077	0.079	0.044	0.064	0.062	0.064	0.063	0.062	0.063	0.005	0.011	0.008	0.006	0.010		0.012	0.004	0.012	0.004
ARA043	S. vestita	0.081	0.082	0.050	0.065	0.063	0.065	0.064	0.060	0.064	0.013	0.019	0.015	0.011	0.017	0.009		0.012	0.020	0.012
ARA044	S. vestita	0.077	0.081	0.042	0.061	0.060	0.061	0.060	0.058	0.060	0.001	0.008	0.006	0.008	0.009	0.004	0.011		0.016	0.000
ARA045	S. vestita	0.079	0.081	0.044	0.066	0.064	0.066	0.065	0.067	0.065	0.013	0.017	0.017	0.013	0.017	0.010	0.017	0.013		0.016
ARA046	S. vestita	0.077	0.081	0.042	0.061	0.060	0.061	0.060	0.058	0.060	0.001	0.008	0.006	0.008	0.009	0.004	0.011	0.000	0.013	
ARA047	S. vestita	0.082	0.086	0.045	0.061	0.063	0.064	0.063	0.064	0.063	0.000	0.001	0.011	0.012	0.012	0.009	0.016	0.005	0.015	0.005

A specimen, from Atherton in northern Queensland was sequenced as an example of *S. incana* from the northern extreme of range. Post-priori evidence of genetic differences (>4%) prompted closer morphological examination of the specimen. While externally similar to *S. incana*, the morphological differences in the female genitalia described above were found and support the genetically-based differentiation of these species. The three other specimens available from the Atherton area were then examined in more detail and a second specimen, also female, of the same form was discovered. This form was therefore considered a new species, *Servaea zabkai*. Again the DNA data overturned the original hypothesis.

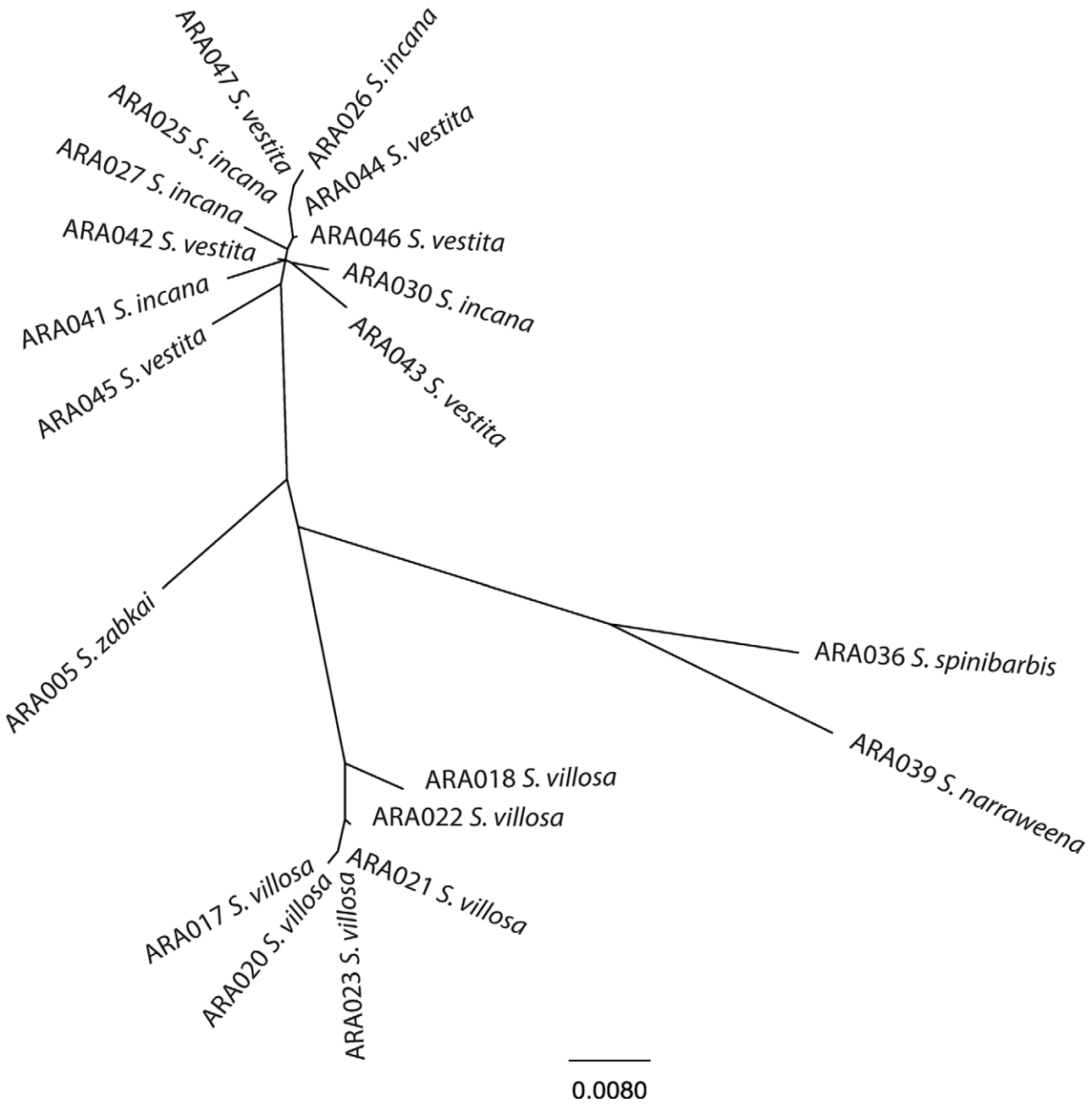


FIGURE 5. Phenetic tree resulting from Neighbour Joining analysis inferred from the COI data-set. Branch lengths are proportional to genetic differences (see scale bar).

Inter-specific genetic distances between morphologically distinct *Servaea* species were variable and ranged between 43 and 94 nucleotide differences (4.1–8.9%). Two species pairs displayed almost equal minimum divergence between interspecific neighbours. *Servaea spinibarbis* displayed a divergence from *S. narraweena* of 4.2%, while *S. zabkai*. displayed the lowest genetic divergence from other species (*S.*

incana; minimum 4.1%). Divergence levels between the different species were in all cases greater than 4% while within species differences were less than 2%.

Distances between COI sequences of 13 genera of euophrine salticids taken from GENBANK showed the distance between genera ranged between 10.1–16.8%.

In an attempt to obtain sequences from a wide range of localities for each species, specimens stored in 70% alcohol were analysed. All specimens less than three months old sequenced, while 2 of 10 specimens 5–10 years old and 2 of 14 specimens more than ten years old were also successfully sequenced based on minimum extractions from single legs.

As a consequence of the combined analysis of morphological, distributional and molecular data, six species of *Servaea* are considered valid, namely, *S. incana*, *S. melaina* n. sp., *S. narraweena* n. sp., *S. spinibarbis*, *S. villosa* and *S. zabkai* n. sp.

Key to the Species

Males

1. CL greater than 2.9mm 2
- CL less than 3mm 3
2. Morphology as in Figs 6–22 . . . . . *Servaea incana* (temperate Qld to WA) (Figs. 6–22)
-. Morphology unknown. . . . . *Servaea zabkai* (Atherton Tableland) (Fig. 58)
3. Origin of embolus on the proximal edge of the bulb (Fig. 51). Pattern on the dorsal abdomen includes a mark of varying intensity with long 'arms' towards the sides and always a strong black mid line marking near the posterior edge of the abdomen (Figs 45–48) . . . . . .*Servaea villosa* (temperate NSW and Qld) (Fig. 1, 47–54)
- Origin of embolus on the distal edge of the bulb (Fig. 16). Pattern on the dorsal abdomen not as in *S. villosa.* 4
4. CW greater than 82% CL, P1+T1 80–90% of CL . . . . . *Servaea narraweena* (SA to Qld) (Figs 31–38)
- CW less than 82% CL, P1+T1 less than 80% or greater than 90% of CL 5
5. Cephalothorax and chelicerae light brown, abdomen light cream with orange brown markings. P1+T1 less than 80% of CL. Bulb wide as or wider than the cymbium and no lateral lobe . . . . . *Servaea spinibarbis* (WA) (Figs 39–46)
- Cephalothorax dark brown with black or dark brown chelicerae. P1+T1 more than 90% of CL, abdomen mid to dark brown. Bulb narrower than the cymbium and lateral lobe present . . . . . *Servaea melaina* (WA) (Figs 23–30)

Females

1. CL greater than 2.9mm 2
- CL less than 3mm 3
2. Dorsal abdomen dark gray with black patterning on the sides coming to the centre in the middle of the abdomen. Accessory gland large and placed centrally on the dorsal surface of the duct . . . . . *Servaea zabkai* (Atherton Tableland) (Figs 55–58)
- Dorsal abdomen varying from cream with brown or ginger markings on the sides to dark brown or grey with black markings. Accessory gland small and placed terminally or subterminally on the anterior edge of the duct . . . . . *Servaea incana* (temperate Qld to WA) (Figs 6–22)
3. Fertilization duct small and indistinguishable from the ventral exterior (Fig 3A), centre of fossa pale orange as is the rest of the fossa . A distinctively shaped marking in the centre of the dorsal abdomen, extending to the sides. No gap between right and left insemination ducts . . . . . *Servaea villosa* (temperate NSW and Qld) (Figs 1, 6–22)
- Fertilization duct large and long (Fig. 3B), externally it appears as a deep red mass in the centre of the fossa (not to be confused with an orange sclerotised area that appears variably in some specimens of several species). Median gap between right and left insemination ducts. Dorsal markings on abdomen not as in *S. villosa* 4
4. Insemination duct approaches the anterior edge of the epigynum and enters the spermatheca towards the posterior edge . . . . . *Servaea narraweena* (SA to Qld) (Figs 31–38)
- Insemination duct crosses the middle of the epigynum and enters the spermatheca on the anterior edge 5
5. Cephalothorax and chelicerae light brown, abdomen light cream with orange brown markings. Accessory gland placed terminally or subterminally on the duct . . . . . *Servaea spinibarbis* (WA) (Figs 39–46)
- Cephalothorax dark brown with black or dark brown chelicerae. Abdomen grey or brown with dark brown or black markings. Accessory gland towards the middle of the insemination duct . . . . . *Servaea melaina* (WA) (Figs 23–30)

Taxonomy

Servaea Simon, 1887

Type species: *Scaea vestita* L. Koch, 1879 by monotypy.

Scaea Koch, L., 1879: 1142 [junior homonym of *Scaea* Phillipi, 1844 (Mollusca)].
Servaea Simon, 1887: 186 [*nom. nov.* for *Scaea* L. Koch, 1879]

Diagnosis. Fissident, ocular quadrangle (equal or) narrower behind, frontal surface of chelicera round, male chelicera geniculate and bowed prolaterally with transverse ridges, epigynum clearly defined with paired fossae and clear median guide, female insemination duct hardly if at all evident, level with fossae, spermatheca large, rounded and within the margin of the fossa close to the posterior edge, embolus coiled in anticlockwise direction with single coil and pointed, tegular groove covers proximal part of embolus, tegulum clearly longer than wide, with posterior lobe. Fringing on male T1. The genus can be differentiated from *Cytaea* as the embolus is single-coiled rather than double coiled in the male and the insemination ducts are within rather than posterior to the fossae. *Servaea* can be differentiated from *Euryattus* as the tegulum has a posterior lobe and the insemination ducts are anterior to the spermatheca and pass towards the lateral edges of the fossae.

Servaea incana (Karsch, 1878)

Figs 6–22

Plexippus incanus Karsch 1878: 25.
Scaea vestita Koch L. 1879: 1142 pl. 94, Fig. 4, 5., Peckham & Peckham 1901: 302 pl. 25, f.2.
Servaea vestita: Simon 1888: 283, Proszynski 1984: 131; 1987: 105; Davies & Zabka 1989: 220; Zabka 1991 52, Platnick 2012 unpaginated.
Plexippus validus Urquhart 1893: 127, Hickman 1967: 84, f. 147–9, preoccupied; *Plexippus validus* Thorell 1877.
Servaea incana: Zabka 1991: 52, Platnick 2012 unpaginated.

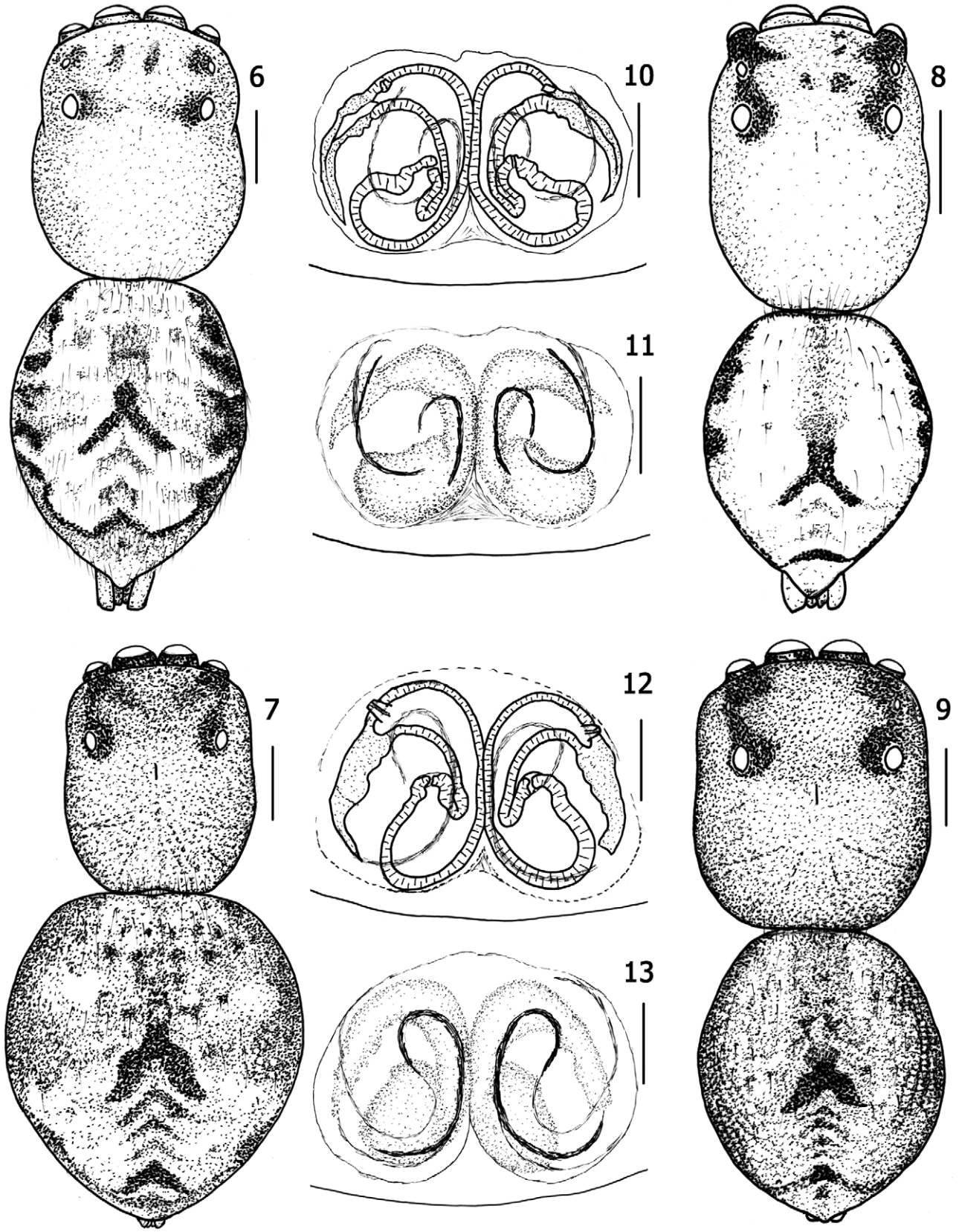
Remarks. The holotype of *S. incana* is large but in extremely poor condition. The morphology of the female genitalia is, however, clear. The syntype series of *S. vestita* consists of three female specimens from Sydney (ZMHB MG3491), all specimens of *S. incana*, and a further specimen from Peak Downs (ZMH, MG 16537, BJR1183) of a second species, *S. narraweena*. Accordingly, we designate a female specimen from Sydney (ZMHB MG3491A) as the lectotype of *Servaea vestita* (L. Koch, 1879) and the remaining two Sydney specimens as paralectotypes, so as to stabilise usage of the names. The type of *P. validus* Urquhart 1893 could not be found and the description is insufficient to diagnose the species, however all known specimens of *Servaea* from Tasmania are of *S. incana* (as *S. vestita*) and so it is considered a junior synonym of *S. incana*.

Type material. Holotype: *Plexippus incanus*, 1F, New South Wales, (ZMHB MG1735 BJR960);

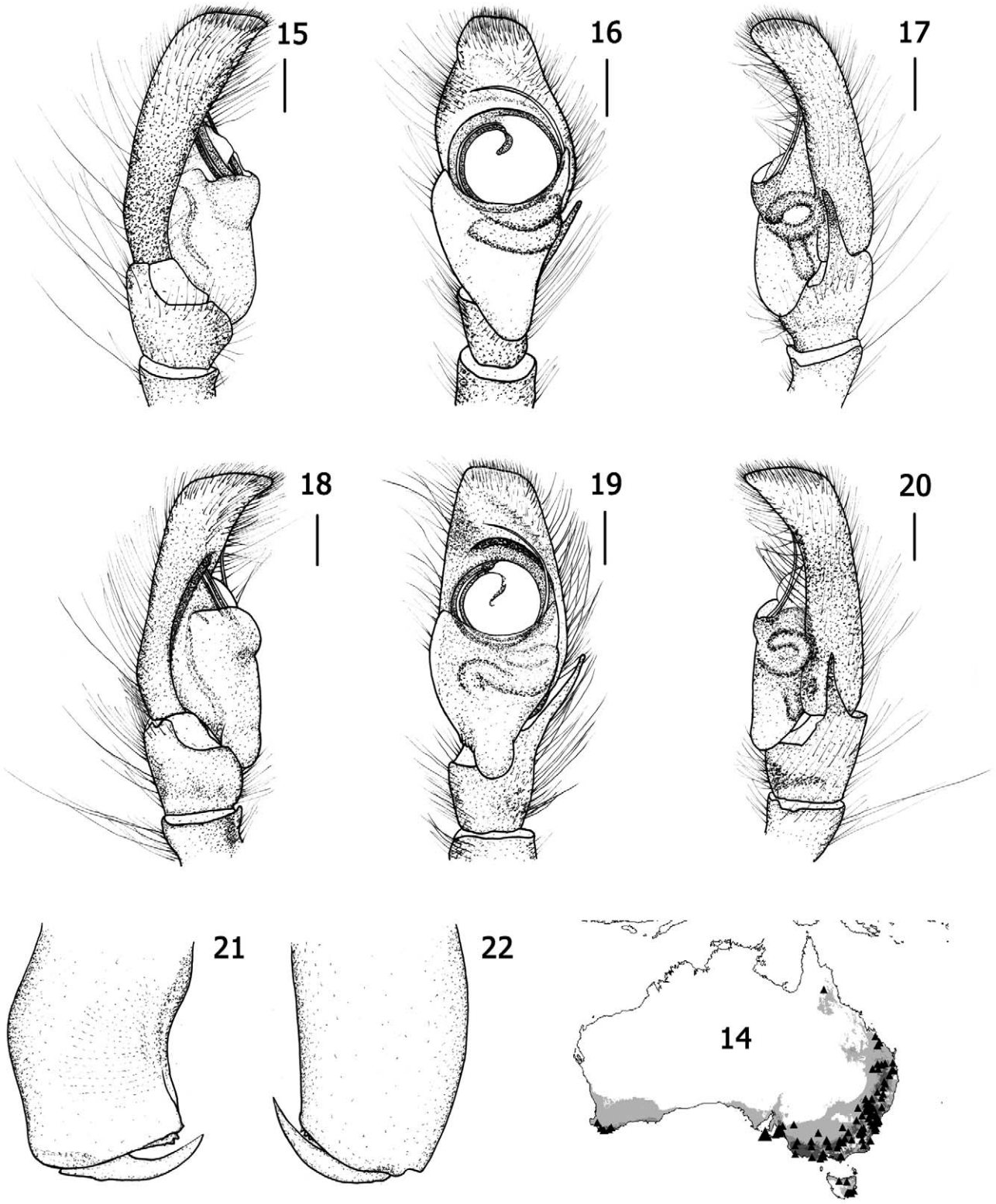
Lectotype: *Scaea vestita*, 1F, New South Wales, Daemel, (ZMHB MG 3491A BJR1209).

Paralectotypes: *Scaea vestita* 2F New South Wales, Daemel, (ZMHB MG3491 BJR 1209).

Other material examined. QUEENSLAND: 2F, Mt Beauty, Eucalyptus, 144.31°E, 17.38°S, 23 Dec, 1990, (QM S 73118, BJR898); 1F, Benaraby Rest Area, 151.31°E, 24.00°S, 20 Jul, 1992, A.F. Longbottom, (WAM T66953, BJR497); 1F, Emu Park, 150.78°E, 23.25°S, 20 Nov, 1990, M. Zabka, (QM S 73116, BJR910); 1F, Kroombit Tops, Lower Kroombit Creek, 45km SSW Calliope, open forest, under log, 151.033°E, 24.35°S, 9 Dec, 1983, V. Davies, J. Gallon, (QM S 73088, BJR905); 2F, Maroochye River, 112 km N of Brisbane, 152.97°E, 26.57°S, 1 Jul, 1939, J.C. Wiburd, (AM KS 37286, BJR792); 1F, Nanango, 152°E, 26.67°S, 8 Nov, 1990, (QM S 73133, BJR949); 3F, Caloola, 151°E, 26.73°S, 10 Sep, 1983, R.R. Jackson, (QM S 55902, BJR906); 2F, 11.5km W Wengenville, 151.58°E, 26.83°S, 8 Nov, 1990, (QM S 73112, BJR903); 1F, Bunya Mt, 151.57°E, 26.85°S, 9 Sep, 1983, R.R. Jackson, (QM S 73084, BJR953); 1M, 6F, Lake Broadwater, under bark, 151.10°E, 27.35°S, 16 Oct, 1984, M. Bennie, (QM S 73101, BJR935); 2F, 7 imm., Lake Broadwater, 151.10°E, 27.35°S, 28 Jul, 1982, M. Bennie, (QM S 61147, BJR917); 2F, Lake Broadwater, Eucalyptus, under bark, 151.10°E, 27.35°S, 26 Jan, 1985, J. Wylie, (QM S 73102, BJR934); 3F, Lake Broadwater, Eucalyptus, 151.10°E, 27.35°S, 26 Jan, 1985, J. Thompson, (QM S 73086, BJR938); 7F, 1 imm., Lake Broadwater, under bark, 151.10°E, 27.35°S, 17 Oct, 1984, M. Bennie,



FIGURES 6–13. *Servaea incana*. 6–9 dorsal view (6 'light' female and 7 'dark' female; 8 'light' male and 9 'dark' male); 10–14 female genitalia (10 dorsal view of cleared holotype of *S. incana*, 11 ventral view of external characteristics of holotype of *S. incana*; 12 dorsal view of cleared lectotype of *S. vestita*, 13 ventral view of external characteristics of lectotype of *S. vestita*). Scale: total body 1 mm; remainder 0.2 mm.



FIGURES 14–22. *Servaea incana* (cont.) 14 known and predicted distribution; 15–20 male palp (15–17 'light' male and 19–20 'dark' male; 21 anterior view of geniculate male chelicera; 22 anterior view of rounded female chelicera. Scale: 0.2 mm

(QM S 73099, BJR942); 2M, 3F, 3 imm., Lake Broadwater, under bark, 151.10°E, 27.35°S, 17 Oct, 1984, M. Bennie, (QM S 73098, BJR907); 7F, 2 imm., Lake Broadwater, under bark, 151.10°E, 27.35°S, 26 Jan, 1985, M. Bennie, V. Davies, (QM S 73104, BJR897); 5F, Lake Broadwater, 151.10°E, 27.35°S, 18 May, 1985, L. & F. Wood, (QM S 73105, BJR901); 2F, Lake Broadwater, 151.10°E, 27.35°S, 17 Oct, 1984, M. Bennie, (QM S 73098, BJR907.2); 1M, 7F, Lake Broadwater, 151.10°E, 27.35°S, 21 Dec, 1984, M. Bennie, (QM S 73097, BJR908); 2M,

2F, Lake Broadwater, 151.10°E, 27.35°S,26 Jan, 1985, M. Bennie, V. Davies, (QM S 73100, BJR912); 1M, 1F, Lake Broadwater, 151.10°E, 27.35°S, 13 May, 1984, V. Wood, (QM K 73103, BJR914); 1M, 1F, Girraween, 150.45°E, 27.37°S, 8 Sep, 1983, R.R. Jackson, (QM S 73087, BJR924); 1F, 1, imm., Camp Mountain, 152.87°E, 27.40°S, 21 Jul, 1992, J.M. Waldock, (WAM T66954, BJR492); 1M, Belmont, 153.02°E, 27.47°S, 30 Aug, 1966, R.E. Mascord, (AM KS 18975, BJR689); 1F, Brisbane, 153.02°E, 27.47°S, 1 Aug, 1987, M. Zabka, (AM KS 64897, BJR568); 1F, 6km E Spicers Gap, 152.48°E, 28.08°S, 22 Nov, 1990, (QM S 73126, BJR915). **NEW SOUTH WALES:** 1F, Girraween National Park, Eucalyptus, 151.93°E, 28.87°S, 26 Nov, 1990, (QM S 73128, BJR954); 1M, 1F, Girraween National Park, 151.93°E, 28.87°S, 26 Nov, 1990, (QM S 73122, BJR951); 1F, 10km S Tenterfield, Eucalyptus, 152.02°E, 29.13°S, 28 Nov, 1990, (QM S 73120, BJR913.3); 1M, 3F, 10km S Tenterfield, 152.02°E, 29.13°S, 28 Nov, 1990, (QM S 73120, BJR913); 1F, 1 imm., 27km S Glen Innes, 151.73°E, 29.73°S, 28 Nov, 1990, (QM S 73114, BJR952); 1F, W of Bakers Ck, Bundarra Baralba Rd., under bark, 151.02°E, 30.20°S, 12 Sep, 2001, H. Smith, hand, (AM KS 75576, BJR772); 1F, 5km E Armidale, 151.72°E, 30.52°S, 29 Nov, 1990, (QM S 73132, BJR933); 1M, 1F, Walcha, 151.58°E, 30.98°S, 2 Oct, 1971,M.R. Gray, (AM KS 19219, BJR679); 1M, Namoi River, 57km W Tamworth, 150.33°E, 31.08°S, 2 Dec, 1990,B. Carrol, (QM S 73135, BJR922); 1M, 1F, Rocky Glen, 34km E Coonabarabran, Eucalyptus, 149.57°E, 31.12°S, 2 Dec, 1990, (QM S 73134, BJR931); 2F, 5km SE Weetaliba, NW Coolah, Eucalyptus, 149.62°E, 31.68°S, 4 Dec, 1990, (QM S 73129, BJR950); 1M, Coolah Tops NP, Grass Tree Track., under bark, 150.00°E, 31.73°S, 11 Aug, 2001, G. Milledge, hand, (AM KS 75106, BJR779); 1M, Sawpit Ck, 149.83°E, 32.08°S, 20 Dec, 1993, J. Noble, (AM KS 56499, BJR740); 1F, 27km N Gresford, Eucalyptus, 151.53°E, 32.18°S, 5 Dec, 1990, (QM S 73117, BJR932); 1F, Dubbo, 148.62°E, 32.25°S, 31 Jul, 1966, R.E. Mascord, (AM KS 18348, BJR687); 1F, 40km W Muswellbrook, 150.47°E, 32.27°S, 4 Dec, 1990, (QM S 73113, BJR955); 1F, nr Deadmans Ck, 15km NE of Gulgong, 149.65°E, 32.28°S, 1 Jan, 2000, G. Milledge & H. Smith, (AM KS 62180, BJR817); 1M, Mudgee, 149.58°E, 32.60°S, 1 Dec, 1994, Trudgett, (AM KS 42638, BJR770); 1M, Bimbadeen Lookout, SW Cessnock, under bark, 150.33°E, 32.83°S, 21 Apr, 1990, D. Hirst, (SAM NN22377, BJR550); 1F, Yengo NP nr Finchly Trig, 150.85°E, 32.98°S, 1 Nov, 1997, A. White, (AM KS 51377, BJR699); 1 imm., Mullion State Forest, N of Orange, under bark, 149.13°E, 33.18°S, 16 Oct, 1999, M. Gray & G. Milledge, hand, (AM KS 59181, BJR728); 1M, Mullion State Forest, N of Orange, under bark, 149.13°E, 33.18°S, 16 Oct, 1999, M. Gray & G. Milledge, hand, (AM KS 59178, BJR720); 1F, Mullion State Forest, N of Orange, 149.13°E, 33.18°S, 16 Oct, 1999, M. Gray & G. Milledge, (AM KS 59177, BJR747); 1M, 4F, The Battery Picnic Area, SE of Merriwa., under bark, 150.45°E, 33.20°S, 11 Jun, 2001, M. Gray, G. Milledge & H. Smith, hand, (AM KS 75051, BJR782); 2M, 1F, Tarana, 149.92°E, 33.53°S, 24 Apr, 1968, R.E. Mascord, (AM KS 18277, BJR682); 1M, 1F, Tarana, 149.92°E, 33.53°S, 23 Apr, 1966, R.E. Mascord, (AM KS 18943, BJR681); 1F, Frazer Res Wahroonga, 151.13°E, 33.72°S, 11 Oct, 1996, J. Noble, (AM KS 56505, BJR750); 1F, Frazer Res Wahroonga, 151.13°E, 33.72°S, 11 Oct, 1996, J. Noble, (AM KS56503, BJR791); 1F, Frazer Res Wahroonga, 151.13°E, 33.72°S, 25 Sep, 1996, J Noble, (AM KS 56504, BJR745); 1F, Waitara, 151.10°E, 33.72°S, 20 Sep, 1996, J. Noble, (AM KS 50231, BJR780); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 24 Oct, 1996, J. Noble, (AM KS 58508, BJR734); 1F, Conimbla NP, Wallaby Picnic Area, 148.43°E, 33.78°S, 14 Mar, 2002, G. Milledge & H. Smith, (AM KS 76349, BJR794); 1F, Lane Cove, 151.17°E, 33.82°S, 10 May, 1966, R.E. Mascord, (AM KS 31690, BJR754); 1F, Beecroft, 151.07°E, 33.75°S, 12 May, 1993, J. Noble, (AM KS 54052, BJR696); 1F, Beecroft, 151.07°E, 33.75°S, 12 Jul, 1993, J. Noble, (AM KS 54053, BJR704); 1M, 1F, Enfield, 151.10°E, 33.88°S, 1 Sep, 1903, E.P. Ramsay, (AM KS 22259, BJR692); 1F, Boyd Plateau Luther's Swamp, 150.13°E, 33.98°S, 6 Sep, 1972, M.R. Gray, (AM KS 17862, BJR688); 1F, Camden, 150.70°E, 34.05°S, 1 May, 1968, M. Gray, (AM KS 749, BJR570); 1F, Waterfall, 151.00°E, 34.13°S, 8 Dec, 1967, (AM KS 18284, BJR685); 1F, Helensburg, 151.00°E, 34.18°S, 25 Sep, 1966, R.E. Mascord, (AM KS 18988, BJR683); 1F, Mittagong, 150.45°E, 34.45°S, 1 Aug, 1959, P. Rainbird, (AM KS 48874, BJR746); 1F, Jamberoo, 150.78°E, 34.65°S, 30 Dec, 1992, J. Noble, (AM KS 58546, BJR751); 1F, 17km NE Narrandera, 146.68°E, 34.65°S, 13 Apr, 1983, J.T. Doyen, (ANIC 42 000308, BJR438); 1M, 1F, Gerringong, 150.83°E, 34.73°S, 13 Mar, 1997, G. Wishart, (AM KS 50105, BJR753); 1F, Harley Hill 6km E of Berry, 150.77°E, 34.77°S, 25 Nov, 1997, G. Wishart, (AM KS 51328, BJR703); 1M, 1F, 2 imm., Harley Hill, nr Gerringong, 150.77°E, 34.77°S, 21 Aug, 1999,G Wishart, (AM KS 65915, BJR799); 1F, Berry, 150.70°E, 34.78°S, 28 Aug, 1966, R.E. Mascord, (AM KS 18945, BJR674); 1M, 2F, Pickwick Farm, S of Gunning, 149.27°E, 34.78°S, 1 Dec, 1999, M. Zabka & M. Gray, (AM KS 65912, BJR787); 4M, 6F, Pickwick Farm, S of Gunning, woodland, under bark, 149.27°E, 34.78°S, 12 Dec, 1999,M Zabka, (AM KS 65910, BJR776); 1F, 1 imm., Murrumbateman, 149.03°E, 34.97°S, 6 Mar, 1977, R. Moran, (ANIC 42 000288, BJR425); 1M, 3F, Jervis

Bay, 150.73°E, 35.05°S, 28 Oct, 2002, M. Zabka & G. Wishart, (AM KS 81350, BJR673); 2F, 1 imm., 10km S of Wagga Wagga, nr Collorboralli Creek, under bark, 147.33°E, 35.25°S, 18 Apr, 1993, C.A. Car, (WAM T66949, BJR499); 2F, E bank Murray River nr Swan Hill, under bark, 143.57°E, 35.33°S, 30 Nov, 2002, M.S. Harvey, M.E. Bosfelds, (WAM T66948, BJR494); 1F, Albury, 146.90°E, 36.05°S, 28 Sep, 1958, R.V. Southcott, (SAM NN22391, BJR557); 1M, Frying Pan, Cooma, 149.13°E, 36.23°S, 12 Aug, 1998, J Noble, (AM KS 51659, BJR708); 1M, Frying Pan, Cooma, 149.13°E, 36.23°S, 11 Jan, 1995, J Noble, (AM KS 56542, BJR727); 1M, Frying Pan, Cooma, 149.13°E, 36.23°S, 12 Aug, 1994, J Noble, (AM KS 56544, BJR735); 1F, Frying Pan, Cooma, 149.13°E, 36.23°S, 12 Aug, 1994, J. Noble, (AM KS 56541, BJR716); 1M, Frying Pan, Cooma, 149.13°E, 36.23°S, 12 Jul, 1993, J. Noble, (AM KS 56549, BJR729); 1M, Frying Pan, Cooma, 149.13°E, 36.23°S, 12 Aug, 1994, J. Noble, (AM KS 56548, BJR736); 1F Frying Pan, Cooma, 149.13°E, 36.23°S, 12 Aug, 1994, J. Noble, (AM KS 56545, BJR749); 1F, Frying Pan, Cooma, 149.13°E, 36.23°S, 12 Mar, 1992, J. Noble, (AM KS 58569, BJR755); 1F, Frying Pan, Cooma, 149.13°E, 36.23°S, 12 Mar, 1992, J. Noble, (AM KS 58568, BJR757); 1F, Frying Pan, Cooma, 149.13°E, 36.23°S, 18 Dec, 1991, J. Noble, (AM KS 56443, BJR758); 1F, Frying Pan, Cooma, 149.13°E, 36.23°S, 12 Mar, 1992, J. Noble, (AM KS 58567, BJR759); 1F Frying Pan, Cooma, 149.13°E, 36.23°S, 12 Aug, 1994, J. Noble, (AM KS 56543, BJR762); 1F, Frying Pan, Cooma, 149.13°E, 36.23°S, 12 Mar, 1992, J. Noble, (AM KS 58565, BJR763); 1F, Frying Pan, Cooma, 149.13°E, 36.23°S, 12 Jul, 1993, J. Noble, (AM KS 56495, BJR765); 1F, Frying Pan, Cooma, 149.13°E, 36.23°S, 12 Mar, 1992, J. Noble, (AM KS 56452, BJR767); 1F, Frying Pan, Cooma, 149.13°E, 36.23°S, 12 Mar, 1992, J. Noble, (AM KS 56451, BJR768); 1F Frying Pan, Cooma, 149.13°E, 36.23°S, 12 Mar, 1992, J. Noble, (AM KS 58566, BJR769); 1F, Beecroft, 151.07°E, 33.75°S, 11 Jan, 1995, J. Noble, (AM KS 56546, BJR778); 1F, Frying Pan, Cooma, 149.13°E, 36.23°S, 12 Mar, 1993, J. Noble, (AM KS 56547, BJR785); 1F, Eurobodalla N.P., Mystery Bay. under bark, 150.12°E, 36.30°S, 26 Dec, 2004, G. Milledge, (AM KS 90904, BJR702); 1F, Bombala, 149.25°E, 36.92°S, 1929, Rev A.J. Barrett, (AM KS 19218, BJR684). **AUSTRALIAN CAPITAL TERRITORY:** 1 imm., Mulligans Flat Nature Reserve, ACT, Eucalyptus, under bark, 149.15°E, 35.20°S, 16 Feb, 2011, B.J. Richardson, bark stripping, (ANIC 42 001500, BJR1190); 2F, Black Mountain, 149.10°E, 35.27°S, 20 Aug, 1986, W. Rafferty, (ANIC 42 000293, BJR430); Canberra, 149.13°E, 35.30°S, 1960, E. McCallan, (ANIC 42 000291, BJR428); 1F, Northbourne Plantation, 149.13°E, 35.30°S, 15 Sep, 1933, W.J. Rafferty, (ANIC 42 000285, BJR422); 1F, 5km NE Piccadilly Circus, ACT, 148.80°E, 35.37°S, 1 Mar, 1982, D.C.F. Rentz, (ANIC 42 001125, BJR870); 1F, 10km W Cotter River, ACT, 148.73°E, 35.40°S, 10 Dec, 1987, M. Baehr, (QM S 73123, BJR945); 1M, Murrumbidgee River 3km Cotter River, 149.05°E, 35.43°S, 20 Dec, 1984, (QM S 73130, BJR927); 1F, 5km S Cotter River, 148.85°E, 35.45°S, 11 Dec, 1983, M. Baehr, (QM S 73125, BJR944); 2M, Canberra, 148.83°E, 35.57°S, 1929, G.F. Hill, (ANIC 42 000318, BJR501). **VICTORIA:** 1M, 1F, Campaspe River, N of Rochester, under bark, 144.68°E, 36.27°S, 23 May, 1988, D. Hirst, (SAM NN22385 6, BJR551); 2F, 40km E Tallangatta, Vict, Eucalyptus, 147.82°E, 36.28°S, 13 Nov, 1990, (QM S 73108, BJR941); 1F, 1 imm., Wangaratta, 146.32°E, 36.35°S, 29 May, 1963,E.F. Riek, (ANIC 42 000286, BJR423); 1F, 30km W Cooma, Eucalyptus, 144.72°E, 36.42°S, 11 Dec, 1990, (QM S 73131, BJR909); 1F, Dimboola, 142.72°E, 36.45°S, 25 May, 1988, D. Hirst, (SAM NN22378, BJR535); 1F, 5km W Gabsted, NW Myrtleford, Eucalyptus, 146.73°E, 36.57°S, 5 Dec, 1990, (QM S 73127, BJR920); 1M, 12km NNE Mansfield, 146.13°E, 36.95°S, 15 Dec, 1990, (QM S 73124, BJR946); 1F, Spring Vale, 144.90°E, 37.00°S, 11 May, 1965, R.V. Southcott, (SAM NN22389, BJR536); 1M, 1F, Deep Lead, 1km SW, under bark, 142.72°E, 37.00°S, 21 Jun, 1989, D. Hirst, (SAM NN22387 8, BJR541); 1F, 5km SW Eilden, 145.92°E, 37.23°S, 16 Dec, 1990, (QM S 73109, BJR948); 1F, Anakie Junction, 1km NW, Brisbane Ranges, under bark, 144.25°E, 37.88°S, 2 Jun, 1989, D. Hirst, (SAM NN22390, BJR539); 1M, 1F, Churchill, peridomestic, 146.45°E, 38.30°S, 28 Dec, 1992, R. de Sousa Daw, (SAM NN22381 2, BJR553); 1F, Churchill, peridomestic, 146.45°E, 38.30°S, 16 Nov, 1993, R. de Sousa Daw, (SAM NN22380, BJR516); **:** 2F, 2imm., Churchill, 146.45°E, 38.30°S, 7 Aug, 1999, R. de Sousa-Daw, (SAM NN22383-4, BJR552); 1M, 2F, Spring Creek, Torquay, 144.32°E, 38.33°S, 26 Dec, 1982, (ANIC 42 000289, BJR426); 1M, Billys Creek Section, Morwell Natl Park, 146.42°E, 38.35°S, 12 Apr, 2003, K. Harris, (SAM NN22379, BJR517); 1F, 17km E of Naringal, Eucalypts, under bark, 142.80°E, 38.42°S, 27 Aug, 1978,Parnaby, (AM KS 44483, BJR798); 1F, 6 imm., Separation Creek, 143.90°E, 38.63°S, 19 Sep, 1989, M.S. Harvey, M.E. Blosfelds, (WAM T66952, BJR498). **TASMANIA:** 1M, Forth Falls, 146.22°E, 41.38°S, 28 Dec, 1926, Hickman, (AM KS 31084, BJR800); 1M, Punch Bowl, 147.17°E, 41.45°S, 24 Aug, 1928, V.V.Hickman, (AM KS 31063, BJR801); 1F, West Darlington, Maria Is. 148.07°E, 42.58°S, 14 Apr, 1968, A.J. Dartnall, (TM J814, BJR1121); 1F, West Moonah, 147.28°E, 42.85°S, 27 Oct, 1988, Grade 6, Springfield Gardens P.S., (TM J2765, BJR1126); 1M, Carlton, S.E., 147.68°E, 42.87°S, 20 Jul,

1963, E. Aves, (TM J824, BJR1118); 2F, Hobart, 147.32°E, 42.88°S, 30 Dec, 1899, (TM J871, BJR1119); 1M, Hobart, 147.32°E, 42.88°S, 24 Jan, 1938, D.C. Pearse, (TM J832, BJR1120); 1F, Hill behind New Town, 147.23°E, 42.88°S, Nov, 1938 G. Brownell, (TM J845, BJR1124); 1F, Domain, Hobart, 147.32°E, 42.88°S, 15 Oct, 1962, J..F. Greenhill, (TM J870, BJR1125); 1F, Roches Beach, 147.50°E, 42.90°S, Jul, 1977, E. Turner, (TM J1280, BJR1117); 1F, Sloping Main, S.E. , 147.68°E, 42.98°S, 29 Apr, 1965, E. Aves, (TM J507, BJR1123). **SOUTH AUSTRALIA:** 2M, 2F, Lock 4, Murray River, under bark, 140.57°E, 34.33°S, 18 May, 1964,G.F. Gross, (SAM NN22363 6, BJR554); 3F, 3.8km NW Keyneton, under bark, 139.10°E, 34.53°S, 27 Dec, 2002, M.S. Harvey, M.E. Bosfelds, (WAM T66942, BJR482); 2M, Para Hills, 138.65°E, 34.80°S, 11 Sep, 1975, G. Crook, (SAM NN22331-7A, BJR514.1); 1F, Tea Tree Gully, 138.72°E, 34.82°S, 30 Dec, 1899, C. Bain, (SAM NN22339, BJR504); 1F, 1 imm., Millbrook Reservoir, 138.82°E, 34.82, 7 Mar, 2002°S, D. Hirst, J. Cox, (SAM NN22376, BJR522); 1M, Tea Tree Gully, 138.72°E, 34.82°S, 1 Jun, 1958, J. Walsh, (SAM NN22338, BJR545); 1F, Chain of Ponds, now Kangaroo Creek, under bark, 138.83°E, 34.82°S, 30 Jun, 1985, JJJ Szent Ivany, (SAM NN22347, BJR523); 1M, Blair Athol, Adelaide, 138.58°E, 34.85°S, May, 1987, J.A. Kairl, (SAM NN22330, BJR511); 1F, Norwood, 138.63°E, 34.92°S, 14 Mar, 1967, R. Briggs, (SAM NN22328, BJR510); 1F, Norwood, 138.63°E, 34.92°S, 18 Aug, 1967, R. Briggs, (SAM NN22329, BJR513); 2F, Norton Summit, 138.72°E, 34.92°S, Apr, 1967, R. Briggs, (SAM NN22345-6, BJR540); 14F, Adelaide Parklands, nr Dulwich, 138.62°E, 34.93°S, 7 Oct, 1975, G. Cook, P. Christie, (SAM NN22306-19, BJR505); 1F, 1 imm., Hazelwood Park, Adelaide, 138.65°E, 34.93°S, Jul, 1990, H. Mincham, (SAM NN2815, BJR538); 1M, Adelaide Parklands, nr Dulwich, 138.62°E, 34.93°S, 19 Oct, 1975, G. Crook, (SAM NN22304, BJR548); 1M, Adelaide Parklands, nr Dulwich, on flowering plants, 138.62°E, 34.93°S, 14 Sep, 1975, G. Crook, (SAM NN22305, BJR520); 1F, 1 imm., Waite Institute, Netherby, 138.62°E, 34.97°S, 23 Sep, 1975, R. Cook, (SAM NN22323, BJR503); 2F, Waite Institute, Netherby, 138.62°E, 34.97°S, 24 Sep, 1975, R. Cook, (SAM NN22321-2, BJR509); 1F, Waite Institute, Netherby, 138.62°E, 34.97°S, 10 Mar, 1977, R. Cook, (SAM NN22327, BJR524); 2M, 1F, Waite Institute, Netherby, 138.62°E, 34.97°S, 5 Dec, 1975, R. Cook, (SAM NN22324-5, BJR525); 1F, Waite Institute, Netherby, 138.62°E, 34.97°S, 8 Dec, 1975, R. Cook, (SAM NN22326, BJR530); 1F, Waite Institute, Netherby, 138.62°E, 34.97°S, 9 Feb, 1936, H. Womersley, (SAM NN22320, BJR531); 1M, 2 imm., Blackwood, 138.62°E, 35.02°S, 15 May, 1935,H. Womersley, (SAM NN22353, BJR526); 1M, Mylor, 138.77°E, 35.05°S, 11 Feb, 1979, (QM S 73085, BJR900); 1M, Mylor, 138.77°E, 35.05°S, 11 Feb, 1979, A. Austin, (QM S 73092, BJR929); Mylor 5km S of, 138.77°E, 35.05°S, 14 Dec, 1980, A.D. Austin, (AM KS 10546, BJR686); 1F, Belair National Park, 138.65°E, 35.03°S,, Jan, 1936, H. Womersley, (SAM NN22352, BJR519); 1F, Mylor, 138.77°E, 35.05°S, 18 Nov, 1994, A. Austin, (QM S 73090, BJR921); 1M, Mylor, 138.77°E, 35.05°S, 11 Feb, 1979, (QM S 73091, BJR939); 2M, 21F, 6 imm., Mylor 5km S of, 138.77°E, 35.05°S, 14 Dec, 1980, A.D. Austin, (AM KS 10546, BJR686); 1F, Kanmantoo, on tree trunk, 139.00°E, 35.07°S, 4 Oct, 1975, L. Davis, (SAM NN22362, BJR521); 1F, Clarendon, under bark, 138.63°E, 35.12°S, 26 Nov, 1978, A.F. Lees, (SAM NN22348, BJR534); 1F, Wistow, Klenka Rd, 136.93°E, 35.13°S, 5 Nov, 2003, M.S. Harvey, (WAM T66946, BJR490); 1F, 1 imm., Wirra Wirra, 138.60°E, 35.23°S, 19 Sep, 1999, Waterhouse Club, (SAM NN22350, BJR502); 1F, Langhome Creek, 139.03°E, 35.30°S, Dec, 1979, C Wilson, (SAM NN22360, BJR528); 1F, 1 imm., Currency Creek°138.75°E, 35.43°S, 20 May, 1986, D.C. Lee, (SAM NN22349, BJR533); 2M, 2F, 2 imm., Second Valley, under bark, 138.23°E, 35.53°S, 2 Aug, 1992, J.M. Waldock, (WAM T66944, BJR488); 1M, Waterfall Creek, Western River, Conservation Park, Kangaroo Is, 136.90°E, 35.70°S, 4 Nov, 1987, D. Hirst, (SAM NN22370, BJR506); 1F, Cape Torrens Cons Park, 1km S Kangaroo Is, 136.72°E, 35.72°S, 4 Nov, 1990, E.G. Matthews, J.A. Forrest, (SAM NN22371, BJR532); 1F, Flinders Chase N.P. Kangaroo Is, 136.55°E, 35.88°S, 5 Oct, 1994, C. Graham, (SAM NN22374, BJR556); 1F, Kangaroo Is., 137.33°E, 35.92°S, Oct, 1925, (SAM NN22369, BJR515); 1M, 1 imm., Rocky River camping area, Flinders Chase N.P., Kangaroo IS, under bark, 136.73°E, 35.93°S, 8 Nov, 1987, D. Hirst, (SAM NN22373, BJR537); 1F, Rocky River camping area, Flinders Chase N.P., Kangaroo IS, under bark, 136.73°E, 35.93°S, 7 Nov, 1987, D. Hirst, (SAM NN22372, BJR549); 1F, 1M, Naracoorte, 140.73°E, 36.95°S, 18 Nov, 1978, E.G. Matthews, (SAM NN22354 5, BJR507); 1M, 1km W Vic/SA border, Dukes Hwy, 140.93°E, 36.38°S, 7 Aug, 1980, M.S. Harvey, (WAM T66941, BJR489); 1F, Dingley Dell Natl Pleasure Resort, under bark, 140.68°E, 38.03°S, 22 Apr, 1979, D.C. Lee, (SAM NN22357, BJR518). **WESTERN AUSTRALIA:** 1F, Wheatley, Donnelly R Pool, 115.93°E, 34.08°S, 6 Jan, 1990, J.M. Waldock, (WAM T66939, BJR479); 1M, 1F. 7imm., Mount Barker, 117.67°E, 34.63°S, 1 May, 1992, P. Man, (WAM T66919, BJR465); 1F, Dog pool on Shannon River, 116.37°E, 34.77°S, 27 Apr, 1992, M.S. Harvey, J.M. Waldock, (WAM T66902, BJR468); 1F, 7km N of South Coast Highway, 117.37°E, 34.93°S, 26 Apr, 1992, M.S. Harvey, J.M. Waldock, (WAM T66935, BJR476);

1F, Denmark, 117.35°E, 34.95°S, 15 Dec, 1976, S.J. Curry, (WAM T66900, BJR474); 1F, Walpole, 116.73°E, 34.98°S, 26 Apr, 1978, S.J. Curry, (WAM T66938, BJR477); 1F, 10km SW of Walpole, 116.65°E, 35.05°S, 1 Dec. 1997, B. & M. Baehr, (QM S 73110, BJR899).

Diagnosis. A large species (CL> 2.9mm), with a very short fertilization duct. It can be separated from the smaller *S. villosa* by size, position of the origin of the embolus and the size and position of the accessory gland on the insemination duct, and the shape of abdominal markings. It can be separated from *S. zabkai* by the position of the smaller gland, which is placed terminally or subterminally on the anterior edge of the insemination duct. The insemination duct approaches the anterior edge of the epigynum, while it is nearer the centre of the epigynum in *S. zabkai*. The abdomen is cream to dark brown with highly variable ginger, through brown, to black markings. The distinctive dorsal central marking on the abdomen is shaped with shorter thicker arms than in *S. villosa*. COI sequence differs by <2% from GenBank accessions JF949734-39, JF949749 and JF949751 and by >4% from all other species.

Description. Male: Cephalothorax mid to dark orange with scattered pennate grey hairs over dorsal and lateral surfaces. Integument surrounding ALE, PME and PLE black with scattered grey hairs. Clypeus narrow, with long sparse fringe of grey hairs. Chelicerae geniculate, light to dark tan with median sparse fringe of long grey hairs. Blunt toothlike protuberance projecting forwards, three large fused promarginal teeth and one large straight fissident retromarginal tooth. Endites and labium dark brown grading to yellow. Sternum yellow to orange. Dorsal abdomen yellow to light brown with variable orange to dark brown or black pattern. Spinnerets yellow to brown. Ventral abdomen same colour as dorsal surface with faint darker median patch. Palps mid brown. L1 and L2 darker brown and more robust than L3 and L4, tibia and tarsus of L1 and L2 sparsely fringed. L3 and L4 femora with three transverse darker stripes. *Palp*: brown, tibia with single narrow apophysis. Tegulum relatively broad with anterior lateral lobe and a proximal lobe, origin of the embolus distal, forming a tapering single anticlockwise spiral around the bulb. Dimensions*:* CL 3.60±0.11 (20) 2.91–4.77, EFL 1.39±0.04 (20) 1.11–1.73, CW 2.88±0.10 (20) 2.30–3.59, AEW 2.28±0.05 (20) 1.92–2.72, AMEW 1.27±0.03 (20) 1.05–1.55, PEW 2.21±0.05 (20) 1.86–2.60, AL 3.86±0.12 (12) 3.22–4.58, P1+T 1 3.49±013 (20) 2.48–4.40.

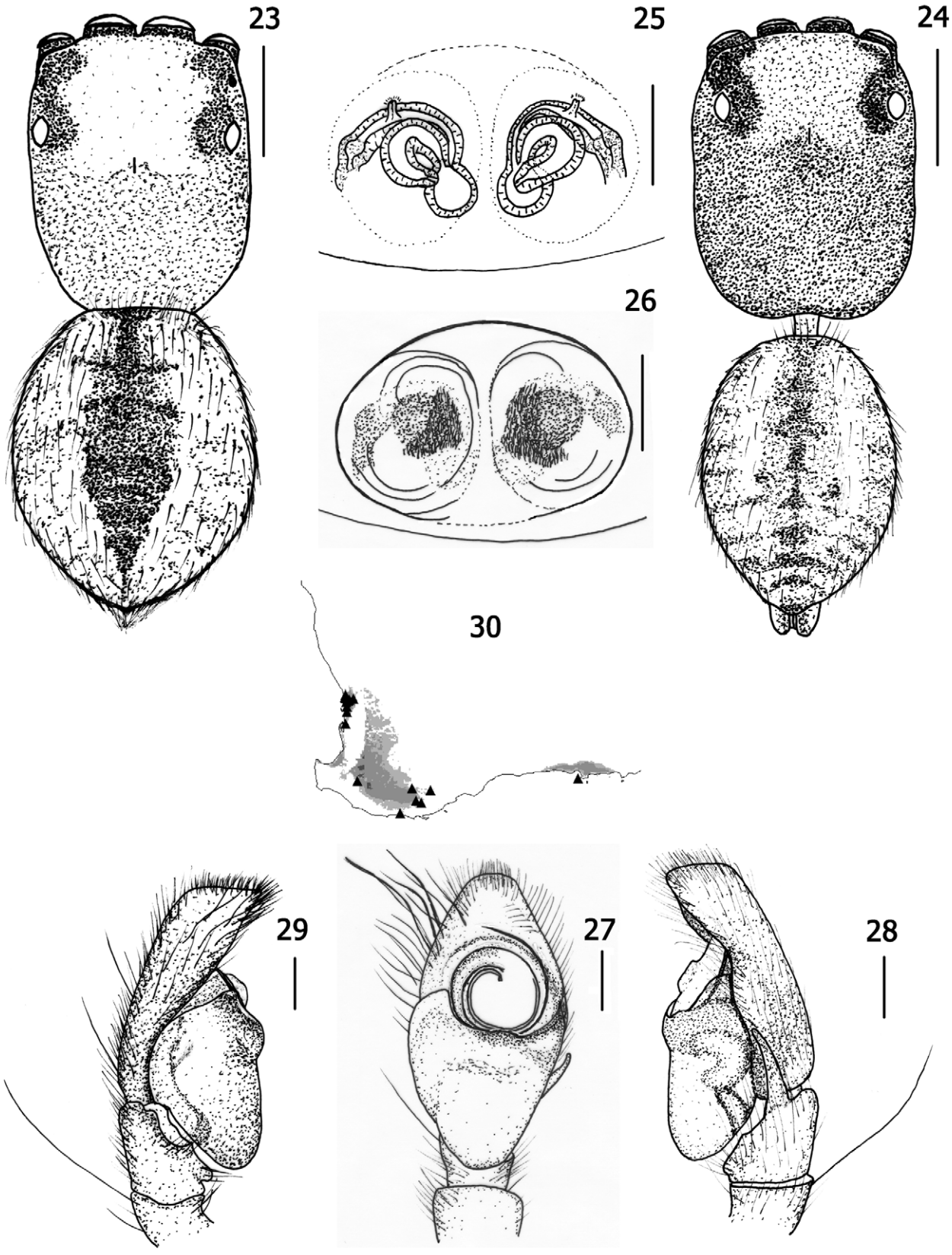
Female. Cephalothorax yellow to dark orange, lower margin grading to dark brown, pars cephalica darker than pars thoracica. Integument surrounding ALE, PME and PLE black, sides with light grey hairs, scattered on the upper surface, thicker behind the PLE and on the rear surfaces. Clypeus narrow with light grey fringe of scattered hairs. Chelicerae geniculate, mid orange, with two promarginal teeth on a single base and a single, large, fissident, retromarginal tooth. Endites and labium orange grading to yellow. Sternum orange. Dorsal abdomen yellow with variable dark brown to black pattern. Spinnerets mid brown. Ventral abdomen same colour as dorsal surface with dark brown median patch. Palps mid brown. L1, L2, L3 and L4 similar sizes but grading in robustness. Legs mid brown, femur with three dark brown transverse dark bands, patella with a single transverse band, tibia with two transverse dark bands, metatarsus with two transverse bands and tarsus with a single transverse band. All bands vary in intensity between specimens. *Epigynum*: consisting of two large fossae and a lightly sclerotised margin. Rarely, a faint brown patch varying in shape is found in the middle of each fossa. Guides weakly formed and varying greatly in shape and depth. Copulatory openings indistinct. Accessory gland on the anterior edge of the insemination duct and placed either terminally or subterminally,. Insemination ducts pass laterally across the anterior part of the fossa to the mid line and then move posteriorly until entering the spermatheca on the mid line. Spermatheca large, rounded and within the margin of the fossa close to the posterior edge. Right and left insemination ducts in contact. Fertilization duct short, indistinguishable externally. *Dimensions:* CL 3.54±0.04 (55) 2.97–4.27, EFL 1.42±0.01 (54) 1.18–1.61, CW 2.81±0.03 (53) 2.29–3.34, AEW 2.28±0.02 (54) 1.98–2.54, AMEW 1.24±0.01 (54) 1.11–1.49, PEW 2.20±0.02 (54) 1.92–2.48, AL 4.58±0.13 (41) 3.41–6.19, P1+T1 2.50±0.05 (52) 1.98–2.97.

Distribution and biology. Found in temperate regions throughout Australia (Fig. 14). Does not extend as far inland in WA as predicted. Nocturnal, found under bark in eucalypt forest and woodlands. Likely IUCN Red List Category LC

***Servaea melaina* n.sp.**

Figs 23–29

Etymology. From μελας =dark, referring to an easily discernable difference from *S. spinibarbis*.



FIGURES 23–30. *Servaea melaina* n. sp. 23–24 dorsal view (23 female, 24 male); 25–26 female genitalia (25 dorsal view of cleared specimen, 26 ventral view of external characteristics); 27–29 male palp (27 ventral view, 28 anterior lateral view, 29 posterior lateral view); 30 known and predicted distribution. Scale: total body 1 mm; remainder 0.2 mm

Remarks.

Type material. Holotype: 1F, Mount Barker, WA, 117.67°E, 34.63°S, 1 May, 1992, P.J. Mann, (WAM T100348, BJR465A).

Paratype: 1M, Mount Barker, 19 Osborne Rd, WA, peridomestic, 117.67°E, 34.63°S, Dec, 1992, P.J. Mann, (WAM, T66917, BJR440); 1M, Mount Barker, 19 Osborne Rd, WA, 117.67°E, 34.63°S, Dec, 1992, P.J. Mann, (WAM, T66918, BJR443).

Other material examined. WESTERN AUSTRALIA: 1M, Pinnaroo Valley Memorial Park, 115.77°E, 31.80°S, 1 Aug, 1993, D. Leary, (WAM T66932, BJR460); 1F, Trigg, 115.75°E, 31.87°S, 6 Sep, 1988, D. Knowles, (WAM, T66937, BJR483); 1M, Trigg, 115.75°E, 31.87°S, 6 Sep, 1988, D. Knowles, (WAM, T66936, BJR484); 1F, Karrinyup Shopping Centre, 115.77°E, 31.88°S, 28 Aug, 1992, J. Waldock, (WAM, T66907, BJR451); 1M, East Guildford, 28 Swan St, 115.98°E, 31.90°S, 8 Sep, 1999, P. Vinnicombe, G.W. Kendrick, (WAM, T66903, BJR475); 1F, Mount Lawley, 115.87°E, 31.92°S, 30 Nov, 1986, J. Waldock, D. Terry, (WAM, T66920, BJR445); 1F, Maylands, peridomestic, 115.88°E, 31.93°S, 17 Feb, 1990, J. Waldock, (WAM, T66910, BJR439); 1M, Perth, outside Museum, 115.85°E, 31.95°S, 11 Oct, 1999, M.S. Harvey, J.M. Waldock, (WAM T66933, BJR485); 1F, Nedlands, Edward St, 115.80°E, 31.98°S, 27 Nov, 1996, A. Baynes, (WAM, T66922, BJR452); 1F, Nedlands, Edward St, 115.80°E, 31.98°S, 17 Dec, 1990, A. Baynes, (WAM, T66924, BJR456); 1F, Nedlands, Edward St, 115.80°E, 31.98°S, 26 Sep, 1991, A. Baynes, (WAM, T66923, BJR459); 1M, Yangebup, 115.82°E, 32.12°S, 22 Aug, 1996, D. Mead-Hunter, (WAM, T66940, BJR486); 1M, Parmelia, 115.82°E, 32.25°S, 11 Oct, 1986, A.E. de Jong, (WAM, T66925, BJR463); 1M, Parmelia, 115.82°E, 32.25°S, 11 Sept, 1996, A.E. de Jong, (WAM, T66929, BJR457); 1M, Parmelia, 115.82°E, 32.25°S, 11 Sep, 1989, A.E. de Jong, (WAM, T66927, BJR462); 1M, Parmelia, 115.82°E, 32.25°S, 26 May, 1997, A.E. de Jong, (WAM, T66930, BJR461); 1M, Parmelia, 115.82°E, 32.25°S, 6 Nov, 1990, A.E. de Jong, (WAM, T66928, BJR455); 1M, Furnissdale, SE Mandurah, 115.77°E, 32.57°S, 24 Aug, 1991, F.H. Uther Baker, (WAM, T66904, BJR467); 2F, Sandy Hook Is, Recherche Archipelago, Litter, 122°E, 34.03°S, 16 Nov, 1998, J..M. Waldock, (WAM, T66934, BJR478); 1M, Mockerdillup Rd, 15km SW Bridgetown, 116.10°E, 34.10°S, 11 Dec, 1986, D. Terry, (WAM, T66912, BJR447); 1M, Mockerdillup Rd, 15km SW Bridgetown, 116.10°E, 34.10°S, 1 Nov, 1986, J. Waldock, D.Terry, (WAM, T66911, BJR449); 2F, 1km N Boyup/Franklin Rds jn, W of Cranbrook, 117.55°E, 34.30°S, 18 Nov, 1992, A.F. Longbottom, (WAM, T66899, BJR464); 1M, 1 imm, Stirling Range N.P., Stirling Range Rd, Open woodland, 118.05°E, 34.35°S, 3 Nov, 2003, R. Oberprieler, (ANIC, 42 001480, BJR1173); 2F, 1 imm, Mount Barker/Porogurups Rd, 117.80°E, 34.68°S, 16 Feb, 1993, A.F. Longbottom, (WAM, T66916, BJR473); 1M, 6.5 miles W of Denmark, 117.23°E, 34.97°S, 29 Dec, 1962, J. Crawley, (WAM, T66901, BJR472).

Diagnosis. It can be differentiated from *S. incana*, *S. villosa* and *S. zabkai* as the fertilization duct is large and long and is visible externally as a deep red mass in the centre of the fossa and by the presence of a median gap between right and left insemination ducts. It differs from *S. narraweena* as the insemination duct crosses the middle of the epigynum and enters the spermatheca on the anterior edge and from *S. spinibarbis* as the chelicerae are black or dark brown rather than light brown, L1 is long (P1+T1 more than 90% of CL) rather than short (P1+T1 less than 80% of CL), the bulb is narrower than the palp and the accessory gland is towards the middle of the insemination duct rather than terminal or sub-terminal.

Description. Male: Cephalothorax dark orange covered with pennate grey hairs over dorsal surface and lateral surfaces. Integument surrounding ALE, PME and PLE, black with thick covering of grey hairs. Clypeus narrow, with long sparse fringe of grey hairs. Chelicerae geniculate, black grading distally to dark tan. A toothlike protuberance, projecting forwards off a tubercle on the anterior face of each chelicera, three large promarginal teeth on a single pediment and one large straight fissident retromarginal tooth. Endites dark tan grading to yellow with a protuberance on the distal edge. Labium black and sternum mid brown. Abdomen without a central anterior cleft, mid brown with dark brown mid line stripe and patterning that stretches to the margins. Ventral abdomen same colour as dorsal surface of the abdomen on the sides with a darker median stripe and with scattered white patches of guanine. Spinnerets mid brown. L1 and L2 more robust than L3 and L4. All femoras, patellae, tibiae yellow, tarsi and metatarsi mid brown without fringing.. L3 and L4 femora with three transverse darker stripes, L1 and L2 plane. *Palp*: brown, tibia with single fine apophysis. Tegulum relatively broad with anterior lateral lobe and a proximal lobe, origin of the embolus distal, forming a tapering single anticlockwise spiral around the bulb. Dimensions: CL 2.65±0.05 (12) 2.35–2.91, EFL 1.05±0.03 (12) 0.87–1.24, CW 2.05±0.04 (12) 1.80–2.29, AEW 1.85±0.04 (12) 1.67–2.04 AMEW 1.04±0.02 (12) 0.93–1.11, PEW 1.81±0.04 (12) 1.61–2.04, P1+T1 2. 74±0.10 (11) 2.17–3.22.

Female (Holotype): Cephalothorax dark orange covered with pennate grey hairs over dorsal surface and lateral surfaces. Integument surrounding ALE, PME and PLE, black with thick covering of grey hairs. Clypeus narrow, with long sparse fringe of grey hairs. Chelicerae geniculate, black grading distally to dark tan with four promarginal teeth on a single base and a single, large, fissident, retromarginal tooth but no protuberance on the front face. Endites and labium mid brown. Sternum yellow. Abdomen without a central anterior cleft, mid brown with dark brown mid line stripe of variable intensity and patterning that stretches to the margins. Ventral abdomen same colour as dorsal surface of the abdomen on the sides with a darker median stripe. Spinnerets mid brown. Ventral abdomen same colour as dorsal surface of the abdomen on the sides with a darker median stripe and with scattered white patches of guanine. Palps yellow. L1, L2 and L3 similar sizes with a slender build. L4 similar but longer. Legs yellow grading distally to mid brown, femur without three dark brown transverse bands, patella with a single transverse brown band, tibia with two transverse brown bands, metatarsus with two transverse bands and tarsus with a single transverse band. *Epigynum*: consisting of two large fossae and a sclerotised margin. A distinct brown patch varying in shape is found in the middle of each fossa. Guides and copulatory openings indistinct. Accessory gland either terminally or in the distal third, on the dorsal surface of the insemination duct. Insemination duct passes laterally across the middle of the fossa to the mid line and then moves posteriorly until entering the spermatheca on the anterior mid line. Spermatheca small, rounded and within the margin of the fossa but at the posterior edge. Right and left spermatheca and insemination ducts well separated. The fertilization duct is large, arising from the ventral anterior edge of the spermatheca and curving dorsally in an incomplete circle (Fig. 25). *Dimensions*: Holotype, CL 2.85, EFL 1.11, CW 2.23, AEW 1.86, AMEW 0.99, PEW 1.91, AL 3.10, L1 4.76 (1.42+0.80+0.99+0.0.99+0.56), L2 4.20 (1.30+0.74+0.93+0.0.80+0.43), L3 4.45 (1.61+0.80+0.87+0.74+0.43), L4 5.38 (1.73+0.80+1.05+1.30+0.50): General, CL 2.58±0.07 (9) 2.32–2.97, EFL 1.07±0.02 (9) 0.93–1.18, CW 2.08±0.05 (9) 1.86–2.35, AEW 1.82±0.03 (9) 1.67–1.98, AMEW 1.05±0.02 (9) 0.99–1.11, PEW 1.89±0.04 (9) 1.67–2.04, P1+T1 1.90±0.05 (9) 1.67–2.20.

Distribution and biology. Found in south-western Australia (Fig. 30) on non-sandy soils, surprisingly also found in the Swan River valley sympatric with *S. spinibarbis*. Found under bark in eucalypt forest and woodlands. Likely IUCN Red List Category LC.

***Servaea narraweena* n. sp.**
Figs 31–37

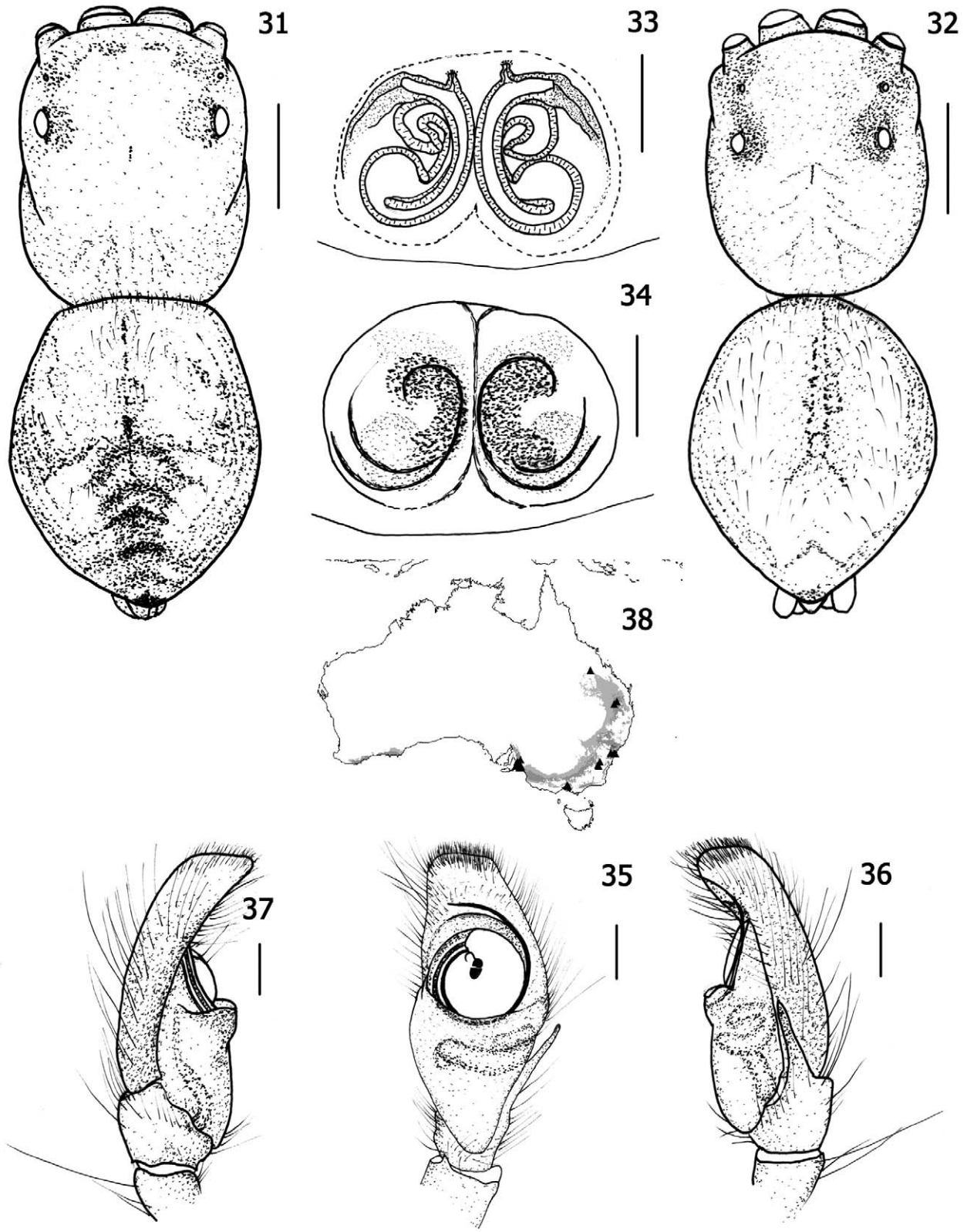
Etymology. An arbitrary combination of letters.

Remarks. On the basis of the structure of its genitalia and its size, the syntype of *S. vestita* from Peak Downs is an example of this species.

Type material. Holotype: 1F, Narraweena, NSW, 149.22°E, 35.5°S, 20 Feb, 1990, EP Small, (AM, KS 30889A, BJR760)

Paratypes: 1M, Pickwick Farm, S of Gunning, 149.27°E, 34.78°S, 1 Dec, 1999, M Zabka & M Gray, (AM KS 65912A BJR787.1); 2F, 4 imm, Narraweena, NSW, 149.22°E, 35.5°S, 20 Feb, 1990, EP Small, (AM, KS 30889, BJR760) 1F, 13 imm, Narraweena, NSW, 149.22°E, 35.5°S, 20 Feb, 1990, EP Small, (AM, KS 30890, BJR739)

Other material examined. QUEENSLAND: 1F, Peak Downs, 148.08°E, 22.93°S, (ZMH, BJR1183: formerly a syntype of *S. vestita*); 1M, 10 km NE Kaimkillenbun NE Dalby, Qld, 151.50°E, 27.00°S, 6 Nov, 1990, (QM, S 73121, BJR930); 1F, Lake Broadwater, Qld, 151.10°E, 27.35°S, Aug, 1986, E. Zillman, (QM, S 73095, BJR904); 2M, 7F, 8 imm, Lake Broadwater, Qld, 151.10°E, 27.35°S, 28 Jul, 1982, M. Bennie, (QM, S 61147, BJR917); 2F, Lake Broadwater, Qld, 151.10°E, 27.35°S, 28 Jul, 1982, M. Bennie, (QM, S 61147, BJR917.2). **NEW SOUTH WALES:** 1M, 2 imm, Agnes Banks, 150.68°E, 33.62°S, 19 Sep, 1965, RE Mascord, (AM, KS 18940, BJR690); 1M, Frazer Res Wahroonga, 151.13°E, 33.72°S, 8 Oct, 1996, J Noble, (AM, KS 56507, BJR773);. **AUSTRALIAN CAPITAL TERRITORY:** 1F Ginninderra Experimental Orchard, ACT, 149.03°S, 35.22°E, 30 Jan, 1965, (ANIC, 42 000290, BJR427); 1F, Westwood, Canberra, ACT, 149.13°E, 35.30°S, 5 Mar, 1972, E. MacCallan, (QM, S 73093, BJR928). **VICTORIA:** 1F, Bundoora, La Trobe University, Acacia, 145.07°E, 37.70°S, 19 Sep, 1981, (QM, S 61146, BJR919); 1M, Clayton, Monash University, Vic, Peridomestic, 145.13°E, 37.92°S, 19 Oct, 1980, M.S. Harvey, (WAM, T66950, BJR493). **SOUTH AUSTRALIA:** 2F, Maculta, nr Angaston, SA, On tree trunk, 139.05°E, 34.5°S, 9 Jul, 1979, D.I. Lang, (SAM, NN223678, BJR529); 1M, 5F,



FIGURES 31–38. *Servaea narraweena* n. sp. 31–32 dorsal view (31 female, 32 male); 33–34 female genitalia (33 dorsal view of cleared specimen, 34 ventral view of external characteristics); 35–37 male palp (35 ventral view, 36 anterior lateral view, 37 posterior lateral view); 38 known and predicted distribution. Scale: total body 1 mm; remainder 0.2 mm.

Para Hills, SA, on flowering plants, 138.65°E, 34.80°S, 11 Sep, 1975, G. Crook, (SAM, NN223317, BJR514); 1F, Uraidla, SA, 138.75°E, 34.95°S, 21 Dec, 1994, J.M. Waldock, (WAM, T66945, BJR495); 1F, Belair National Park, SA, 138.65°E, 35.03°S, 9 Feb, 1936, H. Womersley, (SAM, NN22351, BJR527); 1M, Aldinga Scrub Cons. Park,

SA, 138.48°E, 35.28°S, 16 Jun, 1987, E.G. Matthews, J.A. Forrest, (SAM, NN22340, BJR543); 1F, Nappyalla, SE Longhorn Creek, SA, 139.12°E, 35.33°S, Dec, 1992, J. Eckert, (SAM, NN22359, BJR546), 1F, 3 imm, Hindmarsh Is, Goolwa, SA, under bark, 138.87°E, 35.52°S, 7 Sep, 1975, A.F. Lees, Hilton, (SAM, NN22358, BJR547).

Diagnosis. It can be differentiated from *S. incana*, *S. villosa* and *S. zabkai* as fertilization duct is large and long and is visible externally as a deep red mass in the centre of the fossa and by the presence of a median gap between right and left insemination ducts. It can be differentiated from *S. melaina* and *S. spinibarbis* as the insemination duct approaches the anterior edge of the epigynum and enters the spermatheca towards the posterior edge.

Description. Male: Cephalothorax dark orange with scattered pennate grey hairs over dorsal surface and lateral surfaces. Integument surrounding ALE, PME and PLE, black with scattered grey hairs. Clypeus narrow, with long sparse fringe of grey hairs. Chelicerae geniculate, tan. No toothlike protuberance projecting forwards, four large fused promarginal teeth and one large straight fissident retromarginal tooth. Endites light brown grading to yellow with a slight protuberance on the distal edge. Labium brown and sternum orange. Abdomen with a central anterior cleft, cream with two dark brown parallel mid line stripes and associated patterning, striped pattern on the margins. Ventral abdomen same colour as dorsal surface of the abdomen on the sides with a darker median area. Spinnerets same colour as abdomen. L1 and L2 darker brown and more robust than L3 and L4, tibia and metatarsus sparsely fringed. L3 and L4 femora with three transverse darker stripes. *Palp*: brown, tibia with single slender apophysis. Tegulum relatively broad with anterior lateral lobe and a proximal lobe, origin of the embolus distal, forming a tapering single anticlockwise spiral around the bulb. Dimensions CL 2.52±0.05 (7) 2.35–2.66, EFL 1.00±0.03 (7) 0.87–1.11, CW 1.95±0.04 (7) 1.80–2.04, AEW 1.77±0.02 (7) 1.67–1.86, AMEW 1.00±0.01 (7) 0.93–1.05, PEW 1.72±0.03 (7) 1.61–1.80, P1+T1 2.49±0.08 (7) 2.17–2.72.

Female (Holotype): Cephalothorax dark orange, its lower margin grading to dark brown. Integument surrounding ALE, PME and PLE, black, covered with light grey hairs, scattered on the upper surface, thicker behind the PLE and on the rear surfaces. Clypeus narrow with light grey fringe of scattered hairs. Chelicerae geniculate, tan, with three promarginal teeth on a single base and a single, large, fissident, retromarginal tooth. Endites and labium mid brown grading to yellow. Sternum yellow. Dorsal abdomen yellow with variable brown pattern. Spinnerets mid brown. Ventral abdomen same colour as dorsal surface with dark brown median patch. Palps yellow grading distally to mid brown. L1, L2 and L3 similar sizes and finely built. L4 similar but longer. Legs yellow grading distally to mid brown, femur with three dark brown transverse dark bands, patella with a single transverse band, tibia with two transverse dark bands and metatarsus with two transverse bands and tarsus with a single transverse band. *Epigynum*: consisting of two large fossae and a lightly sclerotised margin. Rarely, a faint brown patch varying in shape is found in the middle of each fossa. Guides and copulatory openings indistinct. Accessory gland either terminally or in the distal third, on the dorsal surface of the insemination duct. Insemination duct passes laterally across the middle of the fossa to the mid line and then moves posteriorly until entering the spermatheca on the posterior mid line. Spermatheca small, rounded and within the margin of the fossa but at the posterior edge. Right and left spermatheca and insemination ducts often in contact. The fertilization duct is large, dark reddish-brown, arising from the ventral anterior edge of the spermatheca and curving in an incomplete circle below the ventral surface of the insemination duct before moving dorsally, clearly distinguishable externally. *Dimensions:* CL 2.58±0.07 (9) 2.33–2.97, EFL 1.07±0.02 (9) 0.93–1.18, CW 2.08±0.0.05 (9) 1.86–2.35, AEW 1.82±0.0.03 (9) 1.67–1.98, AMEW 1.05±0.02 (9) 0.99–1.11, PEW 1.89±0.04 (9) 1.67–2.04, P1+T1 1.90±0.05 (9) 1.67–2.20.

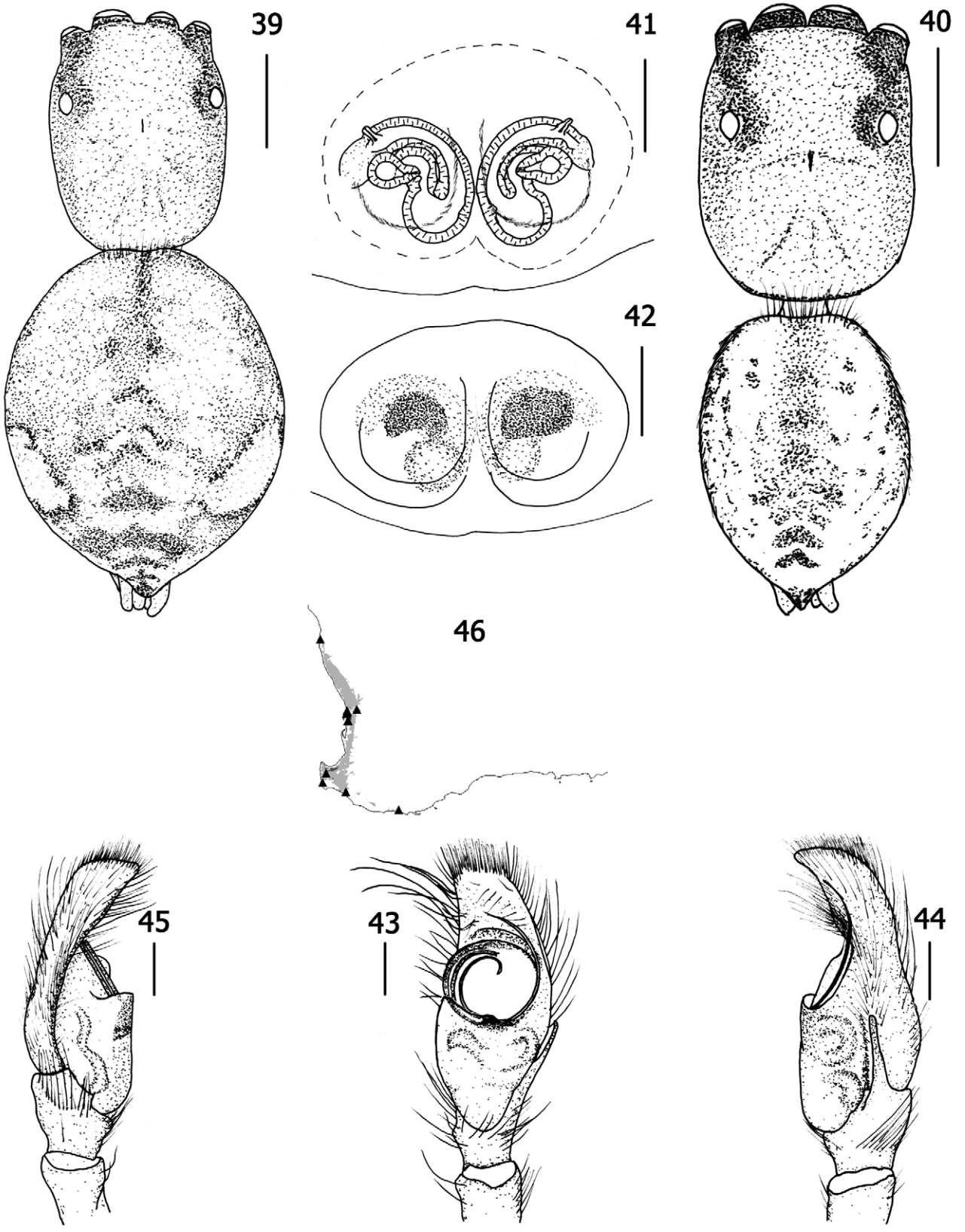
Distribution and biology. Found in temperate regions of eastern Australia from central Queensland to Adelaide; not in Tasmania (Fig. 38). Found on the coastal side of the Great Dividing Range of SE Australia, but not in the inland districts as predicted. Nocturnal, found under bark in eucalypt forest and woodlands. Likely IUCN Red List Category LC.

***Servaea spinibarbis* Simon, 1909**

Figs 39–45

Servaea spinibarbis Simon, 1909: 204, Platnick 2012 unpaginated.

Remarks. All the type specimens examined are juveniles, though one specimen, given as male, is subadult rather than adult and palp characters are not present. The length of P1+T1 in this specimen is consistent with other more recent material from coastal Western Australia, and not consistent with *S. melaina*



FIGURES 39–46. *Servaea spinibarbis*. 39–40 dorsal view (39 female, 40 male); 41–42 female genitalia (41 dorsal view of cleared specimen, 42 ventral view of external characteristics); 43–45 male palp (43 ventral view, 44 anterior lateral view, 45 posterior lateral view); 46 known and predicted distribution. Scale: total body 1 mm; remainder 0.2 mm.

Type material. Syntypes: 3 imm. Station 115 North Fremantle 115.5°E, 32.05°S, (ZMH, BJR1186); 4 imm. Station 109, Subiaco; Station 144, Buckland Hill near North Freemantle; Station 116, East Fremantle Recreation Ground; (ZMHB 19473, 19474, 19475,19473a).

Other material examined. WESTERN AUSTRALIA: 1F, Gum Tree Bay, 114.97°E, 29.78°S, 23 Jul, 1995, R.P. McMillan, (WAM T66905, BJR469); 1F, Gum Tree Bay, 114.97°E, 29.78°S, 10 Oct, 1994, R.P. McMillan, (WAM T66906, BJR470).1F, Darlington, 116.07°E, 31.92°S, Mar, 1975, G.H. Lowe, (WAM T66957, BJR481); 1F, Darlington, 116.07°E, 31.92°S, Mar, 1975, G.H. Lowe, (WAM T66957, BJR481); 1F, Darlington, 116.07°E, 31.92°S, Nov, 1968, G.H. Lowe, (WAM T66956, BJR487); 1F,Darlington, 116.07°E, 31.92°S, Nov, 1968, G.H. Lowe, (WAM T66956, BJR487); 1F, Bold Park, 115.77°E, 31.95°S, 2 Nov, 1991, R.P. McMillan, (WAM T66897, BJR466); 1F, Mosman Park, 115.77°E, 32.02°S, 20 Sep, 1992, C.A. Car, (WAM T66914, BJR446); 1F, Parmelia, 115.82°E, 32.25°S, 15 Oct, 2001, A.E. de Jong, (WAM T66931, BJR453); 1F, Parmelia, 115.82°E, 32.25°S, 5 Jan, 1987, A.E. de Jong, (WAM T66926, BJR454);. 1M, Leeuwin Swamp, Leeuwin-Naturaliste National Park, W.A., 115.08°E, 33.87°S, 19 August 2000, J. Waldock, G. Kendrick, P. Vinnnicombe, S. Sack-Smith, (BJR444, WAM T66909). 1F, Boranup Hill, 115.03°E, 34.15°S, 17 Feb, 1977, S.J. Curry, (WAM, T66898, BJR450); 1M, Scott Rd, D'Entrecasteau National Park, W.A., 115.74°E, 34.43°S, 6–13 November 2003, Malaise Bulk Sample, Casuarina-Jarrah woodland, C. Lambkin, J. Recsei, (ANIC 42 000281, BJR418). 1F, Denmark, 117.35°E, 34.97°S, 30 Nov, 1987, B. and M. Baehr, (QM, S 73111, BJR940).

Diagnosis. It can be differentiated from *S. incana*, *S. villosa* and *S. zabkai* as fertilization duct is large and long and is visible externally as a deep red mass in the centre of the fossa and by the presence of a median gap between the right and left insemination ducts. It differs from *S. narraweena* in that the insemination duct crosses the middle of the epigynum and enters the spermatheca on the anterior edge. It can be differentiated from *S. melaina* as the chelicerae are light brown rather than black or dark brown, L1 is short (male P1+T1 less than 80% of CL) rather than long (male P1+T1 more than 90% of CL), the bulb is wider than the palp and the accessory gland is terminally or sub-terminally placed on the insemination duct. It is generally light brown/fawn in colour and males show female abdominal pattern rather than the male narrow stripe seen in other species. There is only a small anterior tooth projection on the brown chelicera.

Description. Male: Cephalothorax orange with scattered pennate grey hairs over dorsal surface and lateral margins. Integument surrounding ALE, PME and PLE, black with covering of grey hairs. Clypeus narrow, with long sparse fringe of grey hairs. Chelicerae geniculate, tan. A blunt protuberance, projecting forwards off a tubercle on the anterior face of each chelicera, three large promarginal teeth on a single base and one large straight fissident retromarginal tooth. Endites tan grading to yellow with a rounded distal edge. Labium tan and sternum light brown. Abdomen with a central anterior cleft, light brown with dark brown mid line pattern, scattered spots and edges. Ventral abdomen same colour as dorsal surface of the abdomen. Spinnerets light brown. L1 and L2 more robust than L3 and L4. L1 and L2, femur, patella, tibia, metatarsus and tarsus mid brown with fringing on patella and tibia. Other legs pale yellow without fringing. All femora with three transverse darker stripes. *Palp*: brown, tibia with single slender apophysis. Tegulum relatively long and narrow without anterior lateral lobe but with a proximal lobe, bulb as wide or wider than the cymbium, origin of the embolus distal, forming a tapering single-turn anti-clockwise spiral around the bulb. Dimensions: CL 2.41±0.06 (2), EFL 1.05±0.06 (2), CW 1.92 (1), AEW 1.76±0.03 (2), AMEW 0.96±0.03 (2), PEW 1.55±0.06 (2), AL 2.48 (1), P1+T1 1.89±0.09 (2).

Female. Cephalothorax orange with scattered pennate grey hairs over lateral surfaces. Integument surrounding ALE, PME and PLE, black with partial covering of grey hairs. Clypeus narrow with long sparse fringe of grey hairs. Chelicerae geniculate, tan. Fang narrow in distal half. Chelicera with no protuberance projecting forwards off the anterior face, three promarginal teeth on a single base and one large straight fissident retromarginal tooth. Endites tan grading to yellow with a rounded distal edge. Labium tan grading to yellow and sternum light brown. Abdomen with a central anterior cleft, fawn with darker brown mid line pattern, scattered spots and edges. Many specimens with a large ginger ring of hairs on either side. Ventral abdomen same colour as dorsal surface of the abdomen. Spinnerets light brown. Palp yellow grading to mid brown. L1 and L2 slightly more robust than L3 and L4. L1 and L2, femur, patella, tibia, metatarsus and tarsus mid brown with sparse fringing on patella and tibia. Other legs pale yellow without fringing. All femora with three transverse darker stripes and transverse darker brown bands on the other segments. *Epigynum*: Indistinct fossae and a well sclerotised margin. A distinct brown patch varying in shape is found in the middle of each side. Guides and copulatory openings indistinct. Accessory gland either terminal or sub-terminal, on the dorsal surface of the insemination duct. Insemination duct passes laterally across the middle of the fossa to the mid line and then move posteriorly until entering the spermathecae on the anterior mid line. Spermatheca small, rounded and within the margin of the epigynum but at the posterior edge. Right and left spermatheca and insemination ducts touching. The fertilization duct is large and red in colour, arising

from the dorsal anterior edge of the spermatheca, passing under the ventral edge of the insemination duct and then curving dorsally in an incomplete circle. Dimensions: CL 2.58±0.05 (11) (2.23–2.79), EFL 1.13±0.03 (11) (0.99–1.30), CW 2.14±0.04 (11) (1.86–2.35), AEW 1.84±0.03 (11) (1.61–1.98), AMEW 1.05±0.02 (11) (0.93–1.11), PEW 1.94±0.03 (11) (1.73–2.04), AL 2.48, P1+T1 1.93±0.05 (11) (1.61–2.17).

Distribution and biology. Found in sand areas of the coastal regions of temperate southwestern Australia (Fig. 46). Found under bark in eucalypt forest and woodlands. Likely IUCN Red List Category LC.

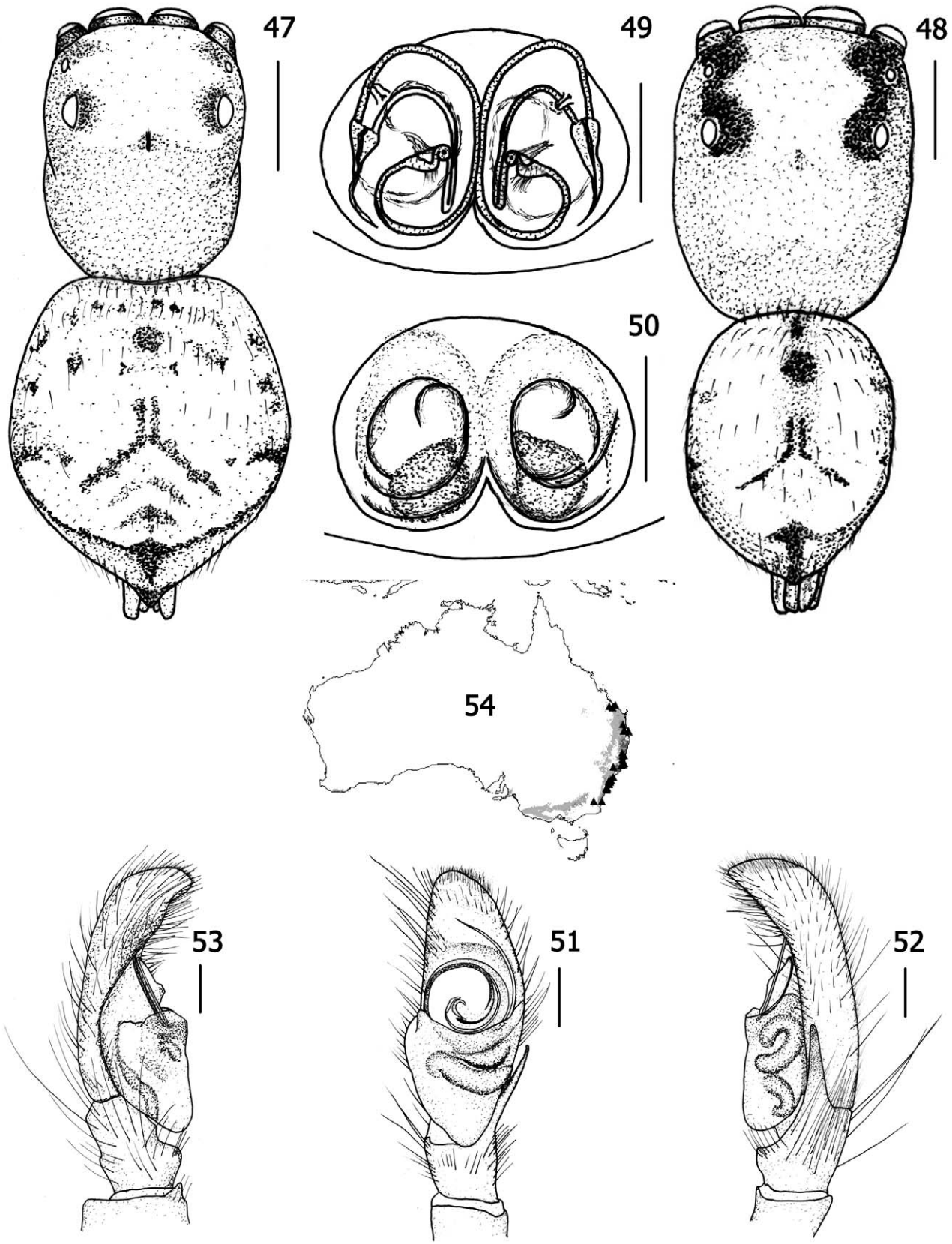
Servaea villosa (Keyserling, 1881)

Figs 1, 47–53

Hasarius villosus Keyserling, 1881: 1281, pl. 109 Fig. 5 (on plate; 6 in text)
Servaea villosa: Zabka 1991: 52, Platnick 2012 unpaginated

Remarks. The species is highly variable in size, colouring, hairiness and patterning. Specimens of the variation in abdominal patterning are shown in Fig. 1

Material examined. QUEENSLAND: 1F, Eurimbula SE of Gladstone, 151.83°E, 24.18°S, 1 Mar, 1975, C. Horseman, (AM KS 6928 BJR676); 1F, Eurimbula SE of Gladstone, 151.83°E, 24.18°S, 1 Mar, 1975, C. Horseman, (AM KS 261 BJR693); 1M, 7 imm., Kroombit Tops, Lower Dry Creek, 45km SSW Calliope, 151.05°E, 24.37°S, 9 Dec, 1983, V. Davies, J. Gallon, (QM S 73089 BJR943); 1F, Bulburin Forestry Nursery NW of Bundaberg, 151.48°E, 24.52°S, 1 Mar, 1975, M. Gray C. Horseman, (AM KS 104 BJR575); 2M, 5F, Bunyobi, Hunsley Rd, Kidaman Creek, 152.78°E, 26.63°S, 1 Jul, 2010, R. Whyte, (QM BJR1128); 2M, Bunyobi, Hunsley Rd, Kidaman Creek, 152.78°E, 26.63°S, 10 May, 2010, R. Whyte, (ANIC 42 001496 BJR1130); 2M, Taylors residence, Lochinvar WBR, 152.95°E, 27.45°S, 15 Jun, 2010, R. Whyte, (ANIC 42 001493 BJR1129); 1F, The Island, Walton Bridge Reserve, The Gap, 152.95°E, 27.45°S, 27 Aug, 2009, R. Whyte, (ANIC 42 001494 BJR1131); 1F, 917 Waterworks Rd, The Gap, 152.95°E, 27.45°S, 27 Aug, 2009, R. Whyte, (ANIC 42 001497 BJR1187); 3M, 3F, 1 imm, Paten Rd, The Gap, 152.95°E, 27.45°S, 29 Aug, Jan 2011, R. Whyte, (ANIC 42 001498 BJR1188); 2M, 4 imm. Brisbane, 153.02°E, 27.47°S, 23 Jan, 1983, V. Davies, (QM S 73107 BJR956); 2F, 4 imm., Upper Brookfield, , 152.87°E, 27.48°S, 11 Dec, 1980, V. Davies, R. Raven, (QM S 73083 BJR916); 1M, 1 imm., Upper Brookfield, 152.87°E, 27.48°S, 15 Oct, 1980, V. Davies, R. Raven, (QM S 73078 BJR925); 1F, 6 imm., Upper Brookfield, , 152.87°E, 27.48°S, 17 Jul, 1981, V. Davies, R. Raven, (QM S 73106 BJR958); 1M, 2F, Brookfield, 152.92°E, 27.50°S, 15 Feb, 1981, Y. Lubin, (QM S 73081 BJR937); 1F, Causeway Lagoon, Mining Company Road, 153.53°E, °S, 27.52, 11 Oct, 2009, R. Whyte, (ANIC 42 001495 BJR1132). **NEW SOUTH WALES**: 1F, Wild Cattle Creek Forest, 152.70°E, 30.15°S, 15 Nov, 1982, J.T. Doyen, (ANIC 42 000299 BJR436); 1M, Bellingen, The Island, 152.90°E, 30.45°S, 3 Aug, 1981, M. Gray, (AM KS 9429 BJR563); 1M, Irishman SF, Rickerbys Rd, 1km from jnct Bellbucca Rd, 152.70°E, 30.55°S, 25 Nov, 1999, M. Gray, G. Milledge & H. Smith, (AM KS 65873 BJR808); 1F, 3 imm., Turners Dip , 152.70°E, 31.02°S, 22 Nov, 1978, R. Raven, (QM S 73082 BJR936); 1M, Port Macquarie, 152.92°E, 31.42°S, 10 Jan, 2005, A. Walker, (ANIC 42 000242 BJR1127); 1F, Port Macquarie, Sea Acres Nature Reserve, 152.93°E, 31.47°S, 28 Feb, 1999, G. Williams, (AM KS 56324 BJR737); 1M, Port Macquarie, Sea Acres Nature Reserve, 152.93°E, 31.47°S, 28 Feb, 1999, G. Williams, (AM KS 56329 BJR777); 1M, Camden Head, 152.83°E, 31.65°S, 1 Apr, 2000, G. & T. Williams, (AM KS 62199 BJR816); 1F, 'Lorien' Wildlife Refuge 3 km N of Lansdowne, 152.57°E, 31.77°S, 26 Nov, 1987, D.J. Bickel, (AM, KS 29831 BJR717); 1M, Cobark Forest Park, Barrington Tops, 151.60°E, 31.90°S, 11 Feb, 1984, I.D. Naumann, (ANIC 42 000283 BJR420); 1F, Munmorah NP, 151.57°E, 33.22°S, 11 Dec, 2002, M. Gray, (AM KS 81976 BJR826); 1M, 2 imm., The Basin, Pittwater, 151.28°E, 33.60°S, 5 Jul, 1966, R.E. Mascord, (AM KS 18343 BJR564); 1F, Coasters Retreat, 151.30°E, 33.60°S, 29 Jan, 1967, R.E. Mascord, (AM KS 22262 BJR761); 1M, Mt Colah, 151.12°E, 33.67°S, 28 Aug, 1988, M.R. Gray, (AM KS 19445 BJR766); 1M, Dural, 151.03°E, 33.68°S, 28 Nov, 1993, J. Noble, (AM KS 56529 BJR713); 1F, Hornsby, Waitara Creek, 151.08°E, 33.70°S, 30 Sep, 2000, G. Milledge, (AM KS 68253 BJR788); 1M, Hornsby, Waitara Creek, 151.08°E, 33.70°S, 14 Apr, 2001, G. Milledge, (AM KS 71254 BJR790); 1F, Hornsby, Waitara Creek., 151.08°E, 33.70°S, 16 Oct, 2000, G. Milledge, (AM KS 68560 BJR797); 2M, Waitara Ck, Hornsby, 151.08°E, 33.70°S, 22 Sep, 2002, G. Milledge, (AM KS 79675 BJR831); 1M, Frazer Reserve, Wahroonga, 151.13°E, 33.72°S, 20 Aug, 1997, J. Noble, (AM KS 51395 BJR705); 1M, Frazer Reserve,



FIGURES 47–54. *Servaea villosa*. 47–48 dorsal view (47 female, 48 male); 49–50 female genitalia (49 dorsal view of cleared specimen, 50 ventral view of external characteristics); 51–53 male palp (51 ventral view, 52 anterior lateral view, 53 posterior lateral view); 54 known and predicted distribution. Scale: total body 1 mm; remainder 0.2 mm.

Wahroonga, 151.13°E, 33.72°S, 8 Oct, 1996, J. Noble, (AM KS 56502 BJR738); 1F, Beecroft, 151.05°E, 33.73°S, 30 May, 2004, J. Noble, (AM KS 90876 BJR714); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 26 Oct, 1997, J. Noble, (AM KS 51449 BJR694); 1M, Beecroft Reserve, 151.07°E, 33.75°S, 4 Aug, 1997, J. Noble, (AM KS 52001 BJR697); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 9 Dec, 1992, J. Noble, (AM KS 56448 BJR698); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 9 Jan, 1997, J. Noble, (AM KS 51658 BJR700); 1M, Beecroft Reserve, 151.07°E, 33.75°S, 4 Jan, 1997, J. Noble, (AM KS 51662 BJR701); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 30 Apr, 1997, J. Noble, (AM KS 52004 BJR709); 1M, Beecroft Reserve, 151.07°E, 33.75°S, 17 Sep, 1993, J. Noble, (AM KS 56484 BJR710); 1M, Beecroft Reserve, 151.07°E, 33.75°S, 9 Aug, 1993, J. Noble, (AM KS 58538 BJR711); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 30 Apr, 1997, J. Noble, (AM KS 52003 BJR712); 1M, Beecroft, 151.07°E, 33.75°S, 5 Oct, 1992, J. Noble, (AM KS 58571 BJR715); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 30 May, 1999, J. Noble, (AM KS 58971 BJR718); 1M, Beecroft Reserve, 151.07°E, 33.75°S, 9 Oct, 1992, J. Noble, (AM KS 56441 BJR719); 1M, Beecroft Reserve, 151.07°E, 33.75°S, 30 Apr, 1999, J. Noble, (AM KS 56388 BJR721); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 9 Aug, 1993, J. Noble, (AM KS 56487 BJR722); 1M, Beecroft Reserve, 151.07°E, 33.75°S, 4 Aug, 1997, J. Noble, (AM KS 52002 BJR723); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 15 Aug, 1993, J. Noble, (AM KS 58536, (BJR724); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 10 Oct, 1996, J. Noble, (AM KS 58506 BJR725); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 9 Aug, 1993, J. Noble, (AM KS 56436 BJR726); 1M Beecroft Reserve, 151.07°E, 33.75°S, 22 Aug, 1995, J. Noble, (AM KS 56511 BJR731); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 14 Jul, 1999, J. Noble, (AM KS 58970 BJR732); 1M, Beecroft Reserve, 151.07°E, 33.75°S, 10 Oct, 1996, J. Noble, (AM KS 58507 BJR733); 1M, Beecroft Reserve, 151.07°E, 33.75°S, 9 Aug, 1993, J. Noble, (AM KS 56478 BJR741); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 9 May, 1993, J. Noble, (AM KS 56485 BJR742); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 15 Aug, 1993, J. Noble, (AM KS 58542 BJR743); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 9 Aug, 1993, J. Noble, (AM KS 56481 BJR744); 1F, Beecroft Reserve, 151.07, °E, 33.75°S, 10 Oct, 1996, J. Noble, (AM KS 58505 BJR748); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 8 Mar, 1992, J. Noble, (AM KS 34409 BJR764); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 22 Dec, 1992, J. Noble, (AM KS 56440 BJR771); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 30 Sep, 1995, J. Noble, (AM KS 56517 BJR774); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 5 Oct, 1999, J. Noble, (AM KS 56411 BJR775); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 17 Nov, 1992, J. Noble, (AM KS 56442, BJR781); 1M, Beecroft Reserve, 151.07°E, 33.75°S, 25 Jul, 2001, J. Noble, (AM KS 76828 BJR784); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 25 Jul, 2001, J. Noble, (AM KS 76823 BJR789); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 25 Jul, 2001, J. Noble, (AM KS 76829 BJR793); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 25 Jul, 2001, J. Noble, (AM KS 76830 BJR795); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 20 Aug, 1999, J. Noble, (AM KS 58969 BJR796); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 11 Dec, 2001, J. Noble, (AM KS 76808 BJR802); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 11 Dec, 2001, J. Noble, (AM KS 76808 BJR802); 1M, Beecroft Reserve, 151.07°E, 33.75°S, 9 Oct, 1999, J. Noble, (AM KS 62821 BJR803); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 10 Jan, 2001, J. Noble, (AM KS 76766 BJR804); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 6 Mar, 2001, J. Noble, (AM KS 72867 BJR805); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 20 Nov, 2001, J. Noble, (AM KS 76783 BJR806); 1M, Beecroft Reserve, 151.07°E, 33.75°S, 4 Dec, 2001, J. Noble, (AM KS 72879 BJR807); 1M, Beecroft Reserve, 151.07°E, 33.75°S, 15 Sep, 2002, J. Noble, (AM KS 79713 BJR810); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 4 Jan, 2002, J. Noble, (AM KS 76893 BJR811); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 1 Oct, 2002, J. Noble, (AM KS 76847 BJR814); 1M, Beecroft Reserve, 151.07°E, 33.75°S, 5 Oct, 2002, J. Noble, (AM KS 79737 BJR819); 1M, Beecroft Reserve, 151.07°E, 33.75°S, 4 Dec, 2001, J. Noble, (AM KS 72899 BJR820); 1M, Beecroft Reserve, 151.07°E, 33.75°S, 25 Apr, 2001, J. Noble, (AM KS 72874 BJR821); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 7 Apr, 2002, J. Noble, (AM KS 79749 BJR822); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 1 Jun, 2000, J. Noble, (AM KS 65827 BJR823); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 8 Mar, 2003, J. Noble, (AM KS 87225 BJR824); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 21 Aug, 2002, J. Noble, (AM KS 84296 BJR825); 1 imm. Beecroft Reserve, 151.07°E, 33.75°S, 21 Aug, 2002, J. Noble, (AM KS 84303 BJR827); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 7 Apr, 2002, J. Noble, (AM KS 79750 BJR828); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 19 May, 2002, J. Noble, (AM KS 79744 BJR829); 1M, Beecroft Reserve, 151.07°E, 33.75°S, 5 May, 2002, J. Noble, (AM KS 79726 BJR832); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 25 Jul, 2001, J. Noble, (AM KS 76822 BJR833); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 2 Apr, 2000, J. Noble, (AM KS 66015 BJR836); 1M, Beecroft Reserve, 151.07°E, 33.75°S, 5 May, 2002, J. Noble, (AM KS 79725 BJR838); 1F, Beecroft Reserve, 151.07°E, °S, 33.75, 10 Mar, 1999, J. Noble, (AM KS 66213 BJR841); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 4 Jan, 2002, J. Noble, (AM KS 76890 BJR842); 1F, Beecroft Reserve, 151.07°E, 33.75°S, 15 Dec, 2002, J. Noble, (AM KS 84265 BJR843); 1F, Lindfield, 151.17°E, 33.78°S, 16 Oct, 1966, D. Doolan, (AM KS 18981 BJR569); 1F, Wallumatta Nature Reserve, North Ryde., 151.12°E, 33.80°S, 26 Nov, 2002, (G. Milledge, (AM KS 81953 BJR834); 1M, Lilyfield, 151.15°E, 33.87°S, 18 Nov, 1956, A. Musgrave, (AM KS 49873 BJR783); 1F, Sydney Royal National Park, 151.07°E,

34.13°S, 12 Feb, 1981, Horseman & Harland, (AM KS 8650 BJR574); 1F, Stony Range, 150.83°E, 34.55°S, 26 Sep, 1997, D. Mead-Hunter, (WAM T66947 BJR496); 1M, Macquarie Pass, Macquarie Pass NP, 150.65°E, 34.57°S, 9 Dec, 1999, G. Milledge, (AM KS 58745 BJR706); 1F, Jamberoo Mountain, 150.72°E, 34.67°S, 4 Nov, 1994, J. Noble, (AM KS 51656 BJR695); 1M, Jamberoo Mountain, 150.72°E, 34.67°S, 9 Nov, 1997, J. Noble, (AM KS 51451 BJR707); 1F, Jamberoo Mountain, 150.72°E, 34.67°S, 1 Feb, 2000, J. Noble, (AM KS 65678 BJR809); 1F, Jamberoo Mountain, 150.72°E, 34.67°S, 20 Apr, 1995, J. Noble, (AM KS 79779 BJR812); 1M, Barren Grounds Nature Reserve, 150.72°E, 34.68°S, 27 Oct, 2002, M. Gray, (AM KS 81939 BJR835); 1M, 1F,, Foxground, near Gerringong, 150.77°E, 34.72°S, 29 Oct, 2002, M. Zabka, M. Gray, (AM KS 81354 BJR818); 1M, Gerringong, 150.83°E, 34.73°S, 13 Mar, 1997, G. Wishart, (AM KS 50105A BJR753.1); 1M, Seven Mile Beach NP., 150.77°E, 34.82°S, 28 Oct, 2002, M. Gray, (AM KS 81905 BJR839); 1F, 2km west of Narooma, 150.12°E, 36.22°S, 7 Nov, 2007, B.J. Richardson, (ANIC 42 001193 BJR966). **AUSTRALIAN CAPITAL TERRITORY**: 1F, Canberra, 149.13°E, 35.30°S, 1960, E. McCallan, (ANIC 42 000291 BJR428.1).

Diagnosis. This is a small species (CL, <3mm), in which the fertilization ducts are short and the insemination ducts reach the anterior edge of the fossa. It is distinct from all other species in the genus as the origin of the embolus is near the proximal rather than distal edge of the bulb. A median black mark is found on the posterior edge of the abdomen unlike all other species. When visible there is a distinctively shaped pattern in the middle of the dorsal abdomen.

Description. Male: Cephalothorax dark orange covered with pennate ginger-brown hairs over dorsal surface with pennate grey hairs on the posterior and lateral surfaces. Integument surrounding ALE, PME and PLE black with thick covering of grey hairs. Clypeus narrow with long sparse fringe of grey hairs. Chelicerae long and strongly geniculate, dark tan with sparse covering of long white hairs on the proximal and median areas. A tooth-like protuberance, projecting forwards off a large mound on the anterior face of each chelicera, a cluster of three large promarginal teeth and a separate small tooth on a single base and one large straight fissident retromarginal tooth. Endites and labium tan grading to yellow, sternum tan. Abdomen without a central anterior cleft, yellow with dark brown mid line stripe and brown patterning that reach the margins. Pattern highly variable, constant features are the black mid line marking at the posterior end of the abdomen and the shape of the chevron (when present). Ventral abdomen same colour as dorsal surface of the abdomen on the sides with a black central section. Spinnerets yellow. L1 longer and a little more robust than L2, L3 and L4. Femora of L1 and L2 brown with dark brown anterior lateral and ventral patches covering over half the segment. L3 and L4 femora with three transverse dark stripes.L3 and L4 femora, and all patellae, tibias, tarsi and metatarsi yellow, without fringing. Patella plain, tibia with two transverse brown bands, metatarsus with a single transverse band and tarsus with two transverse bands. *Palp* (Figs 51–53): brown, tibia with single slender apophysis. Tegulum relatively broad with anterior lateral lobe and a proximal lobe, origin of the embolus proximal, forming a tapering single anticlockwise spiral around the bulb. Dimensions: CL 2.7±0.10 (16) (1.98–3.22), EFL 1.16±0.04 (16) (0.93–1.36), CW 2.11±0.08 (16) (1.49–2.54), AEW 1.90±0.06 (16) (1.42–2.17), AMEW 1.12±0.03 (16) (0.87–1.30), PEW 1.79±0.06.

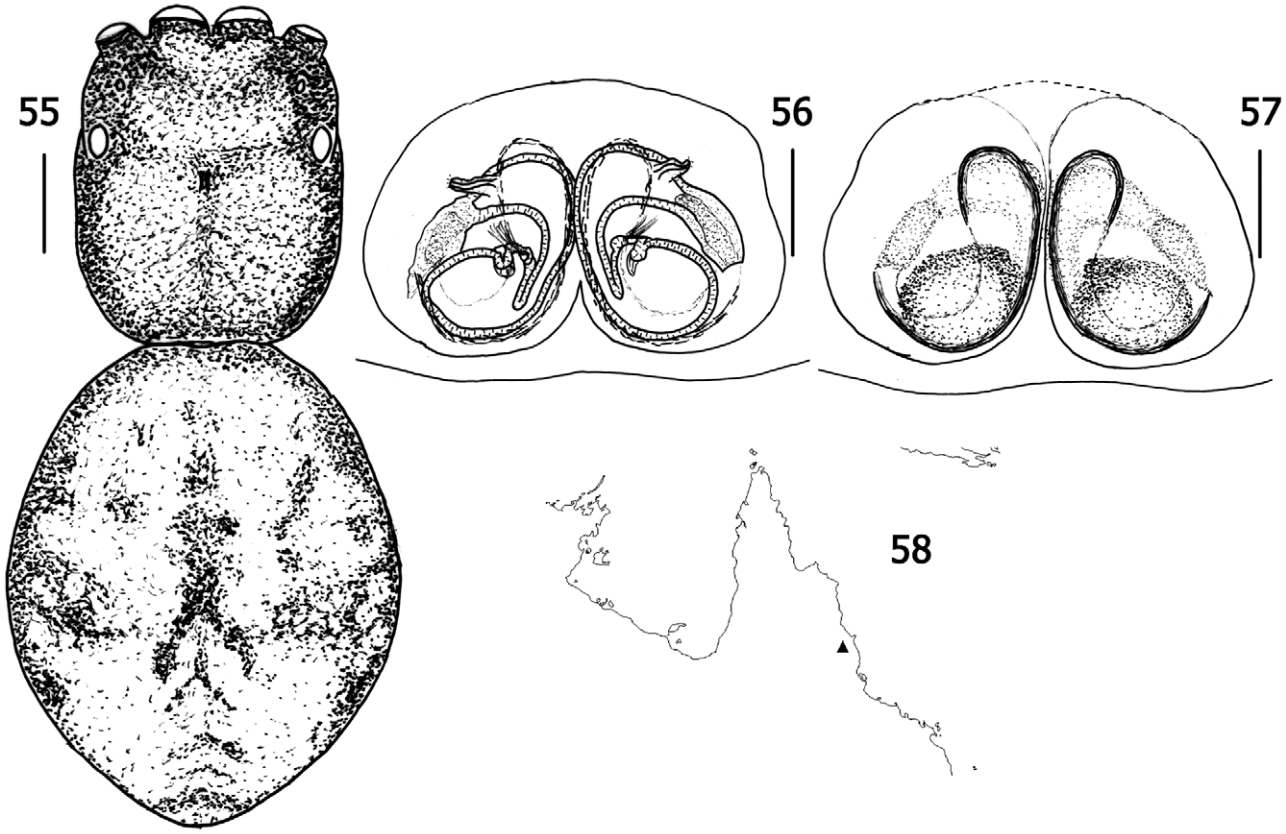
Female: Cephalothorax dark orange covered with pennate grey hairs, thicker on the posterior and lateral surfaces. Integument surrounding ALE, PME and PLE black with covering of grey hairs. Clypeus narrow with long sparse fringe of grey hairs. Chelicerae geniculate, dark tan with a sparse long white hairs on the front face, four promarginal teeth on a single base and a single, large, fissident, retromarginal tooth but no protuberance on the front face. Endites and labium mid brown grading to yellow. Sternum mid brown. Abdomen with a slight central anterior cleft, yellow with dark brown to black markings. Pattern highly variable, constant features are the black mid line marking at the posterior end of the abdomen and the shape of the chevron. Ventral abdomen same colours as dorsal surface of the abdomen on the sides with a black central section. Spinnerets yellow. Palps orange with darker transverse bands. L4>L3> L1>L2, all relatively slender. Legs yellow grading distally to mid brown, femur without three dark brown transverse bands, patella with a single transverse brown band, tibia with two transverse brown bands and metatarsus with two transverse bands and tarsus with a single transverse band. *Epigynum*: consisting of two large fossae and a darker sclerotised margin. A distinct brown patch varying in shape and position is sometimes found in the middle of each fossa. Guides and copulatory openings indistinct. Guide consistent in shape but varying in position with different parts emphasised in different specimens. Anterior edge of the insemination duct beyond or near the anterior edge of the epigynum. Posterior edge of the insemination duct in line with or anterior to the matching edge of the guide. Accessory gland in the distal third of the insemination duct. Insemination duct passes laterally across the anterior part of the fossa to the mid line and then move posteriorly until entering the

spermatheca on the posterior mid line. Spermatheca pear-shaped and within the margin of the fossa towards the posterior edge. Right and left spermatheca touching, insemination ducts well separated. The fertilization duct is short, arising from a branch of varying length off the anterior edge of the spermatheca and curving dorsally in a tight circle. *Dimensions:* CL 2.77±0.04 (26) 2.35–3.10, EFL 1.22±0.02 (26) 1.02–1.36, CW 2.27±0.03 (26) 1.98–2.54, AEW 1.98±0.02 (26) 1.86–2.11, AMEW 1.1±0.01 (26) 1.05–1.30, PEW 1.91±0.02 (26) 1.67–2.11.

Distribution and biology. Only found to the east of the Great Dividing Range from southern NSW to central Queensland (Fig. 54), though predicted to be found in Victoria and South Australia. Found under bark in eucalypt forest and woodlands. Likely IUCN Red List Category LC.

***Servaea zabkai* n. sp.**
Figs 55–58

Etymology. Named for the collector of the type specimens and doyen of Australian salticid taxonomists, Prof. Marek Zabka.



FIGURES 55–58. *Servaea zabkai* n. sp. 55 dorsal view (female); 55–57 female genitalia (56 dorsal view of cleared specimen, 57 ventral view of external characteristics); 58 known distribution. Scale: total body 1 mm; remainder 0.2 mm.

Type material. Holotype: 1F, Atherton area, 145.48°E, 17.27°S, 18 Oct, 2002, M. Zabka, (AM KS 81340, BJR815).

Paratype. 1F, Atherton area, 145.48°E, 17.27°S, 18 Oct, 2002, M. Zabka, (AM KS 81339, BJR830).

Diagnosis. This is a large species (CL> 2.9mm) with a very short fertilization duct. It can be separated from the smaller *S. villosa* by size and abdominal markings, and from *S. incana* by the position of the much larger accessory gland on the dorsal surface of the insemination duct, in which it resembles *S. narraweena*. The spermatheca are anterior to and well separated from the posterior edge of the epigynum. COI sequence differs by <2% from GenBank accession JF949750 and by >4% from other *Servaea* species.

Description. Female (Holotype): Cephalothorax dark orange dorsally and dark brown on the sides, pars cephalica darker than pars thoracica. Integument surrounding ALE, PME and PLE black, dorsal surface covered with fine dark brown hairs, sides and rear covered with large, pennate grey hairs. Clypeus narrow with occasional long, light grey hairs. Chelicerae broad, rounded and geniculate, mid orange, with sparse grey hairs on the anterior mid line. Three small promarginal protuberances on a single base and a single, large, fissident, retromarginal tooth. Endites and labium mid orange grading to yellow. Sternum orange. Dorsal abdomen brown with variable dark brown pattern. Spinnerets mid brown. Ventral abdomen same colour as dorsal surface with dark brown median patch. Palps mid brown. L1, L2, L3 and L4 similar in size and relatively slender. Legs mid brown, femur with three dark brown transverse dark bands, patella with a single transverse band, tibia with two transverse dark bands and metatarsus with one transverse band and tarsus without a transverse band. *Epigynum:* Consists of two large fossae with lightly sclerotised margins. Guides weakly formed. Copulatory openings indistinct. Accessory gland in the centre of the dorsal surface and in the distal third of the insemination duct. Insemination duct passes laterally across the mid part of the fossa to the mid line and then move posteriorly until entering the spermatheca on the mid line. Spermatheca large, rounded and well forward of the posterior margin of the fossa. Right and left insemination ducts in contact. Fertilization duct short. *Dimensions:* CL 3.47, EFL 1.42, CW 2.85, AEW 2.23, AMEW 0.99, PEW 2.23, AL 3.72, P1+T1 2.47, L1 6.44 (1.98+1.30+1.36+1.18+0.62), L2 6.00 (1.92+1.11+1.30+1.11+0.56), L3 6.13 (1.92+0.99+1.24+1.36+0.62), L4 7.06 (2.17+1.05+1.55+1.67+0.62).

Distribution. Known only from two specimens from the Atherton tableland of northern Queensland (Fig. 58). Likely IUCN Red List Category VU B1ab(iii)

Nomen Dubium

Servaea obscura Rainbow 1915

Servaea obscura Rainbow 1915 791, pl. 68 Fig. 22

Type material. Syntypes: 1sub-adult F 1 imm SAM Flat Rock Hole, Musgrave Ranges; 26° 33'S 132° 26'E, July, 1914, Capt. S.A. White Expedition 1915 (BJR559, NN418).

Remarks: Based on immature specimens in poor condition, does not belong in *Servaea*.

Discussion

Servaea presented a challenge when attempting to determine the number of species present. The morphology of the female genitalia and of the male palp normally provide the basis for distinguishing species in the Salticidae. This is usually not the case for *Servaea* however, where only *S. villosa* is easily differentiated on palp morphology and *S. melaina*, *S. narraweena* and *S. spinibarbis* from the others on gross differences in female genitalia. The genus presents a clear example of the value of DNA sequence data for testing taxonomic hypotheses made on morphological grounds. Further, sequence data proved very useful in differentiating between individual and specific variation. It would not have been possible, for example, to confirm the individual, as opposed to specific, nature of much of the minor variation seen in female genitalia or the variation in colour and pattern seen in this genus without the DNA data.

Our molecular analysis included all but one of the Australian *Servaea* species. Overall, intra-specific variation within species was less than 2%, while inter-specific variation ranged between 4–9%. Robinson et al (2009) reviewed available COI sequence differences across species-rich spider genera and reported a mean intra specific variation of 3.2% and mean distance between sister species (nearest inter-specific neighbour) of 6.8%. Similar levels of intra- and inter-specific variation were observed in several of the spider genera they examined. These mean genetic distances values are higher than those found in the present study (<2 and >4% respectively) but genetic variation should be assessed on a genus by genus basis and supported by morphological or ecological observations. It is important to maintain no set criterion for what level of DNA sequence divergence represents a distinct species.

It would be possible to argue that the molecular divergence and the morphological differences in the female genitalia that separate, *S. melaina*, *S. narraweena* and *S. spinibarbis* from the rest of the *Servaea* species warrants dividing the genus into two. Such differences are commonly used as diagnostic features of salticid genera. However, the absence of any correlated differences in the male palp, general morphology or general ecology of the subgroups leads us to conclude that splitting the genus is unwarranted. The genetic distance between the two subgroups (7.5–9%) is less than the divergence between genera (>10%) for the euophrine genera analysed but greater than that between related species (4–6.5%) within subgroups.

The approach of using morphological and predicted distribution data to develop species hypotheses followed by the independent testing of these hypotheses *after* they were proposed using DNA data proved very useful in this case. The hypotheses related to the non-specific nature of colour and pattern variation was confirmed, as were the specific status of several species. The great surprise, however, was the discovery that the yellow abdomen/ ginger-marked 'incana' specimens were conspecific with the dark brown/black-marked 'vestita' specimens. This was only uncovered by careful experimental design in the use of sequence data.

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