# SYSTEMATICS OF THE AFROTROPICAL MYSTARINI (ARANEAE: THOMISIDAE: DIETINAE)

---

**By**

**ALLETHA S. HONIBALL**

**Submitted in partial fulfilment of the requirements for the degree of**

**Master of Science (Entomology)**

**In the**
**Faculty of Natural & Agricultural Sciences**
**University of Pretoria**
**Pretoria**
**South Africa**

**AUGUST, 2010**

---

**Systematics of the Afrotropical Mystarini (Araneae: Thomisidae: Dietinae)**

---

**By**

**Alletha S. Honiball**

Supervisors

Prof C.H. Scholtz[1], Prof A.S. Dippenaar-Schoeman[1,2] & Prof C.T. Chimimba[1,3]

[1]Department of Zoology & Entomology, University of Pretoria, Pretoria, 0002 South Africa; chscholtz@zoology.up.ac.za

[2]ARC-Plant Protection Research Institute, P/Bag X134, Queenswood, 0121 South Africa; dippenaara@arc.agric.za

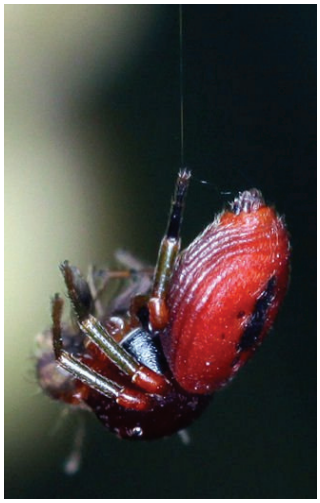
[3]Mammal Research Institute (MRI) & DST-NRF Centre of Excellence for Invasion Biology (CIB), Department of Zoology & Entomology, University of Pretoria, Pretoria, 0002 South Africa; ctchimimba@zoology.up.ac.za

---

Declaration

I, Alletha Sophia Honiball declare that the thesis/dissertation, which I hereby submit for the degree Master of Science (Entomology) at the University of Pretoria, is my own work and has not previously been submitted by me for a degree at this or any other tertiary institution.

SIGNATURE: DATE: 29/11/2010



**Photographs taken by Charissa de Lange©**

## Abstract

The Thomisidae is a large family represented by *ca*. 2085 species and 173 genera and has a worldwide distribution. The thomisids of the Afrotropical region are known from *ca*. 69 genera and 371 species grouped into seven subfamilies of which the subfamily Dietinae is the focus group in the present study. The Dietinae of the Afrotropical region are represented by 18 genera and *ca*. 58 species and they are divided into six tribes that were established by Simon (1895). The present study aims to resolve the taxonomic status of the genera and species within one of the six tribes, the Mystarini using classical taxonomy including scanning electron microscopy (SEM), stereo and compound microscopy and photography. The focus on the Mystarini resulted in the taxonomic revisions of the genera *Sylligma* Simon, 1895*, Paramystaria* Lessert, 1919 and *Mystaria* Simon, 1895 and the description of a new genus *Leroya*. Prior to the present study, the genus *Sylligma* was known from three species. In the present study, two of the known species *S. hirsuta* and *S. lawrencei* are re-described, the third is considered as *incertae sedis*, while the following four new species are described: *S. franki, S. ndumi, S. spartica* and *S. theresa*. The genus *Paramystaria* was previously known to comprise four species and two subspecies. In the present study, the genus *Paramystaria* is considered a junior synonym of *Mystaria,* a genus previously known from two species. *Mystaria* presently comprises 13 species, of which four, namely, *M. flavogutatta, M. lata, M. rufolimbata and M. variabilis* were re-described and one subspecies, *Paramystaria variabilis occidentalis*, was elevated to species level, designated *M. occidentalis* and re-described. Eight new species within *Mystaria*, namely, *M. budongii, M. irmatrix, M. lindaicapensis, M. mnyama, M. oreadii, M. savannensis, M. soleili* and *M. stakesbyi* are described, and one species, *Paramystaria decorata*, and one subspecies, *Paramystaria variabilis delesserti,* are considered *incertae sedis*. A new genus *Leroya* is erected to accommodate two species, one removed from *Mystaria, L. unicolor* and a newly described, *L. signopuellaris*. Taxonomic accounts together with identification keys to genera and species and geographic distributions for each species are provided.

**Key words:** Systematics, taxonomy, Dietinae, Thomisidae, *Sylligma, Mystaria, Paramystaria*, Afrotropical region, scanning electron microscopy (SEM).

## Acknowledgements

I would like to thank the following people and institutions for their support on different aspects of this thesis, which would not otherwise have been finalized without their support:

My three supervisors, Proffs Chris Chimimba for his faith, motivation and support with my study, Ansie Dippenaar-Schoeman for her guidance on the taxonomy of crab spiders, and Clarke Scholtz for his input on taxonomy and for funding;

The South African National Research Foundation (NRF) for funding this research project and the South African National Survey of Arachnida (SANSA) project for additional funding;

Personnel at the the University of Pretoria, Pretoria, South Africa and the Agricultural Research Council (ARC), Plant Protection Research Institute (PPRI), Pretoria, South Africa for logistical support, particularly Annette van den Berg at the ARC-PPRI for her assistance with relevant literature translations;

Charnie Craemer for her guidance support, during the time we both studied systematics and taxonomy;

Curators and their technical assistants at national and international museums who were kind enough to lend specimens for study, in particular Dr. Rudy Jocqué of the Royal Museum for Central Africa, Tervuren, Belgium for the meticulous distribution data on specimens, Drs Pekka Lehtinen and Benjamin Suresh for invaluable discussions on various aspects of the study;

Drs Guido Gryseels and Rudy Jocqué and the personnel at the Invertebrate Section of

the Royal Museum for Central Africa, Tervuren, Belgium for facilitating a research visit and opportunity to study the Thomisidae under their care; also thanks to Domir De Bakker for his assistance and in acquiring canopy spiders for me to study; and Alain Reygel for advice on scietific drawings;

Charles Haddad from the University of the Free State, Bloemfontein for the opportunity to accompany him on a field trip to Ndumo Game Reserve, and for the thomisids that he and his team collected, which greatly contributed to my study;

All enthusiastic spider collectors that collected and donated preserved material and its valuable field notes to museums for taxonomic studies;

Allan Hall and Chris van der Merwe of the Microscopy Department at the University of Pretoria, Pretoria, South Africa for their kind assistance with scanning electron microscopy and its associated photography;

Prof. Braam van Wyk and Elsa van Wyk of the Department Plant Sciences, University of Pretoria, Pretoria, South Africa for allowing me to use microscope equipment under their care;

Barend van der Merwe of the Department of Geography, Geoinformatics and Meteorology, University of Pretoria, Pretoria, South Africa for assistance with distribution maps;

Human Buiriski of the Department of Zoology and Entomology, University of Pretoria, Pretoria, South Africa for assistance on the use of computer programs;

My friend, Martin Geyer from Free 2 Lance for his assistance in preparing plates of chapter 1 and 2.

Carmen Jacobs of the Department of Zoology and Entomology, University of Pretoria, Pretoria, South Africa for her assistance with literature;

To my friends and family, near and far, young and old, to mention a few, Yolande, Piet, Cornel, Martin, Dave, my parents in law Etienne and Karlien, aunty Sux, uncle Bob, Luna, Schalk, Jackie, Nadine, Helene, Sonnika and Fai. I appreciate your advice, interest in the subject, helping hands, talks and laughs;

My brothers Henk and Stephan and their families for their faith and fun times through life;

My parents, Frank and Irma Honiball for your unconditional love and immense support in all ways;

My adored husband Eduard, thank you for always being there for me, letting me be myself and loving me for who I am;

Gracey, the other love of my life – thank you for being there for me when things got tough and lonely – you made it worthwile; and

My Creator who inspires and is with me in everything I do.

## Table of contents

## List of figures

*oreadii* sp. n. from Rwanda: Rwankuba. 2. (a–d). Male *M. soleili* sp. n. from Kenya, Kakamega. 3. (a–d). Male *M. budongii* sp. n. from Kakamega.

**Fig. 4.4** ***Mystaria budongii*** sp. n. 1. Male right palp ventral view. 2. Right palp retro-lateral view. 3 Male from Rwanda, Ibanda Makera dorsal view.

**Fig. 4.5** Recorded geographical distribution of *Mystaria budongii* sp. n.

**Fig. 4.6** ***Mystaria flavogutatta*** (Lawrence, 1952) comb. nov. 1. Female epigyne ventral view. 2. Epigyne dorsal view. 3. Male left palp ventral view. 4. Left palp retro-lateral view. 5. Female from South Africa, Richards Bay antero-dorsal view. 6. Female postero-dorsal view. 7. Male from South Africa, Punda Maria Camp dorsal view.

**Fig. 4.7** Recorded geographical distribution of *Mystaria flavogutatta* (Lawrence, 1952) comb. nov.

**Fig. 4.8** ***Mystaria irmatrix*** sp. n. 1. Female epigyne ventral view. 2. Epigyne dorsal view. 3. Male right palp ventral view. 4. Right palp retro-lateral view. 5. Female from Mozambique, Marracuene antero-dorsal view. 6. Female latero-dorsal view. 7. Male form Marracuene postero-dorsal view.

**Fig. 4.9** Recorded geographical distribution of *Mystaria irmatrix* sp. n.

**Fig. 4.10** ***Mystaria lata*** (Lawrence, 1927) comb. nov. 1. Female epigyne ventral view. 2. Epigyne dorsal view. 3. Male right palp ventral view. 4. Right palp retro-lateral view. 5. Female from South Africa, Keiriver Mouth antero-dorsal view. 6. Female latero-dorsal view. 7. Two males from South Africa, Mazeppa Bay dorsal views.

**Fig. 4.11** Recorded geographical distribution of *Mystaria lata* (Lawrence, 1927) comb. nov.

**Fig. 4.12** ***Mystaria lindaicapensis*** sp. n. 1. Female epigyne ventral view. 2. Epigyne

dorsal view. 3. Male right palp ventral view. 4. Right palp retro-lateral view. 5. Female from South Africa, Jeffreys Bay antero-dorsal view. 6. Female latero-dorsal view. 7. Male from South Africa, Knysna dorsal view.

**Fig. 4.13** Recorded geographical distribution of *Mystaria lindaicapensis* sp. n.

**Fig. 4.14** ***Mystaria mnyama*** sp. n. 1. Female epigyne ventral view. 2. Epigyne dorsal view. 3. Male right palp ventral view. 4. Right palp retro-lateral view. 5. Female from South Africa, Tembe Elephant Park antero-dorsal view. 6. Female latero-dorsal view. 7. Male from Tembe Elephant Park dorsal view.

**Fig. 4.15** Recorded geographical distribution of *Mystaria mnyama* sp. n.

**Fig. 4.16** ***Mystaria occidentalis*** (Millot, 1942) comb. nov. 1. Female epigyne ventral view. 2. Epigyne dorsal view. 3. Male right palp ventral view. 4. Right palp retro-lateral view. 5. Female from Democratic Republic of Congo, Kaisola antero-dorsal view. 6. Female latero-dorsal view. 7. Male from Rwanda, Butare dorsal view.

**Fig. 4.17** Recorded geographical distribution of *Mystaria occidentalis* (Millot, 1942) comb. nov.

**Fig. 4.18** ***Mystaria oreadii*** sp. n. 1. Female epigyne ventral view. 2. Epigyne dorsal view. 3. Female from Rwanda, Rwankuba antero-dorsal view. 4. Female latero-dorsal view.

**Fig. 4.19** Recorded geographical distribution of *Mystaria oreadii* sp. n.

**Fig. 4.20** ***Mystaria rufolimbata*** Simon, 1895 1. Female epigyne ventral view. 2. Epigyne dorsal view. 3. Male right palp ventral view. 4. Right palp retro-lateral view. 5. Female from Democratic Republic of Congo, Walikale dorsal view. 6. Male from Gabon, Kinguélé dorsal view.

**Fig. 4.21** Recorded geographical distribution of *Mystaria rufolimbata* Simon, 1895.

**Fig. 4.22** ***Mystaria savannensis*** sp. n. 1. Female epigyne ventral view. 2. Epigyne dorsal view. 3. Male right palp ventral view. 4. Right palp retro-lateral view. 5. Female from South Africa, Soutpansberg antero-dorsal view. 6. Female latero-dorsal view. 7. Male form Soutpansberg dorsal view.

**Fig. 4.23** Recorded geographical distribution of *Mystaria savannensis* sp. n.

**Fig. 4.24** ***Mystaria soleili*** sp. n. 1. Female epigyne ventral view. 2. Epigyne dorsal view. 3. Male right palp ventral view. 4. Right palp retro-lateral view. 5. Female from Kenya, Kakamega dorsal view. 6. Male from Kakamega dorsal view.

**Fig. 4.25** Recorded geographical distribution of *Mystaia soleili* sp. n.

**Fig. 4.26.** ***Mystaria stakesbyi*** sp. n. 1. Female epigyne ventral view. 2. Epigyne dorsal view. 3. Male right palp ventral view. 4. Right palp retro-lateral view. 5. Female from Ghana, Legon dorsal view. 6. Male from Democratic Republic of Congo, Semliki dorsal view.

**Fig. 4.27** Recorded geographical distribution of *Mystaria stakesbyi* sp. n.

**Fig. 4.28** ***Mystaria variabilis*** (Lessert, 1919) comb. nov. 1. Female epigyne ventral view. 2. Epigyne dorsal view. 3. Male right palp ventral view. 4. Right palp retro-lateral view. 5. Female from Democratic Republic of Congo, Kisantu anterior view. 6. Female lateral view. 7. Male from Democratic Republic of Congo, Butembo dorsal view.

**Fig. 4.29** Recorded geographical distribution of *Mystaria variabilis* (Lessert, 1919) comb. nov.

**Fig. 5.1** ***Leroya signopuellaris*** sp. n. from the Democratic Republic of Congo, Mayombe. 1. Chelicerae. 2-5.Tarsal claws and tufts 2. leg I. 3. leg II. 4. leg III. 5. leg IV.

**Fig. 5.2** ***Leroya signopuellaris*** gen. n., sp. n. 1. & 2. Female epigyne ventral view. 3. Epigyne dorsal view. 4. Male right palp ventral view. 5. Right palp retro-lateral view. 6. Female from Democratic Republic of Congo, Mayombe dorsal view. 7. Male from Mayombe dorsal view.

**Fig. 5.3** Recorded geographical distribution of *Leroya singopuellaris* sp.n.

**Fig. 5.4** ***Leroya unicolor*** (Simon, 1895) comb. nov. 1. & 2. Female epigyne ventral view. 3. Epigyne dorsal view. 4. Female from the Democratic Republic of Congo, Rwankwi dorsal view.

**Fig. 5.5** Recorded geographical distribution of *Leroya unicolor* (Simon, 1895) comb. nov.

## List of tables

# Chapter 1

# Introduction

## 1.1 The family Thomisidae

Spiders have inhabited the earth since the Devonian Period, approximately 374 million years ago (Seldon *et al.* 2009). They are members of the Class Arachnida, Order Araneae and ranked by Order, 7$^{th}$ in global biodiversity for terrestrial animals (Wunderlich 2004). Currently, 109 spider families represented by *ca*. 3733 genera and *ca*. 40700 species are recognized worldwide (Platnick 2009) and the number is estimated to increase to *ca.* 179000 species (Adis & Harvey 2000).

Spiders are remarkably successful in ecosystems, and are an important predatory group of terrestrial animals (Dippenaar-Schoeman & Jocqué 1997). They are specialists in various niches and able to survive with different survival strategies (Coddington & Levi 1991). Spiders have been extensively studied in the last three centuries and on-going studies still continue to provide insights into their behaviour (Herberstein 2000), ecology (Oxford & Gillespie 1998), speciation (Jocqué 2002), phylogeny (Griswold *et al.* 1999), natural and fossil history (Wunderlich 2004), and medical importance in their general association with humankind (Newlands 1981). In addition, their role as predators in agro-ecosystems as biological control agents proves them to be very effective and environmentally-friendly (van den Berg *et al.* 1992). However, the chaotic state of the taxonomy of many families necessitates the study of the systematics of spiders in order to document, revise and describe species to better understand their diversity and their role in ecosystem functioning as an indicator group in the approach to the formulation of conservation management plans (Haddad *et al.* 2010).

Among the diverse range of spider families, crab spiders of the family Thomisidae Sundevall, 1833 are recognized as one of the largest families that has a worldwide distribution (Jocqué & Dippenaar-Schoeman 2006). Crab spiders are

wandering spiders and do not produce webs to catch prey, but use camouflage and mimicry to ambush prey, which they kill with strong venom (Foelix 1996). They have lost their fleetness, and have become sedentary to deceive and entrap their prey (Dippenaar-Schoeman & Jocqué 1997). With their cryptic colouration and camouflage, most species await their prey, usually on plants (Dippenaar-Schoeman & Jocqué 1997). They are mainly active during the day (Ono 1988). The first two pairs of legs are longer than the rest and laterigrade-positioned allowing for a crab-like motion and maneuverability in crevices between bark and vegetation, hence their common name (Ono 1988; Foelix 1996).

The Thomisidae are morphologically diverse, with a range of adaptations in body size, form and colouration that allows them to inhabit different plant habitats; a few are also found on the ground. Genera such as *Tmarus* Simon, 1875 and *Pherecydes* O.P. Cambridge, 1883, with their mottled brown and grey bodies, decorated with tubercles, are primarily found on bark while *Monaeses* Thorell, 1869 and *Runcinia* Simon, 1875 with their cream coloured, elongated bodies are found on grasses and plant stems (Dippenaar-Schoeman 1980b, 1980c, 1984, 1985). Members of the genus *Heriaeus* Simon, 1875 have a spiny appearance and live on flowers and dense vegetation while members of the Bominae with their small, round bodies are found perfectly camouflaged between seeds and flowers (Dippenaar-Schoeman 1986a, 1986b, 1989b). Members of the genus *Xysticus* Koch, 1835, with their dominantly brown colouration are soil-dwellers while *Thomisus* Walckenaer, 1805 and *Misumenops* O.P. Cambridge, 1900 have bright coloured bodies and live on flowers (Dippenaar-Schoeman 1983; Levy 1973, 1976). Members of the genus *Thomisus* are able to change their colour, from white to pink, to conform with the background of the flowers they live on (Dippenaar-Schoeman 1980a). In *Phrynarachne* Thorell, 1869, the spiders spin a small uneven silk disk on a leaf (Dippenaar-Schoeman & Jocqué 1997). Their bodies are covered with numerous tubercles and when resting in the middle of a silk disk, they resemble bird droppings (Ono 1988).

Members of the Thomisidae are small- to medium-sized, two-clawed, ecribellate, entelegyne spiders with eight eyes (Dippenaar-Schoeman & Jocqué 1997). Their strong front legs, which in most genera bear macro-setae, act as raptorial legs that allow them to grab prey from the air, while their shorter posterior legs hold on to the substrate (Ono 1988; Wunderlich 2004). Their eyes are usually situated on tubercles and in most genera the lateral eyes are larger than the median eyes, an adaptation of these particularly day-hunting spiders (Ono 1988). Regarding their genitalia, the male palpal tibia usually has a conspicuous retro-lateral and ventral apophysis and the cymbium frequently has a tutaculum, a disc-shaped tegulum sometimes with tegular- or cymbial apophyses (Fig. 1.1.4). The embolus varies in length, but is often long and thin and surrounds the tegulum (Fig. 1.1.4). The female epigyne usually has a hood or a guide pocket (Wunderlich 2004). A medium septum may be present ventrally that divides the epigyne into two separate parts (Dippenaar-Schoeman 1980a). Two small intromittent orifices (Fig. 1.1.3) are present where the embolus enters the epigyne for sperm transfer during copulation. From there, intromittent canals carry sperm to the larger round or kidney-shaped spermathecae while small fertilization tubes connect the spermathecae to the ovaries (Ono 1988).

## 1.2 Systematics and taxonomic history of the Thomisidae

Currently, *ca*. 2085 species allocated to 173 genera are recognized within the familiy Thomisidae (Platnick 2009). Of these, 69 genera allocated to six subfamilies have been reported to occur in the Afrotropical region (Dippenaar-Schoeman & Jocqué 1997) but a new subfamily, the Coriarachninae was added by Lehtinen (2002). The most significant contribution to the systematics of the Thomisidae was made by the renowned French arachnologist E. Simon between 1881 and 1910 (Simon 1881, 1895, 1903a, 1910). He published a world revision of the family, which still provides the basis on which most of the present taxonomy of the thomisids is based (Jocqué & Dippenaar-Schoeman 2006). Although the family has been the subject of several studies in the past (Benjamin *et al.* 2008), large numbers of genera are still in need of revision and the systematic relationships within the family and with other families

still remain unresolved. Worldwide studies so far conducted on the Thomisidae are listed in the following catalogues: Mello-Leitao (1929), Bonnet (1945–1959), Roewer (1954) and Platnick (2009), with the latter being available on-line and is regularly up-dated with new information.

Simon (1895) classified the Thomisidae into the following six subfamilies: 1) Aphantochilinae; 2) Strophiinae; 3) Stiphropodinae; 4) Stephanopsinae; 5) Misumeninae; and 6) Philodrominae, each containing a number of his newly established genus-groups. Petrunkevitch (1928) elevated the Aphantochilinae to family level but that was not generally accepted (Ono 1988). Petrunkevitch (1928) split the Misumeninae and created a subfamily Dietinae, based on the tarsal claw tufts consisting of tenent setae.

Subsequently, some changes have been made to the taxonomic rankings alluded to above. The name Thomisinae Sundevall, 1833 is now the accepted subfamily name, replacing Misumeninae. Holm (1940) and Homann (1975) found that the Philodrominae are phylogenetically removed from the Thomisidae and it was accorded family rank. In a revision of the thomisids from Japan, Ono (1988) provided an identification key for the Thomisidae where he recognized seven subfamilies including a new subfamily Bominae. The last change to the subfamily list was by Lehtinen (2002) who proposed the inclusion of three genera *Xysticus* Koch, 1835, *Ozyptila* Simon, 1864 and *Bassaniodes* Pocock, 1903 in the subfamily Coriarachninae.

### 1.3 The Thomisidae of the Afrotropical region

Currently, only 31% of the thomisids from the Afrotropical region have been revised (Dippenaar-Schoeman 1980a). The most important regional studies on the Thomisidae are: 1) Simon (1881–1910); 2) Pocock (1898–1903) and 3) Strand (1907a-c) who described species from Madagascar, North and southern Africa; 4) Lessert (1915–1943) who studied the thomisids from Central and southern Africa; 5) Caporiacco (1939–1949) who investigated the thomisids of North and East Africa; 6)

Millot (1942) who studied the thomisids from East Africa; 7) Comellini (1955–1959) who revised the African species of the genera *Tmarus* and *Thomisus;* 8) Jézéquel (1964, 1966) who investigated the thomisids from Côte d'Ivoire; and 9) Dippenaar-Schoeman (1988) who revised some thomisid genera from Malawi; 10) Dippenaar-Schoeman (1989a) who reviewed the thomisids from Saudi Arabia; and 11) Dippenaar-Schoeman & Van Harten (2007) revised the genus *Thomisus* from Yemen and Socotra. Contributions to studies on the thomisids have also been made by Roewer (1954), Benoit (1977–1978), Loerbroks (1983), Garcia-Neto (1989) and Lehtinen (2004). In southern Africa, Lawrence (1928–1968) described several new species. All the above cited studies on the thomisids were mainly based on alpha taxonomy. The first revisionary work in southern Africa was conducted by Dippenaar-Schoeman (1980–1989) who to-date has revised 12 thomisid genera from the subregion.

Although the family Thomisidae has been the subject of several studies in the past and represents one of the most abundant groups in the Afrotropical region (Dippenaar-Schoeman & Jocqué 1997), the majority of the genera within the family are still in need of taxonomic revision. There are difficulties in studying spiders from the Afrotropical region as most type specimens are deposited in overseas collections and difficult if not impossible to obtain for study (Dippenaar-Schoeman 1980a). The older descriptions are inadequate for identification and some descriptions are without illustrations, with vague locality records and often based on either juvenile or sub-adult specimens that lacked genital characters that are essential for species identification (Eberhard 1986). Consequently, there is a need for systematic revisions of genera that should include detailed descriptions and re-descriptions, illustrations of both the internal and external genitalia, as well as workable identification keys for both genera and species.

### 1.4 The subfamily Dietinae

In the present study, three genera of the subfamily Dietinae from the Afrotropical region are revised. Simon (1895) originally included 18 genus-groups in the

subfamily Misumeninae (Thomisinae). Petrunkevitch (1928) recognized the presence of true claw tufts on the tarsi (Fig. 1.1.1) of some genera and regarded this as an important diagnostic feature, so he elevated the Dieteae to subfamily level. Roewer (1954) listed seven of the genus-groups of Simon (1895) in the subfamily Dietinae, namely: 1) Alcimochtheae; 2) Amyciaeeae; 3) Apyretineae; 4) Dieteae; 5) Emplesiogoneae; 6) Mystarieae; and 7) Taguleae. Table 1 provides a list of the genera included in six of the groups known from the Afrotropical region as listed by Roewer (1954). Alcimochtheae is the only group not known from the Afrotropical region (Roewer 1954). Following Ono (1988), these genus-groups are referred to as tribes throughout the present study.

Ono (1988) provided the following diagnosis for the subfamily Dietinae: carapace flat to convex, setaceous; eyes well-developed; lateral eyes on small tubercles; chelicerae without teeth, only small vestigial teeth; labium longer than wide, truncated; legs long, slender, setaceous; patellae shorter than tibiae and metatarsi; tarsi with claw tufts formed by tenent hairs and body setae not branched.

Most members of the subfamily Dietinae live on plants and the presence of tenent hairs possibly assist with their movement on plants and smooth surfaces such as leaves (Ono 1988). Gertsch (1939) speculated that tarsal claw tufts evolved to provide spiders with better adhesion to either foliage or other substrates. Ono (1988) reported that apart from claw tufts, the Dietinae is not very different from Thomisinae. Lehtinen (2001) noted that claw tufts consisting of tenent hairs are weakly developed in some genera of the Dietinae and is, therefore argued that it is not the best defining character for the Dietinae. He suggested that the development of this type of claw tufts might be a result of parallel adaptation since it varies between species occupying different habitats (P.T. Lehtinen *pers. comm*.). Lehtinen (2001) speculated that the Dietinae are not monophyletic and that their grouping is based on parallel adaptation with no phylogenically related characters among the groups. He proposed (P.T. Lehtinen *pers. comm.*) that members of the Apyretini–Tagulini complex and possibly the Mystarini, specifically members of the genus

*Sylligma* have numerous diagnostic characters, including the presence of strong setae and modifications along the carapace border or sometimes on the abdomen.

In the present study, three genera of the Mystarini (Table 1) are investigated, namely: 1) *Mystaria* Simon, 1895; 2) *Paramystaria* Lessert, 1919; and 3) *Sylligma* Simon, 1895.

Tabel 1. Six tribes of the Dietinae of the Afrotropical region and their associated genera as recognized by Simon (1895) and listed by Roewer (1954).

| **1**<br>**Amyciaeini** | **2**<br>**Apyretini** | **3**<br>**Dietini** | **4**<br>**Emplesiogonini** | **5**<br>**Mystarini** | **6**<br>**Tagulini** |
|---|---|---|---|---|---|
| *Amyciaea* Simon, 1885 | *Apyretina* Strand, 1929 | *Diplotychus* Simon, 1903 | *Emplesiogonus* Simon, 1903 | *Mystaria* Simon, 1895 | *Tagulis* Simon, 1895 |
| *Hewittia* Lessert, 1928 | *Lampertia* Strand, 1907 | *Oxytate* Koch, 1878 | *Plastonomus* Simon, 1903 | *Paramystaria* Lessert, 1919 | |
| | *Zametopias* Thorell 1892 | *Phaenopoma* Simon, 1895 | *Pseudoporrhopis* Simon, 1886 | *Sylligma* Simon, 1895 | |
| | | *Ostanes* Simon, 1895 | | | |

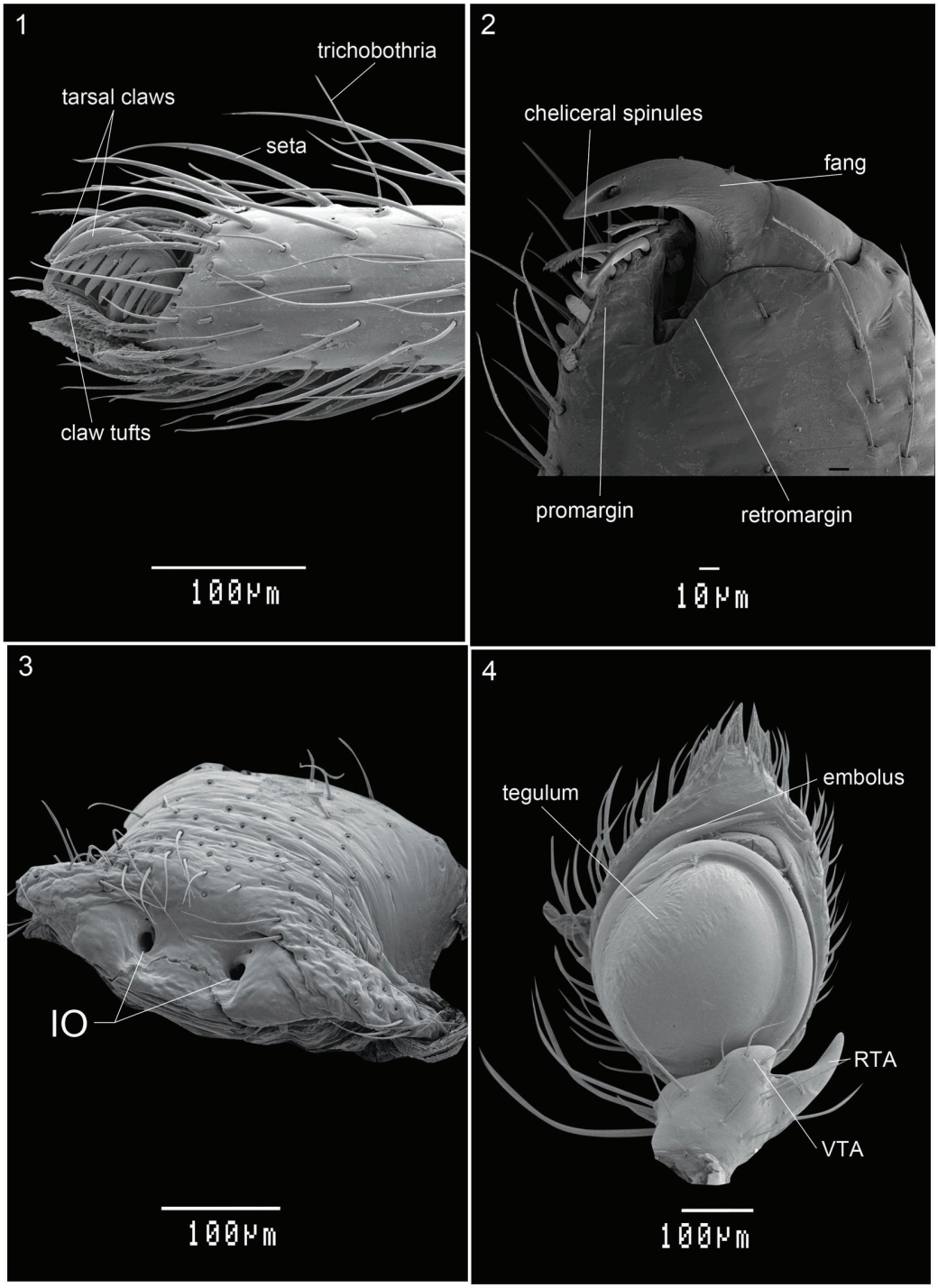



**Fig. 1.1** SEM photographs of morphological characters of genera and species in the Dietinae 1. Tarsus of *Sylligma* Simon, 1895. 2. Chelicera of *Apyretina* Strand, 1929. 3. Female genitalia, epigyne of *Sylligma ndumi* sp. n. 4. Male genitalia, palp of *Sylligma ndumi* sp. n.

## 1.5 Aim of study

The aim of the present study is to assess the systematic status of genera within the tribe Mystarini of the subfamily Dietinae from the Afrotropical region, namely: 1) *Mystaria*; 2) *Paramystaria*; 3) *Sylligma,* based on a classical taxonomic approach using standard microscopy as well as scanning electron microscopy (SEM). The approach followed includes: 1) the description of new taxa and re-description of known species, with appropriate illustrations with a special focus on genitalia that are considered to be the most useful characters in the delineation of taxa; 2) deriving identification keys for the recognized genera and species within the Mystarini; and 3) determining the geographic distributions of the delineated species.

## 1.6 Research questions

More specifically, the following research questions were addressed in the present study:

1) Are there any qualitative morphological features that can be used to distinguish between species and between genera within the tribe Mystarini?

2) How many genera and species within the Afrotropical Mystarini can be recognized using the qualitative morphological features?

3) What are the geographic distributions of the delineated species within the tribe?

## 1.7 Justification

Apart from contributing towards the general knowledge of spiders from the Afrotropical region, the present study may assist in providing an insight into the nature and extent of variation within the subfamily Dietinae that could be used for resolving evolutionary relationships among tribes within Dietinae and other subfamilies within the Thomisidae worldwide. The delineation of species and the development of operational identification keys may contribute towards a better understanding of the systematics of the group. This, in turn, may shed light on the

role of the group in ecosystem functioning, and provide data for red data species listing initiatives, and the formulation of conservation management plans.

**References**


ADIS, J. & HARVEY, M.S. 2000. How many Arachnida and Myriapoda are there worldwide and in Amazonia. *Study of the Neotropical Fauna and Environment* **35**: 139–141.

BENJAMIN, S.P., DIMITROV, D., GILLESPIE, R.G. & HORMIGA, G. 2008. Family ties: molecular phylogeny of crab spiders (Araneae: Thomisidae). *Cladistics* **24**: 708–722.

BENOIT, P. L. G. 1977. Fam. Thomisidae. In: La faune terrestre de l'île de Sainte-Hélène IV. *Annales du Musée royal de l'Afrique Centrale* **220**: 82–87.

BENOIT, P. L. G. 1978. Contributions à l'étude de la faune terrestre des îles granitiques de l'archipel des Séchelles (Mission P.L.G. Benoit - J.J. Van Mol 1972). Thomisidae (Araneae). *Revue de Zoologie africaine* **92**: 899–901.

BONNET, P. 1945-1959. Bibliographia araneorum. Toulouse, Douladoure **2**: 1–5058.

CAPORIACCO, L. DI. 1939. Aracnidi cavernicoli delle Puglie. *Le Grotte d' Italia* **3**: 43–47.

CAPORIACCO, L. DI. 1949. Aracnidi della Colonia del Kenya raccolti da Toschi e Meneghetti negli anni 1944 -1946. *Commentationes Pontificiae Academiae Scientiarum* **13**: 309–492.

CODDINGTON, J.A. & LEVI, H.W. 1991. Systematics and evolution of spiders (Araneae). *Annual Review of Ecology and Systematics* **22**: 565–592.

COMELLINI, A. 1955. Notes sur les Thomisidae d'Afrique. I. Le genre *Tmarus*. *Revue de zoologie et de botanique africaines* **51**: 117–126.

COMELLINI, A. 1957. Notes sur les Thomisidae d'Afrique. 2. Le genre *Thomisus*. *Revue de zoologie et de botanique africaines* **55**: 1–32.

COMELLINI, A. 1959. Notes sur les Thomisidae d'Afrique 3. Complement du genre *Thomisus*. *Revue de zoologie et de botanique africaines* **60**: 110–119.

DIPPENAAR-SCHOEMAN, A.S. 1980a. *A revision of some genera of the subfamily Misumeninae (Thomisidae: Araneae) of Southern Africa.* PhD thesis. Rand Afrikaans University, Johannesburg. 1–287 pp.

DIPPENAAR-SCHOEMAN, A.S. 1980b. The crab-spiders of southern Africa (Araneae: Thomisidae). 1. The genus *Runcinia* Simon, 1875. *Journal of the Entomological Society of Southern Africa* **43**: 303–326.

DIPPENAAR-SCHOEMAN, A.S. 1980c. The crab-spiders of southern Africa (Araneae: Thomisidae). 2. The genera *Pherecydes* Picard-Cambridge, 1883 and *Smodicinus* Simon, 1895. *Journal of the Entomological Society of Southern Africa* **43**: 327–340.

DIPPENAAR-SCHOEMAN, A.S. 1983. The spider genera *Misumena, Misumenops, Runcinia* and *Thomisus* (Araneae: Thomisidae) of southern Africa. *Entomological Memoirs of the Department of Agriculture, South Africa* **55**: 1–66.

DIPPENAAR-SCHOEMAN, A.S. 1984. The crab-spiders of southern Africa (Araneae: Thomisidae). 4. The genus *Monaeses* Thorell, 1869. *Phytophylactica* **16**: 101–116.

DIPPENAAR-SCHOEMAN, A.S. 1985. The crab-spiders of southern Africa (Araneae: Thomisidae). 5. The genus *Tmarus* Simon, 1875. *Phytophylactica* **17**: 115–128.

DIPPENAAR-SCHOEMAN, A.S. 1986a. The crab-spiders of southern Africa (Araneae: Thomisidae). 6. The genus *Avelis* Simon, 1895. *Phytophylactica* **18**: 131–132.

DIPPENAAR-SCHOEMAN, A.S. 1986b. The crab-spiders of southern Africa (Araneae: Thomisidae). 7. The genus *Holopelus* Simon, 1886. *Phytophylactica* **18**: 187–190.

DIPPENAAR-SCHOEMAN, A. S. 1988. An annotated checklist of the crab-spiders of Malawi (Araneae: Thomisidae). I. The genera *Misumenops, Runcinia* and *Thomisus*, with a description of a new species. *Revue de Zoologie africaine* **102**: 429–438.

DIPPENAAR-SCHOEMAN, A. S. 1989a. An annotated check list of crab spiders (Araneae: Thomisidae) of Saudi Arabia. *Fauna of Saudi Arabia* **10**: 20–30.

DIPPENAAR-SCHOEMAN, A.S. 1989b. The crab spiders of southern Africa (Araneae: Thomisidae). 8. The genus *Thomisops* Karsch, 1879. *Phytophylactica* **21**: 319–330.

DIPPENAAR-SCHOEMAN, A.S. & JOCQUÉ, R. 1997. *African spiders, an identification manual.* Plant Protection Research Institute Handbook 9, Agricultural Research Council, Pretoria. 1–392 pp.

DIPPENAAR-SCHOEMAN, A.S. & VAN HARTEN, A. 2007. Crab spiders (Araneae: Thomisidae) from mainland Yemen and the Socotra Archipelago: Part 1. The genus *Thomisus* Walckenaer, 1805. *Fauna of Arabia* **23**: 169–188.

EBERHARD, W.G. 1986. Why are genitalia good species characters? In: Eberhard, W.G., Lubin, Y.D. and Robinson, B.C. (Eds). *Proceedings of the 9th International Congress of Arachnology, Panama 1938*. 53–59. Smithsonian Institution Press, Washington.

FOELIX, R.F. 1996. *Biology of spiders.* Harvard University Press, United States of America. 1– 330 pp.

GARCIA-NETO, L. N. 1989. *Tmarus comellini* nom. nov. para *Tmarus hirsutus* Comellini, 1955 (Araneae, Thomisidae, Misumeninae). *Iheringia* **69**: 149–150.

GERTSCH, W.J. 1939. A revision of the typical Crab-Spiders (Misumeninae) of America North of Mexico. *American Museum of Natural History* **126**: 277–442.

GRISWOLD, C.E., CODDINGTON, J.A., PLATNICK, N.I. & FORSTER, R.R. 1999. Towards a phylogeny of entelegyne spiders (Araneae, Araneomorphae, Entelegynae). *Journal of Arachnology* **27**: 53–63.

HADDAD, C.R., HONIBALL, A.S., DIPPENAAR-SCHOEMAN, A.S., SLOTOW, R & VAN RENSBURG, B.J. 2010. Spiders as potential indicators of elephant induced habitat changes in endemic sand forest, Maputaland, South Africa. *African Journal of Ecology* **48**: 446–460.

HERBERSTEIN, M.E. 2000. Foraging behaviour in orb-web spiders (Araneidae): do web decorations increase prey capture success in *Argiope keyserlingi* Karsch, 1878. *Australian Journal of Zoology* **48**: 217–223.

HOLM, A. 1940. Studien über die Entwicklung und Entwicklungsbiologie der Spinnen. *Zoologiska Bidrag fran Uppsala* **19**: 1–214.

HOMANN, H. 1975. Die Stellung der Thomisidae und der Philodromidae im System der Araneae (Chelicerata, Arachnida). *Zeitschrift für Morphologie der Tiere* **80**: 181–202.

JÉZÉQUEL, J.F. 1964. Araignées de la savane de Singrobo (Côte d'Ivoire). III.-Thomisidae. *Bulletin de l Institut français de Afrique Noire* **26**: 1103–1143.

JÉZÉQUEL, J.F. 1966. Araignées de la savane de Singrobo (Côte d'Ivoire). V.-Note complémentaire sur les Thomisidae. *Bulletin du Muséum national d'histoire naturelle* Paris **37**: 613–630.

JOCQUÉ, R. 2002. Genitalic polymorphism – a challenge for taxonomy. *Journal of Arachnology* **30**: 298–306.

JOCQUÉ, R. & DIPPENAAR-SCHOEMAN, A.S. 2006. *Spider families of the world.* Royal Museum for Central Africa, Tervuren. 1–336 pp.

LAWRENCE, R. F. 1928. Contributions to a knowledge of the fauna of South-West Africa VII. Arachnida (Part 2). *Annals of the South African Museum* **25**: 217–312.

LAWRENCE, R. F. 1968. Four new spiders from southern Africa (Araneae). *Annals of the Natal Museum* **20**: 109–121.

LEHTINEN, P.T. 2001. Polyphyly of Thomisidae: Dietinae. *Proceedings of the 15th International Congress of Arachnology* (unpublished). Badplaas South Africa.

LEHTINEN, P.T. 2002. Generic revision of some thomisids related to *Xysticus* C.L. Koch 1835 and *Ozyptilla* Simon, 1864: In*:* Toft S. & Scharff N. (Eds) *Proceedings of the 19th European Colloquium of Arachnology 2000.* 315–327. Aarhus University Press, Aarhus.

LEHTINEN, P.T. 2004. Review of the crab spiders of Madagascar and the Mascarene Islands. *Proceedings of the 16th International Congress of Arachology* (unpublished), Ghent, Belgium.

LESSERT, R. DE. 1915. Arachnides de l'Ouganda et de l'Afrique Orientale Allemande (Voyage du Dr J. Carl dans la région des lacs de l'Afrique centrale). *Revue suisse de zoologie* **23**: 1–80.

LESSERT, R. DE. 1919. Araignées du Kilimandjaro et du Merou (suite). III. Thomisidae. *Revue suisse de zoologie* **27**: 99–234.

LESSERT, R. DE. 1928. Araignées du Congo recueillies au cours de l'expedition organiseé par l'American Museum (1909-1915). (II). *Revue suisse de zoologie* **35**: 303–352.

LESSERT, R. DE. 1943. Araignées du Congo Belg (III). *Revue suisse de zoologie* **50**: 305–338.

LEVY, G. 1973. Crab-spiders of six genera from Israel (Araneae: Thomisidae). *Israel Journal of Zoology.* **22**: 107–141.

LEVY, G. 1976. The spider genus *Xysticus* (Araneae: Thomisidae) in Israel. *Israel Journal of Zoology* **25**: 1–37.

LOERBROKS, A. 1983. Revision der Krabbenspinnen-Gattung *Heriaeus* Simon (Arachnida: Araneae: Thomisidae). *Verhandlungen der Naturwissenschaftlichen Verein zu Hamburg* **26**: 85–139.

MELLO-LEITAO, C. F. DE. 1929. Aphantochilidas e Thomisidas do Brasil. *Archivos do Museu Nacional do Rio de Janeiro.* **31**: 9–359.

MILLOT, J. 1942. Les araignées de l'Afrique Occidentale Français: Thomisidae. *Mémoires de l'Académie des sciences de l'Institut de France* **65**(2): 1–82

NEWLANDS, G. 1981. A new violin spider from Johannesburg with notes on its medical and epidemiological importance. *Zeitschrift für Angewandte Zoologie* **68**: 357–365.

ONO, H. 1988. *A revisional study of the spider family Thomisidae (Arachnida, Araneae) of Japan.* National Science Museum, Tokyo. 1–252 pp.

OXFORD, G.S. & GILLESPIE, R.G. 1998. Evolution and ecology of spider coloration. *Annual Review of Entomology* **43**: 619–643.

PETRUNKEVITCH, A. 1928. Systema Aranearum. *Transactions of the Connecticut Academy of Arts and Science* **29**: 1–270.

PLATNICK, N.I. 2009. The world spider catalog, Version 9.5. American Museum of Natural History, online at http://research.amnh.org/entomology/spiders/catalog/index.html.

POCOCK, R. I. 1898. The Arachnida from the province of Natal, South Africa, contained in the collection of the British Museum. *Annals and Magazine of Natural History* **7**: 197–226.

POCOCK, R. I. 1903. Some Arachnida collected by Mr G. W. Bury in Yemen. *Annals and Magazine of Natural History* **7**: 214–220.

ROEWER, C.F. 1954. Katalog der Araneae 1758 –1940, Institut Royal des Sciences Naturelles de Belgique (2): 1–1751.

SELDON, P.A., ANDERSON, H.M. & ANDERSON, J.M. 2009. A review of the fossil record of spiders (Araneae) with special reference to Africa, and description of a new specimen from the Triassic Molteno Formation of South Africa. *African Invertebrates* **50**: 105–116.

SIMON, E. 1881. Descriptions d'Arachnides nouveaux d'Afrique. *Bulletin de la Société zoologique de France* **6**: 1–15.

SIMON, E. 1889. Etudes arachnologiques. 21e Mémoire. 31. Descriptions d'espèces et the genres nouveaux de Madagascar et de Mayotte. *Annales de la Société entomologique de France* **6**: 223–236.

SIMON, E. 1890. Etudes arachnologiques. 22e Mémoire. 35. Etude sur les arachnides recueillis par M. L. von Höhnel, officier de la marine autrichienne, pendant l'expedition de M. le comte Teleki dans l'Afrique orientale équatoriale en 1887–1888. *Annales de la Société entomologique de France* **6**: 125–130.

SIMON, E. 1895. Histoire naturelle des Araignées.1. Paris 1895: 761–1084.

SIMON, E. 1901. Histoire naturelle des Araignées. 2. Paris 1901: 381–668.

SIMON, E.1903a. Histoire naturelle des Araignées. 2. Paris 1903: 669–1080.

SIMON, E. 1903b. Descriptions d'Arachnides nouveaux de Madagascar, faisant partie des collections du Muséum. *Bulletin du Muséum national d'histoire Naturelle,* Paris **9**: 133–140.

SIMON, E. 1907. Arachnides recueillis par L. Fea sur la côte occidentale d'Afrique. Pt I. *Annali del Museo Civico di Storia naturale "Giacomo Doria",* Genova **43**: 218–323.

SIMON, E. 1910. Catalogue raisonné des Arachnides du nord de l'Afrique (1 re partie). *Annales de la Société entomologique de France* **79**: 265–332.

SONG, D. X., FENG Z. Q. & SHANG. J. W. 1982. On the males of two species of crab spiders (Araneida: Thomisidae). *Acta Zootaxonomica Sinica* **7**: 257–259.

STRAND, E. 1907a. Diagnosen neuer Spinnen aus Madagascar und Sansibar. *Zoologischer Anzeiger* **31**: 725–748.

STRAND, E. 1907b. Afrikanische Spinnen (exkl. Avicullariiden) hauptsächlich aus dem Kapland. *Zoologische Jahrbücher II. Abteilung für Systematik* **25**: 557–731.

STRAND, E. 1907c. Über einige tropisch-afrikanische Spinnen. *Societas Entomologica* **22**: 65–92.

VAN DEN BERG, M.A., DIPPENAAR-SCHOEMAN, A.S., DEACON, V.E. & ANDERSON, S.H. 1992. Spiders of unsprayed citrus orchard in the Transvaal lowveld, South Africa, and their interaction with the citrus psylla, *Trioza erytreae* (Hemiptera: Triozidae). *Entomophaga* **37**: 599–608.

WUNDERLICH, J. 2004. *Fossil spiders in amber and copal*. Joerg Wunderlich Verlag. Hirschberg-Leutershausen, Germany. Vol 3A, B. 1–1908 pp.

# Chapter 2

# Material and Methods

## 2.1 Introduction

The present chapter provides a general “Materials and Methods” section that applies to the entire dissertation. Nevertheless, some specific aspects of “Materials and Methods” that are unique to some subsequent chapters may be provided in those chapters. There may also be some repetition in “Material and Methods” in some subsequent chapters. This is because the chapters are designed to be stand-alone chapters for future publication purposes.

## 2.2 Study area

The geographic coverage of the present study encompasses the Afrotropical Region, south of the Sahara, Yemen (and its associated surrounding islands), and Madagascar.

## 2.3 Study material

The study was based on available museum-preserved material obtained on loan from both local and overseas museum collections that included the following:

1) American Museum of Natural History (AMNH), New York, U.S.A;
2) California Academy of Science (CAS), San Francisco, U.S.A;
3) Iziko Museums–South African Museum (SAM), Cape Town, South Africa;
4) Musée d’Histoire Naturelle Geneva (MNHG), Switzerland ;
5) Muséum National d’Histoire Naturelle (MNHN), Paris, France;
6) Museum of Comparative Zoology (MCZ), Harvard University, Cambridge U.S.A;
7) Natal Museum (NM), Pietermaritzburg, South Africa;
8) National Museum, Bloemfontein (NMBA), South Africa;
9) Senckenberg Museum of Natural History (SMF), Frankfurt, Germany;

10) The Koninklijk Museum voor Midden-Afrika (MRAC), Tervuren, Belgium.
11) The National Collection of Arachnida (NCA) Pretoria, South Africa; and
12) Zoologisches Forschungsmuseum Alexander Koenig (ZFMK), Bonn, Germany.

Some museum-preserved material studied in the present study dates back to the late 19th and early 20th centuries and was augmented by fresh material from the following countries: South Africa (collected by C. Haddad, R. Lyle and S. Foord and deposited in the NCA); the Democratic Republic of Congo (DRC) (collected by D. De Bakker and J.P. Michiels and deposited in the MRAC); and from Rwanda, Uganda and Kenya (collected by T. Wagner and W. Freund deposited in the ZFMK). This material was collected by either active searching on the ground and vegetation, leaf-litter sifting, tree- and bush-beating using a stick, canopy fogging and sweep-netting.

### 2.4 Methodology

The present study follows the Biological Species Concept (BSC; Mayr 1942, 1969; Mayr & Ashlock 1991) which defines species as "*groups of actually or potentially inter-breeding natural populations which are reproductively isolated from other such groups*"). Given that the present study is dependent on museum-preserved material, disruption of gene flow was inferred from morphological evidence based on classical taxonomic procedures using stereo, compound, scanning electron microscopy (SEM) and photography.

### 2.5 Classical taxonomy

A suite of homologous qualitative and quantitative morphological characters were compiled from original descriptions, existing identification keys, and through an examination of actual specimens, with special reference to type material where available. These morphological characters were used for descriptions and redescriptions of taxa at both the generic and specific levels, and, where appropriate, were also used to develop identification keys for both genera and species within the Mystarini (subfamily: Dietinae). All characters were assessed with

special reference to sexually dimorphic characters such as genitalia (Fig. 1.1). It has been reported that male and female genitalia in most entelegyne spiders are usually species-specific (Eberhard 1986). Where appropriate, the characters were illustrated by line drawings and/or photographs. These illustrations included both external and internal genital structures in females, as well as different views of the male genitalia (Figs 1.1.3-4). In addition, descriptions were based on some diagnostic characters such as eye pattern, eye distances and size, clypeal length, chelicera shape and marginal teeth, setae on both the body and appendages, diverse colours of sclerotized parts of bodies and appendages.

### 2.5.1 Light microscopy

All characters were examined using stereo and compound microscopy. Characters were examined under 40 x magnification using a Wild M3C light microsope (Wild, Heerbrugg, Switzerland) fitted with a calibrated 10x micrometer ocular lens, with measurements being recorded to the nearest 0.01 mm. A Vickers compound microscope (Vickers Instruments Limited, York, England) was exclusively used to study genitalia, and drawings were made with the aid of a Camera Lucida (Leica-Leitz Wetzlar, Vienna, Austria). A Nikon DXM 1200 digital camera (Nikon, Tokyo, Japan) was used for photography on both a Nikon SMZ 800 stereo microscope (Nikon, Tokyo, Japan) and a Nikon Optiphot compound microscope (Nikon, Tokyo, Japan).

### 2.5.2 Scanning electron microscopy (SEM)

Structures such as tarsal segments of the legs, chelicerae and male and female genitalia in spider samples preserved in ethanol, were dissected, air dried and mounted on double-sided carbon tape on aluminum stubs. These were then sputter-coated with gold to a thickness of *ca* 15-20 µm. Mounted samples were then viewed under a JEOL JSM-840 scanning electron microscope (JEOL, Tokyo, Japan) at an accelerating voltage of 5 kv in order to obtain high magnification photographs.

## 2.6 Qualitative morphological characters

Qualitative morphological characters included the following characters identified from the entire body and its associated appendages, and the genitalia (Fig. 2.1):

1) Carapace: inclination, shape, texture, colour and setation;
2) Eyes: size, arrangement and the presence or absence of tubercles;
3) Clypeus: inclination and setation;
4) Chelicera: form, colour, setation and the presence or absence of teeth;
5) Seta: position and type;
6) Sternum: inclination, shape and colour;
7) Endites: shape and the presence or absence of scopula;
8) Leg: setation, scopula, colour and presence or absence of claws tufts; and
9) Abdomen: shape, colour, setation and spinnerets.

Female genitalia characters (Fig. 1.1.3 & Fig. 2.2.3) recorded included the following:

1) Epigyne: rim, shape, presence or absence of atrium and hood or medium septum;
2) Intromittent orifice (opening on epigyne): position;
3) Intromittent canal: length and structure;
4) Spermatheca: shape and position;
5) Gland of spermatheca: presence or absence; and
6) Fertilization tube (tube to ovaries): position.

Male genitalia characters recorded based on palp structures (Fig.1.1.4 & Fig. 2.2.2) included the following:

1) Shape and size of ventral tibial apophysis;
2) Shape and size of retro-lateral tibial apophysis;
3) Shape of bulb;
4) Shape and length of embolus;

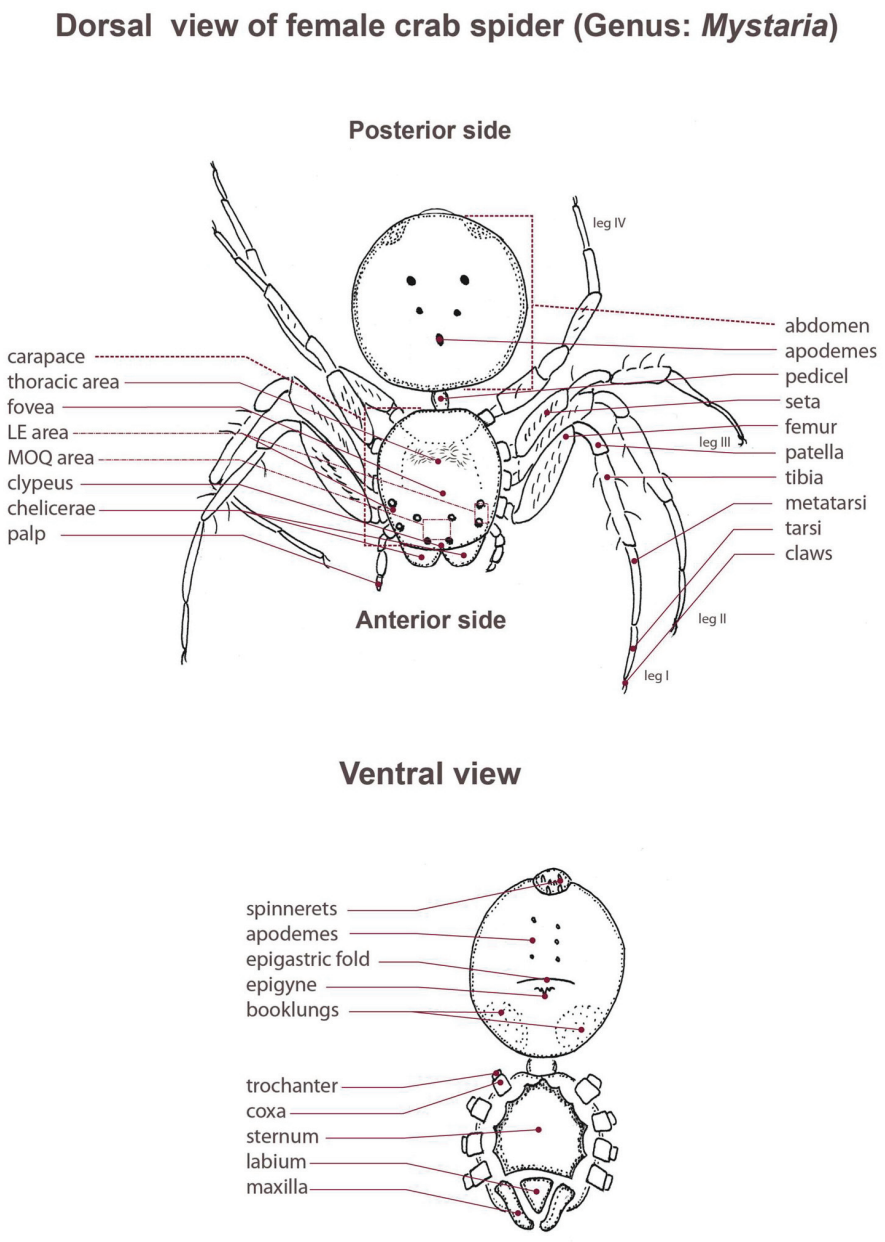



Fig. 2.1 Diagram of qualitative characters of external morphology on the dorsal and ventral view of a female crab spider (Thomisidae: Dietinae: *Mystaria*).

5) Presence or absence of tegular apophysis;
6) Presence or absence of tutaculum; and
7) Presence or absence of cymbial apophysis.

## 2.7 Quantitative morphological characters

Quantitative morphological characters in the present study were mainly adopted from those previously defined and used by Ono (1988). Thirteen quantitative measurements per specimen were recorded using an ocular micrometer on a Wild M3C light microscope (Wild, Heerbrugg, Switzerland) and included both linear dimensions as well as ratios. About five specimens of each sex per species were recorded to the nearest 0.01 mm.

### 2.7.1 Defintitions of quantitative measurements and ratios

*Abbreviations*

Throughout the study, the following abbreviations were used to denote linear measurements and ratios:

1) AER–anterior eye row;
2) AL–abdomen length;
3) ALE–anterior lateral eyes;
4) AME–anterior median eyes;
5) CH–carapace height;
6) CI–carapace index;
7) CL–carapace length;
8) CLL–clypeus length;
9) Clyp–clypeus;
10) CW– carapace width;
11) Fe–femur leg segment;
12) IC–intromittent canal of female epigyne;
13) IO–intromittent orifice of female epigyne;

14) MOQ–median ocular quadrangle;
15) MOQ-AW–median ocular anterior width;
16) MOQ-L–median ocular quadrangle length;
17) MOQ-PW–median ocular posterior width;
18) MOQ-W–median ocular width;
19) Mt–metatarsus leg segment;
20) Pat–patella leg segment;
21) PER–posterior eye row;
22) PLE–posterior lateral eyes;
23) PME–posterior median eyes;
24) RTA–retro-lateral tibial apophysis of male palp;
25) Ta–tarsus leg segment;
26) Tib–tibia leg segment;
27) TL–total length of cephalothorax and abdomen; and
28) VTA–ventral tibial apophysis of male palp.

Linear measurements and ratios in the present study included the following (Fig. 2.2.1):

*Length, height and width measurements*:

1) CH–carapace height (measured on higher thoracic lateral side of carapace);
2) CI–carapace index (length of carapace divided by width);
3) CL–carapace length (measured from clypeus anterior edge to carapace posterior edge);
4) CLL–clypeus length (measured from the anterior edge of clypeus to AME); and
5) CW–carapace width (over widest part of carapace).

*Eye distances and ratios*:

1) Anterior eye ratios: AME–AME/AME–ALE (ratio of distance between AME to distance between AME and ALE).

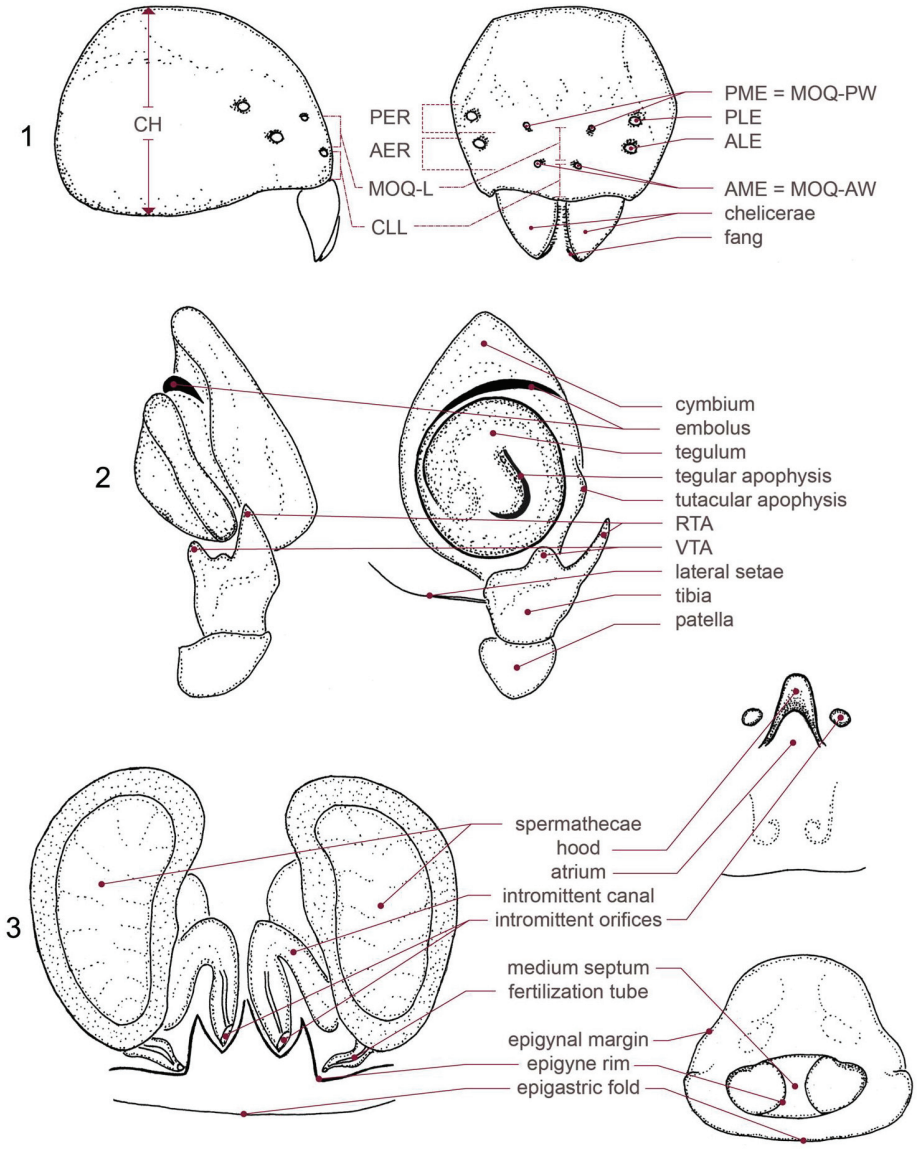



Fig. 2.2 Diagram of qualitative and quantitative characters 1. Carapace latero-dorsal and antero-dorsal views. 2. Genital bulb retro-lateral and ventral views. 3. Epigyne internal and external dorsal and ventral views.

2) Anterior eye row: distances between AME–AME (measured from the centre of AME = MOQ–AW) and (AME–ALE) (measured from the centre of AME to the centre of ALE).
3) ALE/AME (ratio of the diameters of ALE and AME);
4) Clyp/AME–AME (ratio of clypeus length to the distance between AME).
5) MOQ: quadrangle delimited by distances between four median eyes: MOQ-L = AME–PME (distance between the centre of AME to the centre of PME);
6) MOQ eye ratios: MOQ-AW/MOQ-PW = AME/PME (ratio of the anterior width to the posterior width of MOQ);
7) MOQ-L / MOQ-W = MOQ-L / MOQ- AW/PW (ratio of the length to width of MOQ);
8) Posterior eye ratios: PME–PME/PME–PLE (ratio of distance between PME to distance between PME and PLE);
9) Posterior eye row: distances between (PME–PME) (measured from the centre of PME = MOQ–PW) and (PME–PLE) (measured from the centre of PME to the centre of PLE); and
10) PLE/PME (ratio of the diameters of PLE and PME).

*Sternum dimensions*:

1) SI–sternum index (ratio of the sternum length to its width);
2) SL–sternum length (measured over the longest part of the sternum); and
3) SW–sternum width (measured over the widest part of the sternum).

*Leg dimensions*:

1) Fe, Pat, Tib, Mt, Ta were measured for leg I, II, III, IV on the lateral side of each segment and the sum given as the total length of each leg. Leg formula is given from the longest to the shortest leg eg. II:IV:I:III.

*Abdomen dimensions*:

1) AI–abdomen index (ratio of abdomen length to its width);

2) AL–abdomen length (measured from the anterior edge along a mid–dorsal line to the posterior edge); and
3) AW–abdomen width (measured over the widest part of the abdomen).

*Body length*:

1) TL–total length (the sum of CL and AL).

### 2.8 Male and female genitalia

The genitalia were dissected using either a tweezer or a minute needle mounted on a wooden stick. In males, the left palps, where available, were removed, at the patella, while in females, the epigynes were carefully removed by lightly poking around the epigyne margin, from the ventral side of the abdomen and lifting it out. The dissected male and female genitalia were temporarily mounted on a slide in a Polyvinyl alcohol solution (PVA) (Kranz & Walter 2009) and placed under a Vickers compound microscope (Vickers Instruments Limited, York, England) and Nikon Optiphot compound microscope (Nikon, Tokyo, Japan) to study and to photograph. The dissected structures were subsequently stored together with their associated specimens in small glass vials. Drawings of female genitalia were made from the ventral view to illustrate the epigyne rim and openings/intromittent orifices and from the dorsal view to illustrate the spermathecae and its associated tubes. Drawings of male and female genitalia were made to scale using a Camera Lucida (Leica–Leitz Wetzlar, Vienna, Austria). Drawings of male genitalia were made from the ventral view to illustrate the bulb and embolus and from the retro-lateral view to illustrate the tibial apophysis.

### 2.9 Taxonomic accounts

All taxonomic accounts of species in the genera examined in the present study included the following:

1) Identification key for genera and species;
2) Taxonomic nomeclature;
3) Diagnosis;

4) Re-descriptions or new descriptions that included the following characters:
    a. Size;
    b. Colour;
    c. Carapace;
    d. Clypeus;
    e. Chelicerae;
    f. Mouth parts;
    g. Eyes;
    h. Legs;
    i. Abdomen;
    j. Spinnerets;
    k. Male palp; and
    l. Female epigyne.
5) Type material;
6) Material examined;
7) Natural history;
8) Distribution; and
9) Etymology.

## 2.10 Key to genera of Mystarini (Subfamily: Dietinae)

1. Carapace broad and dorsally flattened (Figs 5.2.6-7) with AER=PER, MOQ eyes not equal in size with PME very small, LE large, situated laterally on edge of carapace; clypeus very small, vertical; cheliceral teeth absent (Fig. 5.1.1); leg I & II darkly coloured, leg III & IV pale (Fig. 5.4.4).....*Leroya* gen. n.

\- Carapace dorsally elevated in thoracic and/or cephalic region with AER<PER, MOQ eyes fairly equal in size, LE situated nearer to MOQ eye area; clypeus vertical or sloping, almost equal to MOQ length; cherliceral teeth absent or present; legs not like above.....…….2

2. Coppery-coloured carapace, elevated in thoracic area sloping anteriorly (Fig. 3.8.1), setaceous with long scattered erectile setae; clypeus sloping; MOQ longer than wide; chelicerae with long setae on promargin but without cheliceral teeth (Figs 3.1.1-2); legs long and slender, uniform in colour with long erectile setae; abdomen uniform in colour with bristle-like setae .....*Sylligma* Simon, 1895

- Dark or orange-coloured carapace usually elevated in thoracic and cephalic area (Figs 4.10.5-7), slightly sloping with no long erectile setae; clypeus vertical; MOQ wider than long; chelicerae with three cheliceral teeth present, two on promargin, one on retro margin (Figs 4.1.1-5); legs usually with coloured bands or pattens on different segments of legs, with fine shorter setae present; abdomen with or without faint or bright patterns (Figs 4.6.5-7), fine setae present. ……*Mystaria* Simon, 1895

**References**


DIPPENAAR-SCHOEMAN, A.S. & JOCQUÉ, R. 1997. *African spiders, an identification manual.* Plant Protection Research Institute Handbook 9, Agricultural Research Council, Pretoria. 1–392 pp.

EBERHARD, W.G. 1986. Why are genitalia good species characters? In: Eberhard, W.G., Lubin, Y.D. and Robinson, B.C. (Eds) *Proceedings of the 9th International Congress of Arachnology. Panama, 1983.* 53–59 Smithsonian Institution Press, Washington.

KRANZ, G.W. & WALTER, D.E. 2009. *A manual of Acarology.* 3rd Edition Tech University Press. Texas 1–807 pp.

MAYR, E. 1942. *Systematics and the Origin of Species*. Columbia University Press. New York. 1–334 pp.

MAYR, E. 1969. *Principles of Systematic Zoology*.: McGraw-Hill, New York. 1–428 pp.

MAYR, E. & ASHLOCK, P.D. 1991. *Principles of Systematic Zoology.* 2nd Edition. McGraw-Hill, Inc, United States of America. 1–475 pp.

ONO, H. 1988. *A revisional study of the spider family Thomisidae (Arachnida, Araneae) of Japan*. National Science Museum, Tokyo. 1–252 pp.

## Chapter 3

## A revision of spiders of the genus *Sylligma* Simon, 1895 (Araneae: Thomisidae) from the Afrotropical region

### 3.1 Abstract

The Afrotropical representatives of the genus *Sylligma* Simon, 1895 are revised. The genus belongs to the subfamily Dietinae and is known only from the Afrotropical region. Individuals are found in both vegetation and ground layers, but are rarely encountered. The genus *Sylligma* is re-described and an identification key is provided for the six species that are recognized, of which four are new, namely, *S. franki*, *S. ndumi*, *S. spartica* and *S. theresa*. The males of *S. lawrencei* Millot, 1942 and *S. hirsuta* Simon, 1895 are described for the first time. Species *incertae sedis* include *Sylligma cribrata* (Simon, 1901).

**Keywords:** Afrotropical region, Dietinae, *Sylligma,* classical taxonomy, thomisid ant-mimic, Thomisidae, scanning electron microscopy (SEM).

### 3.2 Introduction

In the present study, the genus *Sylligma* Simon, 1895 of the Afrotropical region is revised. *Sylligma* belongs to the subfamily Dietinae that is composed of 32 genera (Ono 1988) and 90 species (Platnick 2009) known from the tropical and subtropical regions of the world, with 18 genera known from the Afrotropical region (Dippenaar-Schoeman & Jocqué 1997).

Although the genus *Sylligma* is known only from the Afrotropical region, it is absent from Madagascar (Platnick 2009). Prior to the present study, *Sylligma* was known from three species namely: 1) the type species, *S. hirsuta* Simon, 1895, based on a female specimen described from Gabon; 2) *S. lawrencei* Millot, 1942 based on a female specimen from Guinea; and *Pyrethesis cribata* Simon, 1901, the type species of the monotypic genus *Platypyresthesis* described by Simon (1903)

from Ethiopia that was recognized as a junior synonym of *Sylligma* by Lehtinen (2005).

Members of *Sylligma* are small, brown spiders with thin, slender legs. They are characterized by a round body and the carapace decorated with pronounced long, erectile setae (Simon, 1895). In males, an abdominal scutum is usually present. The material examined in the present study was collected from both vegetation and ground layers. Their slender bodies resemble ants and their brown bodies camouflage them well, hence they are not easily observed, and are rare in museum collections. Little is known about the behaviour of the *Sylligma* species except for the (field) observation that they prey on and mimic ants (A. Leroy & C.Haddad *pers. comm.*). In KwaZulu-Natal Province, South Africa at least one ant species, *Myrmicaria natalensis* Smith, 1885 was identified as prey of *Sylligma ndumi* sp. n. They resemble *M. natalensis* in colour and the presence of long setae on the thorax (Smith 1885).

In the present study, the tenth in a series of revisions of spiders of the family Thomisidae from the Afrotropical region, *Sylligma* is revised, resulting in the re-description of two known species from Central Africa, as well as the first description of the male of the genus, and the description of four new species. *Sylligma cribata* (Simon, 1901) is only known from the holotype female and unfortunately the specimen could not be located. Due to the absence of drawings and poor description, the taxonomic placement of this species is still uncertain.

### 3.3 Material and methods

Available material housed in the following institutions (abbreviations in parentheses) was examined: Koninklijk Museum voor Midden-Afrika (MRAC), Tervuren, Belgium; Museé d'Histoire Naturelle (MNHG), Genèva Switzerland; Muséum National d'Histoire Naturelle (MNHN), Paris, France; Natal Museum (NM), Pietermaritzburg, South Africa; National Collection of Arachnida (NCA), Pretoria, South Africa;

National Museum (NMBA), Bloemfontein, South Africa; and Senckenberg Museum of Natural History (SMF), Frankfurt, Germany.

The following abbreviations of characters are used in the present study (Ono 1988): *Body:* AL–abdomen length; AW–abdomen width; CL–carapace length; CW–carapace width; CH–carapace height; Clyp–clypeus; CLL–clypeal length; SL–sternum length; SW–sternum width; TL–total length. *Eyes*: AER–anterior eye row; AME–anterior median eyes; ALE–anterior lateral eyes; PER–posterior eye row; PME–posterior median eyes; PLE–posterior lateral eyes; MOQ–median ocular quadrangle; MOQ-L–median ocular quadrangle length; MOQ-W–median ocular quadrangle width; MOQ-AW–median ocular quadrangle anterior width; MOQ-PW–median ocular quadrangle posterior width. *Legs*: Fe–femur; Pat–patella; Tib–tibia; Mt–metatarsus; Ta–tarsus. *Palp*: VTA–ventral tibial apophysis; RTA–retro-lateral tibial apophysis.

Measurements were taken in mm. The mean size is given with the observed range in parenthesis. The following indices were calculated by dividing a character's length with its width: SI-sternum index; AI-abdomen index and CI-carapace index. The description format and the abbreviations of morphological terms used in this study follow that of Ono (1988). All specimens examined were preserved in alcohol, causing loss of their original bright colouring.

## 3.4 Systematics

### **3.4.1.** Genus ***Sylligma*** Simon, 1895

*Sylligma* Simon, 1895: 990; Lessert, 1943: 313; Ono, 1988: 214; Lehtinen, 2005: 152.
*Platypyresthesis* Simon, 1903: 1014; Lehtinen, 2003: 152 (syn).
Type species: *Sylligma hirsuta* Simon, 1895 by original designation.

*Diagnosis*. Small, ant-like spiders in various hues of brown ranging from pale to brown copper to rich orange brown (Fig. 3.8.1) with long setae on carapace; long and slender legs; no cheliceral teeth; female epigyne with or without a median septum; intromittent orifices open laterally on atrium (Fig. 3.6.3), spermathecae large, round to kidney-shaped (Fig. 3.8.6). Males resemble females but are smaller, and abdominal scutum present in some species; palp with bulb and cymbium simple; embolus of medium length to long; tibia with RTA and VTA (Figs. 3.4.1-2).

*Re-description*

*Female*: Small spiders 2.2–4.7 mm, body length. *Colour*: Carapace and legs similar shades of brown ranging from pale to dark brown copper to rich orange brown; abdomen sometimes mottled with grey; black spots in eye region, more distinct around lateral eyes (Fig. 3.8.1). *Carapace*: slightly longer than wide; round to almost square seen from above; elevated in thoracic region; truncated posteriorly and sloping anteriorly; texture smooth to granular, studded with small tubercles, some bearing long erect setae with thin setae scattered in between; tubercles on carapace arranged along striae in thoracic region, around lateral eyes and on lateral and posterior edge. *Clypeus*: varies from being vertical to slightly sloping, CLL varies from slightly longer than MOQ-L to shorter than MOQ-L; edge straight or sinuated, bearing long, curved setae. *Chelicerae:* dorsally round to slightly flattened, with erect setae; broad at base, obtuse tip; incurving serrated setae at tip on promargin of chelicerae (Figs 3.1.1-2), fangs short. *Mouth parts*: labium longer than wide, triangular; endites long, slightly converging and indented, scopulae present on edge. *Sternum*: heart-shaped, anterior edge straight; posterior tip not extending beyond coxae IV; edge bordered. *Palp*: with long setae on all segments; single dentated tarsal claw. *Eyes*: AER re-curved; AME<ALE, situated closer to each other than to ALE; PER re-curved, slightly wider than AER; PME<PLE equally spaced; PME form tangent line with ALE; lateral eye spots almost touching and equal in size; MOQ trapezium-shaped, wider than long, anterior narrower than posterior. *Legs*: long and slender; legs I and II longer than the rest; femur, patella, tibia and metatarsus bearing long, thin, erect, spiniform setae with short, thin setae scattered in between;

metatarsi and tarsi III and IV with scopulae; trichobothria present on tibiae, metatarsi and tarsi (Figs 3.1.3-6) of all legs; two dentated tarsal claws; tarsal claws of leg I and II with up to nine teeth each (Figs 3.1.3-4), equal in length, straight base; leg III and IV with five teeth each (Figs 3.1.5-6); first tooth twice as long as rest, curved at base; claw tufts reaching beyond claws; consist of plumose tenent setae seen under high magnification (Fig. 3.1.7); claws and claw tufts are similar between species with minor changes between males and females. *Abdomen*: round, bearing numerous short, strong, erect, bristle-like setae; five apodemes grouped in arrow-shaped formation; striae present ventrally around abdomen edge and dorsally of spinnerets. *Spinnerets*: cone-shaped; bearing numerous setae; anterior pair largest. *Epigyne*: with medium septum (Figs 3.2.5 & 3.6.3) or without (Fig. 3.4.3), rim of atrium circular (Fig. 3.4.3) to transverse (Fig. 3.8.5), intromittent orifices open laterally on atrium; intromittent canal varies from being simple to spiraling tubes; spermathecae large, oval or kidney-shaped (Figs. 3.4.4 & 3.2.6); fertilization tubes short, situated posteriorly.

*Males*: 2.1–3.4 mm body length. Males resemble females but smaller in size and differ as follows: *Carapace:* less sloping more flattened, with fewer setae. *Abdomen*: in some species completely covered dorsally with shiny scutum bearing short, fine, flat lying setae. *Palp*: cymbium and tibia bearing long setae; bulb round without apophysis; embolus medium length (Fig. 3.8.3) to long (Fig. 3.2.1); RTA usually slender and long (Figs 3.4.1-2) or tooth-like (Figs 3.8.3-4); VTA small, either flat or curving inwards (Fig. 3.8.4).

*Natural history*. Members of the genus *Sylligma* have been collected from the savanna, grassland and forest biomes. They are found in both vegetation and ground layers. On the ground layer, they were found under rocks or in leaf litter, and in the vegetation layer they occurred on grasses and in forest undergrowth. Observations showed that they prey on ants. Adults were more abundant during the summer months.

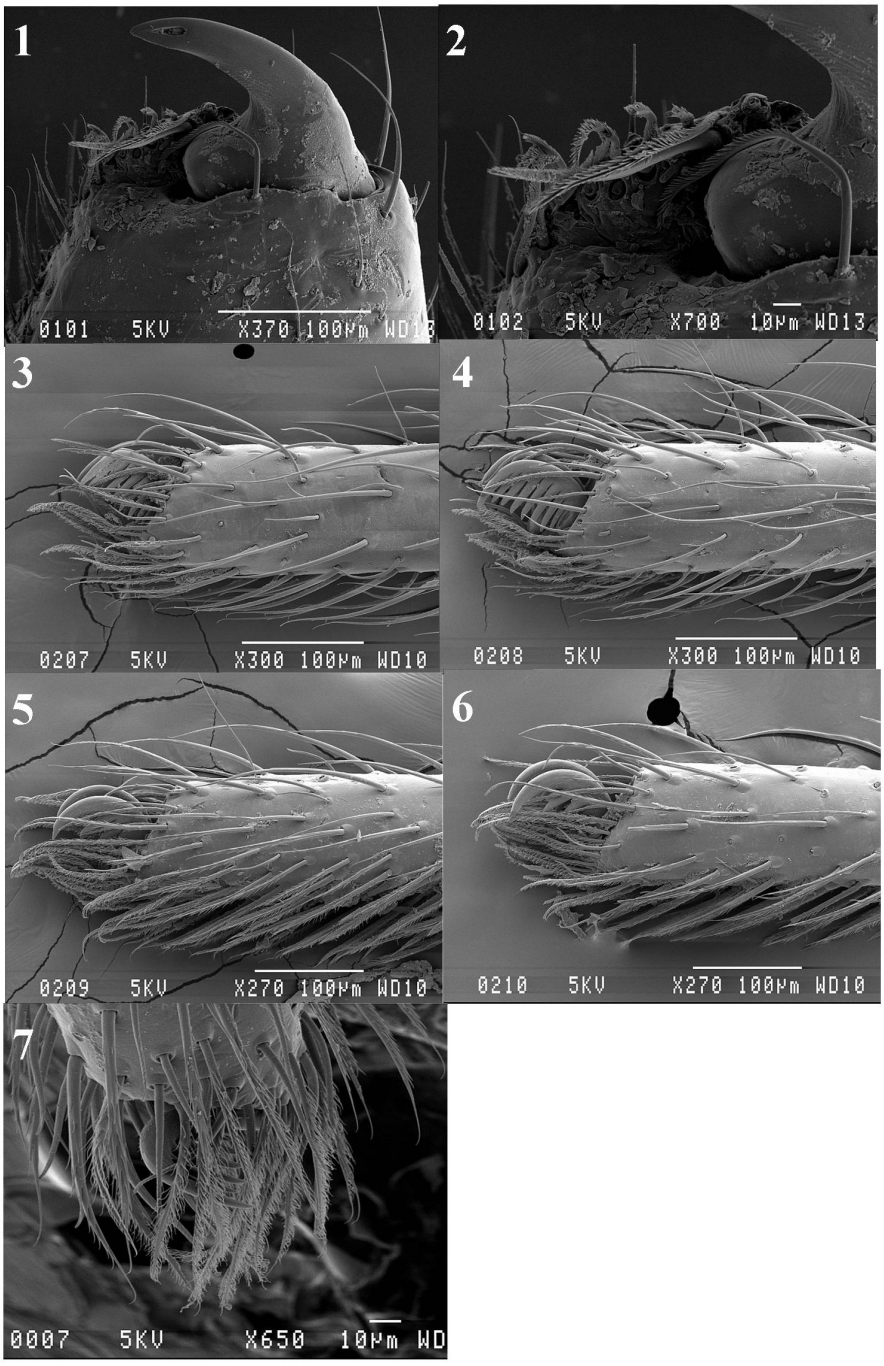



**Fig. 3.1** *Sylligma ndumi* sp. n. male from South Africa, Brits. 1.Chelicera with 2. In-curving serated setae. 3-6 *S. franki* female from Democratic Republic of Congo, Equateur legs I-IV: tarsal claws and claw tufts showing tenent hair and scopula prominent in leg III-IV. 7. Magnified image of tenent hair.

*Distribution*. The genus is endemic to the Afrotropical region and known from the Democratic Republic of Congo (DRC), Gabon, Guinea and Ethiopia. New records: Botswana, Kenya, Mozambique, Namibia, Nigeria, Ruanda, South Africa and Uganda.

### 3.4.2 Key to species of *Sylligma*

1. Females …… …..2
- Males ……6

2. Epigyne with median septum (Fig. 3.6.3) …….....3
- Epigyne without median septum ……...4

3. Atriums round, well separated, a distance apart from each other (Fig. 3.6.3)……...*S. lawrencei*
- Atriums encircled by rim, not wide apart (Fig. 3.2.5) …….*S. franki* sp. n.

4 Atrium with round-oval rim (Fig. 3.4.3)…….…..*S. hirsuta*
- Atrium not as above…….5

5. Atrium with transverse wave-like rim (Fig. 3.8.5)……*S. ndumi* sp. n.
- Atrium with U-shaped rim (Fig. 3.12.3) ……..…*S. theresa* sp. n.

6. Embolus of medium length, thickened apically (Figs 3.8.3, 3.12.1) ……...7
- Embolus long and slender, coiling at least once around bulb (Fig. 3.4.1) …….8

7. RTA short, tooth-like (Fig. 3.8.3); VTA with hook (Fig. 3.8.4) ……*S. ndumi* sp. n.

- RTA longer, finger-like (Fig. 3.12.1); VTA without hook (Fig. 3.12.2) ……
…… *S. theresa* sp. n.

8 RTA slender, short, directing laterad (Fig. 3.6.1)…….*S. lawrencei*
- RTA longer and thicker, directing upwards (Fig. 3.2.1) ……9

9. RTA straight and thick, tapering to tip (Figs 3.2.1 & 3)…….. *S. franki* sp. n.
- RTA longer, thinner and slightly curved (Fig. 3.4.1) ……..……..10

10. RTA situated more dorsally (Fig. 3.4.2)……*S. hirsuta*
- RTA as seen in Figs 3.10.1-2…….....*S. spartica* sp. n.

### 3.4.2.1 *Sylligma franki* sp. n.

Figs 3.1, 3.2 & 3.3

*Diagnosis*. The carapace and legs of the female is orange to copper with the abdomen often darkly mottled. The male carapace is flattened and slightly widens out laterally at clypeus edge. The female epigyne with a median septum (Fig. 3.2.5); spermathecae is oval- to kidney-shaped (Fig. 3.2.6). The male palp with a long, thin embolus coiling once around bulb (Figs 3.2.1 & 3); RTA medium length, tooth-like, slightly arched; VTA small and flattened (Figs 3.2.2 & 4).

*Description*.

*Female:* Size, measurements (mm): (*n* = 6). TL: 3.49 (3.38–3.60); CL: 1.61 (1.60–1.62); CW: 1.44 (1.41–1.48); CI: 1.12 (1.08–1.15); CH: 0.91 (0.88–0.94); CLL: 0.28 (0.28–0.28); MOQ-L: 0.28 (0.28–0.28). *Colour*: carapace and legs orange to copper; abdomen either mottled khaki-brown or grey often with yellow band over width. *Carapace*: texture smooth, square viewed from above.

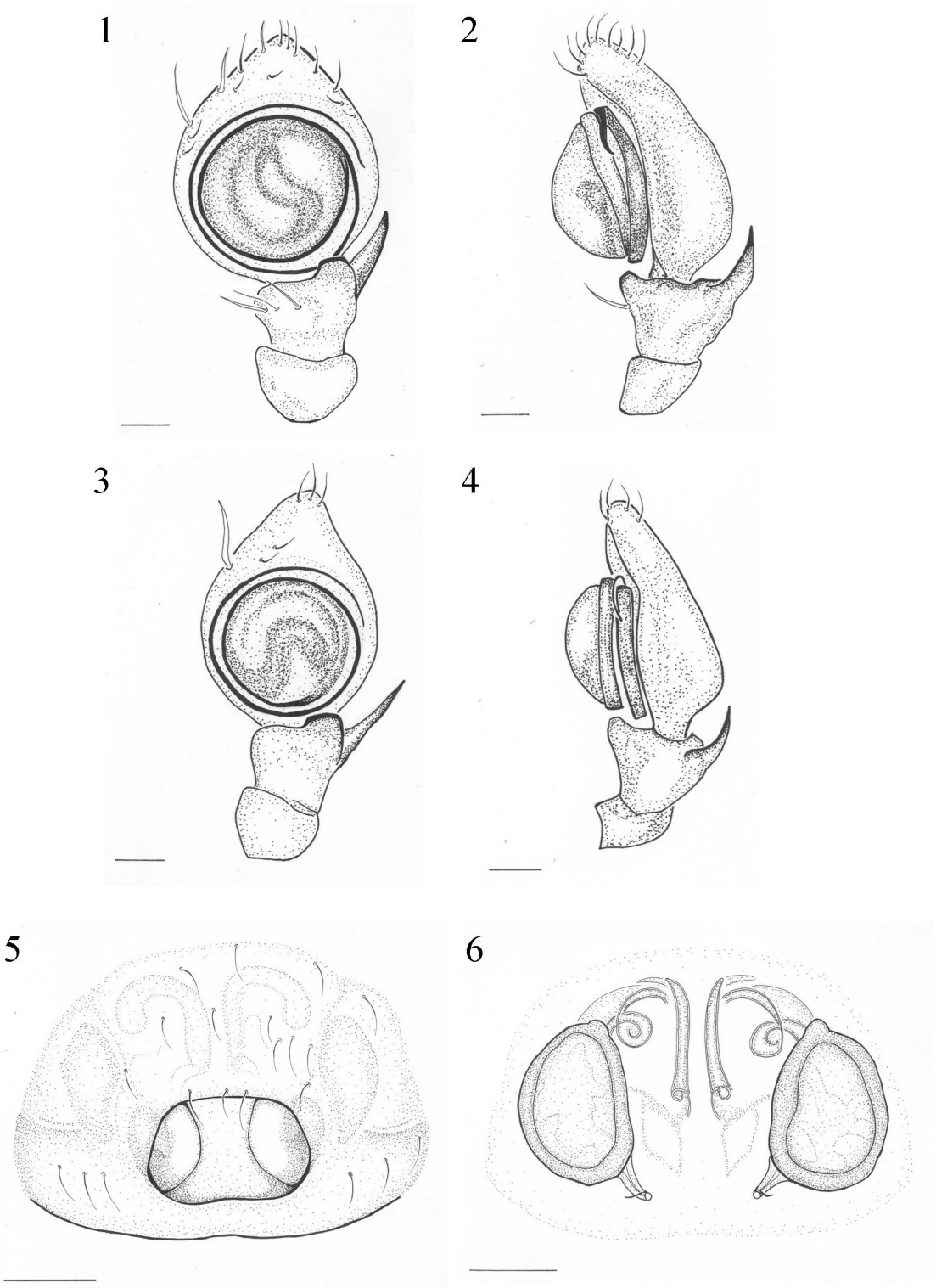



**Fig. 3.2** ***Sylligma franki*** sp. n. 1 & 3 Male right palp ventral view (showing variation). 2 & 4 Right palp retro-lateral view. 5. Female epigyne ventral view. 6. Epigyne dorsal view.

*Clypeus*: gently sloping, well-defined sinuated anterior edge with long curving setae. *Chelicerae*: flattened dorsally. *Sternum*: SL (mm): 0.86; SW (mm): 0.65; SI (mm): 1.32. *Eye*s: eye measurements (mm): AME-AME: 0.27; ALE–AME: 0.38; AME–AME/AME–ALE: 0.71; PME–PME: 0.42; PLE–PME: 0.40; PME–PME/PME–PLE: 1.06; ALE/AME: 1.41; PLE/PME: 0.94; MOQ-AW/MOQ-PW: 0.63; MOQ-L/MOQ-W: 0.44; Clyp/AME–AME: 1.05. *Legs*: shorter than other species bearing dense setae; tarsi with scopulae and claw tufts (Figs 3.1.3-6); leg formula: II:I:IV:III; leg measurements (mm): leg I – Fe 1.44, Pat 0.42, Tib 1.23, Mt 0.91, Ta 0.63, total 4.62; II – Fe 1.56, Pat 0.50, Tib 1.29, Mt 1.09, Ta 0.75, total 5.12; III – Fe 1.05, Pat 0.40, Tib 0.76, Mt 0.54, Ta 0.39, total 3.15; IV – Fe 1.09, Pat 0.38, Tib 0.90, Mt 0.65, Ta 0.41, total 3.42. *Abdomen:* smooth to granular; AL (mm): 1.88; AW (mm): 2.01; AI (mm): 0.96. *Epigyne*: varies with median septum, rim defined either as two heart-shaped structures or one oval structure (Fig. 3.2.5), sometimes visible as only one large opening; intromittent orifices open antero-laterally, intromittent canal extend straight from orifices anteriorly, coiling once before reaching spermathecae; spermathecae large, either oval or kidney-shaped with small spermathecal glands present anteriorly (Fig. 3.2.6).

*Male*: Size, measurements (mm): (*n* = 3). TL: 2.94 (2.88–3.00); CL: 1.55 (1.48–1.63); CW: 1.28 (1.20–1.35); CI: 1.22 (1.20–1.23); CH: 0.81 (0.75–0.88); CLL: 0.26 (0.25–0.28); MOQ-L: 0.20 (0.20–0.20). Resemble females but differs as follows: *Colour:* carapace and legs orange to copper-brown, abdomen pale brown with pale band over dorsal width (specimen from Mozambique pale yellow). *Carapace*: slightly smaller in size, square or circular viewed from above, less elevated in thoracic region with fewer setae, slightly granular. *Clypeus*: slightly widening out laterally on edge. *Sternum*: SL (mm): 0.73; SW (mm): 0.59; SI (mm): 1.24. *Eyes*: eye measurements (mm): AME–AME: 0.25; ALE–AME: 0.39; AME–AME/AME–ALE: 0.64; PME–PME: 0.38; PLE–PME: 0.41; PME–PME/PME–PLE: 0.91; ALE/AME: 1.55; PLE/PME: 1.10; MOQ-AW/MOQ-PW: 0.67; MOQ-L/MOQ-W: 0.30; Clyp/AME–AME: 1.06. *Legs*: slightly thinner than female, tarsal claws longer,

bearing claw tufts and scopulae; leg formula: I:II:IV:III; leg measurements (mm): leg I – Fe 1.38, Pat 0.41, Tib 1.26, Mt 0.98, Ta 0.64, total 4.66; II – Fe 1.45, Pat 0.36, Tib 1.16, Mt 0.90, Ta 0.63, total 4.50; III Fe 0.88, Pat 0.31, Tib 0.71, Mt 0.56, Ta 0.34, total 2.80; IV – Fe 1.08, Pat 0.33, Tib 0.85, Mt 0.63, Ta 0.39, total 3.26. *Abdomen*: smaller in size, with smooth scutum; apodemes when present, dorsally distinctly depressed; AL (mm): 1.39; AW (mm): 1.38; AI (mm): 1.01. *Palp*: embolus coils at least once around bulb (Figs 3.2.1 & 3); RTA medium length, tooth-like, very slightly arched; VTA small (Figs 3.2.2 & 4).

*Type material*. Holotype ♀, UGANDA: Busaga District, Mount Buvenda, 00°45'N 33°30'E, ii.1967, J. Ruabunesa (MRAC 131.576). Paratypes: Uganda: 1 ♀, Busaga District, Yaga River, 0°45'N 33°30'E, forest gallery, ii.1967, J. Ruabunesa (MRAC 131.604). RWANDA: 1 ♂, 1 ♀, exact locality and collector unknown, (SMF 7828). DEMOCRATIC REPUBLIC OF CONGO (DRC): *Nord-Kivu Region*, 1 ♀, Rutshuru, 1°11'S 29°27'E, 15.v.1937, J. Ghesquière (MRAC 127.960); 1 ♀, Butembo, Musosa valley, 0°09'N 29°17'E, 15.v.1967, R.P.M. Lejeune (MRAC 132.817); 1 ♀, Kibati, 01°35'S 29°15'E, 1925, H. Schouteden (MRAC 20715). MOZAMBIQUE: 1 ♂, exact locality and collector unknown (SMF).

*Natural history*. Females were collected between February and May. Individuals were obtained from mountainous areas, forest galleries and near rivers.

*Distribution*. Democratic Republic of Congo (DRC), Mozambique, Rwanda, and Uganda (Fig. 3.3).

*Etymology*. Named after Frank Honiball the father of the author, in gratitude for his support and inspiration.

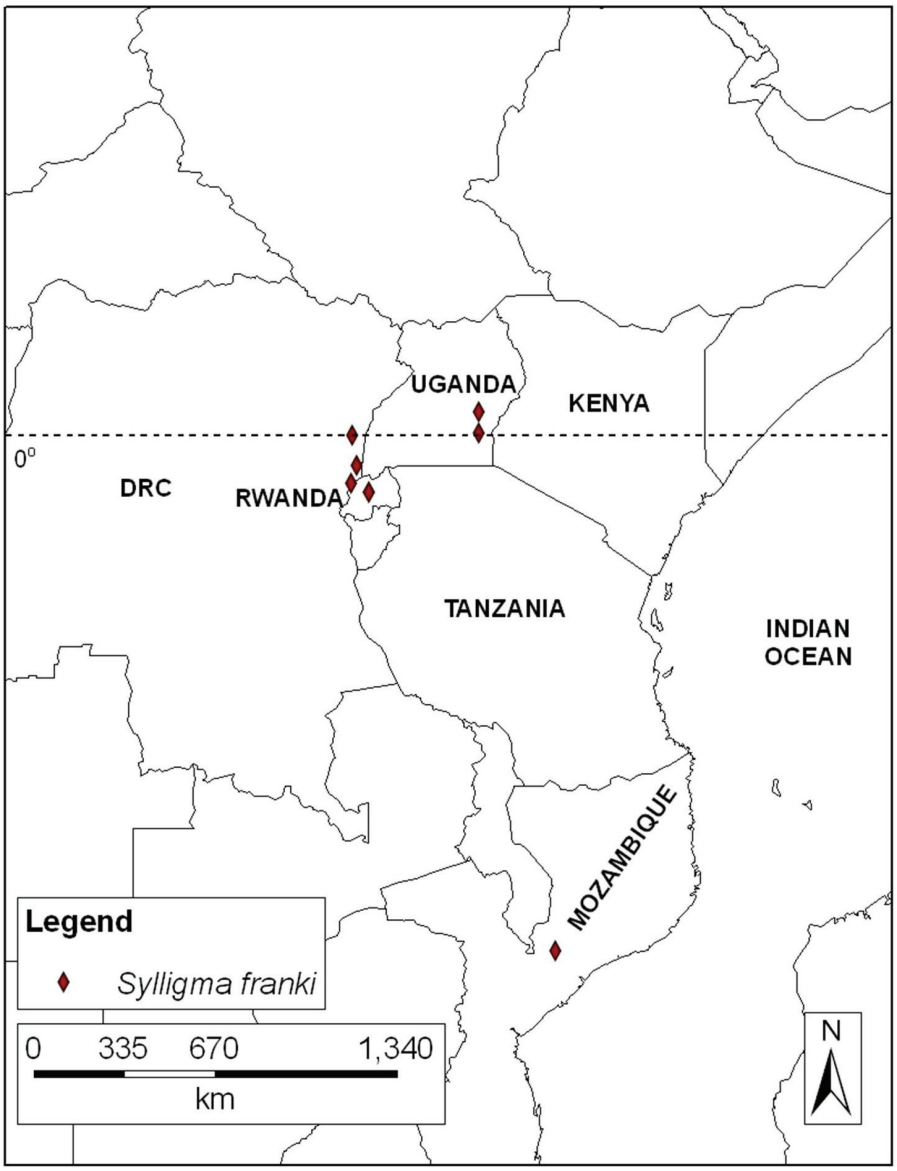



**Fig. 3.3** Recorded geographical distribution of *Sylligma franki* sp. n .

### 3.4.2.2 *Sylligma hirsuta* Simon, 1895

Figs 3.4 & 3.5

*Sylligma hirsuta* Simon, 1895: 990; Lessert, 1943: 314.

*Diagnosis*. This species differs from other species in being orange to copper-brown to dark brown; the epigyne has an atrium with an oval-shaped rim (Fig. 3.4.3); the intromittent canals are fairly complex and the spermathecae are oval (Fig. 3.4.4). The male palp has a thin embolus, which distinctly coils twice around the bulb and the RTA long and curved (Figs 3.4.1-2).

*Re-description*.

*Female*: Size, measurements (mm): (*n* = 7). TL: 3.51 (2.2–4.5); CL: 1.80 (1.67–1.90); CW: 1.56 (1.45–1.60); CI: 1.15 (1.09–1.19); CH: 1.03 (0.84–1.13); CLL: 0.28 (0.25–0.30); MOQ-L: 0.29 (0.27–0.33). *Colour*: carapace orange to copper-brown to dark brown; abdomen various shades of pale to darker brown, sometimes mottled, or with two faint bands over dorsal width; black spots present over eye region. *Carapace*: square as observed from above; well-elevated and flattened on top in thoracic region; sloping anteriorly. *Sternum*: SL (mm): 0.90; SW (mm): 0.68; SI (mm): 1.34. *Eyes*: eye measurements (mm): AME–AME: 0.29; ALE–AME: 0.40; AME–AME/AME–ALE: 0.72; PME–PME: 0.43; PME–PLE: 0.42; PME–PME/PME–PLE: 1.03; ALE/AME: 1.40; PLE/PME: 0.97; MOQ-AW/MOQ-PW: 0.66; MOQ-L/MOQ-W: 0.44; Clyp/AME–AME: 0.97. *Legs*: leg formula: II:I:IV:III; leg measurements (mm): leg I – Fe 1.53, Pat 0.54, Tib 1.29, Mt 1.03, Ta 0.67, total 5.06; II – Fe 1.63, Pat 0.55, Tib 1.32, Mt 0.94, Ta 0.64, total 5.07; III – Fe 1.11, Pat 0.43, Tib 0.77, Mt 0.56, Ta 0.39, total 3.27; IV – Fe 1.09, Pat 0.40, Tib 0.86, Mt 0.63, Ta 0.40, total 3.37. *Abdomen*: AL (mm): 1.71; AW (mm): 1.96; AI (mm): 0.87. *Epigyne*: atrium oval-shaped (Fig. 3.4.3); intromittent orifice opens antero-laterally; intromittent canal coils at least twice (Fig. 3.4.4); spermathecae oval, often sclerotized, visible from outside; fertilization tubes short.

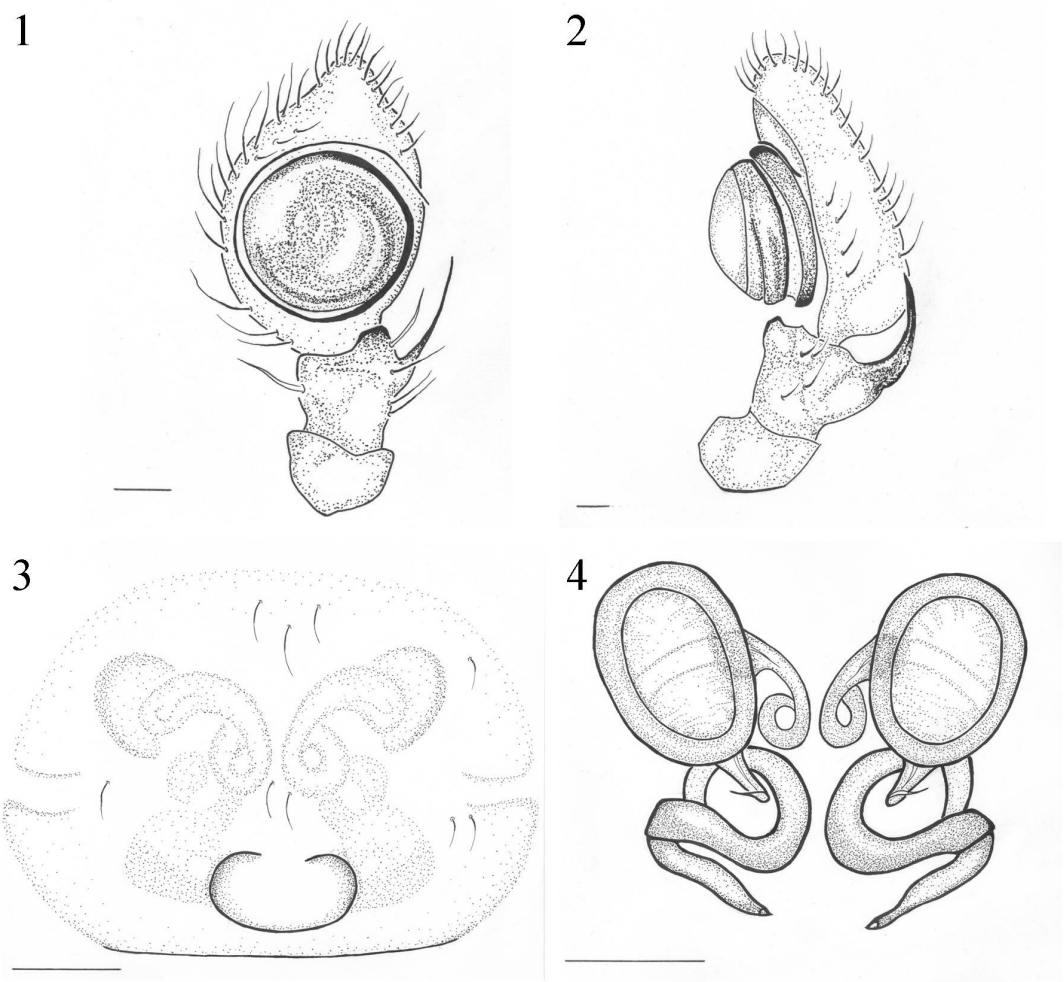



**Fig. 3.4** ***Sylligma hirsuta*** Simon, 1895. 1. Male right palp ventral view. 2. Right palp retro-lateral view. 3. Female epigyne,ventral view. 4. Epigyne dorsal view.

*Male*: Size, measurements (mm): (*n* = 3). TL: 2.97 (2.75–3.38); CL: 1.47 (1.39–1.62); CW: 1.31 (1.24–1.41); CI: 1.12 (1.10–1.15); CH: 1.04 (0.73–1.46); CLL: 0.25 (0.22–0.28); MOQ-L: 0.26 (0.25–0.28). Similar to female but smaller in size and differs as follows: *Colour:* carapace light to dark orange to copper-brown; abdomen brown, slightly tinted with black. *Carapace*: round observed from above. *Sternum:* SL (mm): 0.78; SW (mm): 0.60; SI (mm): 1.30. *Eyes*: eye measurements: AME–AME: 0.24; ALE–AME: 0.34; AME–AME/AME–ALE: 0.71; PME–PME: 0.38; PLE–PME: 0.37; PME–PME/PME–PLE: 1.05; ALE/AME: 1.42; PLE/PME: 0.96; MOQ-AW/MOQ-PW: 0.64; MOQ-L/MOQ-W: 0.41; Clyp/AME-AME: 1.04. *Legs*: leg formula: II:I:IV:III; leg measurements (mm): leg I – Fe 1.18, Pat 0.44, Tib 1.23, Mt 0.95, Ta 0.66, total 4.47; II – Fe 1.43, Pat 0.45, Tib 1.19, Mt 1.01, Ta 0.69, total 4.78; III – Fe 0.98, Pat 0.34, Tib 0.74, Mt 0.53, Ta 0.38, total 2.97; IV – Fe 1.07, Pat 0.33, Tib 0.87, Mt 0.65, Ta 0.38, total 3.31. *Abdomen*: with scutum, apodemes dorsally in arrow formation; AL (mm): 1.50; AW (mm): 1.44; AI (mm): 1.04. *Palp*: bulb slightly flattened retro-laterally; embolus long, coiling around bulb at least twice (Fig. 3.4.1); RTA long, arched, fairly broad only at base of tibia, becoming thin and sharply pointed (Fig. 3.4.2); VTA small, flattened, very slightly curved inwards; tibia with at least two long setae retro-laterally.

*Type material.* Simon (1895) listed the type locality to be in Sierra Leone, but Lessert (1943) indicated that the types are from Gabon. Syntypes: 2♀, GABON: Mocq, 0°40'S 11°52'E (MNHN 17.479). A female was from the syntype series was elected as a new lectotype.

*Material examined.* DEMOCRATIC REPUBLIC OF CONGO (DRC): *Equateur Region*, 1 ♀, 1 ♂, Bokatola, 0°38'S 18°46'E, 1943, R.P. Hulstaert (MRAC 11510); 1 ♂ palp only, same locality data (MNHG); 2 ♀, Ikela River, Yalonga, 01°11'S 23°16'E, litter in swampy forest, ix.1959, N. Leleup (MRAC 114595); 1 ♀, Mongonde, 2°11'N 20°48'E, H. Schouteden (MNHG); *Katanga Region*, 2 ♀, Kalemie (Albertville), Bendera, Kiymbi River, 5°03'S 28°54'E, vii.1958, N. Leleup (MRAC 112507); *Nord-Kivu Region,* 1 ♀, 1 ♂, Semliki middle valley, 0°01S 29°34E, 8.viii.1968,

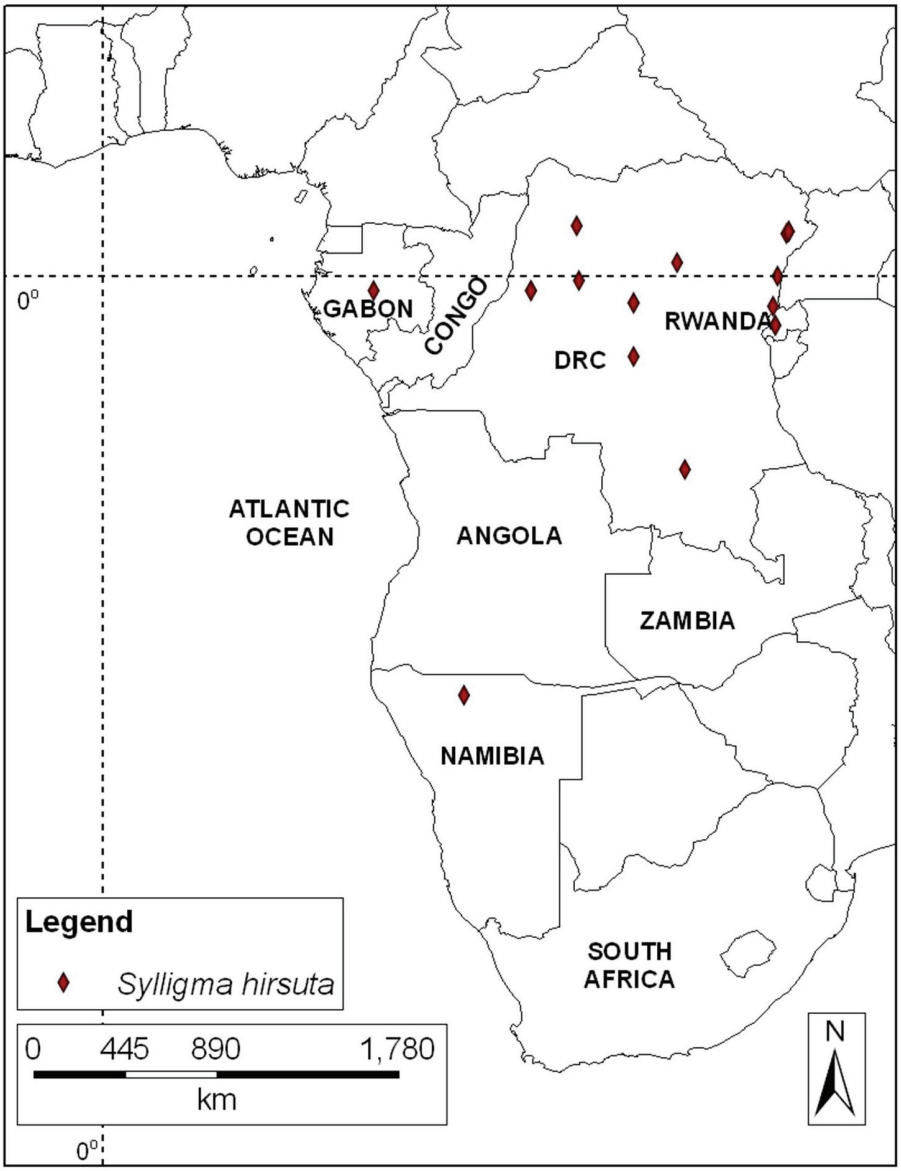



**Fig. 3.5** Recorded geographical distribution of *Sylligma hirsuta* Simon, 1895.

R.P.M. Lejeune (MRAC 135.443); 1 ♀, Rutshuru, Rwankwi, 0°20'S 29°22'E, 1948, J. Leroy (MRAC 134.562); *Kasai-Oriental Region,* 1 ♀, Komi Sankuru, 3°33'S 23°16'E, J. Gresquière (MNHG); *Orientale Region,* 1 ♀, Ituri, 1°51'N 29°57'É, 16.xi.1929, A. Collart (MRAC 11365); 1 ♂, Masako, 0°35'N 25°11'E, 420 m asl, 15 km N of Kisangani, 19–27.i.1988, L. De Vos (MRAC 169.358); 1 ♂, 3 ♀, Mongbwalu, 1°57'N 30°02'E, vii.1938, M. Scheitz (MRAC 1598.99; 1831; 222208). NAMIBIA: 1 ♀, Ovamboland, 18°20'S 15°50'E, (SMF 10276). RWANDA: 2 ♀, exact locality unknown (SMF 7828).

*Natural history*. The species has been collected from savanna habitats. Adult females were collected between July and November, while males were sampled between July and January.

*Distribution*. Gabon. New records: Democratic Republic of Congo (DRC), Namibia and Rwanda (Fig. 3.5).

#### 3.4.2.3 ***Sylligma lawrencei*** Millot, 1942

Figs 3.6 & 3.7

*Sylligma lawrencei* Millot, 1942: 10.

*Diagnosis*. Both sexes differ from other species in having a dark red copper-brown, glossy, granular carapace; the carapace is small in relation to its abdomen and legs shorter. The epigyne has a median septum and two atriums (Fig. 3.6.3) and kidney-shaped spermathecae (Fig. 3.6.4). The male is the smallest of all *Sylligma* species and recognized by the long, thin embolus, coiling twice around bulb (Fig. 3.6.1), the RTA is short, straight and directed laterally with a small and flattened VTA (Fig. 3.6.2).

*Re-description*.

*Female*: Size, measurements (mm): (*n* = 4). TL: 3.67 (3.45–3.88); CL: 1.41 (1.41–1.41); CW: 1.37 (1.36–1.39); CI: 1.03; (1.02–1.03); CH: 0.74 (0.66–0.82); CLL: 0.24 (0.24–0.24); MOQ-L: 0.24 (0.24–0.24). *Colour*: carapace very dark red copper; legs red to copper-brown and abdomen dark brown to mottled brown or turquoise. *Carapace*: glossy, granular, small, square-shaped viewed from above. *Chelicerae*: flattened dorsally. *Sternum*: SL (mm): 0.74; SW (mm): 0.60; SI (mm): 1.24. *Eye*s: eye measurements (mm): AME–AME: 0.28; ALE–AME: 0.37; AME–AME/AME–ALE: 0.75; PME–PME: 0.41; PLE–PME: 0.40; PME–PME/PME–PLE: 1.03; ALE/AME: 1.34; PLE/PME: 0.97; MOQ-AW/MOQ-PW: 0.67; MOQ-L/MOQ-W: 0.35; Clyp/AME–AME: 0.85. *Legs*: shorter than other species, more granular, dense setae; leg formula: II:I:IV:III; leg measurements (mm): leg I – Fe 1.27, Pat 0.41, Tib 1.03, Mt 0.82, Ta 0.59, total 4.12; II – Fe 1.33, Pat 0.45, Tib 1.10, Mt 0.89, Ta 0.62, total 4.39; III – Fe 0.89, Pat 0.36, Tib 0.61, Mt 0.45, Ta 0.33, total 2.64; IV – Fe 0.90, Pat 0.33, Tib 0.75, Mt 0.52, Ta 0.32, total 2.82. *Abdomen*: AL (mm): 2.26; AW (mm): 2.56; AI: 0.88 (mm). *Epigyne*: with median septum, rim defined as two square to circular openings (Fig. 3.6.3); intromittent orifices open antero-laterally; spermathecae large, kidney-shaped with three swollen sections and small spermathecal glands present anteriorly (Fig. 3.6.4).

*Male*: Size, measurements (mm): (*n* = 4). TL: 2.17 (2.07–2.35); CL: 1.08 (1.03–1.15); CW: 1.00 (0.96–1.01); CI: 1.08 (1.07–1.11); CH: 0.66 (0.56–0.92); CLL: 0.17 (0.15–0.19); MOQ-L: 0.18 (0.16–0.19). Resemble females but differs as follows: *Colour*: carapace and legs dark copper-brown; abdomen brown, tinted with black. *Carapace:* slightly smaller in size with fewer setae; circular viewed from above. *Sternum:* SL (mm): 0.55; SW (mm): 0.38; SI (mm): 1.65. *Eyes:* eye measurements (mm): AME–AME: 0.18; ALE–AME: 0.26; AME–AME/AME–ALE: 0.68; PME–PME: 0.27; PLE–PME: 0.29; PME–PME/PME–PLE: 0.93; ALE/AME: 1.48; PLE/PME: 1.08; MOQ-AW/MOQ-PW: 0.67; MOQ-L/MOQ-W: 0.26; Clyp/AME–AME: 0.97. *Legs*: slightly more slender than in female; leg formula: I:II:IV:III; leg measurements (mm): I – Fe 0.85., Pat 0.31, Tib 0.69, Mt 0.55, Ta 0.41, total 2.81; II – Fe 0.88, Pat 0.31, Tib 0.72, Mt 0.56, Ta 0.32, total 2.78; III – Fe 0.59, Pat 0.22, Tib

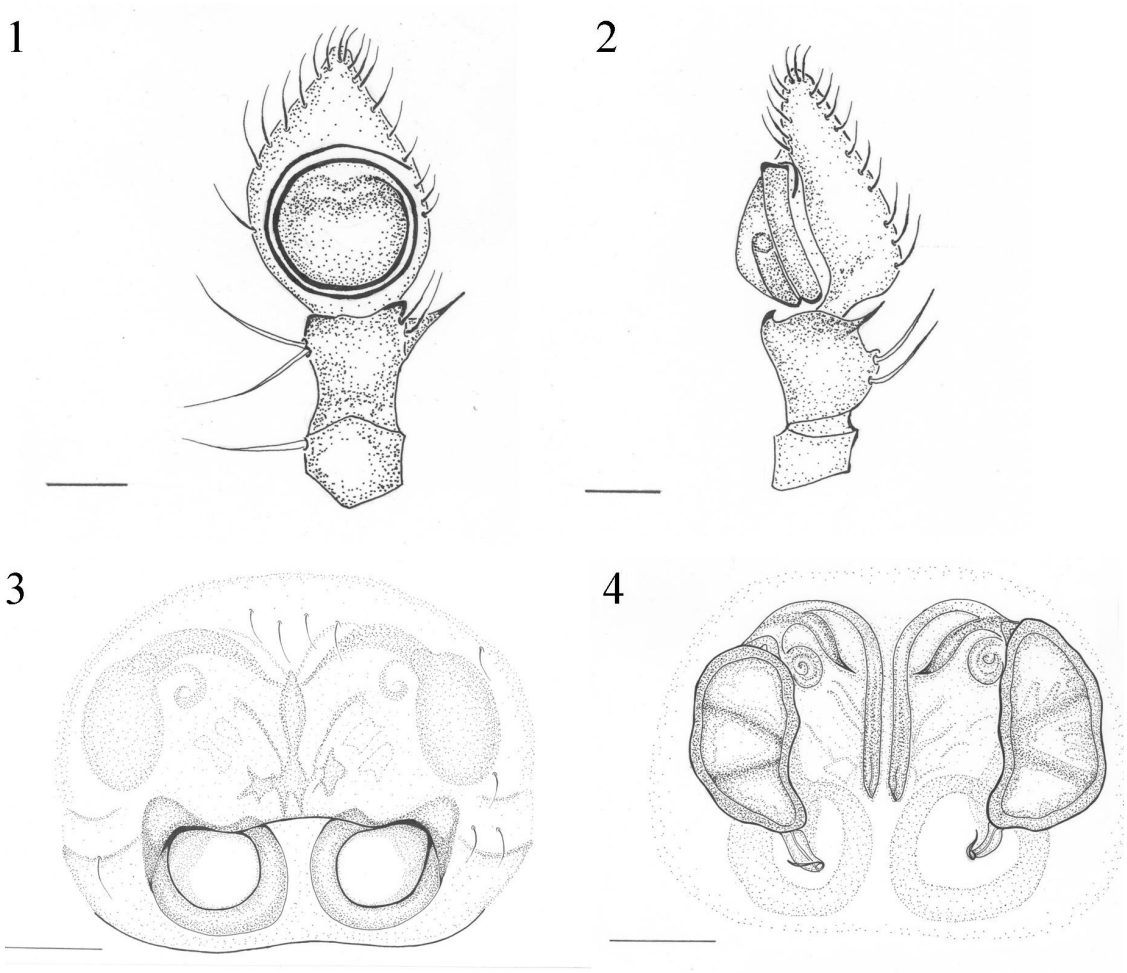



**Fig. 3.6.** ***Sylligma lawrencei*** Millot, 1942. 1. Male right palp ventral view. 2. Right palp retro-lateral view. 3. Female epigyne ventral view. 4. Epigyne dorsal view.

0.42, Mt 0.30, Ta 0.25, total 1.78; IV – Fe 0.63, Pat 0.22, Tib 0.46, Mt 0.33, Ta 0.26, total 1.90. *Abdomen*: small, with glossy smooth scutum; AL (mm): 1.09; AW (mm): 1.16; AI (mm): 0.94. *Palp*: embolus short coiling at least once around bulb (Fig. 3.6.1); RTA small, thin, directed laterally, more dorsally positioned to bulb; VTA small (Fig. 3.6.2).

*Type material*. Holotype ♀ & juvenile, GUINEA: Macenta, 8°32'N 9°28'W, viii.1937 (MNHN).

*Material examined*. DEMOCRATIC REPUBLIC OF CONGO (DRC): *Nord-Kivu Region,* 5 ♂, Kivu, Semliki middle valley, 01°13'S 30°32'E, found on ground layer, 1.viii.1968, R.P.M. Lejeune (MRAC 135.702); 1 ♂, same locality data, 3.viii.1968, R.P.M. Lejeune (MRAC 135.537); *Katanga Region*, 2 ♀, Shaba, Luiswishi, 11°33'S 27°42'E, 28 km NE of Lubumbashi, savanna, 1974, F. Malaisse (MRAC 145.504); 1 ♀, same locality, 19.iii.1973, F. Malaisse (MRAC 149.140); 1 ♀, same locality, Miombo forest not burnt, xi.1973. F. Malaisse (MRAC 149.073). GABON: 1 ♂, Mondah, 0°36'N 9°36'E, forest, i.ix.1985, A. Pauly (MRAC 172.806); 1 ♂, Ntoum, 0°36'N 10°48'E, diverse environment, 7.iv.1985, A. Pauly (MRAC 172.992). NIGERIA: 2 ♂, 1 ♀, Ibadan, 7°22'N 3°56'E, from Notatum grass on buffer strips of rice plots, 5.v.1981, A. Russell-Smith (MRAC 177.231); 1 ♂, same locality, swept from buffer strips of rice plots, two days after mowing, 17.v.1981, A. Russell-Smith (MRAC 177.259).

*Natural history*. This species has been collected from savanna and forest habitats. They are found on vegetation and ground layer. In Nigeria, they were sampled from Notatum grass buffer strips from agricultural lands. Adult females have been sampled between November and May, while the males were collected between August and May. This species was sampled with *S. theresa* sp. n. from buffer strips of Notatum grass in Nigeria.

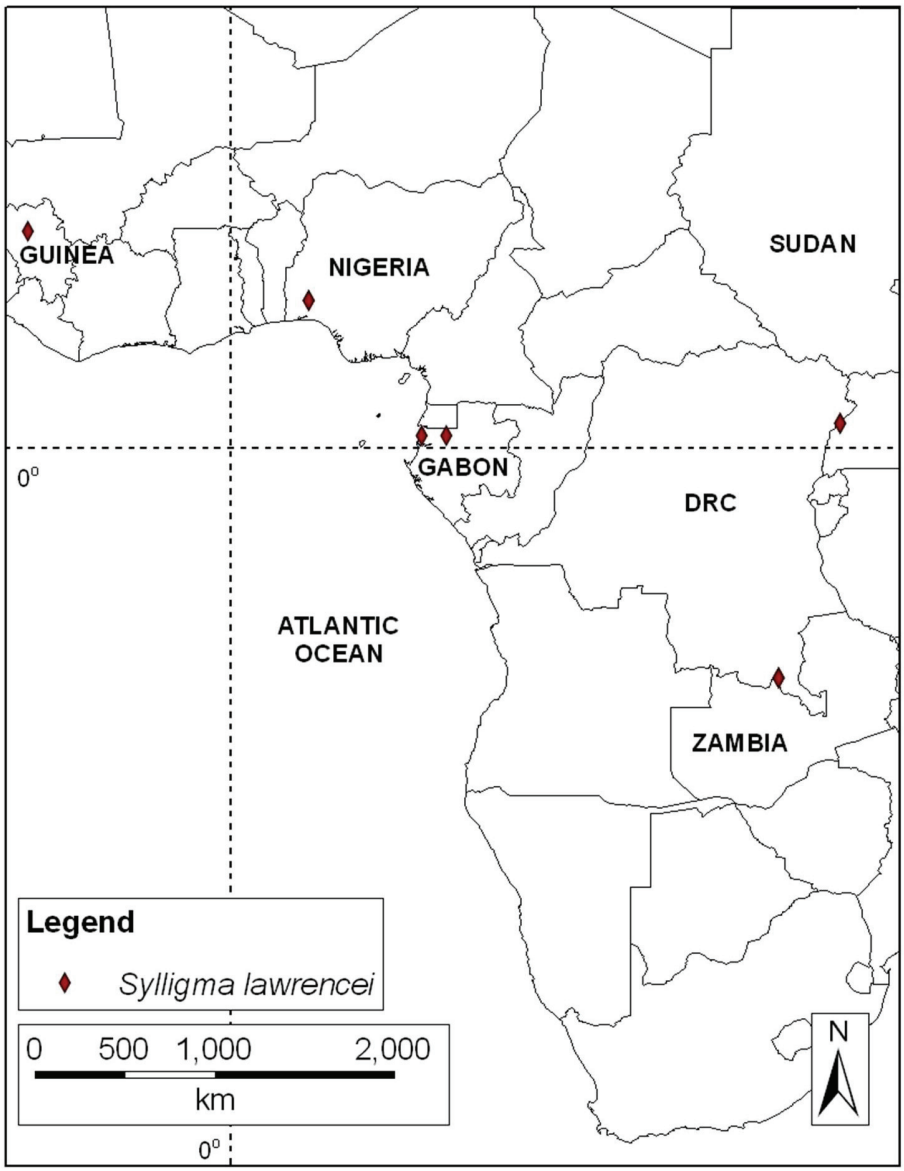



**Fig. 3.7** Recorded geographical distribution of *Sylligma lawrencei* Millot, 1942.

*Distribution*. Guinea. New records: Democratic Republic of Congo (DRC), Gabon and Nigeria (Fig. 3.7).

#### 3.4.2.4 *Sylligma ndumi* sp. n.

Figs 1.1, 3.1, 3.8 & 3.9

*Diagnosis*. Female is recognized by carapace and legs being shades of pale to dark copper-brown to rich orange-brown, tinged with black (Figs 3.8.1-2). The atrium rim of the epigyne has a transverse shape with the spermathecae large, kidney-shaped with thick intromittent canals (Figs 3.8.5-6). The male palp with a short, sclerotized embolus with sharp tip apically and strong, tooth-like RTA (Figs 3.8.3-4); abdominal scutum present in males.

*Description*.

*Female*: Size, measurements (mm): (*n* = 8). TL: 3.68 (3.18–4.38); CL: 1.79 (1.56–2.00); CW: 1.57 (1.38–1.73); CI: 1.14; CH: 0.95 (0.50–1.14); CLL: 0.31 (0.25–0.40); MOQ-L: 0.28 (0.23–0.34). *Colour*: carapace and legs shades of pale to dark copper-brown to rich orange-brown, tinged with black, abdomen sometimes mottled. *Carapace*: slightly longer than wide; posterior edge accentuated with tubercles bearing strong setae; texture smooth to granular with scattered setae present on cephalic region; tubercles present along striae on thoracic region. *Chelicerae*: with long incurving serrated setae on promargin (Figs 3.1.1-2) *Sternum*: SL (mm): 0.86; SW (mm): 0.72; SI (mm): 1.21. *Eyes*: eye measurements (mm): AME–AME: 0.29; ALE–AME: 0.43; AME–AME/AME–ALE: 0.69; PME–PME: 0.46; PME–PLE: 0.41; PME–PME/PME–PLE: 1.13; ALE/AME: 1.45; PLE/PME: 0.89; MOQ-AW/MOQ-PW: 0.64; MOQ-L/MOQ-W: 0.44; Clyp/AME–AME: 1.05. *Legs*: slender with long setae on all segments except tarsi; leg formula: I:II:III:IV; leg measurements (mm): leg I – Fe 1.63, Pat 0.51, Tib 1.51, Mt 1.19, Ta 0.71, total 5.55; II – Fe 1.53, Pat 0.48, Tib 1.37, Mt 1.06, Ta 0.64, total 5.07; III – Fe 1.27, Pat 0.47, Tib 0.94, Mt 0.65, Ta 0.34, total

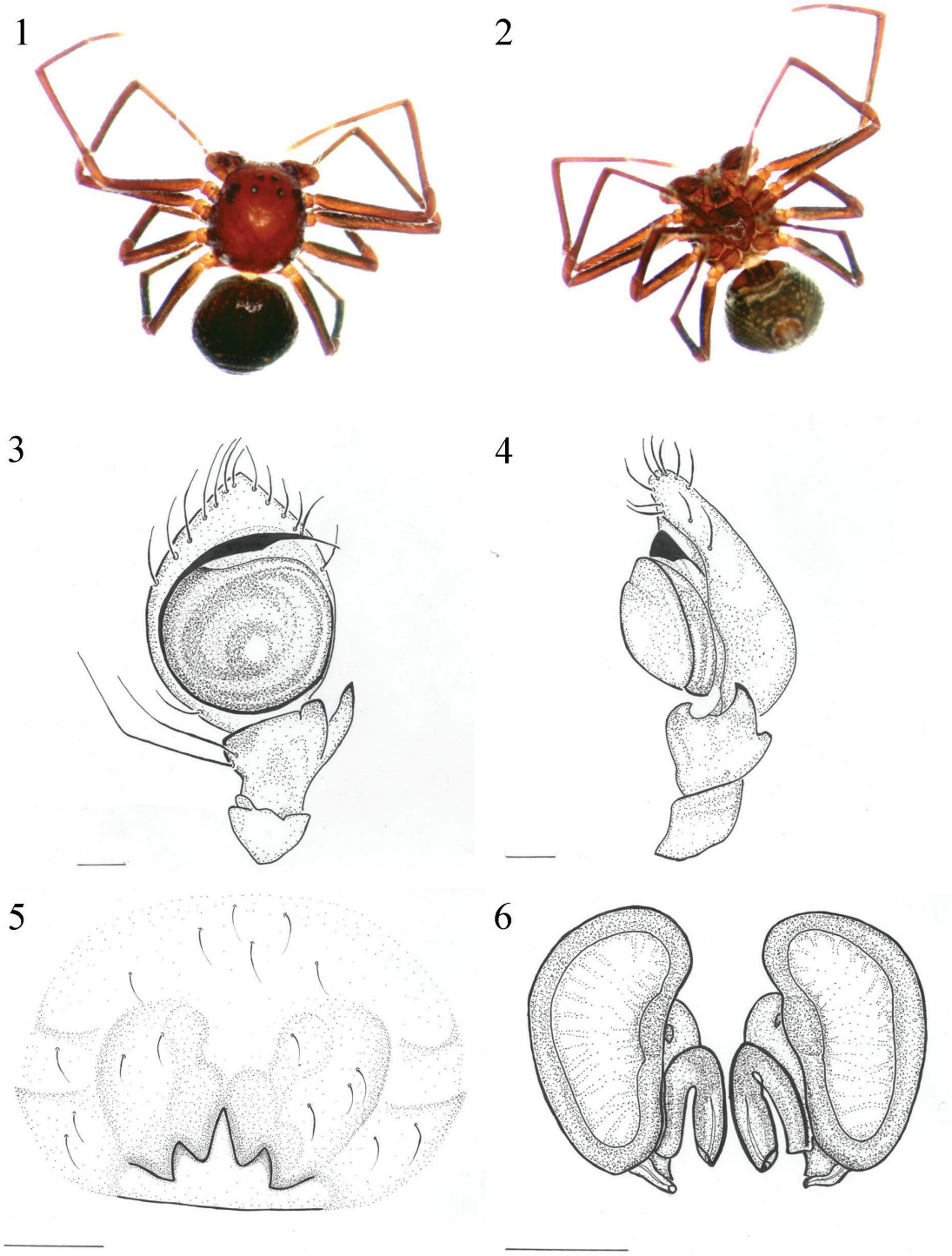



**Fig. 3.8** ***Sylligma ndumi*** sp n. 1. Male dorsal view. 2. Male ventral view. 3. Male right palp ventral view. 4. Right palp retro-lateral view. 5. Female epigyne ventral view. 6. Epigyne dorsal view.

3.68; IV – Fe 1.13, Pat 0.37, Tib 0.84, Mt 0.63, Ta 0.35, total 3.32. *Abdomen:* round with numerous long, strong setae; AL (mm): 1.88; AW (mm): 2.12; AI (mm): 0.89. *Epigyne*: atrium with rim wave-like parallel to epigastric furrow (Fig. 3.8.5); intromittent orifices small (Fig. 1.1.3); intromittent canal thick, simple tubes; spermathecae large, varying from kidney-shaped to slightly elongate (Fig. 3.8.6).

*Male*: Size, measurements (mm) (*n* = 8). TL: 2.96 (2.50–3.35); CL: 1.52 (1.25–1.75); CW: 1.38 (1.18–1.60); CI: 1.11; CH: 0.95 (0.73–1.14); CLL: 0.27 (0.19–0.33); MOQ-L: 0.25 (0.19–0.28). Similar to female but varies as follows: *Colour*: often darker than females (Figs 3.8.1-2). *Carapace*: rounder shape viewed from above; texture smooth; clypeus vertical; strong setae along striae across thoracic region, fewer setae than in female. *Sternum*: SL (mm): 0.72; SW (mm): 0.61; SI (mm): 1.19. *Eyes*: eye measurements (mm): AME–AME: 0.26; ALE–AME: 1.54; AME–AME/AME–ALE: 0.65; PME–PME: 0.41; PLE–PME: 0.38; PME–PME/PME–PLE: 1.07; ALE/AME: 1.54; PLE/PME: 0.94; MOQ-AW/MOQ-PW: 0.63; MOQ-L/MOQ-W: 0.40; Clyp/AME–AME: 1.05. *Legs*: leg formula: II:I:III:IV; leg measurements (mm): leg I – Fe 1.56, Pat 0.43, Tib 1.42, Mt 1.14, Ta 0.66, total 5.21; II – Fe 1.64, Pat 0.46, Tib 1.50, Mt 1.19, Ta 0.69, total 5.48; III – Fe 1.07, Pat 0.38, Tib 0.81, Mt 0.61, Ta 0.37, total 3.25; IV – Fe 1.26, Pat 0.37, Tib 0.94, Mt 0.76, Ta 0.40, total 3.74. *Abdomen*: scutum bearing few fine, short and flat lying setae; AL (mm): 1.43; AW (mm): 1.50; AI: 0.96 (mm). *Palp*: embolus short and strongly sclerotized (Figs 1.1.4 & 3.8.3), embolar tip thin; RTA broad, tooth-like; VTA medium-sized, flat, slightly curving inwards (Fig. 3.8.4); tibia with at least one very long seta pro-laterally.

*Type material*. Holotype ♂, SOUTH AFRICA: *KwaZulu-Natal Province,* Ndumo Game Reserve, Ingwavuma Crocodile Farm, 26°54'S 32°19'E, 12.i.2007, found underneath rock, C. Haddad (NMBA 10677). Paratypes: 2 ♂, 1 ♀, same locality data as holotype (NMBA 10676/78). BOTSWANA: 1 ♂, Shakawe, 19°20'S 22°40'E, Okavango swamps, 15.vii.2001, J. van Niekerk (NCA 2005/456). SOUTH AFRICA: *Eastern Cape Province,* 1 ♂, East London, Pineapple Research Station,

32°59’S 27°53’E, sweeping grasslands, 7.xii.1977, A.S. Dippenaar-Schoeman (NCA 78/29). 1 ♂, False Bay, 34°10’S 18°40’E, Savanna biome, from yellow pantrap, 15.i.2005, M. Hamer (NCA 2006/247); *KwaZulu-Natal Province,* 2 ♂, Enseleni Game Reserve, 28°42'S 31°59'E, Lower Umfolozi, sweeping and beating, 12.xii.1994, L. Lotz (NMBA 7258); 1 juvenile, Mkuze Game Reserve, 27°37’S 32°00’E, *Acacia* woodland beating, 8.vi.2004, M. Hamer (NCA 2006/212); 1 juvenile, same locality, *Acacia* woodland, 9.i.2003, M. Hamer (NCA 2006/80); 1 juvenile, same locality data, *Acacia leuderetzi* active searching, M. Hamer (NCA 2003/1510); 1 ♀, Mtunzini, 28°57’S, 31°46’E, Twin Streams Farm, coastal dune grassland, 19-20.i.1984, T. Griswold, C. Griswold, P. Croeser & P. Reavell (NM); 1 juvenile, Fanie’s Island, 28°06’S 32°27’E, forest undergrowth, 22.vii.1990, M. Filmer (NCA 91/627); 1 ♀, Hellsgate, Tsetse Fly Research Station, 28°14’S 32°27’E, from blue tsetse fly traps, 26.i.2004, J. Esterhuizen (NCA 2006/1330); 1 ♀, 1 ♂, Ndumo Game Reserve, 26°51'S 32°07'E, leaf litter sifting in broad leaf woodland, 6.ii.2005, C. Haddad (NCA 2005/34); 1 ♂, Tembe Elephant Park, 27°01'S 32°24'E, leaf litter sifting, 10.i.2002, C. Haddad (NCA 2006/1387); 2 ♀, same locality, 08.i.2002, C. Haddad (NCA 2006/1388); 1 ♀, 1 ♂, same locality, 07.i.2002, from sand forest, C. Haddad (NCA 2006/1389); *Mpumalanga Province*, 1 ♀, Kruger National Park, Skukuza Camp, 25°00’S 31°42’E, 6.xii.1984, found on ground and beneath logs in riparian forest, C.E. Griswold, F. Khuna, T. M. Griswold (NM); 1 ♂, Kruger National Park, Munwena, 25°04’S 32°24’E, 5.xii.1963, R. Lawrence (NM); 1 ♂, same locality, Skukuza, 25°00'S 31°36’E, sweeping and beating, 17.xii.1984, C. Griswold & T. Meikle-Griswold (NM); 1 ♂, same locality, Skukuza, 25°00'S 31°42'E, riparian forest sweeping, 16.vii.1984, T. Meikle-Griswold, F. Wright & C. Griswold (NM); 1 ♂, same locality, Mlondozi, 25°09'S 31°59'E, 15.i.1963, R. Lawrence (NM); 1 juvenile, same locality, Skukuza, 25°00'S 31°42'E, riparian forest sweeping, 16.vii.1984, C.E. Griswold (NM). *Limpopo Province*, 1 ♂, Soutpansberg, Lajuma, 23°01’S 29°25’E, grasslands, 20.ii.2006, N. Fischer (NCA 2006/1329). *North West Provinc*e, 1 ♀, Buffelspoort, 25°39’S 27°45’E, sweeping grass, 15.x.1978, A. Dippenaar-Schoeman (NCA 91/1207); 2 ♂, Brits, Swarthoek, 25°39’S 27°45’E, prey on ants, 4.ii.1995. A.

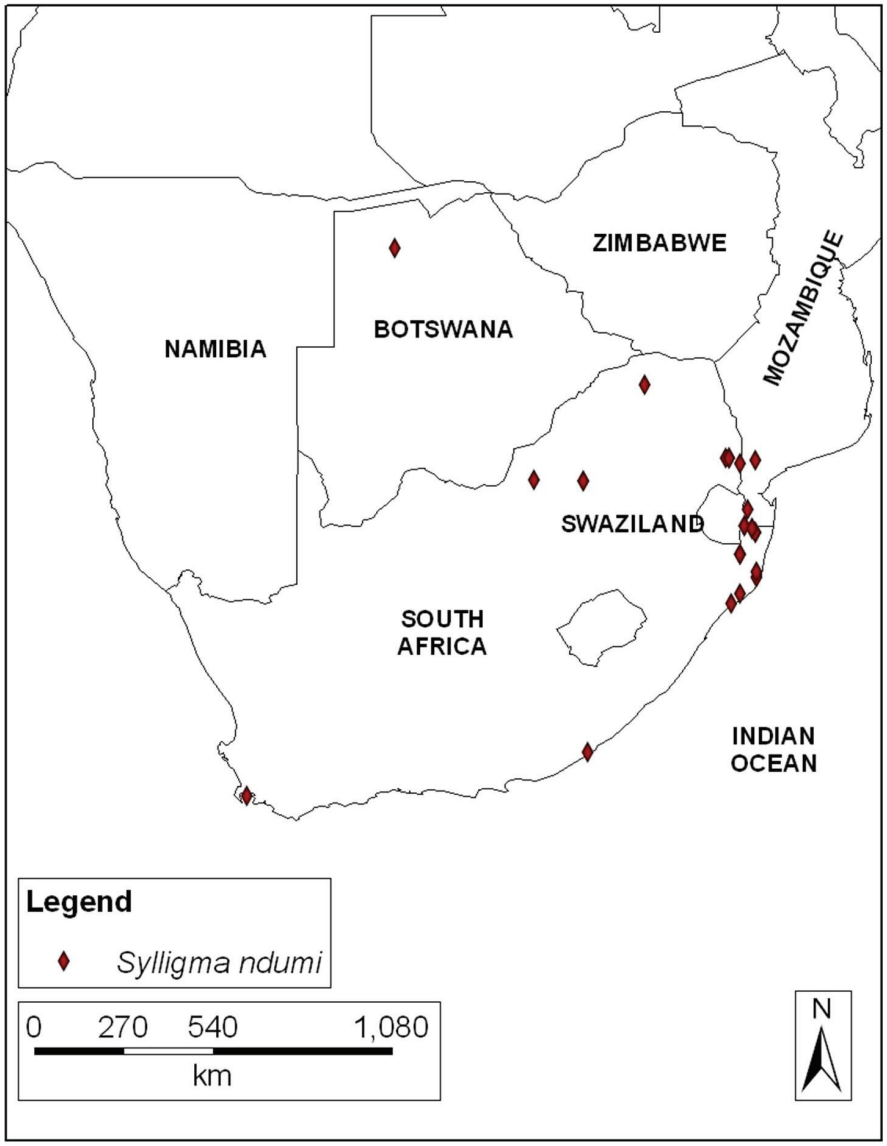



**Fig. 3.9** Recorded geographical distribution of *Sylligma ndumi* sp. n.

Leroy, NCA 2009/4611; 1 ♀, Groot Marico, 25°36'S 26°25'E, leaf litter, 27.i 1991, M. Filmer (NCA 91/684).

*Natural history*. Specimens were collected using a variety of collecting methods from savanna, grassland, swamps, riparian and sand forest. They were found on the field and ground layer and forest undergrowth, in leaf litter and under rocks. Males were collected between July and February while females were collected between October and February. In Ndumo Game Reserve, specimens were observed (C. Haddad, *pers. comm*.) preying on the ant *Myrmicaria natalensis*. Similar observations that they prey on ants (not identified) were also made in Brits by A. Leroy (*pers. comm*.).

*Distribution*. Botswana and South Africa (Fig. 3.9).

*Etymology*. Named after the type locality, Ndumo Game Reserve in KwaZulu-Natal Province, South Africa. The name "*ndumi"* is derived from the name of a local chief in the Ndumo-Tembe area of the province.

### 3 4.2.5 *Sylligma spartica* sp. n.

Figs 3.10 & 3.11

*Diagnosis*. Very similar to *S. hirsuta* Simon, 1895 but males differ in this species by having a very long, curved RTA in the form of an axe (Figs 3.10.1-2) and long embolus (Fig. 3.10.1). Female unknown.

*Description*.

*Male*: Size, measurements (mm): (*n* = 1). TL: 2.88; CL: 1.46; CW: 1.31; CI: 1.11; CH: 0.73; CLL: 0.26; MOQ-L: 0.24. *Colour*: carapace and legs orange to copper; abdomen brown, with slightly darker tint, with two yellow dorsal bands

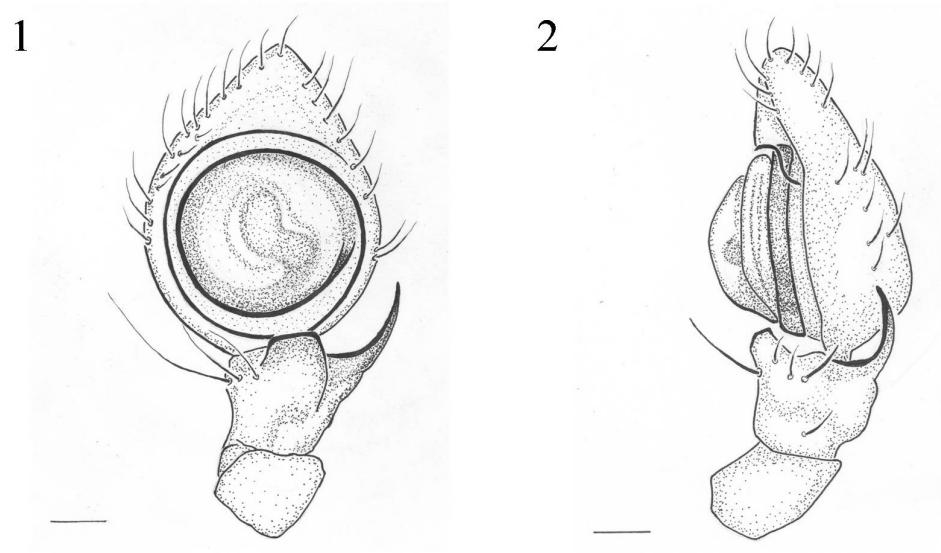



**Fig. 3.10.** ***Sylligma spartica*** sp. n. 1. Male right palp ventral view. 2. Right palp retro-lateral view.

over width. *Carapace*: round viewed from above, abundant setae and strong setae; elevated in thoracic region, steeply sloping anteriorly. *Clypeus*: almost vertical with long setae on edge. *Sternum*: V-shaped, slightly bordered; SL (mm): 0.73; SW (mm): 0.62; SI (mm): 1.18. *Eyes*: eye measurements (mm): AME–AME: 0.24; ALE–AME: 0.37; AME–AME/AME–ALE: 0.65; PME–PME: 0.37; PLE–PME: 1.10; PME–PME/PME–PLE: 0.91; ALE/AME: 1.54; PLE/PME: 1.10; MOQ-AW/MOW-PW: 0.65; MOQ-L/MOQ-W: 0.37; Clyp/AME–AME: 1.08. *Legs*: with long spiniform setae and abundant shorter setae. Legs I and II with strong setae ventrally on metatarsi and tarsi; leg formula: I:II:IV:III; leg measurements (mm): I – Fe 1.53, Pat 0.51, Tib 1.24, Mt 1.06, Ta 0.69, total 5.04; II – Fe 1.50, Pat 0.47, Tib 1.13, Mt 1.10, Ta 0.69, total 4.89; III – Fe 1.02, Pat 0.37, Tib 0.77, Mt 0.51, Ta 0.33, total 2.99; IV – Fe 0.99, Pat 0.40, Tib 0.91, Mt 0.69, Ta 0.37, total 3.36. *Abdomen*: bearing fine setae with scutum dorsally and striae ventrally; apodemes slight depressions; AL (mm): 1.42; AW (mm): 1.42; AI (mm): 1.00. *Palp*: bulb round with embolus coiling more than once around it (Fig. 3.10.1); RTA well-arched (Figs 3.10.1–2), resembling an axe, significantly shorter than in *S. hirsuta*.

*Type material*. Holotype ♂, DEMOCRATIC REPUBLIC OF CONGO (DRC): *Orientale Region*, Parc National Garamba, 4°00'N 29°00'E, 2007, Hallet (MRAC 222220).

*Other material examined*. None

*Natural history.* Nothing known.

*Distribution*. Known only from the type locality, near the northern border of the Democratic republic of Congo (DRC), south of Sudan (Fig. 3.11).

*Etymology.* Derived from the Greek word "*sparti*" meaning earth-born warriors, armed for war. This refers to the RTA of the male palp that is curved in the form of an axe.


**Fig. 3.11** Recorded geographical distribution of *Sylligma spartica* sp. n.

### 3.4.2.6 *Sylligma theresa* sp. n.

Figs 3.12, 3.13

*Diagnosis*. Resembles *S. ndumi* sp. n. by its colour, general appearance and the shape of the spermathecae and palp. This species, however, differs from *S. ndumi* in its granular carapace, abdomen with wide dorsal stripes, and epigyne having a U-shaped rim (Fig. 3.12.3). Male palp with medium-sized embolus, partly sclerotized (Fig. 3.12.1) and long RTA (Figs 3.12.1-2). Female the largest member of the genus *Sylligma.*

*Description*.

*Female*: Size, measurements (mm): (*n* = 2). TL: 3.80 (2.89–4.70); CL: 1.53 (1.41–1.65); CW: 1.39 (1.27–1.50); CI: 1.10 (1.09–1.11); CH: 0.98 (0.94–1.01); CLL: 0.26 (0.24–0.28); MOQ-L: 0.25 (0.24–0.27). *Colour*: carapace orange to copper-brown to slightly darker tint; abdomen pale brown with one or two yellow dorsal stripes. *Carapace*: circular viewed from above; texture slightly granular. *Clypeus*: sloping, with sinuated anterior edge bearing long setae. *Chelicerae*: flattened dorsally; with a few incurving setae. *Sternum*: slightly narrower than other species; SL (mm): 0.79; SW (mm): 0.62; SI (mm): 1.26. *Eyes*: eye measurements (mm): AME–AME: 0.25; ALE–AME: 0.51; AME–AME/AME–ALE: 0.66; PME–PME: 0.39; PLE–PME: 0.39; PME–PME/PME–PLE: 1.01; ALE/AME: 1.51; PLE/PME: 0.99; MOQ-AW/MOQ-PW: 0.64; MOQ-L/MOQ-W: 0.39; Clyp/AME–AME: 1.03. *Legs*: leg formula: II:I:IV:III; leg measurements (mm): leg I – Fe 1.30, Pat 0.45, Tib 1.21, Mt 0.94, Ta 0.67, total 4.57; II – Fe 1.42, Pat 0.46, Tib 1.22, Mt 1.12, Ta 0.63, total 4.58; III – Fe 0.95, Pat 0.34, Tib 0.69, Mt 0.49, Ta 0.38, total 2.86; IV – Fe 1.06, Pat 0.36, Tib 0.83, Mt 0.66, Ta 0.42, total 3.34. *Legs*: long with numerous setae; long spiniform setae ventrally on femora and tibiae I and II. *Abdomen*: with numerous bristle-like setae; five apodemes grouped in arrow-shape formation, centre two form large depressions; ventrally with small apodemes in two rows; AL (mm): 2.27; AW (mm): 2.35; AI (mm): 0.99. *Epigyne*: rim U-shaped (Fig. 3.12.3); intromittent orifices postero-laterad of rim;

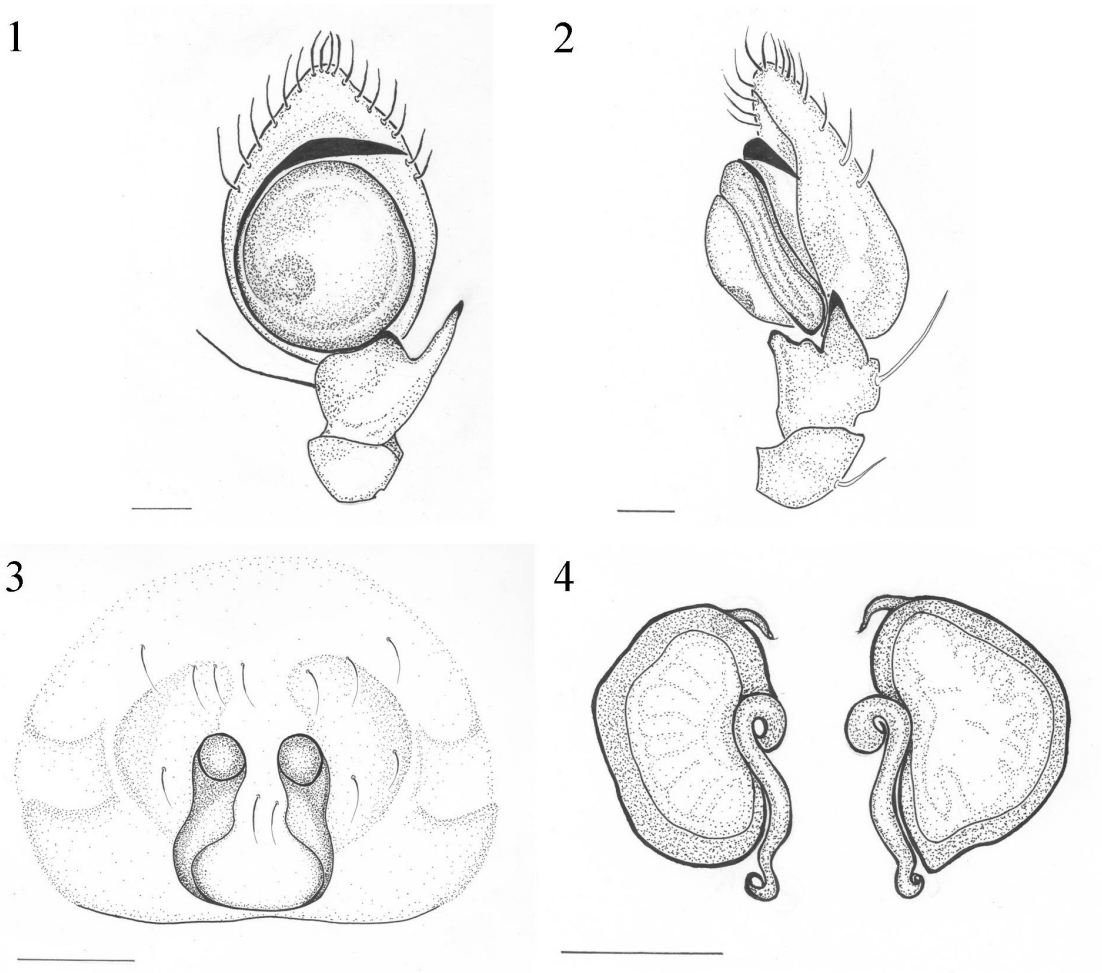



**Fig 3.12** ***Sylligma theresa*** sp. n. 1. Male right palp ventral view. 2. Right palp retro-lateral view. 3. Female epigyne ventral view. 4. Epigyne dorsal view.

intromittent canal S-shaped curving towards spermathecae (Fig. 3.12.4); spermathecae kidney-shaped and fairly large.

*Male*: Size, measurements (mm): (*n* = 3). TL: 2.99 (2.75–3.38); CL: 1.49 (1.41–1.62); CW: 1.33 (1.29–1.41); CI: 1.12 (1.09–1.15); CH: 1.08 (0.85–0.94); CLL: 0.26 (0.25–0.28); MOQ-L: 0.27 (0.25–0.28). Resembles female but differs as follows: *Colour*: carapace and legs reddish brown, slightly tinted with black; abdomen dark copper, tinted with black with two orange-copper, dorsal stripes over width. *Carapace*: granular, bearing numerous long setae. *Sternum*: SL (mm): 0.80; SW (mm): 0.62; SI (mm): 1.28. *Eyes*: eye measurements (mm): AME–AME: 0.26; ALE–AME: 1.44; AME–AME/AME–ALE: 0.70; PME–PME: 0.40; PLE–PME: 0.38; PME–PME/PME–PLE: 1.08; ALE/AME: 1.44; PLE/PME: 0.93; MOQ-AW/MOQ-PW: 0.65; MOQ-L/MOQ-W: 0.41; Clyp/AME–AME: 1.03. *Legs*: more slender than female; leg formula: I:II:IV:III; leg measurements (mm): leg I – Fe 1.23, Pat 0.45, Tib 1.24, Mt 0.97, Ta 0.69, total 4.56; II – Fe 1.00, Pat 0.31, Tib 1.81, Mt 0.71, Ta 0.49, total 3.33; III – Fe 1.01, Pat 0.36, Tib 0.72, Mt 0.53, Ta 0.38, total 2.99; IV – Fe 1.09, Pat 0.31, Tib 0.85, Mt 0.64, Ta 0.37, total 3.27. *Abdomen*: scutum bearing fine, short setae, sometimes with apodemes forming two depressions; AL (mm): 1.50; AW (mm): 1.49; AI (mm): 1.01. *Palp*: simple with medium-sized embolus, coiling around bulb once (Fig. 3.12.1); RTA fairly long and thin, tooth-like; VTA medium-sized (Fig. 3.12.2).

*Type material*. Holotype ♂, NIGERIA: Ibadan, 7°22'N 3°56'E, collected from Notatum grass on rice buffer strips, 5.v.1981, A. Russell-Smith (MRAC 177.231). Paratypes: 1 ♂ same locality data as holotype (MRAC 177.231); 1 ♀, same locality, swept from rice buffer strips two days after mowing, 17.v.1981, A. Russell-Smith (MRAC 177.259). KENYA: 1 ♂, Homabay Farm, 0°31S 34°27E, found on maize, 15.iii.2003, C. Midega (NCA 2005/1294). NIGERIA: 1 ♀, Ibadan, 7°22'N 3°56'E, from Notatum grass on buffer strips plots, 5.v.1981, A. Russell-Smith (MRAC 177.231). RWANDA: 1 juvenile, Bugesera, 02°06'S 30°00'E, river Lac Tsohoa, in nest of weaver bird, ix.1957, N. Leleup (MRAC 97138).

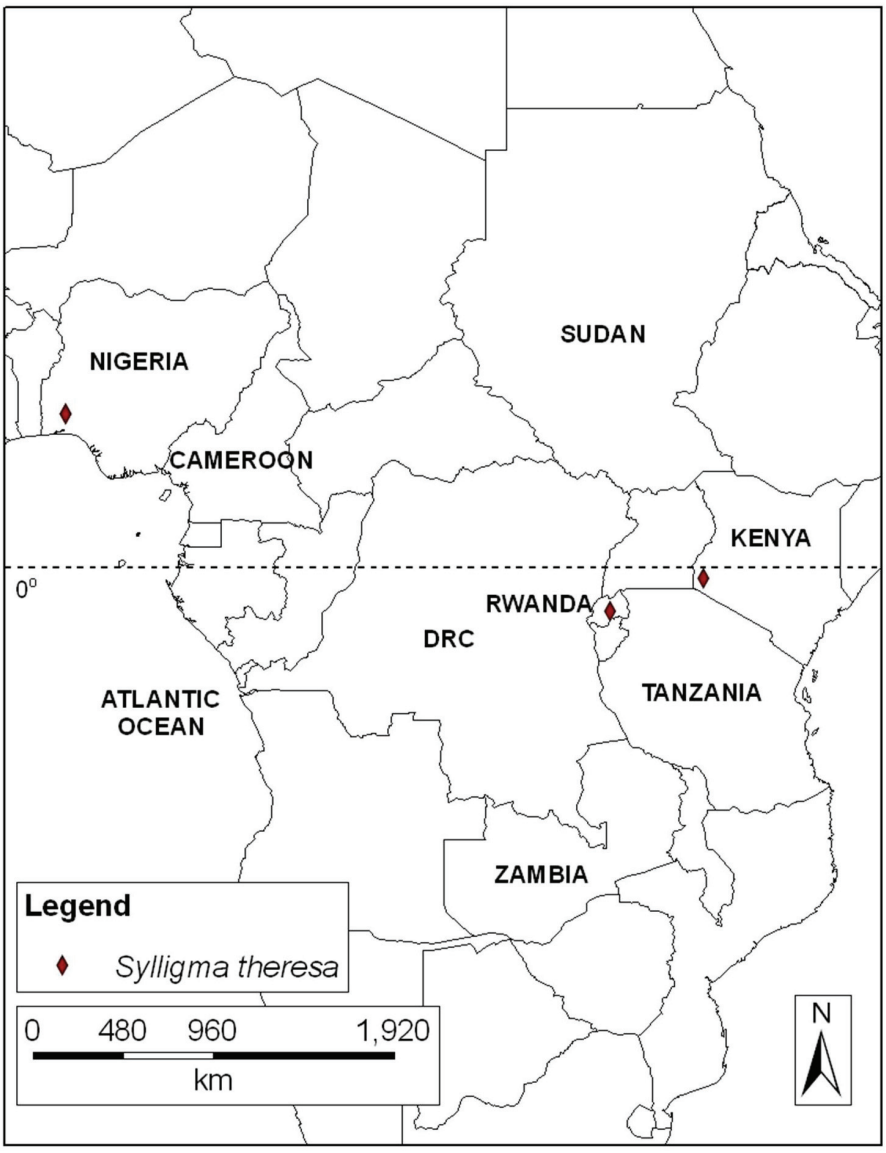



**Fig. 3.13** Recorded geographical distribution of *Sylligma theresa* sp. n.

*Natural history*. Collected from maize, Notatum grass buffer strips in rice plots and a weaver's nest. Males were collected between March and May, while females were collected in May and juveniles in September.

*Distribution*. Kenya, Nigeria and Rwanda (Fig. 3.13).

*Etymology.* Derived from the Greek word "*theres*" that refers to the numerous beasts (large animals) of sub-Saharan Africa.

#### 3.4.2.7 Species *Incertae sedis*

***Sylligma cribrata*** (Simon, 1901)

*Pyresthesis cribrata* Simon, 1901: 22.
*Platypyresthesis cribata* Simon, 1903: 1014; Lehtinen 2005:152 (synonym of *Sylligma*).

*Note:* The holotype of this species collected in Ethiopia could not be located. The species cannot be positively identified from the original description of Simon (1901).

**References**

DIPPENAAR-SCHOEMAN, A.S. & JOCQUÉ, R. 1997. *African spiders, an identification manual.* Plant Protection Research Institute Handbook 9, Agricultural Research Council, Pretoria. 1–392 pp.

LEHTINEN, P.T. 2005. Taxonomic notes on the Misumenini (Araneae: Thomisdae: Thomisinae), primarily from the Palaearctic and Oriental regions. In: Logunov, D.V. & Penney, D. (Eds). *Proceedings of the 21st European Colloquium of Arachnology, St. Petersburg 2003*. 147–184. Arthropoda Selecta, Special Issue **1**

LESSERT, R. DE. 1943. Araignées du Congo Belg (III). *Revue suisse de zoologie* **50**: 305–338.

MILLOT, J. 1942. Les araignées de l'Afrique Occidentale Français: Thomisidae. *Mémoires de l'Académie des sciences de l'Institut de Paris* **65**: 1–82.

ONO, H. 1988. *A revisional study of the spider family Thomisidae (Arachnida, Araneae) of Japan*. National Science Museum, Tokyo. 1–252 pp.

PLATNICK, N.I. 2009. The world spider catalog, Version 9.5. American Museum of Natural History, online at http://research.amnh.org/entomology/spiders/catalog/index.html

SIMON, E. 1895. Histoire naturelle des Araignées. 1. Paris 1895: 761–1084.

SIMON, E. 1901. Etude sur les Arachnides recueillis au cours de la Mission Bonchamps á travers l'Ethiopee, de Djibouti au Nil blanc (1897–1898). *Annales de la Société entomologique de France* **70**: 1–26.

SIMON, E. 1903. Histoire naturelle des araignées. 2. Paris 1903: 669–1080.

SMITH, F. 1885. Catalogue of the hymenopterous insects in the collection of the British Museum. Part VI. Formicidae. London. 1–216 pp.

## Chapter 4

# A revision of spiders of the genera *Mystaria* Simon, 1895 and *Paramystaria* Lessert, 1919 (Araneae: Thomisidae) from the Afrotropical region


## 4.1 Abstract

Two genera of the Dietinae from the Afrotropical region are revised. Prior to the present study, the genus *Mystaria* Simon, 1895 was represented by two species *M. rufolimbata* Simon, 1895 and *M*. *unicolor* Simon, 1895 while the second genus *Paramystaria* Lessert, 1919 was represented by the type species *P*. *variabilis* Lessert, 1919, *P. decorata* Lessert, 1919, *P*. *lata* Lawrence, 1927 and *P*. *flavoguttata* Lawrence, 1952. Within *P. variabilis*, two subspecies were recognized, namely, *P. v. occidentalis* Millot, 1942 and *P. v. delesserti* Caporiacco, 1949. Species of both genera have three small cheliceral teeth, a character unique to members of *Paramystaria*. Based on the presence of cheliceral teeth, and similarities in body shape, genitalia and eye patterns, *Paramystaria* is here recognized as a junior synonym of *Mystaria* and all the species within it are transferred to the genus *Mystaria.* They are plant-dwellers and known only from the Afrotropical region. The only exception is *M. unicolor,* which does not possess small cheliceral teeth, and is here allocated to a new genus *Leroya* (see chapter 5). The subspecies *P. v. occidentalis* is elevated to the species level and transferred to the genus *Mystaria* and designated *M. occidentalis.* Eight new *Mystaria* species are described, namely, *M. budongii, M*. *irmatrix*, *M*. *lindaicapensis*, *M. mnyama*, *M*. *oreadii*, *M. savannensis*, *M*. *soleili* and *M*. *stakesbyi. Paramystaria decorata* and the subspecies *P. v. delesserti* are treated as *incertae sedis*. All the species are either described or re-described and identification keys provided.



**Keywords:** Afrotropical region, Araneae, Dietinae, *Mystaria*, *Paramystaria*, synonym, Thomisidae, classical taxonomy, scanning electron microscopy (SEM).

## 4.2 Introduction

The Afrotropical genus *Mystaria* was described by Simon (1895), and represented by two species *M. rufolimbata* Simon, 1895 the type species and *M*. *unicolor* Simon, 1895, both from Sierra Leone. A second genus, *Paramystaria* was described by Lessert (1919), and represented by two species, *P*. *variabilis* Lessert, 1919, the type species and *P. decorata* Lessert, 1919. Two additional species were subsequently recognized, namely, *P*. *lata* Lawrence, 1927 from Namibia and *P*. *flavoguttata* Lawrence, 1952 from the Democratic Republic of Congo (DRC). Due to the colour variation in *P. variabilis*, two subspecies were recognized within the genus, namely, *P. v. occidentalis* Millot, 1942 from Guinea and *P. v. delesserti* Caporiacco, 1949 from Kenya.

Lessert (1919) reported that *Paramystaria* has one cheliceral tooth present on the retromargin and two teeth on the promargin, see SEM photographs (Figs 4.1.1-5). However, after examining the type species of the genus *Mystaria* it become clear that members of this genus also have three small teeth on the cheliceral margins an observation confirmed by (Jézéquel, 1964). The presence of these small teeth was observed in all the species described in *Paramystaria* but is absent in *M. unicolor.*

Species within *Paramystaria* and *Mystaria* also share similar morphology in body shape, genitalia and eye patterns. Based on the similarities of these characters *Paramystaria* is here recognized as a junior synonym of *Mystaria,* and all the species are transferred to *Mystaria* except *M. unicolor,* which does not possess small cheliceral teeth and is allocated to a new genus *Leroya* (see Chapter 5). The subspecies *P. v. occidentalis* is elevated to species level and transferred to the genus *Mystaria* and designated *M. occidentalis.*

Members of the genus *Mystaria* are plant dwellers and known only from the Afrotropical region (Platnick 2009). They are small, colourful spiders decorated with patterns on the body and have slender legs. The material examined in the present study was collected exclusively from vegetation such as shrubs and grasses as well

as the canopy of indigenous forests and were found near coastal beaches, estuaries, rivers, wetlands and forest areas in the Afrotropical region.

In the present study, the eleventh in a series of revisions of the spider family Thomisidae of the Afrotropical region, *Mystaria* and *Paramystria* are revised resulting in *Paramystaria* being recognized as a junior synonym of *Mystaria* and the re-description of five known species, and description of eight new species.

### 4.3 Materials and methods

Available material housed in the the following collections (abbreviations in parentheses) was examined: American Museum of Natural History (AMNH), New York, U.S.A; California Academy of Science (CAS), San Francisco, U.S.A; Iziko Museums–South African Museum (SAM), Cape Town, South Africa; Koninklijk Museum voor Midden-Afrika (MRAC), Tervuren, Belgium; Musée d'Histoire Naturelle (MNHG), Geneva, Switzerland; Museum Comparative Zoology (MCZ), Harvard University, Cambrige, U.S.A; Muséum National d'Histoire Naturelle (MNHN), Paris, France; Natal Museum (NM), Pietermaritzburg, South Africa; National Collection of Arachnida (NCA), Pretoria, South Africa; National Museum (NMBA), Bloemfontein; Senckenberg Museum of Natural History (SMF), Frankfurt, Germany and Zoologisches Forschungsmuseum Alexander Koenig (ZFMK), Bonn, Germany.

The following character abbreviations are used in the present study: *Body:* AL–abdomen length; AW–abdomen width; CL–carapace length; CW–carapace width; CH–carapace height; Clyp–clypeus: CLL–clypeal length; SL–sternum length; SW–sternum width; and TL–total length. *Eyes*: AER–anterior eye row; AME–anterior median eyes; ALE–anterior lateral eyes; PER–posterior eye row; PME–posterior median eyes; PLE–posterior lateral eyes; MOQ–median ocular quadrangle; MOQ-L–median ocular quadrangle length; MOQ-W–median ocular quadrangle width; MOQ-AW–median ocular quadrangle anterior width; and MOQ-PW–median ocular quadrangle posterior width. *Legs*: Fe–femur; Pat–patella; Tib–tibia; Mt–metatarsus; and Ta–tarsus. *Palp*: VTA–ventral tibial apophysis; and RTA–retro-lateral tibial

apophysis.

Measurements were recorded in mm. The mean size is given with the observed range in parentheses. The following indices are calculated by dividing a character's length with its width: SI–sternum index; AI–abdomen index and CI–carapace index. The description format and the abbreviations of morphological terms used in the present study follow that of Ono (1988). All specimens examined were preserved in alcohol, causing loss of their original bright colouring as observed in live specimens (Fig. 4.8.5).

## 4.4 Systematics

### **4.4.1.** Genus ***Mystaria*** Simon, 1895

*Mystaria* Simon, 1895: 989; Jézéquel, 1964: 1111; Ono, 1988: 219.
Type species*: Mystaria rufolimbata* Simon, 1895 by original designation
*Paramystaria* Lessert, 1919: 102 (***syn. nov.***) Type species: *Paramystaria variabilis* Lessert, 1919 by original designation

*Diagnosis:* Small spiders; body and/or legs may be decorated with blue, yellow, red, black or brown patterns (Figs 4.4.3, 4.6.6, 4.10.5-7) (however, colour fades in alcohol preservation); carapace circular to cube-shaped, cephalic and thoracic region elevated; abdomen circular to oval, female abdomen large in size relative to carapace; median eyes small, MOQ anterior narrower than posterior (Fig. 4.10.5). Cheliceral margins with three small teeth, two on promargin and one on retromargin (Figs 4.1.1-5); legs long and slender. Female epigyne without a median septum (Fig. 4.6.1); intromittent orifices usually open laterally or antero-laterally on atrium; rim and atrium have varying shapes (Figs 4.6.1, 4.8.1, 4.12.1, 4.24.1); intromittent canals centrally straight with numerous complex coils laterad, spermathecae small, round, situated posteriorly (Figs 4.8.2 & 4.12.2). Males

resemble females, but vary in colour patterns, size and an abdominal scutum (Figs 4.12.7 & 4.28.7); palp with bulb and cymbium simple, frequently with small cymbial apophysis or tutaculum present; embolus fairly long in lenght; tibia with VTA curved at tip and slender RTA (Figs 4.4.1-2, 4.20.3-4, 4.28.3-4).

*Re-description.*

*Female*: Small spiders 1.90–5.24 mm body length. *Colour.* Carapace either uniform or with shades, patches or bands ranging from red to copper-brown to orange, brown or black (Figs 4.20.5, 4.14.5, 4.16.5); sometimes with dark patches over eye region and sometimes with yellow patches on clypeus and AME area (Fig. 4.22.5); abdomen uniform (Fig. 4.10.5) or with patterns varying from a mid-dorsal stripe (Fig. 4.8.5) to larger patches (Fig. 4.12.5), or two circular spots postero-laterally or dark pattern around border (Figs. 4.20.5, 4.6.6); colour patterns on legs vary between species as follows: 1) uniformly pale (Figs 4.14.5–6) or with dark areas on different parts of legs; 2) femora with either darker hue (Fig. 4.26.5) or sometimes with infuscated bands (Figs 4.12.5–6); 3) When infuscated bands present on femora, dark band present on tibia IV (Figs 4.10.5–6); 4) only tarsi and/or metatarsi IV darkened (Fig. 4.8.6); 5) with longitudinal thin dorsal line along the whole length of all four legs usually starting at patella (Fig. 4.22.6); 6) patellae I-IV partially darkened (Fig. 4.24.5); or 7) similar colour to carapace with leg III, a reddish-orange on some segments (Fig. 4.6.6). *Carapace*: slightly longer than wide (exception *M. rufolimbata* wider than long); cubic to circular viewed from above; elevated in thoracic and sometimes cephalic region, truncated posteriorly, sloping slightly anteriorly (Figs 4.6.5–6); smooth without setae to fairly dense covering of fine setae, usually more dense in cephalic region and on clypeus, sometimes with longer erectile setae on postero-thoracic and postero-lateral region, and around lateral eyes (Fig. 4.26.5). *Clypeus*: vertical with or without long setae; clypeus length slightly shorter than MOQ length. *Chelicerae*: three cheliceral teeth present; two on promargin and one on retromargin (Figs 4.1.1–5), with incurving serrated setae at tip on dorsal margin of chelicerae. *Mouth parts*: labium triangular, usually longer than wide, endites converged and indented with scopulae on edge. *Sternum:* heart-shaped, usually

wider than long, anterior edge straight; posterior tip not extending beyond coxae IV; edge bordered. *Palp*: with long setae on all segments; single dentated tarsal claw. *Eyes:* AER recurved; AME<ALE; AME closest to each other; PER recurved, slightly wider than AER; PME<PLE; PME nearest to PLE; MOQ area wider than long with MOQ-AW narrower than MOQ-PW; LE situated on small tubercles. *Legs:* long and slender, with second pair usually longest; leg formula: II:I:IV:III, with long to medium length setae; usually two spiniform setae ventrally on tibiae and metatarsi distally of all legs; scopula present on metatarsi and tarsi of all legs, denser on leg III and IV; trichobothria in a row present on tibiae, metatarsi and tarsi of all legs; two dentated tarsal claws (Figs 4.2 & 4.3) with a well-defined, thick base, with *ca* 12 long slender teeth present on all tarsal claws. *Abdomen*: round to oval, bearing numerous short setae; dorsally with seven orange-red apodemes grouped in arrow-shaped formation, ventrally with small apodemes in two rows; striae present ventrally around abdomen edge and dorsally of spinnerets. *Spinnerets:* small and conical, with numerous short setae; anterior pair largest. *Epigyne*: sometimes with delicate rim, variable atrium and rim shape, usually very simple cube-shaped (Fig. 4.6.1), teardrop-shaped (Fig. 4.16.1) to slightly longitudinal (Fig. 4.22.1) or U-shaped (Fig. 4.14.1); some species with a small hood anteriorly (Fig. 4.24.1); intromittent orifices open laterally or antero-laterally on atrium; intromittent canals long, centrally extending fairly straight to posterior side, curving back to anterior side forming numerous complex coils laterally, usually shape differs slightly on both sides; spermathecae small, round, situated posteriorly; fertilization tubes short.

*Males*: Smaller in size 2.1–3.3 mm body length. Males resemble females but smaller in size and differ as follows: *Colour*: Body usually uniform dark in colour, although in some species it may be shades of brown, orange or copper-red with yellow, orange to copper-red patterns or tinted black; legs either pale or with brown or black tinted parts, or similar to female with infuscated bands or longitudinal dorsal lines. *Clypeus:* length more often equal to MOQ length. *Eyes:* PME usually closest to PLE. *Legs:* first pair of legs usually longest; leg formula: I:II:IV:III; tarsal claws with less defined base, slightly shorter and fewer teeth present; leg III and IV and/or leg II

with second tooth usually modified, slightly flattened and broadened (Fig. 4.2.2) or few instances with all claw tips modified with a slight angle (Fig. 4.3.2). *Abdomen:* scutum present. *Palp*: cymbium and tibia bearing long setae; bulb round with small cymbial apophysis (Fig. 4.6.3) or more often tutaculum apophysis (Fig. 4.8.3); embolus thin (Fig. 4.6.3) or thick, of medium to long length (Fig. 4.4.1), coiling *ca* three times around bulb; RTA sometimes broad at base, apically tooth-like and slender (Figs 4.8.3-4), to broad (Figs 4.6.3-4) or long and slender (Figs 4.20.3-4); VTA with curved tip, long almost similar length as RTA (Figs 4.4.1-2).

*Natural history:* Members of *Mystaria* live on vegetation ranging from trees, shrubs, grasses or leaf litter in a diversity of natural areas including: savanna, woodland, grassland, canopies of rainforests, forest galleries, coastal dune-, sand- and riverine forests in river banks, swamps, wetlands, estuaries, valleys and mountains. Adults are found throughout the year.

*Distribution:* This genus is endemic to Africa and known from the Democratic Republic of Congo (DRC), Guinea, Kenya, Mozambique, Namibia, Sierra Leone, South Africa and Tanzania. New records: Botswana, Côte d'Ivoire, Ethiopia, Gabon, Ghana, Liberia, Malawi, Rwanda, Uganda, Zambia, and Zimbabwe.


**Fig. 4.1** Chelicerae of *Mystaria* species 1. *M. rufolimbata* Simon, 1895 from Democratic Republic of Congo, Walikale. 2. *M. flavogutatta* (Lawrence, 1952) from South Africa, Richards Bay. 3. *M. savannensis* sp.n. form South Africa, Kruger National Park, Letaba. 4. *M. soleili* sp. n. from Kenya, Kakamega. 5. *M. budongii* sp. n. from Kakamega.

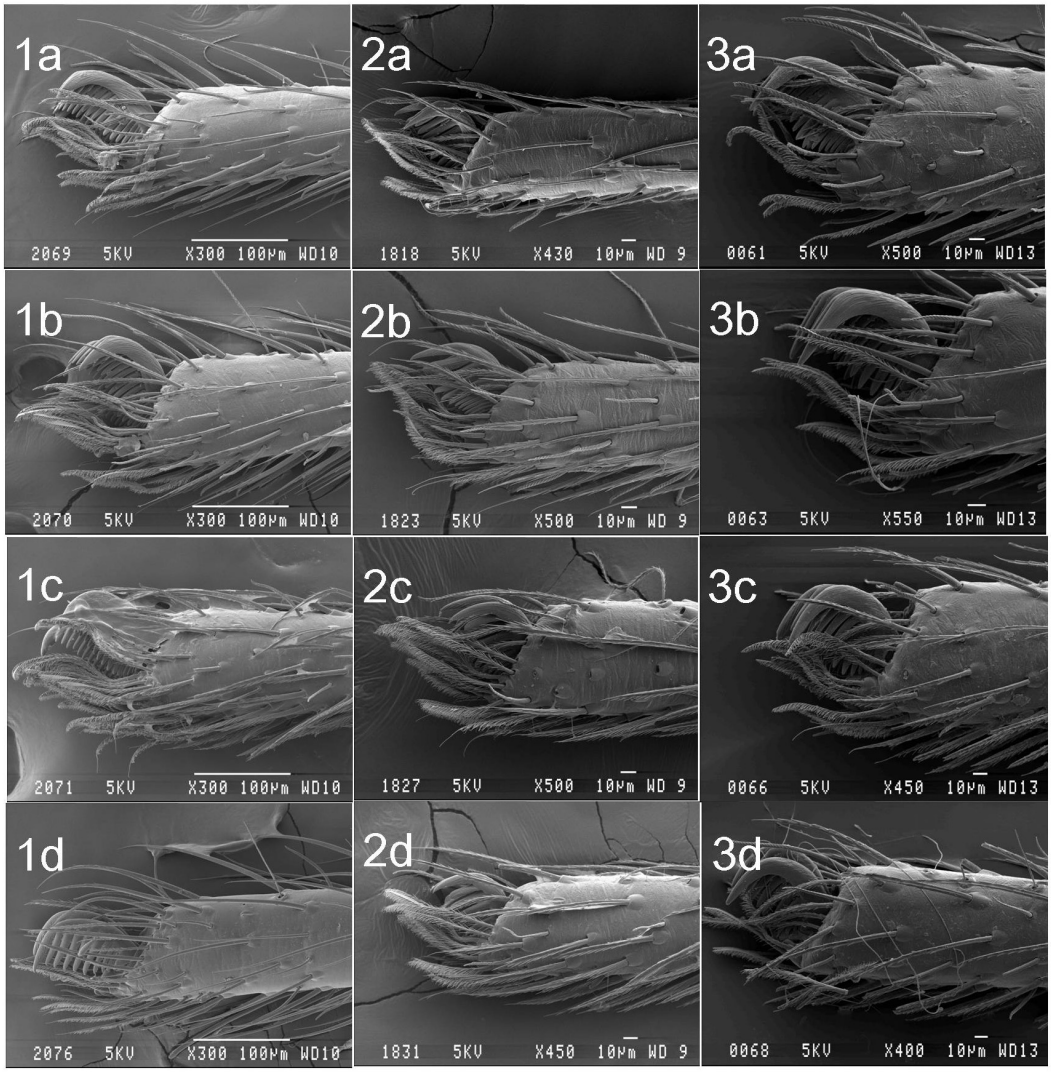



**Fig. 4.2** Tarsal claws and tufts on leg I-IV of *Mystaria* species: 1. (a–d). Female *M. rufolimbata* Simon, 1895 from South Africa, Hellsgate. 2. (a–d) Male *M. rufolimbata* from South Africa, Ndumo. 3. (a–d) Female *M. savannensis* sp. n. from South Africa, Kruger National Park, Letaba Camp.

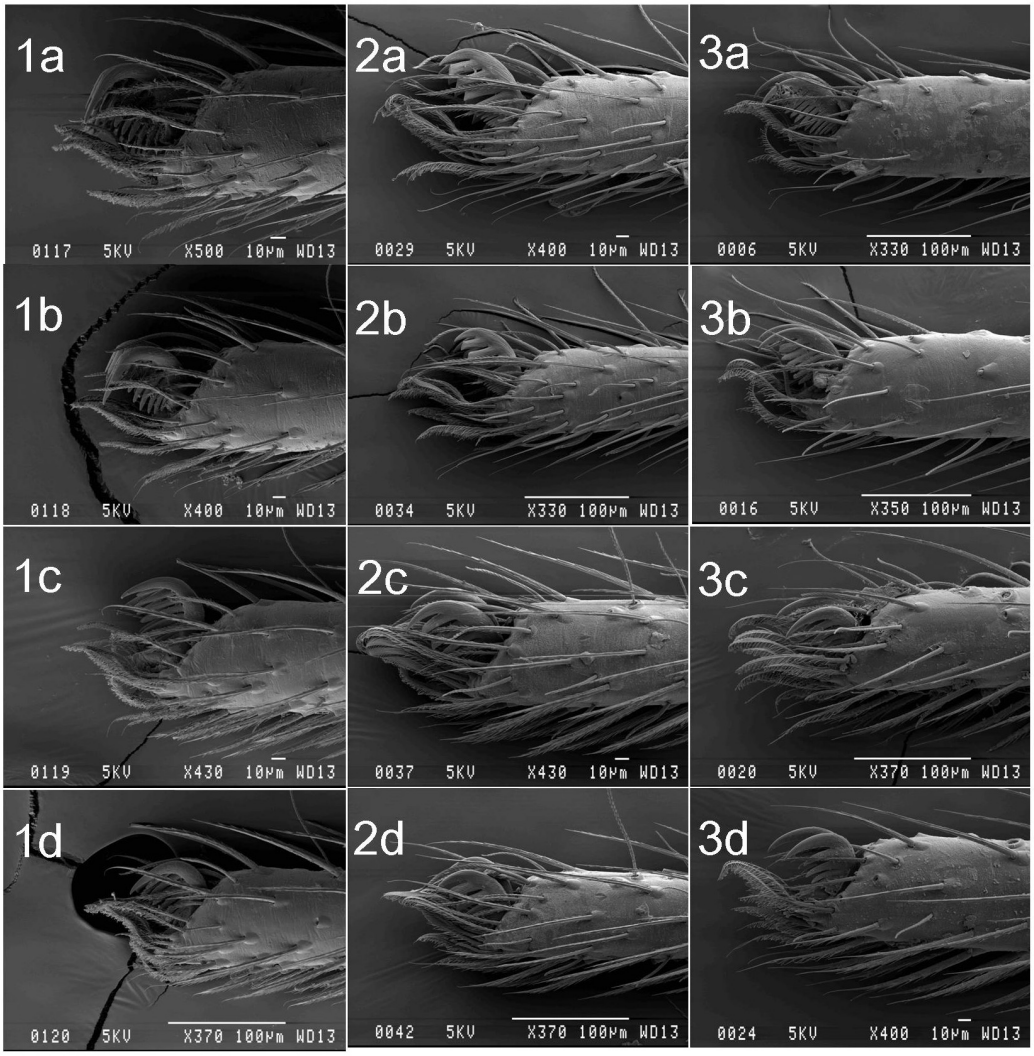



**Fig. 4.3** Tarsal claws and tufts on leg I-IV of *Mystaria* species 1. (a–d) Female *M. oreadii* sp. n. from Rwanda, Rwankuba. 2. (a–d). Male *M. soleili* sp. n. from Kenya, Kakamega. 3. (a–d) Male *M. budongii* sp. n. from Kakamega.

### 4.4.2. Key to species of *Mystaria*

1. Females……..……..……..……2
- Males……..……..……..……....14

2. Epigyne without a hood (Fig. 4.8.1)…….……...…3
- Epigyne with a hood (Fig. 4.24.1) ……..……....12

3. Rim of atrium U-shaped (Fig. 4.12.1) ….....11
- Rim of atrium not U-shaped……..……..……4

4. Rim of atrium not teardrop-shaped (Figs 4.6.1 & 4.20.1); abdomen usually decorated with two spots on dorso-posterior end or with contrasting border; legs of similar colour to carapace sometimes leg III different colour …….....5
- Atrium teardrop-shaped or elongated; colour of body and legs different….. 6

5. Atrium cube-shaped; delicate spiders; fovea area with fine line of dense setae on fovea (Fig. 4.6)…… ……..……..*M. flavogutatta* comb. nov.
- Atrium triangular; more robust spiders with broad carapace and no fine line of setae in fovea region (Fig. 4.20)… …..……..…….*M. rufolimbata*

6. Atrium long-oval (Fig. 4.22.1); all leg segments except femora dorsally with a longitudinal stripe (Fig. 4.22.6)…..… ……. *M. savannensis* sp. n.
- Atrium not as long, teardrop-shaped; legs without longitudinal stripes…….……..……7

7. Atrium teardrop-shaped, closed anteriorly; femora dark with infuscated bands dorso-ventrally; tibia IV with dark band (Fig. 4.10).....*M. lata* comb. nov.
- Rim not closed anteriorly; legs uniform colour or with a brown band on femora……..……..……....8

8. Atrium elongate, teardrop-shaped; metatarsi IV and sometimes tarsi dark (Fig. 4.8)……..…..…….……..*M. irmatrix* sp. n.

- Atrium wider posteriorly; tarsi and metatarsi not dark…….…….....….9

9. Atrium almost horseshoe-shaped (Fig. 4.28.1) …...…*M. variabilis* comb. nov.

- Atrium more trianglular (Fig. 4.16.1)……...*M. occidentalis* comb. nov.

11. Atrium cube-shaped posteriorly, anteriorly forming a small notch (Fig. 4.14.1)…….. …… ……*M. mnyama* sp. n.

- Atrium U-shaped (Fig. 4.12.1) …….....….....*M. lindaicapensis* sp. n.

12. Atrium horseshoe-shaped, rim with small hood centrally (Fig. 4.18.1) ……..…..…..*M. oreadii* sp. n.

- Atrium rim different, hood situated anteriorly, a distance from posterior rim……...…….……..……...13

13. Epigyne with hood wide; atrium rounded two half circles posteriorly to hood (Fig. 4.24)……. …….……..…...*M. soleili* sp. n.

- Hood narrow, with atrium longitudinally, posteriorly to hood (Fig. 4.26.1) ……..……..……..*M. stakesbyi* sp. n.

14. Male with long legs; bearing long conspicuous spiniform setae on legs and carapace…..…….…….……15

- Legs shorter; dense setae and scattered short, spiniform seta on legs, with very few or dense short setae on carapace.....17

15. Carapace pear-shaped with yellow-orange median band or patch on fovea; embolus thick and well-defined; RTA long and finger-like, directed away from bulb (Fig. 4.4)… ……..……...…...*M. budongii* sp. n.

- Carapace shape and colour not as above; embolus long and

thin; RTA situated close to bulb, pointing laterally……..16

16. Bulb small; VTA thick at base, shorter than RTA; body uniform brown (Fig. 4.26)…… ……...*M. stakesbyi* sp. n.
- Bulb larger sclerotized; VTA slender, longer than RTA; carapace yellow with brown median band on cephalic area (Fig. 4.24)… ……..*M. soleili* sp. n.

17. RTA with medium-length, very slender fine tip (Fig. 4.16.3) ……....18
- RTA with long or short tip, slightly thicker (Fig. 4.12.3)……..…22

18. Legs with longitudinal dorsal stripes, over all leg segments except femora; RTA broad and wide at base, extending anteriorly; tip long, thin and slightly curved (Fig. 4.22)….....*M. savannensis* sp. n.
- Legs without stripes, fairly uniform or darkened femora; RTA slender at base, narrowing to narrow tip……19

19. RTA base very slender from base to tip, long slender tip (Fig 4.8.3) ……..20
- RTA base broader, tip different (Fig 4.10.3)…… 21

20. Tarsi IV and/or metatarsi IV dark; AME a distance apart; RTA long and tip dark, extending straight antero-laterally (Fig. 4.8)……....*M. irmatrix* sp. n.
- Femora usually I-II dark; AME very close; RTA extends laterally, with shorter tip, curving acutely anteriorly at it (Fig. 4.16)….....*M. occidentalis* comb. nov.

21. Femora I, II and IV with dark and infuscated bands, patella, tibia, metatarsi and/or tarsi IV dark; MOQ eye area wide, with LE far from ME; RTA thick at base, tip extending antero-laterally (Fig. 4.10)……..*M. lata* comb. nov.
- Leg segments usually uniform, femora sometimes with brown bands; MOQ eye area different, LE close to ME; RTA base slightly more slender, tip extends antero-laterally (Fig. 4.28)…….*M. variabilis* comb. nov.

22. Bulb large, without apophysis; tegulum large, take up almost whole area; RTA extends dorso-laterally very close to and almost behind bulb (Fig. 4.12.3)……..……..….*M. lindaicapensis* sp. n.

- Bulb smaller with a cymbial apophysis or tutaculum, tegulum smaller, RTA not as above…….……23

23. RTA long, extending anteriorly beyond tutaculum, base thick with dark slender tip (Fig. 4.14.3)……. ……..…....*M. mnyama* sp. n.

- RTA shorter, not as above.....24

24. Cymbium without cymbial apophysis, small tutaculum present; RTA short with sharp tip that extend anteriorly, situated close to bulb (Fig. 4.20.3) ……..……....*M. rufolimbata*

- Cymbium with cymbial apophysis, tutaculum absent; RTA tooth-like, extend laterally, situated a distance from bulb (Fig. 4.6.3)… …….. ……..*M. flavogutatta* comb. nov.

#### 4.4.2.1 *Mystaria budongii* sp. n.

Figs 4.1, 4.3, 4.4 & 4.5

*Diagnosis.* Male recognized by round carapace, narrower in eye region (Fig. 4.4.3); with pale orange-yellow median band covering the central area of the body with darker brown-black bands laterally. Legs pale yellow with distinct spiniform setae. Bulb with long and thick, well-sclerotized embolus; RTA long, finger-shaped, VTA almost same length as RTA with tip with distinct curve (Figs 4.4.1-2). Female unknown.

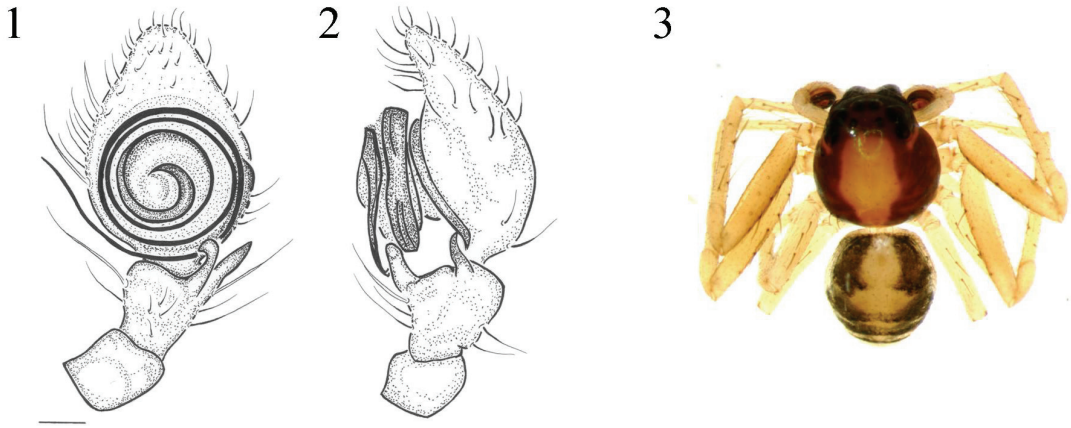



**Fig. 4.4** ***Mystaria budongii*** sp. n. 1. Male right palp ventral view. 2. Right palp retro-lateral view. 3 Male from Rwanda, Ibanda Makera dorsal view.

*Description.*

*Male:* Size, measurements (mm): (*n* = 2). TL: 2.80 (2.70–2.90); CL: 1.30 (1.22–1.37); CW: 1.23 (1.18–1.28); CI: 1.05 (1.03–1.07); CH: 0.65 (0.65–0.65); CLL: 0.19 (0.18–0.21); MOQ-L: 0.22 (0.22–0.22). *Colour:* carapace and abdomen dark copper-brown laterally with orange-yellow band medially; ventrally pale; legs pale. *Carapace:* round, narrower anteriorly, with numerous long erectile setae present on postero-lateral edge of carapace and LE area. *Chelicerae:* as in (Fig. 4.1.5). *Sternum*: SL: 0.70 (mm); SW (mm): 0.64; SI (mm): 1.10. *Eyes:* PME nearer to each other than to PLE; eye measurements (mm): AME–AME: 0.21; ALE–AME: 0.24; AME–AME/AME–ALE: 0.88; PME–PME: 0.25; PLE–PME: 0.31; PME–PME/PME–PLE: 0.80; ALE/AME: 1.13; PLE/PME: 1.26; MOQ-AW/MOQ-PW: 0.85; MOQ-L/MOQ-W: 0.26; Clyp/AME–AME: 0.91. *Legs:* long; long spiniform setae present on femora and patellae of legs I-IV and ventrally on tibiae and metatarsi; spiniform setae on tibiae and metatarsi I and II often twice as long as rest of setae on leg segments; claws and claw tufts as in Fig. 4.3.3; leg formula: II:I:III:IV; leg measurements (mm): leg I – Fe 1.14, Pat 0.34, Tib 1.08, Mt 0.81, Ta 0.61, total 3.99; II – Fe 1.42, Pat 0.41, Tib 1.35, Mt 1.09, Ta 0.31, total 4.58; III – Fe 0.81, Pat 0.28, Tib 0.70, Mt 0.50, Ta 0.34, total 2.64; IV – Fe 0.80, Pat 0.28, Tib 0.68, Mt 0.48, Ta 0.36, total 2.60. *Abdomen:* long-oval, with scutum oval-shaped; AL (mm): 1.51; AW (mm): 1.10; AI (mm): 1.40. *Palp:* embolus long, darkly sclerotized; RTA fairly large, finger-shaped extend anteriorly (Fig. 4.4.1); VTA almost same length as RTA with tip curving; wide space between VTA and RTA (Fig. 4.4.2).

*Type material.* Holotype ♂, RWANDA: Ibanda Makera, Rusumo, 02°09'S 30°55'E, alt. 1450 m, gallery forest canopy fogging of *Teclea nobilis*, x.1993, T. Wagner (ZFMK AR 1307). Paratypes: DEMOCRATIC REPUBLIC OF CONGO (DRC): *Orientale Region,* 1 ♂, Cyamudongo, Nyakabuye, 02°34'S 28°59'E, alt. 1750 m, canopy fogging *Carapa grandiflora,* x.1993, T. Wagner (ZFMK AR 1304); KENYA: 1 ♂, Kakamega forest, 00°22'N 34°50'E, alt. 1600 m, secondary forest canopy fogging *T. nobilis*, i-ii.2003, W. Freund (ZFMK AR 1305); 1 ♂, same locality,

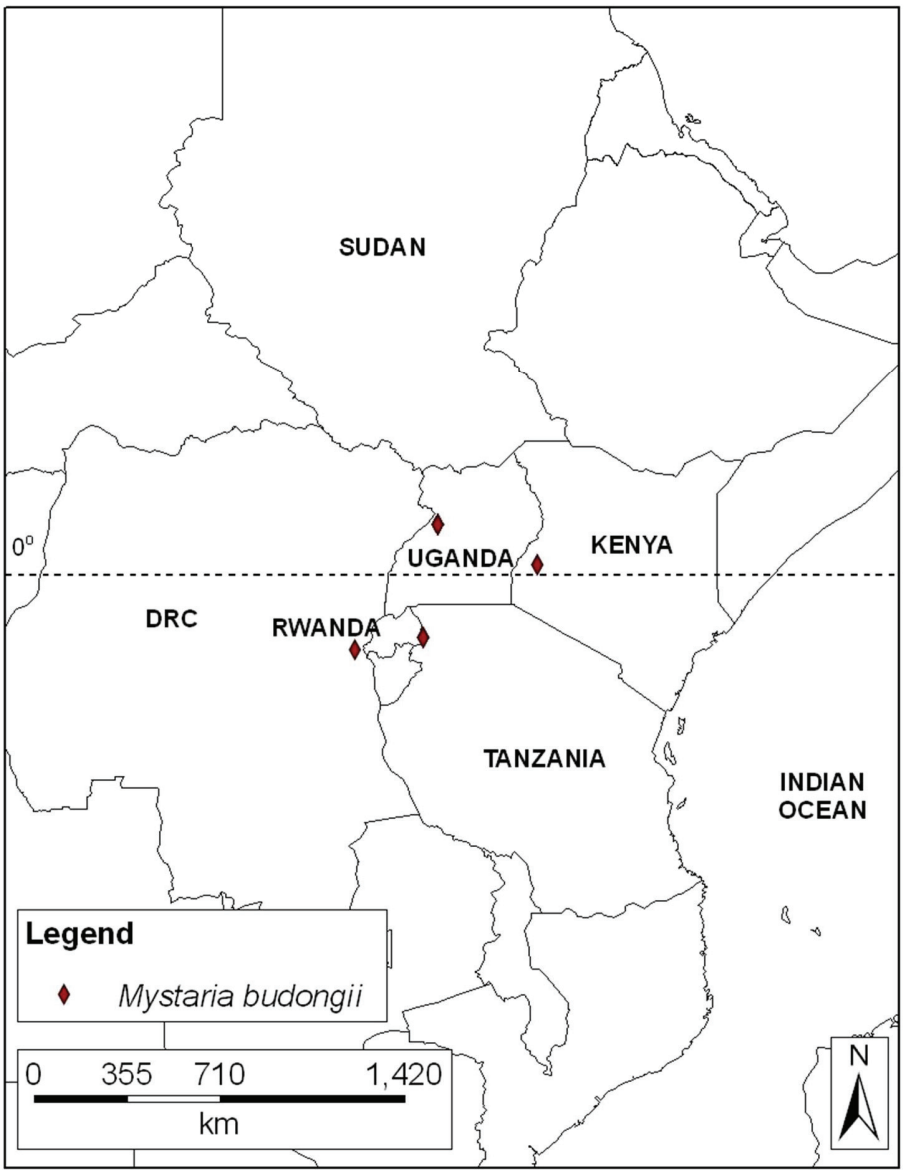



**Fig. 4.5** Recorded geographical distribution of *Mystaria budongii* sp. n.

canopy fogging *T. nobilis*, 7-11.ii.1999, T. Wagner (ZFMK AR 1306). RWANDA: 1 ♂, Ibanda Makera, Rusumo, 02°09'S 30°55'E, alt. 1450 m, gallery forest canopy fogging *T. nobilis*, x.1993, T. Wagner (ZFMK AR 1308); 1 ♂, same data (ZFMK AR 1309); 1 ♂, same data (ZFMK AR 1310). UGANDA: 1 ♂, Budongo forest, 01°45'N 31°25'E, alt. 1200 m, secondary forest canopy fogging *Cynometra alexandri*, 15-25.i.1997, T. Wagner (ZFMK AR 1311); 1♂, same data (ZFMK AR 1316); 1 ♂, Budongo forest, 01°45'N 31°25'E, alt 1200 m, primary forest canopy fogging *C. alexandri*, 15-25.i.1997, T. Wagner (ZFMK AR 1313); 1 ♂, same data (ZFMK AR 1315);1 ♂, same locality, swamp forest canopy fogging *Rinorea beniensis*, 15-25.i.1997, T. Wagner (ZFMK AR 1312); 1 ♂, Budongo forest, 01°45'N 31°25'E, alt. 1200 m, primary forest canopy fogging *R. beniensis*, 5-15.i.1997 T. Wagner (ZFMK AR 1314); 1 ♂, same data (ZFMK AR 1317); 1 ♂, same data (ZFMK AR 1318); 1 ♂, same locality data, secondary forest canopy fogging *C. alexandri* ,15-25.i.1997, T. Wagner (ZFMK AR 1319).

*Natural history*. Specimens were collected from primary and secondary forest canopy using fogging. They were sampled from various tree species such as *Carapa grandiflora, Cynometra alexandri, Rinorea beniensis* and *Teclea nobilis.* Only males known and they were sampled between October and February.

*Distribution.* Democratic Republic of Congo (DRC), Kenya, Rwanda and Uganda (Fig. 4.5).

*Etymology*. Named after the Budongo forest, where most specimens were sampled from.

#### 4.4.2.2 ***Mystaria flavogutatta*** (Lawrence, 1952) comb. nov.

Figs 4.1, 4.6 & 4.7

*Paramystaria flavoguttata* Lawrence, 1952: 14; fig. 8; Jézéquel, 1964: 1111.

*Diagnosis.* Both sexes recognized by highly elevated cephalic region; female with a U-shaped declivity in thoracic region bearing row of setae on edge (Fig. 4.6.5); carapace and legs copper-brown; abdomen paler with pattern (Fig. 4.6.6) or in holotype juvenile female abdomen uniform in colour with two prominent spots posteriorly. Female epigyne with atrium well-defined cube-shape (Fig. 4.6.1). Male palp with VTA finger-shaped, RTA tooth-like (Fig. 4.6.3) extending laterally with slight curve at tip (Fig. 4.6.4) and a small cymbial apophysis. Resembles *M. rufolimbata* Simon, 1895 but differ in that the carapace of the latter species is larger and broader and not very highly elevated.

*Re-description.*

*Female:* Size, measurements (mm): (*n* = 1). TL: 4.58; CL: 1.53; CW: 1.41; CI: 1.08; CH: 1.18; CLL: 0.24; MOQ-L: 0.31. *Colour*: carapace and legs copper-brown to orange-yellow; leg III paler; abdomen pale copper, with two contrasting spots postero-dorsally, two spots may either be circles, or form contrasting border encircling abdomen (Fig. 4.6.6). *Carapace:* highly elevated in thoracic region with U-shaped declivity; setae short, densely scattered. *Chelicerae:* as in Fig. 4.1.2. *Sternum:* SL (mm): 0.59 SW (mm): 0.75 SI (mm): 0.78. *Eyes*: eye measurements (mm): AME–AME: 0.29; ALE–AME: 0.35; AME–AME/AME–ALE: 0.83; PME–PME: 0.41; PLE–PME: 0.33; PME–PME/PME–PLE: 1.25; ALE/AME: 1.20; PLE/PME: 0.80; MOQ-AW/MOQ-PW: 0.71; MOQ-L/MOQ-W: 0.43; CLYP/AME–AME: 0.80. *Legs*: femora with long and numerous short dense setae, rest of legs with fewer setae; tibiae with medium length spiniform setae directed latero-ventrally of body, two or three spiniform setae in a row; tibiae and patellae dorsally with spiniform setae; leg formula: II:I:IV:III; leg measurements (mm): leg I – Fe 0.87, Pat 0.33, Tib 0.94, Mt 0.73, Ta 0.54, total 3.41; II – Fe 1.01, Pat 0.38, Tib 0.99, Mt 0.78, Ta 0.61, total 3.76; III – Fe 0.71, Pat 0.33, Tib 0.63, Mt 0.47, Ta 0.38, total 2.51; IV – Fe 0.89, Pat 0.35, Tib 0.73, Mt 0.54, Ta 0.40, total 2.91. *Abdomen:* AL (mm): 3.06; AW (mm): 2.59; AI (mm): 1.18. *Epigyne*: atrium well-defined cube-shaped; intromittent orifices open laterally (Fig. 4.6.1); intromittent canals complex (Fig. 4.6.2); spermathecae small, situated postero-laterally.

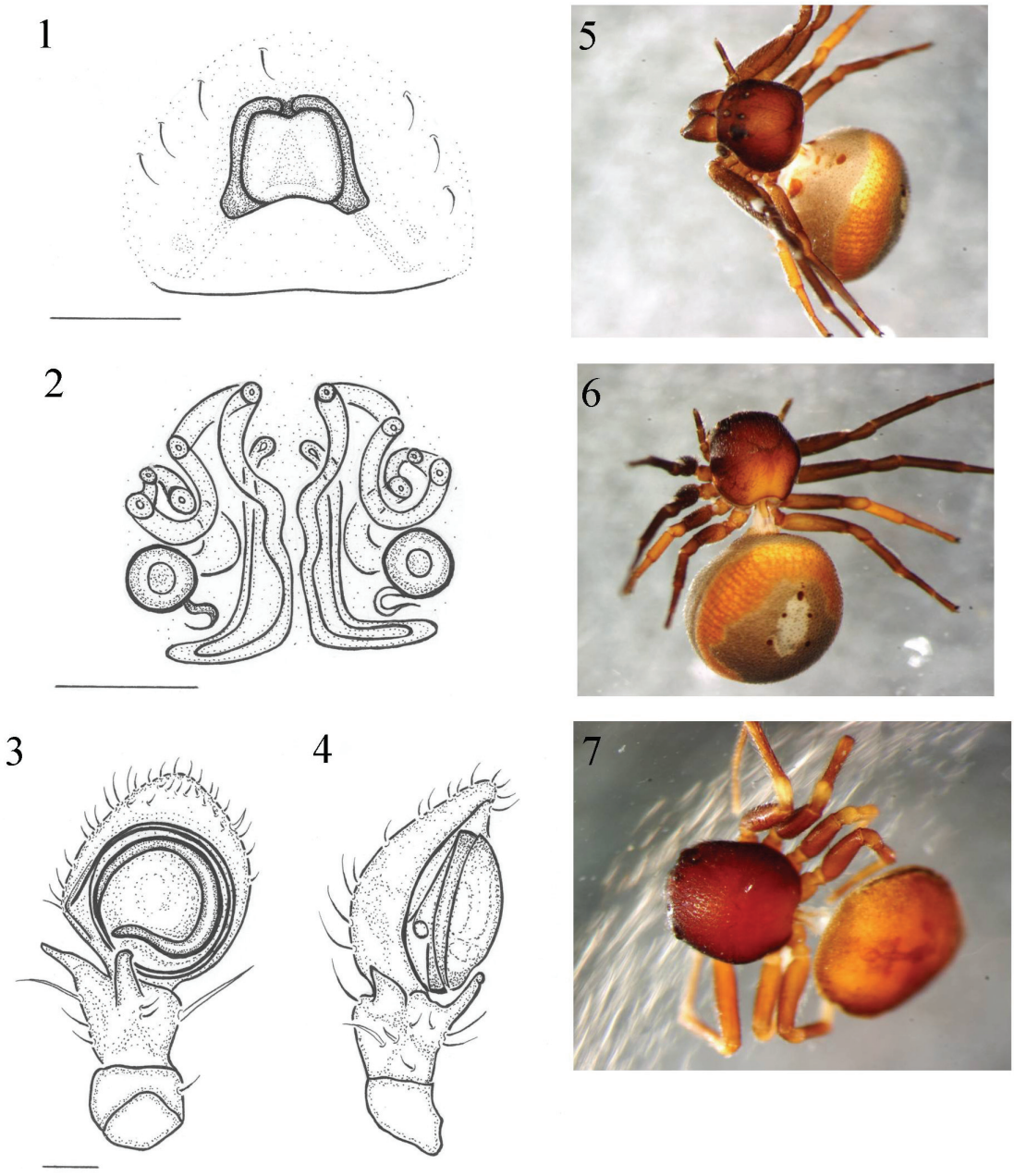



**Fig. 4.6** ***Mystaria flavogutatta*** (Lawrence, 1952) comb. nov. 1. Female epigyne ventral view. 2. Epigyne dorsal view. 3. Male left palp ventral view. 4. Left palp retro-lateral view. 5. Female from South Africa, Richards Bay antero-dorsal view. 6. Female postero-dorsal view. 7. Male from South Africa, Kruger National Park, Punda Maria Camp dorsal view.

*Males:* Size, measurements (mm): (*n* = 1). TL: 3.43; CL: 1.36; CW: 1.36; CI: 1.00; CH: 0.96; CLL: 0.32; MOQ-L: 0.28. Resemble females but differs as follows: *Colour:* carapace uniform reddish-brown; abdomen orange to copper. Legs uniform in colour, leg III sometimes paler. *Carapace:* with dense short setae. *Clypeus*: with long and numerous setae on edge. *Sternum:* SL (mm): 0.59; SW (mm): 0.67; SI (mm): 0.88. *Eyes*: eye measurements (mm): AME–AME: 0.28; ALE–AME: 0.32; AME–AME/AME–ALE: 0.89; PME–PME: 0.40; PLE–PME: 0.35; PME–PME/PME–PLE: 1.13; ALE/AME: 1.13; PLE/PME: 0.88; AME–AME/AME–ALE: 0.89; PME–PME/PME–PLE: 1.13; MOQ-AW/MOQ-PW: 0.71; MOQ-L/MOQ-W: 0.40; CLYP/AME–AME: 1.13. *Legs:* leg formula: I:II:IV:III; leg measurements (mm): leg I – Fe 1.08, Pat 0.35, Tib 0.94, Mt 0.73, Ta 0.56, total 3.67; II – Fe 1.13, Pat 0.38, Tib 0.89, Mt 0.68, Ta 0.56, total 3.64; III – Fe 0.75, Pat 0.31, Tib 0.59, Mt 0.45, Ta 0.35, total 2.44; IV – Fe 0.87, Pat 0.31, Tib 0.63, Mt 0.49, Ta 0.38, total 2.68; *Abdomen:* AL (mm): 2.07 (mm); AW (mm): 1.81; AI (mm): 1.14. *Palp* (only left palp available): embolus long, sclerotized, coil at least twice around bulb (Fig. 4.6.3); RTA broad at base, tip sharply pointed; VTA finger-shaped (Fig. 4.6.4).

*Type material examined.* DEMOCRATIC REPUBLIC OF CONGO (DRC)*: Katanga Region*, juvenile ♀, Grotte de Kakontwe, 10°59'S 26°40'E found at entrance of cave beneath stones, 3.viii.1948, N. Leleup (MRAC 81211).

*Other material examined.* SOUTH AFRICA: *Eastern Cape Province,* sub-adult ♂, juvenile ♀, Cwebe Nature Reserve, The Haven, 31°45'S 29°16'E, beating of coastal dune forest, 30.x.2006, R. Lyle & C. Haddad (NCA 2007/332); *KwaZulu-Natal Province,* 1 ♀, Richards Bay, 28°47'S 32°06'E, tree beating, 26.iv.2004, T. Wassenaar (NCA 2009/5037); *Limpopo Province,* 1 ♂, Kruger National Park, Punda Maria Camp, Shipudze, 22°27'S 31°13'E, 19.xii.1962, R.F. Lawrence (NM 23345).

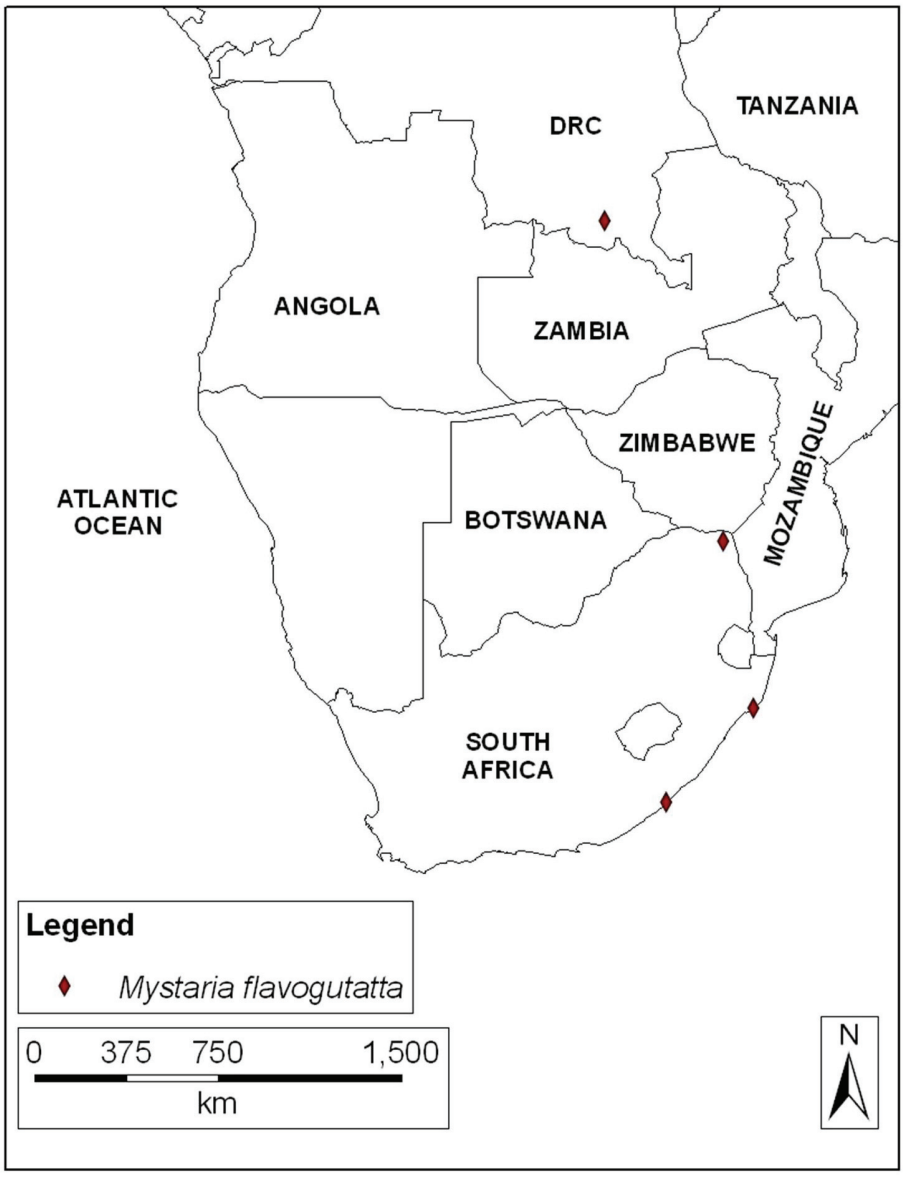



**Fig. 4.7** Recorded geographical distribution of *Mystaria flavogutatta* (Lawrence, 1952) comb. nov.

*Natural history.* Sampled from trees in savanna and coastal forest habitats. The holotype was found under a stone at a cave entrance. Adults were sampled from December to April and juveniles in October.

*Distribution.* Democratic Republic of Congo (DRC). New record: South Africa (Fig. 4.7).

#### 4.4.2.3 *Mystaria irmatrix* sp. n.

Figs. 4.8 & 4.9

*Diagnosis.* Female can be recognized by colour patterns on body (Fig. 4.8.5), both sexes with metatarsi and/or tarsi IV dark brown to black (Figs 4.8.6-7). Epigyne with atrium rim narrow teardrop-shaped; small intromittent orifices open antero-laterally (Fig. 4.8.1). Male palp with VTA and RTA almost same length; RTA with dark, long, narrow tip (Fig. 4.8.4); VTA slender, curving at tip (Fig. 4.8.3).

*Description.*

*Female:* Size, measurements (mm): (*n* = 6). TL: 3.51 (3.15–4.14); CL: 1.27 (1.06–1.46); CW: 1.16 (1.05–1.34); CI: 1.09 (0.98–1.28); CH: 0.83 (0.87–0.96); CLL: 0.25 (0.19–0.30); MOQ-L: 0.26 (0.25–0.30). *Colour:* carapace varies from orange with black line around postero-lateral border (Fig. 4.8.6), with or without two dark patches over LE region (Fig. 4.8.5) to darker specimens, often with orange triangular patch on clypeus; abdomen pale white with dark, longitudinal central band that may expand laterally, or with two darker patches laterally; ventrally pale with pale blue stria. Legs yellow-orange with metatarsi and/or tarsi IV dark brown to black. *Carapace*: smooth. *Sternum*: SL (mm): 0.52; SW (mm): 0.56; SI (mm): 0.93. *Eyes*: eye measurements (mm): AME–AME: 0.26; ALE–AME: 0.35; AME–AME/AME–ALE: 0.73; PME–PME: 0.42; PLE–PME: 0.32; PME–PME/PME–PLE: 1.30; ALE/AME: 1.38; PLE/PME: 0.78; MOQ-AW/MOQ-PW: 0.61; MOQ-L/MOQ-W: 0.43; Clyp/AME–AME: 0.96. *Legs*: covered with fine, inconspicuous setae, spiniform setae present

dorsally on femora and tibiae; leg formula: II:I:IV:III; leg measurements (mm): leg I – Fe 0.82, Pat 0.33, Tib 0.66, Mt 0.57, Ta 0.41, total 2.78; II – Fe 0.92, Pat 0.32, Tib 0.72, Mt 0.61, Ta 0.42, total 2.98; III – Fe 0.69, Pat 0.27, Tib 0.42, Mt 0.39, Ta 0.28, total 2.04; IV – Fe 0.78, Pat 0.29, Tib 0.57, Mt 0.49, Ta 0.36, total 2.49. *Abdomen:* round; AL (mm): 2.24; AW (mm): 2.16; AI (mm): 1.06. *Epigyne*: with atrium rim narrow teardrop-shape; small intromittent orifices open antero-laterally (Fig. 4.8.1); intromittent canals complex (Fig. 4.8.2).

*Male*: Size, measurements (mm): (*n* = 3). TL: 2.76 (2.50–3.13); CL: 1.19 (1.12–1.34); CW: 1.06 (0.96–1.20); CI: 1.13 (1.10–1.16); CH: 0.68 (0.62–0.75); CLL: 0.25 (0.22–0.28); MOQ-L: 0.26 (0.20–0.31). Differs from females as follows: *Colour*: body dorsally orange to copper-brown or blackish-brown (Fig. 4.8.7); in orange specimens abdomen with central black patterns; ventrally abdomen white, centrally with blue striae or in dark specimens with blue metallic colour; striae decorated with white dots; legs uniform brown or orange-yellow with metatarsi and/or tarsi IV dark. *Carapace*: sharply sloping anteriorly. *Sternum*: SL (mm): 0.45; SW (mm): 0.48; SI (mm): 0.94. *Eyes*: eye measurements (mm): AME–AME: 0.24; ALE–AME: 0.32; AME–AME/AME–ALE: 0.74; PME–PME: 0.37; PLE–PME: 0.29; PME–PME/PME–PLE: 1.30; ALE/AME: 1.36; PLE/PME: 0.77; MOQ-AW /MOQ-PW: 0.63; MOQ-L MOQ-W: 0.41; Clyp/AME–AME: 1.05. *Legs*: covered with fine setae, few spiniform setae present on femora and tibiae, leg formula: I:II:IV:III; leg measurements (mm): leg I – Fe 0.93, Pat 0.29, Tib 0.81, Mt 0.62, Ta 0.45, total 3.10; II – Fe 0.94, Pat 0.28, Tib 0.81, Mt 0.56, Ta 0.44, total 3.03; III – Fe 0.62, Pat 0.24, Tib 0.52, Mt 0.35, Ta 0.29, total 2.02; IV – Fe 0.71, Pat 0.21, Tib 0.53, Mt 0.43, Ta 0.32, total 2.21. *Abdomen*: round with scutum; AL (mm): 1.56; AW (mm): 1.33; AI (mm): 1.17. *Palp*: VTA and RTA almost same length; VTA slender (Fig. 4.8.4), RTA with long narrow, dark tip; embolus long (Fig. 4.8.3).

*Type material*. Holotype ♀, MOZAMBIQUE: Marracuene, Marracuene Lodge, 25°53'S 32°30’E, beating shrubs in riverine forest, 1.xii.2007, R. Lyle & R. Fourie (NCA 2009/4616a). Paratypes: MOZAMBIQUE: 4 ♂ (collected with holotype ♀),

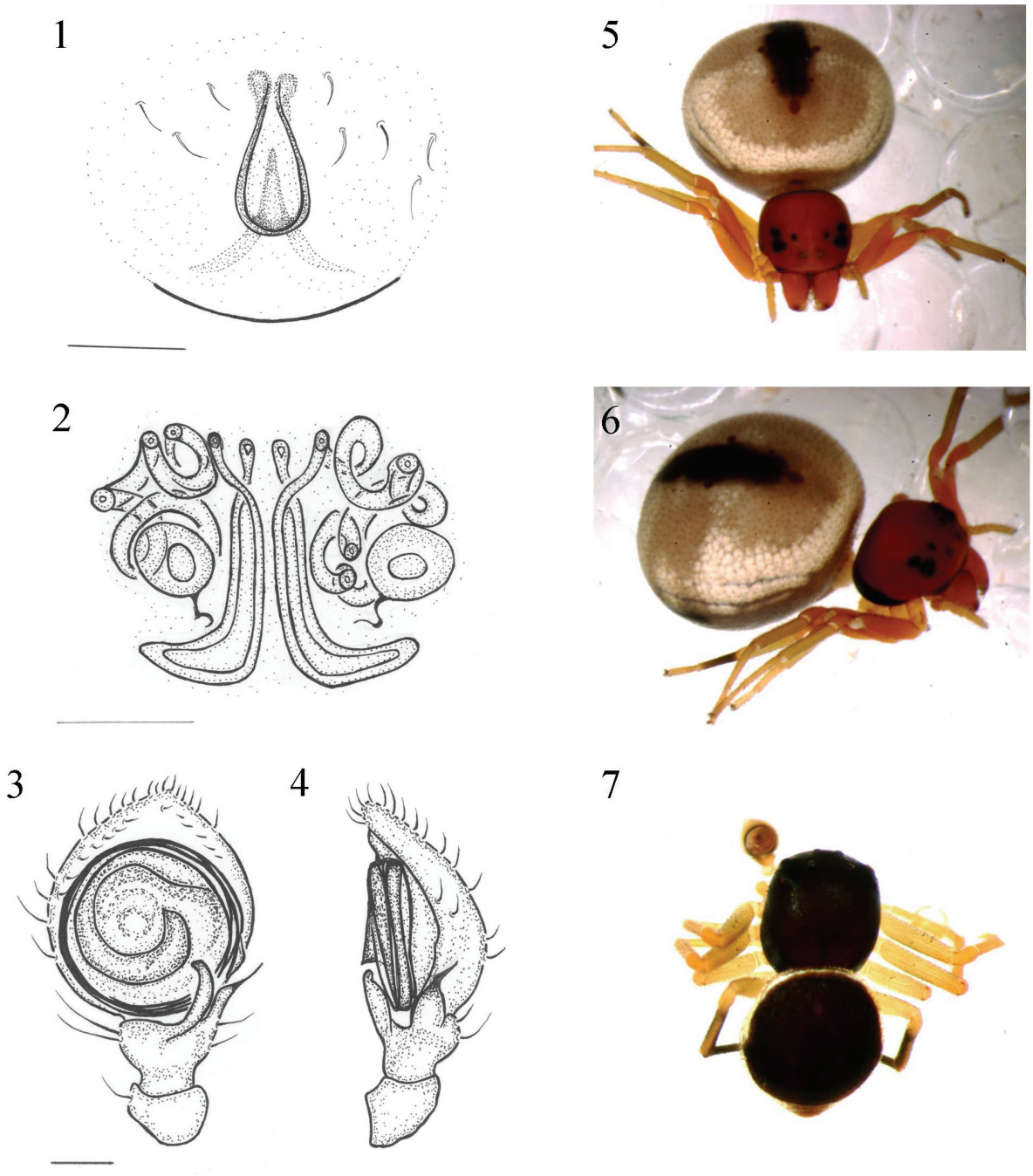



**Fig. 4.8** ***Mystaria irmatrix*** sp. n. 1. Female epigyne ventral view. 2. Epigyne dorsal view. 3. Male right palp ventral view. 4. Right palp retro-lateral view. 5. Female from Mozambique, Marracuene antero-dorsal view. 6. Female latero-dorsal view. 7. Male form Marracuene postero-dorsal view.

Marracuene, Marracuene Lodge, 25°53'S 32°30'E, beating shrubs in riverine forest, 1.xii.2007, R. Lyle & R. Fourie (NCA 2009/4616b); 1 ♂, 1 juvenile ♀, Xai-Xai, Montego's Lodge, 25°03'S 33°38'E, beating shrubs on dune forest, 2.xii.2007. R. Lyle & R. Fourie (NCA 2009/4614); 1 ♂, 1 juvenile ♀, Chidenguile, Paraiso de Chidenguele, 24°54'S 34°11'E, beating shrubs in dune forest, 15.xii.2007. R. Lyle, R. Fourie & C. Haddad (NCA 2009/4615). SOUTH AFRICA: *Eastern Cape Province*, 1 ♂, East London, Pinapple Research Station, 32°59'S 27°54'E, found on plants, 2.vii.1977, A.S. Dippenaar-Schoeman (NCA 88/606); 1 ♂, same locality sweeping grasslands, 7.xii.1977, A.S. Dippenaar-Schoeman (NCA 78/29); 1 ♀, Mkhambati Nature Reserve, 31°21'S 29°51'E, collected from butterfly traps in forest, 27.i.2008, M. Hamer (NCA 2009/5037); *KwaZulu-Natal Province,* 1 ♀, Mkuze Nature Reserve, 27°36'S 32°00'E, yellow pantraps in *Terminalia sericea* woodland, 21.i.2005, M. Hamer (NCA 2006/76); 1♂, same locality, *T. sericea* woodland tree beating, 22.i.2005, M. Hamer (NCA 2006/273); 1 ♀ same locality, *T. sericea* woodland tree beating, 21.iii.2005, M. Hamer (NCA 2006/298); 1 ♀, Empangeni, University of Zululand, 28°44'S 31°53'E, 17.ix.1975, P. Reavell (NM 23344); same locality, 1 ♀, hanging on a silk thread on *Acacia sieberiana* with bee in its fangs, 20.xi.1981, P. Reavell (NM 14064); 1 ♀, Tembe Elephant Park, 27°01'S 32°24'E, sand forest beating, 15.iii.2003, A.S. Honiball (NCA 2003/1462); 1 ♀, Phinda Game Reserve 27°43'S 32°03'E, tree beating, 22.iii.2004, S. Lovell (NCA 2004/685).

*Natural history.* Sampled from riverine, sand, dune and coastal forest as well as woodlands and grasslands. Samples were found in trees such as *Terminalia sericea* and *Acacia sieberiana.* Most adults were sampled between September and March, while juveniles were sampled in December. One of the specimens sampled was hanging on a silk thread from trees while feeding on a bee (P. Reavell, *pers. comm*.).

*Distribution.* Mozambique and eastern parts of South Africa (Fig. 4.9).

*Etymology.* Named after the mother of the author in gratitude for her love.

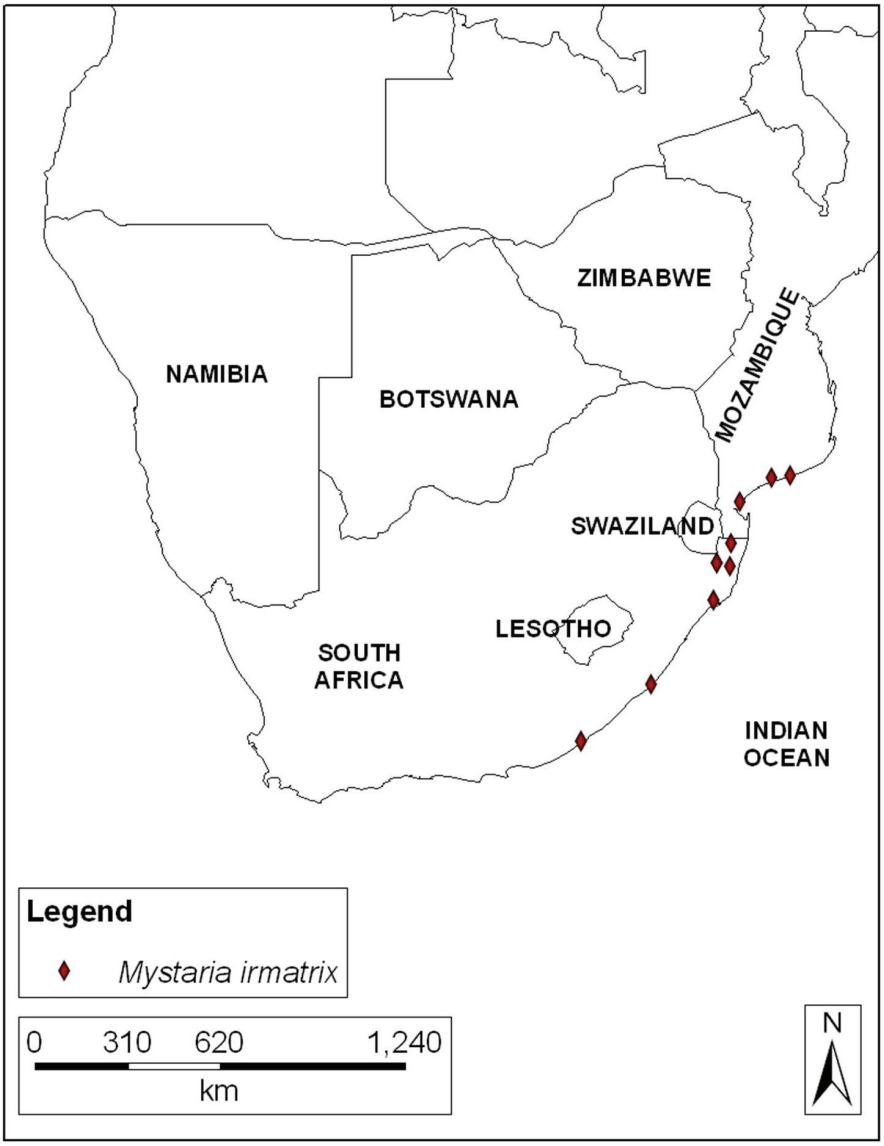



**Fig. 4.9** Recorded geographical distribution of *Mystaria irmatrix* sp. n.

#### 4.4.2.4 ***Mystaria lata*** (Lawrence, 1927) comb. nov.

Figs 4.10 & 4.11

*Paramystaria lata* Lawrence, 1927: 32; Pl. 1 fig. 20; Pl 2 fig. 42.

*Diagnosis.* Female can be recognized by the distinct colour patterns on body (Fig. 4.10.5); both sexes with infuscated bands on femora (Figs 4.10.5–7), epigyne atrium small, teardrop-shaped to oval but closed anteriorly (Fig. 4.10.1). Male with broad RTA base; resemble *P. irmatrix* sp. n. but genitalia and colour of body different.

*Re-description.*

*Female:* Size, measurements (mm): (*n* = 5). TL: 3.13 (1.91–3.68); CL: 1.01 (0.14–1.36); CW: 1.26 (1.14–1.36); CI: 0.81 (0.11–1.06); CH: 0.83 (0.70–0.96); CLL: 0.26 (0.23–0.26); MOQ-L: 0.29 (0.28–0.30). *Colour:* carapace varies from mottled copper-brown to bright orange, copper-red or very dark copper, sometimes tinted with black; clypeus sometimes paler or with orange area extending onto cephalic area as a fine line; cheliceral tips sometimes darker; labium and mouth-parts dark; abdomen varies from dorsally uniform pale to varying dark patterns (Fig. 4.10.5) sometimes with thin longitudinal central band, or a big patch covering anterior region and most of abdomen, longitudinal central band expanding laterally into two parts, either with or without small white areas within a dark patch; abdomen ventrally usually with metallic or dark blue or purple striae with a paler white or yellow band centrally; femora of legs with dark infuscated bands; tibiae, metatarsi and/or tarsi IV or only tibia IV caudally dark. *Carapace*: broad; smooth. *Sternum*: SL (mm): 0.56; SW (mm): 0.59; SI (mm): 0.95. *Eye*s: MOQ eye area wide, eye measurements (mm): AME–AME: 0.29; ALE–AME: 0.36; AME–AME/AME–ALE: 0.81; PME–PME: 0.43; PLE–PME: 0.33; PME–PME/PME–PLE: 1.35; ALE/AME: 1.26; PLE/PME: 0.75; MOQ-AW/MOQ-PW: 0.67; MOQ-L/MOQ-W: 0.43; Clyp/AME–AME: 0.90. *Legs*:

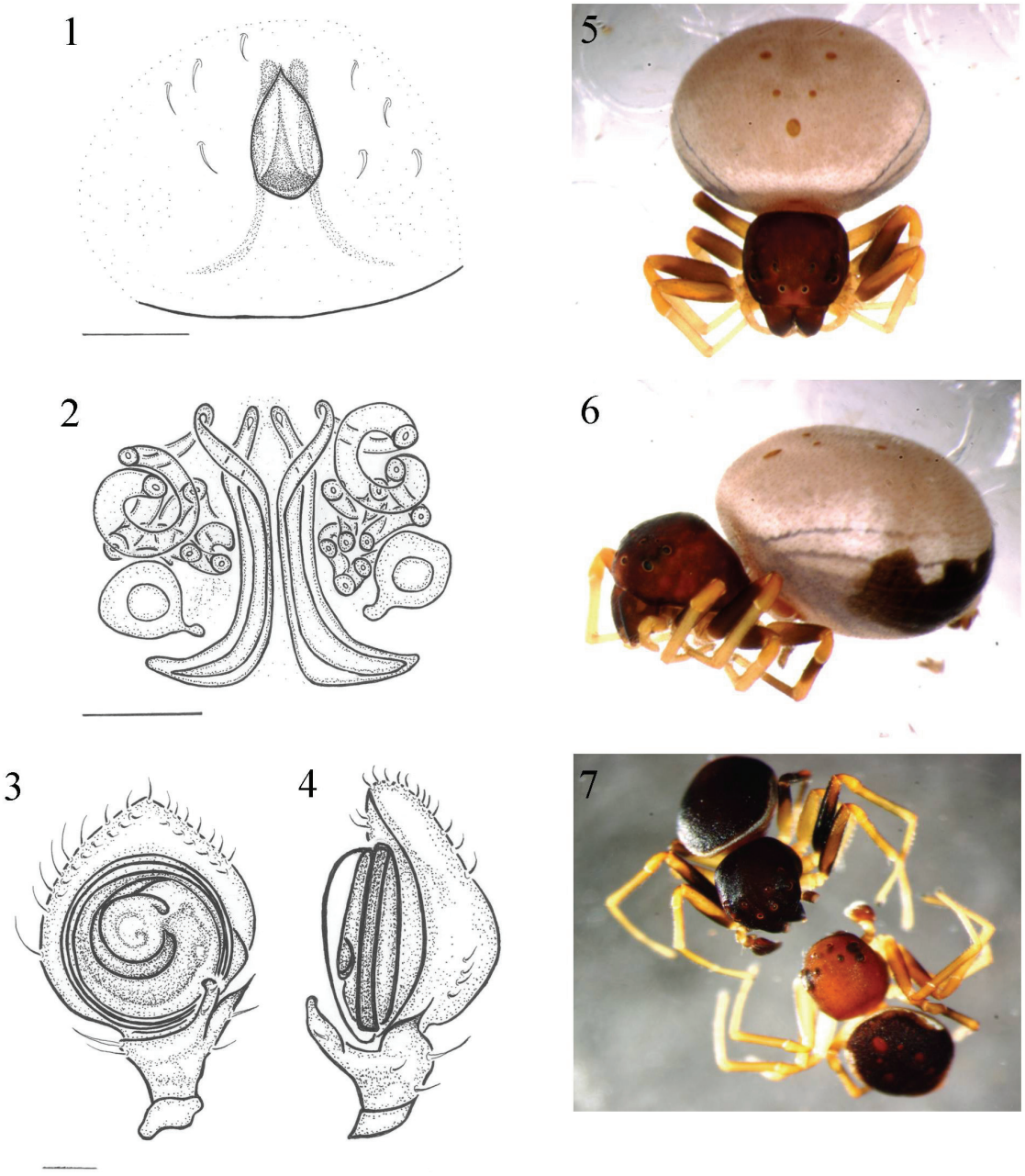



**Fig. 4.10** ***Mystaria lata*** (Lawrence, 1927) comb. nov 1. Female epigyne ventral view. 2. Epigyne dorsal view. 3. Male right palp ventral view. 4. Right palp retro-lateral view. 5. Female from South Africa, Keiriver Mouth antero-dorsal view. 6. Female latero-dorsal view. 7. Two males from South Africa, Mazeppa Bay dorsal views.

all legs segments bearing dense setae; femora and tibiae with a few short spiniform setae; leg formula: II:I:IV:III; leg measurements (mm): leg I – Fe 0.88, Pat 0.30 Tib 0.68, Mt 0.57, Ta 0.43, total 2.86; II – Fe 0.89, Pat 0.31, Tib 0.69, Mt 0.59, Ta 0.40, total 2.88; III – Fe 0.65, Pat 0.26, Tib 0.45, Mt 0.38, Ta 0.29, total 2.02; IV – Fe 0.75, Pat 0.28, Tib 0.56, Mt 0.46, Ta 0.33, total 2.38. *Abdomen:* AL (mm): 2.12; AW (mm): 2.00; AI (mm): 1.06. *Epigyne*: atrium oval to teardrop-shaped with small flap posteriorly, closed anteriorly (Fig. 4.10.1); differ from *M. irmatrix* sp. n. in that the rim of the latter species is longer; intromittent canals of *M. lata* sp. n. is thicker and complex (Fig. 4.10.2).

*Male*: Size, measurements (mm): (*n* = 2). TL: 2.86 (2.68–3.03); CL: 1.20 (1.16–1.25); CW: 1.09 (1.08–1.10); CI: 1.10 (1.07–1.13); CH: 0.55 (0.38–0.73); CLL: 0.21 (0.15–0.26); MOQ-L: 0.28 (0.26–0.30). Differ from female as follows: *Colour*: carapace uniform in colour either dark copper-red to orange, differ sometimes from that of abdomen (Fig. 4.10.7); sternum copper-brown; abdomen dorsally copper-red or dark with small narrow white or blue anterior border; ventrally pale cream or pale blue; centrally with shiny black to pinkish-blue metallic striae, sometimes with white spots on or between striae; eyes usually surrounded by a thin orange-red border; lateral eyes situated on small black tubercles; legs yellow-orange to copper-brown with dark infuscated bands dorso-ventrally on femora I, II and IV including patella, tibiae, metatarsi and/or tarsi IV. *Carapace*: smooth. *Sternum*: SL (mm): 0.49 SW (mm): 0.56 SI (mm): 0.89. *Eyes*: eye measurements (mm): AME–AME: 0.21; ALE–AME: 0.30; AME-AME/AME-ALE: 0.71; PME-PME: 0.36; PLE-PME: 0.28; PME–PME/PME–PLE: 1.31; ALE/AME: 1.40; PLE/PME: 0.76; MOQ-AW/PW: 0.59; MOQ-L/MOQ-W: 0.49; Clyp/AME–AME: 0.94. *Legs*: covered densely with setae, slightly longer spiniform setae present on femora and tibiae; leg formula: II:I:IV:III; leg measurements (mm): leg I – Fe 0.99, Pat 0.30, Tib 0.71, Mt 0.61, Ta 0.43, total 3.02; II – Fe 1.04, Pat 0.46, Tib 0.80, Mt 0.69, Ta 0.50, total 3.50; III – Fe 0.65, Pat 0.30, Tib 0.54, Mt 0.41, Ta 0.33, total 2.23; IV – Fe 0.75, Pat 0.26, Tib 0.55, Mt 0.52, Ta 0.35, total 2.43. *Abdomen*: with slightly granular scutum, dorsal view almost oval, anteriorly border straight, slightly pointed posteriorly; AL (mm): 1.65; AW (mm): 1.47;

AI (mm): 1.12. *Palp*: RTA base broad, tip extending diagonally (Fig. 4.10.3); VTA almost equal in length to RTA (Fig. 4.10.4); tutaculum present.

*Type material examined*. Syntypes 4 ♀, NAMIBIA: Kunene river (Kaokoland) bordering Namibia and Angola, 17°15'S 11°47'E, iii.1923, R. F. Lawrence (SAM/ARAN 2463) (specimens not well-preserved, bleached). A female from the syntype series is elected as a new lectotype.

Other material listed by Lawrence in same publication (no type label) (Lawrence, 1927), SOUTH AFRICA: *Eastern Cape,* 2 ♀, Dunbrody, 33°28'S 25°33'E, 1901-1902, J. O'Neil (SAM/ARAN 2464)

*Other material examined.* SOUTH AFRICA: *Eastern Cape Province,* 1 ♀, Cwebe Nature Reserve, 32°11'S 28°55'E, beating coastal dune forests, 10.x.2006, R. Lyle & C. Haddad (NCA 2007/330); 1 ♀, same locality data (NCA 2007/330); 3 ♂, same locality, beating coastal dune forest, 30.x.2006, R. Lyle & C. Haddad (NCA 2007/331); 1 ♂, same locality data (NCA 2007/339); 2 ♂, Mazeppa Bay, 32°27'S 28°38'E, beating coastal dune forest, 28.x.2006, R. Lyle & C. Haddad (NCA 2007/434); 1 juvenile, same locality data (NCA 2007/437); 1 ♀, 1 juvenile, same locality data (NCA 2007/435); 1 ♂, 2 ♀, between East London and Port Alfred, 33°26'S 26°55'E, sweeping in bushes, 1.xii.1977. A.S. Dippenaar-Schoeman (NCA 77/1191); 1 ♀, 1 juvenile, Keiriver Mouth 32°41'S 28°21'E, sweeping coastal forest, 8.xii.2005, C. Haddad (NCA 2007/1441); 6 ♂,1 ♀, same locality data (NCA 2007/1435); 1 ♀, same locality data, (NCA 2007/1429); *KwaZulu-Natal Province*, 1 ♀, Vryheid Nature Reserve, 27°53'S 30°54'E, grassland and wooded grassland, beating and sweeping, 31.i.2007, A.P. Marais (NCA 2009/5845).

*Natural history.* Specimens were sampled by beating and sweeping vegetation in grass- and wooded grasslands of coastal dune forests, they were also found near rivers and estuaries. Adults were sampled between October and January and juveniles in December.

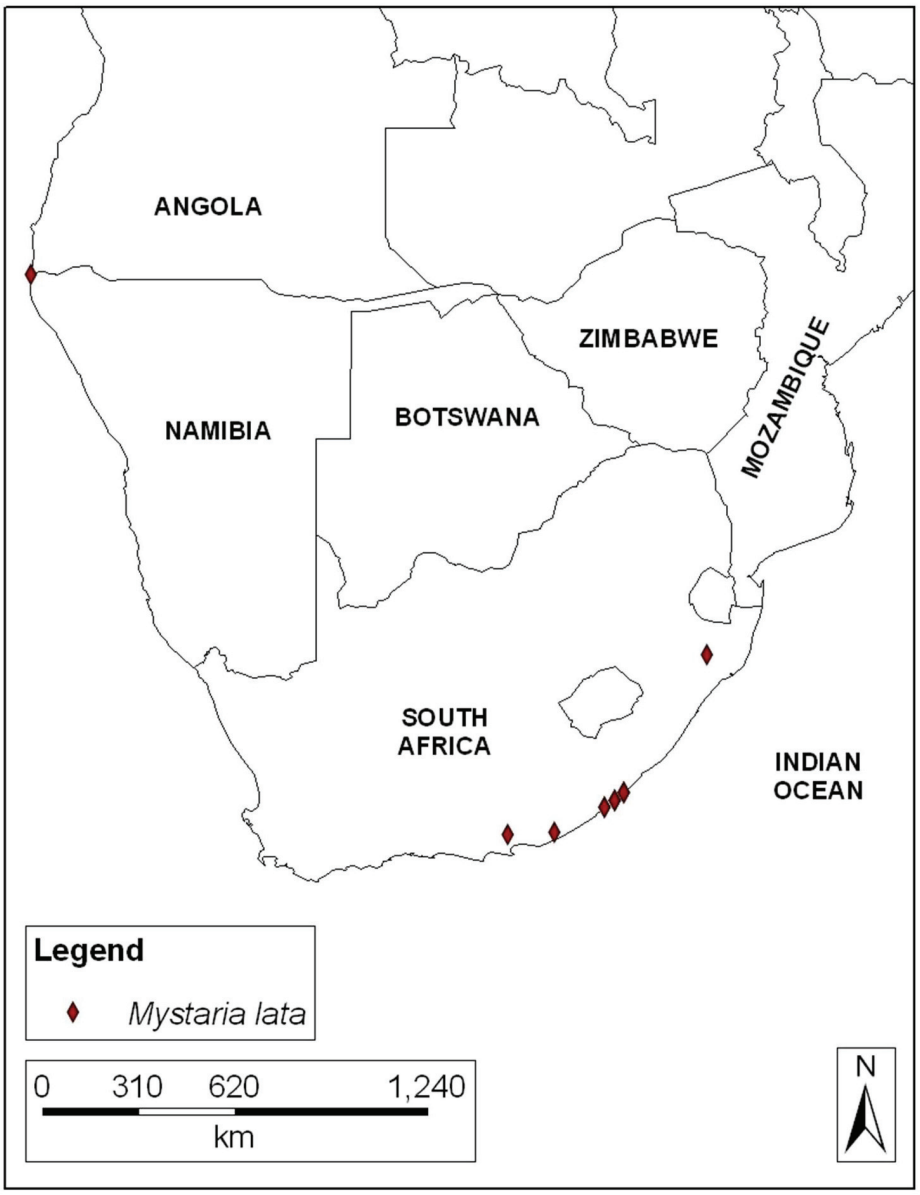



**Fig. 4.11** Recorded geographical distribution of *Mystaria lata* (Lawrence, 1927) comb. nov.

*Distribution.* Namibia and South Africa (Eastern Cape Province, new record: KwaZulu-Natal Province) (Fig. 4.11).

#### 4.4.2.5 *Mystaria lindaicapensis* sp. n.

Figs 4.12 & 4.13

*Diagnosis.* Females can be recognized by the distinct colour patterns on body (Figs 4.12.5-6); epigyne with atrium sclerotized, rim oval to U-shaped (Fig. 4.12.1); intromittent orifices open antero-laterally. In male palp the bulb is large and round with RTA longer that VTA; RTA with slender tip extending dorso-laterally (Figs 4.12.3-4).

*Description.*

*Female:* Size, measurements (mm): (*n* = 1). TL: 3.90; CL: 1.26; CW: 1.31; CI: 0.96; CH: 0.94; CLL: 0.28; MOQ-L: 0.31. *Colour:* carapace brown to dark copper, abdomen dorsally pale yellow to copper-blue with a broad, black longitudinal band centrally that expand laterally; ventrally with brown striae, centrally blue; clypeus with small orange area; sternum dark; femora I-III with infuscate brown bands dorsally and ventrally; femur IV distally with brown band; patellae yellow-orange, tibiae and metatarsi greenish, tarsi pale yellow. *Carapace*: texture granular and hairy. *Clypeus:* sloping. *Sternum*: SL (mm): 0.64; SW (mm): 0.67; SI (mm): 0.95. *Eye*s: MOQ eye area fairly big and wide, eye tubercles small, PLE not very big, almost equal in size to AME; ALE>PLE>AME>PME; eye measurements (mm): AME–AME: 0.33; ALE–AME: 0.36; AME–AME/AME–ALE: 0.92; PME–PME: 0.52; PLE–PME: 0.34; PME–PME/PME–PLE: 1.54; ALE/AME: 1.09; PLE/PME: 0.65; MOQ-AW/MOQ-PW: 0.64; MOQ-L/MOQ-W: 0.49; Clyp/AME–AME: 0.84. *Legs*: with very dense setae; femora with two medium spiniform setae, tibiae I-IV with two short spines; leg formula: II:I:IV:III; leg measurements (mm): leg I – Fe 0.96, Pat 0.26, Tib 0.76, Mt 0.62, Ta 0.46, total 3.06; II – Fe 0.96, Pat 0.31, Tib 0.79, Mt 0.66, Ta 0.48, total 3.20; III – Fe 0.72, Pat 0.29, Tib 0.49, Mt 0.40, Ta 0.31, total 2.21; IV – Fe 0.78, Pat 0.34, Tib

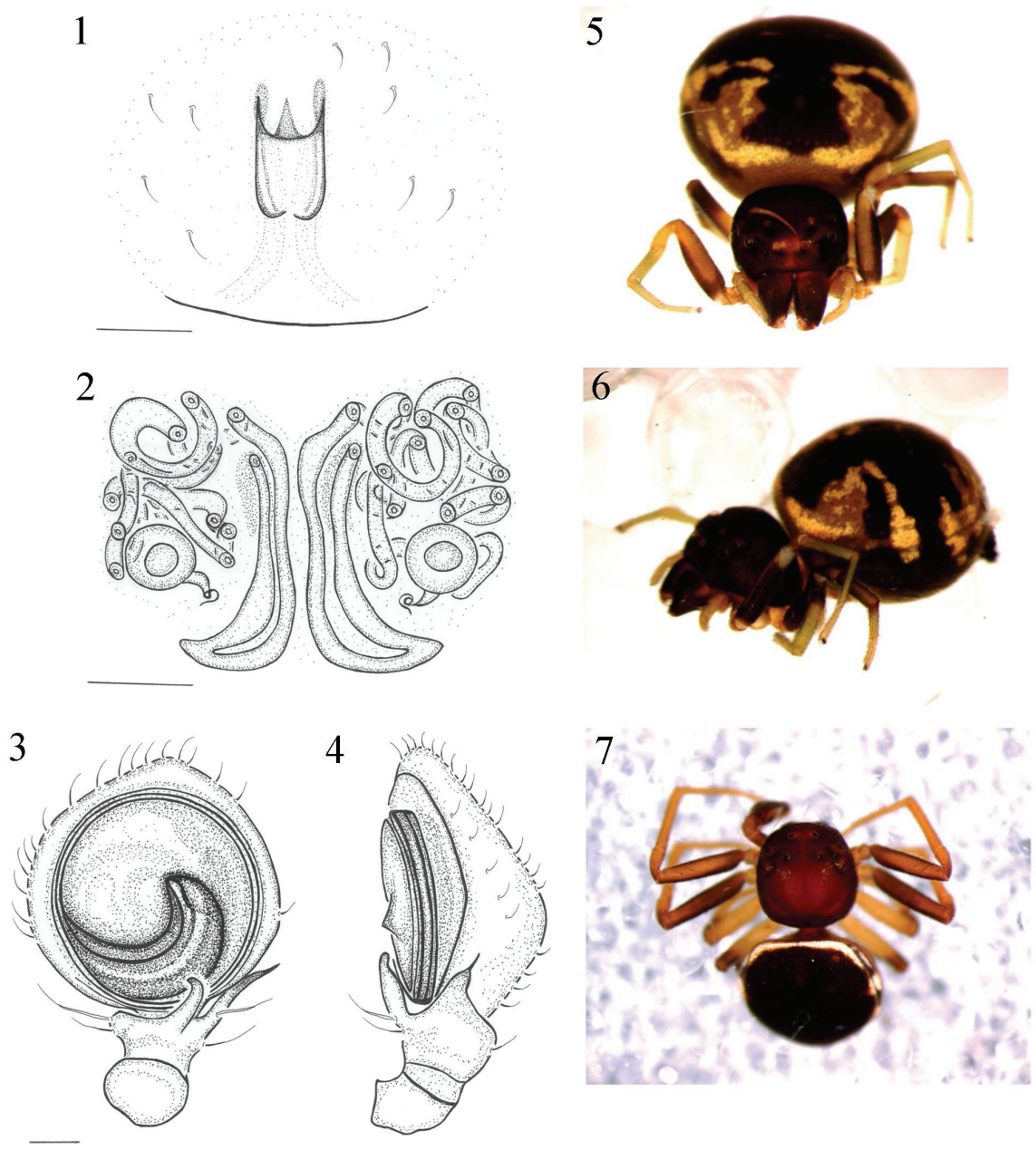



**Fig. 4.12** ***Mystaria lindaicapensis*** sp. n. 1. Female epigyne ventral view. 2. Epigyne dorsal view. 3. Male right palp ventral view. 4. Right palp retro-lateral view. 5. Female from South Africa, Jeffreys Bay antero-dorsal view. 6. Female latero-dorsal view. 7. Male from South Africa, Knysna dorsal view.

0.60, Mt 0.52, Ta 0.36, total 2.59. *Abdomen:* large, round; AL (mm): 2.64; AW (mm): 2.76; AI (mm): 0.96. *Epigyne*: atrium U-shaped to slightly oval, rim extending slightly anteriorly with intromittent orifices situated antero-laterally (Fig. 4.12.1); intromittent canals longer than in other species (Fig. 3.12.2).

*Male*: Size, measurements (mm): (*n* = 3). TL: 2.83 (2.78–2.87); CL 1.20 (1.15–1.25); CW: 1.13 (1.12–1.14); CI: 1.06 (1.03–1.09); CH: 0.83 (0.82–0.84); CLL: 0.26 (0.25–0.26); MOQ-L: 0.28 (0.28–0.29). Differs from female as follows: *Colour*: abdomen dorsally blackish-brown with slight orange-red pattern, small blue or whitish border around abdomen (Fig. 4.12.7); ventrally metallic blue, with striae slightly darker. Femora I-II dark or with infuscate dark brownish bands; femora III-IV distally slightly darker; patellae, tibiae, metatarsi and tarsi of leg IV with darker tint, remainder of leg segments yellow or orange. *Carapace*: granular and/or hairy, with few long, erectile setae present on postero-thoracic edge and laterally of LE area. *Sternum*: SL (mm): 0.49 SW (mm): 0.55 SI (mm): 0.90. *Eyes*: eye measurements (mm): AME–AME: 0.28; ALE–AME: 0.30; AME–AME/AME–ALE: 0.92; PME–PME: 0.39; PLE–PME: 0.28; PME–PME/PME–PLE: 1.38; ALE/AME: 1.09; PLE/PME: 0.72; MOQ-AW/MOQ-PW: 0.71; MOQ-L/MOQ-W: 0.40; Clyp/AME–AME: 0.93. *Legs*: with dense fine setae; few long spiniform setae present on femora and tibiae I-IV, spiniform setae on tibia IV especially long and erectile; spiniform setae present ventrally on tibiae, dorsally more numerous; leg formula: II:I:IV:III; leg measurements (mm): leg I – Fe 0.90, Pat 0.30, Tib 0.74, Mt 0.65, Ta 0.50, total 3.09; II – Fe 1.01, Pat 0.34, Tib 0.85, Mt 0.73, Ta 0.47, total 3.40; III – Fe 0.64, Pat 0.26, Tib 0.50, Mt 0.37, Ta 0.31, total 2.08; IV – Fe 0.77, Pat 0.27 Tib 0.58, Mt 0.47, Ta 0.36, total 2.45. *Abdomen*: AL (mm): 1.63; AW (mm): 1.48; AI (mm): 1.10. *Palp*: bulb and tegulum large and round; RTA small extending dorso-laterally, situated slightly behind bulb (Fig. 4.12.3), tip dark and slender; RTA slightly longer than VTA (Fig. 4.12.4).

*Type material*. Holotype ♀, SOUTH AFRICA: *Eastern Cape Province,* Jeffreys Bay, 34°02.10’S 24°55.07’E, in garden, 15.vii.2008, L. Wiese (NCA 2009/5036).

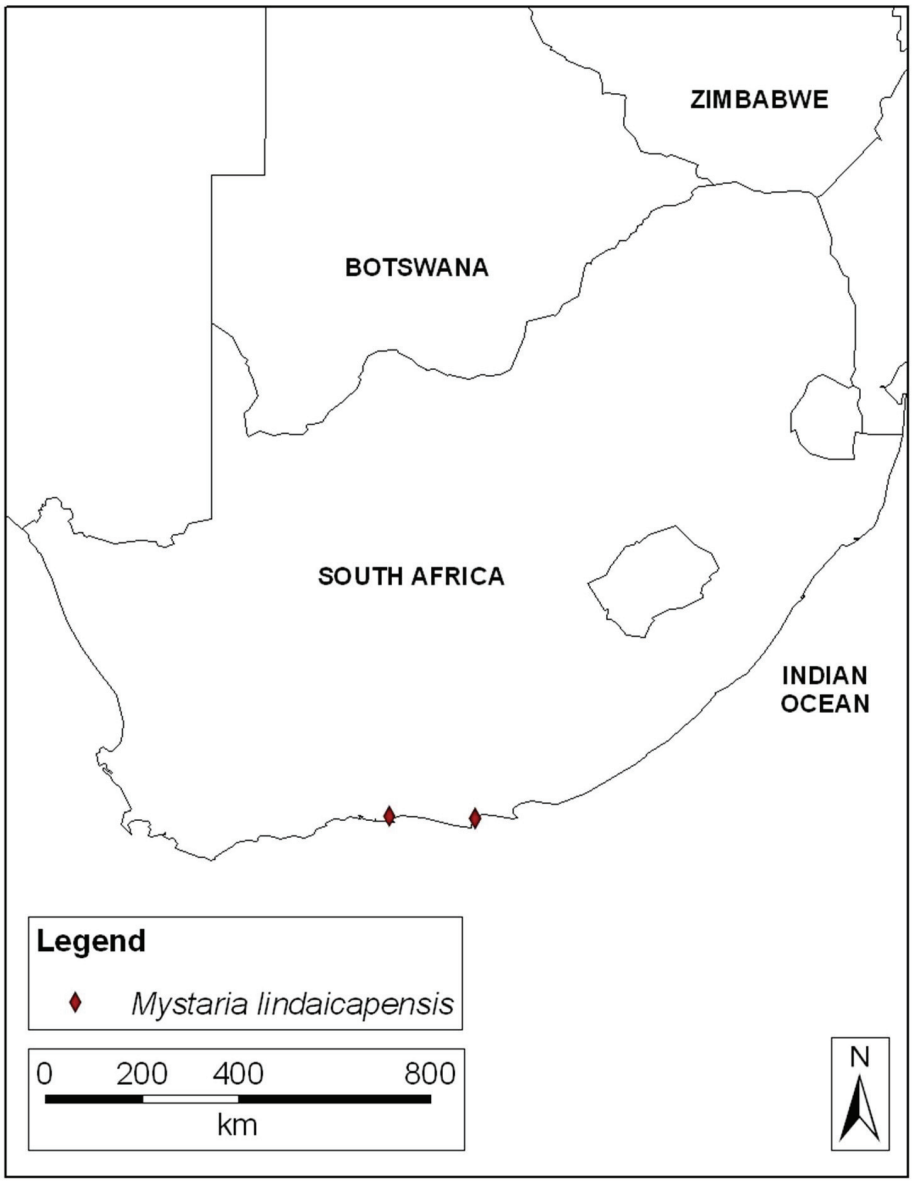



**Fig. 4.13** Recorded geographical distribution of *Mystaria lindaicapensis* sp. n.

Paratypes: 1 ♂, same locality data as holotype, L. Wiese (NCA 2009/5036); *Western Cape Province,* 1 ♂, Knysna, 34°00'S 23°20'E, beating, 7.xii.1989, L.N. Lotz (NMBA 3317).

*Distribution.* South Africa (Eastern Cape and Western Cape Province) (Fig. 4.13).

*Natural history.* Sampled from vegetation in forests and garden. Adults collected between December and July.

*Etymology.* Named after Linda Wiese who collected the holotype in the Eastern Cape Province, the southern-most locality for this genus in South Africa.

#### 4.4.2.6 *Mystaria mnyama* sp. n.

Figs 4.14 & 4.15

*Diagnosis.* Females can be recognized by the distinct colour patterns on body (Fig. 4.14.5); epigyne with atrium bullet-shaped and small notch anteriorly (Fig. 4.14.1). Male is very dark with pale legs (Fig. 4.14.7); palp with RTA slightly longer than VTA (Fig. 4.14.4); RTA with long narrow tip directed antero-laterally (Fig. 4.14.3).

*Description.*

*Female:* Size, measurements (mm): (*n* = 1). TL: 2.64; CL: 1.06; CW: 0.94; CI: 1.13; CH: 0.73; CLL: 0.23; MOQ-L: 0.24. *Colour:* carapace copper-red, black tint in LE region, partially central eye region and postero-lateral side of carapace; clypeus with orange patch; sternum dark; abdomen dorsally pale white with two dark spots laterally; ventrally with blue tint central area; striae metallic purplish-blue to pinkish-brown; legs uniform yellow with femora I-II a darker orange. *Carapace*: slightly granular. *Sternum*: SL (mm): 0.43; SW (mm): 0.46; SI (mm): 0.95. *Eye*s: AME large; eye measurements (mm): AME–AME: 0.22; ALE–AME: 0.29; AME–AME/AME–ALE:

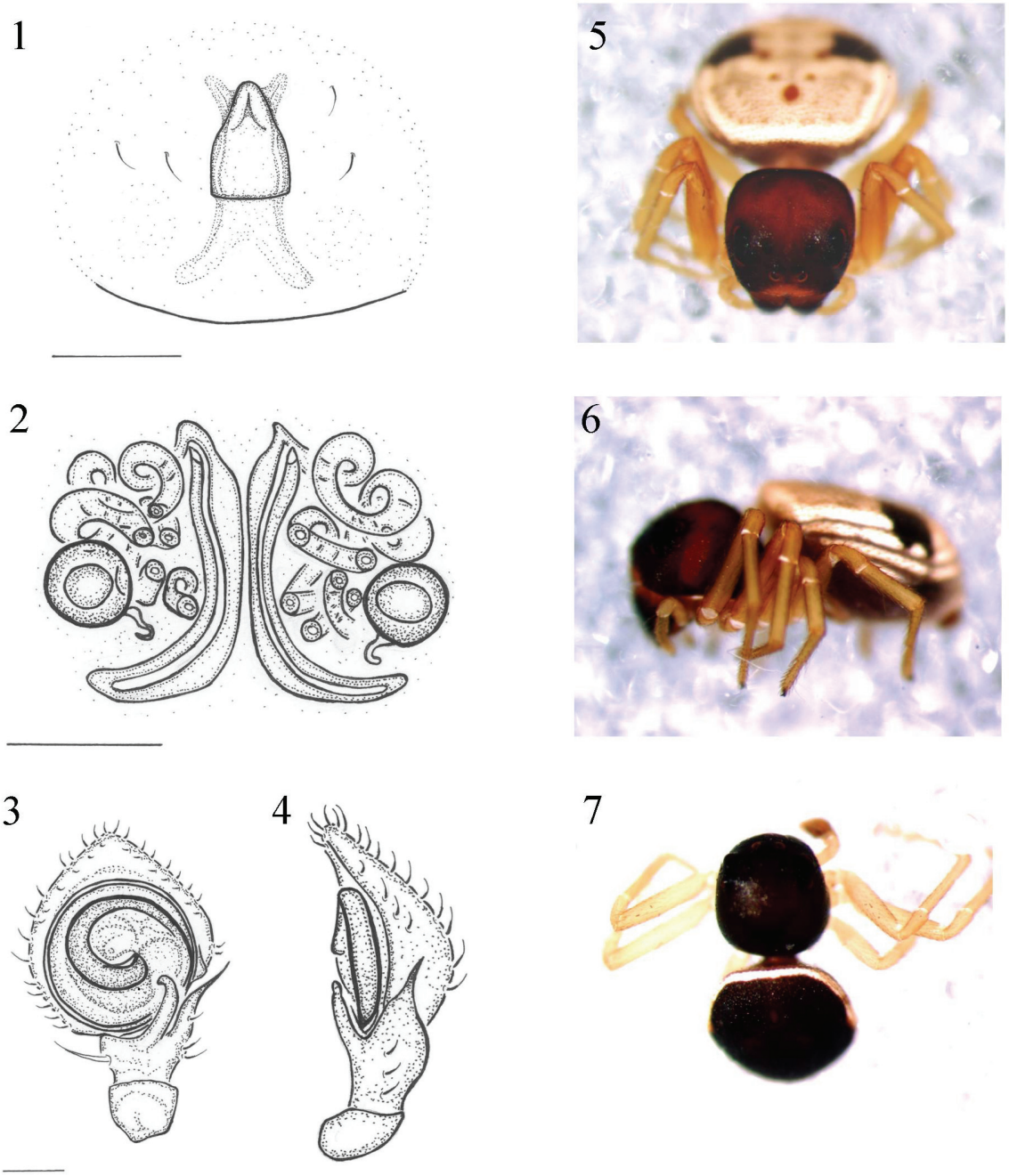



**Fig. 4.14** ***Mystaria mnyama*** sp. n. 1. Female epigyne ventral view. 2. Epigyne dorsal view. 3. Male right palp ventral view. 4. Right palp retro-lateral view. 5. Female from South Africa, Tembe Elephant Park antero-dorsal view. 6. Female latero-dorsal view. 7. Male form Tembe Elephant Park dorsal view.

0.75; PME–PME: 0.34; PLE–PME: 0.26; PME–PME/PME–PLE: 1.27; ALE/AME: 1.33; PLE/PME: 0.79; MOQ-AW/PW: 0.64; MOQ-L/MOQ-W: 0.37; Clyp/AME–AME: 1.06. *Legs*: all legs with medium setae, femora I-III with 3 short, thick spiniform setae, absent from femur IV; tibiae I-IV with 3 or more spiniform setae; tibiae III–IV with spiniform setae dorsally and ventrally; leg formula: I:II:IV:III; leg measurements (mm): leg I – Fe 0.74, Pat 0.29, Tib 0.64, Mt 0.52, Ta 0.40, total 2.58; II – Fe 0.76, Pat 0.29, Tib 0.61, Mt 0.50, Ta 0.37, total 2.53; III – Fe 0.50, Pat 0.20, Tib 0.40, Mt 0.30, Ta 0.24, total 1.64; IV – Fe 0.60, Pat 0.23, Tib 0.49, Mt 0.41, Ta 0.29, total 2.02. *Abdomen:* AL: 1.58; AW: 1.58; AI: 1.00. *Epigyne*: atrium small, bullet-shaped, small notch anteriorly (Fig. 4.14.1); intromittent orifices small, open antero-laterally; intromittent canals as in Fig. 4.14.2.

*Male*: Size, measurements (mm): (*n* = 1). TL: 2.29; CL: 0.97; CW: 0.88; CI: 1.11; CH: 0.66; CLL: 0.22; MOQ-L: 0.22. Differ from female as follows: *Colour*: body dark blackish to copper with a white border in anterior half of abdomen; ventrally greyish to brownish-purple striae; legs uniform pale yellow in contrast to body. *Carapace*: round. *Sternum*: SL (mm): 0.40 SW (mm): 0.44 SI (mm): 0.89. *Eyes*: eye measurements (mm): AME–AME: 0.20; ALE–AME: 0.28; AME–AME/AME–ALE: 0.74; PME–PME: 0.31; PLE–PME: 0.23; PME–PME/PME–PLE: 1.37; ALE/AME: 1.35; PLE/PME: 0.73; MOQ-AW /MOQ-PW: 0.65; MOQ-L/MOQ-W: 0.33; Clyp/AME–AME: 1.06. *Legs*: with dense short to medium setae on all segments; femora I-III with 3 spiniform setae; fairly long, thick and erectile spiniform setae on patella and dorsally and ventrally on tibiae I-IV; leg formula: II:I:III (leg IV damaged); leg measurements (mm): leg I – Fe 0.77, Pat 0.25, Tib 0.68, Mt 0.55, Ta 0.42, total 2.68; II – Fe 0.84, Pat 0.26, Tib 0.76, Mt 0.55, Ta 0.42, total 2.83; III – Fe 0.52, Pat 0.23, Tib 0.46, Mt 0.31, Ta 0.29, total 1.80; IV – Fe 0.60. *Abdomen*: round, anteriorly straight border, posteriorly slightly pointed; scutum with fine setae; AL (mm): 1.32; AW (mm): 1.18; AI (mm): 1.12. *Palp*: RTA longer than VTA; RTA long and slender with sharp tip, directed antero-laterally (Fig. 4.14.3).

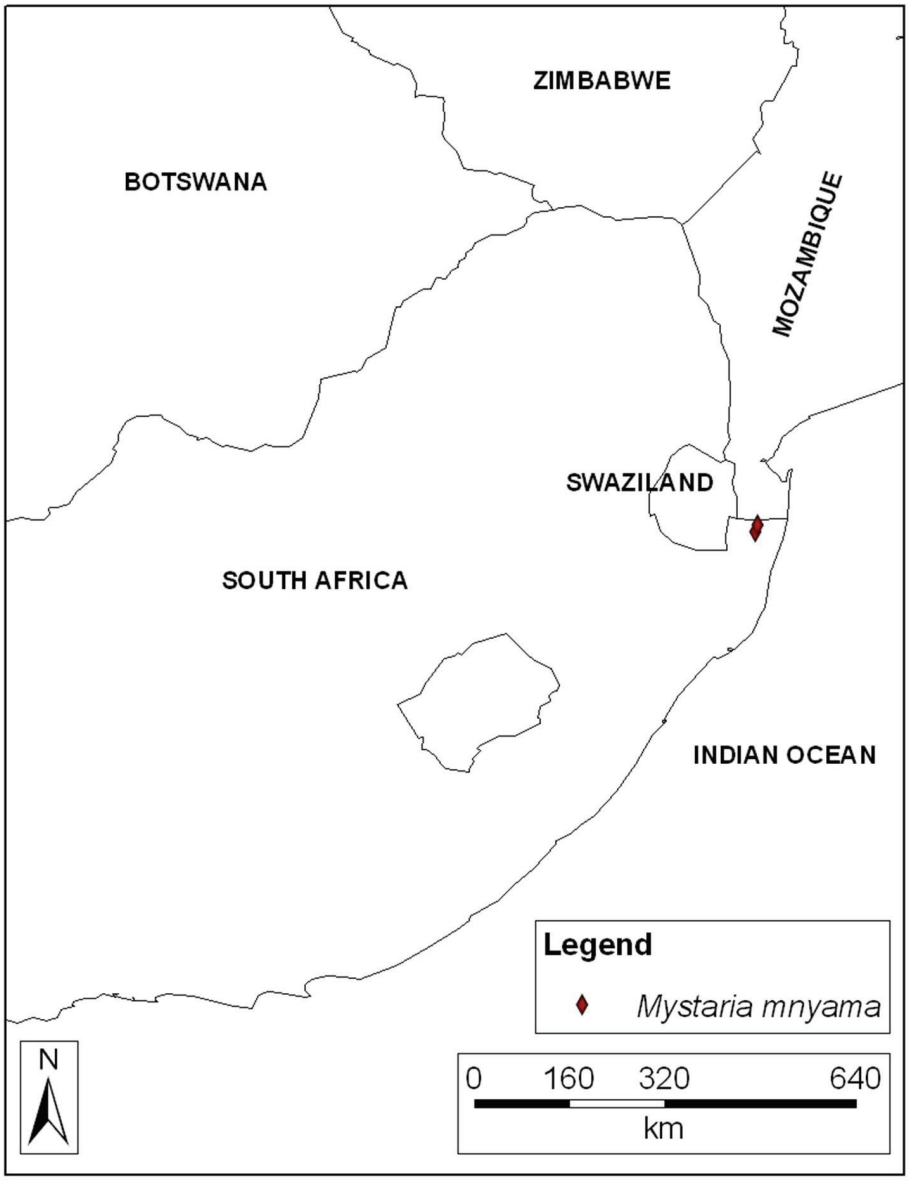



**Fig. 4.15** Recorded geographical distribution of *Mystaria mnyama* sp. n.

*Type material*. Holotype ♀, SOUTH AFRICA: *KwaZulu-Natal Province*, Tembe Elephant Park, sparse woodland, sweeping grasses, 26°52'S 32°27'E, 7.vii.2007, C. Haddad (NCA 2008/2839). Paratype:1 ♂, Tembe Elephant Park, 27°03'S 32°24'E, open woodland, beating short shrubs, 7.vii.2007, C. Haddad (NCA 2008/2822).

*Natural history.* Sampled from sweeping and beating vegetation in open woodlands. Known from only two adults sampled in July.

*Distribution.* South Africa (KwaZulu-Natal Province) (Fig. 4.15).

*Etymology. 'Mnyama'* means black in Zulu, as this species is recognized by the black-tinted areas on the cephalic and eye area.

#### 4.4.2.7 ***Mystaria occidentalis*** (Millot, 1942) comb. nov.

Figs 4.16 & 4.17

*Paramystaria variabilis occidentalis* Millot, 1942: 8, fig. 3.

*Diagnosis.* Females recognized by the distinct colour patterns on body (Fig. 4.16.5); epigyne with atrium rim teardrop-shaped with small flap posteriorly; small intromittent orifices open antero-laterally (Fig. 4.16.1). Male dark with pale legs (Fig. 4.16.7); palp with VTA and RTA almost same length; RTA with long narrow tip directed laterally with slight curve anteriorly (Fig. 4.16.3); VTA slender (Fig. 4.16.4). Some specimens resemble *M. variabilis* (Lessert, 1919) in colour patterns on carapace, but differ from it in size, eye distances and genitalia.

*Re-description.*

*Female:* Size, measurements (mm): (*n* = 21). TL: 2.99 (2.56–3.76); CL: 1.12 (1.05–1.33); CW: 1.01 (0.92–1.20); CI: 1.11 (1.04–1.20); CH: 0.70 (0.60–0.86); CLL:

0.22 (0.15–0.27); MOQ-L: 0.24 (0.20–0.28). *Colour:* carapace varies from dark copper-brown to orange-red, sometimes uniform or usually with two darker bands dorso-laterally (Fig. 4.16.5) or darker areas in eye region either with or without two small orange triangles on postero-lateral sides and/or bands on thoracic area, in orange specimens carapace dark postero-laterally; clypeus and anterior eye area paler; chelicerae sometimes orange at base and dark distally; labium dark; sternum orange-brown or sometimes with darker brown pattern; abdomen varies from dorsally pale or with blue tint and with a dark brown medial band or with patterns laterally; ventrally striae striped; legs I-IV uniform pale yellow (Fig. 4.16.6), or often with darker tinted femora I-II; tibiae, metatarsi and tarsi II or IV sometimes dark. *Carapace*: smooth, not granular. *Sternum*: SL (mm): 0.48; SW (mm): 0.51; SI (mm): 0.95. *Eye*s: AME situated very close, eye measurements (mm): AME–AME: 0.22; ALE–AME: 0.30; AME–AME/AME–ALE: 0.72; PME–PME: 0.35; PLE–PME: 0.28; PME–PME/PME–PLE: 1.26; ALE/AME: 1.40; PLE/PME: 0.81; MOQ-AW/MOQ-PW: 0.63; MOQ-L/MOQ-W: 0.39; Clyp/AME–AME: 1.01. *Legs*: two or three small setae on femora, rest of leg segments covered with dense fine setae, few small strong setae dorsally and ventrally on patellae and tibiae; leg formula: II:I:IV:III; leg measurements (mm): leg I – Fe 0.77, Pat 0.27, Tib 0.58, Mt 0.50, Ta 0.39, total 2.51; II – Fe 0.79, Pat 0.28, Tib 0.63, Mt 0.52, Ta 0.37, total 2.59; III – Fe 0.58, Pat 0.25, Tib 0.42, Mt 0.33, Ta 0.28, total 1.86; IV – Fe 0.67, Pat 0.25, Tib 0.50, Mt 0.43, Ta 0.31, total 2.16. *Abdomen:* covered with short setae embedded in small tubercles; AL (mm): 1.87; AW (mm): 1.76; AI (mm): 1.06. *Epigyne*: atrium rim teardrop-shaped, wide posteriorly, narrow anteriorly (Fig. 4.16.1), almost closed anteriorly; small flap in central posterior area; intromittent canals complex, as in Fig. 4.16.2.

*Male*: Size, measurements (mm): (*n* = 12). TL: 2.39 (2.10–2.64); CL: 1.02 (0.90–1.14); CW: 0.92 (0.80–1.00); CI: 1.11 (1.05–1.19); CH: 0.62 (0.54–0.72); CLL: 0.22 (0.18–0.24); MOQ-L: 0.22 (0.20–0.24). Resemble females but differ as follows: *Colour*: body dark or rich copper-brown; abdomen dorsally with or without patterns, sometimes with narrow bluish or white border anteriorly; ventrally uniform metallic blue or pinkish-purple or with pale centre with blue and white striped striae; legs

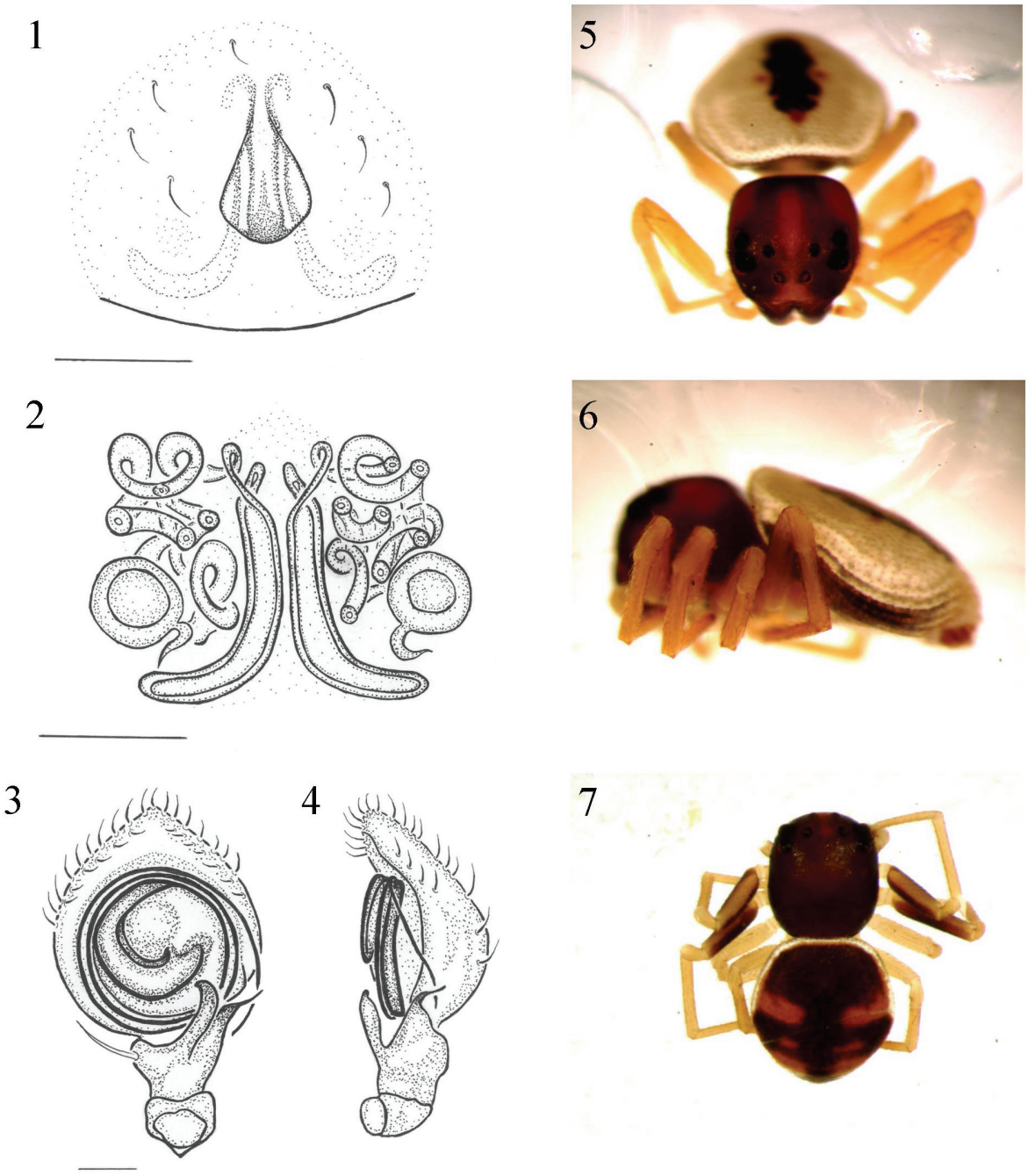



**Fig. 4.16** ***Mystaria occidentalis*** (Millot, 1942) comb. nov. 1. Female epigyne ventral view. 2. Epigyne dorsal view. 3. Male right palp ventral view. 4. Right palp retrolateral view. 5. Female from Democratic Republic of Congo, Kaisola antero-dorsal view. 6. Female latero-dorsal view. 7. Male from Rwanda, Butare dorsal view.

either pale or femora I-II and tibiae, metatarsi and tarsi IV darker (Fig. 4.16.7). *Sternum*: SL (mm): 0.42 SW (mm): 0.46 SI (mm): 0.92. *Eyes*: large; eye measurements (mm): AME–AME: 0.21; ALE–AME: 0.27; AME–AME/AME–ALE: 0.79; PME–PME: 0.31; PLE–PME: 0.25; PME–PME/PME–PLE: 1.26; ALE/AME: 1.29; PLE/PME: 0.80; MOQ-AW/MOQ-PW: 0.68; MOQ-L/MOQ-W: 0.34; Clyp/AME–AME: 1.05. *Legs*: usually with short setae; leg formula: II:I:IV:III; leg measurements (mm): leg I – Fe 0.84, Pat 0.26, Tib 0.73, Mt 0.59, Ta 0.43, total 2.85; II – Fe 0.91, Pat 0.28, Tib 0.75, Mt 0.60, Ta 0.42, total 2.95; III – Fe 0.56, Pat 0.23, Tib 0.48, Mt 0.35, Ta 0.29, total 1.92; IV – Fe 0.64, Pat 0.32, Tib 0.52, Mt 0.44, Ta 0.31, total 2.23. *Abdomen*: AL (mm): 1.36; AW (mm): 1.17; AI (mm): 1.17. *Palp*: embolus long with at least three coils; RTA extending laterally with narrow tip curving anteriorly (Figs 4.16.3-4).

*New combination.* Millot (1942) described *Paramystaria variabilis occidentalis* as a subspecies of *P. variabilis,* based mainly on colour variation. A critical examination of *P. v. occidentalis* revealed that the epigyne differs from that of *P. variabilis* and these differences necessitate the recognition of *P. occidentalis* as a distinct species within *Mystaria.*

*Type material examined*. Syntypes: 3 ♀, GUINEA: Kouroussa, 11°15'N 11°59'W, viii.1937, J. Millot (MNHN) (material not well-preserved, bleached). One female from the syntype series is elected as a new lectotype.

*Other material examined.* CAMEROON: 1 ♂, Chabal Mbabo, 07°25'N 12°49'E, alt 1250 m, SW-slope, 7-13.iv.1983, R. Bosmans & J. Van Stalle (MRAC 162.638); 1 juvenile, Letta, 4°55'N 13°51'E, alt. 1100 m, 50 km N of Bertoua, sweeping, 3.iii.1983, R. Bosmans & J. Van Stalle (MRAC 162.732); 1 ♂, 1 juvenile ♀, Mbam mountain near Koutoupi, W-slope, alt. 1100 m, Ndop plateau, forest litter, sweeping, 31.iii.1983, R. Bosmans & J. Van Stalle (MRAC 162.645). DEMOCRATIC REPUBLIC OF CONGO (DRC): *Katanga Region*, 1 ♀, Likasi (Jadotville), 11.2 km NW, 10°59'S 26°44'E, alt 1350 m, 27.i.1958, E.S. Ross & R.E. Leech (CAS); *Nord-*

*Kivu Region*, 1 ♀, Ishanga spillway of Lake Edward into Semliki, 00°08'S 29°36'E, 26-29.xii.1968, R.P.M. Lejeune (MRAC 135.362); 1 ♂, same locality (MRAC 135.368); 1 ♀, Semliki middle valley, 01°13'N 30°32'E, sweeping, 8.viii.1968, R.P.M. Lejeune (MRAC 135.463); 1♀, same locality data (MRAC 135.439); 3 ♀, Lulimbi, river mouth Ishasha into Lake Edward, South East, 00°32'S 29°40'E, gallery forest beating dense shrub, vii-viii.1976, R.P.M. Lejeune (MRAC 169.056); 3 ♂, 3 ♀, same locality data (MRAC 169.031); 2 ♂, same locality data (MRAC 168.314); 1 ♂, same locality, sweeping meadow, vii-viii.1976 (MRAC 169.079); 1 ♀, Sake, 01°34'S 29°02'E, iii.1936, L. Lippens (MRAC 20737); 1 ♀, N'Zulu, Lake Kivu, 01°37'S 29°06'E, 13-14.ii.1934, G.F. De Witt (MRAC 222219); *Orientale Region*, 1 ♀, Kivu, valley of Kaisola, Plain of Ruindi, 00°47'S 29°17'E, beating, alt. 1100 m, 3.vii.1972, R.P.M. Lejeune (MRAC 144.494); 2 ♀, same locality data, R.P.M. Lejeune (MRAC 144.595); *Sud-Kivu Region,* 1 ♀, Bukavu, 2°27'S 28°43'E, xii.1954, H. Bomans (MRAC 85564). MOZAMBIQUE: 1 ♂, Tete, 16°09'S 33°34'E, iv.1947 (SMF 10-034); 1 ♀, same locality data (SMF 9976); 1 ♀, Ponta Torres, Inhaca Island, 26°00'S 32°56'E, coastal beach forest, 22.xii.1992, T. Steyn (NCA 93/240). RWANDA: 1 ♀, Gabiro, 01°31'S 30°28'E, xi.1985, R. Jocqué, J. Nsengimana & J.P Michiels (MRAC 165.867); 1 ♀, PN. Akagera, Lake Ihema, fisheries, 01°55'S 30°45'E, sweeping, alt. 1298 m, 8.xii.1985, R. Jocqué, J. Nsengimana & J.P. Michiels (MRAC 165.830); 1 ♂, 2 ♀, same locality, beating on three tree spp. *Acacia*, *Ziziphus* and *Commiphora*, 29.xi.1985, R. Jocqué, J. Nsengimana & J.P. Michiels (MRAC 165.370); 1 ♂, same locality, 1.vii.1985, R. Jocqué, J. Nsengimana & J.P. Michiels (MRAC 165.460); 1 ♂, Butare, 2°36'S 29°43'E, iv.1968, E. Vertriest (MRAC 134.811); 1 ♀, P.N. Akagera, 6 km south of fisheries, 01°40'S 30°35'E, dry forest, 5.xii.1985, R. Jocqué, J. Nsengimana & J.P. Micheils (MRAC 165.670). SOUTH AFRICA: *KwaZulu-Natal Province,* 1♂, 1 ♀, Mtunzini, Twin Streams Farm, 28°57'S 31°46'E, 15.xii.1963, W. Lawson & O. Bourquin (NM); 1 ♀, Hellsgate, 28°07'S 32°18'E, blue traps, tsetse fly survey, 15.ii.2004, J. Esterhuizen (NCA 2009/4613); 1 ♀, Umtamvuna Nature Reserve, 32°11'S 28°58'E, L. Berio (MNHG); 1 juvenile, same locality, L. Berio (MNHG). TANZANIA: 1 ♀, Tanganyika territory, x.1926, A. Loveridge (MCZ). UGANDA: 1 ♀, Busaga district, Mount Kisunyi, 00°40'N 33°18'E, ii.1967, T.

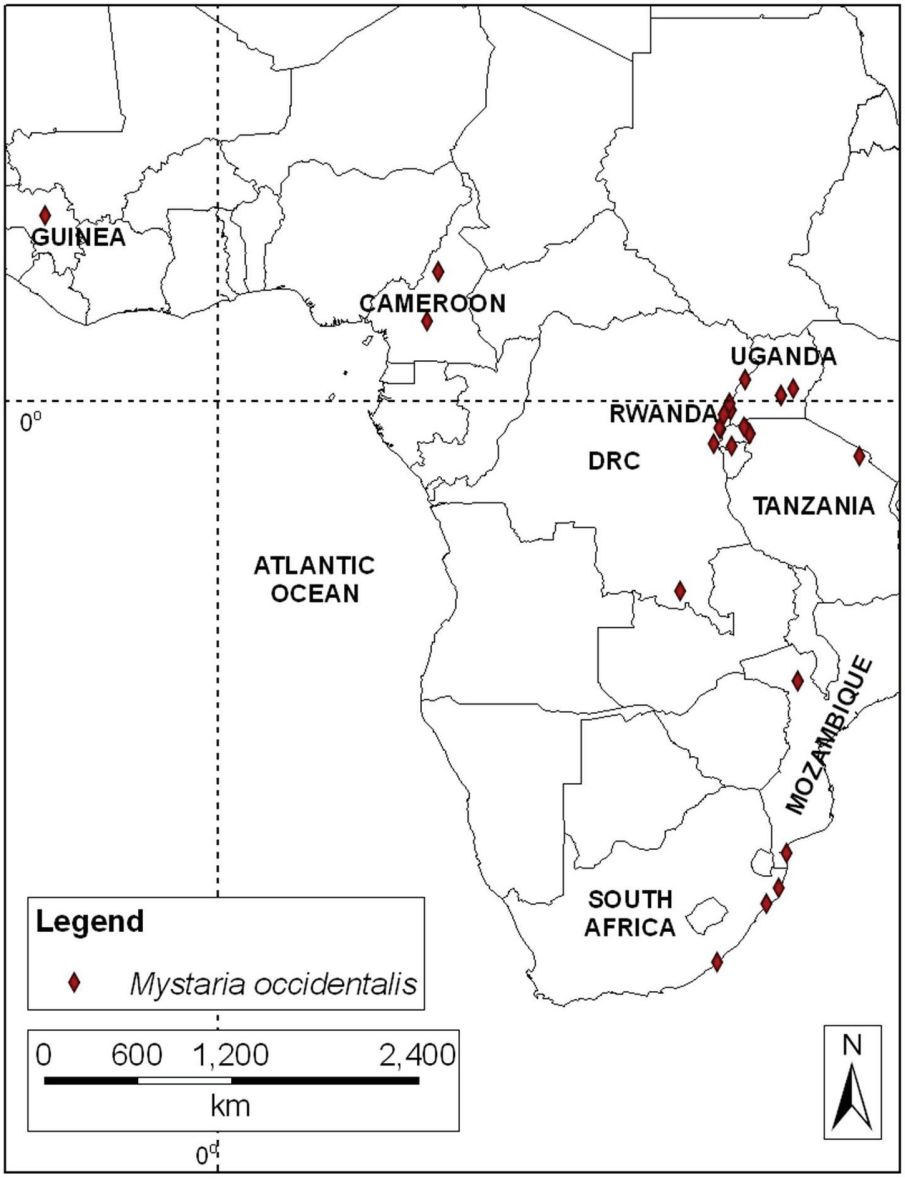



**Fig. 4.17** Recorded geographical distribution of *Mystaria occidentalis* (Millot, 1942) comb. nov.

Ruabunesa (MRAC 131.591); 1 ♀, Rubaga, 00°18'N 32°33'E, sweeping, 9.iv.1994, D. Penney (MRAC 210194); 3 ♂, same locality, sweeping, vi-viii.1994, D. Penney (MRAC 210216); 1 ♂, 3 ♀, same locality, found on flowers, 6.viii.1994, D. Penney (MRAC 210192), sub-adult ♂, same locality, vi/1994, D. Penney (MRAC 210206).

*Natural history.* Sampled from sweeping and beating vegetation in coastal beach forest, gallery forests, marshy areas near lakes and mountainous areas. Adults were collected over a year period from July and to April and juveniles were collected from March to June.

*Distribution.* Guinea. New records: Cameroon, Democratic Republic of Congo (DRC), Mozambique, Rwanda, South Africa, Tanzania and Uganda (Fig. 4.17).

#### 4.4.2.8. *Mystaria oreadii* sp. n.

Figs 4.3, 4.18 & 4.19

*Diagnosis.* Females can be recognized by the distinct colour patterns on body. Femora I-IV infuscated totally or partially with brown (Figs 4.18.3-4) Epigyne with atrium rim horseshoe-shaped, with small hood centrally (Fig. 4.18.1). Male unknown.

*Description*

*Female:* Size, measurements (mm): (*n* = 3). TL: 3.20 (2.74–3.53); CL: 1.14 (1.01–1.27); CW: 1.09 (0.97–1.22); CI: 1.05 (1.04–1.07); CH: 0.66 (0.63–0.70); CLL: 0.23 (0.20–0.26); MOQ-L: 0.24 (0.24–0.25). *Colour:* varies with carapace a red or orange copper sometimes with darker areas dorsally over thoracic region with paler areas postero-laterally or with dark area on posterior edge; chelicerae orange to copper, with tips tinted black; sternum dark copper; abdomen dorsally pale white sometimes with median longitudinal band which extends to spinnerets and striae; striae blue-grey; ventrally uniformly metallic blue to turqoise or slightly dark pink; femora I-IV with or without brownish band dorso-ventrally, remaining legs uniform

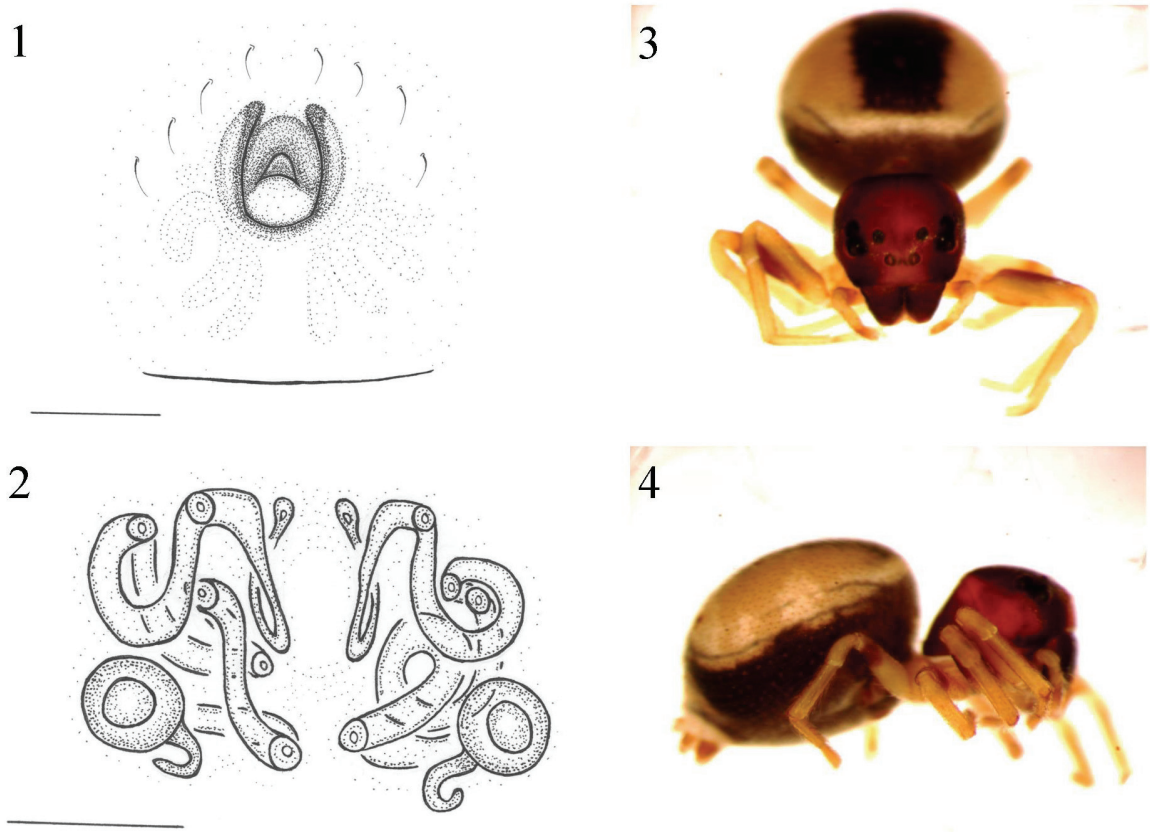



**Fig. 4.18** ***Mystaria oreadii*** sp. n. 1. Female epigyne ventral view. 2. Epigyne dorsal view. 3. Female from Rwanda, Rwankuba antero-dorsal view. 4. Female latero-dorsal view.

orange-yellow (Fig. 4.18.4). *Carapace:* slightly granular; setae present on clypeal edge and laterally of LE. *Sternum*: SL (mm): 0.48; SW (mm): 0.53; SI (mm): 0.91. *Eye*s: eye measurements (mm): AME–AME: 0.22; ALE–AME: 0.31; AME–AME/AME–ALE: 0.72; PME–PME: 0.37; PLE–PME: 0.28; PME–PME/PME–PLE: 1.35; ALE/AME: 1.40; PLE/PME: 0.74; MOQ-AW/MOQ-PW: 0.60; MOQ-L/MOQ-W: 0.41; Clyp/AME–AME: 1.04. *Legs*: femora with two or three medium spiniform setae laterally; tibia with many scattered, erectile, long spiniform setae, often ventrally or dorsally; tibiae distally with two fairly long spiniform setae ventrally; short setae present on all legs; tarsal claws as in Fig. 4.3.1; leg formula: II:I:IV:III; leg measurements (mm): leg I – Fe 1.75, Pat 0.30, Tib 0.59, Mt 0.50, Ta 0.40, total 2.53; II – Fe 0.75, Pat 0.30, Tib 0.62, Mt 0.50, Ta 0.40, total 2.57; III – Fe 0.58, Pat 0.26, Tib 0.43, Mt 0.34, Ta 0.29, total 1.89; IV – Fe 0.66, Pat 0.24, Tib 0.50, Mt 0.42, Ta 0.30, total 2.12. *Abdomen:* slightly wider posteriorly; AL (mm): 2.06; AW (mm): 1.80; AI (mm): 1.14. *Epigyne*: atrium rim horseshoe-shaped, small hood centrally; intromittent orifices small, open antero-laterally (Fig. 4.18.1); intromittent canals visible ventrally, postero-laterally to rim; intromittent canals as in Fig. 4.18.2.

*Type material*. Holotype ♀, RWANDA: Rwankuba, 01°45'S 29°51'E, alt. 2200 m, 23.viii.1953, A.E. Bertrand (MRAC 78855). Paratypes: 2 ♀, same locality data as holotype (MRAC 78856-7). DEMOCRATIC REPUBLIC OF CONGO (DRC): *Orientale Region,* 1 ♀, Ituri, Mount Bugera, 00°10'S 29°14'E, xi.1953, R.P. Bergmans & R.P. Celis (MRAC 76630).

*Natural history.* Specimens have been sampled from mountainous regions. Females were collected from August to November.

*Distribution.* Rwanda and Democratic Republic of Congo (DRC) (Fig. 4.19).

*Etymology:* This species, that was sampled exclusively from mountainous regions is named after *'Oread'*, a mountain nymph in old Greek mythology.

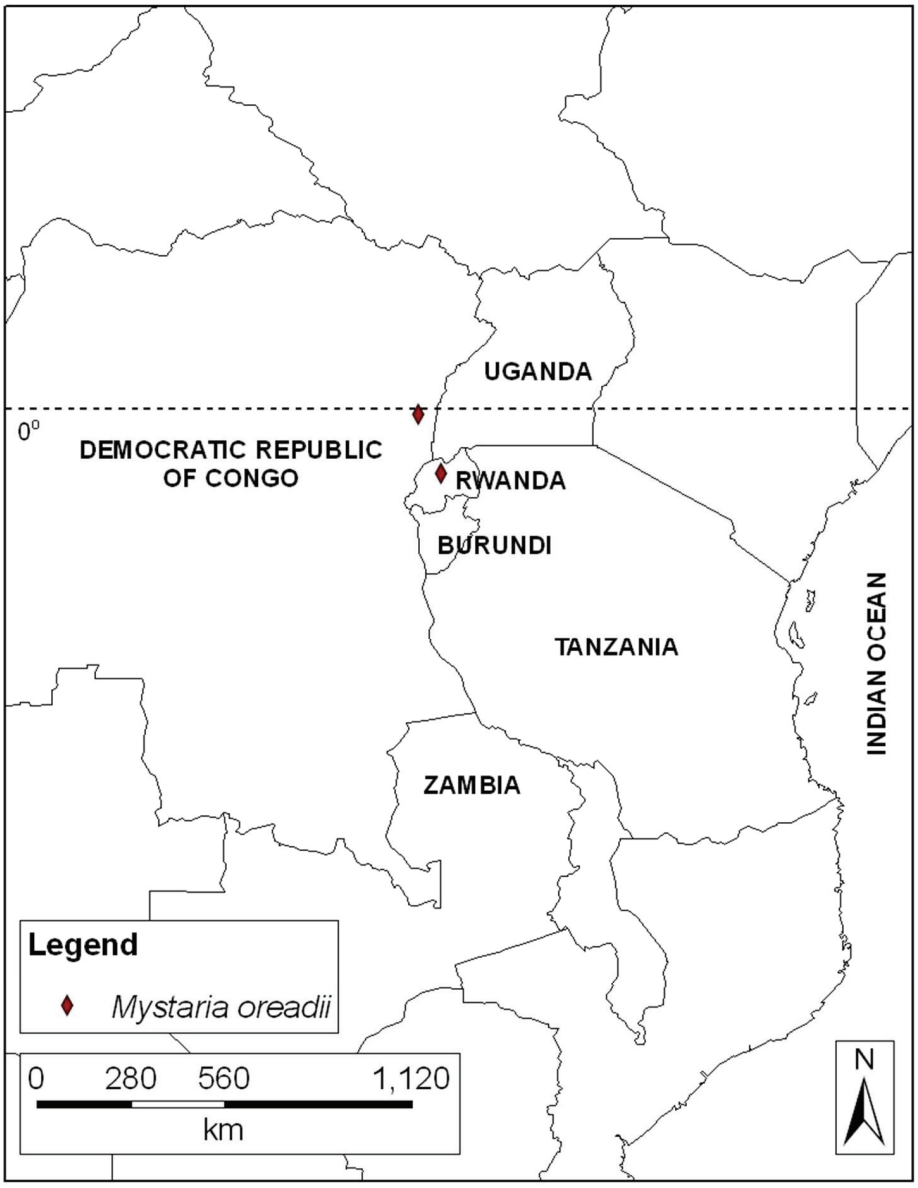



**Fig. 4.19** Recorded geographical distribution of *Mystaria oreadii* sp. n.

#### 4.4.2.9 *Mystaria rufolimbata* Simon, 1895

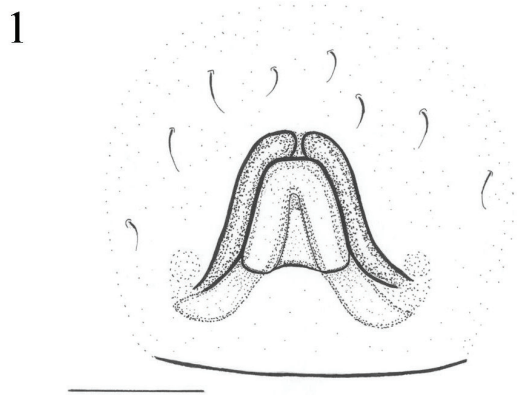
Figs 4.1, 4.2, 4.20 & 4.21

*Mystaria rufolimbata* Simon, 1895: 989; Jézéquel, 1964: 1111, fig. 9.

*Diagnosis.* Female body dark with two spots postero-laterally (Fig. 4.20.5) or border encircling the abdomen; males uniform copper-red or black (Fig. 4.20.6). Epigyne with triangular-shaped atrium (Fig. 4.20.1). Male palp with RTA slightly longer than VTA (Figs 4.20.3-4), RTA with tip sharp directed anteriorly, situated close to bulb. This species resembles *M. flavogutatta* (Lawrence, 1952) but differs in that the carapace of the female of the latter species is slightly longer than wide and highly elevated, with stronger line of setae on thoracic region and fovea of carapace with different genitalia.

*Re-description.*

*Female:* Size, measurements (mm): (*n* = 7). TL: 4.28 (3.10–5.24); CL: 1.16 (1.39–1.95); CW: 1.54 (1.22–1.86); CI: 1.08 (1.05–1.14); CH: 1.08 (0.86–1.2); CLL: 0.29 (0.23–0.35); MOQ-L: 0.31 (0.24–0.46). *Colour:* carapace dark reddish-brown to almost blackish-brown; legs yellow to orange, femora sometimes dark brown anteriorly, metatarsi and tarsi IV with a reddish shade. *Carapace:* wider than long, texture varies from smooth to granular studded with small holes; setae dense, very short, flat lying sometimes with two postero-lateral long setae on thoracic edge and laterally or between LE near clypeal region; more distinct than in *M. flavogutatta*. *Chelicerae:* as in Fig. 4.1.1. *Sternum:* SL (mm): 0.70; SW (mm): 0.72; SI (mm): 0.97. *Eyes*: eye measurements (mm): AME–AME: 0.31; ALE–AME: 0.41; AME–AME/AME–ALE: 0.77; PME–PME: 0.44; PLE–PME: 0.37; PME–PME/PME–PLE: 1.19; ALE/AME: 1.30; PLE/PME: 0.84; MOQ-AW/MOQ-PW: 0.71; MOQ-L/MOQ-W: 0.45; Clyp/AME–AME: 0.93. *Legs*: leg I-II almost nearly twice the length of leg III-IV; tarsal claws with long teeth, as in Fig. 4.2.1; leg formula: II:I:IV:III; leg measurements (mm): leg I – Fe 1.00, Pat 0.45, Tib 0.85, Mt 0.74, Ta 0.54, total 3.58; II – Fe 1.34,



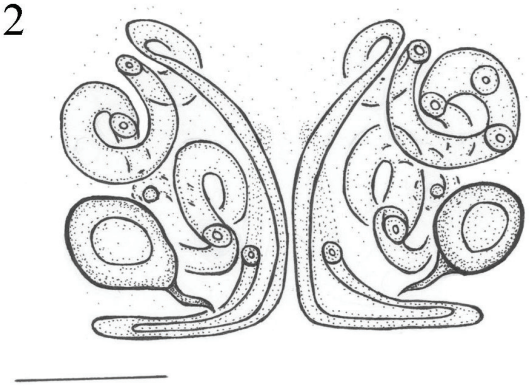
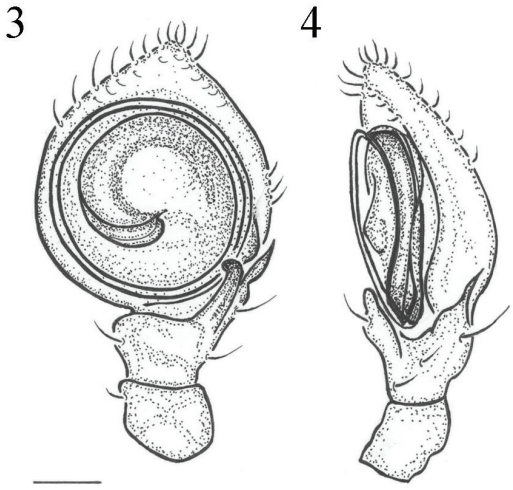




**Fig. 4.20** ***Mystaria rufolimbata*** Simon, 1895 1. Female epigyne ventral view. 2. Epigyne dorsal view. 3. Male right palp ventral view. 4. Right palp retro-lateral view. 5. Female from Democratic Republic of Congo, Walikale dorsal view. 6. Male from Gabon, Kinguélé dorsal view.

Pat 0.44, Tib 1.01, Mt 0.88, Ta 0.50, total 4.17; III – Fe 0.87, Pat 0.35, Tib 0.59, Mt 0.53, Ta 0.36, total 2.71; IV – Fe 0.93, Pat 0.32, Tib 0.63, Mt 0.55, Ta 0.35, total 2.76. *Abdomen:* AL (mm): 2.62; AW (mm): 2.16; AI (mm): 1.28. *Epigyne*: atrium triangular, rim wider posteriorly than anteriorly (Fig. 4.20.1); intromittent orifices open laterally of atrium; intromittent canals extended antero-laterally (Fig. 4.20.2).

*Male:* Size, measurements (mm): (*n* = 4). TL: 2.60 (2.09–2.91); CL: 1.12 (0.87–1.29); CW: 1.04 (0.84–1.18); CI: 1.07 (1.05–1.10); CH: 0.76 (0.61–0.94); CLL: 0.21 (0.17–0.24); MOQ-L: 0.24 (0.19–0.26). Similar to female but smaller in size and differs as follows: *Colour:* body uniform copper-brown, black or brown (Fig. 4.20.6). *Carapace:* longer than wide, slightly smaller and more flattened; with two long, erectile setae on postero-thoracic edge. *Sternum:* as wide as long; SL (mm): 0.49; SW (mm): 0.49; SI (mm): 1. *Eye*s: eye measurements (mm): AME–AME: 0.22; ALE–AME: 1.27; AME–AME/AME–ALE: 0.82; PME–PME: 0.31; PLE–PME: 0.26; PME–PME/PME–PLE: 1.21; ALE/AME: 1.22; PLE/PME: 0.83; MOQ-AW/MOQ-PW: 0.72; MOQ-L/MOQ-W: 0.34; Clyp/AME–AME: 0.94. *Legs:* tarsal claws of leg I, II with 2$^{nd}$ comb modified, broad and flattened (Fig. 4.2.2); leg formula: II:I:IV:III; leg measurements (mm): leg I – Fe 0.89, Pat 0.41, Tib 0.84, Mt 0.72, Ta 0.57, total 3.44; II – Fe 1.06, Pat 0.32, Tib 0.95, Mt 0.74, Ta 0.39, total 3.46 ; III – Fe 0.66, Pat 0.23, Tib 0.50, Mt 0.39, Ta 0.31, total 2.10; IV– Fe 0.68, Pat 0.25, Tib 0.54, Mt 0.44, Ta 0.33, total 2.23. *Abdomen:* almost round; AL (mm): 1.47; AW (mm): 1.29; AI (mm): 1.14. *Palp*: embolus long, coiling around bulb at least twice (Fig. 4.20.3); RTA tip very slender and sharply pointed, directed anteriorly (Fig. 4.20.3), RTA longer than VTA; VTA long, flattened (Fig. 4.20.4).

*Type material examined.* 2 ♀, Syntypes collected from Sierra Leone, 8°23'N 12°04'W (MNHN). One female is elected as a new lectotype from the syntype series.

O*ther material examined.* CAMEROON: 1 ♂, Yaonde, 3°52'N 11°30'E (SMF10916). COTE D'IVOIRE: 1 ♀, Park National de Tai, 15 km ESE of Tai, 5°52'N 07°27'W, alt 170 m, collected from branches of primary tree rainforest, 5.i.1989, A.J.

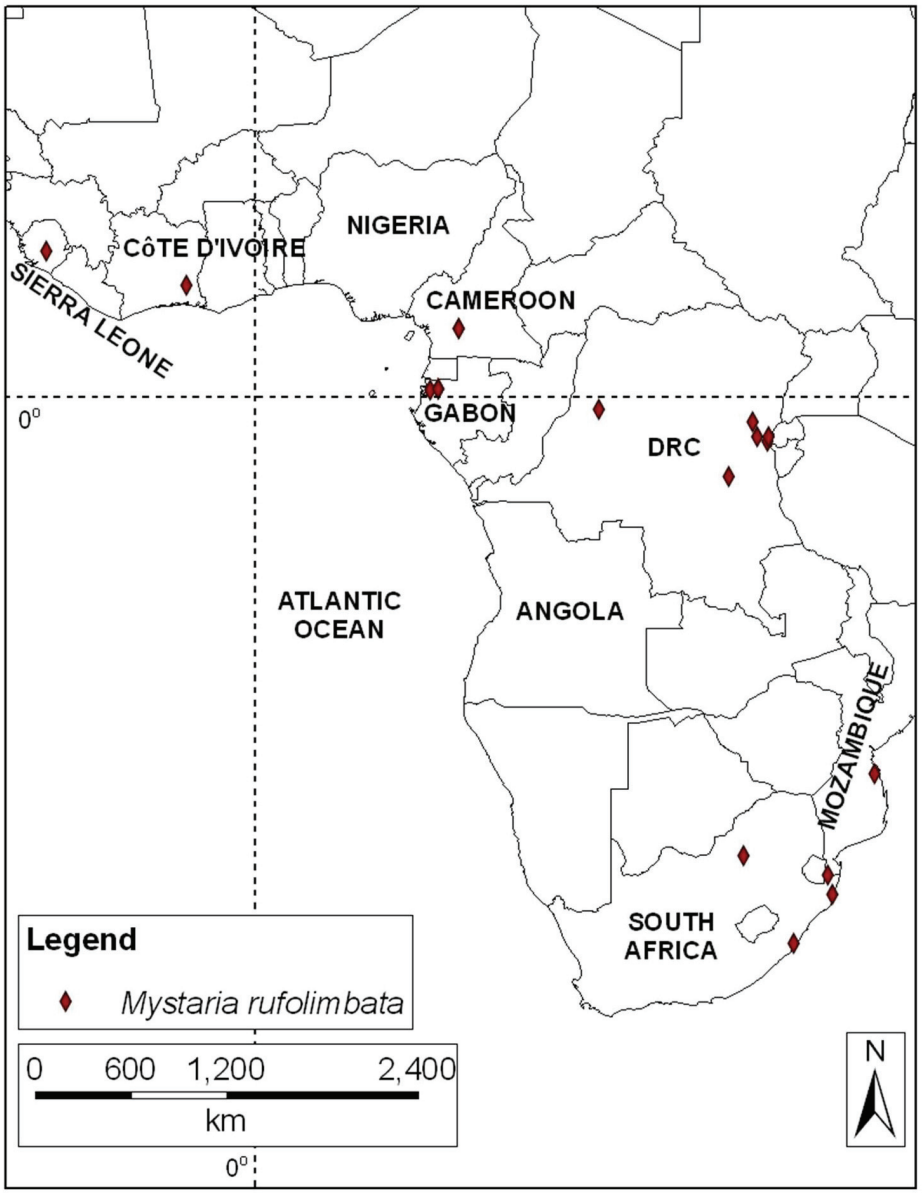



**Fig. 4.21** Recorded geographical distribution of *Mystaria rufolimbata* Simon, 1895.

de Winter (MRAC 174.331). DEMOCRATIC REPUBLIC OF CONGO (DRC): *Bandundu Region,* 1 juvenile, Kasonga, Maniema, 4°27'S 26°40'E, 24.viii.1959, P.L.G. Benoit (MRAC 114.963); *Equateur Region,* 1 ♀, Tshuapa, Etata, 00°40'S 19°22'E, 5.vi.1971, J. Hauwaert (MRAC 140.398); *Nord-Kivu Region,* 1 ♀, 39 km S of Walikale,1°24'S 28°03'E, 25.xii.1957, E.S. Ross & R.E. Leech (CAS); *Orientale Region,* 1 ♀, Costermansville, 02°29'S 28°51'E, iii.1934, H.J. Bredo (MRAC 21427); *Sud-Kivu Region*, 1 ♀, Ibanda, 2°13'S 28°55'E, 1952, M. Vandelannoite (MRAC 78438). GABON: 1 ♀, 10 km N of Kinguélé, 00°29'N 10°20'E, 6.iv.1986, A. Pauly (MRAC 173.085); 1 ♀, same locality, 6.iv.1986, A. Pauly (MRAC 173.084); 1 ♀, Kougouleu, 0°22'N 9°55'E, 12.iv.1985, A. Pauly (MRAC 168.767); 1 ♂, 1 ♀, between Atogafina and Kingaélé, 00°29'N 10°20'E, 23.iii.1986, A. Pauly (MRAC 172.896). MOZAMBIQUE: 1 ♀, Maputo, 16 km S of Villa Franca, Marnbone, 21°11'S 34°51'E, 29.vi.1971 - 3.vii.1971, F. Farquharson (NCA 2009/4612). SOUTH AFRICA: *KwaZulu-Natal Province,*1 ♀, Hellsgate, 28°07'S 32°18'E tsetse fly survey, 3.v.2004, J. Esterhuizen (NCA 2006/1332); 1 ♀, Oribi Gorge, 21 km W of Port Shepstone, 30°45'S 30°20'E, alt 200-350 m, 27.xi.1983, C.E. Griswold (NM); 1 ♂, Ndumo Game Reserve, 26°54'S 32°15'E, fever tree forest, 21.vi.2006, A.S. Honiball (NCA 2006/1331); *North West Province,* 1 ♂, Buffelspoort dam, 25°12'S 27°16'E, vii.1988, L. Prendini (NCA 91/579).

*Natural history.* Collected from vegetation, more specifically records from rainforests and fewer tree forests. Adults sampled from November to July and juveniles during August.

*Distribution.* Sierra Leone. New records: Cameroon, Cote d'Ivoire, Democratic Republic of Congo (DRC), Gabon, Mozambique, and South Africa (Fig. 4.21).

#### 4.4.2.10 *Mystaria savannensis* sp. n.

Figs 4.1, 4.2, 4.22 & 4.23

*Diagnosis.* Both sexes recognized by dark longitudinal stripes on legs (Fig. 4.22.6). Epigyne with atrium long-oval teardrop-shaped with intromittent orifices open antero-laterally (Fig. 4.22.1). Bulb large with VTA and RTA almost same size; RTA very broad at base, slender tip (Fig. 4.22.4).

*Description.*

*Female:* Size, measurements: (*n* = 9). TL: 3.76 (3.15–5.08); CL: 1.38 (1.20–1.65); CW: 1.33 (1.20–1.53); CI: 1.03 (0.93–1.11); CH: 0.93 (0.84–1.10); CLL: 0.26 (0.21–0.33); MOQ-L: 0.29 (0.27–0.33). *Colour:* carapace orange-red or dark brown with yellow or orange triangular patch on clypeus and sometimes with dark patches over LE; PME sometimes with blackish eye spots (Fig. 4.22.5); abdomen pale with dark patterns dorsally which varies as follows: sometimes with dorsal longitudinal band centrally, broader anteriorly than posteriorly, in central area extending laterally, or with dark areas on lateral sides; ventrally pale centrally; striae dark blue to black with white in between; legs I–IV with thin, longitudinal stripes dorsally over all leg segments excluding femora; femora may have infuscated bands dorso-ventrally. *Carapace:* smooth to slightly granular. *Chelicerae:* as in Fig. 4.1.3. *Sternum*: SL (mm): 0.56; SW (mm): 0.61; SI (mm): 0.92. *Eye*s: eye measurements (mm): AME–AME: 0.27; ALE–AME: 0.38; AME–AME/AME–ALE: 0.70; PME–PME: 0.45; PLE–PME: 0.35; PME–PME/PME-PLE: 1.29; ALE/AME: 1.43; PLE/PME: 0.77; MOQ-AW/MOQ-PW: 0.59; MOQ-L/MOQ-W: 0.49; Clyp/AME–AME: 0.98. *Legs*: covered with fine short setae on all segments, femora I-IV with two medium spines dorsally; tibiae with two short spiniform setae dorsally; tarsal claws as in Fig. 4.2.3; leg formula: I:II:IV:III; leg measurements (mm): leg I – Fe 0.89, Pat 0.36, Tib 0.75, Mt 0.62, Ta 0.43, total 3.05; II – Fe 0.93, Pat 0.36, Tib 0.69, Mt 0.62, Ta 0.42, total 3.03; III – Fe 0.68, Pat 0.30, Tib 0.47, Mt 0.42, Ta 0.31, total 2.19; IV – Fe 0.84, Pat 0.29, Tib 0.58, Mt 0.53, Ta 0.35, total 2.61. *Abdomen*: AL (mm): 2.38; AW (mm): 2.27; AI (mm): 1.05. *Epigyne*: teardrop-shaped long-oval with flap posteriorly (Fig. 4.22.1), intromittent orifices open antero-laterally; intromittent canals antero-laterally extended (Fig. 4.22.2).

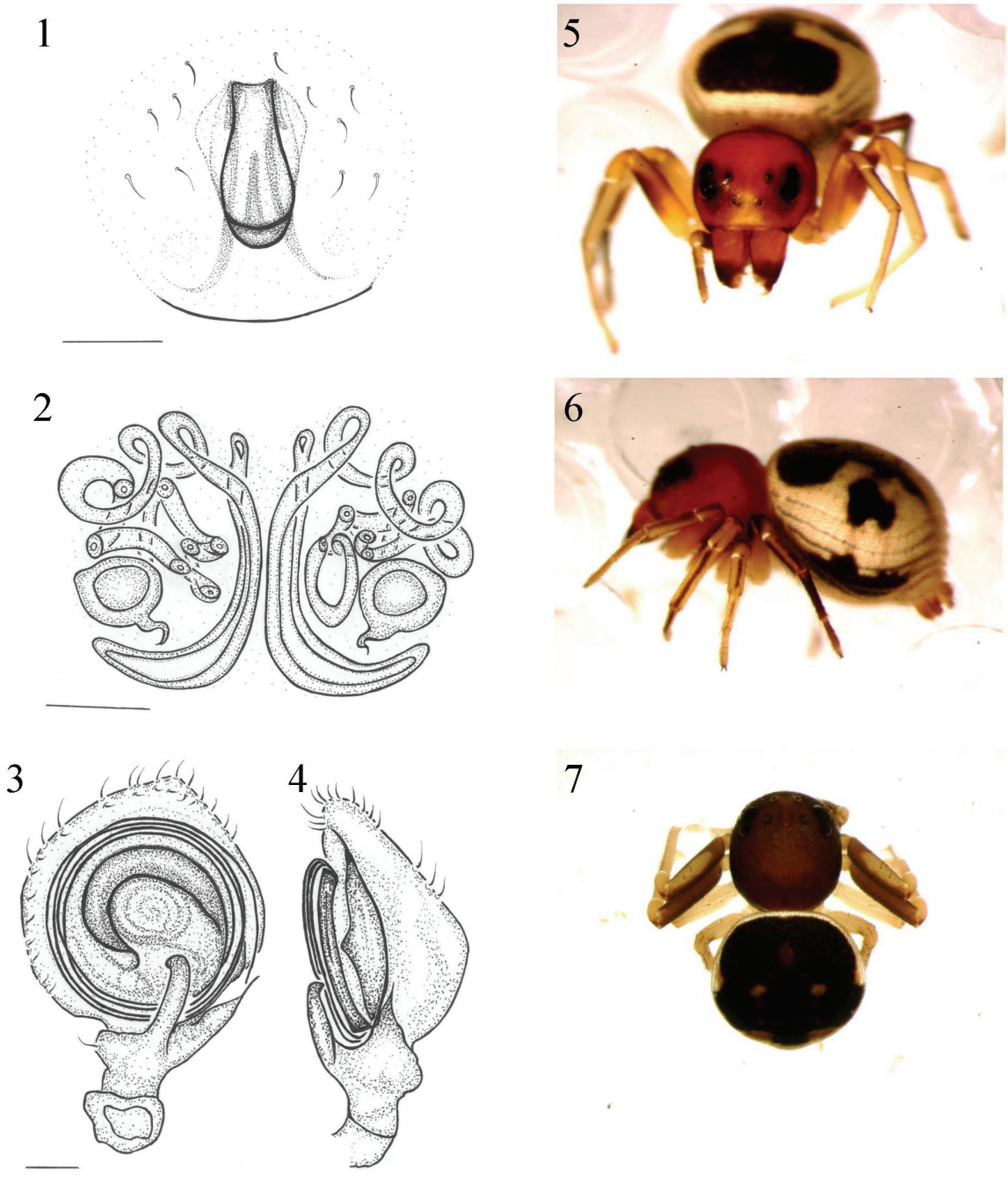



**Fig. 4.22** ***Mystaria savannensis*** sp. n. 1. Female epigyne ventral view. 2. Epigyne dorsal view. 3. Male right palp ventral view. 4. Right palp retro-lateral view. 5. Female from South Africa, Soutpansberg antero-dorsal view. 6. Female latero-dorsal view. 7. Male form Soutpansberg dorsal view.

*Male*: Size, measurements (mm): (*n* = 9). TL: 2.74 (2.50–3.27); CL: 1.17 (1.06–1.32); CW: 1.10 (0.98–1.34); CI: 1.07 (1.02–1.15); CH: 0.74 (0.66–0.85); CLL: 0.27 (0.24–0.31); MOQ-L: 0.27 (0.25–0.31). Resemble female but differ as follows: *Colour*: carapace dark or pale copper-brown; abdomen dorsally dark orange or black, with narrow whitish border anteriorly, sometimes with orange-brown pattern or a few spots posteriorly (Fig. 4.22.7); legs with dark dorsal longitudinal stripe, rest of legs reddish-brown or orange, yellow or pale-green with infuscated bands on femora I-II, tibiae, metatarsi and tarsi IV darker brown. *Sternum*: SL (mm): 0.46 SW (mm): 0.52 SI (mm): 0.90. *Eyes*: MOQ big, long wide; eye measurements (mm): AME–AME: 0.24; ALE–AME: 0.31; AME–AME/AME–ALE: 0.76; PME–PME: 0.37; PLE–PME: 0.29; PME–PME/PME–PLE: 1.29; ALE/AME: 1.33; PLE/PME: 0.78; MOQ-AW/MOQ-PW: 0.63; MOQ-L/MOQ-W: 0.43; Clyp/AME–AME: 1.16. *Legs*: patellae sometimes with medium spines; tibiae III-IV with medium spiniform setae dorsally and ventrally; leg formula: I:II:IV:III; leg measurements (mm): leg I – Fe 0.91, Pat 0.28, Tib 0.81, Mt 0.70, Ta 0.49, total 3.17; II – Fe 0.86, Pat 0.26, Tib 0.75, Mt 0.62, Ta 0.42, total 2.91; III – Fe 0.61, Pat 0.24, Tib 0.49, Mt 0.40, Ta 0.30, total 2.04; IV – Fe 0.68, Pat 0.23, Tib 0.53, Mt 0.49, Ta 0.33, total 2.27. *Abdomen*: AL (mm): 1.57; AW (mm): 1.47; AI (mm): 1.06. *Palp*: large with RTA broad and widened at base, extending, anteriorly with long, narrow tip (Fig. 4.22.3); VTA fairly long, almost equal in length to RTA (Fig. 4.22.4).

*Type material*. Holotype ♀, ZAMBIA: near Choma Wildlives Game Farm, 16°50'S 26°59'E, beating short shrubs, 4.xii.2006, C. Haddad & R. Lyle (NCA 2007/530). Paratypes: BOTSWANA: 1 ♀, Selkirk Mine, near Francistown, 21°10'S 32°00'E, 29.ii-iv.2008, D.H. Jacobs (NCA 2009/5033); 1 ♀, same locality, 28.iii-v.2008, D.H. Jacobs & M. Stiller (NCA 2009/5034); 1 ♀, 1 juvenile, same locality data (NCA 2009/5035). SOUTH AFRICA: 1 ♂, collected with holotype (NM); *Gauteng Province,* 1 ♀, Hartbeespoortdam, 25°43'S 27°50'E, 10.iii.1966, A. Capener (NCA 78/33); *KwaZulu-Natal Province,* 1 ♀, Ubombo, 27°33'S 32°05'E, 16km N, 4.iv.1958, E.S. Ross & R.E. Leech (CAS); 1♀, Mkuze Game Reserve, 27°39S 32°10E, alt 30 m, 13.vi.1985, C.E. Griswold (NM); 1 ♀, Ophathe Game

Reserve, river bed, 28°29'S 31°27'E, alt 455 m beating short shrubs, 2.x.2008, C. Haddad (NCA 2008/4179); 2 ♂, 1 ♀, 4 juveniles, same locality data (NCA 2008/4175); *Limpopo Province,* 1 ♂, Blouberg Nature Reserve, 23°06'S 28°59'E, beating *Sclerocarya birrea*, 25.iii.2006, P. Tshivhandekano (NCA 2009/4617); 2 ♂, same locality data, V. Gelebe (NCA 2009/4622); 1 ♀, same locality, sweeping *Spirostachys africana*, 26.iii.2006, S. Foord (NCA 2009/4618); 2 ♂, same locality data, beating *S. africana*, S. Foord (NCA 2009/4619); 1 ♀, same locality data, S. Foord (NCA 2009/4620); 1 ♂, same locality, sweeping *S. birrea*, 26.iii.2006, M. Muelelwa (NCA 2009/4621); 3 ♂, same locality, sweeping *S. africana*, 26.iii.2006, N. Hahn (NCA 2009/4624); 3 ♂, same locality data, S. Foord (NCA 2009/5024);1 ♂, same locality, beating *S. birrea*, 29.xi.2005, F. Mbedzi (NCA 2009/4623); 4 ♂, same locality, sweeping *Kirkia acuminate*, 24.iii.2006, S. Foord (NCA 2009/5025); 1 ♂, Klasserie, Bokmakierie Game Farm, 24°34'S 31°12'E, open grass lands, 8.iv.2001, R. Jocqué (MRAC 210095); 1 ♂, 1 ♀, Kruger National Park, Punda Maria Camp, 22°40'S 31°01'E, Shipudze on road to Dunyadgiba, 2.v.1962, R.F. Lawrence (NM 23346). 4 ♂, 4 ♀, 1 sub-adult ♂, Wallers Camp, near Pafuri, 22°25'S 31°02'E, alt 261 m, canopy fogging, 16.ii.2008, R. Jocqué and team (NCA 2009/5039 ); 2 ♂, Strydomtunnel, 22°23'S 30°00'E, tree beating, 22.ii.1978, E.A. Ueckermann (NCA 88/592); 3 ♀, Tshulu Research Reserve, 22°34'S 30°48'E, alt 38 m, canopy fogging, 18.ii.2008. R. Jocqué and team, (NCA 2009/5040); 2 ♂, 1 ♀, same locality data (NCA 2009/5041); 25 ♂ same locality data (NCA 2009/5042); 1 ♂, same locality data, R. Jocqué and team (NCA 2009/5043); 2 ♂, 2 juvenile ♀, same locality data, R. Jocqué and team (NCA 2009/5044); 1 ♀, same locality data, R. Jocqué and team (NCA 2009/5843); 6 ♀, 5 juvenile ♀, same locality data, R. Jocqué and team (NCA 2009/5844); 1 ♂, Western Soutpansberg, Farm Little Leigh, 23°05'S 29°00'E, alt 108 m, beating *Kirkia wilmsi*, 21.iii.2006, F. Maanda (NCA 2009/4625); 1 ♀, same locality beating *Pterocarpus rotundifolius*, 22.iii.2006, M. Muelelwa (NCA 2009/5026); 1 ♂, same locality data, beating *K. wilmsi*, F. Maanda (NCA 2009/5027); 1 ♀, same locality, beating gallery forest, 19.iii.2006, E. Stam (NCA 2009/5028); 1 ♀, same locality, beating *K. wilmsi*, 24.xi.2005, F. Mbedzi (NCA 2009/5029); 1 ♀, same

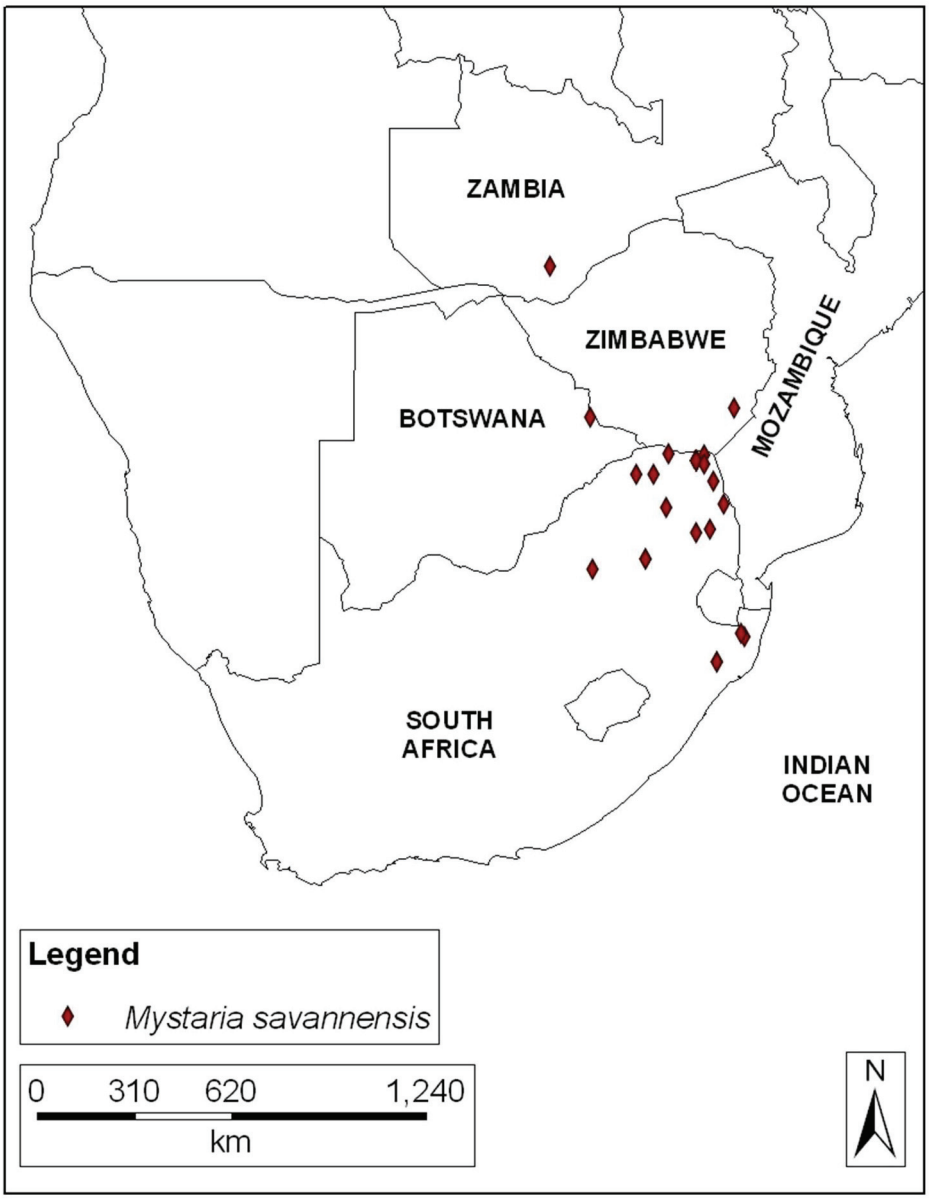



**Fig. 4.23** Recorded geographical distribution of *Mystaria savannensis* sp. n.

locality, beating *Burkea africana*, 23.ii.2005, S. Foord (NCA 2009/5030); 1 ♂, same locality, beating gallery forest, 22.xii.2005, E. Stam (NCA 2009/5031); 1 ♂, 1 ♀, Wolkberg, Haenertsburg, 23°57'S 29°56'E, sweeping shrubs, 15.vii.1993, A. Leroy (NCA 2004/522); *Mpumalanga Province,* 1 ♀, Loskopdam, Farm Ranch 2D, 25°26'S 29°20'E, bush beating, 27.ii.1994, A. Leroy (NCA 2009/5032); 1 ♀, same locality data (NCA 2004/524); 1 ♀, Kruger National Park, Letaba Camp, 23°51'S 31°35'E 19.ii.1962, R.F. Lawrence (NM); 1 juvenile ♀, Bourke's Luck, 24°50S' 30°46'E, sifting leaf litter, 29.iii.1991, M. Filmer (NCA 92/144). ZIMBABWE: 1♀, Malilangwe Estate, Hakamela Camp, 21°05'S 32°00'E, active search on the ground, 26.iii.2000, M. Cumming (NCA 2004/1424); 1 ♂, 1 ♀, same locality, SE low veld, sweeping dense grassland, 25.iii.2004, M. Cumming (NCA 2004/1423).

*Natural history.* Specimens have been collected by means of active searching on the ground, sweeping, beating and fogging of vegetation. Individuals have been observed (*pers. comm*.) to frequently rely on their own silk thread by hanging from it when disturbed from a branch or twig. Some individuals occur in mountainous areas, but seem to be common in the savanna biome in southern Africa. Individuals have been found on a variety of trees such as *Sclerocarya birrea*, *Spirostachys africana, Kirkia acuminate*, *K. wilmsi*, *Pterocarpus rotundifolius*. Adults were sampled from October until July, while juveniles were sampled from October until February.

*Distribution.* Botswana, Zambia, South Africa and Zimbabwe (Fig. 4.23).

*Etymology*. Named after the savanna biome where most specimens were sampled from.

#### 4.4.2.11 *Mystaria soleili* sp. n.

Figs 4.1, 4.3, 4.24 & 4.25.

*Diagnosis.* Both sexes recognized by the orange-yellow carapace decorated with a brown patch on cephalic and thoracic region (Figs 4.24.5-6). Female epigyne

with wide, curved hood, situated anteriorly (Fig. 4.24.1). Male palp with RTA short and slender, situated close to bulb, extending laterally (Fig. 4.24.3); VTA slender and small, slightly longer than RTA (Fig. 4.24.4).

*Description.*

*Female:* Size, measurements (mm): (*n* = 8). TL: 3.32 (3.13–3.48); CL: 1.32 (1.20–1.41); CW: 1.15 (1.13–1.20); CI: 1.15 (1.06–1.25); CH: 0.77 (0.71–0.80); CLL: 0.21 (0.19–0.24); MOQ-L: 0.27 (0.27–0.28). *Colour:* carapace orange-yellow with a brown patch medially; abdomen dorsally pale brown with darker longitudinal median band, a whitish border with two small dark spots dorso-posteriorly (Fig. 4.24.5); legs orange-yellow, patellae with dark brown patches. *Carapace:* with highest part in foveal region sloping laterally and anteriorly; texture granulate covered with small holes covered with fine, short setae with few long, erectile spiniform setae on posterior edge and laterally of LE. *Chelicerae:* cheliceral teeth as in Fig. 4.1.4. *Sternum*: longer than wide; SL (mm): 0.59; SW (mm): 0.52; SI (mm): 1.15. *Eyes*: eyes and eye tubercles largest of species, all eyes situated on silver-white tubercles; eye measurements (mm): AME–AME: 0.24; ALE–AME: 0.28; AME–AME/AME–ALE: 0.83; PME–PME: 0.33; PLE–PME: 0.29; PME–PME/PME–PLE: 1.15; ALE/AME: 1.20; PLE/PME: 0.87; MOQ-AW/MOQ-PW: 0.71; MOQ-L/MOQ-W: 0.39; Clyp/AME–AME: 0.90. *Legs*: leg I-II nearly twice the length of leg III-IV; femora, tibiae and patellae with few medium to short spiniform setae; metatarsi and tarsi with finer, shorter setae and with small spiniform setae on postero-ventral side; tarsal claws and claw tufts as in Fig. 4.3.2; leg formula: I:II:IV:III; leg measurements (mm): leg I – Fe 1.26, Pat 0.42, Tib 1.06, Mt 0.84, Ta 0.52, total 4.10; II – Fe 1.25, Pat 0.44, Tib 1.05, Mt 0.81, Ta 0.48, total 4.03; III – Fe 0.88, Pat 0.32, Tib 0.65, Mt 0.43, Ta 0.32, total 2.60; IV – Fe 0.92, Pat 0.31, Tib 0.70, Mt 0.50, Ta 0.32, total 2.74. *Abdomen:* wider posteriorly than anteriorly. AL (mm): 2.00; AW (mm): 1.59; AI (mm): 0.26. *Epigyne:* hood present; atrium wide with postero-laterally rounded rims (Fig. 4.24.1). Intromittent orifices visible as two small circular openings antero-laterally from hood; intromittent canals as in Fig. 4.24.2.

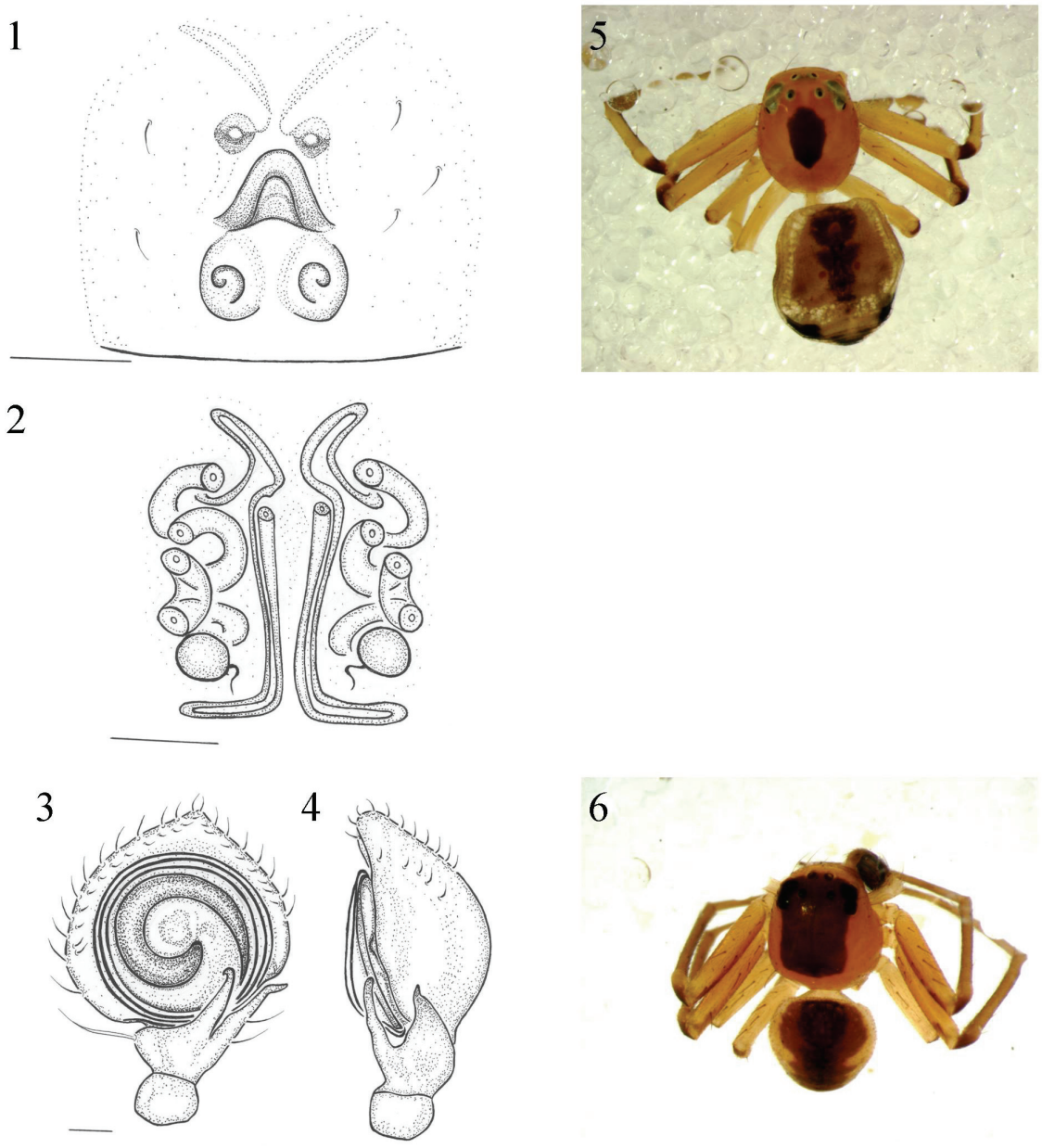



**Fig. 4.24** ***Mystaria soleili*** sp. n. 1. Female epigyne ventral view. 2. Epigyne dorsal view. 3. Male right palp ventral view. 4. Right palp retro-lateral view. 5. Female from Kenya, Kakamega dorsal view. 6. Male from Kakamega dorsal view.

*Male:* Size, measurements (mm): (*n* = 2). TL: 2.60 (2.46–2.70); CL: 1.18 (1.08–1.25); CW: 1.05 (1.00–1.08); CI: 1.12(1.08–1.15); CH: 0.78 (0.72–0.85); CLL: 0.21 (0.20–0.21); MOQ- L: 0.23 (0.23–0.24). Differ from female as follows: *Colour:* similar to female, carapace with large copper-brown patch centrally (Fig. 4.24.6); eye tubercles dark; abdomen dorsally orange-yellow with two spots postero-laterally and large longitudinal band starting anteriorly narrowing posteriorly; ventrally pale yellow. Legs orange-yellow with patellae I-IV partly brown, femora I-II distally brown, as well as tibiae, metatarsi and tarsi I-II. *Carapace:* elevated in thoracic area; texture smooth, with few long erectile setae present on postero-lateral thoracic edge. *Sternum:* SL (mm): 0.56; SW (mm): 0.47; SI (mm): 1.19. *Eyes:* eye tubercles not as large; eye measurements (mm): AME–AME: 0.21; ALE–AME: 0.26; AME–AME/AME–ALE: 0.82; PME–PME: 0.30; PLE–PME: 0.27; PME–PME/PME–PLE: 1.12; ALE/AME: 1.23; PLE/PME: 0.89; MOQ-AW/MOQ-PW: 0.70; MOQ-L/MOQ-W: 0.34; Clyp/AME–AME: 0.99. *Legs:* femora, patellae, tibiae and metatarsi I-IV with dense short setae and medium spiniform setae dorsally and laterally; tibiae III-IV with longer spiniform setae; tibia and metatarsi I-IV with shorter spiniform setae distally on ventral side; tarsal claws differ from other species, in 2$^{nd}$ comb strongly curved at tip (Fig. 4.3.2); leg formula: I:II:IV:III; leg measurements (mm): leg I – Fe 1.23, Pat 0.36, Tib 1.13, Mt 0.92, Ta 0.57, total 4.21; II – Fe 1.26, Pat 0.36, Tib 1.16, Mt 0.86, Ta 0.54, total 4.17; III – Fe 0.79, Pat 0.27, Tib 0.62, Mt 0.43, Ta 0.33, total 2.43; IV – Fe 0.80, Pat 0.24, Tib 0.62, Mt 0.49, Ta 0.32, total 2.47. *Abdomen:* long-oval, with oval scutum. AL (mm): 1.43; AW (mm): 1.05; AI (mm): 1.36. *Palp:* bulb large with a well-defined, dark tegulum, that differs from *M. stakesbyi* sp. n. in tegulum being less sclerotized and smaller; RTA extends laterally, situated close to bulb (Fig. 4.24.3); VTA slender, slightly longer than RTA (Fig. 4.24.4)

*Type material.* Holotype ♀, UGANDA: Budongo forest, 01°45'N 31°25'E, alt 1200 m, secondary forest canopy fogging of *Cynometra alexandri*,15-25.i.1997, T. Wagner (ZFMK AR1287). Paratypes: KENYA: 1 ♂, Kakamega forest, 0°22'N 34°50'E, alt. 1600 m, middle-aged secondary forest canopy fogging of *Teclea nobilis*

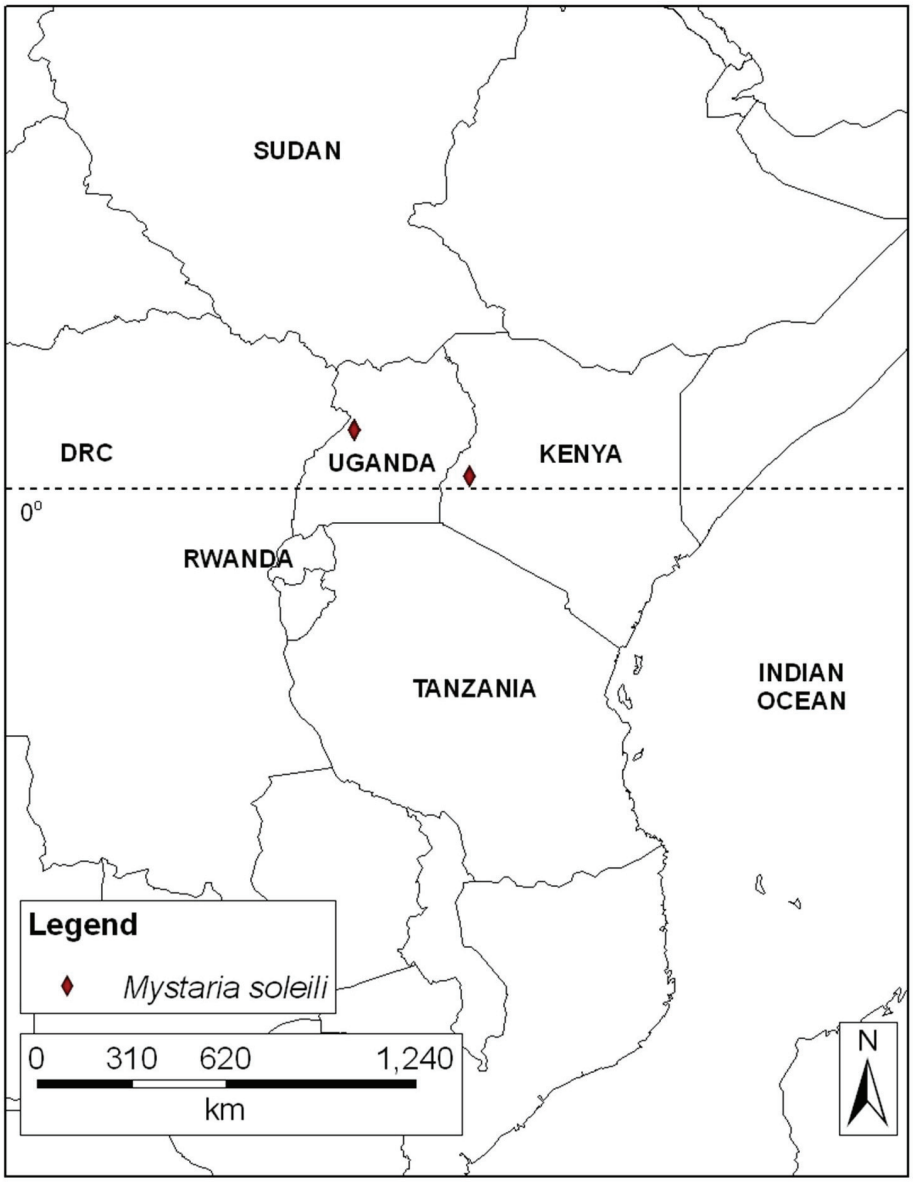



**Fig. 4.25** Recorded geographical distribution of *Mystaia soleili* sp. n.

– 12 m canopy height, i-ii.2003, W. Freund (ZFMK AR 147); 1 ♂, same locality data (ZFMK AR 098); 1 ♂, same locality, old secondary-aged forest canopy fogging *T. nobilis* – 10 m canopy height, ix-x.2001, W. Freund (ZFMK AR 1273); 1 ♀, same locality, middle aged secondary forest canopy fogging *T. nobilis*, i-ii.2002, W. Freund (ZFMK AR 1274). UGANDA: 2 ♂, Budongo forest, 01°45'N 31°25'E, alt. 1200 m, secondry forest canopy fogging of *Rinorea beniensis* – 14.5 m canopy height, 15-25.i.1997, T. Wagner (ZFMK AR 1275); 3 ♀, same locality data (ZFMK AR 1279);1 ♀, same locality data (ZFMK AR 1286); 2 ♂, same locality data (ZFMK AR 1289); 1♀, same locality data (ZFMK AR 1282); 1 ♂, same locality, 5-15.i.1997, T. Wagner (ZFMK AR1277); 1 ♂, same locality data (ZFMK AR 1278); 2 ♀, same locality, secondary forest canopy fogging *C. alexandri*, 15-25.i.1997, T. Wagner (ZFMK AR 1288); 1 ♂, 1 ♀, same locality data (ZFMK AR 1290); 1 ♀, same locality, 35 m canopy height, 19-30.vi.1995, T. Wagner (ZFMK AR 1283); 1 ♀, same locality data, 1-10.vii.1995, T. Wagner (ZFMK AR 1284); 1 ♀, same locality data (ZFMK AR1285); 1 ♂, 1 ♀, same locality data (ZFMK AR 1293); 1 ♂, same locality, primary forest canopy fogging *C. alexandri* – 35 m canopy height, 1-10.vii.1995, T. Wagner (ZFMK AR 1280); 4 ♂, 2 ♀, same locality, secondary forest canopy fogging *C. alexandri*, 15-25.i.1997, T. Wagner (ZFMK AR 1291); 3 ♂, 1 ♀, same locality data,T. Wagner (ZFMK AR 1292); 1 ♂, 1 ♀, same locality data, T. Wagner (ZFMK AR1294); 2 ♀, same locality, swamp forest canopy fogging *R. beniensis*, 21-31.vii.1995, T. Wagner (ZFMK AR 1295); 1 ♂, same locality, swamp forest canopy fogging, 11-20.vii.1995, T. Wagner (ZFMK AR1276); 1 ♀, same locality, swamp forest canopy fogging *T. nobilis* -16 m canopy height, 1-10.vii.1995, T. Wagner (ZFMK AR 1281).

*Natural history.* Specimens have exclusively been collected from secondary- and middle-aged primary rainforests and swamp forests by means of canopy fogging of the tree species, *Teclea nobilis, Rinorea beniensis* and *Cynometra alexandri.* Adults were sampled from January until October.

*Distribution.* Uganda and Kenya (Fig. 4.25).

*Etymology*. '*Soleil'* is French for the sun, as this species is characteristically yellow.

#### 4.4.2.12 *Mystaria stakesbyi* sp. n.

Figs. 4.26 & 4.27

*Diagnosis*. Both sexes recognized by the copper-brown or red-orange carapace; in females carapace usually decorated with darker brown patch (Fig. 4.26.5); abdomen brownish to pale. Epigyne with narrow hood anteriorly and intromittent orifices two circular openings, antero-laterally (Fig. 4.26.1), resembles *M. soleili* sp. n. but differs in smaller rim and atrium. Male palp with cymbial apophysis; RTA broad base, tip curving laterally, close to bulb (Fig. 4.26.3), VTA slightly shorter than RTA (Fig. 4.26.4).

*Description:*

*Female:* Size, measurements (mm): (*n* = 6). TL: 3.15 (2.72–4.07); CL: 1.22 (1.06–1.39); CW: 1.10 (0.99–1.30); CI: 1.11(1.06–1.20); CH: 0.74 (0.63–0.88); CLL: 0.21 (0.16–0.25); MOQ-L: 0.25 (0.21–0.28). *Colour:* varies from dark copper-red, orange to brown dorsally; usually with dark brown patch in eye area or clypeus, with central band extending to thoracic edge or postero-lateral area; laterally with paler orange-brown to yellow areas; abdomen dorsally paler than carapace; sometimes with pale, purple-grey or dark brown triangular patterns arranged in three rows across width of abdomen; abdomen with faint white border; ventrally pale in centre, striae dark brown; all legs yellow-orange, with brown bands usually partially present over width of femora I-IV. *Carapace*: with fine granules or small holes with few long, erectile setae on postero- or postero-lateral edge and laterally of LE. *Sternum*: slightly longer than wide; SL (mm): 0.54; SW (mm): 0.50; SI (mm): 1.09. *Eyes*: eye measurements (mm): AME–AME: 0.23; ALE–AME: 0.33; AME–AME/AME–ALE: 0.69; PME–PME: 0.36; PLE–PME: 0.32; PME–PME/PME–PLE: 1.13; ALE/AME: 1.46; PLE/PME: 0.89; MOQ–AW/MOQ-PW: 0.63; MOQ-L/MOQ-W: 0.39; Clyp/AME–AME: 0.92. *Legs*: long and slender with few medium spiniform setae dorsally and

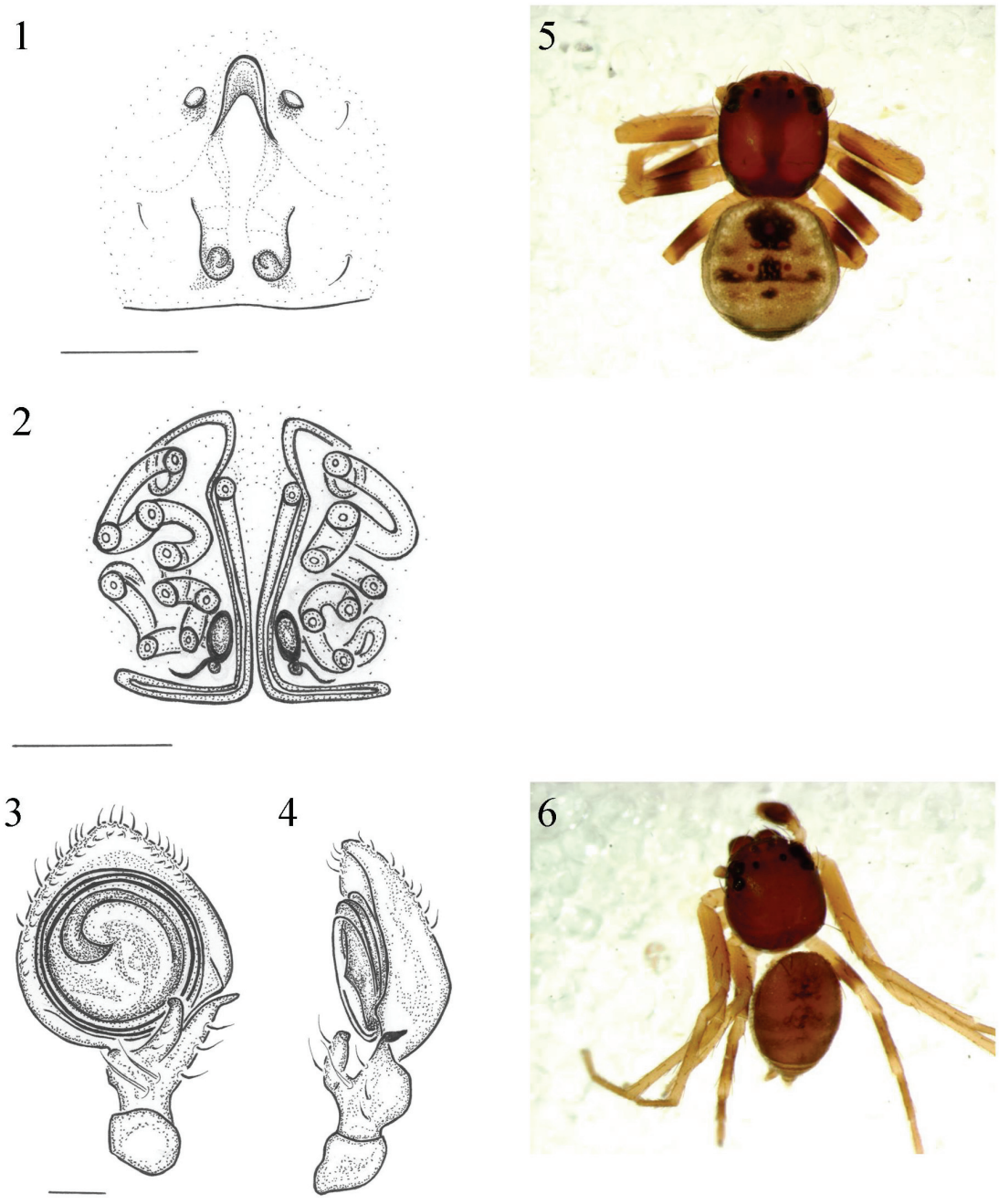



**Fig. 4.26.** ***Mystaria stakesbyi*** sp n. 1. Female epigyne ventral view.. 2. Epigyne dorsal view. 3. Male right palp ventral view. 4. Right palp retro-lateral view. 5. Female from Ghana, Legon dorsal view 6. Male from Democratic Republic of Congo, Semliki dorsal view.

laterally on femora, patellae and tibiae I-IV; tibiae with long and short spiniform setae; metatarsi and tarsi III-IV with numerous fine setae and small spiniform setae, also present on leg I-IV, ventrally on tibiae and latero-dorsally on metatarsi; leg formula: II:I:IV:III; leg measurements (mm): leg I – Fe 0.91, Pat 0.32, Tib 0.74, Mt 0.58, Ta 0.44, total 2.99; II – Fe 1.00, Pat 0.35, Tib 0.73, Mt 0.60, Ta 0.44, total 3.12; III – Fe 0.64, Pat 0.28, Tib 0.46, Mt 0.36, Ta 0.30, total 2.05; IV – Fe 0.74, Pat 0.29, Tib 0.57, Mt 0.41, Ta 0.29, total 2.30. *Abdomen:* round. AL (mm): 1.93; AW (mm): 1.73; AI (mm): 1.12. *Epigyne:* with well-defined narrow hood centrally (Fig. 4.26.1) with small circular intromittent orifices situated laterad of hood; narrow atrium below. Intromittent canals as in Fig. 4.26.2.

*Male*: Size, measurements (mm): (*n* = 3). TL: 2.50 (2.34–2.76); CL: 1.12 (1.03–1.20); CW: 0.98 (0.90–1.40); CI: 1.15 (1.14–1.15); CH: 0.66 (0.54–0.72); CLL: 0.19 (0.18–0.22); MOQ-L: 0.23 (0.23–0.24). Similar to female but differs as follows: body smaller and more slender. *Colour*: carapace uniform dark copper-red; abdomen paler brown; femora I-IV, tibiae IV and metatarsi IV with partially copper or brown tint. *Carapace*: with fewer long setae. *Sternum*: SL (mm): 0.49 SW (mm): 0.48 SI (mm): 1.02. *Eyes*: ALE large; PME equally close to PLE than to each other; eye measurements (mm): AME–AME: 0.20; ALE–AME: 0.28; AME–AME/AME–ALE: 0.70; PME–PME: 0.31; PLE–PME: 0.30; PME–PME/PME–PLE: 1.01; ALE/AME: 1.43; PLE/PME: 0.99; MOQ-AW/MOQ-PW: 0.64; MOQ-L/MOQ-W: 0.37; Clyp/AME–AME: 0.99. *Legs*: longer spiniform setae, with short fine dense setae scattered in between, leg I-IV with spiniform setae dorso-laterally on femora, patellae, tibiae, metatarsi and tarsi as well as ventrally on metatarsi and tarsi; leg formula: I:II:IV:III; leg measurements (mm): leg I – Fe 1.90, Pat 0.30, Tib 0.92, Mt 0.76, Ta 0.41, total 3.28; II – Fe 0.99, Pat 0.37, Tib 0.77, Mt 0.50, Ta 0.33, total 2.97; III – Fe 0.62, Pat 0.23, Tib 0.54, Mt 0.42, Ta 0.30, total 2.12; IV – Fe 0.70, Pat 0.21, Tib 0.57, Mt 0.44, Ta 0.31, total 2.22. *Abdomen*: longer than wide; scutum narrow oval; AL (mm): 1.38; AW (mm): 0.95; AI (mm): 1.45. *Palp*: cymbial apophysis present; RTA close to bulb, tip extend laterally (Fig. 4.26.3), RTA slightly longer than VTA (Fig. 4.26.4); bulb

differ from *M. soleili* sp. n. in that the tegulum of *M. stakesbyi* is not as dark, sclerotized and wide.

*Type material*. Holotype ♀, GHANA: Legon, 5°39'N 0°11W, 10.xii.1969, P.A. Room (MRAC 135.996). Paratypes: DEMOCRATIC REPUBLIC OF CONGO (DRC): *Kasai-Occidental Province* 1 ♀, Luebo 5°20'S 21°25'E, 1992, D.H Schouteden (MNHG); *Nord-Kivu Region,* 1 ♂, Kivu, Semliki, Valley of Djuma, 00°43'N 29°45'E, leaf litter sifting, 15.vii.1968, R.P.M. Lejeune (MRAC 135.812); 1 ♀, Rutshruru, 1°10'S 29°27'E, iv.1937, J. Ghesquierie (MRAC 20812/20816). GABON: 1 ♂, Kinguele, 00°29'N 10°20'E, 10 km N of Kinguélé, 6.iv.1986, A. Pauly (MRAC 173.087). KENYA: 1 ♀, Kakamega forest, 0°22'N 34°50'E, alt. 1600 m, secondary forest canopy fogging of *Heinsia diervilleoides*, 17.i.2003, W. Freund (ZFMK AR 137); 1 ♀, same locality, canopy fogging *Teclea nobilis*, 7-11.ii.1999, T. Wagner (ZFMK AR 1297). LIBERIA: 1 ♀, Banga, 26.x.1926, R.P. Strong & G.M. Allen (MCZ). RWANDA: 1 ♀, Ibanda Makera, Rusumo, 02°09'S 30°55'E, alt. 1450 m, gallery forest canopy fogging of *T. nobilis*, x.1993, T. Wagner (ZFMK AR 1303). TANZANIA: 1 ♀, Kibongoto, 3°10'S 37°06'E (MNHG). UGANDA: 1 ♂, Budongo forest, 01°45'N 31°25E, alt. 1200 m, secondary canopy fogging of *Cynometra alexandri*, 15-25.i.1997, T. Wagner (ZFMK AR 1298); 1 ♀, same locality data (ZFMK AR 1302); 1 ♂, same locality, 21-31.vii.1995, T. Wagner (ZFMK AR 1300); 1 ♂, same locality, primary forest canopy fogging of *Rinorea beniensis*, 19-30.vi.1995, T. Wagner (ZFMK AR 1301); 1 ♂, same locality, swamp forest canopy fogging of *T. nobilis*, 1-10.vii.1995, T. Wagner (ZFMK AR 1299).

*Natural history.* Collected from the canopy of *Heinsia diervilleoides*, *Teclea nobilis*, *Cynometra alexandri* and *Rinorea beniensis* in swamp, primary-, secondary- and gallery rainforests as well as from leaf litter. Adults sampled from October to July.

*Distribution*. Democratic Republic of Congo (DRC), Liberia, Gabon, Ghana, Kenya, Rwanda, Tanzania and Uganda (Fig. 4.27).

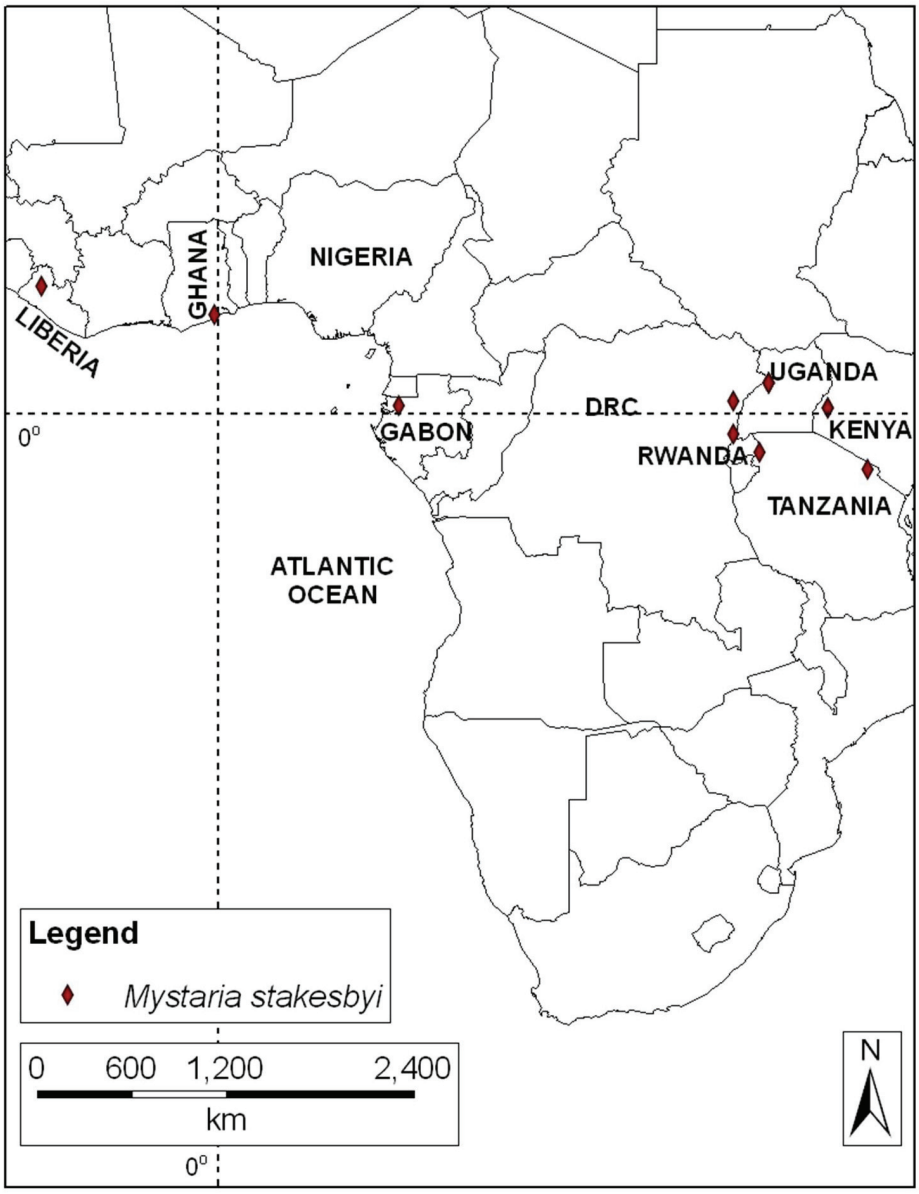



**Fig. 4.27** Recorded geographical distribution of *Mystaria stakesbyi* sp. n.

*Etymology.* Named after my husband Eduard Stakesby Lewis.

#### 4.4.2.13 ***Mystaria variabilis*** (Lessert, 1919) comb. nov.

Figs 4.28 & 4.29

*Paramystaria variabilis* De Lessert, 1919:103, fig. 2, 3, 4; Pl.2 fig. 14, 21, 27; De Lessert, 1925: 323; De Lessert, 1936: 253; De Lessert 1943: 313.

*Diagnosis.* Females can be recognized by the distinct colour and pattern on the body (Figs 4.28.5-6). Eyes of both sexes fairly large and closely spaced. Epigyne with atrium horseshoe-shaped; intromittent orifices open antero-laterally (Fig. 4.28.1); intromittent canals complex (Fig. 4.28.2). Bulb round with VTA broad at base, slightly indented at tip; RTA thickened at base, extending antero-laterally (Fig. 4.28.3). VTA slightly longer than RTA (Fig. 4.28.4).

*Re-description*

*Female:* Size, measurements (mm): (*n* = 6). TL: 3.14 (3.06–3.45); CL: 1.22 (1.18–1.34); CW: 1.11 (1.12–1.22); CI: 1.10 (1.04–1.18); CH: 0.75 (0.63–0.82); CLL: 0.24 (0.18–0.27); MOQ-L: 0.25 (0.23–0.28). *Colour*: carapace with dark copper area over thoracic and cephalic region to eye area, paler postero-laterally; eyes on black tubercles; clypeus with a yellow patch (Figs 4.28.5-6); in some specimens carapace uniform orange and postero-thoracic edge tinted; sternum brown and chelicerae uniform copper. Abdominal pattern variable, dorsally pale with grey longitudinal band with slightly zig-zag edge or band wider anteriorly and centrally; ventrally pale white centrally with pale blue to darker grey striae; legs usually uniform pale yellow-orange, sometimes femora I-II with infuscated brown bands; femora III-IV brown distally (Fig. 4.28.5). *Carapace*: broad. *Sternum:* SL (mm): 0.50; SW (mm): 0.52; SI (mm): 0.97. *Eye*s: eye measurements (mm): AME–AME: 0.22; ALE–AME: 0.30; AME–AME/AME–ALE: 0.75; PME–PME: 0.37; PLE–PME: 0.30; PME–PME/PME–PLE: 1.24; ALE/AME: 1.34; PLE/PME: 0.81; MOQ-AW/MOQ-PW: 0.61; MOQ-

L/MOQ-W: 0.41; Clyp/AME–AME: 1.06. *Legs*: numerous fine setae on all legs, dark erect setae present dorsally, ventrally and laterally on all leg segments; five spiniform setae on tibiae and femora; spiniform setae on tibiae longer than femora; leg formula: II:I:IV:III; leg measurements (mm): leg I – Fe 0.81, Pat 0.29, Tib 0.64, Mt 0.54, Ta 0.43, total 2.71; II – Fe 0.79, Pat 0.31, Tib 0.66, Mt 0.55, Ta 0.42, total 2.72; III – Fe 0.63, Pat 0.28, Tib 0.45, Mt 0.37, Ta 0.29, total 2.01; IV – Fe 0.73, Pat 0.27, Tib 0.56, Mt 0.47, Ta 0.34, total 2.37. *Abdomen:* round to slightly wider posteriorly. AL (mm): 1.92; AW (mm): 1.75; AI (mm): 1.11. *Epigyne*: atrium well-defined horseshoe-shaped (Fig. 4.28.1); intromittent orifices open antero-laterally; intromittent canals long and complex with large coils anteriorly on both sides (Fig. 4.28.2).

*Male*: Size, measurements (mm): (*n = 3*). TL: 2.49 (2.34–2.59); CL: 1.08 (1.08–1.09); CW: 0.96 (0.90–1.01); CI: 1.13 (1.08–1.20); CH: 0.66 (0.66–0.66); CLL: 0.22 (0.21–0.24); MOQ-L: 0.23 (0.20–0.26). Differ from female as follows: *Colour*: Body orange or copper-red, abdomen dorsally dusted with blackish-brown pattern, usually with pale border anteriorly (Fig. 4.28.7); ventrally pale blue, sometimes slightly metallic blue, with darker blue striae; clypeus with lighter yellow or orange area; legs usually uniform pale, with shades of brown or orange-yellow; sometimes femora I-II and tibiae and/or metatarsi IV slightly darker. *Carapace*: smooth. *Sternum:* SL (mm): 0.44; SW (mm): 0.45; SI (mm): 0.98. *Eyes*: large, especially LE, eye measurements (mm): AME–AME: 0.19; ALE–AME: 0.28; AME–AME/AME–ALE: 0.67; PME–PME: 0.33; PLE–PME: 0.27; PME–PME/PME–PLE: 1.21; ALE/AME: 1.49; PLE/PME: 0.83; MOQ-AW/MOQ-PW: 0.56; MOQ-L/MOQ-W: 0.42; Clyp/AME–AME: 1.18. *Legs*: all leg segments with very fine medium length setae; femora and tibiae I-IV with few medium length, spiniform setae; leg formula: I:II:IV:III; leg measurements (mm): leg I – Fe 0.91, Pat 0.26, Tib 0.78, Mt 0.61, Ta 0.31, total 2.87; II – Fe 0.61, Pat 0.19, Tib 0.53, Mt 0.41, Ta 0.29, total 2.03; III – Fe 0.65, Pat 0.26, Tib 0.49, Mt 0.22, Ta 0.20, total 1.82; IV – Fe 0.69, Pat 0.23, Tib 0.57, Mt 0.30, Ta 0.22, total 2.02. *Abdomen*: AL (mm): 1.41; AW (mm): 1.20; AI (mm): 1.17. *Palp*: RTA directed antero-laterally (Fig. 4.28.3); RTA slightly shorter than VTA (Fig. 4.28.4).

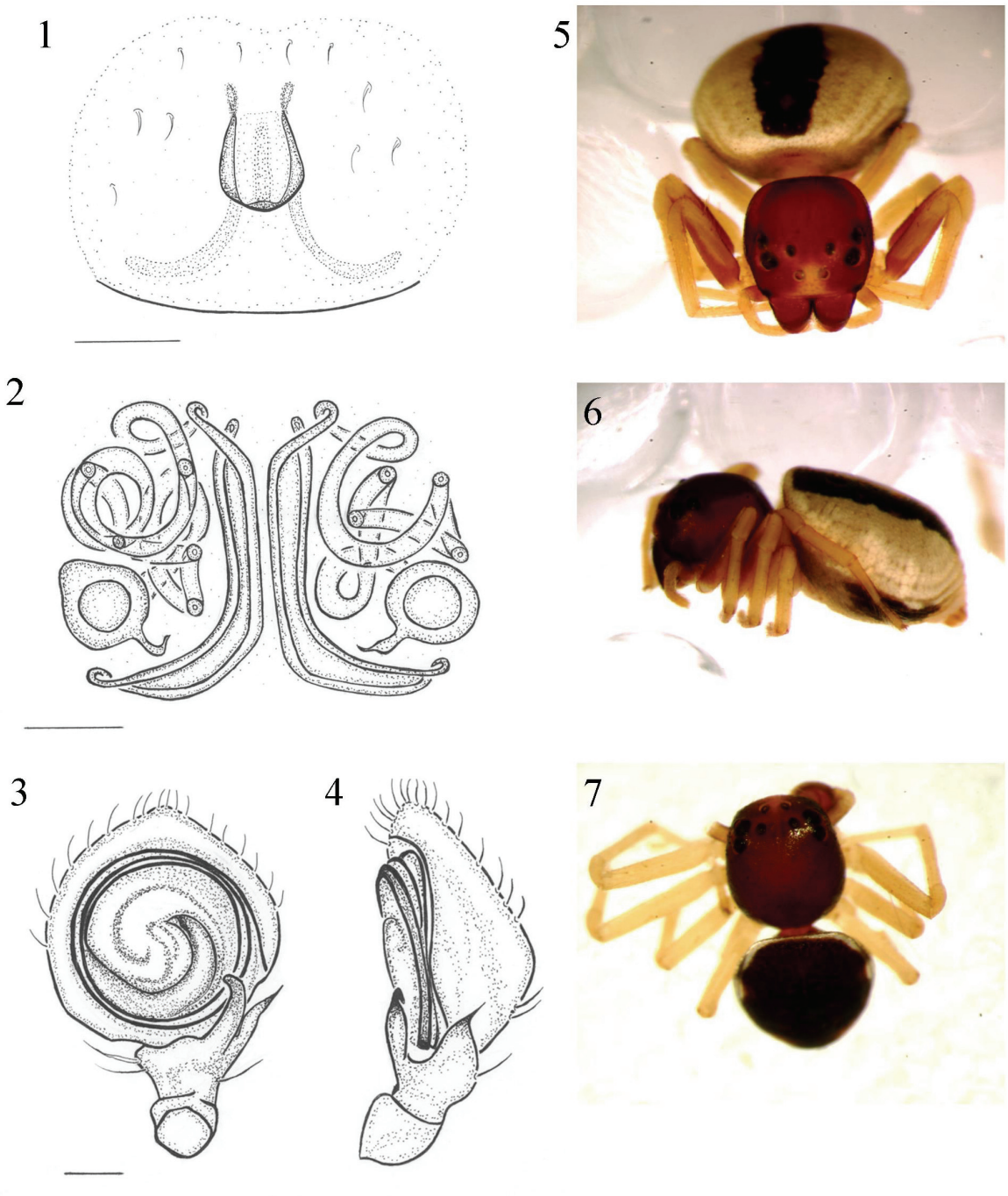



**Fig. 4.28** ***Mystaria variabilis*** (Lessert 1919) comb. nov. 1. Female epigyne ventral view. 2. Epigyne dorsal view. 3. Male right palp ventral view. 4. Right palp retro-lateral view. 5. Female from Democratic Republic of Congo, Kisantu anterior view. 6. Female lateral view. 7. Male from Democratic Republic of Congo, Butembo dorsal view.

*Type material examined.* Holotype ♂, TANZANIA: Kibongoto, 3°10'S 37°05'E (MNHG).

*Other material examined.* TANZANIA: 2 ♀, same locality as holotype (MNHG). DEMOCRATIC REPULIC OF CONGO (DRC): *Bass-Congo Region*, 2 ♂, 6 ♀, Kisantu, 5°06'S 15°05'E, 1919, R.P. Vanderyst (MNHG); *Equateur Region,* 1 ♀, Bokuma, 0°39'S 21°01'E, ii.1925. R.P. Lootens (MRAC 81635); 1 ♀, Bokungu, Boende 0°13'S 20°52'E, 1950, Dupuis (MRAC 67392); 1 ♀, Bamba, 06°49'S 17°18'E, i.1940, H. De Saeger (MRAC 20088); *Katanga Region,* 2 ♀, Kalemie (Albertville) 5°56'S 29°12'E, 18.xi.1925, D.H. Schouteden (MNHG); *Nord-Kivu Region,* 1 ♀, Rwankwi, 01°20'S 29°22E, vii.1951, J. Leroy (MRAC 71571); 4 ♂, 4 ♀, 2 juveniles, Butembo, valley of Musosa, 0°09'N 29°17'E, v.1967, R.P.M. Lejeune (MRAC 132.856); 5 ♂, 2 ♀, 2 juveniles, Butembo neighbourhood, 0°09'N 29°17'E, ix-x.1965, M.J. Celis (MRAC 130.120); 1 ♀, Rutshuru, 0°36'S 29°27'E, iii.1937, J. Gherquien (MRAC 21091); 1 ♀, same locality data (MRAC 21096); 1 ♀, same locality data (MRAC 21103); 1 ♀, same locality data (MRAC 21108); *Orientale Region*, 2 ♀, Watsa Niangara, 3°01N 29°31'E, L. Burgeon (MNHG); 2 ♂, 2 ♀, Kisangani (Stanleyville), 0°31'N 25°11E, 28.iv.1928. A. Collart (MRAC 11512/11516); 2 ♀, Saki, 2°31'N 27°25'E, iii.1936. L. Lippens (MRAC 20950/20951). ETHIOPIA: 1 ♂, Awash river, 80°25'N 39°25'E, sweeping, xi.1966 (AMNH). KENYA: 1 ♀, Baringo Lake, Rift valley, 0°28'N 35°57'E, found on dead grass, 20.xii.1979, P. Reavell (NM 13347); 1 ♂, Lodwar, 3°07'N 35°35'E, 60 km W of Lake Rudolf, 16-26.viii.1963, B. Patterson (MCZ). MALAWI: 1 ♂, Chintheche, 11°49'S 34°10'E, 1.xii.1977, R. Jocqué (MRAC 153.378). MOZAMBIQUE: 1 ♀, Sangadze, 17°26'S 34°51'E, v. (MNHG). RWANDA: 1 ♀, no exact locality data, (SMF); 1 ♀, Kigali, 1°56'S 30°04'E, 28-31.i.1976, J. Decelle (MRAC 147.909); 1 ♂, Bugesera-Kibungo, 02°09'S 30°32'E, 22.vii.1975, P. Nyalugaka (MRAC 155.506). SOUTH AFRICA: *Eastern Cape Province,* 1 ♀, Port Alfred, 33°36'S 26°54'E, sweeping, 30.xi.1977, A.S. Dippenaar-Schoeman (NCA 88/485). UGANDA: 2 ♀, Rakai, 0°43S' 31°24'E, sweeping, vii.1994, D. Penney (MRAC 210209); 1 ♀, Busaga district, on banks of

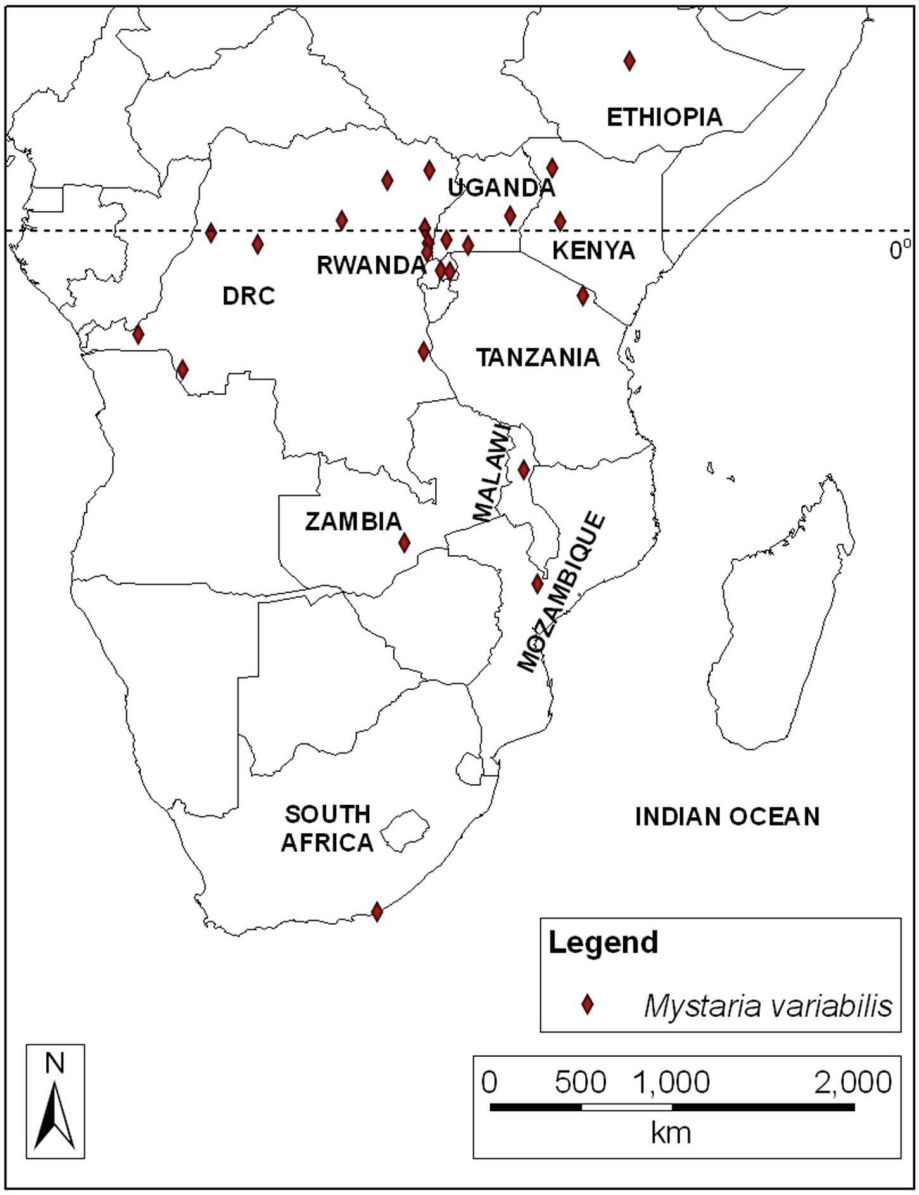



**Fig. 4.29** Recorded geographical distribution of *Mystaria variabilis* (Lessert, 1919) comb. nov.

marsh river Tabu, 00°45'N 33°30'E, ii.1967, J. Ruabunesa (MRAC 131.565); 1 ♀, Busaga district, on bank of river Lutebe, 00°27'S 30°22'E, ii.1967, J. Ruabunesa (MRAC 131.552).

*Natural History.* Specimens were sampled from vegetation. Adults were sampled throughout the year, and juveniles were sampled from May until October.

*Distribution.* Tanzania, Mozambique, South Africa. New records: Democratic Republic of Congo (DRC), Ethiopia, Kenya, Malawi, Rwanda, and Uganda (Fig. 4.29).

#### 4.4.2.14 Species *incertae sedis*

***Paramystaria decorata*** Lessert ,1919

*Paramystaria decorata* De Lessert 1919: 106 Pl. 2 fig. 25, 33

*Note:* The female holotype of this species is described from Kibongoto, Tanzania but the specimen could not be located. The species cannot be positively identified without the holotype. According to Lessert (1919), this species resembles *Mystaria rufolimbata* in the colour of the legs but differs from it in size and stronger abdominal spots.

***Paramystaria variabilis delesserti*** Caporiacco, 1949

*Paramystaria variabilis delesserti* Caporiacco 1949: 454

*Note:* Two female specimens from Nairobi (1944) were listed to belong to this subspecies, but the material could not be traced. This species could not be positively identified from the original description of Caporiacco (1949). They are probably a

variety of a form described by Lessert (1919) having a black abdomen and marginal white spots.

**References**


CAPORIACCO, L. DI. 1949. Aracnidi della Colonia del Kenya raccolti da Toschi e Meneghetti negli anni 1944–1946. *Commentationes Pontificiae Academiae Scientiarum* **13**: 309–492.

JÉZÉQUEL, J.F. 1964. Araignées de la savane de Singrobo (Côte d'Ivoire). III.- Thomisidae. *Bulletin de l Institut français de Afrique Noire* **26**: 1103–1143.

LAWRENCE, R. F. 1927. Contributions to a knowledge of the fauna of South-West Africa V. Arachnida. *Annals of the South African Museum* **25**: 1–75.

LAWRENCE, R. F. 1952. A collection of cavernicolous and termitophilous Arachnida from the Belgian Congo. *Revue de zoologie et de botanique africaines* **46**: 1–17.

LESSERT, R. DE. 1919. Araignées du Kilimandjaro et du Merou (suite). III. Thomisidae. *Revue suisse de zoologie* **27**: 99–234.

LESSERT R. DE. 1925. Araignées du sud de l'Afrique (suite). *Revue suisse de zoologie* **32**: 323–365.

LESSERT, R. DE. 1936. Araignées de l'Afrique orientale portugaise recueillies par MM. P. Lesne et H.-B. Cott. *Revue suisse de zoologie* **43**: 207–306.

LESSERT, R. DE. 1943. Araignées du Congo Belg (III). *Revue suisse de zoologie* **50**: 305–338.

MILLOT, J. 1942. Les araignées de l'Afrique Occidentale Français: Thomisidae. *Mémoires de l'Académie des sciences de l'Institut de France* **65**: 1–82.

ONO, H. 1988. *A revisional study of the spider family Thomisidae (Arachnida, Araneae) of Japan.* National Science Museum, Tokyo, 1–252 pp.

PLATNICK, N.I. 2009. The world spider catalog, Version 9.5. American Museum of Natural History, online at http://research.amnh.org/entomology/spiders/catalog/index.html

SIMON, E. 1895. Histoire naturelle des Araignées. 1. Paris 1895: 761–1084.

## Chapter 5

# A new crab spider genus *Leroya* (Araneae: Thomisidae) from the Afrotropical region


## 5.1 Abstract

A new genus *Leroya* of crab spiders is created for *Mystaria unicolor* Simon, 1895, a species that differs entirely from the type species, *Mystaria rufolimbata* Simon, 1895. The new genus *Leroya* includes *L. unicolor* and a new species, *L. signopuellaris* differing from *Mystaria* in several aspects. *Leroya* has a narrow distribution, with only a few records that are known from central Africa. An identification key is provided.



**Key words:** Afrotropical region, Dietinae, *Mystaria,* Thomisidae, crab spiders, *Leroya* gen. n., *L. unicolor*, *L. signopuellaris* sp. n.


## 5.2 Introduction

A new genus *Leroya*, which is endemic to the Afrotropical region, was erected in the present study to accommodate two species. *Mystaria unicolor* Simon, 1895, originally described from Sierra Leone, was removed from *Mystaria* due to morphological differences such as carapace shape, eye size, clypeal length, leg colouration and shape of the genitalia. The new genus is erected to accommodate a second newly described species, *L. signopuellaris* from the Democratic Republic of Congo (DRC), Rwanda and Uganda. *Leroya signopuellaris* sp. n. is known from both sexes and therefore recognized as the type of the genus *Leroya.*

*Leroya* gen. n. is characterized by a carapace which is very broad and dorsally flattened with a granular texture, the anterior eyes are situated close to clypeal edge, the posterior median eyes are minute and the genitalia in both sexes are sclerotized. They resemble members of the genus *Mystaria* in their general

appearance but differ in lacking small cheliceral teeth and having only serrated setae on the cheliceral edge (Fig. 5.1.1). The female is not as brightly coloured as *Mystaria* and is without patterns on the body with legs I-II darkly sclerotized and legs III-IV pale. Some of these characters show similarities with other genera in Dietinae such as the genera *Tagulis* Simon, 1895 and *Apyretina* Strand, 1929. Members of the genus *Leroya* gen. n. are known only from a few localities in central Africa and have been collected from rainforests by means of canopy fogging.

### 5.3 Material and methods

Available material housed in the following institutions (abbreviations in parentheses) were examined: Museum National d'Histoire Naturelle (MNHN) Paris, France; Musée Royal de l'Afrique Centrale (MRAC) Tervuren, Belgium; Zoologisches Forschungsmuseum Alexander Koenig (ZFMK), Bonn, Germany.

The following abbreviations are used throughout the study: *Body:* AL–abdomen length; AW–abdomen width; CL–carapace length; CW–carapace width; CH–carapace height; Clyp–clypeus: CLL–clypeal length; SL–sternum length; SW–sternum width; TL–total length. *Eyes*: AER–anterior eye row; AME–anterior median eyes; ALE–anterior lateral eyes; PER–posterior eye row; PME–posterior median eyes; PLE–posterior lateral eyes; MOQ–median ocular quadrangle; MOQ-L–median ocular quadrangle length; MOQ-W–median ocular quadrangle width; MOQ-AW–median ocular quadrangle anterior width; MOQ-PW–median ocular quadrangle posterior width. *Legs*: Fe–femur; Pat–patella; Tib–tibia; Mt–metatarsus; Ta–tarsus. *Palp*: VTA–ventral tibial apophysis; RTA–retro-lateral tibial apophysis.

Measurements were recorded in mm. The mean size is given with the observed range in parentheses. The following indices were calculated by dividing a structure's length with its width: SI–sternum index; AI–abdomen index and CI–carapace index. The description format and the abbreviations of morphological terms used in this paper follow that of Ono (1988). All specimens examined were

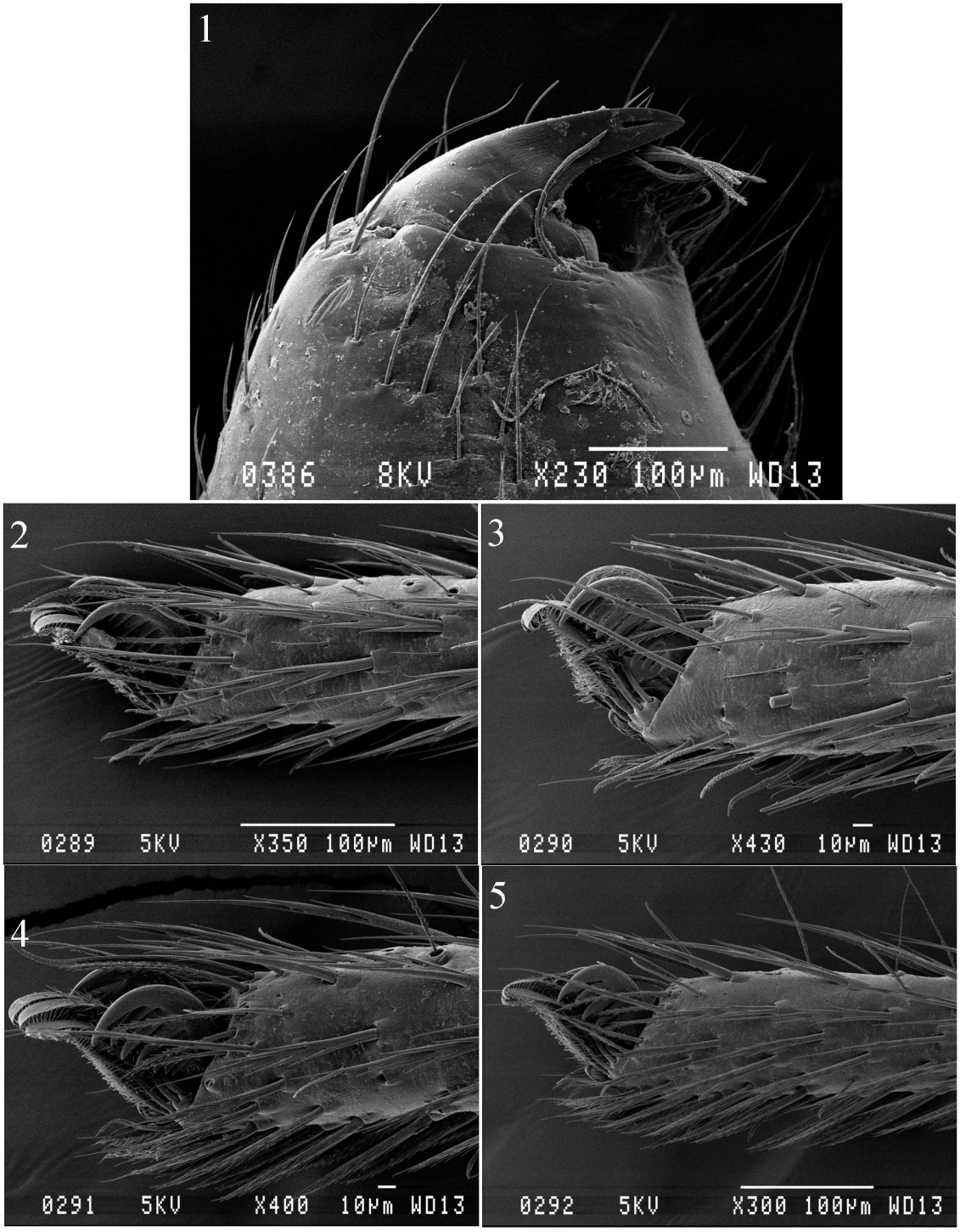



**Fig. 5.1** ***Leroya signopuellaris*** gen. n., sp. n. from the Democratic Republic of Congo, Mayombe 1. Chelicerae. Tarsal claws and tufts of : 2. leg I. 3. leg II. 4. leg III. 5. leg IV.

preserved in alcohol, causing loss of their original bright colouring.

## 5.4 Systematics

### **5.4.1** Genus ***Leroya* gen. n.**

Type species: *Leroya signopuellaris* sp. n.

*Diagnosis:* Recognized by uniform colour of body with abdomen usually paler than carapace (Figs 5.2.6-7, 5.4.4); carapace broadly flattened, cube-shaped; clypeus short, vertical; LE fairly large, situated laterally to carapace, PME very small with anterior and posterior eye rows nearly equal in width. Female epigyne area darkly sclerotized, no atrium (Figs 5.2.1-2, 5.4.1-2); intromittent orifices situated posteriorly, spermathecae large, kidney-shaped; intromittent canals as in Figs 5.2.3 & 5.4.3. Males with bulb sclerotized, tegulum large and swollen (Figs 5.2.4-5); VTA long, tip thickened and curved, longer than RTA; RTA long, sharp tip extending antero-laterally (Fig. 5.2.5).

*Description*

*Female*: Small to medium-sized spiders 3.46–5.21 mm body length. *Colour*: carapace a shiny-metallic copper-red to darker copper-brown or black; abdomen pale brown or darker blue-green (turqoise); leg I-II similar colour as carapace, with femora III-IV distally, patellae III-IV caudally and metatarsi and tarsi III-IV red to dark copper-brown (Figs 5.2.6-7, 5.4.4), remaining leg segments pale white sometimes with a faint brown line laterally on both sides of tibiae III-IV; palp with femur and tarsus brown, tibia paler with longitudinal brown stipe dorsally. *Carapace*: cube-shaped, wide and flattened dorsally; very slightly elevated in thoracic area; slightly sloping anteriorly and posteriorly; texture granular with dense, short setae; long, erectile setae on postero-thoracic edge, laterally on carapace and/or on LE area. *Clypeus*: vertical, very short, almost non-existent with long, erectile setae on edge. *Chelicerae:* obtuse, fairly small, broadened at base narrowing to tip with long

serrated setae on promargin (Fig. 5.1.1). *Mouth parts*: labium cube-shaped to oval, with narrow base that widens centrally, anteriorly slightly narrower; endites indented with few scopula. *Sternum*: heart-shaped covered with fine setae. *Palp*: with single dentated claw; setae on all segments. *Eyes*: both eye rows re-curved, AER=PER; ALE>AME; AME closest to each other; PLE>PME; MOQ eye area wider than long, narrower in front; median eyes small, especially PME; PME nearer to LE than to each other; LE large, usually sessile sometimes with a black spot; situated laterally on edge of carapace. *Legs*: medium to long, slightly stouter than *Mystaria*; leg segments densely covered with short setae; spiniform setae present dorsally on femora, patellae, tibiae I-IV and ventrally of tibiae III-IV; shorter spiniform setae present ventrally and/or laterally or distally on tibiae and metatarsi I-IV; scopula present ventrally on metatarsi and tarsi I-IV, denser on legs III-IV; trichobothria dorsally in single rows on tibiae, metatarsi and tarsi I-IV; tarsal claw tufts differ from *Sylligma* and *Mystaria*, expanding upwards to claw; claw base curved with claws of legs I-II with >8 teeth and legs III-IV <8 teeth (Figs 5.1.2-5). *Abdomen*: round with numerous setae; five apodemes present dorsally, grouped in arrow-shape formation; ventrally with stria around border of abdomen and above spinnerets. *Spinnerets*: small, conical, anterior pair largest, median pair smallest. *Epigyne*: darkly sclerotized, ventrally circular or two diamond-shaped areas (Figs 5.2.1-2, 5.4.1-2); intromittent orifices posteriorly of sclerotized area; dorsally intromittent canals extend anteriorly into large, kidney-shaped spermathecae (Figs 5.2.3 & 5.4.3).

*Males*: Smaller 3.04–3.92 mm in body length. Males resemble females but smaller in size and differ as follows: *Colour.* darker, carapace with a metallic-shine, copper to dark turquoise; abdomen dark, dorsally brown to turqoise, ventrally brown. *Legs:* similar to females. *Carapace*: granular; elevated in thoracic area; setae fine and dense with a number of long erectile setae. *Eyes:* with spots and/or dark tubercles, LE situated on very small tubercles. *Palp*: bulb with sclerotized embolus and tegulum large and swollen; embolus of medium-length (Fig. 5.2.4); RTA sharply curved antero-laterally, shorter than VTA; VTA with curved, thickened tip (Fig. 5.2.5).

*Natural history:* Members of the genus *Leroya* gen. n. have been sampled from rain forests and primary canopy forests by hand or fogging.

*Distribution.* This genus is endemic to the Afrotropical region, known from a few localities in the Democratic Republic of Congo (DRC), Cote d' Ivoire, Rwanda and Uganda.

*Etymology.* Named after John Leroy who sampled a specimen of *L. unicolor* at the age of six when accompanying Dr. Sedel during an expedition in the then Belgian Congo, now referred to as the Democratic Republic of Congo (DRC).

### 5.4.2 Key to species of *Leroya* gen. n.

1. Male with large bulb, tegulum large and swolen, embolus darkly sclerotized with long RTA and VTA (Figs 5.2.4-5)……..*L. signopuellaris* sp. n.
- Females……..……..……2

2. Epigyne large, with circular sclerotized area that slightly curves antero-laterally (Figs 5.4.1-2)……..……*L. unicolor* comb. nov.
- Epigyne with two partly sclerotized, diamond to circular-shaped areas (Figs 5.2.1-2) ……..…..…*L. signopuellaris* sp. n.

#### 5.4.2.1 *Leroya signopuellaris* sp. n.

Figs 5.1, 5.2 & 5.3

*Diagnosis.* Body without patterns (Figs 5.2.6-7). Differs from *L. unicolor* in slightly darker body, shape of genitalia and carapace that is wider than long. Epigyne with two elongate sclerotized areas that are either diamond-shaped (Figs 5.2.1-2) or circular; intromittent orifices open posteriorly of sclerotized area. Male

bulb with embolus sclerotized, tegulum large and swollen; RTA long, sharply pointed and directed antero-lateralllly; RTA shorter than VTA (Figs 5.2.4-5); VTA thickenend with curved tip.

*Description*

*Female:* Size, measurements (mm): (*n = 3*). TL: 4.10 (3.89–4.22); CL: 1.98 (1.91–2.04); CW: 2.00 (1.96–2.05); CI: 0.99 (0.97–1.03); CH: 0.99 (0.74–1.11); CLL: 0.20 (0.19–0.23); MOQ-L: 0.37 (0.34–0.37). *Colour:* carapace with metallic-shine to copper-brown; eye tubercles copper; abdomen dorsally and ventrally pale brown (Fig. 5.2.6). *Carapace*: slightly wider than long. *Clypeus*: with numerous thick, long setae on edge. *Chelicerae*: with short setae (Fig. 5.1.1). *Sternum*: SL (mm): 0.85; SW (mm): 0.84; SI (mm): 1.02. *Eye*s: eye spots on all eyes or only on LE; ALE and PLE situated on very flatish tubercles; eye measurements (mm): AME–AME: 0.57; ALE–AME: 0.60; AME–AME/AME–ALE: 0.94; PME–PME: 0.72; PLE–PME: 0.68; PME–PME/PME–PLE: 1.07; ALE/AME: 1.07; PLE/PME: 0.94; MOQ-AW/MOW-PW: 0.97; MOQ-L/MOQ-W: 0.46; Clyp/AME–AME: 0.36. *Legs*: with trichobothria, tarsal claws with long tufts that extend densely towards claws (Fig. 5.1.2-5); leg formula: I:II:III:IV; leg measurements (mm): leg I – Fe 1.47, Pat 0.57, Tib 1.39, Mt 1.14, Ta 0.81, total 5.38; II – Fe 1.48, Pat 0.46, Tib 1.28, Mt 1.15, Ta 0.80, total 5.17; III – Fe 1.10, Pat 0.38, Tib 0.78, Mt 0.62, Ta 0.51, total 3.40; IV – Fe 1.04, Pat 0.37, Tib 0.81, Mt 0.67, Ta 0.50, total 3.39. *Abdomen:* with numerous long and shorter setae, spiniform setae scattered in between, all embedded in distinct tubercles; apodemes bigger than other species. AL (mm): 2.12; AW (mm): 2.05; AI (mm): 1.03. *Epigyne:* two elongated sclerotized diamond-shaped areas (Figs 5.2.1-2) or circular areas, differ from *L. unicolor* in that epigyne is not sclerotized over entire central area and without straight anterior margin; intromittent orifices small situated posteriorly of sclerotized area; spermathecae large, kidney-shaped; intromittent canals as in Fig. 5.2.3.

*Male*: Size, measurements (mm): (*n* = 3). TL: 3.39 (3.04–3.92); CL: 1.63 (1.42–1.94); CW: 1.68 (1.49–2.00); CI: 0.97 (0.95–0.99); CH: 0.82 (0.68–0.93); CLL:

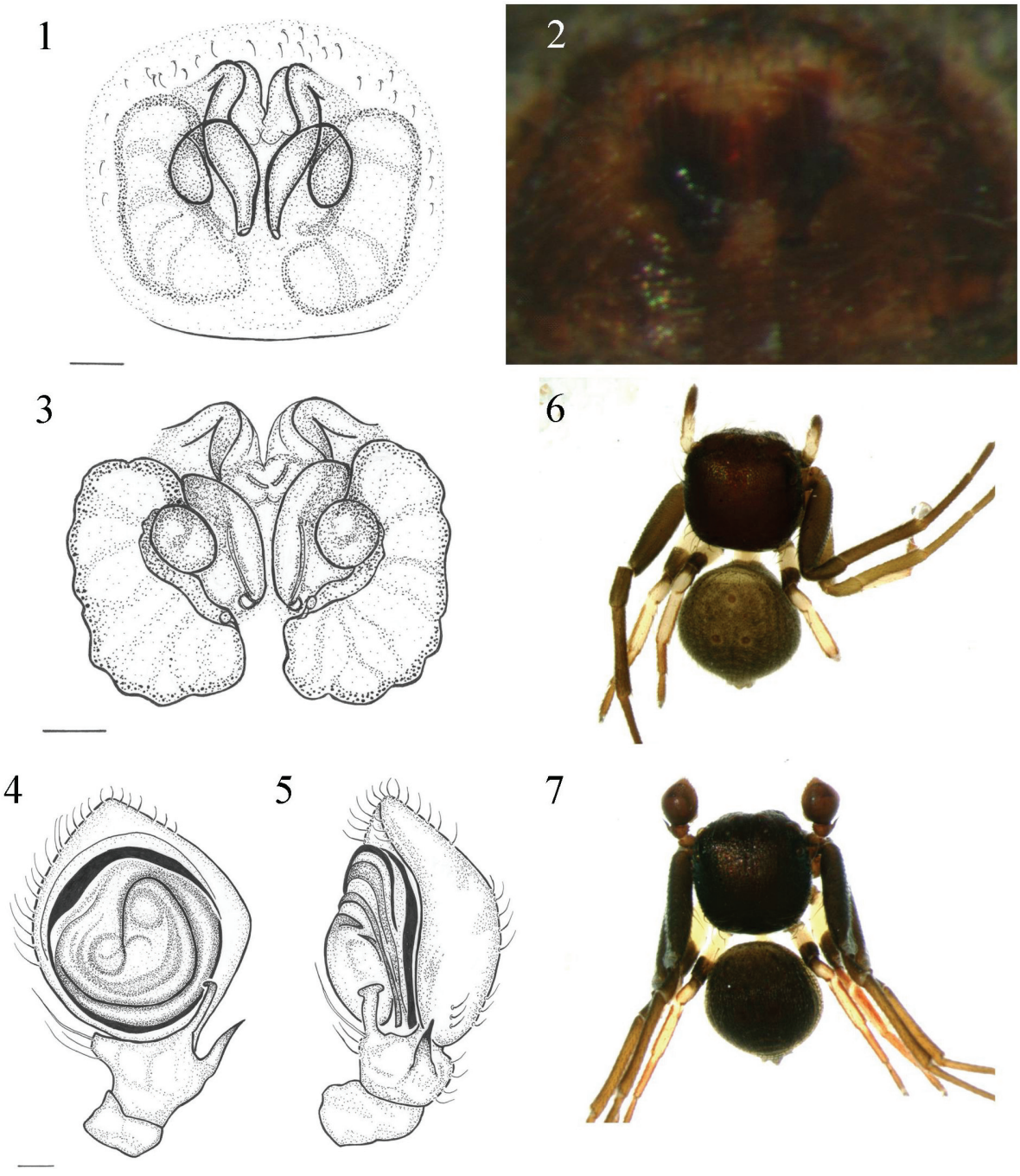



**Fig. 5.2** ***Leroya signopuellaris*** gen. n., sp. n. 1. & 2. Female epigyne ventral view. 3. Epigyne dorsal view. 4. Male right palp ventral view. 5. Right palp retro-lateral view. 6. Female from Democratic Republic of Congo, Mayombe dorsal view. 7. Male from Mayombe dorsal view.

0.20 (0.15–0.26); MOQ-L: 0.31 (0.28–0.35). Resemble females but differ as follows: *Colour:* metallic-shine, copper or blackish-turquoise; abdomen dorsally and ventrally dark brown (Fig. 5.2.7). *Sternum:* SL (mm): 0.67 SW (mm): 0.70 SI (mm): 0.96. *Eyes*: eye measurements (mm): AME–AME: 0.47; ALE–AME: 0.50; AME–AME/AME–ALE: 0.93; PME–PME: 0.56; PLE–PME: 0.59; PME–PME/PME–PLE: 0.95; ALE/AME: 1.08; PLE/PME: 1.05; MOQ-AW/MOQ-PW: 0.83; MOQ-L/MOQ-W: 0.37; Clyp/AME– AME: 0.41. *Legs*: leg formula: II:I:III:IV; leg measurements (mm): leg I – Fe 0.99, Pat 0.28, Tib 1.00, Mt 0.84, Ta 0.54, total 3.65; II – Fe 1.50, Pat 0.41, Tib 1.44, Mt 1.20, Ta 0.77, total 5.32; III – Fe 0.97, Pat 0.29, Tib 0.71, Mt 0.57, Ta 0.45, total 2.98; IV – Fe 0.86, Pat 0.28, Tib 0.72, Mt 0.56, Ta 0.45, total 2.87. *Abdomen*: AL (mm): 1.75; AW (mm): 1.67; AI (mm): 1.05. *Palp*: bulb with slight swelling on lateral side; tegulum large and swollen (Fig. 5.2.4); embolus medium-length and sclerotized; tibia with long setae; RTA and VTA long; VTA tip fairly stout, curved, longer than RTA (Fig. 5.2.5).

*Type material.* Holotype ♂, DEMOCRATIC REPUBLIC OF CONGO (DRC): *Bas Congo-Region,* Mayombe, Luki Forest Reserve, 5°37'S 13°05'E, fogging, 5.xi.2006, D. De Bakker & J.P. Michiels (MRAC 222238a). Paratypes: DEMOCRATIC REPUBLIC OF CONGO (DRC): 2 ♂, 1 ♀, collected with holotype, (MRAC 222238b); 1 juvenile ♀, same locality as holotype, fogging primary forest, 10.xi.2006, D. De Bakker & J.P. Michiels (MRAC 220995); 2 ♂, same locality as holotype, fogging primary forest, 10.xi.2006, D. De Bakker & J.P. Michiels (MRAC 220995). RWANDA: 1 ♀, Ibanda Makera, 02°09'S 30°55'E, x.1993, T. Wagner (ZFMK AR 1320). UGANDA: 1 ♂, Budongo forest, 01°45'N 31°25'E, 15-25.i.1997, T. Wagner (ZFMK AR 1321).

*Natural history.* This species lives in the canopy of trees in rainforests. Adults and juveniles have been collected from October until January.

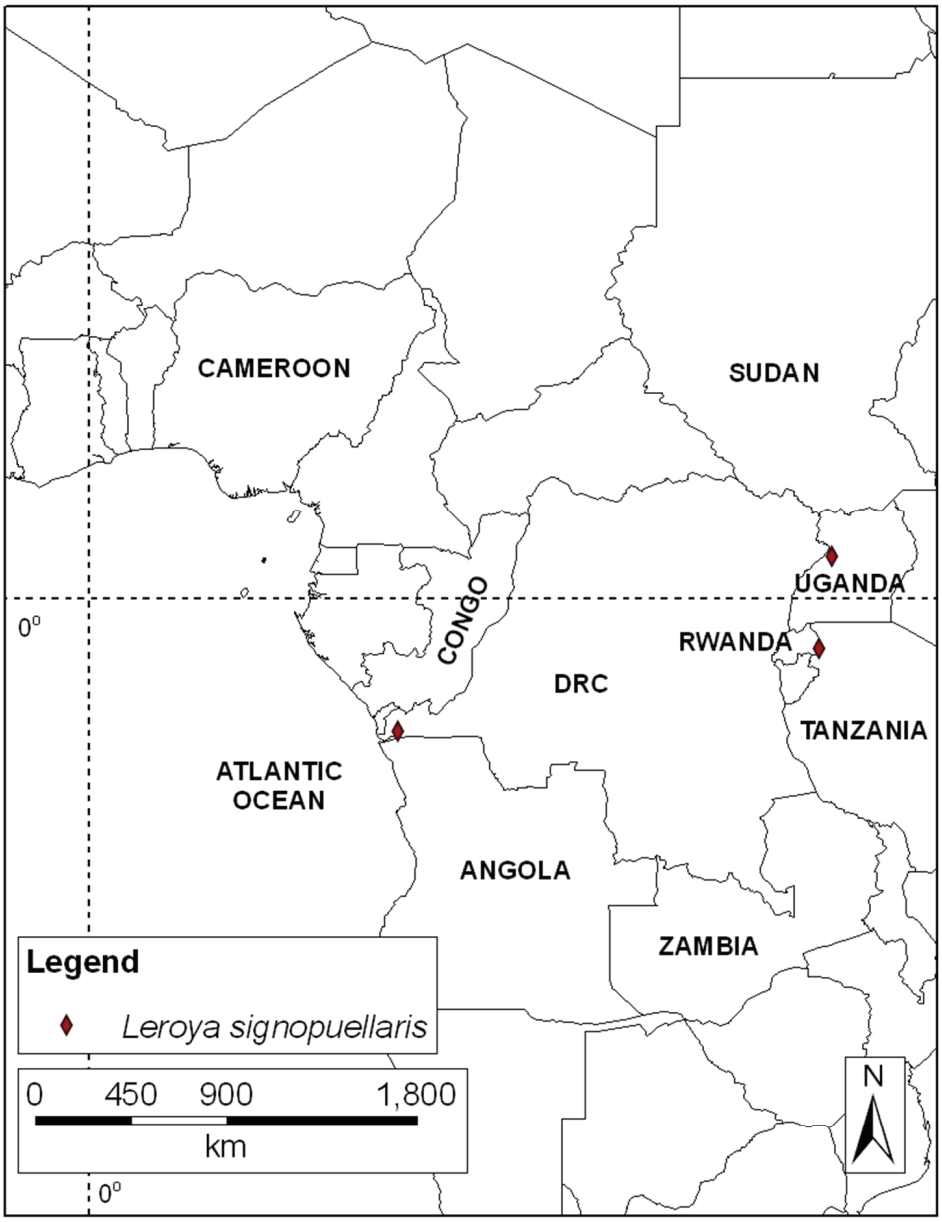



**Fig. 5.3** Recorded geographical distribution of *Leroya signopuellaris* sp. n.

*Distribution.* Democratic Republic of Congo (DRC), Rwanda, Uganda (Fig. 5.3).

*Etymology.* "*Signo*" is the Latin word that refers to the dark sclerotized epigynal mark which is present on females of both species of the genus, and the word "*puellaris*" is also Latin meaning girl and refers to the similarity between this species and *L. unicolor.*

#### 5.4.2.2 ***Leroya unicolor*** (Simon, 1895). comb. nov.

Figs 5.4 & 5.5

*Mystaria unicolor* Simon, 1895: 989-990

*Diagnosis.* Carapace orange to copper; abdomen pale brown (Fig. 5.4.4); carapace with few, short setae; body larger than *L. signopuellaris.* Female epigyne a circular sclerotized area (Figs 5.4.1-2). Male unknown.

*Re-description.*

*Female:* Size, measurements (mm): (*n* = 2). TL: 4.77 (3.46–5.21); CL: 1.81 (1.49–1.92); CW: 1.77 (1.38–1.91); CI: 1.03 (1.01–1.08); CH: 0.94 (0.71–1.02); CLL: 0.19 (0.10–0.22); MOQ-L: 0.32 (0.26–0.34). *Colour:* carapace metallic shine, orange to copper; abdomen pale brown. *Carapace*: slightly longer than wide, large and broad (Fig. 5.4.4). *Sternum:* SL (mm): 0.72; SW (mm): 0.77; SI (mm): 0.93. *Eye*s: not situated on tubercles, no eye spots; eye measurements (mm): AME–AME: 0.56;

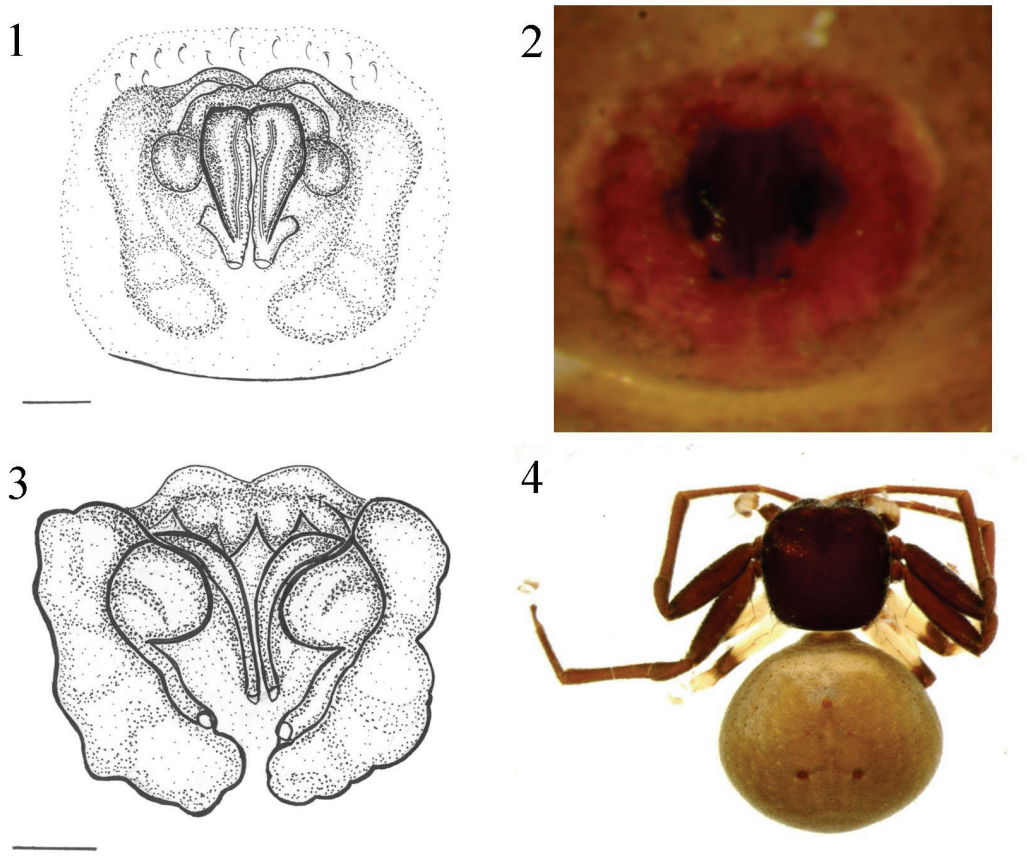



**Fig. 5.4** ***Leroya unicolor*** (Simon, 1895) comb. nov. 1. & 2. Female epigyne ventral view. 3. Epigyne dorsal view. 4. Female from the Democratic Republic of Congo, Rwankwi dorsal view.

ALE-AME: 0.54; AME-AME/AME-ALE: 1.03; PME-PME: 0.68; PLE-PME: 0.61; PME-PME/PME-PLE: 1.11; ALE/AME: 0.97; PLE/PME: 0.91; MOQ-AW/MOQ-PW: 0.83; MOQ-L/MOQ-W: 0.39; Clyp/AME-AME: 0.32. *Legs*: dense setae on all leg segments; trichobothria not very conspicuous probably present on all legs, seen on metatarsi and tarsi II-III; leg formula: II:I:III:IV; leg measurements (mm): leg I – Fe 1.23, Pat 0.47, Tib 1.20, Mt 1.02, Ta 0.76, total 4.57; II – Fe 1.31, Pat 0.46, Tib 1.22, Mt 1.03, Ta 0.72, total 4.73; III – Fe 1.11, Pat 0.27, Tib 0.73, Mt 0.54, Ta 0.45, total 3.10; IV – Fe 1.03, Pat 0.28, Tib 0.66, Mt 0.54, Ta 0.44, total 2.95. *Abdomen:* with fine setae and small apodemes; large in comparison to carapace; AL (mm): 2.96; AW (mm): 2.97; AI (mm): 1.00. *Epigyne*: large circular, sclerotized area with anterior margin straight (Figs 5.4.1-2) and laterally with two small areas curving antero-laterally; intromittent canals extend wide antero-laterally until it reaches the large kidney-shaped spermathecae (Fig. 5.4.3).

*Type material examined.* Holotype ♀ specimen was collected from West Africa, Sierra Leone, 8°23'N 12°04'W (MNHN).

*Other material examined.* DEMOCRATIC REPUBLIC OF CONGO (DRC): *Orientale Region*, 1 ♀, Rwankwi, 01°20'S 29°22'E, vii.1951, J. Leroy (MRAC 71632); CÔTE D' IVOIRE: 1 sub-adult ♂, Appouesso, F.C. Bossematie, 6°37'N 3°26'W, collected by hand in rainforest, 13.ii.1997, R. Jocqué & L. Baert (MRAC 205.408).

*Natural history.* This species has been collected in rainforests. Adult females have been sampled during July and a sub-adult male during Feburary.

*Distribution.* Sierra Leone. New records: Democratic Republic of Congo (DRC) and Côte d'Ivoire (Fig. 5.5).

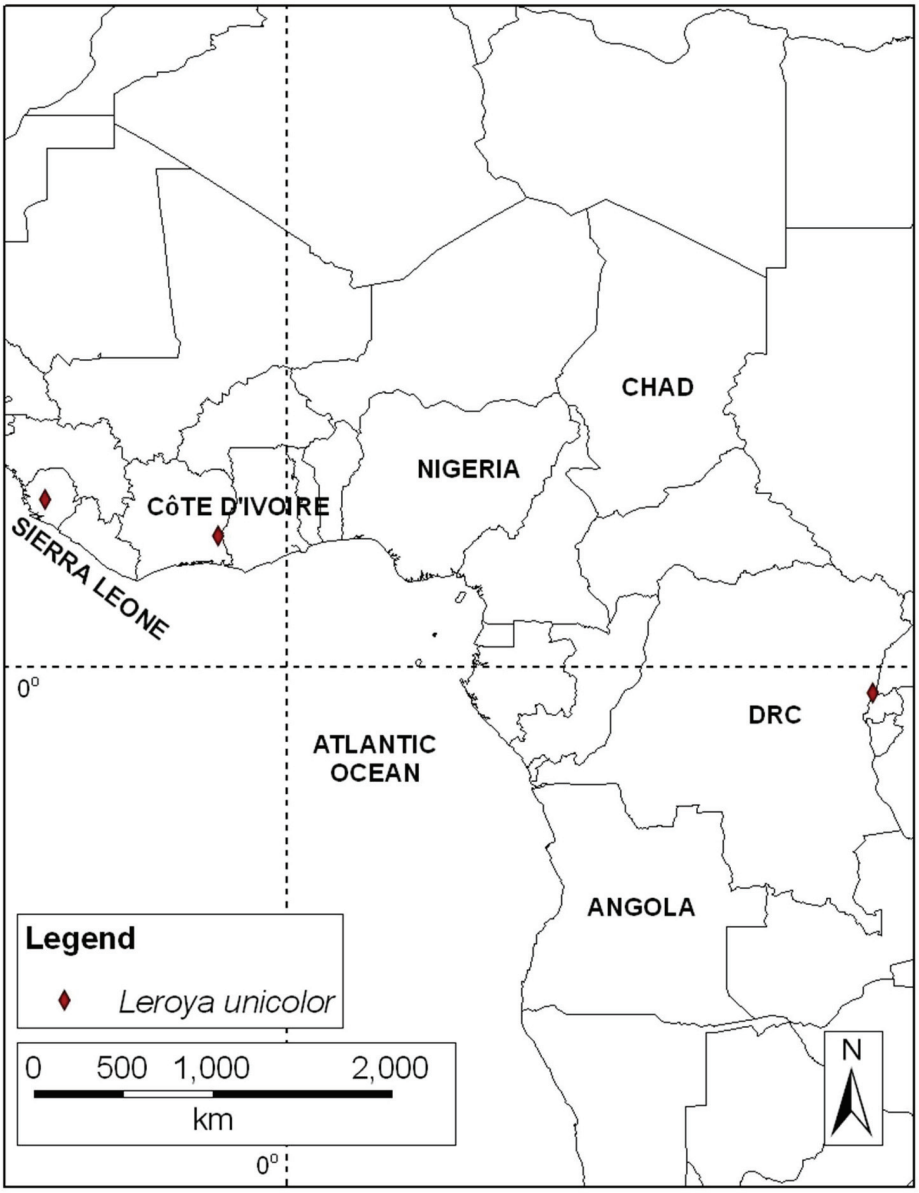



**Fig. 5.5** Recorded geographical distribution of *Leroya unicolor* (Simon, 1895) comb. nov.

## Reference

SIMON, E. 1895. Histoire naturelle des Araignées. 1. Paris 1895: 761–1084.