



Research article

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An update on the spider genus *Hexophthalma* (Araneae: Sicariidae) in the Afrotropical region, with descriptions of new species

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Abstract. The described Afrotropical species of the genus *Hexophthalma* Karsch, 1879 (under the genus name *Sicarius* Walckenaer, 1847), of the spider family Sicariidae Keyserling, 1880, were recently reviewed. In the present paper the Afrotropical species of the genus *Hexophthalma* are revisited. After a thorough examination of all the available specimens from nine major collections, the species *H. testacea* (Purcell, 1908) is here synonymized with *H. hahni* (Karsch, 1878), three new species are described – *H. binfordae* sp. nov., *H. goanikontesensis* sp. nov. (both from Namibia) and *H. leroyi* sp. nov. (from South Africa) – and the male of *H. dolichocephala* (Lawrence, 1928) is described for the first time. The distribution of the species is also revised and a new updated key to the species is compiled.

Keywords. Africa, six-eyed crab spiders, Haplogynae.

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Introduction

In a very recent paper on Sicariidae, Magalhaes *et al.* (2017) revalidated the genus name *Hexophthalma* Karsch, 1879 for six species occurring in Africa (World Spider Catalog 2017). The genus was firstly described as *Hexomma* (Karsch 1878) for the species *H. hahni*, but this name was preoccupied and replaced with *Hexophthalma* (Karsch 1879). Simon (1893) synonymized *Hexophthalma* with *Sicarius* Walckenaer, 1847. All subsequent authors published new Afrotropical species as *Sicarius* (Pocock 1900; Purcell 1908; Lawrence 1928). The Distribution of *Hexophthalma* is restricted to the southern part of the Afrotropical region. The majority of the species occur in the drier western half of southern Africa, extending eastward to the north. As very little collecting has been done in Angola, it is possible that the distribution may extend further north into this country.

In a recent paper on the Afrotropical species of *Hexophthalma* (Lotz 2012), a short review was given of the described species. This was based on the type specimens or specimens collected close to the type locality. Since then an intensive study of all available specimens from nine collections was undertaken. This led to the discovery of a lot of variation in the female genitalia and of unexpected prominent differences between the palps of the different species that can be used to differentiate between them.

The dorsal setae on the leg femora were found to be too variable to be used as a diagnostic character for species, except in the case of *H. spatulata* (Pocock, 1900), where the setae are scoop shaped and situated on a slight mound (Fig. 23). In all other species the setae vary from thin to broad, with some having both thin and broad setae. In this publication the female genitalia and male palps are drawn from photos of actual specimens. In some cases the female genitalia of several specimens of the same species are depicted to show the intraspecific variation as well as the variation between the left and right side of the same specimen.

During the study three new species and the male of *H. dolichocephala* (Lawrence, 1928) were discovered and are described here. The variation in female genitalia and the differences found in the male palps also led to the realization that *H. testacea* (Purcell, 1908) and *H. hahni* (Karsch, 1878) is one and the same species and *H. testacea* is therefore here synonymized with *H. hahni*. The distribution of the different species is also updated here with maps showing the localities of the studied specimens only, because not all specimens mentioned in published records (Newlands 1986) could be found to corroborate their identification.

Material and methods

All the specimens that could be obtained on loan, from the collections mentioned below, were studied and are discussed here (responsible curator(s) mentioned in parentheses). Illustrations of the male palps and female genitalia were made from photos of the actual genitalia studied. Male palps were taken from the right side and studied and drawn from the prolateral side. Illustrations were made with CorelDRAW X4. Photos of the genitalia were taken with a Paxcam 5 digital camera, mounted on a Novel dissection microscope. Photos are not included, as they are not of publishable quality. All female genitalia and male palps were photographed and compared. Coordinates given in square brackets are not included on the specimen labels, but were looked up on physical maps and added.

Abbreviations

Morphological terms

AME-LE	=	distance between anterior median and anterior lateral eyes
CL	=	carapace length
CLL	=	clypeus length
CW	=	carapace width
TL	=	total length

Institutions

AMSA	=	Albany Museum, Grahamstown, South Africa (J. Mitchley). The code “AM” is used on the specimen labels
PPRI	=	Plant Protection Research Institute, Pretoria, South Africa (A. Dippenaar-Schoeman, P. Marais). The code “ARC (NCA)” is used on the specimen labels
BMNH	=	British Museum of Natural History, London, England (J. Beccaloni)
CAS	=	California Academy of Sciences, USA (C. Griswold)
DMSA	=	Durban Museum, Durban, South Africa
MNHN	=	Muséum national d’Histoire naturelle, Paris, France (C. Rollard)
NMBA	=	National Museum, Bloemfontein, South Africa (Araneae collection) (L. Lotz)
NMNW	=	National Museum of Namibia, Windhoek (T. Bird). The code “SMN” is used on the specimen labels
NMZB	=	National Museum of Zimbabwe, Arachnology Department Bulawayo, Zimbabwe (M. FitzPatrick). The code “NMZ/A” is used on the specimen labels
SAMC	=	Iziko Museum, Cape Town, South Africa (D. Larson)

Results

Class Arachnida Cuvier, 1812
 Order Araneae Clerck, 1757
 Family Sicariidae Keyserling, 1880
 Genus *Hexophthalma* Karsch, 1879

Key to the species of *Hexophthalma*

1. Females 2
 – Males 9
2. Enlarged dorsal setae on femora raised on a slight mound and scoop-shaped (Fig. 23); female spermathecae consist of numerous tubes, each ending in one or more spherical vesicles (Fig. 16) ..
 *H. spatulata* (Pocock, 1900)
 – Enlarged dorsal setae on femora not raised on a slight mound and not scoop-shaped; spermathecae consist of one or more finger-like tubes (Figs 1–15) 3
3. Inner spermathecae consist of one main finger-like tube on each side (Fig. 10)
 *H. dolichocephala* (Lawrence, 1928)
 – Inner spermathecae consist of more than one finger-like tube on each side 4
4. Spermathecae without outer spermathecae near uterus externus and without reduced outer spermathecae (Fig. 9) *H. damarensis* (Lawrence, 1928)
 – Spermathecae with outer spermathecae near uterus externus or with reduced outer spermathecae ...
 5
5. Spermathecae with outer spermathecae near uterus externus 6
 – Spermathecae with reduced outer spermathecae 7
6. Inner spermathecae with long finger-like tubes (Figs 6–8) *H. albospinosa* (Purcell, 1908)
 – Inner spermathecae with shorter, more bulbous, finger-like tubes (Figs 11–15)
 *S. hahni* (Karsch, 1878)
7. Inner spermathecae hammer-like, bent slightly laterally (Fig. 1) *H. binfordae* sp. nov.
 – Inner spermathecae not hammer-like, bent more or less medially 8
8. Inner spermathecae with two finger-like tubes, outer spermathecae relatively round (Fig. 5)
 *H. leroyi* sp. nov.
 – Inner spermathecae with three or more finger-like tubes, outer spermathecae long (Figs 2–4)
 *H. goanikontesensis* sp. nov.
9. Embolus with a broad, blunt apex (Fig. 22) *H. spatulata* (Pocock, 1900)
 – Embolus with a narrow apex (Figs 17–21) 10
10. Embolus with a short, flattened apex (Fig. 20) *H. dolichocephala* (Lawrence, 1928)
 – Embolus with a thin, sharp apex 11
11. Broader, basal part of embolus straight-edged (Figs 18, 21) 12
 – Broader, basal part of embolus with a hump along one edge (Figs 17, 19) 13

12. Thin apical part of embolus almost as long as thicker basal part (Fig. 17)
 *H. albospinosa* (Purcell, 1908)
 – Thin apical part of embolus much shorter than thicker basal part (Fig. 21)
 *H. hahni* (Karsch, 1878)
13. Thin apical part of embolus without embolus keel at base (Fig. 19)
 *H. damarensis* (Lawrence, 1928)
 – Thin apical part of embolus with embolus keel at base (Fig. 18) *H. goanikontesensis* sp. nov.

Hexophthalma binfordae sp. nov.

[urn:lsid:zoobank.org:act:DD563DE2-A5BD-4AB0-8319-021E01B366DA](https://doi.org/10.3896/eb.2018.424.1.1)

Figs 1, 24

Diagnosis

Female inner spermathecae consist of one lateral extending sac and a divided round sac medially, on each side, with a small sclerotized reduced outer spermatheca (Fig. 1) which is unlike that of any of the other species. Male unknown.

Etymology

The species name is a matronym for Greta Binford, collector of the type specimen.

Material examined

Holotype

NAMIBIA: ♀, Khorxas, Twyfelfontein, 18°30'53.64" S, 14°22'21.84" E, 19 Aug. 2005, G. Binford leg. (NMNW 45842).

Description

Female (n=1)

TL=11.9; CL=5.5; CW=5.5; CLL=0.7. AME-LE=0.6; eye diameter 0.2. Carapace reddish-brown, cephalic area slightly darker; abdomen and legs yellow-brown. Body and legs with lancet-like curved macrosetae, more strongly curved on body than on legs. Spermathecae consist of one lateral extending sac and a divided round sac medially, on each side, with a small sclerotized reduced outer spermatheca basally (Fig. 1).

Leg measurements:

	I	II	III	IV	Palp
Femur	7.0	7.2	7.2	7.0	1.6
Patella	2.6	2.6	2.5	2.3	1.0
Tibia	6.9	7.0	6.3	6.0	1.0
Metatarsus	4.8	4.7	4.6	4.6	–
Tarsus	2.9	3.0	2.8	3.0	2.1
Total	24.2	24.5	23.5	22.9	5.7

Natural history

Hexophthalma binfordae sp. nov. was collected from a savanna area.

Distribution

Hexophthalma binfordae sp. nov. is only known from the type locality in Namibia (Fig. 24).

Hexophthalma goanikontesensis sp. nov.

[urn:lsid:zoobank.org:act:EA012B80-652F-43DF-B071-33618A497072](https://doi.org/10.21203/rs.3.rs-1234567)

Figs 2–4, 18, 24

Diagnosis

Female inner spermathecae consist of sac-like fingers on each side, with a sclerotized reduced outer spermatheca; the number of sac-like spermathecae varies from three to seven between specimens and from side to side (Figs 2–4); may at first glance resemble *H. leroyi* sp. nov., but with more than two spermathecae sacs, the other sacs hidden behind two top sacs. Male embolus with a thin apical part with small keel at the base and a thicker basal part with a slight hump on one side, similar to that of *H. damarensis*, but differing by the presence of the small keel and the side hump being apical of median, on the thicker part of the embolus (Fig. 18).

Etymology

The specific name is an adjective derived from the type locality.

Material examined

Holotype

NAMIBIA: ♂, Swakpomund, Namib-Naukluft Park, Goanikontes, 22.68565° S, 14.84964° E, 7 Feb.–28 Mar. 2009, J. Irish & R. Scholtz leg. (NMNW 47282).

Paratypes

NAMIBIA: 2 ♂♂, 2 ♀♀, same data as for holotype (ex NMNW 47282); 1 ♀, Cape Cross [21°46' S, 13°59' E], 8 Jul. 1963, A. Els leg. (NMNW 35066); 2 ♀♀, Damaraland, Klein Graias, 2014Cc, 5 Aug. 1985, E. Griffin leg. (NMNW 41688); 1 ♂, 1 imm., Kaokoland, 17°37' S, 12°12' E, 14 Oct. 1988, H. Kleinmans leg. (NMNW 40797); 1 ♂, Kaokoland, 15 miles W of Orupembe at park border, 1812Ac, R.E.G. leg. (NMNW 35964); 2 ♀♀, 3 imm., Koichab River, Skeleton coast, 20 miles inland [ca 20°21' S, 13°33' E], 8 Nov. 1968, R.F. Lawrence leg. (AMSA); 1 ♀, Rössing Mine, Arandis water, 2214Bd, 7 Jun. 1984, E. Griffin leg. (NMNW 38930); 1 ♂, Rössing Mine, Crusher Dust area, 2215Ca, 19 Mar.–9 Apr. 1984, E. Griffin leg. (NMNW 37021); 1 ♂, Rössing Mine, Panner Gorge, 22°29' S, 15°01' E, 9 Apr.–8 May 1984, E. Griffin leg. (NMNW 37086); 1 ♀, same data as for preceding but 11 Mar.–9 Apr. 1985, Irish and Rust leg. (NMNW 38737); 1 ♂, Rössing Mine, Upper Ostrich Gorge, 22°29' S, 14°59' E, 9 Apr.–8 May 1984, E. Griffin leg. (NMNW 37057); 1 ♂, same data as for preceding but 5 Apr.–6 May 1985, Irish and Rust leg. (NMNW 38794); 1 ♂, Swakopmund, 22.67° S, 14.52° E, 15 Mar. 2010, G. Ackerman leg. (PPRI 2010/2540); 3 ♂♂, 1 ♀, Swakpomund, Namib-Naukluft Park, Goanikontes, 22°43'11.9" S, 14°49'23.2" E, 7–28 Feb. 2009, J. Irish & R. Scholtz leg. (NMNW 47221, 47233); 1 ♀, same data as for preceding but 5 Feb. 1929, R.D. Bradfield leg. (AMSA 6003); 1 ♀, Ugab River [21°10' S, 13°39' E], 25 Apr. 1987 (NMNW 40495); 1 ♂, Vogelfederberg, 23°06' S, 14°55' E, 5 Oct. 1984, E. Griffin leg. (NMNW 42837).

Note

Hexophthalma goanikontesensis sp. nov. appears to be the same species as *H. sp. 2* in Magalhaes *et al.* (2017), judging from the figures in their publication (figs 20C–D, 21C–D).

Description

Female (n=7)

TL=10.26 (8.8–12.4); CL=4.80 (3.7–6.0); CW=4.76 (3.8–5.6); CLL=0.59 (0.5–0.8). AME-LE=0.6; eye diameter=0.2. Carapace reddish-brown, cephalic area slightly darker; abdomen and legs yellow-brown. Body and legs with lancet-like curved macrosetae, more strongly curved on body than on legs. Inner spermathecae consist of sac-like fingers on each side, with a sclerotized reduced outer spermatheca;

the number of sac-like inner spermathecae varies from three to seven sacs among specimens and from side to side (Figs 2–4).

Leg measurements:

	I	II	III	IV	Palp
Femur	6.0	6.3	6.0	6.2	1.8
Patella	2.3	2.4	2.3	2.3	1.0
Tibia	5.5	5.6	5.1	5.1	1.0
Metatarsus	3.9	4.0	3.5	3.8	–
Tarsus	2.8	2.6	2.5	2.8	1.9
Total	20.5	20.9	19.4	20.2	5.7

Male (n=10)

TL=9.01 (8.0–9.8); CL=4.65 (4.1–5.2); CW=4.62 (4.2–5.1); CLL=0.61 (0.60–0.65). AME-LE=0.55; eye diameter=0.2. Colour and spination as in female. Embolus with a thin apical part with small keel at the base and a thicker basal part with a slight hump on one side, apical of median on the thicker part of the embolus (Fig. 17).

Leg measurements:

	I	II	III	IV	Palp
Femur	6.3	7.0	6.4	6.4	1.6
Patella	2.2	2.2	2.2	2.0	1.0
Tibia	5.8	5.9	5.5	5.4	1.2
Metatarsus	4.1	4.3	4.0	3.8	–
Tarsus	2.8	2.8	2.6	2.6	0.6
Total	21.2	22.2	20.7	20.2	4.4

Natural history

Hexophthalma goanikontesensis sp. nov. have been collected in desert areas, by pit traps and by hand from under rocks.

Distribution

Hexophthalma goanikontesensis sp. nov. is known from the northern coastal areas in Namibia (Fig. 24).

Hexophthalma leroyi sp. nov.

[urn:lsid:zoobank.org:act:3EAAF34D-D7DB-4C5F-84BE-231233E064B4](https://zoobank.org/act:3EAAF34D-D7DB-4C5F-84BE-231233E064B4)

Figs 5, 24

Diagnosis

Female inner spermathecae consist of two sac-like fingers on each side, with a round sclerotized reduced outer spermatheca (Fig. 5), to a certain extent similar to *H. goanikontesensis* sp. nov., but with only two inner spermathecae sacs. Male unknown.

Etymology

The specific name is a patronym for John Leroy, collector of the type specimen.

Material examined

Holotype

SOUTH AFRICA: ♀, Northern Cape Province, Augrabies National Park, 28.66° S, 20.42° E, 24 Feb. 1983, J. Leroy leg., LR270 (PPRI 89/786).

Description

Female (n=1)

TL=12.9; CL=5.9; CW=6.0; CLL=0.9. AME-LE=0.65; eye diameter=0.2. Carapace reddish-brown, cephalic area slightly darker; abdomen and legs yellow-brown. Body and legs with lancet-like curved macrosetae; macrosetae more curved on body than on legs. Inner spermathecae consist of two sac-like fingers on each side, with a round, sclerotized, reduced outer spermatheca (Fig. 5).

Leg measurements:

	I	II	III	IV	Palp
Femur	7.2	7.4	6.8	7.0	1.6
Patella	2.6	2.8	2.7	2.7	1.0
Tibia	7.1	7.1	6.8	6.2	1.1
Metatarsus	4.9	4.8	4.3	4.6	–
Tarsus	2.8	2.8	2.6	3.2	2.0
Total	24.6	24.9	23.2	23.7	5.7

Natural history

Hexophthalma leroyi sp. nov. was collected in a grassy area in the Nama Karoo biome.

Distribution

Hexophthalma leroyi sp. nov. is known only from the type locality in South Africa (Fig. 24).

***Hexophthalma albospinosa* (Purcell, 1908)**

Figs 6–8, 17, 25

Sicarius albospinosus Purcell, 1908: 224.

Sicarius albospinosus – Lawrence 1938: 215. — Newlands 1986: 45. — Lotz 2012: 3.

Hexophthalma albospinosa – Magalhaes *et al.* 2017: 851, figs 20A–B, 21A–B, 62A–C.

Revised diagnosis

Female inner spermathecae consist of long finger-like sacs that branch close to the copulatory tube end, similar to in *H. hahni* except that the finger-like tubes are longer and thinner (Figs 6–8). Male embolus consisting of a thin pointed apical part and straight-sided thicker basal section (Fig. 17), similar to in *H. hahni* except for the longer thin apical part in relation to the thicker basal part.

Material examined

Lectotype

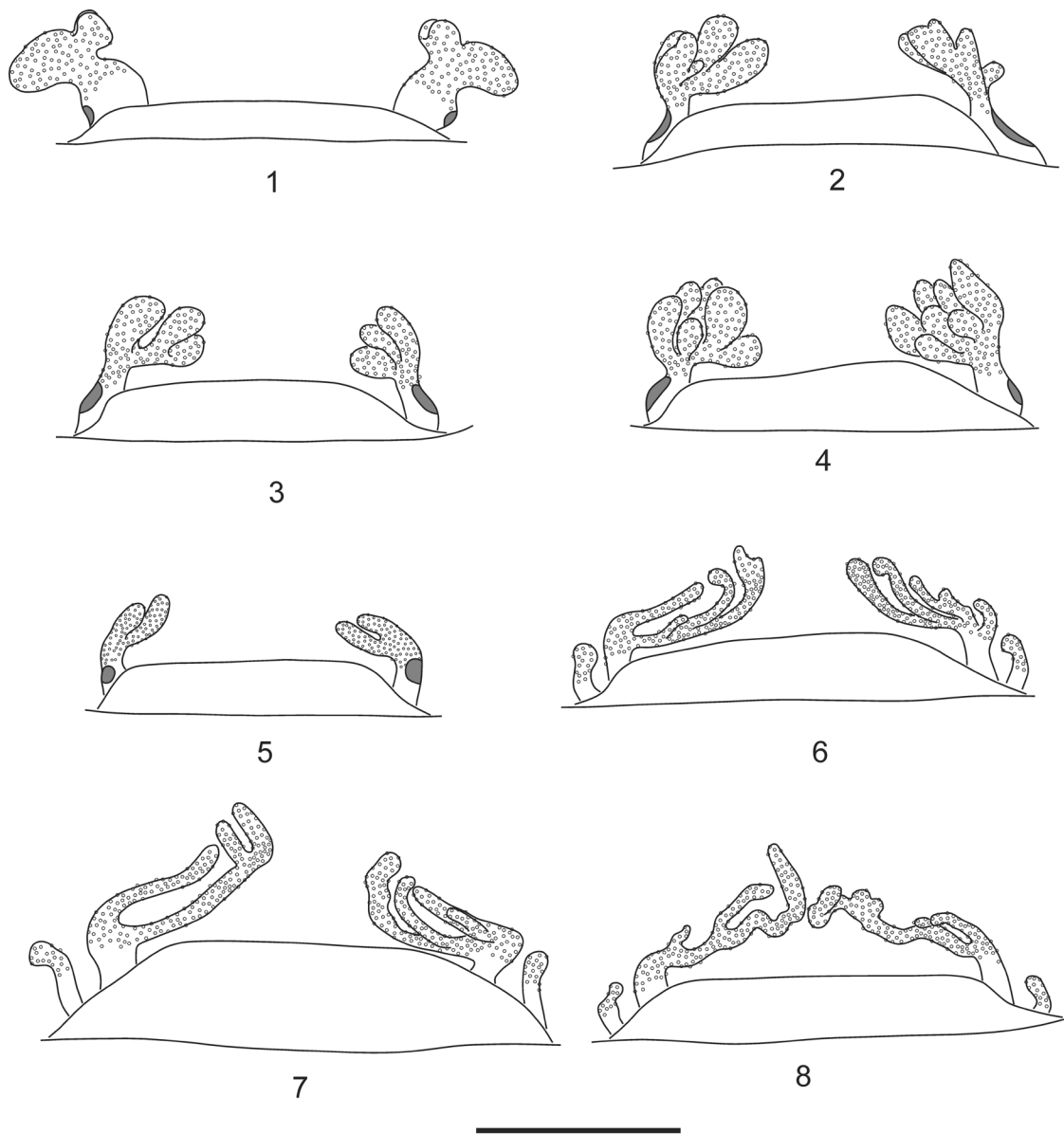
NAMIBIA: ♀, Lüderitz Bay (Angra Pequena, Great Namaqualand [26°39' S, 15°09' E], Jan. 1904, L. Schultze leg. (SAMC X150521).

Paralectotypes

NAMIBIA: 2 juv., same data as for lectotype (SAMC X150521).

Other material

NAMIBIA: 1 ♂, Agate Beach, 2615Ca, 9 Oct. 1984, M. Griffin leg. (NMNW 42838); 1 ♀, same data as for preceding (NMNW 42927); 1 ♂, Atlas Bay, Diamond area I, 26°49' S, 15°08' E, 13–26 Nov. 1993, E. Marais leg. (NMNW 43252); 1 ♂, between Chameis Head and South Rock, 27°51' S, 15°39' E, 6 Aug. 1997, E. Griffin leg. (NMNW 43810); 1 ♀, 1 imm., Griffiths Bay, Diamond area 1, 26°39' S, 15°07' E, 16 Jun. 1993, M. Griffin leg. (NMNW 42894); 1 ♂, Jammerbucht, 27°10' S, 15°16' E, 20 Jun. 1993, M. Griffin leg. (NMNW 42912); 1 ♂, 3 ♀♀, 4 imm., Klinghardts Mountain foothills, Diamond area 1,



Figs 1–8. Female internal genitalia. 1. *Hexophthalma binfordae* sp. nov. 2–4. *H. goanikontesensis* sp. nov. 5. *H. leroyi* sp. nov. 6–8. *H. albospinosa* (Purcell, 1908). Scale bar = 1 mm.

27°25' S, 15°36' E, 17–18 Jun. 1993, M. Griffin and E. Griffin leg. (NMNW 42905, 42907); 2 ♂♂, 2 ♀♀, 2 imm., Lüderitz, Diamond area 2, Kowis Mountain, 26°38'25.7" S, 15°20'46.7" E, 22 Aug. 2006, EduVentures 9 leg. (NMNW 47257, 47258); 1 ♂, Lüderitz, Lüderitz Peninsula, 26°39'58.5" S, 15°07'19.9" E, 14 Dec. 2008–3 Feb. 2009, I. Wiesel, T.L. Bird and C. Bird leg. (NMNW 47339); 1 ♂, Lüderitz, Spergebiet National Park, base of Tsaukhaib Mountain, 26°43'01.1" S, 15°40'05.2" E, 20 May 2009, EduVentures leg. (NMNW 47367); 1 ♂, NamDeb southern mine, old articulated dumptruck, 30 Jan.–12 Feb. 1997, V. Ward and J. Daneel leg. (NMNW 43565); 2 ♀♀, Oranjemund, 28.55° S, 16.43° E, Jan. 1991, N. Larson leg. (PPRI 91/1530); 1 ♀, Oranjemund site 3, NamDeb mine dumps, 2816Cb, 23–26 Jan. 1998, V. Ward leg. (NMNW 43844); 1 ♂, Oranjemund mining area, control site 5, near Orange River, 20 Sept.–2 Oct. 1996, E. Griffin leg. (NMNW 43554); 1 ♀, Orange River Mouth, coastal dunes, 2826Cb, 10 Nov. 1986, E. Griffin leg. (NMNW 42957).

Natural history

Hexophthalma albospinosa have been collected in the Succulent Karoo biome, by pitfall traps and by hand from under rocks and old roofing tin.

Distribution

Hexophthalma albospinosa is distributed along the southern coastal areas of Namibia (Fig. 25).

Hexophthalma damarensis (Lawrence, 1928)

Figs 9, 19, 25

Sicarius damarensis Lawrence, 1928: 221.

Sicarius damarensis – Newlands 1986: 47. — Lotz 2012: 4.

Hexophthalma damarensis – Magalhaes *et al.* 2017: 852.

Diagnosis

Female inner spermathecae unique, with short, bulbous, finger-like sacs that branch off the copulatory tube part, without reduced outer spermathecae (Fig. 9). Male embolus ending in a thin, pointed apex; thicker basal part of embolus with a hump on one side, slightly basal from median (Fig. 19); this is similar to in *H. goanikontesensis* sp. nov. except that the thinner apical part lacks a basal embolus keel and the hump on the side of the thicker part is more basal.

Material examined

Holotype

NAMIBIA: ♀, Outjo [20°07' S, 16°09' E] (SAMC 7057).

Other material

NAMIBIA: 1 ♂, Helio, 19°03' S, 16°29' E, 14 Feb.–23 Mar. 1987, E. Griffin leg. (NMNW 40160); 1 ♀, 1 imm., same data as for preceding but 8 Aug. 1987–27 Mar. 1988 (NMNW 40986); 1 ♂, same data as for preceding but 27 Mar.–4 May 1988 (NMNW 41135).

Natural history

Hexophthalma damarensis have been collected in Savanna biomes using pitfall traps.

Distribution

Hexophthalma damarensis is distributed in the northern central part of Namibia (Fig. 25).

Hexophthalma dolichocephala (Lawrence, 1928)

Figs 10, 20, 25

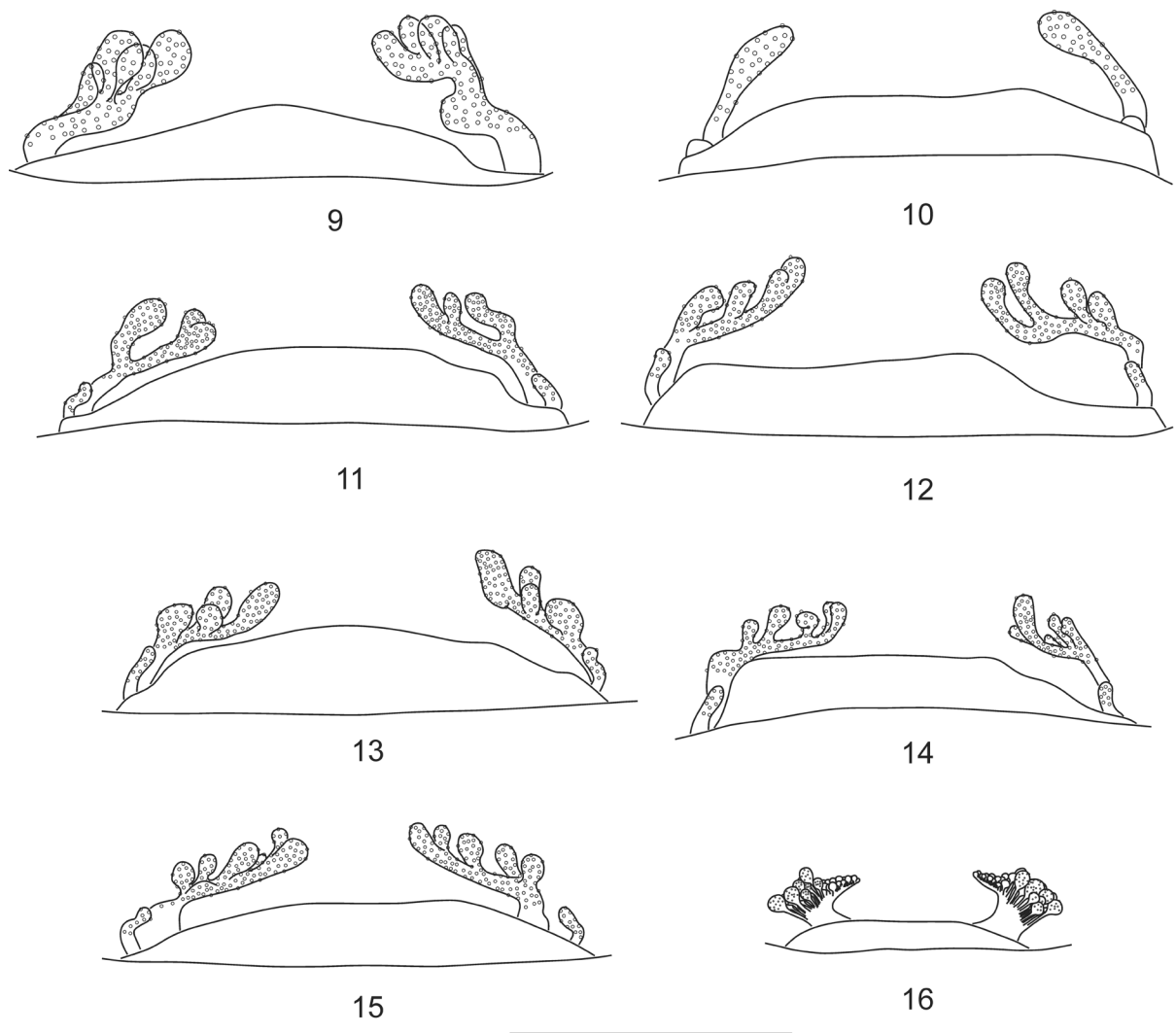
Sicarius dolichocephalus Lawrence, 1928: 222.

Sicarius dolichocephalus – Newlands 1986: 49. — Lotz 2012: 8.

Hexophthalma dolichocephala – Magalhaes *et al.* 2017: 850.

Diagnosis

Female inner spermathecae consist of one finger-like sac on each side, with a very short outer spermatheca (Fig. 10). Male embolus apical part thin, blunt and slightly twisted and flattened, unlike the other species where the apical part is thin and pointed (Fig. 20).



Figs 9–16. Female internal genitalia. **9.** *Hexophthalma damarensis* (Lawrence, 1928). **10.** *H. dolichocephala* (Lawrence, 1928). **11–15.** *H. hahni* (Karsch, 1878). **16.** *H. spatulata* (Pocock, 1900). Scale bar = 1mm.

Material examined

Lectotype

NAMIBIA: ♀, Kaoko Otavi [18°18' S, 13°40' E], Apr. 1926 (SAMC 6937).

Other material

NAMIBIA: 1 ♂, 1 ♀, 1 imm., Kaokoland, Opuwo, 17°24'20.34" S, 14°13'01.20" E, 18 Aug. 2005, G. Binford leg. (NMNW 45843); 1 ♀, Kaokoland, Opuwo, Baynes Mountain, Epembe, 17°04'32.9" S, 13°02'08.5" E, 20 Apr. 2006, EduVentures 8 leg. (NMNW 47266); 1 ♂, 1 ♀, Munutum River [18°17' S, 12°04' E], 19 Oct. 1988, H. Kleinhaus leg. (NMNW 40863); 1 ♂, Okahama water point, 17°10'34.1" S, 12°59'54.7" E, 25 Apr. 2006, EduVentures 8 leg. (NMNW 47271); 1 ♂, Möwe Bay, 19°20' S, 12°40' E, 1990, D. and J. Bartlett leg. (NMNW 42684); 1 ♂, Ruacana, 17°25' S, 14°19' E, 25–27 Aug. 1973, State Museum leg. (NMNW 35801).

Description

Male (n=5)

TL=19.5 (11.6–28.7); CL=4.98 (4.7–5.6); CW=4.94 (4.7–5.6); CLL=0.59 (0.50–0.65). AME-LE=0.5; eye diameter=0.2. Carapace reddish-brown, cephalic area slightly darker; abdomen and legs yellow-brown. Body and legs with lancet-like curved macrosetae, more strongly curved on body than on legs. Embolus thick over most of the length, tapered apically, point blunt and slightly twisted at base of thinner part (Fig. 20).

Leg measurements:

	I	II	III	IV	Palp
Femur	7.4	8.6	7.4	7.7	1.5
Patella	2.3	2.4	2.2	2.2	0.9
Tibia	8.4	8.8	7.6	7.3	1.2
Metatarsus	6.2	7.5	6.5	6.5	–
Tarsus	2.9	3.3	2.9	3.3	0.7
Total	27.2	30.6	26.6	27.0	4.3

Natural history

Hexophthalma dolichocephala have been collected in Desert, Nama Karoo and Savanna biomes, by pitfall traps and by hand from under rocks.

Distribution

Hexophthalma dolichocephala is distributed in the northwestern corner of Namibia (Fig. 25).

***Hexophthalma hahni* (Karsch, 1878)**

Figs 11–15, 21, 26

Hexomma hahnii Karsch, 1878: 325.

Sicarius testaceus Purcell, 1908: 224. **Syn. nov.**

Hexophthalma hahni – Karsch, 1879: 109. — Magalhaes *et al.* 2017: 850, figs 13B, 14B–C, 16G, 18G, 19C, 23A–C, 24A, 61A–D.

Sicarius hahni – Simon, 1893: 269. — Purcell 1908: 225. — Newlands 1986: 51. — Lotz 2012: 8.

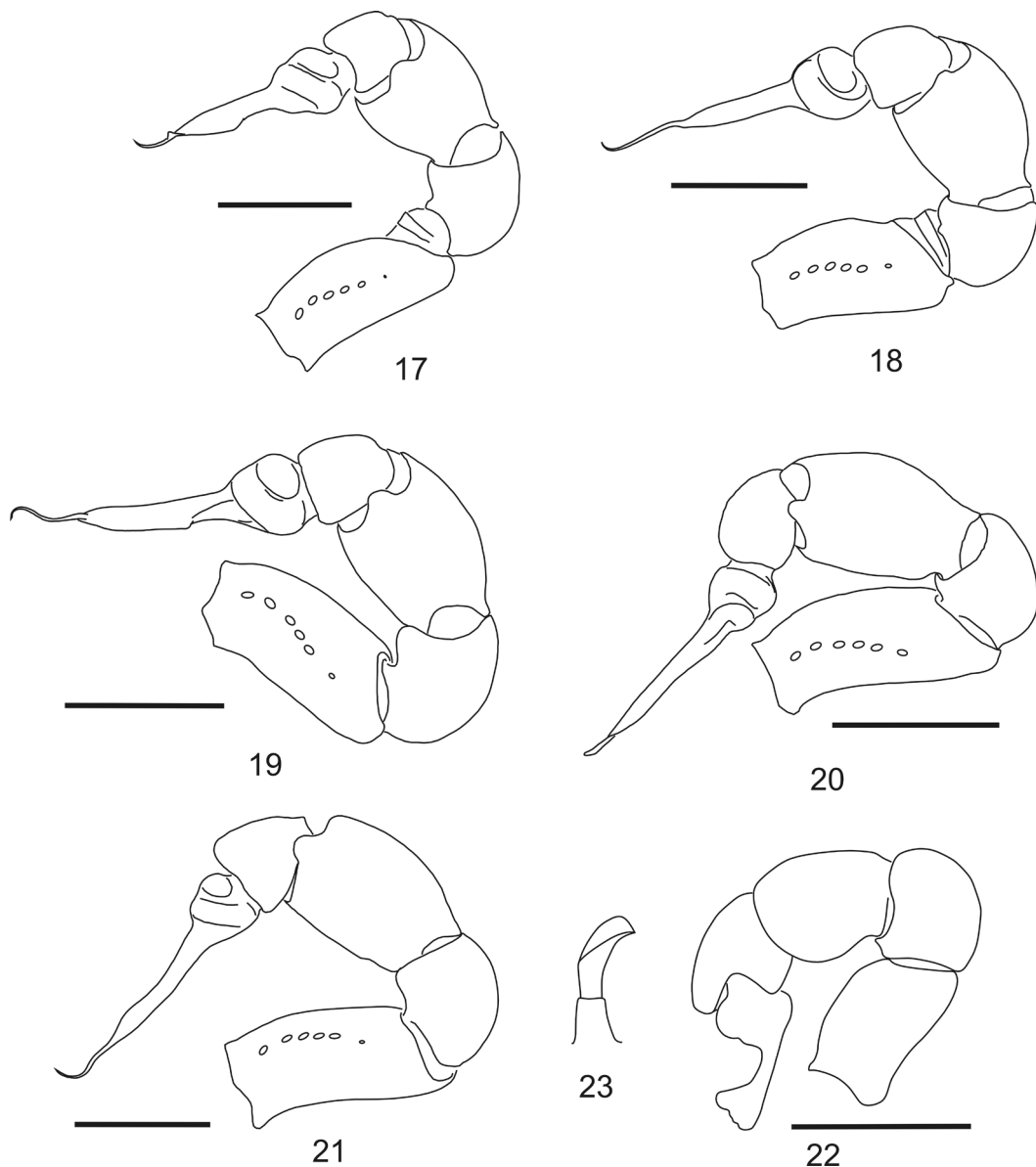
Sicarius testaceus – Newlands 1986: 57. — Lotz 2012: 12.

Hexophthalma testacea – Magalhaes *et al.* 2017: 852.

Note: *Sicarius oweni* Newlands, 1986: 53 is an unpublished synonym.

Diagnosis

Female inner spermathecae consist of finger-like sacs that branch close to the copulatory tube end, similar to in *H. albospinosa* except that the finger-like tubes are shorter and more bulbous (Figs 11–15). Male embolus consisting of a thin pointed apical part and a straight-sided thicker basal section (Fig. 21), similar to in *H. albospinosa* except that the thin apical part is shorter in relation to the thicker basal part.



Figs 17–23. 17–22. Male palps (right side prolateral). 17. *Hexophthalma albospinosa* (Purcell, 1908). 18. *H. goanikontesensis* sp. nov. 19. *H. damarensis* (Lawrence, 1928). 20. *H. dolichocephala* (Lawrence, 1928). 21. *H. hahni* (Karsch, 1878). 22. *H. spatulata* (Pocock, 1900). 23. *H. spatulata*, enlarged femoral seta (not to scale). Scale bars=1 mm.

Material examined

COUNTRY UNKNOWN: 2 ♂♂, 2 ♀♀, 4 imm. (SAMC B7732, B8870).

NAMIBIA: 1 ♂ [no locality or date], G. Brown leg. (SAMC B5704); 1 ♂, Ganab, 23°04' S, 15°10' E, 13–16 Sep. 1971, P.G. Olivier leg. (NMNW 35311); 1 ♀, same data as for preceding (NMNW 35313); 1 ♀, Grootfontein, Nosib Cave, 1917Bd, 8 Feb. 1995, SEGL leg. (NMNW 43454); 1 ♂, 1 ♀, Keetmanshoop, Khabus 146, 2618Ac, 7 Dec. 1987–17 Jan. 1988, Mar. 1992, N. and G. Olivier leg. (NMNW 40752); 2 ♂♂, same data as for preceding but 23 Jul.–1 Dec. 1988 (NMNW 42120, 42788); 1 ♀, Naukluft Park, Gifgat 2, 2215Da, 11 Jul. 1995, E. Marais leg. (NMNW 43673); 1 ♀, 1 imm., Naukluft Park, Gobabeb, 23°33'28.2" S, 15°02'14.32" E, 25 Oct. 1968, R.F. Lawrence leg. (AMSA); 1 ♂, 2 ♀♀, same data as for preceding but 21 Aug. 2005, G. Binford leg. (NMNW 45835); 1 ♂, 2 ♀♀, Naukluft Park, Kuiseb River, near Gobabeb [23°34' S, 15°03' E], 18 Feb.–20 Mar. 1983, Kuiseb survey leg. (PPRI 83/341); 1 ♂, same data as for preceding but 27 Aug. 1985, C.S. Crawford leg. (NMNW 41116); 1 ♂, 1 ♀, Otjiwarongo, Waterberg Plateau Park, 20°30'17.94" S, 17°14'32.16" E, 14 Aug. 2005, G. Binford leg. (NMNW 45838); 1 ♂, Sossusvlei, 24.7° S, 15.42° E, Dec. 1988, B. Grobbelaar leg. (PPRI 92/54); 1 ♂, Valencia, 96 km SW of Windhoek, 2316Ab, 23 Jun. 1969, A. Kemp leg. (AMSA); 1 ♂, 1 imm., Windhoek, Daan Viljoen Game Reserve, 22°32'16.14" S, 16°54'44.16" E, 12 Aug. 2005, G. Binford leg. (NMNW 45845); 1 ♂, Windhoek, Verloren Cave, 23°09' S, 16°20' E, 28 Jun. 1993, J. Irish leg. (NMBA 7361); 1 ♂, 1 imm., Messum Crater, 21°20.430' S, 14°13.218' E, 4–10 Apr. 2000, E. Griffin leg. (NMNW 44724); 1 ♀, 10 miles W of Okombahe [ca 21°24' S, 15°14' E], 10 May 1958, E.S. Ross and R.E. Leech leg. (CAS).

SOUTH AFRICA – **Limpopo Province**: 1 ♂, Kruger National Park, Pafuri area, 22.46° S, 31.3° E, 14 Oct. 1995, A. Leroy leg. (PPRI 98/405); 1 ♀, Limpopo Valley National Park, 22.22° S, 29.13° E, 29 Apr. 1997, J. Leroy leg. (PPRI 97/816); 4 ♂♂, Makgabeng area, W of Senwabawana, 23.24° S, 28.85° E, 22 Dec. 2006, M. Burger and R. Hawkins leg. (PPRI 2008/3788, 2008/3807); 1 ♂, Rochdale, near Waterpoort, 22.54° S, 29.41° E, 4 Apr. 1993, A. Leroy leg. (PPRI 2007/1626); 1 ♂, Vhembi Biosphere, Gondeni, 22.914° S, 30.050° E, 4 Dec. 2012, C. Schoeman leg. (PPRI 2015/632). – **Mpumalanga**: 1 ♀, 2 imm., Bango Poort, Cave Poort, 24.58° S, 31.1° E, Mar. 1984, L. Braak leg. (PPRI 85/174). – **Northern Cape Province**: 1 ♂, Blackridge, E of Langberge, E-NE of Groblershoop, 28°49' S, 22°32' E, 22 Dec. 2005, M. Burger leg. (PPRI 2009/3835); 1 ♂, Bo-Seekoebaard, SE of Groblershoop [29°05' S, 22°17' E], 13 Dec. 2005, M. Burger leg. (PPRI 2009/3834); 1 ♂, Bushmanland, Krapohl Island [28°50'30" S, 18°43'30" E], 1909 (SAMC 14708); 2 ♀♀, 4 imm., Calvinia, Klein Arendskraal, 31°24' S, 19°03' E, 19 Feb. 2004, L.N. Lotz leg. (NMBA 9259, 9269); 1 ♂, Douglas [29°04' S, 23°47' E], R. Broom leg. (AMSA); 3 ♂♂, Eselsfontein, south of Grootdrink, 28.62° S, 21.68° E, 13 Nov. 2005, M. Burger, P. Braad and A. Hill leg. (PPRI 2009/3830–32); 1 ♂, same data as for precedings but 22 Nov. 2005, M. Burger leg. (PPRI 2009/3833); 1 ♂, 1 imm., Little Namaqualand, Kamies [Kamieskroon?] [ca 30°13' S, 17°56' E] (SAMC B7442); 1 ♂, 1 imm., Namaqualand, Kap Kap 382, 30°16' S, 18°22' E, 20 Oct. 1990, L.N. Lotz leg. (NMBA 5122); 1 ♂, 1 ♀, Nieuwoudtville, Oorlogskloof Nature Reserve, 31.45° S, 19.1° E, 27 Apr. 2000, A. Leroy leg. (PPRI 2010/187); 1 ♀, 2 imm., NW Gordonia, C.A. Anderson leg. (AMSA 1967); 1 ♂, Port Nolloth, 2916Bd, 13 Mar. 1973, M.-L. Penrith leg. (NMNW 35722); 2 ♂♂, 1 ♀, Quaggafontein 476, 15 km S-SW of Soebatsfontein, 30°11'14.6" S, 17°32'58.6" E, 29 Sept. 2002, BIOTA leg. (PPRI 2009/5561, 2009/5562). – **North West Province**: 1 ♀, Groot Marico, 25.6° S, 26.43° E, 21 Jan. 1991, M. Filmer leg. (PPRI 91/1323). – **Western Cape Province**: 1 ♀, 10 km N of Bitterfontein [ca 30°59' S, 18°14' E], 15 Sept. 1983, J.V. leg. (SAMC C1981); 1 ♀, Clanwilliam District (SAMC 3548); 1 ♀, Clanwilliam, Sanddrif (Dwarsrivier 330), 32.16° S, 18.89° E, Feb. 1993, G. Müller leg. (PPRI 93/261); 1 ♀, Donkins Bay, 3118Cd, 14 Mar. 1973, M.J. and M.-L. Penrith leg. (NMNW 35729); 1 ♀, Doringbaai [31°49' S, 18°14' E], Nov. 1956, SAMC Expedition leg. (SAMC C1235); 3 ♀♀, Swartberg Nature Reserve, Gamkaskloof, 33.36° S, 21.69° E, Dec. 1995, M. de Jager leg. (PPRI 96/399); 1 ♀, 12 imm., same data as for preceding but 1 Jul. 2000, Z. van der Walt leg.

(PPRI 2002/44); 1 ♀, Hans Strydom Dam Nature Reserve, Mogol, 33.95° S, 22.46° E, 19 Jan. 1983, M. Mansell leg. (PPRI 83/198); 1 ♂, The Island, S of Herbertsdale, 34.08° S, 21.77° E, 3 Jan. 2006, M. Burger leg. (PPRI 2009/3828); 1 ♂, same data as for preceding but 30 Jan. 2006 (PPRI 2009/3829); 1 ♀, 19 km SE of Klawer [ca 31°54' S, 18°39' E], 1 May 1958 (CAS); 1 ♀, Lutzville, Vlêrmuisklip, near Vredendal, 31.39° S, 18.32° E, 2 Oct. 1986, M.W. Mansell and J. Hoffman leg. (PPRI 86/650); 1 ♀, Papendorp, near Olifants River Estuary [ca 31°42' S, 18°13' E], 12 Nov. 1949, B. Malkin leg. (CAS); 2 ♂♂, 1 ♀, 1 imm., Prince Albert, Swartberg Nature Reserve, Gamkaskloof, Die Hel, 33°20' S, 21°40' E, Sep. 1998, Z. van der Walt leg. (NMBA 8695, 8860); 1 ♀, 3 imm., Vanrhynsdorp, Van Rhyn's Pass, 31.6° S, 18.75° E, 3 Oct. 1986, M.W. Mansell and J. Hoffman leg. (PPRI 86/648).

ZIMBABWE: 1 ♀, Pande Mine, 2230Ad, 9 Feb. 1994, F. Nyathi leg. (NMZB A/11518); 1 ♀, 1 imm., Sentinel Ranch, Hunters Camp, 2229Ab, 16 Apr. 1990, Falcon Collage-NHMZ leg. (NMZB A/9940).

Natural history

Hexophthalma hahni have been collected in the Fynbos, Grassland, Karoo, Desert and Savanna biomes, by pitfall traps and by hand, in caves and from under rocks and logs.

Distribution

Hexophthalma hahni is distributed in Namibia, South Africa and southern Zimbabwe (Fig. 26).

Hexophthalma spatulata (Pocock, 1900)

Figs 16, 22–23, 25

Sicarius spatulatus Pocock, 1900: 321.

Sicarius spatulatus – Newlands 1986: 56. — Lotz 2012: 10.

Hexophthalma spatulata – Magalhaes *et al.* 2017: 853, figs 6A–D, 12C, 14D, 18H, 19D, 20E–F, 22A–E, 23D–F, 31H.

Diagnosis

Leg femora in both sexes with scoop-shaped enlarged dorsal setae (Fig. 23), differing from the setae of all other species. Female inner spermathecae consist of a broad chamber, extending anteriorly in numerous tubes, each ending in one or more spherical vesicles (Fig. 16), differing from all other species, where the inner spermathecae are finger-like sacs. Male embolus ending in a broad, blunt triangular apex (Fig. 22), whereas the embolus of all the other species have thin apices.

Material examined

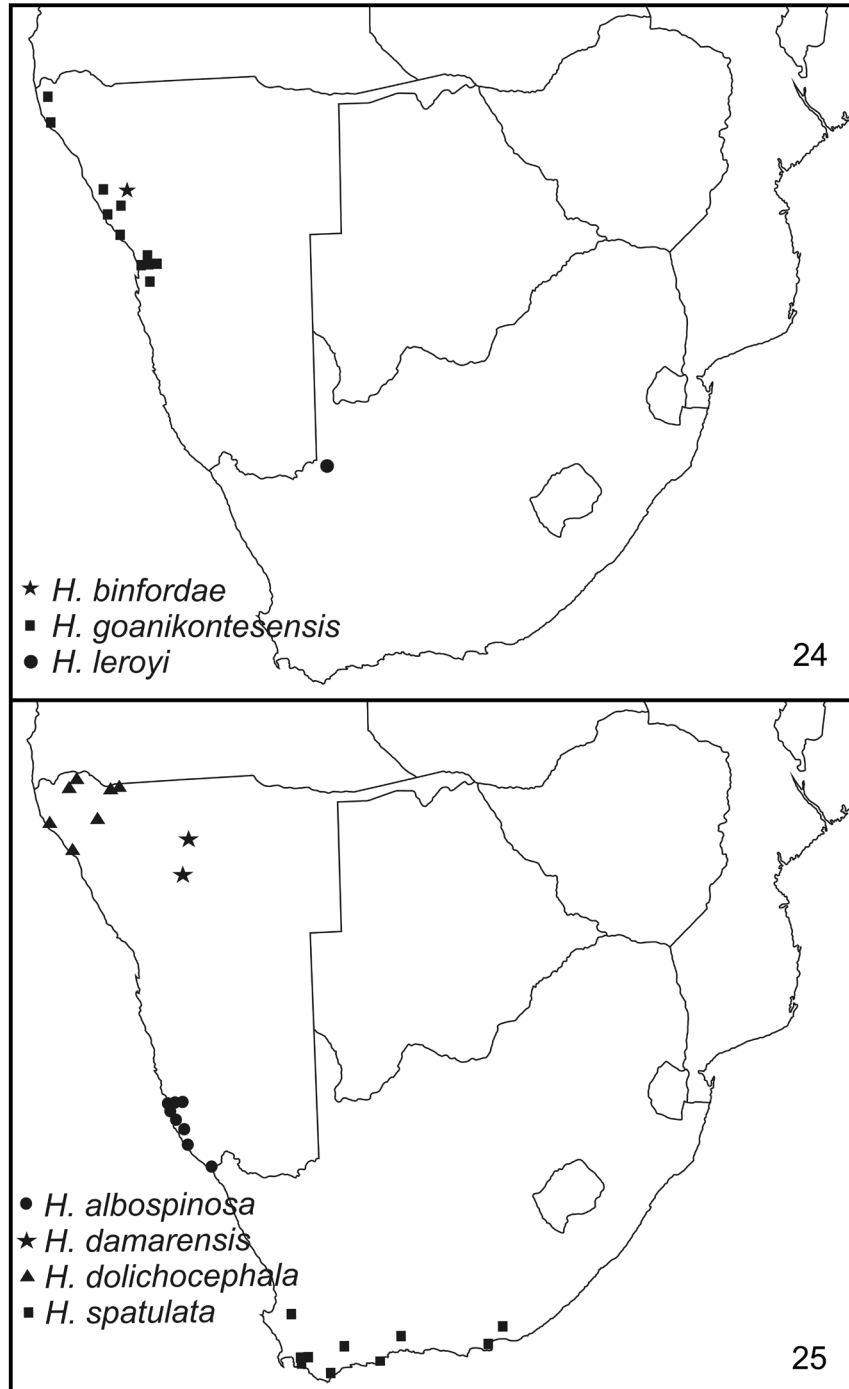
SOUTH AFRICA – **Eastern Cape Province**: 5 ♂♂, 1 ♀, 2 imm., Alicedale [33°18' S, 26°05' E], Dec. 1914, F. Cruden leg. (AMSA); 1 ♀, same data as for preceding (AMSA 2525). – **Western Cape Province**: 1 ♂, Borrelfontein, 8 km W of Gouritz River mouth, 34°20' S, 21°51' E, 4 Mar. 2007, H. Leibel leg. (PPRI 2008/745); 1 ♂, same data as for preceding but Nov. 2007–May 2008 (PPRI 2009/5601); 1 ♂, Bredasdorp [34°32' S, 20°03' E] (SAMC B7435); 4 ♀♀, Calidon [34°14' S, 19°26' E] (SAMC 8348); 1 ♂, 1 ♀, 2 imm., same data as preceding but W.F. Purcell leg. (SAMC B363); 1 ♂, 2 ♀♀, 1 imm., Hermanus [34°25' S, 19°13' E], (SAMC 11632, B8482); 2 ♂♂, 2 ♀♀, 5 imm., Houwhoek, 3419Aa (SAMC 8327); 1 ♂, Kammanasie Nature Reserve, 33°39' S, 22°44' E, 31 Jul. 2003, Reserve Staff leg. (PPRI 2010/2403); 1 ♀, Piquetberg, 3218Dd (SAMC B8490); 1 ♀, Swellendam, Tradows Pass [33°58' S, 20°42' E] (SAMC B6767).

Natural history

Hexophthalma spatulata have been collected in a Fynbos biome.

Distribution

Hexophthalma spatulata is distributed along the southern coastal areas of South Africa (Fig. 25).



Figs 24–25. Distribution maps for species of *Hexophthalma* Karsch, 1879. **24.** *H. goanikontesensis* sp. nov., *H. binfordae* sp. nov. and *H. leroyi* sp. nov. **25.** *H. albospinosa* (Purcell, 1908), *H. damarensis* (Lawrence, 1928), *H. dolichocephala* (Lawrence, 1928) and *H. spatulata* (Pocock, 1900).

Discussion

Species of *Hexophthalma*, the former African *Sicarius*, have raised interest because of their supposed medical importance (Newlands & Atkinson 1988; Van Aswegen *et al.* 1997). The venom of some of the species has even been considered as one of the strongest spider venoms (Newlands 1986), but this has never been corroborated. Studies on this topic, mainly on the interspecific variation of the venom, which can be very large (Müller *et al.* 2012), are particularly difficult, because the identification of the species is virtually impossible. The study of Zobel-Thropp *et al.* (2010) is symptomatic: it was hindered by the lack of systematic knowledge and had to use approximate identifications like *Sicarius* cf. *hahni* and *S.* cf. *damarensis*. The present study has made a step forward, but it is clear that more efforts will be needed to facilitate studies on this genus, be it systematic, ecological or medical. In several species the males are still unknown, more species are to be expected and the monophyly of the genus is questionable because of the morphologically aberrant *H. spatulata*. Future studies will therefore have to be carried out along several axes. In the first place, further collecting will be needed to fill the gaps outlined above. Molecular studies in combination with detailed morphological assessments will be necessary to outline the interspecific relationships and the phylogenetic placement of the group, mainly in connection with its possible polyphyly.

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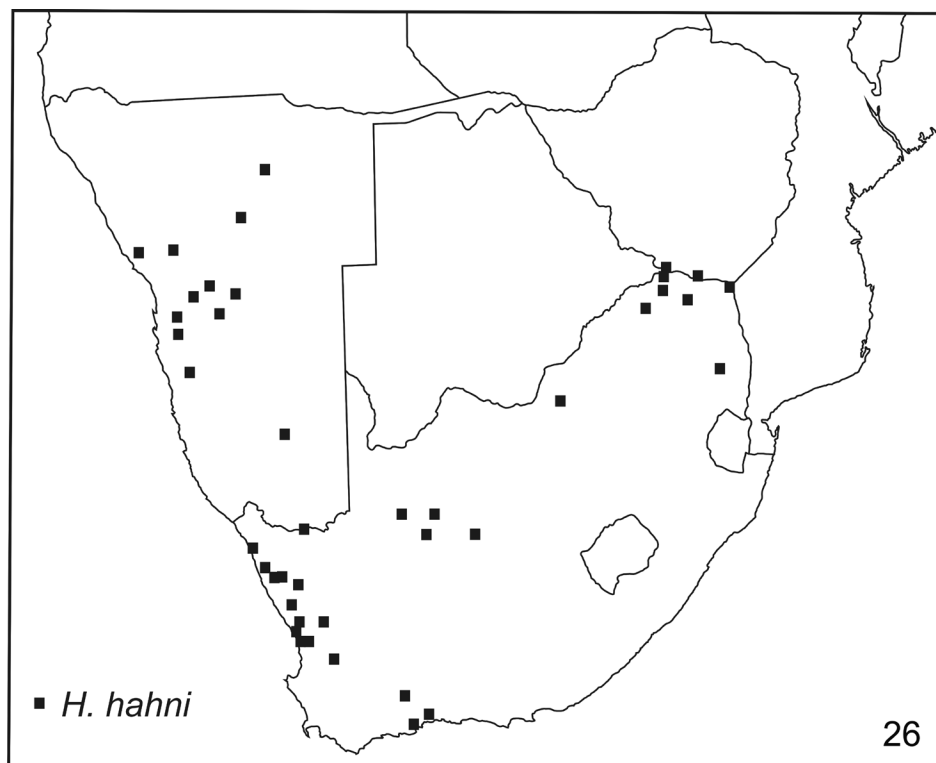


Fig. 26. Distribution map for *Hexophthalma hahni* (Karsch, 1878).

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