



## Research article

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# On the genus *Pachygnatha* (Araneae, Tetragnathidae) in the Albertine Rift of Burundi, with the description of three new species

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**Abstract.** Three new species of *Pachygnatha*, *P. bispiralis* sp. nov., *P. intermedia* sp. nov. and *P. ventricosa* sp. nov., are described from forest areas in western Burundi. The presence of *P. procincta* Bosmans & Bosselaers, 1994 in Burundi confirms its very wide distribution spanning most of Africa. *Pachygnatha* appears to be an important element of the afro-montane spider fauna.

**Keywords.** Kibira National Park, Afro-montane forest, new species, genus template, biodiversity hotspot.

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## Introduction

Twelve species of *Pachygnatha* Sundevall, 1823 are known from tropical Africa (Platnick 2014). Bosmans & Bosselaers (1994) gave an excellent overview of this fauna and not only described several new species from Cameroon but also redescribed all known species except one, *P. africana* Strand, 1906 for which the types could not be traced, doubtless because they have been destroyed during World War II (Renner 1988).

Of the twelve species, two are known from Central Africa, and more precisely from mountainous areas in the Albertine Rift: *Pachygnatha kiwuana* Strand, 1913, and *Pachygnatha ruanda* Strand, 1913.

During three years (2003, 2004–2005, 2008) of field work along altitudinal gradients (793 to 2650 m) in the afro-montane forest of Kibira, miombo forest of Rumonge and circum-Guinean forest of Kigwena, four species of *Pachygnatha* have been found. Only *Pachygnatha procincta* Bosmans & Bosselaers, 1994 has been previously described. It apparently has a wide distribution and was known from Cameroon and Kenya. Three other species are here described as new.

## Material and methods

Primary types are deposited in the Musée Royal de l'Afrique Centrale, Tervuren, Belgium (MRAC), whereas paratypes are divided among MRAC and the Institut National pour l'Environnement et

la Conservation de la Nature, Bujumbura, Burundi (INECN). Specimens were observed, drawn and measured with a WILD M 10 stereo microscope. Details of the female genitalia and male palps were observed with a Zeiss Stemi 2000 stereo microscope.

Female genitalia were detached from the abdomen, cleared with methyl salicylate and temporarily mounted in a mixture of methyl salicylate and cedukol for examination. The same method was used to observe details of the male palp. These structures were photographed with a Leica MZ16 stereo microscope and subject to automontage with the Syncrosopy software. All measurements are in mm. As with the illustrations, they were taken from the holotype and paratypes unless stated otherwise. Coordinates are in decimal format. The distribution map for *Pachygnatha procincta* (Fig. 6) shows only one spot in Burundi: it covers both the adjacent collection sites Kibira and Kigwena mentioned in this paper and of which the former is the type locality of the three new species.

### Abbreviations

ALE	=	anterior lateral eyes
AME	=	anterior median eyes
AW	=	anterior width
Fe	=	femur
INECN	=	Institut National pour l'Environnement et la Conservation de la Nature (Bujumbura, Burundi)
L	=	length
MOQ	=	median ocular quadrangle
MRAC	=	Musée Royal de l'Afrique Centrale (Tervuren, Belgium)
Mt	=	metatarsus
PA	=	patella
PLE	=	posterior lateral eyes
PME	=	posterior median eyes
PW	=	posterior width
t	=	tarsus
T	=	tibia

### Results

Class Arachnida Cuvier, 1812  
Order Araneae Clerck, 1757  
Family Tetragnathidae Menge, 1866  
Genus *Pachygnatha* Sundevall, 1823

*Pachygnatha bispiralis* sp. nov.

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Figs 1A–C, 2A–D

### Diagnosis

Males are easily recognized by several unique features: the peculiar cymbium which is strongly narrowed at the mid-point, the very long conductor protruding beyond the cymbium, the tibia with a large ventrolateral apophysis and the very large, claw shaped, distal spur on the chelicerae.

### Etymology

The specific name *bispiralis* refers to the broad embolus with longitudinal groove giving the impression of a sclerite with two spirals.

## Type material examined

### Holotype

BURUNDI: ♂, Kibira National Park, Rwegura, Mt Musumba, 02.87696°S, 029.49709°E, site 1, mountain heather with *Philippia benguelensis*, 10 Mar. 2008, 2650 m, pitfalls, B. Nzigidahera (MRAC 226712).

### Paratypes

BURUNDI: 2 ♂♂, Kibira National Park, Rwegura, Mt Musumba, 02.86435°S, 029.49540°E, site 7, tea plantation, 10 Sep. 2008, 2100 m, pitfalls, B. Nzigidahera (INECN); 1 ♂, same locality, 02.86435°S, 029.49546°E, site 6, forest with *Carapa grandiflora* and *Polyscias fulva*, 25 Mar. 2008, 2150 m (MRAC 226711); 1 ♂, 1 juv., same locality, 10 Mar. 2008 (MRAC 226730); 1 ♂, same locality, 02.86445°S, 029.49640°E, site 5, forest with *Carapa grandiflora* and *Polyscias fulva*, 25 Jul. 2008, 2252 m (MRAC 226722); 1 ♂, same locality, 10 Apr. 2008 (MRAC 226724); 1 ♂, same locality, 25 Feb. 2008 (MRAC 226731); 2 ♂♂, same locality, 10 Dec. 2008 (MRAC 226732); 1 ♂, same locality, 25 Dec. 2008 (MRAC 226725); 1 ♂, same locality, 15 Mar. 2008 (MRAC 226719); 3 ♂♂, same locality, 26 Jan. 2008 (MRAC 226721); 1 ♂, same locality, 02.87149°S, 029.49641°E, site 3, forest with *Hagenia abyssinica*, 25 Apr. 2008, 2444 m (MRAC 226727); 1 ♂, same locality, 26 Jan. 2008 (MRAC 226715); 1 ♂, same locality, 10 Mar. 2008 (MRAC 226716); 1 ♂, same locality, 25 Nov. 2008 (MRAC 226723); 3 ♂♂, same locality, 25 Feb. 2008 (MRAC 226720); 1 ♂, same locality, 10 Nov. 2008 (INECN); 1 ♂, same locality, 02.87060°S, 029.49669°E, site 2, forest with *Hagenia abyssinica*, 25 Apr. 2008, 2548 m (INECN); 1 ♂, same locality, 02.87696°S, 029.49709°E, site 1, forest mountain heather, *Philippia benguelensis*, 25 Dec. 2008, 2650 m (MRAC 226717); 2 ♂♂, same locality, 10 Nov. 2008 (MRAC 226729); 1 ♂, same locality, 25 Oct. 2008 (MRAC 226726); 1 ♂, same locality, 25 Mar. 2008 (MRAC 226564); 1 ♂, same locality, 25 Jun. 2008 (INECN); 1 ♂, same locality, 10 Sep. 2008 (INECN); 1 ♂, same locality, 25 Feb. 2008 (INECN); 1 ♂, same locality, 02.89891°S, 029.50405°E, site 1, tea plantation, 15 May 2005, 1970 m (INECN); 1 ♂, Kibira National Park, Rusarenda Forest, 03.14228°S, 029.56235°E, forest with *Neoboutonia macrocalyx* and *Myrianthus holstii*, 12 Feb. 2003, 2237 m, pitfalls, B. Nzigidahera (INECN); 1 ♂, Kigwena Nature Reserve, Kigwena Forest, 02.89891°S, 029.50405°E, forest with *Newtonia buchananii* and *Albizia zygia*, 5 Jan. 2004, 793 m, pitfalls, B. Nzigidahera (INECN).

## Description

### Male

Holotype, Figs 1A–C, 2A–D.

MEASUREMENTS. Total length 2.70, carapace 1.20 long, 1.08 wide.

CARAPACE. Pale brown, with two lateral dark brown bands; prominent in anterior part.

EYES. AME: 0.12, ALE: 0.12, PLE: 0.12, PME: 0.20, AME-AME: 0.02, PME-PME: 0.02, AME-ALE: 0.04, PME-PL: 0.06, ALE-PL: 0.00, MOQ: AW: 0.26, PW: 0.32, L: 0.32.

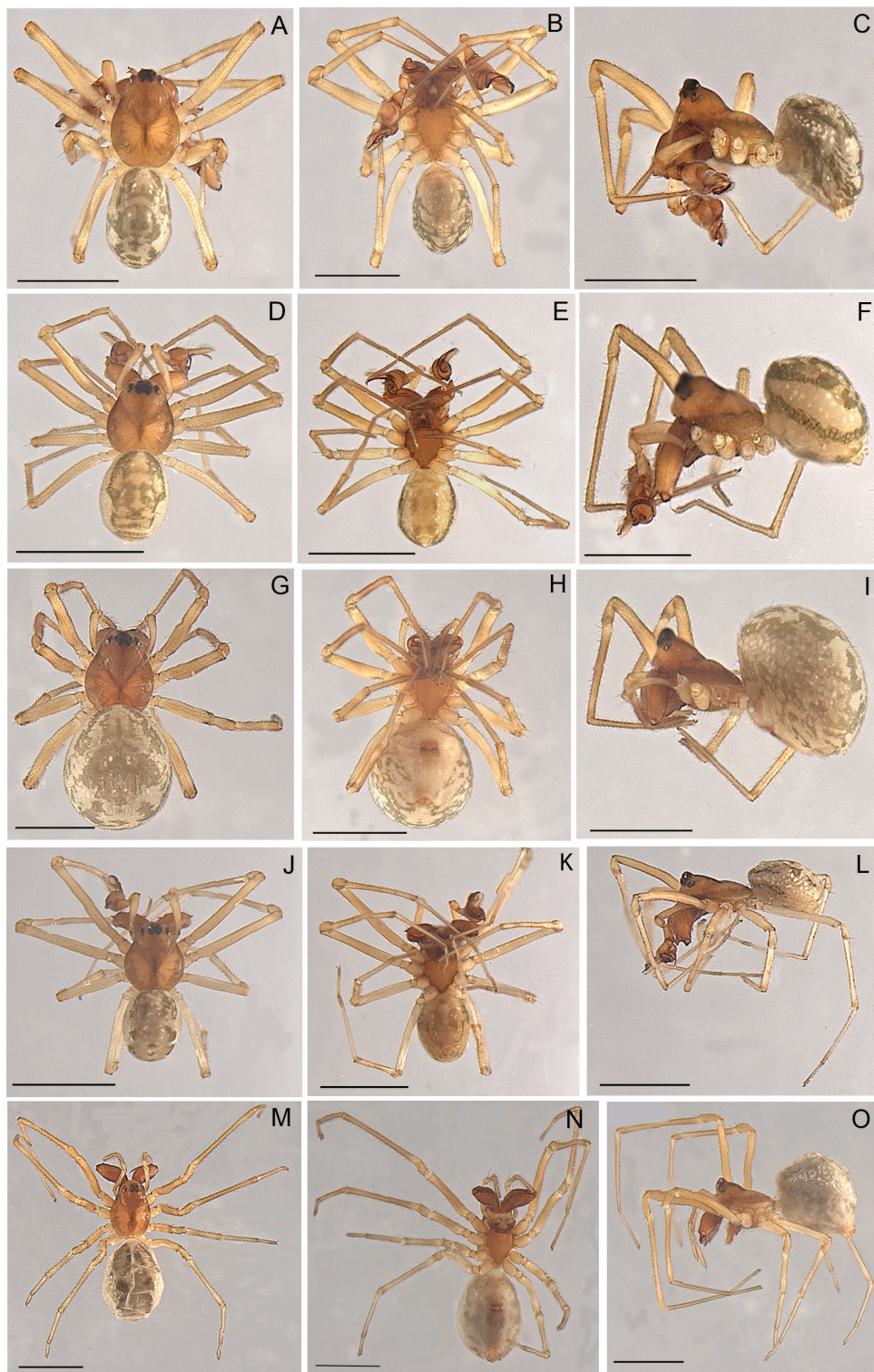
CHELICERAE. (Fig. 2C–D). Four promarginal teeth, four retromarginal teeth, large claw shaped prolateral spur with broad base and sharp, curved tip.

STERNUM. Brownish grey with some setae, distal margin concave; intercoxal sclerites present.

LEGS. Yellowish brown; one distal dorsal spine on patellae; no further spines.

ABDOMEN. Yellowish grey with irregular, connected dark grey spots in almost three longitudinal lines, mixed with silvery spots. Spinnerets pale yellow.





**Fig. 1.** A–C. *Pachygnatha bispiralis* sp. nov. A. Male habitus, dorsal view. B. Male habitus, ventral view. C. Male habitus, lateral view. D–I. *Pachygnatha intermedia* sp. nov. D. Male habitus, dorsal view. E. Male habitus, ventral view. F. Male habitus, lateral view. G. Female habitus, dorsal view. H. Female habitus, ventral view. I. Female habitus, lateral view. J–O. *Pachygnatha ventricosa* sp. nov. J. Male habitus, dorsal view. K. Male habitus, ventral view. L. Male habitus, lateral view. M. Female habitus, dorsal view. N. Female habitus, ventral view. O. Female habitus, lateral view. Scale bars = 2 mm.

**PALP.** (Fig. 2A–B). Sclerotised tibial apophysis very broad, large blade-shape retrolaterally high, ventrally short. Paracymbium long, straight with some long hairs at the sharp, slightly curved tip. Cymbium very broad at base, thin in middle and wider towards tip. Embolus long, running along tegulum and beyond to tip of cymbium, supported by conductor.

LEG MEASUREMENTS

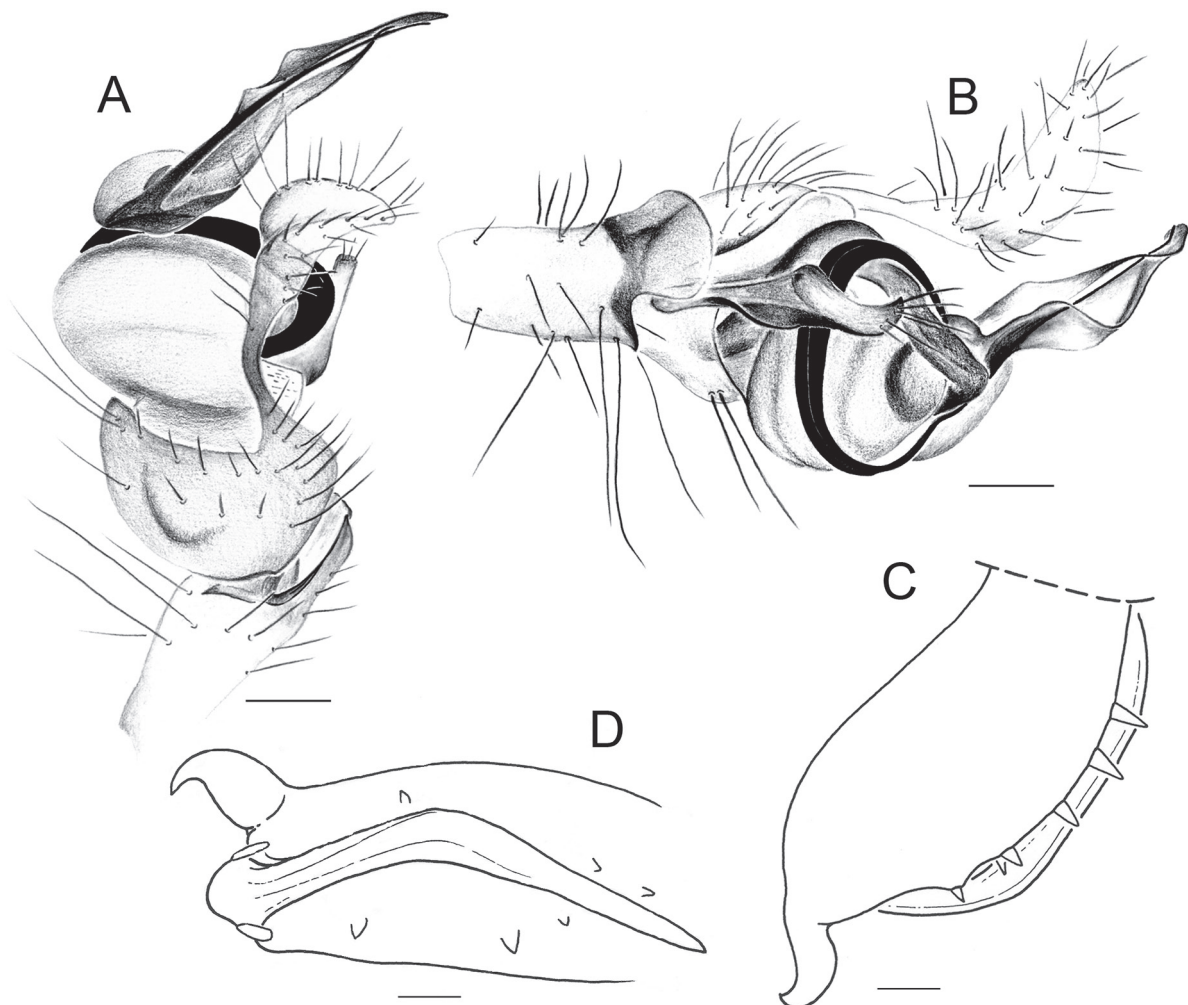
Leg	Fe	Pa	T	Mt	t	Total
I	1.64	0.48	1.76	1.44	0.80	6.12
II	1.60	0.44	1.96	1.28	1.76	7.04
III	1.20	0.40	0.92	0.88	0.48	3.88
IV	1.48	0.40	1.40	1.28	0.64	5.20

**Female**

Unknown.

**Distribution**

Known from Kibira National Park and Kigwena Nature Reserve in Burundi.



**Fig. 2.** *Pachygnatha bispiralis* sp. nov. **A.** Male left palp, dorsal view. **B.** Male palp, retrolateral view. **C.** Male right chelicera, frontal view. **D.** Male right chelicera, ventral view. Scale bars = 0.1 mm.



*Pachygnatha intermedia* sp. nov.

[urn:lsid:zoobank.org:act:AE150829-001F-4063-94A1-86FDA88B309D](http://urn:lsid:zoobank.org:act:AE150829-001F-4063-94A1-86FDA88B309D)

Figs 1D–I, 3A–H, 5A

### Diagnosis

Males are recognized by details of the palp: the cymbium is unique in having a central membranous area dividing it into a proximal and a distal part, the latter provided with a short, thin prong; the paracymbium is broad at its base with a retrolateral swelling and a triangular prolateral extension, the distal part is slender and tapered to a point; the tibia has a well developed truncate dorsal apophysis. The female is recognized by the rectangular sclerotised areas in front and behind the genital opening.

*P. intermedia* sp. nov. is closely related to *P. okuensis* Bosmans & Bosselaers, 1994. The males share the distal paracymbial excavation, the shape of the cheliceral fang and the lozenge shaped paracymbium. Both the latter differ in details of the shape: in *P. intermedia* the triangular extension of the cheliceral fang is much more pronounced and the distal prong of the paracymbium is much more slender and longer; the excavation of the cymbium is subdistal whereas it is at the distal tip of *P. okuensis*. The female has a cheliceral spur on the promargin of the chelicerae. With *P. goedeli* Bosmans & Bosselaers, 1994 it shares the paracymbium with long narrow distal extension and the small cymbial distal prong but details of these sclerites are clearly different.

### Etymology

The specific name *intermedia* refers to shape of the paracymbium which is of median size in between the very broad paracymbium of *Pachygnatha ventricosa* sp. nov. and the narrow one of *P. bispiralis* sp. nov.

### Type material examined

#### Holotype

BURUNDI: ♂, Kibira National Park, Rwegura, Mt Musumba, 02.87149°S, 029.49641°E, site 3, forest with *Hagenia abyssinica*, 10 Jul. 2008, 2444 m, pitfalls, B. Nzigidahera (MRAC 226552).

#### Paratypes

BURUNDI: 1 ♂, Kibira National Park, Rwegura, Mt Musumba (same locality for all paratypes), 02.86435°S, 029.49540°E, site 7, tea plantation, 10 Dec. 2008, 2100 m, pitfalls, B. Nzigidahera (MRAC 226772); 1 ♂, 25 Feb. 2008 (INECN); 1 ♀, 25 Oct. 2008 (INECN); 1 ♂, 02.86435°S, 029.49546°E, site 6, forest with *Carapa grandiflora* and *Polyscias fulva*, 25 Feb. 2008, 2150 m (MRAC 226558); 3 ♂♂, 25 Jul. 2008 (MRAC 226562); 1 ♂, 10 Nov. 2008 (INECN); 3 ♀♀, 02.86445°S, 029.49640°E, site 5, forest with *Carapa grandiflora* and *Polyscias fulva*, 25 Apr. 2008, 2252 m (MRAC 226747); 1 ♂, 25 Jul. 2008 (MRAC 226573); 1 ♀, 10 May 2008 (MRAC 226528); 1 ♂, 10 Jun. 2008 (MRAC 226551); 1 ♂, 10 Jul. 2008 (MRAC 226548); 1 ♂, 02.86455°S, 029.50427°E, site 4, forest with *Macaranga neomildbraediana* and *Polyscias fulva*, 10 Oct. 2008, 2352 m (MRAC 226735); 2 ♂♂, 25 Mar. 2008 (MRAC 226554); 1 ♀, 25 May 2008 (MRAC 226543); 2 ♀♀, 25 Sep. 2008 (MRAC 226535); 2 ♀♀, 25 Mar. 2008 (MRAC 226534); 2 ♂♂, 10 Jan. 2008 (MRAC 226555); 1 ♂, 25 Aug. 2008 (MRAC 226547); 2 ♂♂, 25 Feb. 2008 (MRAC 226571); 1 ♀, 25 Sep. 2008 (MRAC 226527); 1 ♂, 10 Dec. 2008 (INECN); 1 ♂, 25 Apr. 2008 (INECN); 2 ♂♂, 10 Aug. 2008 (INECN); 1 ♂, 25 Oct. 2008 (INECN); 1 ♂, 25 Jun. 2008 (INECN); 3 ♀♀, 25 Jul. 2008 (INECN); 1 ♀, 25 Dec. 2008 (INECN); 1 ♀, 10 Sep. 2008 (INECN); 2 ♀♀, 10 Apr. 2008 (INECN); 3 ♂♂, 02.87149°S, 029.49641°E, site 3, forest with *Hagenia abyssinica*, 25 Nov. 2008, 2444 m (MRAC 226566); 1 ♂, 10 Jul. 2008 (MRAC 226552); 1 ♀, 25 Dec. 2008 (MRAC 226544); 4 ♂♂, 2 juvs, 26 Jan. 2008 (MRAC 226549); 1 ♂, 10 Sep. 2008 (MRAC 226569); 3 ♂♂, 25 Feb. 2008 (MRAC 226561); 1 ♀, 10 Apr. 2008 (MRAC 226524); 1 ♂, 25 Jun. 2008 (MRAC 226563); 1 ♂, 10 Dec. 2008 (MRAC 226556); 1 ♂, 10 Oct. 2008 (INECN); 2 ♀♀, 10 Feb. 2008 (INECN); 1 ♀, 26 Jan. 2008

(INECN); 4 ♀♀, 10 Mar. 2008 (INECN); 1 ♂, 10 Feb. 2008 (INECN); 2 ♂♂, 02.87060°S, 029.49669°E, site 2, forest with *Hagenia abyssinica*, 26 Jan. 2008, 2548 m (MRAC 226756); 2 ♂♂, 25 Jul. 2008 (MRAC 226553); 1 ♂, 25 Dec. 2008 (MRAC 226568); 2 ♂♂, 1 juv., 25 Feb. 2008 (MRAC 226572); 1 ♂, 10 Aug. 2008 (INECN); 2 ♀♀, 02.87696°S, 029.49709°E, site 1, forest mountain heather, *Phillipia benguelensis*, 10 Mar. 2008, 2650 m (MRAC 226539); 1 ♂, 10 May 2008 (MRAC 226567); 1 ♂, 10 Apr. 2008 (MRAC 226559); 1 ♂, 10 Jun. 2008 (MRAC 226557); 3 ♀♀, 25 Dec. 2008 (MRAC 226540); 1 ♂, 25 Apr. 2008 (MRAC 226548); 1 ♂, 10 Nov. 2008 (MRAC 226560); 4 ♂♂, 25 Feb. 2008 (MRAC 226550); 1 ♂, 25 May 2008 (MRAC 226565); 2 ♀♀, 10 Sep. 2008 (MRAC 226545); 4 ♂♂, 25 Dec. 2008 (INECN); 2 ♂♂, 25 Mar. 2008 (INECN); 2 ♂♂, 10 Mar. 2008 (INECN); 1 ♂, 25 Jul. 2008 (INECN); 1 ♂, 25 Sep. 2008 (INECN); 2 ♀♀, 25 Mar. 2008 (INECN); 3 ♀♀, 25 Feb. 2008 (INECN).

## Description

### Male

Holotype, Figs 1D–F, 3A–D.

MEASUREMENTS. Total length 3.80, carapace 1.90 long, 1.60 wide.

CARAPACE. Brown, with prominent anterior part delimited by dark brown lines converging in fovea in Y-shape.

EYES. AME: 0.14, ALE: 0.14, PLE: 0.12, PME: 0.22, AME-AME: 0.04, PME-PME < 0.02, AME-ALE: 0.12, PME-PL: 0.14, ALE-PL: 0.00, MOQ: AW: 0.36, PW: 0.40, L: 0.44.

CHELICERAE. (Fig. 3C–D). Three promarginal teeth, four retromarginal teeth, with oval spur at tip. Cheliceral fang curved with pronounced triangular extension in the middle.

STERNUM. Brown, with a sharp sclerotised point at each end of the slightly concave anterior margin; intercoxal extensions present.

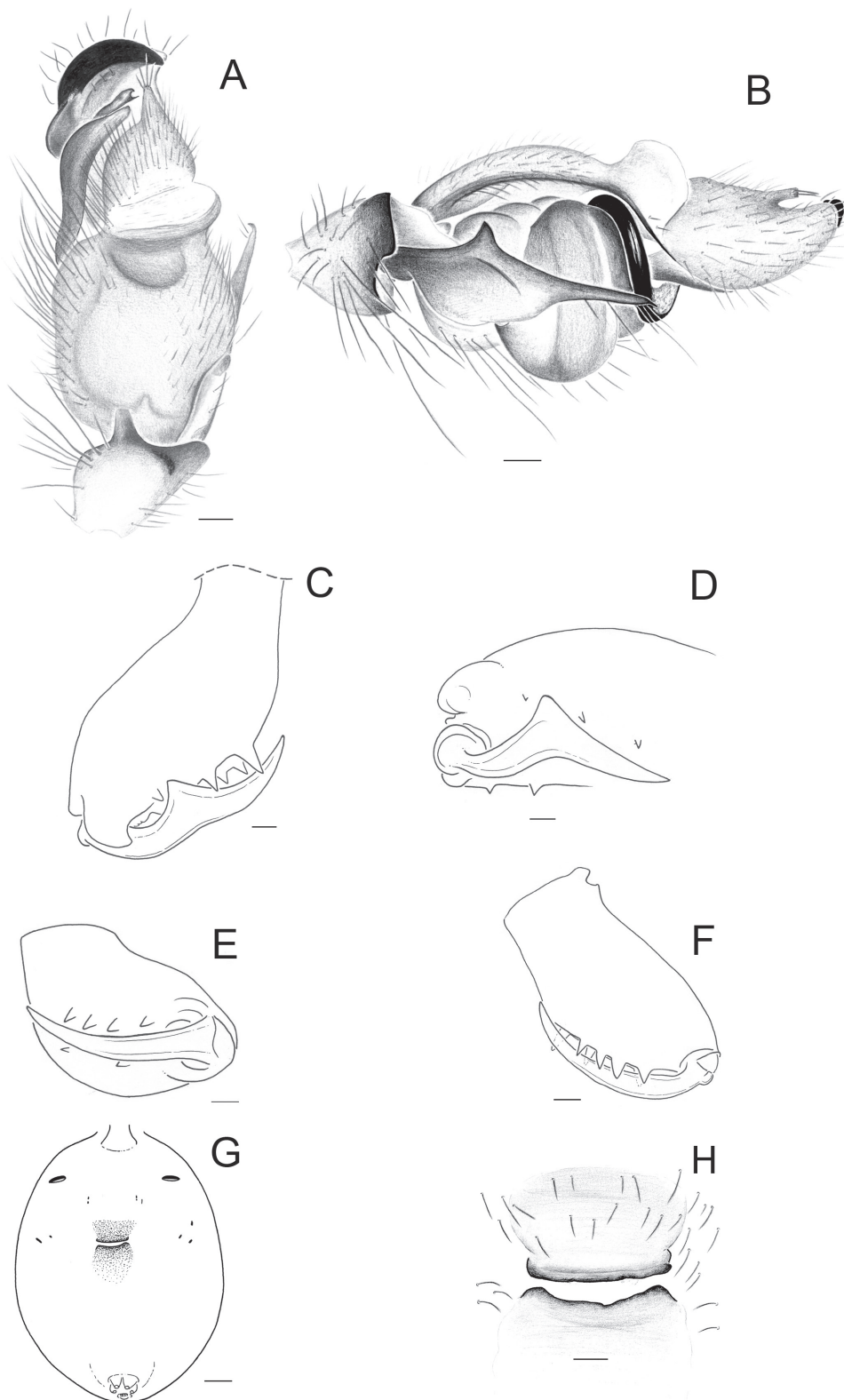
LEGS. Pale yellowish brown with some vague grey spots near femur-patella and tibia-metatarsus articulations; one dorsal distal spine on patellae; no further spines.

ABDOMEN. Dorsum pale grey with irregular, connected dark grey spots in almost three longitudinal lines, raising a pale area in anterior part; venter pale grey with silvery spots in four longitudinal lines. Spinnerets yellowish grey.

PALP. (Fig. 3A–B). Dorsal tibial apophysis rectangular, retrolateral tibial apophysis oval, sclerotised, with setae, ventral tibial apophysis broad, sclerotised, blade shaped. Paracymbium with lozenge-shaped base and long, slender, distal prong surpassing the tegulum. Cymbium with remarkable membranous central part, with deep subdistal excavation at the tip, delimiting a thin lateral prong with a few setae. Embolus long, broad at the base, thin in middle, slightly widened and with flat, bifid tip; conductor with large, strongly sclerotised, distal part.

### LEG MEASUREMENTS

Leg	Fe	Pa	T	Mt	t	Total
I	2.24	0.60	2.28	1.80	1.80	8.72
II	2.12	0.68	2.00	1.60	1.60	8.00
III	1.60	0.60	1.24	1.20	1.20	5.84
IV	2.20	0.52	2.00	1.84	1.84	8.40



**Fig. 3.** *Pachygnatha intermedia* sp. nov. **A.** Male palp, ventral view. **B.** Male palp, retrolateral view. **C.** Male chelicera, frontal view. **D.** Male chelicera, ventral view. **E.** Female chelicera, ventral view. **F.** Female chelicera, frontal view. **G.** Female abdomen, ventral view. **H.** Female external genitalia, ventral view. Scale bars: A–F, H = 0.1 mm; G = 1 mm.



**Female**

Paratype, MRAC 226544, Figs 1G–I, 3E–H. Very similar to male.

MEASUREMENTS. Total length 4.80. Carapace. 1.92 long, 1.50 wide.

EYES. AME: 0.14, ALE: 0.16, PME: 0.24, PLE: 0.14, AME-AME: 0.06, PME-PME < 0.02, ALE-PLE: 0.00, AME-ALE: 0.10, PME-PLE: 0.12; MOQ: AW: 0.44, PW: 0.32, L: 0.44.

CHELICERAE. (Fig. 3E–F). Yellowish brown, 3 teeth on promargin and basal spur, 3 teeth on retromargin.

EXTERNAL GENITALIA. (Figs 3G–H, 5A). With rectangular sclerotised areas in front of and behind the genital opening.

LEG MEASUREMENTS

Leg	Fe	Pa	T	Mt	t	Total
I	1.84	0.68	1.80	1.44	0.80	6.50
II	1.80	0.68	1.60	1.40	0.76	6.24
III	1.36	0.56	1.00	1.00	0.52	4.44
IV	1.96	0.52	1.68	1.60	0.64	6.40

**Other material examined**

BURUNDI: 3 ♂♂, 2 ♀♀, Kibira National Park, Rwegura Forest, 02.89435°S, 029.50078°E, forest with *Maracanga neomilbreadiana* and *Xymalos monospora*, 19 Mar. 2003, 2223 m, pitfalls, B. Nzigidahera (INECN); 1 ♀, same locality, 23 May 2003 (INECN); 1 ♂, same locality, 27 Dec. 2003 (INECN); 2 ♂♂, 5 ♀♀, same locality, 13 Sep. 2003 (INECN); 1 ♂, same locality, 14 Jan. 2004 (INECN); 1 ♀, Kibira National Park, Rusarenda Forest, 03.14228°S, 029.56235°E, forest with *Neoboutonia macrocalyx* and *Myrianthus holstii*, 12 Feb. 2003, 2237 m, pitfalls, B. Nzigidahera (INECN); 3 ♂♂, 1 ♀, 1 juv., same locality, 12 Feb. 2003 (INECN); 1 ♂, 1 ♀, 1 juv., same locality, 21 Mar. 2003 (INECN); 1 ♀, Kibira National Park, Bugarama Forest, 03.26537°S, 029.54921°E, forest with *Symphonia globulifera* and *Parinari holstii*, 28 Mar. 2003, 2202 m, pitfalls, B. Nzigidahera (INECN); 1 ♂, same locality, 14 Oct. 2003 (INECN); 1 ♂, same locality, 15 Jul. 2003 (INECN); 1 ♂, 1 juv., same locality, 14 Oct. 2003 (INECN); 1 ♂, same locality, 30 Jul. 2003 (INECN); 3 ♂♂, Kigwena Nature Reserve, Kigwena Forest, 02.89891°S, 029.50405°E, forest with *Newtonia buchananii* and *Albizia zygia*, 5 Jan. 2004, 793 m, pitfalls, B. Nzigidahera (INECN).

**Distribution**

Known from Kibira National Park and Kigwena Nature Reserve in Burundi.

*Pachygnatha ventricosa* sp. nov.

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Figs 1J–O, 4A–H, 5B

**Diagnosis**

Males of *P. ventricosa* sp. nov. are recognized by details of the palp: the paracymbium has a broad basal part with semicircular retrolateral swelling and small triangular prolateral extension; the cymbium has two parts: a broad basal part, divided from the parallel-sided distal part by a deep, membranous indentation. This resembles that of *P. bispiralis* sp. nov., but the narrow central part of the cymbium is much longer and not membranous. In *Pachygnatha intermedia* sp. nov. there is a central membranous cymbial area but the shape of that sclerite is very different. This is somewhat similar to that of *P.*

*kiwuana* Strand, 1913 but the distal part of the paracymbium is much longer and well separated from the basal part in *P. ventricosa* sp. nov. Females are characterized by external genitalia with a sclerotised and transverse expansion of the upper lip forming a rectangular shape.

### Etymology

The specific name *ventricosa* refers to the inflated, belly-shaped lateral part of the paracymbium on the male palp.

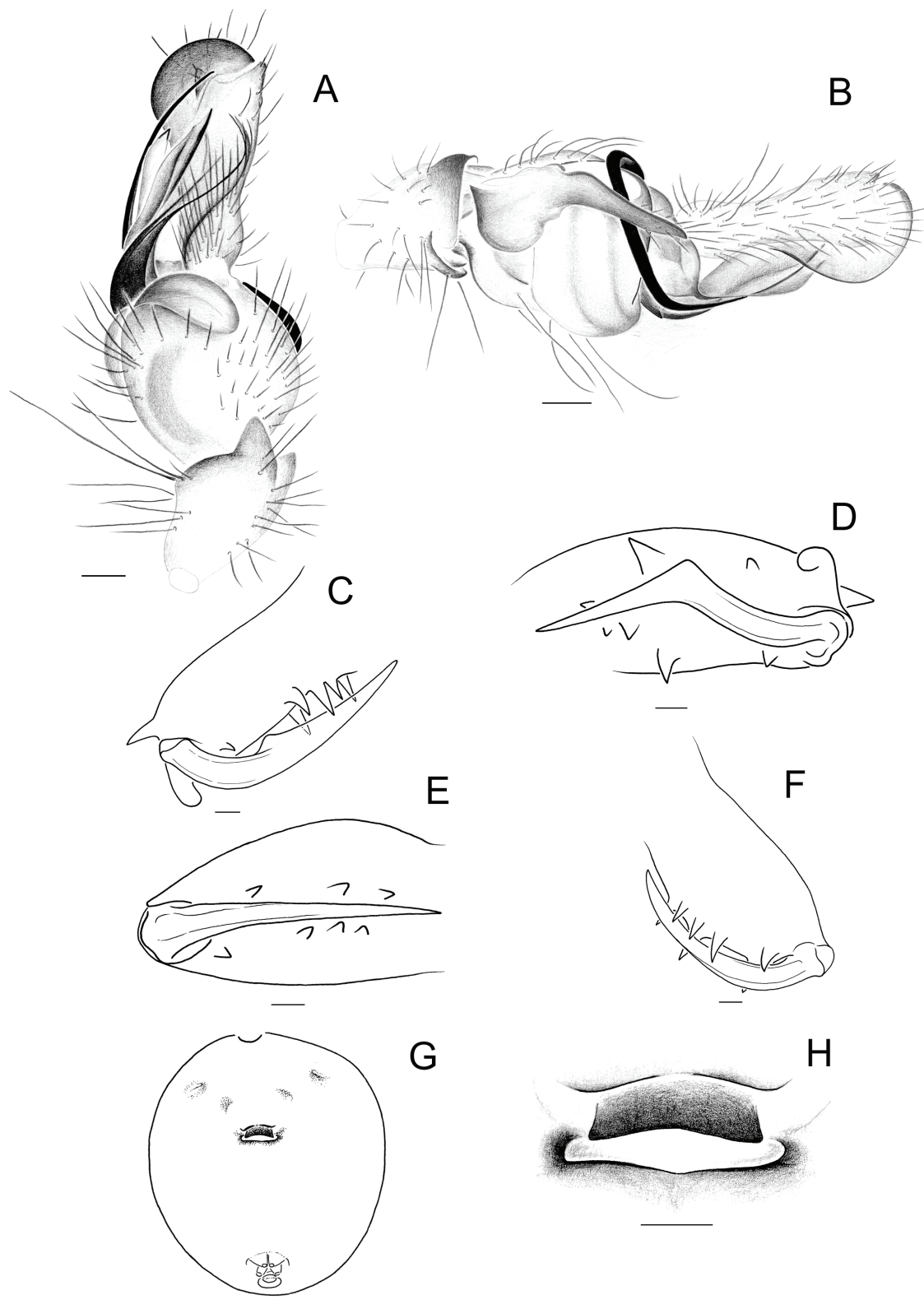
### Type material examined

#### Holotype

BURUNDI: ♂, Kibira National Park, Rwegura, Mt Musumba, 02.86445°S, 029.49640°E, site 5, forest with *Carapa grandiflora* and *Polyscias fulva*, 10 Jul. 2008, 2252 m, pitfalls, B. Nzigidahera (MRAC 226777).

#### Paratypes

BURUNDI: 1 ♂, Kibira National Park, Rwegura, Mt Musumba (same locality for all paratypes), 02.86435°S, 029.49540°E, site 7, tea plantation, 26 Jan. 2008, 2100 m, pitfalls, B. Nzigidahera (INECN); 1 ♂, 10 Sep. 2008 (INECN); 1 ♀, 25 Apr. 2008 (MRAC 226536); 1 ♀, 02.86435°S, 029.49546°E, site 6, forest with *Carapa grandiflora* and *Polyscias fulva*, 26 Jan. 2008, 2150 m (MRAC 226766); 1 ♂, 25 Dec. 2008 (MRAC 226768); 1 ♀, 10 May 2008 (MRAC 226736); 1 ♀, 25 Dec. 2008 (MRAC 226748); 1 ♀, 10 Apr. 2008 (MRAC 226531); 4 ♀♀, 25 Aug. 2008 (INECN); 4 ♀♀, 10 Jan. 2008 (INECN); 2 ♀♀, 2 juvs: 25 Nov. 2008 (INECN); 1 ♀, 25 Sep. 2008 (INECN); 3 ♀♀, 10 Aug. 2008 (INECN); 1 ♂, 2 juvs, 02.86445°S, 029.49640°E, site 5, forest with *Carapa grandiflora* and *Polyscias fulva*, 10 Aug. 2008, 2252 m (MRAC 227427); 1 ♀, 2 juvs, 25 Jun. 2008 (MRAC 226775); 1 ♂, 10 Sep. 2008 (MRAC 226771); 1 ♀, 1 juv., 10 Apr. 2008 (MRAC 226763); 2 ♂♂, 25 Jul. 2008 (MRAC 226758); 1 ♀, 25 Mar. 2008 (MRAC 226754); 2 ♂♂, 3 ♀♀, 1 juv., 25 Feb. 2008 (MRAC 226734); 2 ♀♀, 1 juv., 25 Aug. 2008 (MRAC 226760); 1 ♀, 10 Sep. 2008 (MRAC 336532); 2 ♂♂, 25 Sep. 2008 (INECN); 1 ♀, 26 Jan. 2008 (INECN); 1 ♀, 25 Jul. 2008 (INECN); 1 ♀, 10 Feb. 2008 (INECN); 2 ♂♂, 02.86455°S, 029.50427°E, site 4, forest with *Macaranga neomildbraediana* and *Polyscias fulva*, 10 Jan. 2008, 2352 m (MRAC 226757); 1 ♂, 26 Jan. 2008 (MRAC 226761); 1 ♀, 25 May 2008 (MRAC 226750); 1 ♀, 10 Sep. 2008 (MRAC 226752); 2 ♂♂, 23 Jun. 2008 (MRAC 226753); 1 ♂, 25 Nov. 2008 (MRAC 226773); 2 ♂♂, 25 Mar. 2008 (MRAC 226764); 1 ♂, 10 Oct. 2008 (MRAC 226574); 1 ♂, 10 Oct. 2008 (INECN); 1 ♀, 25 Dec. 2008 (INECN); 1 ♀, 10 Jul. 2008 (INECN); 5 ♀♀, 10 Jan. 2009 (INECN); 7 ♀♀, 25 Aug. 2008 (INECN); 2 ♀♀, 10 Dec. 2008 (INECN); 8 ♀♀, 26 Jan. 2008 (INECN); 2 ♀♀, 10 Nov. 2008 (INECN); 4 ♀♀, 25 Oct. 2008 (INECN); 2 ♀♀, 25 Nov. 2008 (INECN); 2 ♂♂, 02.87149°S, 029.49641°E, site 3, forest with *Hagenia abyssinica*, 25 Oct. 2008, 2444 m (MRAC 226770); 6 ♀♀, 26 Jan. 2008 (MRAC 226762); 2 ♂♂, 10 Sep. 2008 (MRAC 226774); 1 ♀, 25 Apr. 2008 (MRAC 226769); 3 ♂♂, 26 Jan. 2008 (MRAC 226733); 1 ♀, 10 Jun. 2008 (MRAC 226751); 1 ♀, 10 Mar. 2008 (MRAC 226737); 1 ♂, 1 ♀, 3 juvs, 25 Feb. 2008 (MRAC 226739); 1 ♀, 25 Nov. 2008 (MRAC 226740); 1 ♀, 10 Dec. 2008 (MRAC 226537); 1 ♀, 10 May 2008 (MRAC 226523); 1 ♀, 25 Nov. 2008 (MRAC 226529); 1 ♀, 10 Apr. 2008 (INECN); 1 ♂, 10 Mar. 2008 (INECN); 1 ♂, 25 Jul. 2008 (INECN); 2 ♀♀, 10 Apr. 2008 (INECN); 2 ♀♀, 25 Aug. 2008 (INECN); 1 ♀, 25 Sep. 2008 (INECN); 10 ♀, 5 juvs, 25 Feb. 2008 (INECN); 2 ♀♀, 10 Sep. 2008 (INECN); 1 ♀, 2 juvs, 10 Aug. 2008 (INECN); 2 ♀♀, 25 Jan. 2008 (INECN); 1 ♀, 10 Nov. 2008 (INECN); 2 ♂♂, 02.87060°S, 029.49669°E, site 2, forest with *Hagenia abyssinica*, 25 Aug. 2008, 2548 m (MRAC 226749); 1 ♂, 10 Sep. 2008 (MRAC 226767); 1 ♀, 25 Sep. 2008 (MRAC 226742); 1 ♂, 10 Sep. 2008 (MRAC 226745); 1 ♀, 25 Apr. 2008 (MRAC 226755); 1 ♀, 25 Dec. 2008 (MRAC 226542); 1 ♂, 10 Dec. 2008 (MRAC 226570); 1 ♀, 10 Jan. 2008 (MRAC 226526); 1 ♂, 2 juvs, 25 Jul. 2008 (INECN); 1 ♀, 1 juv., 10 Feb. 2008 (INECN); 1 ♀, 25 Mar. 2008 (INECN); 2 ♂♂, 2 juv., 25 Feb. 2008 (INECN); 2 ♂♂, 4 ♀♀, 3 juvs, 02.87696°S, 029.49709°E, site 1, forest mountain heather, *Phyllipia benguelensis*, 10 Mar. 2008, 2650 m (MRAC 226743); 2 ♂♂, 2 juvs, 10 Sep. 2008 (MRAC 226776); 1 ♂,



**Fig. 4.** *Pachygnatha ventricosa* sp. nov. **A.** Male palp, ventral view. **B.** Male palp, retrolateral view. **C.** Male chelicera, frontal view. **D.** Male chelicera, ventral view. **E.** Female chelicera, ventral view. **F.** Female chelicera, frontal view. **G.** Female abdomen, ventral view. **H.** Female external genitalia, ventral view. Scale bars: AF, H = 0.1 mm; G = 1 mm.

10 Jun. 2008 (MRAC 226746); 1 ♀, 10 Sep. 2008 (MRAC 226759); 3 ♀♀, 5 juvs, 25 Mar. 2008 (MRAC 226778); 1 ♂, 10 Aug. 2008 (MRAC 226765); 2 ♀♀, 25 Feb. 2008 (MRAC 226744); 1 ♂, 10 Mar. 2008 (MRAC 226741); 1 ♂, 10 Mar. 2008 (MRAC 226712); 2 ♀♀, 10 Mar. 2008 (MRAC 226530); 1 ♀, 25 Nov. 2008 (MRAC 226541); 1 ♂, 10 Oct. 2008 (INECN); 1 ♂, 10 Nov. 2008 (INECN); 2 ♀♀, 25 Feb. 2008 (INECN); 2 ♀♀, 25 Aug. 2008 (INECN); 6 ♀♀, 25 Feb. 2008 (INECN); 1 ♀, 25 Jun. 2008 (INECN); 2 ♀♀, 10 Jan. 2009 (INECN); 2 ♀♀, 25 Mar. 2008 (INECN); 2 ♀♀, 10 Nov. 2008 (INECN); 1 ♀, 10 Jun. 2008 (INECN); 1 ♀, 10 Jul. 2008 (INECN); 2 ♀♀, 25 Oct. 2008 (INECN); 2 ♀♀, 1 juv., 25 Jul. 2008 (INECN); 1 ♂, 10 Jul. 2008 (MRAC 226738).

## Description

### Male

Holotype, Figs 1J–L, 4A–D.

MEASUREMENTS. Total length 3.47, carapace 1.67 long, 1.34 wide.

CARAPACE. Pale brown, prominent anteriorly, with a mediodorsal longitudinal dark brown band and two lateral margin dark brown bands.

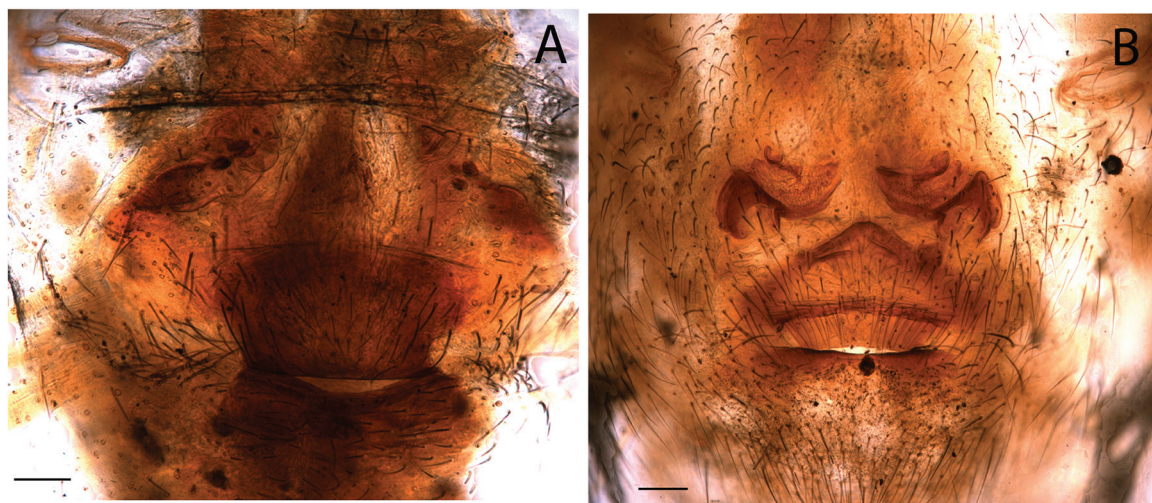
EYES. AME: 0.14, ALE 0.12, PLE: 0.12, PME 0.20, AME-AME: 0.04, PME-PME < 0.02, AME-ALE: 0.10, PME-PLE: 0.12, ALE-PLE: 0.00, MOQ: AW: 0.32, PW: 0.38, L: 0.34.

CHELICERAE. (Fig. 4C–D). Yellowish brown, three promarginal teeth, three retromarginal teeth, an additional, promarginal cylindrical spur and a sharp apical spur.

STERNUM. Yellowish brown with a sharp sclerotised point at each end of the straight anterior margin; intercoxal sclerites present. Labium brown.

LEGS. Yellowish brown; one thin slightly recurved dorsal distal spine on patellae; no further spines.

ABDOMEN. Dorsum pale grey with irregular, connected dark grey spots in almost two longitudinal lines mixed with silvery spots; venter yellowish grey, convex grey line and two silvery spots in two longitudinal lines. Spinnerets pale yellowish brown.



**Fig. 5.** A. *Pachygnatha intermedia* sp. nov. Female genitalia, cleared, ventral view. B. *Pachygnatha ventricosa* sp. nov. Female genitalia, cleared, ventral view. Scale bars = 0.1 mm.



PALP. (Fig. 4A–B). Retrolateral tibial apophysis sharp at tip, ventral tibial apophysis broad, blade-shaped. Paracymbium long, broad on one side towards the base, with small horn to almost middle part of other side. Embolus long, running spirally to the cymbium tip, supported by conductor.

LEG MEASUREMENTS

Leg	Fe	Pa	T	Mt	t	Total
I	2.28	0.60	0.40	2.00	1.00	6.28
II	2.08	0.60	2.12	1.80	0.80	7.4
III	1.36	0.52	1.20	1.08	0.52	4.68
IV	2.40	0.48	1.76	1.76	0.68	7.08

**Female**

Paratype, MRAC 226536, Figs 1M–O, 4E–H, 5B. Very similar to male.

MEASUREMENTS. Total length 4.32. Carapace 1.72 long, 1.36 wide.

EYES. AME: 0.14, ALE: 0.12, PME: 0.20, PLE: 0.12, AME-AME: 0.06, PME-PME: 0.02, ALE-PLE: 0.00, AME-ALE: 0.10, PME-PLE: 0.12; MOQ: AW: 0.40, PW: 0.32, L: 0.40.

CHELICERAE. (Fig. 4E–F). Yellowish brown, 3 promarginal teeth, 3 retromarginal teeth, both margins with short, sharp distal spur.

LEGS. With some vague grey spots on articulations of femora and patella and the tip of tibia; one spine on patella.

EXTERNAL GENITALIA. (Figs 4G–H, 5B). A simple, horizontal slit with an inferior part highly sclerotised laterally, superior one blade-shaped and connected to inferior one by hyaline extension in two extremities; a sclerotised fold along the superior part.

LEG MEASUREMENTS

Legs	Fe	Pa	T	Mt	t	Total
I	2.40	0.68	2.80	2.12	1.00	9.00
II	2.20	0.68	2.16	1.80	0.88	7.72
III	1.48	0.52	1.16	1.12	0.56	4.84
IV	2.12	0.48	1.80	1.72	0.52	6.64

**Other material examined**

BURUNDI: 1 ♀, Kibira National Park, Rwegura, forêt de Rwegura, 02.89891°S, 29.50405°E, site 1, tea plantation, 30 Sep. 2004, 1970 m, pitfalls, B. Nzigidahera (INECN); 1 ♂, same locality, 28 Feb. 2005 (MRAC 227618); 2 ♀♀, 1 juv., same locality, 02.89565°S, 029.50345°E, site 2, forest with *Polyscias fulva* and *Macaranga neomildbraediana*, 30 Sep. 2004, 2120 m (INECN); 2 ♀♀, same locality, 02.89562°S, 029.50221°E, site 3, forest with *Polyscias fulva* and *Hagenia abyssinica*, 15 Mar. 2005, 2160 m (MRAC 227616); 1 ♀, same locality, 02.90249°S, 029.51345°E, forest with *Macaranga neomildbraediana* and *Xymalos monospora*, 26 Jul. 2003, 2223 m (INECN).

**Distribution**

Known only from the type locality.

*Pachygnatha procincta* Bosmans & Bosselaers, 1994

Fig. 6

**Material examined**

BURUNDI: 1 ♂, Kibira National Park, Rwegura, Mt. Musumba, 02.86°S 29.50°E, site 7, tea plantation, 10 Dec. 2008, 2100 m, B. Nzigidahera (MRAC 226772).

**Remarks**

The specimen was compared to the holotype from Cameroon (MRAC 202728) and to the specimens from two localities in Kenya (MRAC 111873, MRAC 112015), that were attributed to the same species by Bosmans & Bosselaers (1994). Reexamination confirms the close resemblance between all these specimens in which the males are characterized by the shape of the paracymbium. This sclerite has a very typical comma shaped bald retrolateral area. The cheliceral dentition of the specimens is virtually identical. The Burundian specimen has a slightly different colouration in the sense that it is paler and less orange than the other specimens. The presently known distribution is shown in Fig. 6.

**Discussion**

This study is a result of the intense sampling campaign of ground spiders carried out in the forest ecosystems of Western Burundi during several years (2003, 2005, 2008). *Pachygnatha ventricosa* sp. nov. was found only in the afro-montane forest of the Kibira National Park whereas *Pachygnatha bispiralis* sp. nov. and *P. intermedia* sp. nov. were collected there and in the circum-Guinean forest of Kigwena at lower altitude. According to our study, 4 species of *Pachygnatha* are found in this small part of the Albertine Rift which corroborates the conclusion of Nzigidahera & Jocqué (2009). They observed

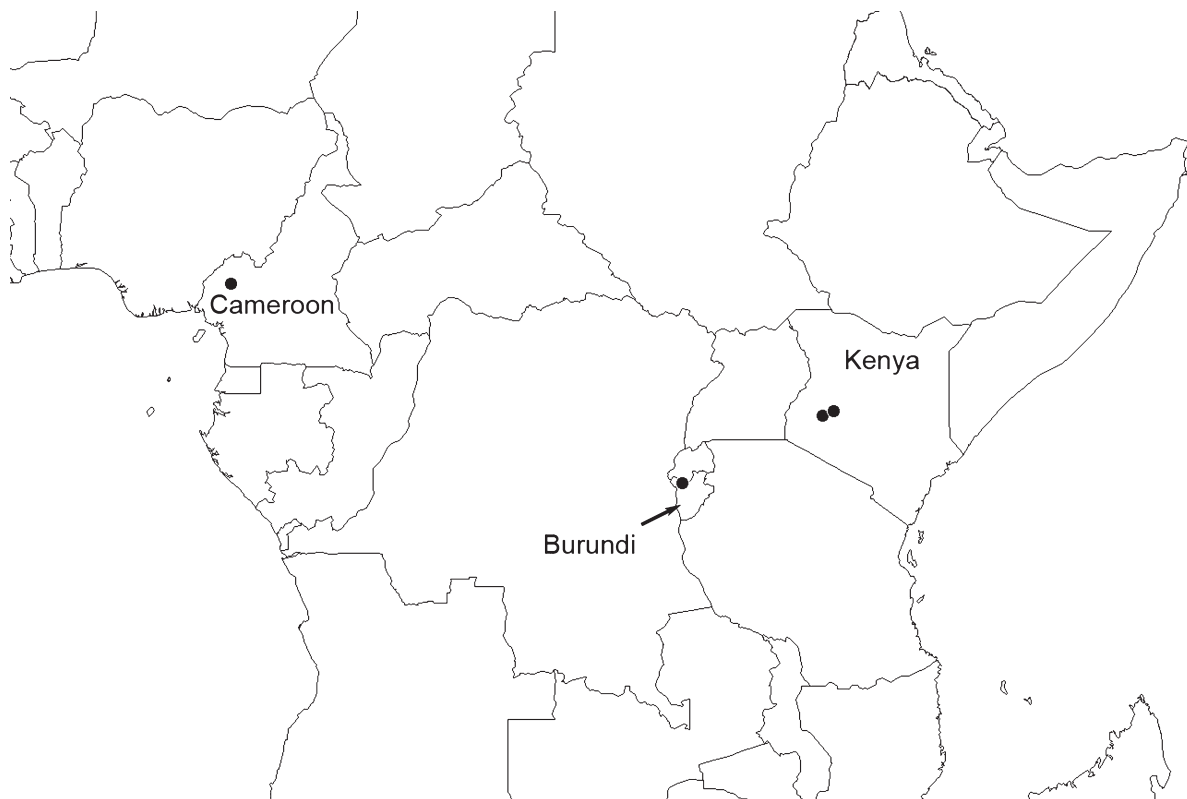


Fig. 6. Distribution map of *Pachygnatha procincta* Bosmans & Bosselaers, 1994.

**Table 1.** Altitude distribution of *Pachygnatha* Sundevall, 1823.

Species	Authorship	Country	Altitude
<i>atromarginata</i>	Bosmans & Bosselaers, 1994	Cameroon	1600
<i>bispiralis</i>	Nzigidahera & Jocqué sp. nov.	Burundi	793–2650
<i>goedeli</i>	Bosmans & Bosselaers, 1994	Cameroon	> 2200
<i>hexatracheata</i>	Bosmans & Bosselaers, 1994	Cameroon	> 1300
<i>intermedia</i>	Nzigidahera & Jocqué sp. nov.	Burundi	793–2650
<i>jansseni</i>	Bosmans & Bosselaers, 1994	Cameroon	> 1200
<i>kiwuana</i>	Strand, 1913	Congo	> 1463
<i>leleupi</i>	Lawrence, 1952	Cameroon	> 1200
<i>longipes</i>	Simon, 1894	Madagascar	sea level
<i>mucronata</i>	Tullgren, 1910	Tanzania	> 2000
<i>okuensis</i>	Bosmans & Bosselaers, 1994	Cameroon	> 2400
<i>opdeweerdtae</i>	Bosmans & Bosselaers, 1994	Cameroon	> 2200
<i>palmquisti</i>	Tullgren, 1910	Tanzania	> 2300
<i>procincta</i>	Bosmans & Bosselaers, 1994	Cameroon	> 2100
<i>ruanda</i>	Strand, 1913	Rwanda	1800
<i>ventricosa</i>	Nzigidahera & Jocqué sp. nov.	Burundi	1970–2650
<i>zappa</i>	Bosmans & Bosselaers, 1994	Cameroon	1900

that this Central African mountain range, recognized as a hot spot for many animal groups, also harbors a high diversity of spiders often belonging to a particular genus which prompted the term ‘species swarm’. In their study on the gnaphosid genus *Zelotibia* Russell-Smith & Murphy, 2005, Russell-Smith & Murphy (2005) found that no less than 19 species are known from the area. This is therefore the first African area for which there is evidence from the spider fauna that it deserves the epithet “hot spot”. Other recent papers on the fauna of the area pointing in the same direction are those on the gnaphosid *Zelowan* Murphy & Russell-Smith, 2010 (Murphy & Russell-Smith 2010), on zodariids (Nzigidahera & Jocqué 2010a, 2010b) and linyphiids (Nzigidahera & Jocqué 2014). These studies also suggest that the Albertine Rift is far from completely inventoried and several papers concerning its spider fauna are in preparation.

The genus *Pachygnatha* has a remarkable distribution on the African continent. All the species have been found above 1200 m (see Table 1) apart from a few specimens of the new species *P. bispiralis* and *P. intermedia*, which are common around 2000 m and higher but were also collected near 800 m. *Pachygnatha* thus appears to be a common element of the Afromontane spider fauna but had not yet been recognized as such. Moreover, it is a typical case of a template genus with very stable somatic characters but with a large range of secondary sexual characters, more precisely of the male palp and the dentition of the chelicerae. A more extensive study of the genus may therefore yield insights into the evolution of secondary sexual characters and their link with biogeographical distribution.

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