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# *Pasilobus dippenaarae* sp. n. (Araneae: Araneidae), a new species of cyrtarachnine spider from South Africa, with a key to the Afrotropical species

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ABSTRACT

A new species of bird-dropping spider, *Pasilobus dippenaarae* sp. n., is described from the KwaZulu-Natal midlands, South Africa on the basis of females. A key is provided to the six Afrotropical species of the genus. Notes are provided on the habitat and web-building behaviour of *P. dippenaarae* sp. n., as well as the egg sac structure.

KEY WORDS: Cyrtarachninae, gardens, egg sac, savanna, web.

## INTRODUCTION

The spider family Araneidae, the most diverse group of orb-web spiders, includes several genera with a reduction in the size and complexity of their webs. Particularly, the subfamily Cyrtarachninae (including Mastophorinae, *sensu* Tanikawa *et al.* 2014) comprises many genera with reduced webs, unique prey capture behaviour, and specialised diets comprising only moths (Stowe 1986; Yeargan 1994; Pekár *et al.* 2011). In a recent molecular phylogeny of Cyrtarachninae, *Pasilobus* Simon, 1895 was considered the most derived genus by Tanikawa *et al.* (2014), although their analysis only included seven of the genera, with representatives of *Acantharachne* Tullgren, 1910, *Cladomelea* Simon, 1895, *Pycnacantha* Blackwall, 1865 and *Taczanowskia* Keyserling, 1879 not included in their study.

South Africa has a relatively rich diversity of Cyrtarachninae (see Dippenaar-Schoeman *et al.* 2010), presently including two species of *Cladomelea* (Leroy *et al.* 1998; Roff & Dippenaar-Schoeman 2004), one species of *Cyrtarachne* Thorell, 1868 (Dippenaar-Schoeman & Jones 2008), two *Pycnacantha* (Dippenaar-Schoeman & Leroy 1996; Dippenaar-Schoeman 2012), and at least three *Paraplectana* Brito Capello, 1867 (Dippenaar-Schoeman 2012). In addition, there are several species in these genera that await description (Haddad, pers. obs.). In the current contribution, a new species of *Pasilobus* is described from subtropical savanna in KwaZulu-Natal, South Africa, representing the first records of the genus for the country. A key to the Afrotropical species of the genus is also provided.

*Pasilobus* currently includes 12 species distributed in tropical Africa, Asia and the Solomon Islands (World Spider Catalog 2015). Of these, only a single species is known from both sexes (*P. hupingensis* Yin, Bao & Kim, 2001 from China and Japan); the rest are only known from females. Five species have been described from the Afrotropical Region: *P. antongilensis* Emerit, 2000 and *P. capuroni* Emerit, 2000 from Madagascar, *P. insignis* O. Pickard-Cambridge, 1908 and *P. mammosus* (Pocock, 1899) from West

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Africa, and *P. laevis* Lessert, 1930 from the Congo. Therefore, the new species described here, *P. dippenaarae* sp. n., represents the southernmost record of the genus in the context of its global distribution.

## MATERIAL AND METHODS

The holotype and paratype of *P. dippenaarae* sp. n. (both females) were examined under a Nikon SMZ800 stereomicroscope. The epigyne of the paratype was dissected from the abdomen and cleared in 70% ethanol for 1 minute in a Labcon 5019U ultrasonic bath, before being illustrated. Digital photographs of the habitus and various aspects of the paratype's epigyne were taken using a Nikon DS-L3 camera system attached to a Nikon SMZ800 stereomicroscope, and the series of images was then stacked using Combine ZM software (Hadley 2008) to increase the depth of field.

The holotype is described here, with measurements also provided for the paratype to indicate size variation. All measurements are given in millimetres. The following abbreviations are used in the descriptions: AER – anterior eye row; AL – abdomen length; ALE – anterior lateral eye; AME – anterior median eye; AW – abdomen width; CL – carapace length; CW – carapace width; MOQAW – median ocular quadrangle anterior width; MOQL – median ocular quadrangle length; MOQPW – median ocular quadrangle posterior width; PER – posterior eye row; PLE – posterior lateral eye; PME – posterior median eye; SL – sternum length; SW – sternum width; TL – total length.

A distribution map of *P. dippenaarae* sp. n. was created using the online mapping software SimpleMappr (Shorthouse 2010). Both type specimens have been deposited in the KwaZulu-Natal Museum, Pietermaritzburg, South Africa (NMSA).

### Key to the Afrotropical species of *Pasilobus* (females)

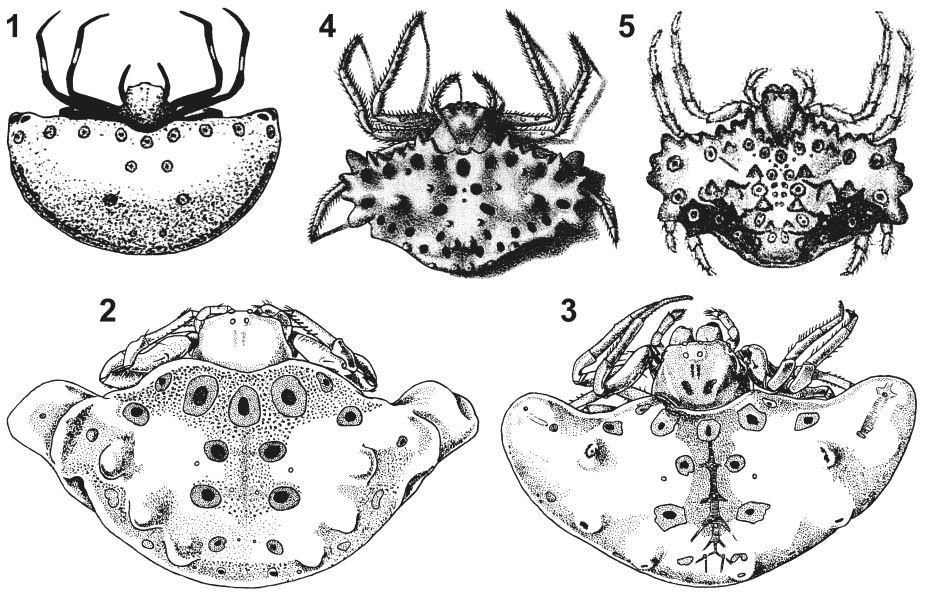
1 Anterior margin of abdomen with two pairs of tubercles, first either side of carapace margins and second laterally, both pairs variable in size ..... 2
– Anterior margin of abdomen with more than five pairs of tubercles, lateral pair largest, others smaller ..... 4

2 Median pair of tubercles distinct, rounded; longitudinal distance from anterior median sigillum to second pair of median sigilla clearly greater than distance between second pair (Madagascar) ..... 3
– Median pair of tubercles poorly developed, barely protruding from anterior margin; longitudinal distance from anterior median sigillum to second pair of sigilla equal to distance between second pair (Fig. 1) (Congo) ..... ***P. laevis*** Lessert, 1930

3 Third pair of median sigilla with distinct sclerite; lateral anterior abdominal tubercles with basal constriction, sometimes appearing bilobed (Fig. 2) ..... ***P. antongilensis*** Emerit, 2000
– Third pair of median sigilla with weak sclerite; lateral anterior abdominal tubercles rounded (Fig. 3) ..... ***P. capuroni*** Emerit, 2000

4 Anterior abdominal margin with seven pairs of smaller tubercles preceding large lateral tubercles; abdominal dorsum colouration variable ..... 5
– Anterior abdominal margin with five pairs of tubercles preceding large lateral tubercle; abdominal dorsum orange-brown or dark brown, darker along midline,

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Figs 1–5. Habitus illustrations of Afrotropical *Pasilobus* species, taken from their original descriptions: (1) *P. laevis* Lessert, 1930; (2) *P. antongilensis* Emerit, 2000; (3) *P. capuroni* Emerit, 2000; (4) *P. mammosus* (Pocock, 1899); (5) *P. insignis* O. Pickard-Cambridge, 1908. All figures reproduced with permission.

with paired broad cream transverse markings medially and large black pair of spots behind them (Figs 6–8).....***P. dippenaarae*** sp. n.

5 Abdominal dorsum uniform ochre-yellow, without darker or paler markings (Fig. 4); abdomen less than twice as broad as long.....***P. mammosus*** (Pocock, 1899)

– Abdominal dorsum pale yellowish, with large paired black patches on posterior margin (Fig. 5); abdomen more than twice as broad as long..... .....***P. insignis*** O. Pickard-Cambridge, 1908

## TAXONOMY

### Family Araneidae Clerck, 1757

### Genus *Pasilobus* Simon, 1895

*Pasilobus* Simon, 1895: 881; Simon 1903: 1004.

Type species: *Micrathena bufonina* Simon, 1867

Diagnosis: *Pasilobus* has never been revised, redescribed or diagnosed, other than Simon's (1895) original generic description. Based on the latter, *Pasilobus* differs from *Paraplectana* by the presence of thickened lanceolate setae in the eye region; the median ocular quadrangle subquadrate and slightly raised; abdomen twice as broad than long, with low tubercles; legs quite slender, anterior and posterior legs longest; patellae, tibiae and metatarsi flattened and slightly unequal, metatarsi shorter than tibiae.

Composition and distribution: Five species from East and South-East Asia (*P. bufoninus* (Simon, 1867), *P. conohumeralis* (Hasselt, 1894), *P. hupingensis* Yin, Bao & Kim, 2001, *P. lunatus* Simon, 1897 and *P. nigrohumeralis* (Hasselt, 1882)); one each from India

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(*P. kotigeharus* Tikader, 1963) and the Solomon Islands (*P. mammatus* Pocock, 1898); four from continental Africa (*P. dippenaarae* sp. n., *P. insignis* O. Pickard-Cambridge, 1908, *P. laevis* Lessert, 1930 and *P. mammosus* (Pocock, 1899)); and two from Madagascar (*P. antongilensis* Emerit, 2000 and *P. capuroni* Emerit, 2000).

***Pasilobus dippenaarae*** sp. n.

Figs 6–16

Etymology: The species is named for Dr Ansie Dippenaar-Schoeman, in recognition of her significant contributions to the taxonomy and biology of African spiders.

Diagnosis: *Pasilobus dippenaarae* sp. n. is related to *P. insignis*, but can be distinguished by the presence of five pairs of tubercles on the anterior margin of the abdomen as opposed to seven (excluding the anterolateral pair), the median eyes on a small mound (absent in *P. insignis*), and the presence of several tubercles on the femora, patellae and tibiae of all of the legs (e.g. Fig. 12), which are only on the tibiae I and II of *P. insignis*. It shares with *P. mammosa* the small mound on which the median eyes are situated, but has fewer tubercles along the anterior margin of the abdomen (five as opposed to seven). Male unknown.

Description:

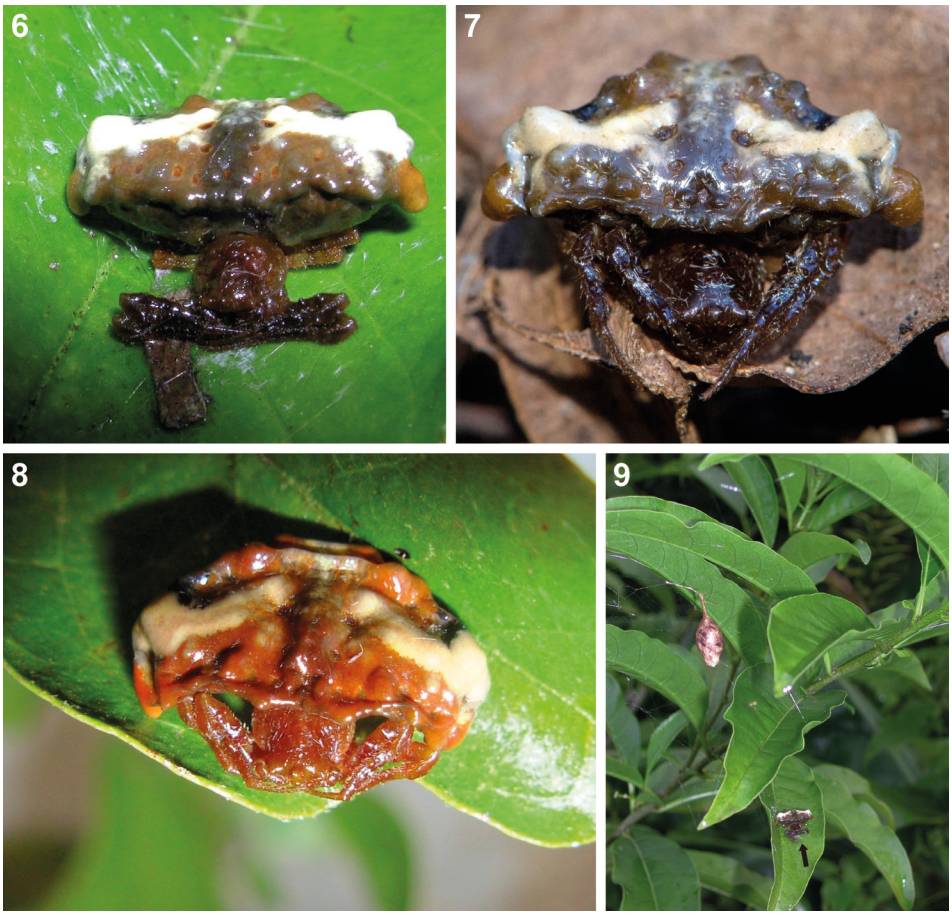
*Female* (holotype, NMSA 26881).

Measurements: CL 3.20, CW 3.40, AL 4.95, AW 10.15, TL 9.65, SL 2.90, SW 3.05, AME–AME 0.18, AME–ALE 0.59, ALE–ALE 1.63, PME–PME 0.25, PME–PLE 0.70, PLE–PLE 1.86, MOQAW 0.57, MOQPW 0.51, MOQL 0.46.
Length of leg segments: I 2.90 + 1.40 + 2.10 + 1.90 + 0.65 = 8.95; II 2.90 + 1.38 + 1.95 + 1.70 + 0.65 = 8.58; III 2.00 + 0.75 + 1.15 + 1.03 + 0.55 = 5.48; IV 2.80 + 1.00 + 1.80 + 1.32 + 0.58 = 7.50.

General appearance as in Figs 6, 10. Carapace yellow-brown, with black mottled markings; slightly broader than long, eye region narrowed, thoracic region round, posterior margin concave; surface coarsely rugose, naked except for short white setae around margins, few scattered setae dorsally, and longer setae on clypeus. Median eyes situated on small rounded mound, lateral eyes on weak tubercle; AER strongly recurved from above, medians much larger than laterals; AME separated by distance equal to their diameter; AME separated from ALE by distance approximately three times AME diameter; clypeus height equal to AME diameter; PER strongly recurved, medians slightly larger than laterals; PME separated by distance slightly less than double their diameter; PME separated from PLE by distance equal to five times PME diameter.

Chelicerae yellow-brown, with scattered short setae on anterior of paturon, longer along mesal margin; promargin with three teeth, proximal tooth smallest, distal tooth largest; retromargin with large subequal proximal and distal teeth, with small tooth between them; field of small denticles between tooth rows. Endites almost square, yellow-brown, paler prolaterally; serrula and maxillar hair tuft distinct; labium subtriangular, with tongue-like anterior margin; nearly twice as broad as long; yellow-brown, cream distally; endites and labium both with scattered long and short black setae. Sternum shield-shaped, anterior margin concave; yellow-brown, with faint black mottling and scattered long black setae.

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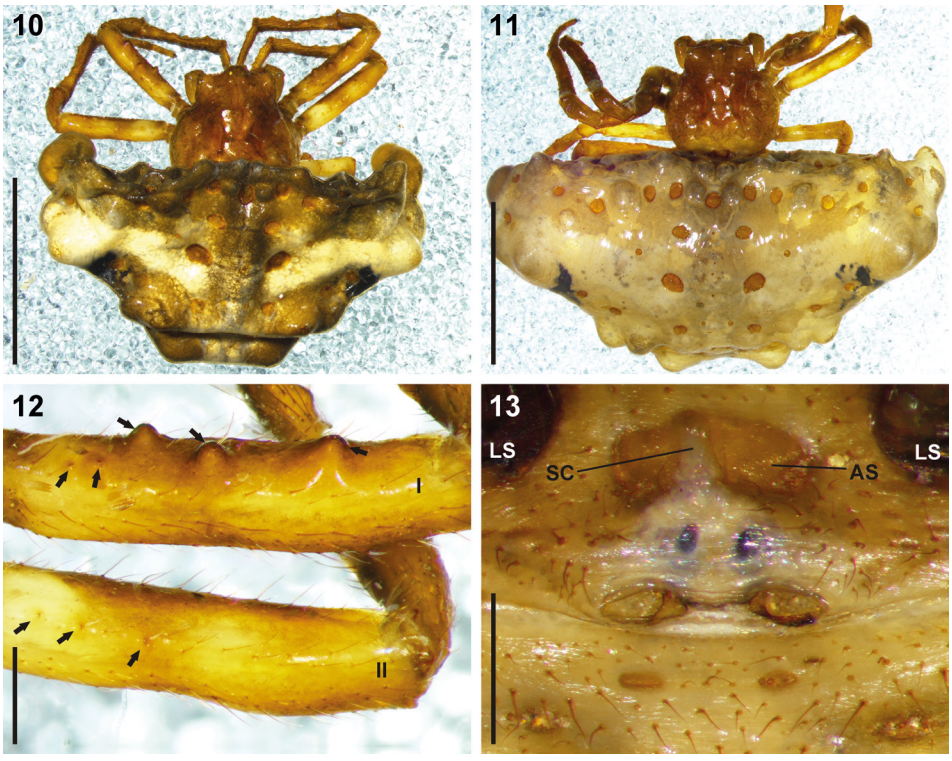



Figs 6–9. *Pasilobus dippenaarae* sp. n., photographs of (6–8) the habitus of live females and (9) egg sac: (6) female from Boughton, Pietermaritzburg; (7) holotype and (8) paratype from Hilton College Nature Reserve; (9) egg sac suspended in web between foliage of shrubs, arrow indicating female sitting on leaf nearby (Boughton, Pietermaritzburg). Photographs: (6, 8, 9) by J. Roff; (7) by D. von Hoesslin.

Legs yellow-brown, with paler proximal and median bands on femora; surface rugose, particularly femora to tibiae, with several tubercles, covered in short setae (Fig. 12); femur I with three prominent and two smaller prolateral tubercles; femur II with one prominent and two smaller prolateral tubercles; femur III with one prominent dorsal tubercle; femur IV with three (right) or two (left) prominent dorsal tubercles; patellae all with distal tubercle, larger on I and II than on III and IV; tibia I with one prominent and two smaller prolateral tubercles, and three small dorsal tubercles; tibia II with two prominent prolateral and two small dorsal tubercles; tibiae III and IV without tubercles; all tibiae with several dorsal and lateral trichobothria, longer on III and IV; metatarsi I and II with small basal tubercle, none on III and IV; all tubercles with slightly thicker, longer white setae than surrounding leg setae.

Abdomen much broader than long, surface smooth; anterior margin with five pairs of small tubercles, followed by pair of large anterolateral tubercles; medially, small pair

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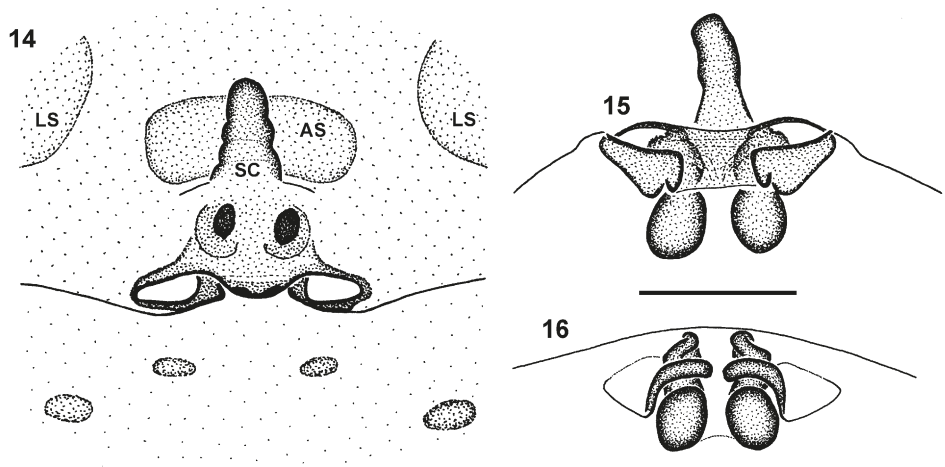



Figs 10–13. Digital microscope photographs of *Pasilobus dippenaarae* sp. n.: (10) habitus of holotype; (11) same, paratype; (12) dorso-prolateral view of femora I and II, arrows indicating large and small tubercles; (13) paratype, ventral epigyne. Abbreviations: AS – anterior sclerite; LS – lateral sclerite; SC – scape. Scale bars: (10, 11) = 5 mm; (12, 13) = 0.5 mm.

of tubercles immediately behind first anterior pair on dorsal surface; two pairs of large tubercles on lateral margins; two pairs on posterior margin, followed by trapezoid lobe with paired lateral tubercles; anterior surface of abdomen with two rows of sigilla, first with eight pairs of small yellow-brown sigilla, second rows with median sigillum and six pairs of larger orange-brown sigilla; dorsum with median and five pairs of sigilla anteriorly, more or less between paired tubercles; from anterior median sigillum four pairs of large sigilla, arranged in diamond, with several pairs of small sclerites between them; two pairs of large sigilla along posterolateral margin; single median and two pairs of lateral sigilla above posterior lobe; several pairs of large orange-brown sigilla on lateral and posterior sides of abdomen. Dorsum dark grey, darker along midline, with paired transverse cream markings medially (Figs 6, 10); large pair of anterolateral tubercles yellow-brown; posterolateral margin with pair of black patches; posterior end of dorsum cream, marking extending onto posterior lobe, which has two narrow lateral black markings; abdomen dark grey laterally, wrinkled and black ventrally; venter with many small sclerites; tracheal spiracle slit-like, in front of small triangular cololus.

Epigyne with ovoid yellow-brown anterior sclerite, immediately in front of short narrow scape, and paired lateral sclerites covering booklungs; scape directed somewhat anteriorly (Figs 13–15); copulatory openings antero-prolaterally within sclerotised oval

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Figs 14–16. *Pasilobus dippenaarae* sp. n. paratype, epigyne in ventral (14), posterior (15) and antero-dorsal views (16). Abbreviations: AS – anterior sclerite; LS – lateral sclerite; SC – scape. Scale bar = 0.5 mm.

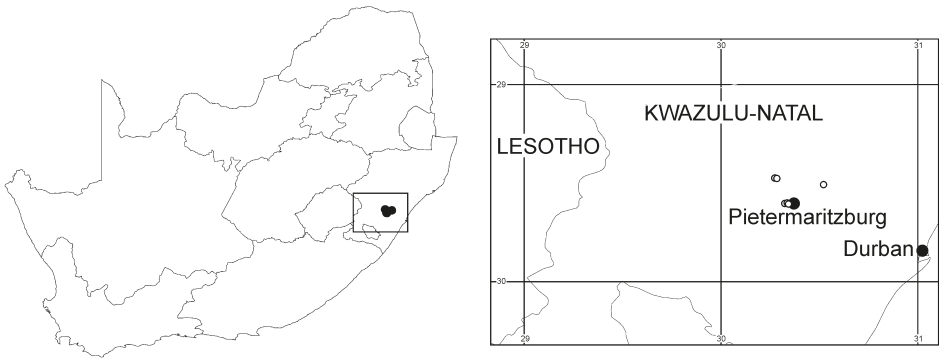



Fig. 17. Distribution of *Pasilobus dippenaarae* sp. n. in KwaZulu-Natal, South Africa.

ridges, just anterior to epigastric furrow; copulatory ducts forming two loops, doubling back in single channel before entering oval spermathecae (Fig. 16).

*Variation* (paratype female, NMSA 26882).

Measurements: CL 3.4, CW 3.6, AL 6.0, AW 14.2, TL 9.6.
Specimen gravid or recently fed, abdomen swollen, tubercles less distinct than holotype (Figs 8, 11). Abdominal colouration in living specimen bright orange-brown, markings as for holotype.

*Male.* Unknown.

Holotype ♀, with 2 egg sacs (sacs not collected): SOUTH AFRICA: *KwaZulu-Natal*: Hilton College Nature Reserve, Gwen's Stream, 29°28'49.06"S 30°16'53.58"E, leg. J. Roff, 17.vi.2014 (NMSA 26881, type no. 3394).

Paratype ♀, with <5 egg sacs (1 egg sac collected): SOUTH AFRICA: *KwaZulu-Natal*: Hilton College Nature Reserve, Gwen's Valley, 29°28'59.92"S 30°17'03.94"E, leg. J. Roff, 28.v.2006 (NMSA 26882, type no. 3395).

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TABLE 1

Summary of biological observations on *Pasilobus dippenaarae* sp. n. in the Pietermaritzburg district, KwaZulu-Natal, South Africa.

| Date | Nature of observation | Locality and habitat |
|---|---|---|
| March 2005 | 3 egg sacs | KwaZulu-Natal National Botanical Garden. In *Encephalartos natalensis*, 2 m above ground |
| May 2006 | Paratype female, with <5 egg sacs | Gwen's Valley, Hilton College Nature Reserve. In *Bidens pilosa*, 2 m above ground |
| June 2007 | Several egg sacs | Cumberland Nature Reserve. In dead tree, 2 m above ground near uMgeni River |
| June 2010 | Several egg sacs | Hilton College Nature Reserve. In small tree, 2.5 m above ground near Gwen's stream |
| April 2011 | Female, with several egg sacs | Boughton, Pietermaritzburg. In shrubs in suburban garden |
| January 2012 | Juvenile female | Boughton, Pietermaritzburg. In shrubs in suburban garden |
| June 2014 | Holotype female, with two egg sacs | Gwen's Valley, Hilton College Nature Reserve. In *Acacia ataxacantha*, 1 m above ground |

Additional material observed but not collected: SOUTH AFRICA: *KwaZulu-Natal*: Cumberland Nature Reserve, uMgeni River, 29°30'43.92"S 30°31'26.10"E, leg. J. Roff, vi.2007, <5 egg sacs; Hilton College Nature Reserve, Gwen's Stream, 29°28'41.27"S 30°16'52.83"E, leg. J. Roff, vi.2010, <5 egg sacs; KwaZulu-Natal National Botanical Garden, 29°36'28.09"S 30°20'50.77"E, leg. J. Roff, iii.2005, 3 egg sacs; Pietermaritzburg, Boughton, 29°36'05.30"S 30°20'11.78"E, leg. J. Roff, iv.2011, 1♀ with egg sacs; Pietermaritzburg, Boughton, garden, 29°36'16.83"S 30°19'48.58"E, leg. J. Roff, i.2012, 1 subadult ♀.

Distribution: Only known from six localities in the vicinity of Pietermaritzburg in KwaZulu-Natal, South Africa (Fig. 17).

## BIOLOGICAL OBSERVATIONS

This species was first observed in a wooded suburban garden in Boughton, Pietermaritzburg during March and April 2001. The initial observation was of several egg cases constructed on a washing line. Approximately 20 m away, next to another egg case (Fig. 4), a mature female spider was observed on the upper surface of a leaf of *Cestrum laevigatum*, approximately 1.5 m above ground (Figs 6, 9). It had made a thin covering of silk threads on which it was sitting. Observations were made sporadically over several days, during which time the spider moved to a new location about 2 m above the ground in the leafy branches of a *Citrus* × *limon*. At the new site it was observed to construct a catch-web resembling the one illustrated in Robinson and Robinson (1975).

Females and egg sacs were subsequently observed on several occasions in the vicinity of Pietermaritzburg. Based on this data, there was no preference for foliage types or tree species with regards to foraging microhabitats of spiders and sites for egg sac production. Most observations were made between 1 and 2.5 m from the ground (Table 1). All specimens were observed and/or collected during summer and autumn, and no records exist for winter and spring thus far.

The two specimens collected (holotype and paratype) were kept alive for several days for observation. They were only active nocturnally, and did not construct catch-webs. All spiders observed in the field were on the upper surfaces of leaves, fully visible during the day, strongly resembling bird droppings. The thin scattering of silk threads on the

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leaf surface surrounding the first observed specimen increased its resemblance to a bird-dropping. All egg sacs observed had a similar shape to the one pictured (Fig. 9): a more-or-less truncated teat shape and mottled dark brown colour, suspended 5–10 cm from the plant substrate. In habitat the egg sacs are hard to distinguish from the dead leaves around them. In three localities, sacs were found several metres apart, suggesting that the spiders move periodically as egg-laying adults. This may serve to reduce predation and parasitism of the eggs. Such behaviour has been noted in *Cladomelea akermani* Hewitt, 1923 by the first author (personal observation).

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