

A new species of *Stasimopus* from the Eastern Cape Province of South Africa (Araneae, Mygalomorphae, Ctenizidae), with notes on its natural history

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Abstract

A new species of ctenizid trapdoor spider is described, *Stasimopus mandelai* **sp. nov.**, from the Eastern Cape Province of South Africa. This species occurs syntopically with *S. schoenlandi* Pocock and a number of other mygalomorph spiders at the Great Fish River Nature Reserve. Illustrations, photographs, and additional notes on burrow architecture and general natural history are provided.

Key words: trapdoor spiders, Ctenizidae, *Stasimopus*, new species, taxonomy, South Africa

Introduction

Stasimopus is a relatively species-rich genus of ctenizid trapdoor spiders endemic to Namibia and South Africa. Hewitt (1915a) stated that these spiders were more or less restricted to the Cape Provinces and the Free State in South Africa, but assumed that additional specimens would probably be found in the more northern provinces once those areas were more thoroughly sampled. He also suggested that the majority of species were allopatric, as only occasionally two or more species have been found at a single locality.

C. L. Koch (1842) described *Actinopus caffrus* Koch, and half a century later, Simon (1892) described the genus *Stasimopus* to properly accommodate this species. After the establishment of *Stasimopus*, a number of new species were identified and described. Pocock (1897, 1898, 1900, 1901, 1902a, 1902b) was among the first authorities to work extensively with this genus, but it was Purcell (1902, 1903a, 1903b, 1908) and Hewitt (1910, 1913, 1914, 1915a, 1915b, 1916, 1917, 1919, 1927) who described the vast majority of the 46 currently recognized species and subspecies (Platnick 2004). These two

authors named 13 and 19 species and subspecies, respectively (or just over two-thirds of all taxa in the genus).

Aside from the somewhat recent revision of the Mygalomorphae by Raven (1985) and the guide to South African mygalomorph spiders by Dippenaar-Schoeman (2002), little attention has been devoted to *Stasimopus*. In fact, until now, no additional species have been described since Hewitt (1927).

Unfortunately, despite this significant species diversity, assigning a name to any particular specimen of *Stasimopus* proves challenging and a modern-day revision is badly needed for this group of interesting trapdoor spiders. Much of the literature is vague and uninformative, and many of the original descriptions can be applied to any number of species. Of those descriptions that are relatively thorough and adequate, there are rarely figures or illustrations that can be used for interpretation of the characters. For example, Pocock's (1900) original description of *S. schoenlandi* Pocock is a mere seven lines of text with no reference to figures; he simply compared his new species to an apparently close relative and only provided a single measurement.

Furthermore, many of the species are described on the basis of a single specimen or sex, and therefore, limits of variation and sexual dimorphism remain unknown. Consequently, geographic variation and distributional data have been poorly defined for these spiders and many species have undoubtedly been diagnosed on the basis of highly variable, and thus unreliable, characters. Less than one-half of the species are known from both sexes, and of the remaining species, 18 are known only from females. In general, mygalomorph spiders are primarily diagnosed and identified on the basis of male secondary sexual characters (e.g., mating clasper morphology) and other somatic features (e.g., leg and pedipalp spination patterns, body proportions), whereas females tend to be morphologically "static" between species, or highly variable within a single species. Based on our observations, *Stasimopus* shows a similar degree of female conservativeness and a high degree of intraspecific variation (within a single population) in characters that have been used by previous authors to diagnose species. As a result, many of the existing species names will likely be synonymized (personal assessment) once a full-fledged revision for the genus is carried out. Dippenaar-Schoeman (2002) provided a key to the *Stasimopus* species in South Africa; however, those species only known from males were excluded and cannot be identified without consulting the original descriptions or the outdated keys of Purcell (1903b) and Hewitt (1915a).

After examining the *Stasimopus* type material available to us (see Appendix for a list of all comparative material examined), we have identified what appears to be an undescribed species from the Eastern Cape Province in South Africa. The primary intent of this paper is to describe this novel diversity on the basis of both sexes, and to include an analysis of variation in characters previously used by other authors to diagnose species in this genus. Furthermore, we have included a number of taxonomically useful figures that will aid in identification. Our second objective is to provide natural history data for this species

from the Great Fish River Reserve in the East Cape Province of South Africa. We hope that this paper might encourage newfound interest in this diverse group of trapdoor spiders and spur additional research.

Methods

Terminology is standard for Araneae. Measurements of appendages were taken from the left side (retrolateral aspect) unless the article was damaged or missing, in which case the right side was used. Reference points for measurements follow that of Coyle (1971). Measurements were taken using a calibrated ocular micrometer and are accurate within 0.02–0.1 mm; all measurements are given in millimeters. Spermathecae were dissected from females with teasing needles and were subsequently cleared in clove oil for closer inspection.

Illustrations were prepared with a camera lucida attached to a Leica MZ 12.5 stereomicroscope and traced in Adobe Illustrator (version 10) vector graphics software. Digital images of the male pedipalp and mating clasper were made with a Microptics, Inc. Digital Imaging System; this imaging system is equipped with an Infinity, Inc. K2 long distance microscope, a ML-1000 fiber optic flash unit, and a Nikon D1X digital camera.

Abbreviations in the text and table are as follows: BL = male palpal bulb length; ChT = number of prolateral cheliceral teeth; CL/CW = carapace length/width; MaxCu = number of maxillary cuspules; Fe1L = femur I length; Fe4L = femur IV length; LbCu = number of labial cuspules; LbL/W = labium length/width; Mt1L = metatarsus I length; Mt4L = metatarsus IV length; PaFeL = palpal femur length; PaTiL = palpal tibia length; StrL/W = sternum length/width; Ta1L = tarsus I length; Ta4L = tarsus IV length; Ti1L = tibia I length; Ti4L = tibia IV length; TotL = total length (measured from the anterior-most aspect of the chelicerae to the posterior-most point on the spinnerets); ALE = anterior lateral eye(s); AME = anterior median eye(s); PLE = posterior lateral eye(s); PME = posterior median eye(s); AER = anterior eye row; PER = posterior eye row. “MY” codes are unique database numbers assigned to each of the specimens examined.

Specimen repository abbreviations are as follows: California Academy of Sciences, San Francisco, USA (CAS); Plant Protection Research Institute, Pretoria, South Africa (PPRI).

Taxonomy

Stasimopus mandelai, new species

(Figs. 1–19; Table 1)

Type data.—**Republic of South Africa:** *Eastern Cape Province:* Great Fish River Nature

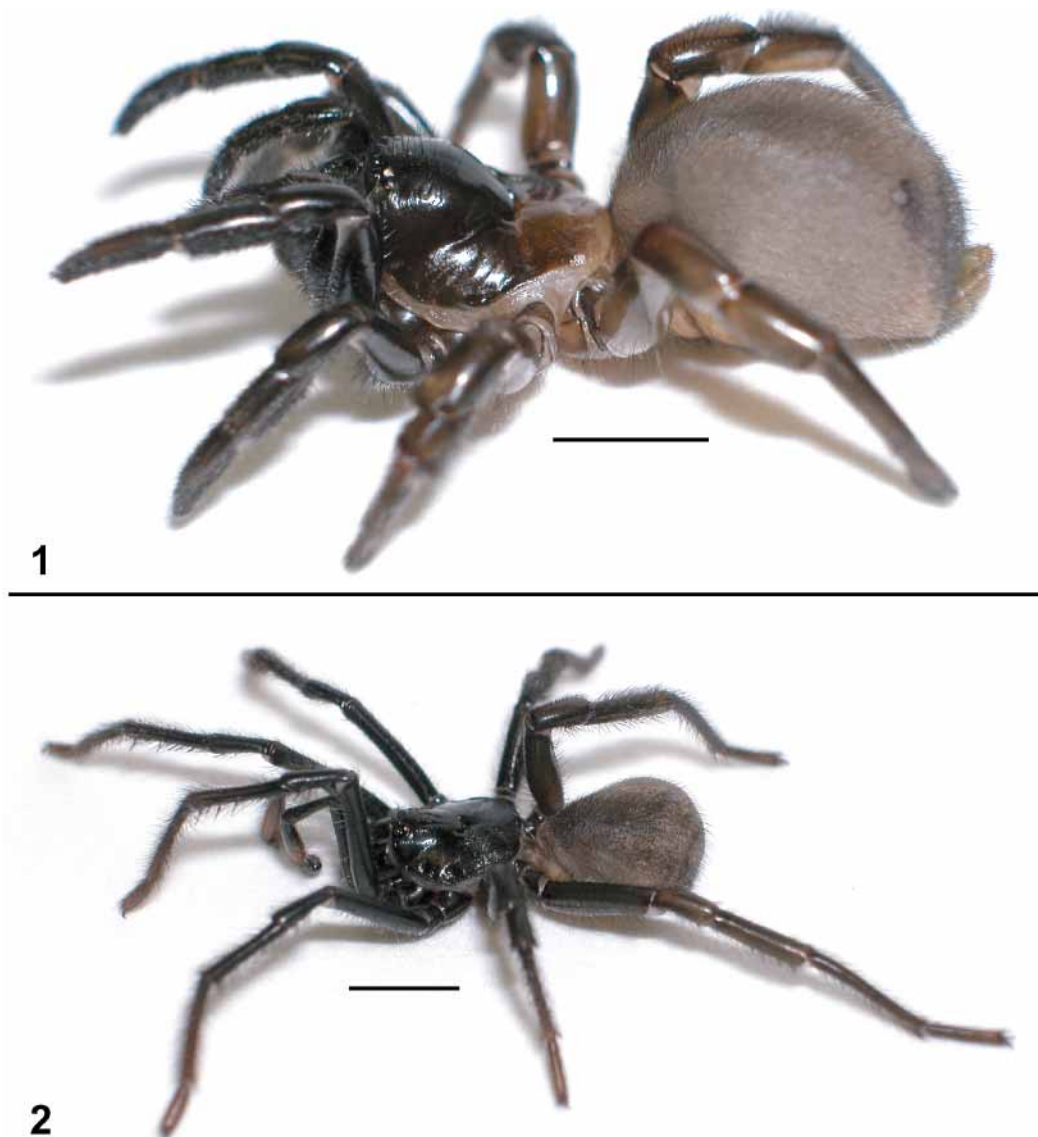
Reserve Site #2, (elev. 420 m), 4 June 2002 (J. E. Bond & M. C. Hedin), male holotype (MY 557) (CAS); same locality data, male paratype (MY 559) (PPRI); Great Fish River Nature Reserve Site #3, (S 33°07.653', E 26°40.372', elev. 325 m), 4 June 2002 (J. E. Bond & M. C. Hedin), 1 male paratype (MY 560) (CAS); same locality data, 2 female paratypes (MY 563, 564) (CAS), MY 563 with 35 second instar spiderlings; same locality data, 1 female paratype (MY 568) (CAS); same locality data, 1 female paratype (MY 569) (PPRI).

TABLE 1. *Stasimopus mandelai* sp. nov., measurements and meristics of all type specimens. See “Methods” section for abbreviations; * = modal counts; N/A = measurement not applicable to particular sex. Ranges and averages for males include the holotype specimen.

Character	Holotype	Male Range	Male Avg	Female Range	Female Avg
<i>TotL</i>	15.00	13.40–15.00	14.27	20.60–23.70	21.95
<i>BL</i>	1.90	1.54–1.90	1.61	N/A	N/A
<i>CL</i>	5.70	4.90–5.70	5.28	6.56–7.94	7.31
<i>CW</i>	5.25	4.50–5.25	4.85	5.75–6.69	6.32
<i>LbL</i>	0.96	0.72–0.96	0.83	1.20–1.44	1.32
<i>LbW</i>	1.00	0.80–1.00	0.91	1.25–1.38	1.33
<i>StrL</i>	3.12	2.96–3.12	3.05	4.00–5.00	4.56
<i>StrW</i>	3.12	2.52–2.72	2.79	3.45–3.94	3.72
<i>Fe1L</i>	4.69	4.06–4.69	4.44	4.20–4.60	4.46
<i>Ti1L</i>	5.13	4.19–5.13	4.73	2.50–2.75	2.64
<i>Mt1L</i>	2.25	2.00–2.38	2.32	2.40–2.95	2.70
<i>Ta1L</i>	2.15	1.90–2.15	2.05	0.95–1.00	0.99
<i>Fe4L</i>	3.31	2.56–3.31	3.06	4.25–4.85	4.66
<i>Ti4L</i>	4.25	3.75–4.25	4.05	2.70–3.25	3.01
<i>Mt4L</i>	5.60	5.15–5.70	5.48	3.35–3.90	3.70
<i>Ta4L</i>	4.00	3.64–4.08	3.91	1.50–1.90	1.69
<i>PaFeL</i>	4.75	4.15–4.75	4.52	N/A	N/A
<i>PaTiL</i>	3.00	2.45–3.00	2.73	N/A	N/A
<i>LbCu</i>	N/A	N/A	N/A	5–8	7*
<i>MaxCu</i>	N/A	N/A	N/A	7–14	12*
<i>ChT</i>	N/A	N/A	N/A	4–5	5*

Diagnosis.—Males can be identified primarily on the basis of leg spination patterns and coloration. The new species differs from *Stasimopus steynsburgensis* Hewitt by lacking distinct spines on the leg tarsi, possessing fewer spines on metatarsus I, and having a

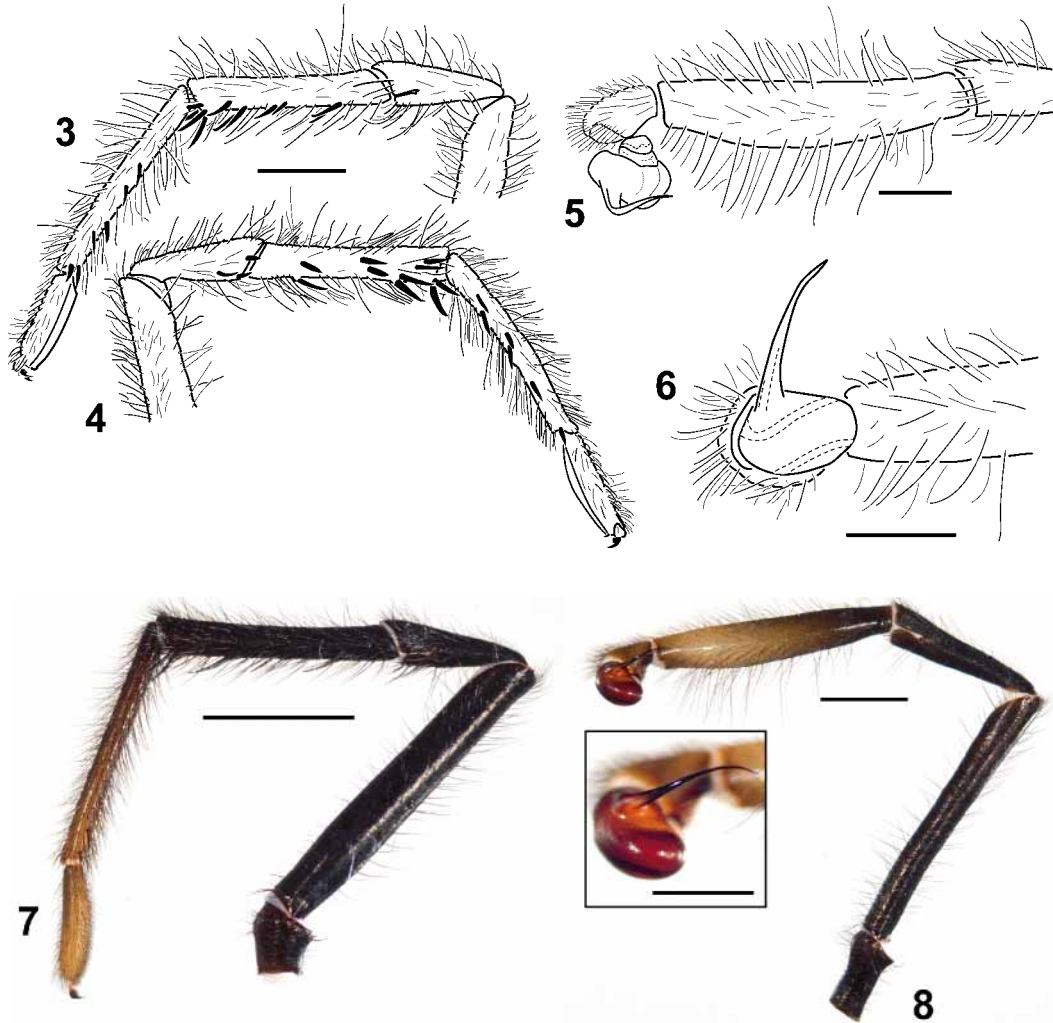
slightly more slender pedipalpal femur. *Stasimopus mandelai* **sp. nov.** does not possess distinctly red tarsi and metatarsi, nor does it have yellow-coloured parts on the book lungs and epigastric region (these are significant color differences) as do males of *S. schoenlandi*. In addition, the legs of the new species are far less spinose than that of the latter species.



FIGURES 1–2. *Stasimopus mandelai* **sp. nov.**, live habitus images. 1, female; 2, holotype male. Scale bars = 5.0 mm.

Females are moderately difficult to distinguish from other species. However, size, dorsal opisthosomal markings, and leg spinule patterns may provide some characters for iden-

tification. *Stasimopus mandelai* **sp. nov.** possesses distinct markings on the opisthosoma and is considerably smaller than *S. schoenlandi* and *S. spinosus* Hewitt. It also differs from *S. spinosus* by having a less extensive patch of spinules on metatarsus I.



FIGURES 3–8. *Stasimopus mandelai* **sp. nov.**, holotype male (MY 557). 3, left leg I, retrolateral aspect; 4, left leg I, prolateral aspect; 5, pedipalp, patella to bulb, retrolateral aspect; 6, pedipalp, distal portion, ventral aspect. Paratype male (MY 559). 7, leg I, retrolateral aspect; 8, pedipalp, retrolateral aspect (box showing enlarged view of palpal organ). Scale bars for legs = 2.0 mm; for pedipalps = 1.0 mm.

Description.—Males (Figs. 2–10). *General:* Moderate to large spiders (CL = 4.90–6.10). Carapace reddish-brown to nearly black. Sternum and coxae yellowish-orange. Opisthosoma of preserved specimens pale, light yellow to gray; faint dusky patch widening toward posterior, sometimes with chevron markings or posterior infuscated blotch.

Chelicerae dark, nearly black. Proximal segments of pedipalps and legs I-III dark, nearly black; distal segments progressively lighter (brownish-orange to orange). Proximal segments of leg IV obviously lighter colored than corresponding segments of other legs. *Prosoma*: Carapace slightly longer than wide ($CL/CW = 1.09-1.22$), appearing somewhat circular when viewed from dorsal aspect. Carapace with sparsely scattered setae along posterior and lateral margins; caput region moderately setose, particularly near ocular area. Carapacial surface roughened, characterized by numerous indistinct ridges or striae. Caput region slightly elevated (Fig. 2), with three vestigial longitudinal carinae where setae originate. Foveal groove moderately deep, strongly procurved. Ocular area (i.e., trapezoidal region encompassing AER and PER) slightly over twice as wider than long; ocular tubercle weak. AER essentially straight; PER somewhat recurved. PME situated behind ALE; distance between AME distinctly greater than distance between PME. Sternum widest between coxae II and III; posterior margin obtusely shaped. Posterior sternal sigilla positioned meso-laterally, about four times longer than wide. Sternal surface slightly to moderately setose; labium moderately setose. Labium and maxillae lacking cuspules. *Opisthosoma*: All surfaces moderately to densely setose. Epiandrous fusillae distinct from surrounding setae (e.g., stouter stature, wider base). *Chelicerae*: Rastellum distinct, consisting of several spinules. Surfaces somewhat roughened. *Pedipalps*: Segments elongated, lacking spines; tibia over five times longer than deep, slightly convex ventrally when viewed from lateral aspect (Fig. 5). Embolus moderately long, slender; tip slightly curved (Figs. 5, 6, 8). Surfaces sparsely to densely setose. *Legs*: Femur I generally shorter than tibia I. Tarsus IV distinctly longer than femur IV. Ventral surface of coxae moderately setose. Other leg segments (except retrolateral aspect of femur IV) moderately to densely setose; femora usually less hirsute than other segments. Scopula well-developed on tarsus I, less so on other tarsi, but still present; scopula absent from metatarsi. Spination of tibia and metatarsus I are illustrated in Figs. 3, 4, 7, 9, 10. Distinct patch of spinules on patella IV. Preening comb on ventrodorsal aspect of metatarsi moderately obscured by other setae and spines. Tibial mating claspers consisting of 2-3 elongated spines with (usually) recurved tips.

Females (Figs. 1, 11-15). *General*: Moderate to large spiders ($CW = 6.56-7.94$). Carapace somewhat lighter than in male; caput region brown, surrounding surfaces usually lighter. Opisthosoma of preserved specimens pale gray, with variable patterns; sometimes with dusky anterior median blotches (e.g., MY 563); usually with distinct posterior chevron markings or blotch. Legs brownish-orange. *Prosoma*: Carapace not noticeably circular ($CL/CW = 1.14-1.19$); anterior margin distinctly wider than posterior. Carapacial surface glabrous, shiny. Caput region much more strongly elevated than in male (Fig. 1), carinae absent. Foveal groove deep, strongly procurved. Ocular area distinctly over two times wider than long; ocular tubercle weak. AER and PER straight. PLE and PME subequal in size. PME oval or nearly circular. Distance between ALE and PLE about one or two times the diameter of one PLE. Diameter of one ALE greater than distance between ALE and

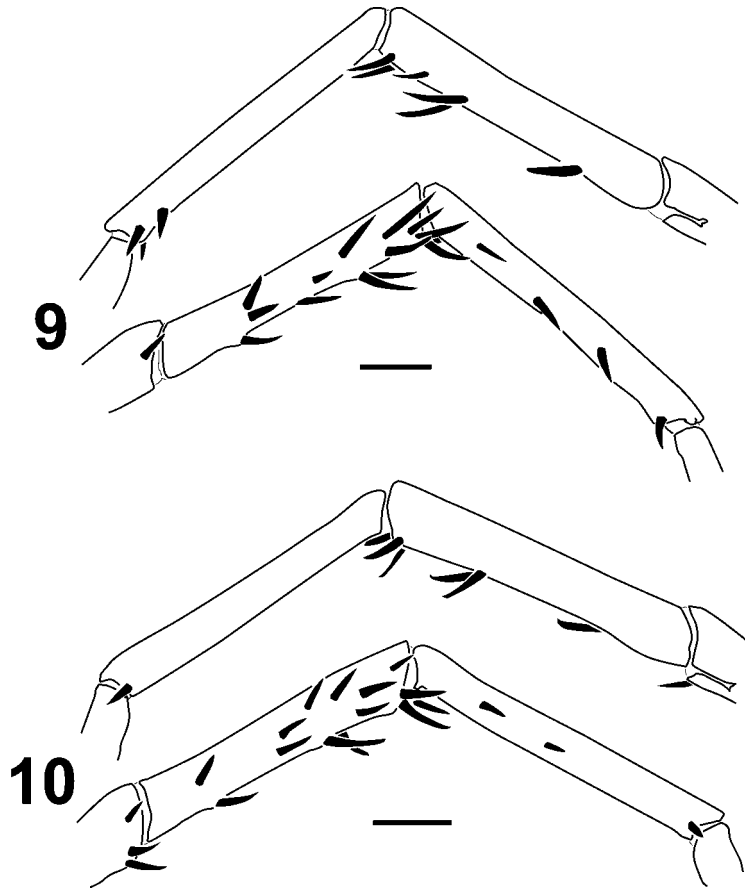
AME. Sternum widest between coxae II and III; posterior margin obtusely shaped. Sternal and labial surfaces moderately setose. Sigilla relatively shallow. Labium about as long as wide, with 5–8 cuspules. Maxillae with 7–14 cuspules concentrated near proximal prolateral margin. *Opisthosoma*: All surfaces moderately to densely setose. Spermathecae (Fig. 11) consisting of two simple, lightly-sclerotized and unbranched bulbs. *Chelicerae*: Rastellum strong. Surfaces more or less glabrous. Prolateral margin of cheliceral fang furrow with 4–5 teeth (anterior-most sometimes smaller or absent). *Pedipalps*: Tarsus with proximal patch of spinules extending over less than one-third of segment or consisting of only a small basal cluster. Tibia without stout dorsal spines; often with a few stiffened setae distally. Tibia and tarsus with numerous digging spines on ventral side of segment. *Legs*: Tibia, metatarsus and tarsus I and II with numerous digging spines. Metatarsus I with dorsobasal band of spinules reaching approximately one-fourth to slightly over one-half of segment (Figs. 12–15); moderately well developed. Femur III with or without single dorsal spine near apex. Patella III with or without distinct spines near apex, not especially slender; with patch of black spinules (unlike red spinules on patella IV). Metatarsus III with apical spines, but not along extreme distal margin; other spines well developed. Metatarsus IV without single, enlarged stout spine within apical tuft; without ventromedian band of spines, but moderately spinose prolaterally; preening comb distinct on ventral surface. Dorsobasal surface of patella IV with distinct patch of red spinules. Most segments weakly to moderately setose; some areas devoid of setae.

Selected measurements and meristics are provided in Table 1.

Taxonomic Remarks.—At present, females can be differentiated from *S. schoenlandi* and *S. spinosus* primarily upon the basis of opisthosomal markings and size. The opisthosoma of numerous *Stasimopus* species is reported as being pale with a darkened blotch posteriorly. The new species has a distinct infuscated blotch (often with anteriorly projecting swathes of pigment which originate from the lateral aspect of the blotch) or a chevron-like pattern on the posterior portion of the opisthosoma. Such a character was not reported for *S. schoenlandi* and was not observed in the holotype female of *S. spinosus* (although it is possible that the opisthosomal markings, if present, have faded over time), but it is fairly conspicuous and was well known to Hewitt, who worked extensively with these two species (Hewitt 1913, 1914, 1915a, 1917, 1927). He described the opisthosoma of an additional species, *S. maraisi* Hewitt, as “pale above with some dark blotches which in the hinder half are symmetrically arranged, forming a kind of tree pattern” (Hewitt 1914); this is somewhat consistent with the opisthosomal pattern of the new species. However, *S. maraisi* is known from the Northern and Western Cape Provinces only.

In addition, females of the new species appear to be considerably smaller than those of *S. schoenlandi* and *S. spinosus*. Hewitt (1913) reported that a female specimen of *S. schoenlandi* had a carapace length of 13.75 mm, nearly twice the average length of the new species (Table 1). The total length of this species has commonly been reported to be well over 30 mm, whereas the largest female (MY 569) of the new species is only about 24

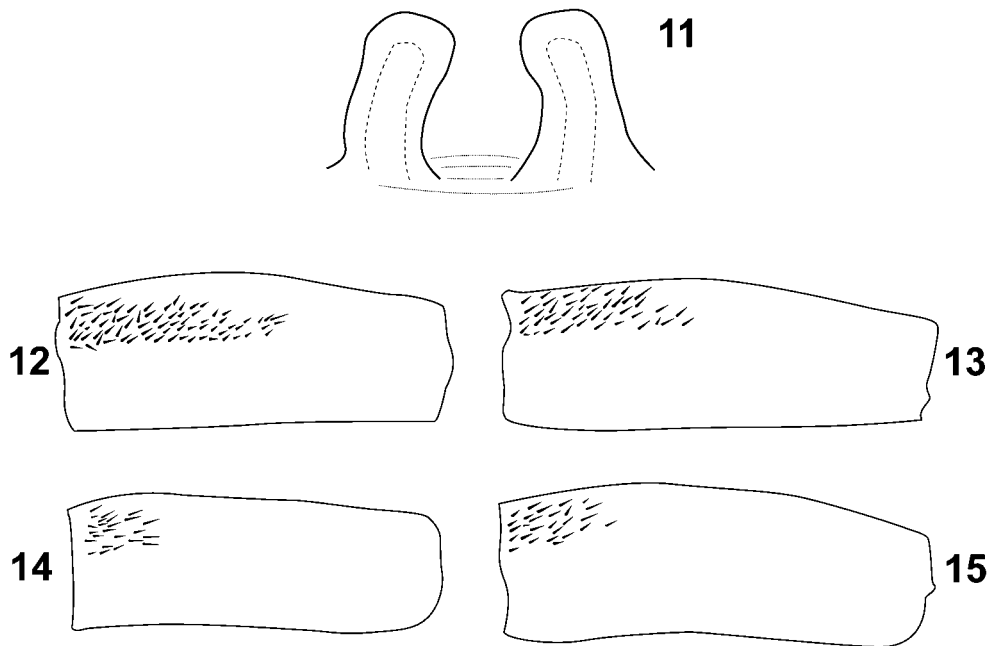
mm. We are well aware that size can be an unreliable diagnostic character for females because of age (i.e., due to post-maturation molts) and nutritional history, but this character has been used successfully in other mygalomorph spiders (e.g., Hendrixson & Bond in press) and the size difference observed herein appears to be significant.



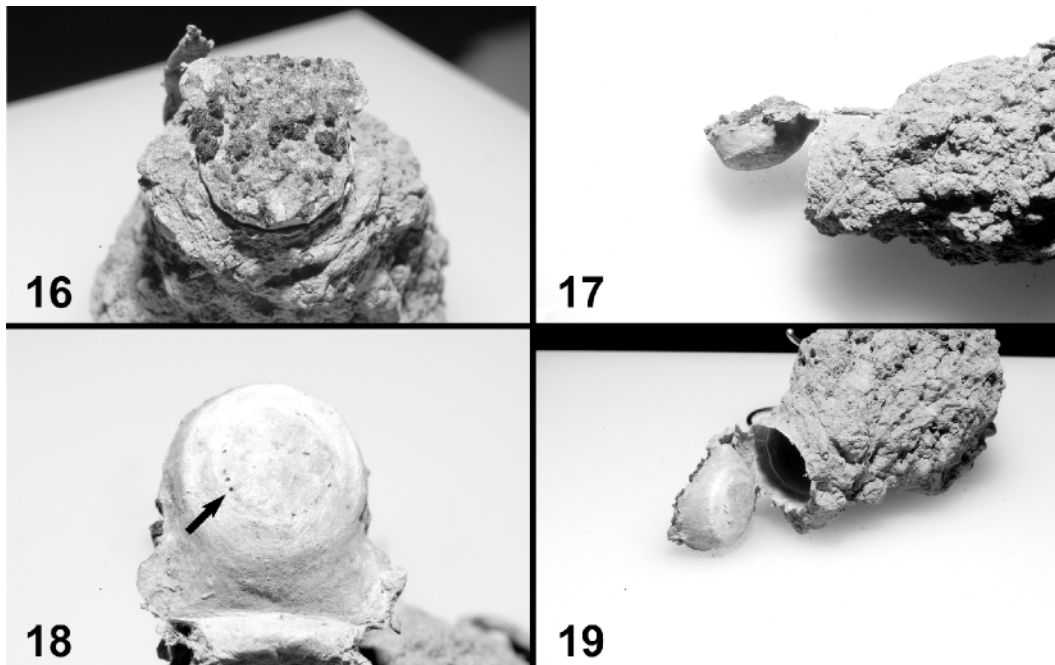
FIGURES 9–10. *Stasimopus mandelai* sp. nov., variation in spine pattern on left leg I of males; retrolateral aspect, top; prolateral aspect, bottom. 9, MY 559; 10, MY 560. Scale bars = 1.0 mm.

Distribution.—Presently known only from the type locality.

Etymology.—The specific epithet is a patronym honoring Nelson Mandela, the former president of South Africa and one of the great moral leaders of our time.



FIGURES 11–15. *Stasimopus mandelai* sp. nov., females. 11, spermathecae. Variation of spinule patch on left leg metatarsus I. 12, MY 563; 13, MY 564; 14, MY 568; 15, MY 569. Scale bar = 1.0 mm.



FIGURES 16–19. *Stasimopus mandelai* sp. nov., trapdoor and architecture of excavated burrow. 16, trapdoor closed, top view; 17, trapdoor open, lateral view; 18, close-up view of inside trapdoor, the arrow is pointing to small pits; 19, trapdoor open, oblique view.

Natural history

Stasimopus mandelai **sp. nov.** was collected in open Karoo habitat. This habitat type, particularly that of the Great Fish River Nature Reserve, is considered to be an extremely harsh environment with high diurnal and annual temperature ranges, and with exceptionally low amounts of precipitation (Cowling 1983). Dominant vegetation types at the collecting locality (site #3) included *Maytenus capitata*, *Lycium campanulatum*, *Grewia robusta*, *Ehretia rigida*, *Pentzia incana*, *Protasparagus suaveolens*, *Rhus refracta*, and *Acacia karroo*. A number of other mygalomorph species were collected very close to *S. mandelai* **sp. nov.** and are considered to be syntopic. These included *Stasimopus schoenlandi*, *Moggridea crudeni* Hewitt (Migidae), *Ancylotrypa* sp. (Cyrtaucheniidae), *Allothele australis* (Purcell) (Dipluridae), and *Ctenolophus* sp. (Idiopidae).

There are relatively few detailed accounts of *Stasimopus* natural history, although Dippenaar-Schoeman (2002) did provide a brief, general overview of trapdoor and burrow construction thought to be typical for members of this genus. Figures 16-19 show a typical *Stasimopus mandelai* **sp. nov.** (specimen MY 563) burrow excavated from the upper ledge (20–25° slope) of a steep bank (the trapdoor hinge facing down the slope), collected at Great Fish River site #3. The trapdoor was a very thick, cork-type door, measuring over 8.70 mm in thickness and firmly attached to the burrow lip by a relatively thin silken hinge approximately 16.00 mm wide. The door is ovoid in shape (length = 15.97 mm, width = 13.30 mm) and is composed primarily of silk and soil with a very light covering of moss. The burrow was approximately 14.50 mm in diameter and 175.00 mm deep, extending into the ravine bank at almost a 90° angle to the entrance. The inside of the trapdoor (Fig. 18) had small pits likely made by the spider gripping the lid with its tarsal claws and chelicerae (Dippenaar-Schoeman 2002, Bond & Coyle 1995).

All males examined were collected in their burrows after they had reached maturity. Based on this information, males likely perform their final molt during the late autumn/early winter months and emerge shortly thereafter. One female (MY 563) contained 35 second instar spiderlings within her burrow. It is unknown whether females mate while brooding young from previous seasons, or how long spiderlings remain within the maternal burrow.

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Appendix—List of Comparative Material Examined

Repository abbreviations as follows: British Museum of Natural History, London, England (BMNH); Natal Museum, Pietermaritzburg, South Africa (NM); South African Museum, Cape Town (SAM).

- *Stasimopus astutus* Pocock, female holotype (NM)
- *Stasimopus brevipalpis* Purcell, male non-type (SAM)
- *Stasimopus erythrognathus* Purcell, male non-type (SAM)
- *Stasimopus fordi* Hewitt, male holotype (NM)
- *Stasimopus gigas* Hewitt, male holotype (BMNH)
- *Stasimopus insculptus* Pocock, male holotype (BMNH)
- *Stasimopus insculptus peddiensis* Hewitt, male syntype (NM)
- *Stasimopus kentanicus* Purcell, male/female syntypes (SAM)
- *Stasimopus kolberi* Purcell, female syntype (SAM)
- *Stasimopus leipoldti* Purcell, female holotype (SAM)
- *Stasimopus longipalpis* Hewitt, male syntype (NM)
- *Stasimopus maraisi* Hewitt, female syntype (NM)
- *Stasimopus nanus* Tucker, female holotype (SAM)
- *Stasimopus nigellus* Pocock, male holotype (NM)
- *Stasimopus oculatus* Pocock, female holotype (BMNH)
- *Stasimopus palpiger* Pocock, male holotype (BMNH)
- *Stasimopus petersonae* Hewitt, male holotype (NM)
- *Stasimopus poweri* Hewitt, female syntype (NM)
- *Stasimopus purcelli* Tucker, male holotype (SAM)
- *Stasimopus quadratimaculatus* Purcell, female syntype (SAM)
- *Stasimopus qumbu* Hewitt, female holotype (NM)
- *Stasimopus rufidens* (Ausserer), female holotype (NM)
- *Stasimopus schoenlandi* Pocock, female holotype (BMNH)
- *Stasimopus schreineri* Purcell, male/female syntypes (SAM)
- *Stasimopus schultzei* Purcell, female syntype (SAM)
- *Stasimopus spinipes* Hewitt, male/female syntypes (NM)
- *Stasimopus spinosus* Hewitt, female holotype (NM)
- *Stasimopus steynsburgensis* Hewitt, male holotype (BMNH)
- *Stasimopus tysoni* Hewitt, male/female syntypes (NM)
- *Stasimopus umtaticus* Purcell, female holotype (SAM)
- *Stasimopus unispinosus* Purcell, female holotype (SAM)