A check list of the spiders of the Kruger National Park, South Africa (Arachnida: Araneae)

ANNA S. DIPPENAAR-SCHOEMAN and A. LEROY

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As part of the South African National Survey of Arachnida (SANSA), projects are underway to determine the biodiversity of arachnids present in protected areas in South Africa. Spiders have been collected over a period of 16 years from the Kruger National Park, South Africa. A check list is provided consisting of 152 species, 116 genera and 40 families. This represents about 7.6 % of the total known South African spider fauna. Of the 152 species, 103 are new records for the park. The ground dwelling spiders comprise 58 species from 25 families. Of these, 21 % are web dwellers and 62 % free living, while 17 % live in burrows. From the plant layer, 94 species have been collected of which 53 % were web builders and 47 % free living wandering spiders.

Key words: Araneae, biodiversity, check list, Kruger National Park, South Africa, spiders.

Anna S. Dippenaar-Schoeman, ARC-Plant Protection Research Institute, Private Bag X134, Pretoria 0001, Republic of South Africa; Astri Leroy, P.O. Box 2810, Wilropark, 1731, Republic of South Africa.

Introduction

Conservation biologists are starting to recognise the importance of the invertebrate component in the functioning of healthy ecosystems. Therefore, any approach to conservation needs to take into account the composition of these invertebrate fauna. Inventories, with resulting check lists, provide valuable baseline information on species present and are the first step toward a better understanding of the fauna of the area.

In 1997, the South African National Survey of Arachnida (SANSA) was initiated (Dippenaar-Schoeman & Craemer 2000) with its main aim to make an inventory of the arachnid diversity of South Africa. One of the projects of SANSA is to compile an inventory of spiders presently conserved in parks and reserves in South Africa.

Although spiders constitute an abundant and highly diverse group of invertebrate animals, little is still known about their diversity even in conserved areas. From South Africa check lists exist for the spider fauna of the Mountain Zebra National (Dippenaar-Schoeman 1988), Roodeplaat Dam Nature Reserve (Dippenaar-Schoeman *et al.* 1989), Karoo National Park (Dippenaar-Schoeman *et al.* 1999), Makelali Nature Reserve in the Limpopo Province (Whitmore *et al.* 2001) and the Western Soutpansberg (Foord 2002).

The aim of this study was to compile the first check list of the spider species of the Kruger National Park (KNP) and to determine the percentage of species protected. This was not an intensive survey but reflects on collecting done in the park over a period of 16 years. Although this survey may not reflect the true diversity and species richness of the area, it does give an indication of species present.

Material and methods

Study area

The Kruger National Park (KNP) is situated in the Lowveld region of the Mpumalanga and Limpopo Provinces of South Africa. The park is 350 km long

from north to south with a surface area of 1 948 528 ha. The climate is subtropical, with the annual rainfall varying between 700 mm in the south and 400 mm in the north. It falls within the Savanna Biome and the vegetation includes mixed bushwillow woodlands, mountain bushveld, thorn thicket, thorn veld, sourveld, scrubveld, sandveld and riverine forest.

Collecting methods

Sporadic collecting was mainly undertaken from 1985 to 2001. Spiders were sampled by hand (ground and plant search, turning rocks and sifting of leaf litter) or using a sweepnet or beating tray for grass and low shrubs. The new records were identified by the first author and are housed in the National Collection of Arachnida (NCA) at the ARC-Plant Protection Research Institute in Pretoria. The lack of taxonomic research in southern Africa within certain families made the identification of some genera to species level impossible. In some families, only immature specimens were collected, hampering identification to species level. This means that, in both instances, only generic names are included in the check list. The species list includes published

Table 1
Guild classification of spiders collected in the Kruger National Park.

Guilds	Abbreviation	Guild explanation
WANDERING SPIDERS (W)		
Ground wandering spiders (GW)		
Free living	FGW	free-living spiders running on the soil surface when active
Burrow living	BGW	living in burrows
Plant wandering spiders (PW)		
Free living	FPW	free-living spiders running on the plant surface when active
WEB-BUILDING SPIDERS (WB)		
Orb-web	OWB	orb-webs consisting of a frame with mooring and bridge lines that anchors the web and radial signal threads arranged like the ribs of a umbrella converging onto the centre of the web with circular spiral threads
Funnel-web	FWB	sheet-webs made over soil surface with a funnel-shaped retreat
Gumfoot-web	GWB	three-dimensional webs consisting of a central area with or without a retreat. The upper part comprises mooring, signal and catch threads and a lower part with mooring and catch threads. The lower catch threads studded with sticky droplets are attached to the substrate
Retreat-web	RWB	silk threads used to catch prey radiating from retreat
Sheet-web	SHWB	sheet-webs which, usually consists of an upper sheet with mooring, signal and catch threads
Space-web	SPWB	space-webs which, fill open space and are usually attached with mooring threads to different substrates.

records of spiders previously recorded from the Kruger National Park.

Guilds

A guild is a group of species that potentially compete for jointly exploited limited resources (Polis & McCormick 1986). Because most spiders live in a defined environment with limitations set by both physical conditions and biological factors (Foelix 1982), species can be grouped into guilds based on available information on their habitat preferences and predatory methods. For the present study two main guilds were recognised, namely wandering spiders (W) and web builders (WB), with further subdivisions based on micro-habitat and general behaviour (Table 1).

Results and discussion

Numbers present

Forty families represented by 116 genera and 152 species are presently known from the KNP (Table 2). Of the 152 species listed 103 are new records for the KNP (Table 2 & 3). The orb-web spiders of the family Araneidae are the most diverse and represented by 23 species, followed by the crab spiders (Thomisidae) with 15, the lynx spiders (Oxyopidae) with 9 and the wolf spiders (Lycosidae) and jumping spiders (Salticidae) with 8 species each. Fifteen families are represented by a single species. A total of 91 species are free living wandering spiders (59 %) while 61 species (41 %) build webs.

Table 2
Spider families collected at the Kruger National Park indicating the number of species and genera in each family and the number of species that are new records (NR)

Family	Genera	Species	Nr	Family	Genera	Species	Nr
Araneidae	15	23	15	Oxyopidae	3	9	4
Archaeidae	1	1	0	Palpimanidae	1	1	1
Barychelidae	1	1	1	Philodromidae	3	4	3
Caponiidae	1	1	1	Pholcidae	3	3	3
Corinnidae	2	2	2	Phyxelididae	1	1	0
Ctenidae	1	1	1	Pisauridae	5	5	3
Cyrtaucheniidae	1	1	1	Prodidomidae	1	2	2
Deinopidae	1	1	1	Salticidae	8	8	7
Dictynidae	2	2	1	Scytodidae	1	1	1
Dipluridae	1	1	0	Segestriidae	1	1	1
Eresidae	3	6	2	Selenopidae	2	6	1
Gnaphosidae	6	6	1	Sicariidae	2	2	2
Hersiliidae	1	2	0	Sparassidae	3	3	2
Idiopidae	1	1	1	Tetragnathidae	5	7	6
Linyphiidae	2	2	1	Theraphosidae	4	5	1
Liocranidae	1	1	1	Theridiidae	5	5	5
Lycosidae	8	8	8	Thomisidae	9	15	14
Mimetidae	1	1	1	Uloboridae	1	2	2
Miturgidae	2	4	2	Zodariidae	4	4	2
Oecobiidae	2	2	2				
Oonopidae	1	1	1				
				Tot: 40	116	152	103

Ground wandering spiders

Twenty-five families represented by 58 species are associated with the ground layer, 10 species live in burrows made in the ground, 36 species are free living and 12 are web dwellers.

Web-building spiders

Twelve species construct their webs on or close to the soil surface. The following web types were found: funnel-webs of the Dipluridae (*Allothele malawi* Coyle, 1984); retreat-webs of the Eresidae (*Dresserus colsoni* Tucker, 1920), Hersiliidae (*Tama* sp.), Oecobiidae (2 spp.) and the Phyxelididae (*Xevioso orthomeles* Griswold, 1990); space-web of the Pholcidae (3 spp.) funnel-web of the lycosid (*Hippasa australis* Lawrence, 1927) and the gumfoot-webs of the theridiids (*Latrodectus geometricus* C.L. Koch, 1841 and *Steatoda capensis* Hann, 1990).

Free living ground spiders

Thirty-six species (62 %) are free-living wanderers represented by 15 families. The more diverse families are the wolf spiders (Lycosidae) with 8 species, the ground spiders (Gnaphosidae) and the flatties (Selenopidae) both with 6 species each.

Burrow living spiders

Eight of the burrow dwellers found in the park belong to the suborder Mygalomorphae. They are represented by: two trapdoor spider families, Cyrtaucheniidae (*Ancylotrypa barbertoni* (Hewitt, 1913)) and Idiopidae (*Idiops castaneus* Hewitt, 1913); five baboon spider species of the family Theraphosidae; and one lesser baboon spider of the family Barychelidae. Of the mygalomorphs, the International Union for the Conservation of Nature (IUCN) (De Wet & Schoonbee 1991) finds that it is mainly the larger Theraphosidae that are considered commercially threathened. Four of the theraphosid species, added to Schedule VII of the Transvaal Provincial Nature Conservation Ordinance of 1983 as Protected Invertebrate Animals, are found in the park (Dippenaar-Schoeman 2002a; Gallon 2002), viz., *Ceratogyrus bechuanicus* Purcell, 1902, *Harpactira gigas* Pocock, 1898, *Augacephalus breyeri* (Hewitt, 1919) and *A. junodi* (Simon, 1904).

Plant wandering spiders

Web-building spiders

From the field layer 52 % of the species (50) collected build webs. The orb-web spiders were the most diverse and represented by three families namely the Araneidae (23 spp.), Tetragnathidae (7 spp.) and Uloboridae (2 spp.). Members of the genera *Argiope*, *Afracantha* and *Gasteracantha* of the Araneidae and *Leucauge*, *Nephila*, *Nephilengys* and *Tetragnatha* of the Tetragnathidae construct large orb-webs between plants and are seen in their webs during the day. The tropical tent-web spider *Cyrtophora citricola* (Forskål, 1775) makes horizontal adapted orb-webs in plants like aloes. Most of the other orb-web species are nocturnal, e.g., the bark spider *Caerostris,* and remove their webs early each morning. The retreat webs of the Dictynidae, Eresidae and Segestriidae are made on different parts of the plants. Two species of the genus *Stegodyphus*, *S. dumicola* Pocock, 1898 and *S. mimosarum* Pavesi, 1883 are communal nest spiders found in large nests attached to the trees. The other web spiders construct gumfoot-webs (Theridiidae) and sheet-webs (Pisauridae and Linyphiidae). The large funnel-webs made vertically next to trees with the retreat part usually concealed in the plants or in abandoned animal holes are made by the large pisaurid *Euprosthenops australis* Simon, 1898.

Free living plant spiders

Ten families from 44 species are found on plants, with members of four families associated with bark, eight with grass, and four with leaves. The long spinnered bark spider *Hersilia sericea* Pocock, 1898 is a permanent inhabitant on bark, while members of the Philodromidae, Salticidae and Thomisidae are found on bark as well as

Table 3
Check list of the spiders of the Kruger National Park

Family/genus/species	Guild	Record
1. Family Araneidae		
Afracantha camerunensis (Thorell, 1899)	OWB	Emerit 1973
Araneus apricus (Karsch, 1884)	OWB	NR
Argiope australis (Walckenaer, 1805)	OWB	Bjørn 1997
A. flavipalpis (Lucas, 1858)	OWB	Bjørn 1997
A. trifasciata (Forskål, 1775)	OWB	NR
Caerostris sexcuspidata (Fabricius, 1793)	OWB	NR
Cyclosa insulana (Costa, 1834)	OWB	NR
Cyphalonotus larvatus (Simon, 1881)	OWB	NR
Cyrtophora citricola (Forskål, 1775)	OWB	NR
Gasteracantha milvoides Butler, 1873	OWB	NR
G. sanguinolenta C.L. Koch, 1844	OWB	NR
G. versicolor (Walckenaer,1842)	OWB	Emerit 1973; Benoit & Emerit 1975
Hypsacantha crucimaculata (Dahl, 1914)	OWB	NR
Isoxya stuhlmanni (Bösenberg & Lenz,1895)	OWB	NR
I. tabulata (Thorell, 1859)	OWB	NR
Kilima decens (Blackwall, 1866)	OWB	NR
Nemoscolus vigintipunctatus Simon, 1897	OWB	NR
Neoscona blondeli (Simon, 1885)	OWB	Grasshoff 1986
N. moreli (Vinson, 1863)	OWB	Grasshoff 1986
N. rufipalpis (Lucas, 1858)	OWB	NR
N. subfusca (C.L. Koch, 1837)	OWB	NR
Poltys furcifer Simon, 1881	OWB	NR
Singa albodorsata Kauri, 1950	OWB	Kauri 1950
2. Family Archaeidae		
Afrarchaea bergae Lotz, 1996	FGW	Lotz 1996a
3. Family Barychelidae		
Brachionopus pretoriae Purcell, 1904	BGW	NR
4. Family Caponiidae		
Caponia natalensis (O.P.-Cambridge, 1874)	FGW	NR
5. Family Corinnidae		
Castianeira sp.	FGW	NR
Merenius alberti Lessert, 1923	FGW	NR
6. Family Ctenidae		
Ctenus transvaalensis Benoit, 1981	FGW	NR
7. Family Cyrtaucheniidae		
Ancylotrypa barbertoni (Hewitt, 1913)	BGW	NR
8. Family Deinopidae		
Menneus camelus Pocock, 1902O	WB	NR
9. Family Dictynidae		
Mashimo leleupi Lehtinen, 1967	RWB	NR
Archaeodictyna ulova Griswold & M-Griswold, 1987	RWB	Griswold & M-Griswold 1987
10. Family Dipluridae		
Allothele malawi Coyle, 1984	FWB	Coyle 1984
11. Family Eresidae		
Dresserus colsoni Tucker, 1920	RWB	NR

Gandanameno purcelli Tucker, 1920	RWB	NR
Stegodyphus africanus (Blackwall, 1866)	RWB	Kraus & Kraus 1988
S. dumicola Pocock, 1898	RWB	Kraus & Kraus 1988
S. mimosarum Pavesi, 1883	RWB	Kraus & Kraus 1988
S. sabulosus Tullgren, 1910	RWB	Kraus & Kraus 1988
12. Family Gnaphosidae		
Aphantaulax inornata Tucker, 1923	FGW	Tucker 1923
Asemesthes purcelli Tucker, 1923	FGW	Tucker 1923
Camillina maun Platnick & Murphy, 1987	FGW	Platnick & Murphy 1987
Megamyrmaekion transvaalense Tucker, 1923	FGW	Tucker 1923
Scotophaeus marleyi Tucker, 1923	FGW	Tucker 1923
Zelotes tuckeri Roewer, 1951	FGW	NR
13. Family Hersiliidae		
Hersilia sericea Pocock, 1898	FPW	Benoit 1967
Hersilida sp. (immature)	RWB	NR
14. Family Idiopidae		
Idiops castaneus Hewitt, 1913	BGW	NR
15. Family Linyphiidae		
Tybaertiella krugeri (Simon 1894)	SHWB	Simon 1894
Meioneta habra Locket, 1968	SHWB	NR
16. Family Liocranidae		
Rhaeboctesis trinotatus Tucker, 1920	FGW	NR
17. Family Lycosidae		
Arctosa transvaalana Roewer, 1960	FGW	NR
Evippomma squamulatum (Simon, 1898)	FGW	NR
Hippasa australis Lawrence, 1927	FWB	NR
Hogna transvaalica (Simon, 1898)	FGW	NR
Lycosa sp.	BGW	NR
Pardosa crassipalpis Purcell, 1903	FGW	NR
Pirata sp.	FGW	NR
Proevippa albiventris (Simon, 1898)	FGW	NR
18. Family Mimetidae		
Mimetus natalensis Lawrence, 1938	FPW	NR
19. Family Miturgidae		
Cheiracanthium africanum Lessert, 1921	FPW	Lotz 1996b*
C. furculatum Karsch, 1879	FPW	Lotz 1996b*
Cheiramiona paradisus Lotz, 2002	FPW	Lotz 2002
C. krugerensis Lotz, 2002	FPW	Lotz 2002
20. Family Oecobiidae.		
Oecobius navus Blackwall, 1859	RWB	NR
Uroecobius sp. (immature)	RWB	NR
21. Family Oonopidae		
Opopaea speciosa (Lawrence, 1952).	FGW	NR
22. FamilyOxyopidae		
Hamataliwa kulczynskii (Lessert, 1915)	FPW	NR
Oxyopes jacksoni Lessert, 1915	FPW	NR
O. longispinosus Lawrence,1938	FPW	NR
O. pallidecoloratus Strand, 1906	FPW	NR
Peucetia pulchra(Blackwall, 1865)	FPW	Van Niekerk & Dippenaar-Schoeman1994
P. madalenae Van Niekerk & Dippenaar-Schoeman, 1994	FPW	Van Niekerk & Dippenaar-Schoeman1994
P. striata Karsch, 1878	FPW	Van Niekerk & Dippenaar-

		Schoeman 1994
P. transvaalica Simon, 1896	FPW	Van Niekerk & Dippenaar-Schoeman 1994
P. viridis (Blackwall, 1858)	FPW	Van Niekerk & Dippenaar-Schoeman1994
23.Family Palpimanidae		
Palpimanus transvaalicus Simon, 1893	FGW	NR
24. Family Philodromidae		
Philodromus rufus Walckenaer, 1825	FPW	NR
Thanatus atlanticus Berland, 1936	FPW	NR
T. vulgaris Simon, 1870	FPW	NR
Tibellus sunetae Van den Berg &Dippenaar- Schoeman 1994	FPW	Van den Berg & Dippenaar-Schoeman, 1994
25. Family Pholcidae		
Leptopholcus sp. (immature)	SPWB	NR
Pholcus leptopholcicus Strand, 1909	SPWB	NR
Smeringopus natalensis Lawrence, 1947	SPWB	NR
26. Family Phyxelididae		
Xevioso orthomeles Griswold, 1990	RWB	Griswold 1990
27. Family Pisauridae		
Cispius problematicus Blandin, 1978	FPW	Sierwald 1997
Euprosthenops australis Simon, 1898	FWB	NR
Perenethis symmetrica (Lawrence, 1927)	FPW	Sierwald 1997
Rothus purpurissatus Simon, 1898	SHWB	NR
Thalassius rossi Pocock, 1902	FGW	NR
28. Family Prodidomidae		
Theuma foveolata Tucker, 1923	FGW	NR
T. fusca Purcell, 1907	FGW	NR
29. Family Salticidae		
Baryphas ahenus Simon, 1902	FPW	NR
Brancus bevisi Lessert, 1925	FPW	NR
Heliophanus transvaalicus Simon, 1901	FPW	NR
Hyllus brevitarsis Simon, 1902	FPW	NR
Myrmarachne laurentina Bacelar, 1953	FPW	NR
Phlegra albostriata Simon, 1901	FGW	NR
Portia schultzi Karsch, 1878	FPW	Wanless 1978
Thyene coccineovittata (Simon, 1885)	FPW	NR
30. Family Scytodidae		
Scytodes fusca Walckenaer, 1837	FGW	NR
31. Family Segestriidae		
Ariadna sp. (immature)	RWB	NR
32.Family Selenopidae		
Anyphops rubicundus (Lawrence, 1940)	FGW	Lawrence 1940
A. silvicolellus (Strand, 1913)	FGW	Corronca 1998
Selenops krugeri Lawrence, 1940	FGW	Corronca 2000
S. ovambicus Lawrence, 1940	FGW	Corronca 2000
S. radiatus Latreille, 1819	FGW	Corronca 2000
S. tenebrosus Lawrence, 1940	FGW	NR
33. Family Sicariidae		
Loxosceles spiniceps Lawrence, 1952*	FGW	NR
Sicarius oweni Newlands, 1986 *	FGW	NR

34. Family Sparassidae		
Olios correvoni Lessert, 1921	FPW	NR
Palystes superciliosus L. Koch, 1875	FPW	Croeser 1996
Pseudomicrommata longipes Bösenberg & Lenz, 1895	FPW	NR
35. Family Tetragnathidae		
Diphya simoni Kauri, 1950	OWB	Kauri 1950
Leucauge decorata (Blackwall, 1864)	OWB	NR
Nephila pilipes (Fabricius, 1793)	OWB	NR
N. senegalensis annulata (Thorell, 1859)	OWB	NR
Nephilengys cruentata (Fabricius, 1775)	OWB	NR
Tetragnatha boydi O.P.-Cambridge, 1898	OWB	NR
T. subsquamata Okuma, 1985	OWB	Okuma & Dippenaar-Schoeman 1988
36. Family Theraphosidae		
Augacephalus breyeri (Hewitt, 1919)	BGW	Gallon 2002
A. junodi (Simon, 1904)	BGW	Gallon 2002
Ceratogyrus bechuanicus Purcell, 1902	BGW	Smith 1990
Harpactira gigas Pocock, 1898	BGW	NR
Idiothele nigrofulva (Pocock, 1898)	BGW	Gallon 2002
37. Family Theridiidae		
Argyrodes convivans (Lawrence, 1937)	GWB	NR
Latrodectus geometricus C.L. Koch, 1841	GWB	NR
Phoroncidia eburnea (Simon,1895)	GWB	NR
Steatoda capensis Hann, 1990	GWB	NR
Theridion purcelli O.P.-Cambridge, 1940	GWB	NR
38. Family Thomisidae		
Misumenops rubrodecoratus Millot, 1942	FPW	NR
Monaeses pustulosus Pavesi, 1895	FPW	Dippenaar-Schoeman 1984
M. quadrituberculatus Lawrence, 1927	FPW	NR
Pactactes compactus Lawrence, 1947	FPW	NR
Runcinia aethiops (Simon, 1901)	FPW	NR
R. flavida (Simon, 1881)	FPW	NR
R. johnstoni Lessert, 1919	FPW	NR
Simorcus cotti Lessert, 1936	FPW	NR
Thomisops pupa Karsch, 1879	FPW	NR
Thomisus daradioides Simon, 1890	FPW	NR
T. granulatus Karsch, 1880	FPW	NR
T. kalaharinus Lawrence, 1936	FPW	NR
T. spiculosus Pocock, 1901	FPW	NR
Tmarus africanus Lessert, 1919	FPW	NR
Xysticus sp.	FPW	NR
39. Family Uloboridae		
Uloborus planipedius Simon, 1896	OWB	NR
U. plumipes Lucas, 1846	OWB	NR
40. Family Zodariidae		
Capheris transvaalica Hewitt, 1915	BGW	NR
Chariobas sp.	FPW	NR
Diores rectus Jocqué, 1990	FGW	Jocqué 1990
Hermippus tenebrosus Jocqué, 1986	FGW	Jocqué 1986

* from unpublished MSc and PhD theses.

BGW = burrow ground dwellers; FWB = funnel web; FGW = free living ground wanderer; FPW = free living plant wanderers; GWB = gumfoot-web; OWB = orb-web; NR = new collecting record; SHWB = sheet-web; SPWB = space web.

other parts of the plant. The KNP, as part of the Savanna Biome, is represented by about 32 grass-living species. Many of the grass dwellers are well camouflaged with elongated bodies, e.g., *Runcinia* spp. (Thomisidae), *Tibellus sunetae* Van den Berg & Dippenaar-Schoeman, 1994 (Philodromidae) and *Pseudomicrommata longipes* Bösenberg & Lenz, 1895 (Sparassidae), while others with their green or straw-coloured bodies blend in with the grass, e.g., members of the families Oxyopidae and Thomisidae.

Conclusion

Preliminary investigations into the biodiversity of invertebrate fauna in South Africa have highlighted the lack of baseline information on the ecology and diversity of most arachnid groups (Dippenaar-Schoeman 2002b). This survey of the KNP forms part of the South African National Survey of Arachnida (SANSA) and data gathered will be used in the Savanna Biome Project, Mpumalanga Biobase Programme and Arachnida in Conserved Area Projects.

Of the 2000 spiders presently known from South Africa (Dippenaar-Schoeman 2002b), the 152 species of KNP represent about 7.6 % of the total spider fauna, with 103 species being new distribution records. Although this paper reports on sporadic collecting and probably represents only a portion of the spider fauna present, we hope this information will stimulate further research on this group of animals in the KNP. Future projects for the park include a key to the spiders and maps showing their distribution patterns.

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