

SPIDERS AND SCORPIONS (ARACHNIDA: ARANEAE, SCORPIONES) OF THE NYLSVLEY NATURE RESERVE, SOUTH AFRICA

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ABSTRACT

Among other activities, the South African National Survey of Arachnida (SANSA) aims to survey the biodiversity of arachnids in protected areas of South Africa. The study presented here documents the diversity of spiders and scorpions collected from the Nylsvley Nature Reserve (NNR), South Africa over a 30-year period. The spider fauna of NNR contains 175 species (7.5% of the total recorded in South Africa), in 131 genera and 37 families. Thomisidae is the most diverse spider family in the reserve, with 33 species (18.9% of the total), followed by Salticidae, with 20 species (11.4%), and Araneidae, with 18 species (10.3%). The majority of species (125) are wandering spiders (71.4%), whereas 50 species (28.6%) build webs. Wandering ground-dwelling spiders comprise 52 species, whereas 73 wandering species have been collected from the vegetation. A total of 158 species are new records for the reserve and *Oxyopes tuberculatus* Lessert, 1915 is newly recorded for South Africa. Six spider species may be new to science. The scorpion fauna of NNR comprises five species (5% of the total recorded in South Africa) in three genera and two families. Buthidae are more diverse in the reserve, with four species and two genera represented. The scorpion fauna of the reserve includes two fossorial and three epigeic species, representing five ecomorphotypes: semi-psammophilous, pelophilous, lithophilous, corticolous and lapidicolous. Five additional scorpion species may be recorded if the reserve is sampled more intensively using appropriate techniques.

The South African National Survey of Arachnida (SANSA) was initiated in 1997 to survey the arachnid diversity of South Africa (Dippenaar-Schoeman & Craemer 2000). SANSA encompasses several projects, including surveys and inventories of arachnids that are protected in parks and reserves; surveys and inventories of arachnid diversity in the floral biomes; and checklists of arachnid species for each province in South Africa. Although arachnids constitute an abundant and diverse group of invertebrates, knowledge of their diversity in South Africa remains poor (Dippenaar-Schoeman, 2002).

The aim of the study presented here was to survey the spider and scorpion fauna of the Nylsvley Nature Reserve (NNR), situated in the Limpopo Province of South Africa. The reserve lies in the upper reaches of the Nyl River on the Nyl floodplain, the largest inland floodplain in South Africa, which was recognised as a Ramsar site in 1998.

The Savanna Biome, a vegetation type where trees and grass are equally important components, covers approximately half of Africa's land surface and about 35% of South Africa. NNR falls entirely within the biome and is one of the most intensively studied savanna sites in the world. More than 100 scientific papers and reports, many postgraduate degrees and several books were produced during the South African Savanna Biome project, conducted at NNR from 1974 to 1990. The aim of this project was to develop the understanding necessary to predict changes in the biome's stability (Scholes & Walker, 1993). However, little information is available for the arachnids. The only published data on the spiders of NNR are a survey of spiders from abandoned mammal holes (Heidiger, 1988) and notes on the behaviour of a trapdoor spider, *Ancylotrypa brevicornis* (Hewitt, 1919) (Leroy & Leroy, 2005).

The study presented in this contribution is the eighth survey of the arachnid fauna of the Savanna Biome in South Africa and the first arachnid inventory for the NNR. Other surveys of arachnids in the Savanna Biome were undertaken at Roodeplaat Dam Nature Reserve (Dippenaar-Schoeman *et al.* 1989), Makalali Nature Reserve (Whitmore *et al.* 2002; Druce *et al.* 2004), Western Soutpansberg (Foord *et al.* 2002; in press), Kruger National Park (Dippenaar-Schoeman & Leroy 2003), the Inselberg at Polokwane (Pietersburg) (Modiba *et al.* 2005), Ndumo Game Reserve (Haddad *et al.* 2006) and Polokwane Nature Reserve (Dippenaar *et al.* 2008).

This contribution does not present the results of a quantitative survey, but instead summarises data from collections of spiders and scorpions made in the NNR over a period of 30 years, including specimens collected during the South African Savanna Biome project (Scholes & Walker, 1993). Although this survey may not reflect the true diversity and species richness of spiders and scorpions in the reserve, it nonetheless provides an estimate of the species presently protected within its boundaries.

STUDY AREA

Nylsvley Nature Reserve (24°39'S 28°42'E) is situated 12 km south of Mole Mole (Nylstroom) in the Limpopo Province of South Africa. The altitude of NNR ranges between 1 080 m and 1 154 m above sea level, with an average altitude of 1 100 m. The reserve, which is located in the upper reaches of the Nyl River floodplain, comprises 3 970 ha, of which 500 ha (10%) falls within the NNR. The Nyl River floodplain, the largest inland wetland in South Africa (Noble & Hemens, 1978), extends from Middelfontein, west of Mole Mole in the south-west, to Moorddrift, near Molopane (Potgietersrus) in the north-east.

NNR is situated in the summer rainfall region, receives rainfall during the hot summer months and experience cool, dry winters. The rainfall is variable: the 69-year mean annual rainfall at NNR is 623 mm, with an annual coefficient of variation of 24%.

The mean annual temperature is 19°C (Scholes & Walker, 1993). The maximum daily temperature ranges from a mean of 29°C in December/January to 21°C in June/July, whereas the minimum daily temperature varies from 17°C in December/January to 4°C in June/July.

The Nyl River floodplain comprises short grassy plains, reed beds, stands of long rice grass, open water patches, marshes, acacia (fineleaf) woodland and broadleaf woodland. Approximately 600 plant species have been recorded in the NNR, and Scholes and Walker (1993) have distinguished nine vegetation types: *Burkea africana* savanna; *Diplorhynchus condylocarpon* savanna; *Combretum* savanna; *Acacia tortilis* savanna; old village sites; *Acacia karroo* savanna; floodplain grasslands; grasslands on vertic soils; and seepine grassland.

These vegetation types may be further grouped into two broad categories (Low & Rebelo 1996), namely mixed bushveld and clay thorn bushveld.

METHODS

Collection techniques

During the South African Savanna Biome project (1974 to 1990), spiders were collected from grass with sweepnets and from trees by beating. This material was donated to the National Collection of Arachnida, where it was sorted and identified. Additional sporadic collecting was undertaken in the NNR from 1985 to 2005. During this period, spiders were collected by hand (ground and plant search, turning rocks, peeling bark, sifting leaf litter) or by using a sweepnet for grass and a beating tray for low shrubs. Scorpions were collected by hand (mainly by turning rocks and peeling bark).

Material examined

The spiders examined during the course of the study were identified by the first author and are deposited in the National Collection of Arachnida (NCA) at the ARC-Plant Protection Research Institute, Pretoria. The scorpions were identified by the third author and are deposited in the NCA, the American Museum of Natural History in New York, and the Transvaal Museum in Pretoria.

The lack of taxonomic research on certain spider families (e.g. Lycosidae and Theridiidae) in southern Africa prevented the identification of some specimens to species. In some families, only immature specimens were collected and these were impossible to identify to species level.

Ecology

A guild is a group of species that potentially compete for jointly exploited limited resources (Uetz *et al.* 1999). Because most spiders live in a defined environment with limitations imposed by both abiotic and biotic factors, species can be grouped into guilds based on information about their habitat preferences and predation methods. Two main guilds of spiders were recognised in the present study, i.e. wandering spiders (W) and web builders (WB), with further subdivisions based on microhabitat and general behaviour, as defined by Dippenaar-Schoeman and Leroy (2003). Guilds of scorpions were defined and subdivided on the basis of the ecomorphotypes defined by Prendini (2001, 2005).

RESULTS AND DISCUSSION

Spiders

Diversity

A total of 175 spider species (7.5% of the total recorded in South Africa), representing 132 genera and 37 families (tables 1 and 2) were collected in the NNR. Thomisidae was the most diverse spider family, with 33 species (18.9% of the total), followed by Salticidae, with 20 species (11.4%), Araneidae, with 18 species (10.3%), and Corinnidae, Gnaphosidae, Oxyopidae and Theridiidae, with 10 (5.7%) species each. Fifteen families were each represented by a single species (Table 2) and 159 species are new records for the reserve (Table 1). *Oxyopes tuberculatus* Lessert, 1915 is newly recorded for South Africa. The pholcid, *Quamtana nylsvey* Huber, 2003, was originally described from the reserve (Huber, 2003). Six species of the genera *Anahita* (Ctenidae), *Diores* and *Ranops* (Zodariidae), *Hamataliwa* (Oxyopidae), *Hypsosinga* (Araneidae) and *Theuma* (Prodidomidae), may be new to science (Table 1).

Guilds

Although the majority of the spiders collected in the NNR, namely 125 species (71.4%) representing 24 families, are wanderers, 50 species (28.6%) in 13 families build webs. A total of 52 species (30%) in 22 families live on the ground. Seven species (4%) in four families of ground-dwelling spiders are fossorial, whereas 45 species (26%) in 14 families are free-living. Seventy-three species (42%) in 12 families inhabit vegetation, of which 36 species (20.8%) in 11 families construct webs to catch prey in the grass and herbaceous layer.

Fossorial species: Seven species of the suborder Mygalomorphae (baboon and trapdoor spiders) inhabit silk-lined burrows and are presently protected in most provinces of South Africa. The baboon spider families Barychelidae and Theraphosidae are represented by one species, *Sipalotasma humicola* (Benoit, 1965), and four species, *Augacephalus junodi* (Simon, 1904), *Brachionopus pretoriae* Purcell, 1904, *Ceratogyrus darlingi* Pocock, 1897 and an unidentified species of *Harpactirella* (Gallon 2005) respectively. Two trapdoor spider families are known from the NNR: *Segregara transvaalensis* (Hewitt, 1913) (Idiopidae) and *Ancylotrypa brevicornis* (Hewitt, 1919) (Cyrtaucheniidae). Observations of the burrow-constructing behaviour of *A. brevicornis* showed that, in addition to constructing a thin wafer-lid trapdoor, these spiders use a hard, spherical plug (or marble) made of soil particles, held together by silk, to close the burrow entrance (Leroy & Leroy 2005).

Free-living ground species: Of the 45 species in 14 families of free-living ground spiders collected in the NNR, Gnaphosidae and Corinnidae, each represented by 10 species, are the most abundant, followed by Zodariidae, with six species, and Lycosidae, with three species.

Plant-dwelling species: Thirty-six species (20.8%) in 10 families are commonly found on the five dominant tree species in the NNR (Table 3). Eleven species (seven families) occur on *Burkea africana* Hock. (wild syringa), eight species (five families) on *Combretum molle* (R.Br ex G. Don) (velvet bush willow), 13 species (six families) on *Dombeya rotundifolia* (Hochst) Planch. (wild pear), 14 species (six families) on *Grewia flavescens* Juss. (raisin bush), and 21 species (five families) on *Ochna pulchra* Hook (peeling plane). Species that live permanently on tree bark include the long-spinnered bark spiders, *Hersilia sericea* Pocock, 1898 and *H. setifrons* Lawrence, 1927 (Foord & Dippenaar-Schoeman, 2006). Four *Tmarus* spp. (Thomisidae) and *Oxytate argenteoculata* (Strand, 1886) (Thomisidae) are also exclusively arboreal.

Most of the araneid orb-web species found on vegetation are nocturnal and remove their webs early each morning.



TABLE 1
Checklist of spider and scorpion species recorded in the Nylsvley Nature Reserve, Limpopo Province, South Africa

SPECIES	GUILD	REFERENCE	DISTRIBUTION
ARANEAE			
1. Family Agelenidae C.L. Koch, 1837 (funnel-web spiders)			
<i>Benoitia ocellata</i> (Pocock, 1900)	FWB	Nr	4
2. Family Ammoxenidae Simon, 1893 (termite-eating spiders)			
<i>Ammoxenus amphalodes</i> Dippenaar & Meyer, 1980	GW	Nr	4
3. Family Araneidae Simon, 1895 (orb-web spiders)			
<i>Araneilla</i> sp. 1	OWB	Nr	-
<i>Araneus apricus</i> (Karsch, 1884)	OWB	Nr	6
<i>Argiope australis</i> (Walckenaer, 1805)	OWB	Nr	6
<i>A. trifasciata</i> (Forskål, 1775)	OWB	Nr	7
<i>Caerostris sexcupidata</i> (Fabricius, 1793)	OWB	Nr	6
<i>Cyphalonotus larvatus</i> (Simon, 1881)	OWB	Nr	6
<i>Gasteracantha sanguinolenta</i> C.L. Koch, 1844	OWB	Nr	6
<i>Hypsosinga lithyphantoides</i> Caporiacco, 1947	OWB	Nr	6
<i>Hypsosinga</i> sp. 2*	OWB	Nr	-
<i>Isoxya cicatricosa</i> (C.L. Koch, 1844)	OWB	Nr	6
<i>Nemoscolus elongatus</i> Lawrence, 1947	OWB	Nr	4
<i>Neoscona blondeli</i> (Simon, 1885)	OWB	Nr	6
<i>N. moreli</i> (Vinson, 1863)	OWB	Nr	6
<i>N. subfusca</i> (C.L. Koch, 1837)	OWB	Nr	6
<i>N. triangula</i> (Keyserling, 1864)	OWB	Nr	7
<i>Poltys furcifer</i> Simon, 1881	OWB	Nr	6
<i>Pycnacantha tribulus</i> (Fabricius, 1781)	OWB	Nr	6
<i>Singa lawrencei</i> (Lessert, 1930)	OWB	Nr	6
4. Family Barychelidae Simon, 1889 (lesser baboon spiders)			
<i>Sipalolasma humicola</i> (Benoit, 1965)	BGW	Nr	5
5. Family Clubionidae Wagner, 1887 (sac spiders)			
<i>Clubiona africana</i> Lessert, 1921	PW	Nr	6
<i>C. revillioidi</i> Lessert, 1936	PW	Nr	6
6. Family Corinnidae Karsch, 1880 (dark sac spiders)			
<i>Apochinomma formicaeforme</i> Pavesi, 1881	GW	Nr	6
<i>Brachyphaea</i> sp. 1	GW	Nr	-
<i>Castianeira fulvipes</i> Simon, 1896	GW	Nr	6
<i>Castianeira</i> sp. 1	GW	Nr	-
<i>Copa flavoplumosa</i> Simon, 1885	GW	Nr	6
<i>Corinnomma semiglabrum</i> (Simon, 1896)	GW	Nr	5
<i>Lessertina mutica</i> Lawrence, 1942	GW	Nr	4
<i>Merenius alberti</i> Lessert, 1923	GW	Nr	5
<i>Pronophaea natalica</i> Simon, 1897	GW	Nr	4
<i>Trachelas</i> sp. 1	GW	Nr	-
7. Family Ctenidae Keyserling, 1877 (tropical wolf spiders)			
<i>Anahita</i> sp. 1*	GW	Nr	-
8. Family Cyrtaucheniidae Simon, 1892 (wafer-lid trapdoor spiders)			
<i>Ancylotrypa brevicornis</i> (Hewitt, 1919)	BGW	Leroy & Leroy 2005	3
9. Family Deinopidae C.L. Koch 1850 (net-throwing spiders)			
<i>Menneus camelus</i> Pocock, 1902	OWB	Nr	4
10. Family Eresidae C.L. Koch, 1851 (velvet spiders)			
<i>Dresserus colsoni</i> Tucker, 1920	RWB	Nr	4
<i>Stegodyphus dumicola</i> Pocock, 1898	RWB	Nr	6
11. Family Gnaphosidae Pocock, 1898 (ground spiders)			
<i>Aphantaulax inornata</i> Tucker, 1923	GW	Nr	4
<i>Asemesthes ceresicola</i> Tucker, 1923	GW	Nr	4
<i>Asemesthes</i> sp. 2	GW	Nr	-
<i>Camillina corrugata</i> (Purcell, 1907)	GW	Nr	4

TABLE 1 (Cont...)

SPECIES	GUILD	REFERENCE	DISTRIBUTION
<i>C. maun</i> Platnick & Murphy, 1987	GW	Nr	5
<i>Echemus</i> sp. 1	GW	Nr	-
<i>Pterotricha varia</i> (Tucker, 1923)	GW	Nr	4
<i>Scotophaeus</i> sp. 1	GW	Nr	-
<i>Setaphis arcus</i> Tucker, 1923	GW	Nr	4
<i>Xerophaeus appendiculatus</i> Purcell, 1907	GW	Nr	4
12. Family Hersiliidae Thorell, 1870 (long-spinnered bark spiders)			
<i>Hersilia sericea</i> Pocock, 1898	PW	Food & Dippenaar-Schoeman 2006	4
<i>H. setifrons</i> Lawrence, 1928	PW	Food & Dippenaar-Schoeman 2006	5
13. Family Idiopidae Simon, 1892 (front-eyed trapdoor spiders)			
<i>Segregara transvaalensis</i> (Hewitt, 1913)	BGW	Nr	4
14. Family Linyphiidae Blackwall, 1859 (hammock-web spiders)			
<i>Ceratinopsis</i> sp. 1	SWB	Nr	-
<i>Microlinyphia sterilis</i> (Pavesi, 1883)	SWB	Nr	6
<i>Tybaertiella krugeri</i> (Simon, 1894)	SWB	Nr	6
15. Family Lycosidae Sundevall, 1833 (wolf spiders)			
<i>Lycosa</i> sp. 1	GW	Nr	-
<i>Pardosa crassipalpis</i> Purcell, 1903	GW	Nr	5
<i>Proevippa albiventris</i> (Simon, 1898)	GW	Nr	5
16. Family Miturgidae Simon, 1885 (sac spiders)			
<i>Cheiracanthium africanum</i> Lessert, 1921	PW	Nr	6
<i>C. furculatum</i> Karsch, 1879	PW	Lotz 2007	6
17. Family Nephilidae Simon, 1894 (golden orb-web spiders)			
<i>Nephila fenestrata</i> Thorell, 1859	OWB	Nr	6
<i>N. senegalensis</i> (Walckenaer, 1842)	OWB	Nr	6
18. Family Oecobiidae Blackwall, 1862 (ant eaters)			
<i>Oecobius navus</i> Blackwall, 1859	RWB	Nr	7
19. Family Oxyopidae Thorell, 1870 (lynx spiders)			
<i>Hamataliwa rostrifrons</i> (Lawrence, 1928)	PW	Nr	5
<i>Hamataliwa</i> sp. 2*	PW	Nr	-
<i>Oxyopes affinis</i> Lessert, 1915	PW	Nr	6
<i>O. jacksoni</i> Lessert, 1915	PW	Nr	6
<i>O. russoi</i> Caporiacco, 1940	PW	Nr	6
<i>O. schenkeli</i> Lessert, 1927	PW	Nr	6
<i>O. tuberculatus</i> Lessert, 1915	PW	Nr (new record for South Africa)	6
<i>Oxyopes</i> sp. 6	PW	Nr	-
<i>Oxyopes</i> sp. 7	PW	Nr	-
<i>Peucetia transvaalica</i> Simon, 1896	PW	Van Niekerk & Dippenaar-Schoeman 1994	6
20. Family Palpimanidae Thorell, 1870 (palp-footed spiders)			
<i>Palpimanus transvaalicus</i> Simon, 1893	GW	Nr	4
21. Family Philodromidae Thorell, 1870 (small huntsman spiders)			
<i>Hirriusa variegata</i> (Simon, 1895)	GW	Nr	4
<i>Philodromus bigibbus</i> (O.P.-Cambridge, 1876)	PW	Nr	6
<i>P. guineensis</i> Millot, 1941	PW	Nr	6
<i>Philodromus</i> sp. 3	PW	Nr	-
<i>Philodromus</i> sp. 4	PW	Nr	-
<i>Thanatus africanus</i> Karsch, 1878	PW	Nr	6
<i>Tibellus hollidayi</i> Lawrence, 1952	PW	Nr	6
22. Family Pholcidae C.L. Koch, 1851 (daddy long-legs)			
<i>Quamtana nylsvley</i> Huber, 2003	SPWB	Huber 2003 (type locality)	3
<i>Smeringopus natalensis</i> Lawrence, 1947	SPWB	Nr	4
23. Family Pisauridae Simon, 1890 (nursery-web spiders)			
<i>Afropisaura rothiformis</i> (Strand, 1908)	PW	Nr	6
<i>Euprosthenoops australis</i> Simon, 1898	FWB	Nr	6



TABLE 1 (Cont...)

SPECIES	GUILD	REFERENCE	DISTRIBUTION
<i>Euprosthonopsis armata</i> (Strand, 1913)	FWB	Nr	6
<i>Maypacijs bilineatus</i> (Pavesi, 1895)	SWB	Nr	6
<i>Thalassius spinosissimus</i> (Karsch, 1879)	GW	Nr	6
24. Prodomidae Simon, 1884 (long-spinnered ground spiders)			
<i>Theuma</i> sp. 1*	GW	Nr	-
25. Family Salticidae Blackwall, 1841 (jumping spiders)			
<i>Afraflacilla</i> sp. 1	PW	Nr	-
<i>Asemonea</i> sp. 1	PW	Nr	-
<i>Baryphas ahenus</i> Simon, 1902	PW	Nr	5
<i>Bianor albobimaculatus</i> (Lucas, 1846)	GW	Nr	7
<i>Brancus bevisi</i> Lessert, 1925	PW	Nr	6
<i>Festucula lawrencei</i> Lessert, 1933	PW	Nr	6
<i>Habrocestum</i> sp. 1	PW	Nr	-
<i>Heliophanus insperatus</i> Wesolowska, 1986	GW	Nr	5
<i>Heliophanus</i> sp. 2	PW	Nr	-
<i>Hyllus bevisi</i> Lessert, 1925	PW	Nr	6
<i>H. brevitarsis</i> Simon, 1902	PW	Nr	6
<i>H. treleaveni</i> Peckham & Peckham, 1902	PW	Wesolowska & Cumming 2004	6
<i>Menemerus</i> sp. 1	PW	Nr	-
<i>Mogrus albogularis</i> Simon, 1901	PW	Nr	4
<i>Myrmarachne</i> sp. 1	PW	Nr	-
<i>Pachyballus transversus</i> Simon, 1900	PW	Nr	6
<i>Pellenes</i> sp. 1	GW	Nr	-
<i>Phlegra</i> sp. 1	GW	Nr	-
<i>Rhene machadoi</i> Berland & Millot, 1941	PW	Nr	6
<i>Thyene coccineovittata</i> (Simon, 1885)	PW	Nr	6
26. Family Scytodidae Blackwall, 1864 (spitting spiders)			
<i>Scytodes</i> sp. 1	GW	Nr	-
27. Family Segestriidae Simon, 1893 (tube spiders)			
<i>Ariadna</i> sp. 1	RWB	Nr	-
28. Family Selenopidae Simon, 1897 (flatties)			
<i>Anyphops</i> sp. 1	GW	Nr	-
29. Family Sparassidae Bertkau, 1872 (huntsman spiders)			
<i>Olios correboni</i> Lessert, 1921	PW	Nr	6
<i>Palystes superciliosus</i> L. Koch, 1875	PW	Nr	5
<i>Pseudomicrommata longipes</i> (Bösenberg & Lenz, 1895)	PW	Nr	6
30. Family Tetragnathidae Menge, 1866 (water orb-web spiders)			
<i>Leucauge festiva</i> (Blackwall, 1866)	OWB	Nr	6
<i>Tetragnatha demissa</i> L. Koch, 1872	OWB	Nr	6
<i>Tetragnatha isidis</i> (Simon, 1880)	OWB	Nr	7
31. Family Theraphosidae Thorell, 1870 (baboon spiders)			
<i>Augacephalus junodi</i> (Simon, 1904)	BGW	Gallon 2005	5
<i>Brachionopus pretoriae</i> Purcell, 1904	BGW	Nr	4
<i>Ceratogyrus darlingi</i> (Pocock, 1897)	BGW	Gallon 2005 (as <i>bechuanicus</i>)	5
<i>Harpactirella</i> sp. 1	BGW	Nr	-
32. Family Theridiidae Sundevall, 1833 (comb-footed spiders)			
<i>Achaearana</i> sp. 1	GWB	Nr	-
<i>Argyrodes convivans</i> Lawrence, 1937	GWB	Nr	4
<i>Dipoena</i> sp. 1	GWB	Nr	-
<i>Enoplognatha inornata</i> O.P.-Cambridge, 1904	GWB	Nr	4
<i>Episinus bilineatus</i> Simon, 1894	GWB	Nr	4
<i>Euryopis episinoides</i> (Walckenaer, 1847)	GW	Nr	4
<i>Latrodectus geometricus</i> C.L. Koch, 1841	GWB	Nr	7
<i>L. renivulvatus</i> Dahl, 1902	GWB	Nr	6
<i>Phoroncidia eburnea</i> (Simon, 1895)	GWB	Nr	4

TABLE 1 (Cont...)

SPECIES	GUILD	REFERENCE	DISTRIBUTION
<i>Steatoda capensis</i> Hann, 1990	GWB	Nr	6
33. Family Thomisidae Sundevall, 1833 (crab spiders)			
<i>Camaricus nigrotesselatus</i> Simon, 1895	PW	Nr	6
<i>Diaea puncta</i> Karsch, 1884	PW	Nr	6
<i>Heriaeus transvaalicus</i> Simon, 1895	PW	Nr	5
<i>Hewittia gracilis</i> Lessert, 1928	PW	Nr	6
<i>Misumenops rubrodecoratus</i> Millot, 1942	PW	Dippenaar-Schoeman 1983	6
<i>Monaeses gibbus</i> Dippenaar-Schoeman, 1984	PW	Nr	4
<i>M. pustulosus</i> Pavesi, 1895	PW	Nr	6
<i>M. quadrituberculatus</i> Lawrence, 1927	PW	Nr	5
<i>Oxytate argenteooculata</i> (Strand, 1886)	PW	Nr	6
<i>Pactactes compactus</i> Simon, 1895	PW	Nr	4
<i>Parabomis martini</i> Lessert, 1919	PW	Nr	6
<i>Pherecydes lucinae</i> Dippenaar-Schoeman, 1980	PW	Dippenaar-Schoeman 1980	4
<i>P. zebra</i> Lawrence, 1927	PW	Nr	6
<i>Runcinia affinis</i> Simon, 1897	PW	Nr	6
<i>R. erythrina</i> Jézéquel, 1964	PW	Nr	6
<i>R. flavida</i> (Simon, 1881)	PW	Dippenaar-Schoeman 1980	6
<i>R. grammica</i> (L. Koch, 1937)	PW	Nr	7
<i>Smodicinus coroniger</i> Simon, 1895	PW	Nr	6
<i>Synema imitator</i> (Pavesi, 1883)	PW	Nr	6
<i>Thomisops bullatus</i> Simon, 1895	PW	Nr	5
<i>T. pupa</i> Karsch, 1879	PW	Nr	6
<i>T. sulcatus</i> Simon, 1895	PW	Nr	6
<i>Thomisus blandus</i> Karsch, 1880	PW	Nr	6
<i>T. citrinellus</i> Simon, 1875	PW	Dippenaar-Schoeman 1983	6
<i>T. congoensis</i> Comellini, 1957	PW	Dippenaar-Schoeman 1983	6
<i>T. kalaharinus</i> Lawrence, 1936	PW	Nr	6
<i>T. scrupeus</i> (Simon, 1886)	PW	Dippenaar-Schoeman 1983	6
<i>T. stenningi</i> Pocock, 1900	PW	Nr	6
<i>Tmarus africanus</i> Lessert, 1919	PW	Dippenaar-Schoeman 1984	6
<i>T. cameliformis</i> Millot, 1942	PW	Dippenaar-Schoeman 1984	6
<i>T. comellinii</i> Garcia-Neto, 1989	PW	Nr	6
<i>T. planetarius</i> Simon, 1903	PW	Nr	6
<i>Xysticus fagei</i> Lessert, 1919	GW	Nr	6
34. Family Trochanteriidae Karsch, 1879 (scorpion spiders)			
<i>Platyoides walteri</i> (Karsch, 1886)	GW	Nr	6
35. Family Uloboridae Thorell, 1869 (hackled orb-web spiders)			
<i>Miagrammopes brevicaudus</i> O.P.-Cambridge, 1882	OWB	Nr	4
<i>Uloborus plumipes</i> Lucas, 1846	OWB	Nr	6
<i>Uloborus</i> sp. 2	OWB	Nr	-
36. Family Zodariidae Thorell, 1881 (burrowing spiders/ant-eating spiders)			
<i>Caesetius</i> sp. 1	GW	Nr	-
<i>Capheris decorata</i> Simon, 1904	GW	Nr	4
<i>Chariobas</i> sp. 1	GW	Nr	-
<i>Diores recurvatus</i> Jocqué, 1990	GW	Nr	4
<i>Diores</i> sp. 2*	GW	Nr	-
<i>Ranops</i> sp. 1*	GW	Nr	-
37. Family Zoropsidae Bertkau, 1882 (ground spiders)			
<i>Griswoldia</i> sp.	RWB	Nr	-
SCORPIONES			
1. Family Buthidae C.L. Koch, 1837 (thick-tail scorpions)			
<i>Parabuthus mossambicensis</i> (Peters, 1861)	FS	Prendini 2001, 2005	5
<i>Uroplectes planimanus</i> (Karsch, 1879)	Li	Prendini 2001, 2005	5
<i>U. triangulifer</i> (Thorell, 1876)	La	Prendini 2001, 2005	4



TABLE 1 (Cont...)

SPECIES	GUILD	REFERENCE	DISTRIBUTION
<i>U. vittatus</i> (Thorell, 1876)	C	Prendini 2001, 2005	5
2. Family Scorpionidae Latreille, 1802 (burrowing scorpions)			
<i>Opisththalmus glabrifrons</i> Peters, 1861	FP	Prendini 2001, 2005	5

* possible new species

Guild: BGW = burrow ground dwellers; FWB = funnel-web; GW = ground dwellers; GWB = gumfoot-web; PW = plant dwellers; RWB = retreat webs; SWB = sheet-web; FS = fossorial semi-psammophilous; FP = fossorial pelophilous; C = corticolous; Li = lithophilous; La = lapidicolous.

Reference: Nr = new fossorial record.

Distribution: 1 = endemic to reserve; 2 = endemic to the Limpopo Province; 3 = near endemic to the Limpopo Province (occurs in two provinces); 4 = endemic to South Africa; 5 = endemic to Southern Africa; 6 = endemic to the Afrotropical Region; 7 = cosmopolitan, occurs outside the Afrotropical Region.

Six araneid species, *Araneus apricus* (Karsch, 1884), *Caerostris sexcupidata* (Fabricius, 1793), *Cyphalonotus larvatus* (Simon, 1881), *Neoscona subfusca* (C.L. Koch, 1837), *N. triangula* (Keyserling 1864) and *Poltys furcifer* Simon, 1881, were collected from trees to which they retreat when inactive during the day.

The NNR has a rich fauna of graminicolous spider species, most with elongated bodies resembling grass stems. These include the *Runcinia* spp. (Thomisidae), *Tibellus hollidayi* Lawrence, 1952 (Philodromidae) and *Pseudomicrommata longipes* (Bösenberg & Lenz, 1895) (Sparassidae). Other graminicolous spider species belong to the families Oxyopidae, Salticidae and Thomisidae.

Web-building species: The orb-web spiders, comprising 25 species in the families Araneidae (18 species), Nephilidae (two), Tetragnathidae (three) and Uloboridae (three), are the most diverse group recorded. Nephilidae and Tetragnathidae are often seen in their large webs during the day. Species of Tetragnathidae (*Tetragnatha* and *Leucauge*) are associated with wetlands and found commonly in the NNR.

Ten species construct webs on or close to the soil surface. *Benoitia ocellata* (Pocock, 1900) an agelenid, is often observed in the NNR, especially early in the mornings when dew collects on the sheet part of its web. The very large *Euprosthenois australis* Simon, 1898 (Pisauridae) is another common spider, which constructs very large funnel webs next to trees, the funnel usually originating from an abandoned termite nest or mammal burrow. The retreat webs of Eresidae (*Dresserus colsoni* Tucker, 1920), Oecobiidae, Segestriidae and Zoropsidae are constructed under rocks and plant debris, whereas the sheet webs of Linyphiidae and gumfoot webs of Theridiidae are constructed in grass close to the ground.

The space webs of Pholcidae are constructed mainly in abandoned mammal holes (Heidger, 1988). *Stegodyphus dumicola* Pocock, 1898 is a community web spider that constructs large nest-like retreats containing numerous spiders on vegetation.

Scorpions

Diversity

Five scorpion species (5% of the total recorded in South Africa), representing three genera and two families, have been collected in the NNR (Table 1). Family Buthidae is represented by two genera and three species, whereas Scorpionidae is represented by a single genus and species.

Guilds

The five scorpion species recorded in the NNR can be grouped into two different guilds: fossorial or burrowing species (40% of the species), and epigean species, which do not construct burrows (60%). Each of these guilds can be further subdivided into distinct ecomorphotypes.

Fossorial species: Two of the scorpion species collected in the NNR are adapted for constructing burrows and spend most of

their time below the soil surface, i.e. they are fossorial. These species represent two distinct ecomorphotypes, associated with different substrata: semi-psammophilous and pelophilous species (Prendini, 2001).

Parabuthus mossambicensis (Peters, 1861) is a semi-psammophilous species that constructs burrows in semi-consolidated sand to sandy-loam substrata. Burrows are constructed in open ground using the thickened metasoma to loosen the soil and the anterior two pairs of legs to scrape and rake soil out of the burrow.

TABLE 2
Spiders and scorpions collected in the Nylsvley Nature Reserve, Limpopo Province, South Africa, indicating the number of species as a percentage of the total collected

FAMILIES	GENERA	SPECIES	% OF TOTAL
Thomisidae	17	33	18.86
Salticidae	17	20	11.43
Araneidae	13	18	10.29
Corinnidae	10	10	5.71
Gnaphosidae	8	10	5.71
Oxyopidae	3	10	5.71
Theridiidae	9	10	5.71
Philodromidae	4	7	4.00
Zodariidae	5	6	3.43
Pisauridae	5	5	2.86
Theraphosidae	4	4	2.29
Linyphiidae	3	3	1.71
Lycosidae	3	3	1.71
Sparassidae	3	3	1.71
Uloboridae	2	3	1.71
Eresidae	2	2	1.14
Hersiliidae	1	2	1.14
Miturgidae	1	2	1.14
Nephilidae	1	2	1.14
Pholcidae	2	2	1.14
Tetragnathidae	2	2	1.14
Clubionidae	1	2	1.14
Agelenidae	1	1	0.57
Ammoxenidae	1	1	0.57
Barychelidae	1	1	0.57
Ctenidae	1	1	0.57
Cyrtachaeniidae	1	1	0.57
Deinopidae	1	1	0.57
Idiopidae	1	1	0.57
Oecobiidae	1	1	0.57
Palpimanidae	1	1	0.57
Prodidomidae	1	1	0.57
Scytodidae	1	1	0.57
Segestriidae	1	1	0.57
Selenopidae	1	1	0.57
Trochanteridae	1	1	0.57
Zoropsidae	1	1	0.57
TOTAL SPIDERS	132	175	100.00
Buthidae	2	4	80.00
Scorpionidae	1	1	20.00
TOTAL SCORPIONS	3	5	100.00

TABLE 3
Spider species collected from five tree species commonly found in the Nylsvley Nature Reserve, Limpopo Province, South Africa

TREE SPECIES	SPIDER SPECIES
<i>Burkea africana</i> Hock	Araneidae: <i>Neoscona triangula</i> Hersiliidae: <i>Hersilia sericea</i> Oxyopidae: <i>Oxyopes russoi</i> Philodromidae: <i>Philodromus bigibbus</i> Salticidae: <i>Afraflacilla</i> sp.; <i>Baryphas ahenus</i> ; <i>Brancus bevisi</i> ; <i>Rhene machadoi</i> . Sparassidae: <i>Olios</i> sp. Thomisidae: <i>Oxytate argenteooculata</i> ; <i>Tmarus cameliformis</i>
<i>Combretum molle</i> (R.Br ex G. Don)	Araneidae: <i>Araneus apricus</i> Miturgidae: <i>Cheiracanthium furculatum</i> Oxyopidae: <i>Oxyopes russoi</i> Philodromidae: <i>Philodromus guineensis</i> Thomisidae: <i>Pactactes compactus</i> ; <i>Tmarus africanus</i> ; <i>T. cameliformis</i> ; <i>T. comellini</i>
<i>Dombeya rotundifolia</i> (Hochst) Planch	Araneidae: <i>Pollys furcifer</i> Oxyopidae: <i>Hamataliwa rostrifrons</i> Philodromidae: <i>Philodromus guineensis</i> Salticidae: <i>Mogrus albogularis</i> Theridiidae: <i>Dipoena</i> sp. Thomisidae: <i>Diaea puncta</i> ; <i>Parabomis martini</i> ; <i>Misumenops rubrodecoratus</i> ; <i>Monaeses pustulosus</i> ; <i>Oxytate argenteooculata</i> ; <i>Synema</i> sp.; <i>Tmarus africanus</i> ; <i>T. cameliformis</i>
<i>Grewia flavescens</i> Juss	Araneidae: <i>Cyphalonotus larvatus</i> Oxyopidae: <i>Hamataliwa rostrifrons</i> ; <i>Oxyopes russoi</i> ; <i>O. schenkeli</i> Salticidae: <i>Baryphas ahenus</i> ; <i>Brancus bevisi</i> ; <i>Festucula lawrencel</i> . Theridiidae: <i>Episinis</i> sp. Thomisidae: <i>Oxytate argenteooculata</i> ; <i>Synema</i> sp.; <i>Tmarus africanus</i> ; <i>T. cameliformis</i> ; <i>T. planetarius</i> Uloboridae: <i>Miagrammopes brevicaudus</i>
<i>Ochna pulchra</i> Hook	Araneidae: <i>Araneus apricus</i> ; <i>Cyphalonotus larvatus</i> ; <i>Neoscona subfusca</i> Oxyopidae: <i>Hamataliwa rostrifrons</i> ; <i>Oxyopes schenkeli</i> ; <i>Peucetia transvaalica</i> Philodromidae: <i>Philodromus bigibbus</i> Salticidae: <i>Afraflacilla</i> sp.; <i>Baryphas ahenus</i> ; <i>Brancus bevisi</i> ; <i>Mogrus albogularis</i> ; <i>Myrmarachne</i> sp.; <i>Rhene machadoi</i> Thomisidae: <i>Diaea puncta</i> ; <i>Misumenops rubrodecoratus</i> ; <i>Oxytate argenteooculata</i> ; <i>Pactactes compactus</i> ; <i>Synema</i> sp.; <i>Thomisus citrinellus</i> ; <i>Tmarus africanus</i> ; <i>T. cameliformis</i>

This species displays several ecomorphological adaptations to increase locomotor and burrowing efficiency in soft substrata, including carinae and spiniform processes on the metasoma and comb-like rows of long macrosetae on the prolateral and retrolateral margins of the tibia and basitarsi of the first and second pairs of legs.

Opisthophthalmus glabrifrons Peters, 1861 is a pelophilous species that constructs burrows in hard sandy-loam and clay substrata. Burrows are constructed in open ground or under stones using the enlarged chelicerae to loosen the soil, and the anterior two pairs of legs to scrape and rake soil out of the burrow; the metasoma is also used for tail-scraping operations. This species displays several ecomorphological adaptations to increase burrowing efficiency in hard substrata, including short, robust legs and telotarsal ungues; stout, spiniform macrosetae distributed laterally and distally on the basitarsi; and carinae and spiniform processes on the metasoma.

Epigeal species: Three (60%) of the scorpion species recorded in the NNR are found at or above the soil surface and are unable to construct burrows, i.e. they are epigeal. These species represent three distinct ecomorphotypes associated with different substrata: lithophilous, corticolous and lapidicolous species (Prendini, 2001).

Uroplectes planimanus (Karsch, 1879) is a lithophilous species adapted to life in the narrow cracks and crevices of rocks and under rocks resting on bedrock. This species is characterised by moderate dorsoventral compression; elongation of the metasoma and pedipalps; and stout macrosetae on the telotarsi, operating in conjunction with curved telotarsal ungues to provide grip on rock surfaces.

These specialised adaptations facilitate rapid locomotion in any spatial plane of their rock habitats, but hinder locomotion on other substrata. These scorpions are therefore restricted to weathered rock outcrops.

Uroplectes vittatus (Thorell, 1876) is an obligate corticolous species, found in holes or under the loose bark of old or dead

trees (especially acacias), often several metres above the ground. This species exhibits a few ecomorphological adaptations, for example moderate dorsoventral compression, elongation of the metasoma and pedipalps, and well-developed telotarsal ungues.

Uroplectes triangulifer (Thorell, 1876) is a lapidicolous species that shelters under loose stones, wood or debris at ground level, and displays few ecomorphological adaptations for this generalist lifestyle.

Species not recorded: Up to five additional scorpion species, representing five genera and two families, may be recorded in the NNR if the scorpion fauna is more intensively sampled using appropriate techniques, e.g. pitfall trapping and night collecting by ultraviolet detection. The NNR falls within the known distributional range of these widespread savanna scorpion species, and suitable habitat occurs within its boundaries, suggesting that at least some of them may be present. The species include two buthids, the semi-psammophilous *Parabuthus transvaalicus* Purcell, 1899 and lapidicolous *Uroplectes carinatus* (Pocock, 1890), and three liochelids, the pelophilous *Cheloctonus jonesii* Pocock, 1892, lithophilous *Hadogenes* sp., and corticolous *Opisthacanthus asper* (Peters, 1861).

Conclusion

Arachnids form an important component of healthy ecosystems. Any approach to conservation must consider the composition of the arachnid fauna. Inventories with resulting checklists provide valuable baseline data about the species present in reserves and are the first step towards a better understanding of the fauna.

Preliminary investigations of the biodiversity of arachnids in South Africa have highlighted the lack of baseline data on the ecology and diversity of most arachnid orders (Dippenaar-Schoeman, 2002). The survey presented here forms part of the South African National Survey of Arachnida (SANSA) and the data gathered will be used in the Savanna Biome database.



The NNR has a rich fauna of arachnid species (180) and, although this contribution reports on sporadic collecting and probably represents only a subset of the arachnids present, we hope it will stimulate further research on the arachnids of the NNR and Savanna Biome.

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