

## **Spiders of the Muller Range, Papua New Guinea**

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## Chapter 13

### Spiders of the Muller Range, Papua New Guinea

Ingi Agnarsson

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#### SUMMARY

A survey of spider fauna was conducted at two elevations (500 m and 1,600 m) in the Muller Range of Western and Southern Highlands Provinces, Papua New Guinea. Beating vegetation and nocturnal aerial searches produced about 500 specimens representing well over 100 species of spiders. More than 70 species were documented at the 500 m site, while somewhat over 30 species were found at the 1,600 m site. Overlap between sites was less than 10%. The genus *Styposis* was recorded (at Gugusu) for the first time in Asia/Australasia, and a putatively new genus of the subfamily Hadrotarsinae was found. A species of the subsocial genus *Anelosimus* that is new to science was found in Porgera township, Enga Province – the first time a subsocial *Anelosimus* species has been documented in Australasia. Given current knowledge of the Papuan spider fauna and levels of endemism, over 50% of the spider species are likely to be new to science, i.e. 50+ species. The large number of taxonomic novelties and the likelihood of local endemism, argues for conservation efforts to protect the poorly-known biota of the Muller Range. Declaration of this region as a World Heritage Area will help to protect this unique biodiversity.

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#### INTRODUCTION

Spiders represent a mega-diverse yet understudied taxon. With over 41,000 described species (Platnick 2010) and an estimated diversity of over 100,000 species they are by far the largest group of exclusively predatory animals. As diverse predators, spiders are excellent as indicators and as candidates for biodiversity estimation, and are exemplar organisms in many prominent biodiversity assessment projects (reviewed in Coddington et al. 2009).

Prior knowledge about spiders in the Muller Range was practically non-existent, and in general knowledge of the spiders of Papua New Guinea is very limited. For example, relatively few species of the family Theridiidae are known from the entire island: a little over 30 species (excluding cosmopolitan and other very widespread species, Platnick 2010), which is about the same number of theridiid species found at one site during the expedition reported here. Given the expectation of relatively high beta diversity among different mountain ranges in New Guinea, the Muller Range likely hosts tens or hundreds of spider species new to science.

This survey of spiders in the Muller Range was conducted to provide a first glimpse of species richness and endemism in one of the most poorly-documented regions of New Guinea. Although the generally poor knowledge of spiders in Australasia hinders accurate identification of many taxa and anything more than crude estimates of local endemism, the current survey represents a starting point for comparison with other sites in New Guinea and beyond. A more complete understanding of diversity of Muller Range spiders will require many new data from the entire Australasian region.

## METHODS

Spider sampling employed two main methods, beating and aerial search. During the day spiders were sampled by beating vegetation onto a 1 m<sup>2</sup> white sheet supported by tent poles. Spiders were sampled across the variety of habitat types found close to Gugusu and Sawetau camps (see below) for approximately 6 hrs daily. Spider searches were also conducted for approximately 3-5 hrs nightly, employing a headlamp and corn-starch puffer (see Agnarsson, Chapter 4 this volume).

Identifications, mostly to the level of morphospecies, were based predominantly on published literature. However Cocalodine salticids were identified by W. P. Maddison, Tetragnathidae by R. Gillespie, and Theridiidae by I. Agnarsson, who also more coarsely sorted the remaining spider groups.

At this point it is in most cases not possible to confirm which species are new to science, because descriptions of spiders from the region occur in literature that is highly scattered, both in venue and time. Instead the number of undescribed species is roughly estimated based on known number of species in New Guinea, and estimated levels of endemism.

### Study Sites

From September 4-9, 2009, at Camp 1 (Gugusu): PNG, Western Province, Muller Range 05°43.751S, 142°15.797E, in lowland rain forest at about 515 m elevation.

From September 10-14 at Camp 2 (Sawetau): PNG, Western Province, Muller Range 05°39.397S, 142°18.277E, lower-montane rainforest, at about 1,600 m elevation

## RESULTS

In all an estimated 500 specimens of about 100 species of spiders were collected belonging to about 19 families, including 'true spiders' (Araneomorphae) and mygalomorphs (Mygalomorphae). It is likely, given prior knowledge of PNG spiders, that over 50% of the spider species are new to science.

Spider species richness was highest at the low elevation site with over 70 species while about 30 species were collected from Sawetau. Species turnover was high with an estimated less than 10% species overlap among sites.

I estimate that minimally 50% of the spider species collected are new to science. While such estimates are necessarily crude at this point, they are based on current knowledge of the local fauna, and expected levels of spider endemism on a relatively unexplored and isolated major island. For example, over 30 species of Theridiidae were sampled only at Gugusu, which matches the entire known number of theridiid species on New Guinea. Also most, and perhaps all collected Cocalodines are new to science. Species suspected to be new to science will have to be compared with the scattered literature and with type material. In some groups,

however, where the author knows the world fauna and literature, species new to science have already been confirmed.

### Interesting Species

Two species of *Anelosimus*, one discovered at Sawetau and another in Porgera Township, are confirmed as being new to science. No species of this genus had been reported from New Guinea prior to Conservation International's 2009 Nakanai and Muller Range RAPs, during which a total of four new species were discovered. The species from Porgera is the first subsocial species of *Anelosimus* from Australasia. The genus *Styposis* was recorded for the first time from Asia/Australasia, and a putatively new genus of the subfamily Hadrotarsinae was found. A surprisingly high diversity of species of the genus *Theridion* was encountered, with about 16 species in total represented. Four to five species of the salticid subfamily Cocalodinae that are new to science were also discovered, including representatives of the genera *Cocalodes* and the recently described genera *Tabuina* Maddison, 2009 and *Cucudeta* Maddison, 2009. It is also possible that a new cocalodine genus is represented in the collection.

## DISCUSSION

The spiders encountered at two elevations during this survey indicate a fauna with relatively low densities but high diversity and rapid species turnover with increasing altitude. Overall, given current knowledge of New Guinea's spider fauna and levels of endemism, over 50% of the spider species are likely new to science, i.e. 50+ species. As an example, within the cobweb spider family (Theridiidae) over 30 species were collected at Gugusu alone, which equals the total number of species of this family previously known from the entire island of New Guinea. It is likely that a total of 15-25 theridiid species encountered during the Muller Range RAP survey are new to science. Of the only genus where I know all described species worldwide – *Anelosimus* – both species collected on this RAP are new to science. Similarly most, and perhaps all, of the species of Cocalodines collected on this RAP are new to science.

The results of this survey present a first glimpse into a diverse and poorly-known spider fauna. More significantly they represent a starting point and an opportunity to compare spider diversity and range distributions between mainland New Guinea, New Britain, and across the Melanesian and Australasian regions.

## CONSERVATION RECOMMENDATIONS

New Guinea is well known for its biological diversity and high levels of endemism. Beta diversity is high in many groups, with different mountain ranges often having unique and localized fauna and flora. Thus, while the majority of suspected new spider species documented here await

**Table 13.1.** List of spiders collected during the 2009 RAP survey of the Muller Range, Papua New Guinea.

Species	Gugusu Camp (500-600 m)	Sawetau Camp (1,500-1,600 m)	Porgera Township (~2,000 m)
<b>Araneidae</b>			
<i>Araneus</i> sp. 1	X		
<i>Araneus</i> sp. 2		X	
<i>Cyclosa</i> sp.	X		
<i>Gasteracantha</i>	X		
<i>Hiposinga</i>	X		
Araneidae indet 1	X		
Araneidae indet 2		X	
Araneidae indet 3	X		
<b>Clubionidae</b>			
Indet Clubionidae	X	X	
<b>Gnaphosidae</b>			
Indet Gnaphosidae	X		
<b>Linyphiidae</b>			
Indet Linyphiidae	X	X	
<b>Lycosidae</b>			
Indet Lycosidae	X	X	
<b>Mysmenidae</b>			
Indet Mysmenidae	X	X	
<b>Mimetidae</b>			
cf. <i>Mimetus</i> sp. 1	X		
cf. <i>Mimetus</i> sp. 2		X	
<b>Oonopidae</b>			
Indet Oonopidae	X	X	
<b>Oxyopidae</b>			
Indet Oxyopidae	X	X	
<b>Pholcidae</b>			
Indet Pholcidae	X	X	
<b>Psechridae</b>			
<i>Fenecia</i> sp. 1	X		
<b>Salticidae</b>			
<i>Cucudeta</i> sp. n.	X		
<i>Tabuina</i> sp. n.1	X		
<i>Tabuina</i> sp. n. 2		X	
Cf. <i>Yamangalea</i> sp. n.	X		
<i>Cocolodes</i> sp. 1	X		
<i>Cocolodes</i> sp. 2	X		
Other unidentified 15+ spp.	X	X	

Species	Gugusu Camp (500-600 m)	Sawetau Camp (1,500-1,600 m)	Porgera Township (~2,000 m)
<b>Tetragnathidae</b>			
<i>Tetragnatha radiata</i>			X
<i>Tetragnatha chauliodus</i>			X
<i>Leucauge</i> sp. 1		X	X
<i>Leucauge</i> sp. 2	X		
Opadometa grata	X		
Unknown genus sp. 1	X		
<i>Mesida</i> sp. 1	X		
<i>Mesida pumila</i>	X		
<i>Tetragnatha</i> sp. 2			
<i>Tylorida</i> sp. 1		X	
<i>Tylorida</i> sp. 2	X		
Unknown genus sp. 2	X		
<i>Orsinome</i> sp. 1	X		
<b>Theridiidae</b>			
<i>Theridion</i> sp 1	X		
<i>Theridion</i> sp. 2	X		
<i>Theridion</i> sp. 3	X		
? <i>Theridion</i> sp.	X		
<i>Theridion</i> sp. 4	X		
<i>Theridion</i> sp. 5	X		
<i>Theridion</i> sp. 6	X		
<i>Theridion</i> sp. 7		X	
<i>Theridion</i> sp. 8		X	
<i>Theridion</i> sp. 9		X	
<i>Theridion</i> sp. 10		X	
<i>Theridion</i> sp. 11	X		
<i>Theridion</i> sp. 12	X		
<i>Theridion</i> sp. 13		X	
<i>Theridion</i> sp. 14	X		
<i>Theridion</i> sp. 15		X	
<i>Theridion</i> sp. 16		X	
<i>Achaearanea</i> sp. 1	X		
<i>Achaearanea</i> sp. 2	X		
<i>Achaearanea</i> sp. 3		X	
<i>Rhomphaea</i> sp. 1	X		
<i>Rhomphaea</i> sp. 2	X		
<i>Thwaitesia</i> sp. 1	X		

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Table 13.1. *continued*

Species	Gugusu Camp (500-600 m)	Sawetau Camp (1,500-1,600 m)	Porgera Township (~2,000 m)
<i>Ariamnes</i> sp. 1	X		
<i>Steatoda</i> cf. <i>subannulata</i>	X		
<i>Phoroncidia</i> sp. 1	X		
<i>Phoroncidia</i> sp. 2	X		
<i>Phoroncidia</i> sp. 3		X	
<i>Stemmops</i> sp. 1	X		
<i>Hadrotarsinae</i> sp. 1	X		
<i>Hadrotarsinae</i> sp. 2	X		
<i>Hadrotarsinae</i> sp. 3	X		
<i>Hadrotarsinae</i> sp. 4		X	
<i>Episinus</i> sp. 1	X		
<i>Episinus</i> sp. 1		X	
<i>Anelosimus</i> sp. 1		X	
<i>Anelosimus</i> sp. 2			X
<i>Meiotipa</i> sp. 1	X		
<i>Styposis</i> sp. 1	X		
Other indet Theridiidae	X	X	
<b>Theridiosomatidae</b>			
Indet	X	X	
<b>Thomisidae</b>			
Indet Thomisidae	X	X	
<b>Uloboridae</b>			
indet Uloboridae	X	X	
<b>Other indet Araneae</b>	X	X	X

confirmation it is clear that the Muller Range is home to a high diversity of spiders including many species new to science. This high diversity, the rapid turnover in species composition with changing elevation, and the expected endemism of spiders in this mountain range all indicate the importance of protecting forests across the broadest possible range of altitudes in the Muller Range. Declaration of the Muller Range as a World Heritage Area will be an important first step towards ensuring the long-term conservation of this unique spider fauna and the other animals and plants that occur within them.

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