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Chapter 10

Ants of the Muller Range, Papua New Guinea

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SUMMARY

A survey of ants at three sites in the Muller Range of Southern Highlands and Western Provinces, Papua New Guinea documented 237 species of ants belonging to 56 genera. At least 31 of these species (13%) are new to science. At the lowland site (500 m elevation) 177 species were collected, of which 19 (11%) are species new to science; at mid-elevation (1,600 m) 79 species were found, 16 (20%) of which are new to science; at high elevation (2,875 m) two ant species were found, one of which is new to science. Of the 237 species of ants encountered, only 21 (9%) were found at more than one site and hence local patchiness may be an important driver of diversity across these sites. In addition to discoveries of species new to science, collections from this survey extended the known elevational limit of ants in New Guinea from 2,600 m to 2,875 m. The close association of many ant species with ant-plant hosts, and apparent lack of any introduced ant species to this region contribute to a unique and diverse ant fauna in this largely intact rainforest habitat, which we strongly recommend be prioritized for conservation.

INTRODUCTION

One of the great success stories in the history of life on Earth, ants (Hymenoptera: Formicidae) are dominant and essential components of most of the world's terrestrial ecosystems. Ants are speciose, with over 12,500 described species belonging to nearly 300 genera in 22 subfamilies (Bolton et al. 2006), accounting for 1% of all described insect species. They are also abundant, comprising an approximated 10% of the terrestrial animal biomass in tropical forests alone (Agosti et al. 2000). Ants perform many roles in ecosystems: they are predators, scavengers, seed harvesters and cultivators of fungus. The services they provide to the ecosystem include improving soil, spreading plant seeds, pollinating flowers and consuming dead small animals. The utility of many of these services extends to humans, including ants' ability to control pest insects. Because of their diversity and their key ecosystem functions, ants also constitute important subjects for monitoring and evaluating environmental conditions and biodiversity status. As part of a biodiversity assessment of the remote Muller Range in Papua New Guinea, ant diversity was assessed at three sites in Western and Southern Highlands provinces. Although previous work has focused on New Guinea ants in general (Janda 2010) or at other lowland sites (Snelling 1998), no surveys of ants in the Muller Range had been conducted prior to this study.

METHODS

Ant diversity at low, mid and high elevations in the Muller Range (Western and Southern Highlands Provinces) was investigated using three collecting methods: hand-collecting, Winkler leaf-litter sifting and extraction, and Malaise trapping. Hand collections involved searching for and collecting ants foraging on soil, leaf-litter, tree trunks and understory vegetation, as well as those nesting under stones, or under or inside decaying wood. In the Winkler method, a sifter was used to obtain ground litter samples from $1m^2$ quadrats of leaf litter that were placed every 5 m along 100 m transects in different rain forest habitat types (along ridges, beside streams, at forest edges, etc.). Winkler bags were used to passively extract and collect ants over a period of 48 hours. Malaise traps, upright mesh tents designed to intercept flying insects, were erected at each site to collect winged reproductive ants (males and queens).

Identifications were made to the species level wherever possible based on comparison with museum material from the Los Angeles County Museum (LACM) and Philip S. Ward (PSWC) collections, and through consultation with taxonomists and published literature. New species designations were assigned conservatively, i.e. we assessed species as new to science only if they belonged to groups for which the taxonomy is well resolved in New Guinea. Many additional species that are new to science are expected among less well-resolved groups (e.g. *Hypoponera, Pheidole, Vollenhovia*), but the lack of revisionary work in these groups prevents ready recognition of named and unnamed species at this time.

Study Sites

From September 4-10, 2009, ants were surveyed in lowland rain forest (515 m) at Gugusu, where the vegetation was highly diverse and composed of typical lowland tree families, but with some montane elements also present (see Takeuchi, Chapter 9, this volume). Ants were collected by the Winkler method along ridges and in low-lying areas where leaf litter had accumulated. Hand collections were conducted with particular emphasis on obtaining species that occur above the forest floor, such as nests in live twigs, standing dead wood and inside ant-plants, as well as in open areas such as tree-fall gaps where canopy-dwelling species often occur. Two Malaise traps were erected at forest edges.

From September 11-18, 2009, ants were surveyed at Sawetau in mid-elevation rain forest, at altitudes of 1,300-2,000 m. Winkler sampling was conducted in rainforest at 1,300 m, 1,600 m and 1,700 m, an elevational range across which the ant fauna changed considerably. The forest at the lowest elevation was similar to the forest type at Gugusu, but with greater water saturation of the leaf litter and substantial amounts of moss present on live and dead wood. With increasing elevation the forest vegetation incorporated more highland elements, many *Pandanus* spp., and became primarily a wet, mossy forest. Hand collections were made in closed forest and in tree-fall gaps at these elevations, and at a bog at 2,000 m. Two Malaise traps were erected at forest edges.

During September 19-26, 2009, ants were surveyed at Apalu Reke in high-elevation mossy/dwarf forest and alpine meadows at 2,875 m. Forests were cold, water-saturated and covered in thick moss-blankets, whereas meadows were composed of *Blechnum* fern interspersed with hummocks of grass and dwarfed, shrubby vegetation. Dominant trees and shrubs included *Pandanus* spp., *Rhododendron* spp. and members of the family Podocarpaceae. Winkler sampling was conducted in forests and hand collections were made in forests, meadows and along the boundary between these two habitat types. Two Malaise traps were erected in alpine meadows.

RESULTS AND DISCUSSION

A total of 237 species of ants, belonging to 56 genera, were collected during the Muller Range Survey (Table 10.1). At least 31 (13%) species are new to science. At the lowland site (~500 m) 177 species were collected, of which 19 (11%) are undescribed; at mid-elevation (1,600 m) 79 species were found, 16 (20%) of which are undescribed, and at high elevation (2,875 m) two ant species were found, *Hypoponera* sp. and *Strumigenys* sp. nov. It has been determined that the latter species is undescribed; identification of the former is yet to be determined.

Results indicate that ant diversity decreased with increasing altitude; the lowest elevation site (Gugusu) possessed the greatest ant diversity, while the highest elevation site (Apalu Reke) had the lowest number of ant species. This pattern of decreasing species diversity with increasing elevation follows a well-established rule in ant ecology, in that the majority of ant species occur in warmer habitats, with decreasing numbers in cooler habitats, i.e. higher elevations (Brühl et al. 1999, Colwell et al. 2008, Lach et al. 2010). All three sites sampled here contained habitat meeting the requirements of ants that nest in intact primary forest: undisturbed litter layer, many canopy epiphytes, standing dead wood, fallen decomposing trees and broken branches and twigs on the forest floor.

Gugusu contained extremely high ant diversity, as expected from previous surveys of ants in other lowland sites in Papua New Guinea (e.g. Snelling 1998). Because of the isolation of the Muller Range, however, it is not surprising that multiple species were found to be new to science. Greatest diversity was found in the leaf litter with considerably fewer species found in the understory or canopy. The leaf litter fauna included predatory army ants (*Aenictus*, *Cerapachys* and *Leptogenys* spp.), specialist predators on collembola (*Strumigenys* spp.) and many generalist foragers.

The forest floor at Sawetau was considerably colder and wetter than the previous site. At the lowest elevations accessed from this site (1,300 m), the ant community composition resembled that seen at Gugusu, with fewer epiphytes and less complete coverage of trees by moss mats. However, in contrast to Gugusu the leaf litter was continually wet, and included arthropods that are characteristically associated with aquatic habitats, such as juvenile c caddisflies (Trichoptera) and mosquitoes (Diptera). At the higher elevations accessed from Sawetau, water saturation of dead wood and moss, which increased with elevation at our survey sites, appeared to be a factor limiting the availability of appropriate nesting sites for ants. At 1,600 m most trees, living and dead, were covered with thick mats of moss that housed ferns and other epiphytic vegetation. The soil at the interface of these moss mats and the tree trunk often provided nesting and foraging sites for ants, including taxa that are normally considered to occur primarily in soil. The bog at 2,000 m contained an ant fauna that was distinct from the forest ant community, likely resulting from the water-saturated soil and open water, distinct vegetation (Pitcher Plants of the genus *Nepenthes,* grasses, etc.) and more extreme climate resulting from the lack of canopy cover.

At Apalu Reke, the temperature extremes were expected to preclude the occurrence of ants. During wet periods the vegetation became completely saturated with water while intermittent dry spells completely robbed soil and moss mats of any moisture. Nevertheless, ants were found nesting in protected sites that retained moisture during dry spells and avoided becoming entirely inundated with rainwater. This type of site was relatively rare, and included partially buried dead trees in open meadows, standing, hollow *Pandanus* trunks and thick mats of roots, mosses and ferns encircling *Pandanus* trunks at the forest/meadow edge. The two species found at this site, belonging to the genera *Hypoponera* and *Strumigenys*, were found in such well-protected nesting sites. Despite intensive searching no surface foragers were encountered at this site, and no ants at all were detected in Winkler samples from leaf litter on the forest floor.

Species of conservation interest

The impressive diversity of ants in the lower elevations of the Muller range includes a high proportion of species that are new to science (13%). Among them are several rarely collected and poorly known genera, including a new species of the blind, subterranean genus *Probolomyrmex* and an undescribed species in the myrmicine genus *Dacetinops,* the only non-dacetine genus known to have spongiform tissue on the cuticle. The predominant large foragers encountered on the forest floor or low vegetation include species in the genera *Anonychomyrma, Camponotus*, *Leptomyrmex, Polyrachis* and *Rhytidoponera*. Numerically and ecologically important in the leaf-litter and soil are members of the genera *Hypoponera, Pachycondyla, Pheidole*, *Strumigenys* and army ants of the genus *Aenictus.*

Above 1,300 m, the ant community composition changed significantly. It also became less diverse generally with increasing elevation. Many genera found at 500 m (including *Anonychomyrma, Strumigenys* and *Hypoponera*) were still present 1,300 m, but did not occur as high as 1600 m. Species turnover was high between 500 m and 1,600 m, with only 21 species shared between these elevations (9%). The genera *Pheidole, Podomyrma, Tetramorium* and *Vollenhovia* became prominent at mid-elevation. Although species richness at mid-elevation was lower than at low-elevation, the percentage of species new to science increased to approximately 20%.

Prior to this survey, ant species were thought not to occur above 2600 m in New Guinea (Wilson 1958). Two species of ants were found at the high elevation site Apalu Reke (2,875 m), representing an extension of the known elevational limit for ants in New Guinea. Species in the genera *Hypoponera* and *Strumigenys* are of particular taxonomic and ecological interest, due to their occurrence at such high elevation. Work on these ants is currently underway to determine their taxonomic status.

The high diversity of ants encountered on this survey, 237 species, rivals numbers cited in a study of the Ivimka ant fauna which, at 254 species, was touted as “possibly the richest ever recorded for a single locality anywhere in the world!” (Snelling 1998, p. 47). The 56 genera recorded here make up fully two-thirds of the total number of ant genera known to occur in New Guinea (87; Guinard 2009).

Given the biotic richness of the isolated Muller Range, in combination with the lack of prior ant surveys, it is not surprising that a high percentage of the species collected on this expedition are yet unknown to science (13%). The results of this survey expand our understanding of named species’ geographic ranges as well as furnishing records of many species new to science in this incredibly rich region. The richness of ants recorded in this single mountain range in New Guinea, particularly in the lowlands, is among the highest recorded on Earth, yet beyond species numbers little is known about the natural history, biogeography and community ecology of these species. This rich assemblage offers an opportunity to conserve and better understand a remarkable terrestrial fauna.

CONSERVATION RECOMMENDATIONS

The Muller Range is of high scientific and conservation value because it contains large contiguous tracts of primary forest suffering minimal human impact that is mostly confined to subsistence hunting and agriculture. As a result, the biotic communities of this isolated mountain range are expected to be fully intact and to contain unique species that are distinct from those in neighboring montane regions. The majority of ant communities on islands suffer the effects of introduced and invasive species, and we recommend that measures be taken to preserve the pristine forests of the Muller Range and the unique ant communities that occur within them. These communities are extremely valuable for understanding the evolutionary history and biogeography of Australasia, Melanesia and the Pacific.

The high diversity of ants in the forests surveyed can be attributed primarily to species in leaf-litter or decomposing wood on the forest floor, with relatively fewer species found in the canopy or on understory vegetation. The highest diversity of ants occurs in the lowest elevation sites. Many ant species that dwell in large, decomposing logs and in accumulations of leaf litter are known to occur only in pristine habitats such as those encountered in the Muller Range. These microhabitats that foster rich communities of terrestrial arthropods are adversely affected by human activities such as logging, mining, agriculture, and the habitat alterations associated with increased population density.

Canopy-dwelling ants were found in association with a number of ant-plants, species that provide nesting structures for ants within their living tissues. One of the dominant components of the low and mid-elevation ant fauna was the ant genus *Anonychomyrma,* whose large and aggressive colonies were commonly found in association with multiple species of ant-plant trees in the genera *Myristica* and *Steganthera*, as well as in epiphytic ant-plants of the genera *Hydnophytum* and *Myrmecodia.*

Inter-species symbioses involving ants are also of conservation interest, as they provide important models for evolutionary study of symbiosis. In the Muller Range, we observed close relationships between ants and plants (shelter-providing ant-plants), as well as between ants and other insects. We observed ants tending and feeding from scale insects (Hemiptera: Coccidae) and mealybugs (Hemiptera: Pseudococcidae) and living in close association with membracidae (Hemiptera: Membracidae). Close interactions such as these often occur only in primary forests, and are therefore unlikely to survive habitat loss.

Based on our assessment of ant assemblages that occur in the Muller Range, which are both extremely diverse and highly endemic, and likely reflective of diversity patterns in other taxa, we strongly recommend taking steps toward conserving contiguous areas in the Muller Range that encompass low and mid elevation primary forests.

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Table 10.1. List of ants collected during the 2009 RAP survey of the Muller Range in Papua New Guinea. Presence in each of the sites surveyed is denoted with an X. Asterisks (*) indicate species new to science.

Subfamily	Genus	Species	Gugusu (500 m)	Sawetau (1,600 m)	Apalu Reke (2,875 m)
Aenictinae	*Aenictus*	cf_*chapmani*	X		
Aenictinae	*Aenictus*	*huonicus*	X		
Aenictinae	*Aenictus*	sp_EMS01	X		
Aenictinae	*Aenictus*	sp_EMS09	X		
Amblyoponinae	*Amblyopone*	*australis*		X	
Cerapachyinae	*Cerapachys*	cf_ *dominulus*	X		
Cerapachyinae	*Cerapachys*	cf_ *flavaclavatus*	X		
Cerapachyinae	*Cerapachys*	cf_*inconspicuus*	X		
Cerapachyinae	*Cerapachys*	*opacus*		X	
Cerapachyinae	*Cerapachys*	sp_MB_B*		X	
Cerapachyinae	*Cerapachys*	sp_MB_C*		X	
Cerapachyinae	*Cerapachys*	sp_MB_D*		X	
Dolichoderinae	*Anonychomyrma*	*scrutator*	X		
Dolichoderinae	*Anonychomyrma*	sp_EMS01		X	
Dolichoderinae	*Anonychomyrma*	sp_EMS02	X		
Dolichoderinae	*Anonychomyrma*	sp_EMS03	X		
Dolichoderinae	*Anonychomyrma*	sp_EMS05	X		
Dolichoderinae	*Dolichoderus*	*monoceros*	X		
Dolichoderinae	*Dolichoderus*	sp_EMS01	X		
Dolichoderinae	*Leptomyrmex*	*flavitarsus*	X	X	
Dolichoderinae	*Leptomyrmex*	*fragilis*	X		
Dolichoderinae	*Leptomyrmex*	*melanoticus*	X		
Dolichoderinae	*Philidris*	sp_EMS04	X		
Dolichoderinae	*Philidris*	sp_EMS05	X		
Dolichoderinae	*Philidris*	sp_EMS06	X	X	
Dolichoderinae	*Philidris*	sp_EMS07	X		
Dolichoderinae	*Philidris*	sp_EMS08	X		
Dolichoderinae	*Philidris*	sp_EMS09		X	
Dolichoderinae	*Technomyrmex*	sp_cf_*albicoxis*		X	
Dolichoderinae	*Technomyrmex*	sp_cf_*albicoxis*	X		
Dolichoderinae	*Technomyrmex*	sp_EMS02		X	
Dolichoderinae	*Technomyrmex*	*vitiensis*	X		
Ectatomminae	*Gnamptogenys*	sp_cf_*biroi*	X		
Ectatomminae	*Gnamptogenys*	sp_cf_*grammodes*	X		
Ectatomminae	*Gnamptogenys*	sp_EMS03	X		
Ectatomminae	*Rhitidoponera*	*aenescens*	X		
Ectatomminae	*Rhitidoponera*	*nexa*	X		
Ectatomminae	*Rhitidoponera*	sp_EMS01_*strigosa_cplx**		X	
Ectatomminae	*Rhitidoponera*	sp_cf_*nexa**	X	X	
Formicinae	*Acropyga*	*acutiventris*	X		
Formicinae	*Acropyga*	*ambigua*	X		

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Table 10.1. *continued*

Subfamily	Genus	Species	Gugusu (500 m)	Sawetau (1,600 m)	Apalu Reke (2,875 m)
Formicinae	*Acropyga*	sp_EMS01	X		
Formicinae	*Adelomyrmex*	*biroi*	X		
Formicinae	*Adelomyrmex*	sp_EMS02		X	
Formicinae	*Adelomyrmex*	sp_*nov**	X		
Formicinae	*Calomyrmex*	*albertisi*	X		
Formicinae	*Camponotus*	*dorycus*	X		
Formicinae	*Camponotus*	*posteropilus*		X	
Formicinae	*Camponotus*	sp_EMS01	X		
Formicinae	*Camponotus*	sp_EMS02	X		
Formicinae	*Camponotus*	sp_EMS04		X	
Formicinae	*Camponotus*	*variegatus_flavotestaceous*	X		
Formicinae	*Camponotus*	*vitreus*	X	X	
Formicinae	*Camponotus*	*xanthopilus*		X	
Formicinae	*Oecophylla*	*smaragdina*	X		
Formicinae	*Paratrechina*	sp_cf_ *pallida*	X		
Formicinae	*Paratrechina*	sp_cf_*minutula*	X		
Formicinae	*Paratrechina*	*glabrior*	X	X	
Formicinae	*Paratrechina*	*nuggeti*	X		
Formicinae	*Paratrechina*	sp_EMS01		X	
Formicinae	*Paratrechina*	sp_EMS02	X		
Formicinae	*Paratrechina*	sp_EMS03	X		
Formicinae	*Paratrechina*	sp_EMS05		X	
Formicinae	*Paratrechina*	sp_EMS10	X		
Formicinae	*Polyrachis*	*bellicosa*	X		
Formicinae	*Polyrachis*	*calliope*	X		
Formicinae	*Polyrachis*	*esuriens*	X		
Formicinae	*Polyrachis*	*hostilis*	X		
Formicinae	*Polyrachis*	*kokoda*	X		
Formicinae	*Polyrachis*	*metella*	X		
Formicinae	*Polyrachis*	nr_*alphea**	X		
Formicinae	*Polyrachis*	nr_*variolosa**	X		
Formicinae	*Polyrachis*	*rufofemorata*	X		
Formicinae	*Polyrachis*	*sericata*	X		
Formicinae	*Polyrachis*	*sexspinosa*	X		
Formicinae	*Polyrachis*	sp_undet_*continua_grp*	X		
Formicinae	*Polyrachis*	sp_nov_*Chariomyrma_grp**		X	
Formicinae	*Pseudolasius*	sp_EMS01	X		
Formicinae	*Pseudolasius*	sp_EMS02	X	X	
Formicinae	*Pseudolasius*	sp_EMS03	X		
Formicinae	*Echinopla*	sp_EMS01	X		

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Table 10.1. *continued*

Subfamily	Genus	Species	Gugusu (500 m)	Sawetau (1,600 m)	Apalu Reke (2,875 m)
Myrmicinae	*Ancyridris*	sp_cf_*polyrachiodes*		X	
Myrmicinae	*Ancyridris*	sp_EMS02*	X		
Myrmicinae	*Ancyridris*	sp_EMS03*	X	X	
Myrmicinae	*Cardiocondyla*	sp_EMS02		X	
Myrmicinae	*Carebara*	sp_EMS02	X	X	
Myrmicinae	*Carebara*	sp_EMS03	X		
Myrmicinae	*Carebara*	sp_EMS04	X		
Myrmicinae	*Carebara*	sp_EMS05	X		
Myrmicinae	*Crematogaster*	sp_cf_*meijerei*	X		
Myrmicinae	*Crematogaster*	*irritabilis*	X		
Myrmicinae	*Crematogaster*	*paradoxa*	X		
Myrmicinae	*Crematogaster*	sp_EMS02_cf_*tetracantha*	X		
Myrmicinae	*Crematogaster*	sp_EMS04	X		
Myrmicinae	*Crematogaster*	sp_EMS05		X	
Myrmicinae	*Dacetinops*	sp_cf_*ignotus**	X		
Myrmicinae	*Lordomyrma*	sp_EMS01*	X		
Myrmicinae	*Lordomyrma*	sp_EMS02_cf_*punctiventris*	X		
Myrmicinae	*Lordomyrma*	sp_EMS03*	X	X	
Myrmicinae	*Lordomyrma*	sp_EMS04*		X	
Myrmicinae	*Mayriella*	sp_EMS01	X		
Myrmicinae	*Meranoplus*	*astericus*	X		
Myrmicinae	*Meranoplus*	*astericus*	X		
Myrmicinae	*Monomorium*	sp_EMS01	X		
Myrmicinae	*Monomorium*	sp_EMS02*	X		
Myrmicinae	*Myrmecina*	sp_EMS01		X	
Myrmicinae	*Myrmecina*	sp_EMS02	X		
Myrmicinae	*Myrmecina*	sp_EMS03	X		
Myrmicinae	*Myrmecina*	sp_EMS04	X		
Myrmicinae	*Myrmecina*	sp_EMS05		X	
Myrmicinae	*Pheidole*	*oceanica*	X		
Myrmicinae	*Pheidole*	sp_EMS01	X	X	
Myrmicinae	*Pheidole*	sp_EMS02		X	
Myrmicinae	*Pheidole*	sp_EMS03		X	
Myrmicinae	*Pheidole*	sp_EMS04	X		
Myrmicinae	*Pheidole*	sp_EMS05	X		
Myrmicinae	*Pheidole*	sp_EMS05	X		
Myrmicinae	*Pheidole*	sp_EMS06		X	
Myrmicinae	*Pheidole*	sp_EMS08		X	
Myrmicinae	*Pheidole*	sp_EMS09		X	
Myrmicinae	*Pheidole*	sp_EMS10		X	
Myrmicinae	*Pheidole*	sp_EMS11	X		

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Table 10.1. *continued*

Subfamily	Genus	Species	Gugusu (500 m)	Sawetau (1,600 m)	Apalu Reke (2,875 m)
Myrmicinae	*Pheidole*	sp_EMS14	X		
Myrmicinae	*Pheidole*	sp_EMS15	X		
Myrmicinae	*Pheidole*	sp_EMS17	X		
Myrmicinae	*Pheidole*	sp_EMS18	X		
Myrmicinae	*Pheidole*	sp_EMS19		X	
Myrmicinae	*Pheidole*	sp_EMS20	X		
Myrmicinae	*Pheidole*	sp_EMS21		X	
Myrmicinae	*Pheidole*	sp_EMS22	X		
Myrmicinae	*Pheidole*	sp_EMS23	X		
Myrmicinae	*Pheidole*	sp_EMS24		X	
Myrmicinae	*Pheidole*	sp_EMS25	X		
Myrmicinae	*Pheidole*	sp_EMS26		X	
Myrmicinae	*Pheidologeton*	sp_EMS01		X	
Myrmicinae	*Podomyrma*	sp_EMS01*	X		
Myrmicinae	*Podomyrma*	sp_EMS03*	X		
Myrmicinae	*Podomyrma*	sp_EMS04*	X		
Myrmicinae	*Podomyrma*	sp_EMS05*	X		
Myrmicinae	*Prionopelta*	sp_cf_*opaca*	X		
Myrmicinae	*Pristomyrmex*	*picteti*	X		
Myrmicinae	*Pristomyrmex*	*levigatus*	X		
Myrmicinae	*Pristomyrmex*	*inermis*	X		
Myrmicinae	*Rhoptromyrmex*	*melleus*	X		
Myrmicinae	*Rogeria*	*stigmatica*	X	X	
Myrmicinae	*Solenopsis*	sp_EMS01	X		
Myrmicinae	*Solenopsis*	sp_EMS02	X		
Myrmicinae	*Solenopsis*	sp_EMS03		X	
Myrmicinae	*Tetramorium*	*bicolor*	X		
Myrmicinae	*Tetramorium*	sp_cf_ *bicolor*	X		
Myrmicinae	*Tetramorium*	*cynicum*	X		
Myrmicinae	*Tetramorium*	*fulviceps*	X	X	
Myrmicinae	*Tetramorium*	*pulchellum*	X		
Myrmicinae	*Tetramorium*	*sculptatum*		X	
Myrmicinae	*Tetramorium*	sp_EMS04	X		
Myrmicinae	*Tetramorium*	sp_EMS07		X	
Myrmicinae	*Tetramorium*	sp_EMS11		X	
Myrmicinae	*Tetramorium*	sp_cf_*politum**		X	
Myrmicinae	*Tetramorium*	*validusculum*		X	
Myrmicinae	*Tetramorium*	*vandalum*		X	
Myrmicinae	*Vollenhovia*	sp_cf_*subtilis*	X		
Myrmicinae	*Vollenhovia*	sp_cf_*pedestris*	X	X	
Myrmicinae	*Vollenhovia*	sp_EMS01		X	

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Table 10.1. *continued*

Subfamily	Genus	Species	Gugusu (500 m)	Sawetau (1,600 m)	Apalu Reke (2,875 m)
Myrmicinae	*Vollenhovia*	sp_EMS02		X	
Myrmicinae	*Vollenhovia*	sp_EMS06		X	
Myrmicinae	*Vollenhovia*	sp_EMS07	X		
Myrmicinae	*Vollenhovia*	sp_EMS09	X		
Myrmicinae	*Vollenhovia*	sp_EMS10		X	
Myrmicinae	*Vollenhovia*	sp_EMS11	X		
Myrmicinae	*Vombisidris*	sp_cf_*acherdos*		X	
Myrmicinae	*Vombisidris*	sp_*nov**		X	
Myrmicinae	*Vombisidris*	*bilongrudi*		X	
(tribe Dacetini)	*Eurhopalothrix*	*biroi*	X		
(tribe Dacetini)	*Eurhopalothrix*	sp_cf_*cibdelus*	X		
(tribe Dacetini)	*Eurhopalothrix*	*punctata*	X		
(tribe Dacetini)	*Eurhopalothrix*	*szentivanyi*	X		
(tribe Dacetini)	*Rhopalothrix*	*diadema*	X		
(tribe Dacetini)	*Strumigenys*	*biroi*	X		
(tribe Dacetini)	*Strumigenys*	sp_cf_*kyroma*(2)*	X	X	
(tribe Dacetini)	*Strumigenys*	*wallacei*	X		
(tribe Dacetini)	*Strumigenys*	sp_cf_*kyroma*(1)*		X	
(tribe Dacetini)	*Strumigenys*	*kyroma*	X	X	
(tribe Dacetini)	*Strumigenys*	*szalayi*	X		
(tribe Dacetini)	*Strumigenys*	sp_cf_*stemonixys**	X		
(tribe Dacetini)	*Strumigenys*	sp_cf_*hemichlaena**		X	
(tribe Dacetini)	*Strumigenys*	sp_*mayri*	X		
(tribe Dacetini)	*Strumigenys*	sp_*undras*	X		
(tribe Dacetini)	*Strumigenys*	sp_*missina*	X		
(tribe Dacetini)	*Strumigenys*	sp_EMS16*			X
(tribe Dacetini)	*Strumigenys*	sp_EMS17*	X		
(tribe Dacetini)	*Strumigenys*	*tigris*		X	
Ponerinae	*Anochetus*	sp_EMS02	X		
Ponerinae	*Anochetus*	sp_EMS02	X		
Ponerinae	*Cryptopone*	sp_cf_*fusciceps*	X		
Ponerinae	*Cryptopone*	sp_EMS01	X		
Ponerinae	*Cryptopone*	*testacea*	X		
Ponerinae	*Diacamma*	*rugosum*	X		
Ponerinae	*Hypoponera*	*alpha*	X		
Ponerinae	*Hypoponera*	*confinis*	X		
Ponerinae	*Hypoponera*	*pallidula*	X		
Ponerinae	*Hypoponera*	*pruinosa*	X	X	
Ponerinae	*Hypoponera*	sp_EMS02		X	
Ponerinae	*Hypoponera*	sp_EMS03	X		
Ponerinae	*Hypoponera*	sp_EMS04	X	X	

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Table 10.1. *continued*

Subfamily	Genus	Species	Gugusu (500 m)	Sawetau (1,600 m)	Apalu Reke (2,875 m)
Ponerinae	*Hypoponera*	sp_EMS07			X
Ponerinae	*Hypoponera*	*tenuis*	X	X	
Ponerinae	*Leptogenys*	*duminuta*	X		
Ponerinae	*Myopias*	*laevigata*	X		
Ponerinae	*Myopias*	*papua*	X		
Ponerinae	*Myopias*	sp_EMS01	X		
Ponerinae	*Myopias*	sp_EMS02	X		
Ponerinae	*Myopias*	sp_EMS04	X		
Ponerinae	*Myopias*	sp_EMS07	X		
Ponerinae	*Myopias*	*tenuis*	X		
Ponerinae	*Odontomachus*	*cephalotes*	X		
Ponerinae	*Odontomachus*	*saevissimus*		X	
Ponerinae	*Odontomachus*	sp_*nov**		X	
Ponerinae	*Odontomachus*	sp_EMS02		X	
Ponerinae	*Odontomachus*	sp_EMS03	X		
Ponerinae	*Odontomachus*	sp_EMS06	X		
Ponerinae	*Pachycondyla*	*acuta*	X		
Ponerinae	*Pachycondyla*	*australis*	X	X	
Ponerinae	*Pachycondyla*	sp_cf_*striatula*	X		
Ponerinae	*Pachycondyla*	*croceicornis*	X		
Ponerinae	*Pachycondyla*	sp_EMS03	X		
Ponerinae	*Platythyrea*	sp_cf_ *quadridenta**	X		
Ponerinae	*Ponera*	*clavicornis*	X		
Ponerinae	*Ponera*	sp_EMS03		X	
Ponerinae	*Ponera*	sp_EMS04	X		
Ponerinae	*Ponera*	sp_EMS06	X	X	
Ponerinae	*Ponera*	sp_EMS08		X	
Ponerinae	*Ponera*	*szaboi*	X		
Ponerinae	*Ponera*	*tenuis*		X	
Ponerinae	*Ponera*	*xenagos*	X	X	
Proceratiinae	*Discothyrea*	sp_EMS01	X		
Proceratiinae	*Probolomyrmex*	sp_EMS01*	X		
Pseudomyrmecinae	*Tetraponera*	*laeviceps*	X		
TOTAL SPECIES		237	177	79	2
SPECIES NEW to science		**31** (13%)	**19** (11%)	**16** (20%)	**1** (50%)