ASIAN MYRMECOLOGY Volume 2, 71 - 83, 2008
ISSN 1985-1944

Diversity and richness of ant species in a lowland wet forest reserve in Sri Lanka

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Abstract. Sinharaja Forest Reserve (SFR) represents one of the largest remaining stands of mixed dipterocarp forest in southwestern Sri Lanka. It is characterised by high floral and faunal endemicity and is gazetted as a World Heritage Site. Research was undertaken to study the ground-dwelling ants in the SFR using pitfall traps and leaf litter extraction. The collection was carried out in disturbed and undisturbed primary forest, old selectively-logged forest (30 years old) and periphery forest (agricultural buffer zone) along a small elevation gradient (200 m – 700 m). A total of 173 species and morphospecies in 11 subfamilies and 54 genera were caught. *Pheidole* and *Tetramorium* were the most speciose genera, with 19 and 18 species respectively; *Cerapachys* followed with 12 species. These results demonstrate the high diversity of litter dwelling ant species in the SFR. There were no significant differences in species richness between sites within the forest. Future studies should analyse species assemblages in each forest type in relation to forest structure and environmental parameters to further understand the distribution of ant species across this unique and complex forest.

Key words: Formicidae, tropical rain forest, dipterocarp forest, species richness

INTRODUCTION

The Western Ghats in India plus the whole island of Sri Lanka is considered one of 34 world biodiversity hotspots (Myers *et al.* 2000; Mittermeier *et al.* 2004). Sri Lanka harbours 1.6 % of global plant species, almost half of them endemic to the island, and 3.9 % of global animal species (Myers *et al.* 2000). Endemic species, both floral and faunal, are concentrated in the wet zone of Sri Lanka (Ashton & Gunatilleke 1987; Meegaskumbura *et al.* 2002; Bossuyt *et al.* 2004) which can be considered a 'hotspot within a hotspot' (Pethiyagoda 2005).

Most of the remaining forest in the wet zone exists only as scattered fragments under varying degrees of protection and usage, but most are small (< 10 km^2), degraded and under-managed (Ashton *et al.* 2001). The largest patches of forest are found in three areas, the Peak Wilderness (250 km^2), the Knuckles Hills (175 km^2) and the Sinharaja Forest Reserve (90 km^2) (Bahir *et al.* 2005).

Sinaharaja Forest Reserve (hereafter SFR) is one of the last remaining contiguous stands of dipterocarp forest in this zone of Sri Lanka (Gunatilleke *et al.* 2004). The western part of the forest was opened up for selective logging between 1972 and 1977 (Gunatilleke & Gunatilleke 1980), which caused a considerable public outcry from both scientific and local communities. Logging was terminated in 1978 (IUCN 1993) and the Sri Lankan Government designated the area as a strict forest reserve, culminating in UNESCO inscribing Sinharaja as a Natural World Heritage Site in 1990 (UNEP 2001).

Currently, the western half of the SFR is a mosaic of logged forest, unlogged forest, and reclaimed periphery forest. This study focused on investigating the ground-dwelling ant diversity of this section of the reserve due to the relatively small elevational change and its ease of accessibility. Ant species of Sri Lanka have been poorly documented, with species diversity within the family still unknown (Dias 2002b). The first comprehensive collection of ants in Sri Lanka was published by C.T. Bingham in 1903 and only in recent decades have further collections been carried out to assess the diversity of Sri Lanka's ant fauna (Bingham 1903; Dias 2002b, 2006). This study used high-intensity sampling to collect ground-dwelling ant species in the different forest types within the SFR in order to document the ant species richness of the reserve and to contribute to the growing body of research on ants in Sri Lanka.

MATERIALS AND METHODS

Sinharaja Forest Reserve is an 110 km^2 reserve located in the Sabaragamuwa Province in Sri Lanka (6° 21' N, 80° 21 E). The reserve is mid-elevation (300 m – 1200 m) mixed dipterocarp (*Mesua-Shorea* type) rain forest, set upon a series of ridges runnning in an east-west direction in the southwestern quarter of the country (Fig. 1) (Gunatilleke *et al.* 2004).

Samples were taken between March 2005 and February 2007 within three forest interior sites (old logged forest (LF), adjacent unlogged forest (UF), and a forest dynamics plot (FDP)) and in four periphery forest sites. Three of the periphery

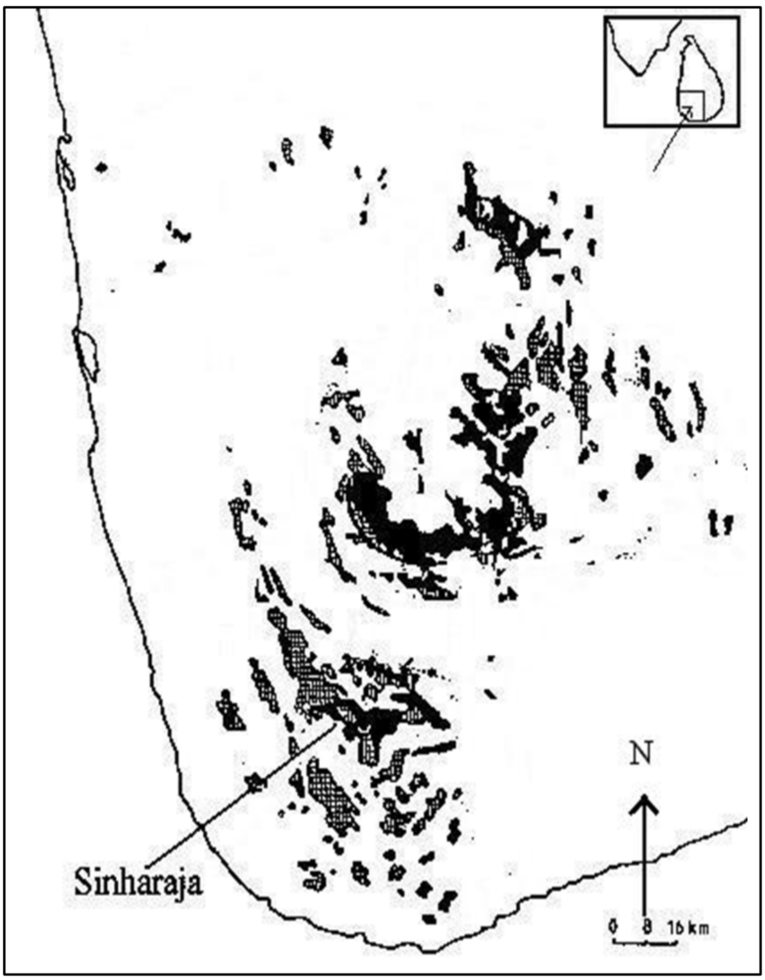

Fig. 1. Southwestern Sri Lanka showing the distribution of disturbed forest (stippled areas) and undisturbed forest (dark shaded areas). The position of Sinharaja Forest Reserve is shown in the southern ranges (modified from Ashton & Gunatilleke 1987).

forest sites were bordered by different land-uses: respectively, a working tea plantation (T); an old *Pinus caribea* plantation (P); and abandoned agricultural land covered in an exotic fern (*Dicranopteris linearis*) (F) (Fig- 2). The fourth periphery-forest site was bordered by a natural riparian edge (N) formed by a river (~ 20 m wide) with farmland on the opposite bank. All sites were within a radius of about 4 km but were at least 2 km apart. In each of the first three forest types, 15 plots were sampled. Within each plot, a 10 by 10 m quadrat was set up from which four leaf litter samples were taken and four pitfall traps set out, to maximise the number of leaf litter ants collected. Collection was carried out four times in one year to account for any potential seasonal variability in ground-dwelling ant fauna activity.

In the periphery forest (PF), a slightly different sample set was taken due to the difficulty in finding replicate plots. In each periphery forest type, five 2 x 2 m quadrats were laid out along each of five transects spaced 5 m apart. In each quadrat, a litter sample was collected and one pitfall trap was laid out. This grid was replicated in the same edge 100 m away and the collection carried out again. These collections were carried out only once in each of the four periphery forest types. A total of 480 samples were taken from each of the three interior forest sites with an additional 400 samples from each periphery forest site.

Leaf litter was collected in a 1 x 1 m quadrat and was sifted using a litter sifter (Bestelmeyer *et al.* 2000). The sifted material was then hung inside a mini-Winkler sack (Fisher 1999) for 48 hours with the leaf litter being removed and shaken after the first 24 hours. This was done so as to agitate the invertebrates into moving again, hence increasing the potential for further collection of fauna from

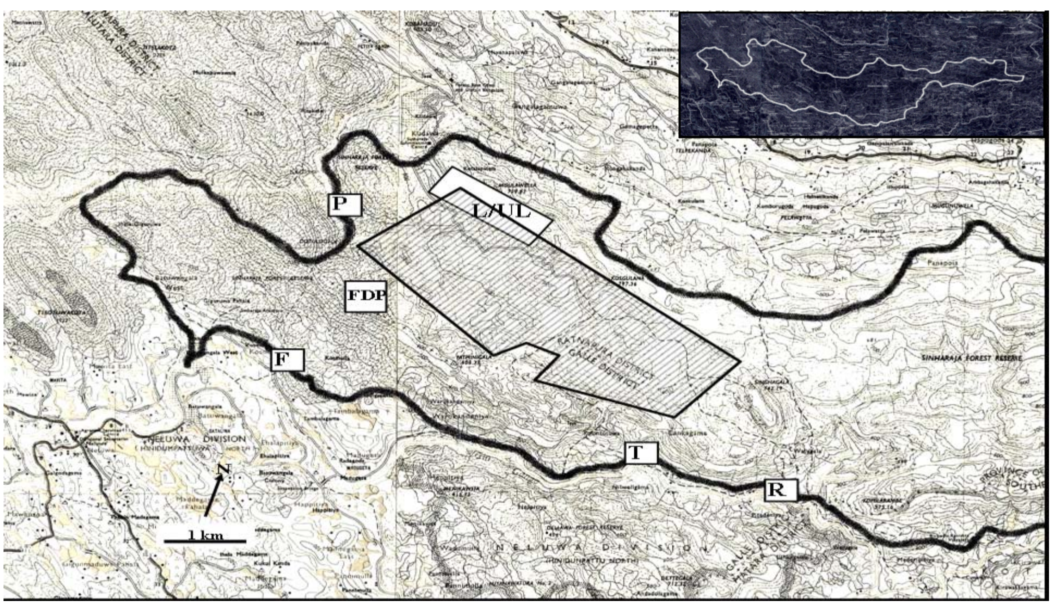

Fig. 2. Distribution of collection sites within western Sinharaja Forest Reserve (whole reserve is indicated in inset). The striped area represents the part of the forest that was selectively logged. Collection sites are indicated by the white boxes: '**LF/UF'** logged sites and unlogged forest sites; '**FDP**' forest dynamics plot. All other boxes indicate the periphery forest sites: natural river edge (**N**); tea edge (**T**); pine edge (**P**); and fernland edge (**F**).

the litter. All material collected from the Winkler extraction was then removed and stored in 70% ethanol.

The pitfall trap consisted of a standard plastic drinking cup (mouth diameter 7 cm) filled with ~70 ml of methylated spirits. The pitfalls were then capped with an inverted plastic cup with large triangles cut out of the sides, to provide a lid to prevent rainfall from flooding the cup. After 72 hours, the material in the cups was collected and returned to the lab. The material was then washed with and stored in 70% ethanol.

All ants were then separated from the other invertebrates, point-mounted and identified to species or morphospecies. Once a reference collection of point-mounted specimens was created, all excess ants were stored in 90% ethanol. Ants were identified to species where possible, with certain genera being sent to specialists for confirmation of species identification (see Appendix for complete list). For species where a taxonomist or taxonomic key were unavailable, a unique species number was assigned. Both wet and dry specimens are housed in the Peradeniya University Entomology Museum, Peradeniya Sri Lanka, with a representative dry collection being stored in the Curtin University of Technology Entomology Museum, Perth, Western Australia.

Ant species data from all four forest types (LF, UF, FDP and PF) were tabulated and converted to presence/absence data. This is a standard conversion for ant data analyses as ants are social insects and tend to be clumped spatially, causing the data to appear aggregated when sampling occurs near colonies (Longino 2000). Due to differences in sampling effort, the species richness of only the three forest interior sites was compared. Species richness of the 15 plots in each forest type were tested for equality of variance using Levene's Test, and a one-way analysis of variance (ANOVA) was utilised to compare the three forest-interior types. The statistical software SPSS 15 was utilised for this analysis. Incidence-based coverage estimator (ICE), first-order jackknife, and bootstrap species-richness estimators were chosen to quantify the species richness present and to assess the collection efficacy. The program EstimateS (Colwell 2000) was utilised to calculate these standard estimators.

RESULTS

From 1840 litter extractions and pitfall traps, 173 species and morphospecies were identified in 54 genera and 11 subfamilies. The breakdown according to subfamily and genera is shown in Table 1. Morphospecies are referred to as species in the following text. Very similar species richnesses were obtained in all four forest types. The one-way ANOVA showed that the differences in number of species present between the three interior forest types were not significant ($F_{1, 2}$ = 1.432; P = 0.250) (see Table 2 for raw data). The highest number of species was collected in PF but was only two species higher than that in FDP and three more than in LF. In all forest types, Myrmicinae was the most common subfamily, with *Pheidole* (19 species) and *Tetramorium* (18 species) being the most speciose genera. Similar numbers of species of these two genera were collected in all four forest types. *Cerapachys* was the third most common genus (12 species) but was restricted to the interior forest sites (LF, UF and FDP). Many of the genera contained only one species and Table 3 shows that over one quarter (45 species) were caught at only one site. Periphery forest had the highest number of species that were unique to that particular forest type (26 species), whereas the FDP, LF and UF had only 16, 14 and 9 unique species respectively. Species richness estimates for all sites together show that about 20 to 40 more species could be caught at these sites using these two methods (Table 3).

DISCUSSION

This study represents the first comprehensive collection of ground dwelling ants in the SFR, one of the last few relatively undisturbed forest remnants in a biologically diverse zone of Sri Lanka. It demonstrates that the diversity of ants in this forest is more comparable to species richnesses in Southeast Asian dipterocarp forest than the mixed forests of the Western Ghats (Basu 1997; Gadagkar *et al.* 2000; Brühl 2001). Current collections in Sri Lanka list 12 subfamilies for the island (Dias 2006); all except Dorylinae were collected in the SFR.

Table 1. Total number of ant species in each genus for each forest type: logged forest (LF); unlogged forest (UF); forest dynamics plot (FDP); and periphery forest (PF).

Subfamily	Genus	LF	UF	FDP	PF	Total
Aneuretinae	*Aneuretus* Emery	1	1	1	1	1
Amblyoponinae	*Amblyopone* Erichson	1	0	0	1	1
Aenictinae	*Aenictus* Shuckard	1	2	2	1	2
Cerapachyinae	*Cerapachys* Smith	7	7	6	0	12
Dolichoderinae	*Bothriomyrmex* Emery	0	0	0	1	1
	Dolichoderus Lund	2	0	1	1	2
	Tapinoma Förster	2	1	1	4	5
	Technomyrmex Mayr	2	2	2	2	2
Ectatomminae	*Gnamptogenys* Roger	0	1	1	0	2
Formicinae	*Acropyga* Roger	1	0	1	1	2
	Anoplolepis Santschi	0	0	0	1	1
	Camponotus Mayr	4	4	4	5	7
	Forelophilus Kutter	1	0	0	0	1
	Lepisiota Santschi	0	1	0	1	1
	Myrmoteras Forel	0	1	1	0	1
	Oecophylla Smith	0	0	0	1	1
	Paratrechina Motschulsky	4	2	3	6	6
	Plagiolepis Mayr	0	0	0	1	1
	Polyrhachis Smith	2	2	1	0	3
	Pseudolasius Emery	0	1	1	0	1
Leptanillinae	*Protanilla* Taylor	1	1	1	0	2
Myrmicinae	*Acanthomyrmex* Emery	1	0	0	1	1
	Cardiocondyla Emery	1	0	0	2	2
	Carebara Westwood	2	1	1	1	2
	Cataulacus Smith	1	1	0	0	1
	Crematogaster Lund	3	3	4	5	9
	Meranoplus Smith	1	0	0	1	2
	Monomorium Mayr	2	2	4	4	5
	Myrmecina Curtis	0	1	0	0	1
	Myrmicaria Saunders	1	2	2	1	2
	Pheidole Westwood	18	16	15	15	19
	Pheidologeton Mayr	1	2	2	2	2
	Pristomyrmex Mayr	1	1	1	1	1
	Pyramica Roger	1	0	3	3	6
	Recurvidris Bolton	1	1	1	1	1
	Rhopalomastix Forel	1	0	1	1	1
	Rhopalothrix Mayr	0	0	1	0	1
	Rogeria Emery	1	0	0	0	1
	Solenopsis Westwood	1	2	1	2	2
	Strumigenys Smith	4	3	3	4	5
	Tetramorium Mayr	15	12	13	15	18
	Tyrannomyrmex Fernandez	0	0	1	0	1
	Vollenhovia Mayr	2	2	3	3	5
Ponerinae	*Anochetus* Mayr	3	2	3	3	4
	Cryptopone Emery	1	1	1	1	1
	Discothyrea Roger	0	1	1	0	1
	Harpegnathos Jerdon	0	1	1	0	1
	Hypoponera Santschi	3	4	3	3	5
	Leptogenys Roger	1	4	5	3	8
	Myopias Roger	1	0	0	0	1
	Odontomachus Latreille	0	0	0	1	1
	Pachycondyla Smith	3	3	4	3	5
	Ponera Latreille	1	1	1	1	1
Pseudomyrmicinae	*Tetraponera* Smith	1	0	1	0	2
Total 11	**54**	**101**	**92**	**102**	**104**	**173**

Table 2. Species richness in each of the 15 sites sampled in the three forest interior sites: logged forest (LF); unlogged forest (UF); and the forest dynamics plot (FDP).

Site no.	LF	UF	FDP
1	29	39	32
2	30	35	29
3	23	37	28
4	30	30	29
5	32	23	39
6	34	19	31
7	30	27	32
8	31	23	29
9	42	29	31
10	25	28	31
11	34	33	37
12	29	35	36
13	34	29	28
14	34	23	30
15	32	22	29

Table 3. The total number of species collected from 65 sites, together with the number of species that were restricted to one site (singletons) or only two sites (doubletons). The table also shows the species richness as estimated by three different estimators: incidence-based coverage estimator (ICE); first-order jackknife; and bootstrap.

Forest	Species	Singletons	Doubletons	ICE	Jackknife 1	Bootstrap
Combined	173	44	22	212	214	190
Interior	146	42	22	193	187	165
Periphery	99	26	23	120	123	111

Results show that there were similar species richnesses in each of the three interior forest sites. The lower species richness recorded in the unlogged forest could be a result of comparatively low habitat heterogeneity. The logged forest and the forest dynamics plot supported a more heterogeneous habitat for the ants, the former having had disturbance and hence regrowth forest, and the latter having a riparian edge. Ribas *et al.* (2003), Richardson *et al.* (2005) and Ribas & Schoereder (2007) have found that habitat heterogeneity is an important factor in determining ant species distribution.

A number of species (not included in the analyses) were caught opportunisitically along roads and in disturbed areas outside the forest (see Appendix). A few of these species, such as *Odontomachus* sp. (nr *haematodes*) and *Meranoplus bicolor*, were collected within the periphery forest, suggesting that the periphery may be affected by the surrounding agricultural land uses. The difference between the interior forest types and the periphery forest in terms of “unique” species also implies a potential mixing of interior-forest and disturbed-area ants.

As the sampling effort within the interior forest and the periphery forest sites was different, statistical analysis of the richness unfortunately cannot be carried out. Each of the interior forests had 40 more Winkler extractions and 40 more pitfall traps laid out than the periphery forest, and sampling was carried out over more than one season. There is a possibility that more ants would have been caught in the periphery if further sampling across seasons was carried out. Future analyses, however, will be carried out to look at the species assemblages within each of the interior forest types. These results, which will be published elsewhere, will provide greater insight into the patterns of distribution of the ant species within the SFR.

Overall, if hand-collected species are included in the species list, then close to 200 species were present in and around the SFR.

Future studies should incorporate shrub-level and canopy collection methods for a fuller picture of the species richness of this diverse forest. The wet zone of Sri Lanka harbours the highest animal and plant diversity for the whole island (Erdelen 1996); one third of the plant species (845 species) is confined to this zone (Ashton & Gunatilleke 1987). Dias (2002a) lists 246 Sri Lankan ant species curated in the Kelaniya University and Colombo Museum collections. The fact that 173 species were found in the SFR alone in the soil stratum demonstrates the high ant diversity of the SFR and the potentially high ant diversity of the entire island. Identification of the morphospecies is currently being carried out to enable comparisons with species assemblages found in Southeast Asia, India and Africa and to contribute to the growing list of ant species found in Sri Lanka.

ACKNOWLEDGEMENTS

The authors are very grateful to the Sri Lankan Forest Department for permitting access to the SFR (Permit no. FRC/8) and to the Sri Lankan Wildlife Deparment for allowing the collection of specimens from the reserve (Permit no. WL/3/2/1/7); to the Professors Gunatilleke for their expertise and long experience of working in the SFR; and to the Centre for Tropical Forest Science – Arnold Arboretum (CTFS-AA) Asia Program for allowing collection in the forest dynamics plot. We would like to thank Drs Gary Alpert, Marek Borowiec, Katsuyuki Eguchi, Brian Fisher, Brian Heterick, Shingo Hosoishi, Kazuo Ogata, Seiki Yamane, and Thresiamma Varghese for their generosity in accepting the ant specimens for identification. Funding for this research was supplied in part by Curtin University Endeavour International Postgraduate Research Scholarship, the International Foundation for Science Grant No.D/3929-1 and to the T.L. Higginson, Jr. Fund managed under the auspices of the CTFS-AA Asia Program.

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Received: 5 October 2007; accepted: 28 September 2008

Appendix. Table of ant species collected in western Sinharaja Forest Reserve, Sri Lanka showing their occurrence (*) in the different collection areas: Logged forest (LF); Unlogged forest (UF); forest dynamics plot (FDP); periphery forest (PF); disturbed areas (D); and hand-collected species (H). Species were determined by taxonomist (far right column) or by authors using available keys. Species marked with ● in the code column were not included in analyses

Subfamily	Genus	Species	Code	LF	UF	FDP	PF	D	H	Keys used	Det. by
Aenictinae	*Aenictus*	*binghami* Forel	SL014	*	*	*	*		*	Bingham 1903	N. Gunawardene
	Aenictus	sp. nr *punensis* Forel	SL124		*	*			*	Bingham 1903	N. Gunawardene
Amblyoponinae	*Amblyopone*	sp. nr *amblyops* Karavaeiev	SL128	*			*			Xu 2001	N. Gunawardene
	Myopopone	Head only maybe *M. castanea* Smith	● head only						*	Bingham 1903	N. Gunawardene
Aneuretinae	*Aneuretus*	*simoni* Emery	SL008	*	*	*	*			Bingham 1903	N. Gunawardene
Cerapachyinae	*Cerapachys*	sp. *dohertyi-cribrinodis* gp. sensu Brown 1975	SL011	*							M. Borowiec
	Cerapachys	sp.	SL026	*	*	*					
	Cerapachys	sp.	SL074	*	*						
	Cerapachys	sp.	SL101	*	*	*					
	Cerapachys	sp.	SL104	*		*					
	Cerapachys	sp.	SL106	*	*	*					
	Cerapachys	sp.	SL111		*						
	Cerapachys	*fragosus* (Roger)	SL130	*							M. Borowiec
	Cerapachys	sp.	SL144		*						
	Cerapachys	sp.	SL152		*						
	Cerapachys	sp.	SL165			*					
	Cerapachys	*typhlus* (Roger)	SL173			*					M. Borowiec
	Cerapachys	sp.	● SL217						*		
	Cerapachys	sp.	● SL215						*		
	Cerapachys	sp.	● SL216						*		
Dolichoderinae	*Bothriomyrmex*	*wroughtoni* Forel	SL158				*			Bingham 1903	N. Gunawardene
	Dolichoderus	sp.	SL075	*							
	Dolichoderus	sp.	SL089	*		*	*	*			
	Tapinoma	sp.	SL056	*	*		*				
	Tapinoma	sp.	SL131	*			*	*			
	Tapinoma	sp.	SL147			*					
	Tapinoma	sp.	SL156				*				
	Tapinoma	sp.	SL157				*				
	Technomyrmex	*albipes* (Fr. Smith)	SL004	*	*	*	*			Bingham 1903	N. Gunawardene
	Technomyrmex	*bicolor* Emery	SL007	*	*	*	*			Bingham 1903	N. Gunawardene
Ectatomminae	*Gnamptogenys*	*laevior* gp. sp.nr *delta* Lattke or *lacunosa* Lattke	SL110		*					Lattke 2004	N. Gunawardene
	Gnamptogenys	*coxalis* gp sp. nr *binghami* Forel	SL171			*				Lattke 2004	N. Gunawardene

Subfamily	Genus	Species	Code	L	U	FDP	E	D	H	Keys used	Det. by
Formicinae	*Acropyga*	sp.	SL093	*		*					
	Acropyga	*acutiventris* Roger	SL203				*			Bingham 1903	N. Gunawardene
	Anoplolepis	*gracilipes* (Smith)	SL194				*			Bingham 1903	N. Gunawardene
	Camponotus	sp.	SL034	*	*		*				
	Camponotus	sp.	SL060	*	*	*	*				
	Camponotus	sp.	SL083	*	*	*	*		*		
	Camponotus	sp.	SL138	*	*		*				
	Camponotus	sp.	SL169			*					
	Camponotus	sp.	SL172			*					
	Camponotus	sp.	SL179				*				
	Camponotus	sp.	SL187				*	*			
	Camponotus	sp.	● SL213						*		
	Camponotus	sp.	● SL212						*		
	Forelophilus	sp.	SL092	*							
	Lepisiota	*(Acantholepis)* sp. nr *capensis* (Mayr)	SL126		*		*			Bingham 1903	N. Gunawardene
	Lepisiota	sp.	SL189				*	*			
	Myrmoteras	*binghami* Forel	SL039		*	*				Bingham 1903	N. Gunawardene
	Oecophylla	*smaragdina* (Fabricius)	SL178				*			Bingham 1903	N. Gunawardene
	Paratrechina	sp.	SL001	*	*	*	*				
	Paratrechina	sp.	SL036	*	*	*	*				
	Paratrechina	*bourbonica* (Forel)	SL088	*			*	*			S. Shattuck
	Paratrechina	*minutula* (Forel) gp.	SL105	*		*	*				S. Shattuck
	Paratrechina	*minutula* (Forel) gp.	SL181				*				S. Shattuck
	Paratrechina	sp.	SL183				*				
	Plagiolepis	sp. nr *alluaudi* Wetterer	SL198				*				N. Gunawardene
	Polyrhachis	*(Myrmhopla) hippomanes ceylonensis* Emery	SL068		*						R. Kohout
	Polyrhachis	*(Hemioptica) bugnioni* Forel	SL069	*	*	*					R. Kohout
	Polyrhachis	*(Myrma) illaudata*	SL085	*							R. Kohout
	Polyrhachis	*(Myrma) convexa* Roger	SL192				*	*			R. Kohout
	Polyrhachis	*(Myrmhopla)* sp. (nr *hippomanes ceylonensis* Emery)	SL195				*	*			R. Kohout
	Polyrhachis	*(Myrma) aculeata gibbosa* Forel	SL204						*		R. Kohout
	Polyrhachis	*(Myrma) yerburyi* Forel	SL205						*		R. Kohout
	Polyrhachis	*(Myrmothrinax) thrinax* Roger	SL206						*		R. Kohout
	Polyrhachis	*(Cyrtomyrma) rastellata* (Latreille)	SL208						*		R. Kohout
	Polyrhachis	*(Myrmhopla) aedipus* Forel	SL209						*		R. Kohout
	Pseudolasius	*familiaris* (Smith)	SL140		*	*				Bingham 1903	N. Gunawardene
Leptallininae	*Protanilla*	sp.	SL080						*		
	Protanilla	sp.	SL108	*							
	Protanilla	sp.	SL129		*	*					

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Myrmicinae	*Acanthomyrmex*	*luciolae* Emery		*			*			Moffett 1986	N. Gunawardene
	Cardiocondyla	*nuda* Mayr		*	*		*	*		Bingham 1903	N. Gunawardene
	Cardiocondyla	*wroughtoni* Forel					*			Bingham 1903	N. Gunawardene
	Carebara	subgenus *Oligomyrmex*		*	*	*	*				N. Gunawardene
	Carebara	subgenus *Oligomyrmex*		*							N. Gunawardene
	Cataulacus	*latus* Forel	SL024	*	*					1974	N. Gunawardene
	Cataulacus	*simoni* Emery	SL120							1974	N. Gunawardene
	Crematogaster	sp.	SL022	*		*	*				*Crematogaster*
	Crematogaster	sp.	SL062	*	*	*					currently
	Crematogaster	sp.	SL119		*	*					being
	Crematogaster	sp.	SL136	*							determined by
	Crematogaster	sp.	SL146				*				S. Hosoishi
	Crematogaster	sp.	SL148			*					
	Crematogaster	sp.	SL174		*		*				
	Crematogaster	sp.	SL182				*				
	Crematogaster	sp.	SL202				*				
	Dilobocondyla	sp.	● SL214						*		
	Meranoplus	*loebli* Schödl	SL018	*						Schödl 1998	N. Gunawardene
	Meranoplus	*bicolor* (Guérin-Méneville)	SL188				*	*		Schödl 1998	N. Gunawardene
	Meranoplus	*rothneyi* Forel	SL196				*			Schödl 1998	N. Gunawardene
	Monomorium	*floricola* gp.	SL023	*	*	*	*				B. Heterick
	Monomorium	*hildebrandti* gp sp. cf. *australicum* Forel	SL025	*	*	*	*				B. Heterick
	Monomorium	*destructor* gp.	SL137	*		*					B. Heterick
	Monomorium	*hildebrandti* gp sp. nr *subcoecum* Emery	SL161				*				B. Heterick
	Monomorium	*floricola* Jerdon	SL170			*	*				B. Heterick
	Myrmecina	*curtisi* Donisthorpe	SL116		*					Tiwari 1994	N. Gunawardene
	Myrmicaria	*brunnea* Saunders	SL032	*	*	*					N. Gunawardene
	Myrmicaria	sp. A ()	SL043		*	*	*				N. Gunawardene
	Pheidole	sp.	SL006	*	*	*	*				*Pheidole*
	Pheidole	sp.	SL019	*	*	*					currently
	Pheidole	sp.	SL027	*	*	*	*				being
	Pheidole	sp.	SL028	*	*	*	*				determined by
	Pheidole	sp.	SL029	*	*						K. Eguchi
	Pheidole	sp.	SL030	*	*	*	*				
	Pheidole	sp.	SL049		*	*	*				
	Pheidole	sp.	SL063	*	*	*	*				
	Pheidole	sp.	SL064		*						
	Pheidole	sp.	SL067	*	*	*	*				
	Pheidole	sp.	SL070	*	*	*	*				
	Pheidole	sp.	SL077	*	*	*	*	*			
	Pheidole	sp.	SL090	*							
	Pheidole	sp.	SL091	*	*	*	*				
	Pheidole	sp.	● SL099						*		
	Pheidole	sp.	SL0Za	*	*	*	*				
	Pheidole	sp.	SL0Zb	*	*	*	*				
	Pheidole	sp.	SL0Zc	*	*	*	*				
	Pheidole	sp.	SL107	*			*				

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Myrmicinae cont'd	*Pheidole*	sp.	SL142	*		*	*				
	Pheidole	sp.	SL185				*	*			
	Pheidole	sp.	SL190				*	*			
	Pheidologeton	sp.	SL013	*	*	*	*				
	Pheidologeton	sp.	SL141		*	*	*				
	Pristomyrmex	sp. nr *profundus* Wang	SL017	*	*	*	*			Wang 2003	N. Gunawardene
	Pyramica	sp.	SL143	*							*Pyramica*
	Pyramica	sp.	SL159			*	*				currently
	Rogeria	sp.	SL057	*							
	Solenopsis	sp.	SL038	*	*	*	*				
	Solenopsis	sp.	SL113		*		*				
	Strumigenys	sp. sl-01	SL003	*	*	*	*				B. Fisher
	Strumigenys	sp. sl-02	SL044	*	*	*	*				B. Fisher
	Strumigenys	sp.	SL098	*	*	*					
	Strumigenys	sp.	SL109	*			*				
	Strumigenys	sp.	SL180				*				
	Tetramorium	sp.	SL002	*	*	*	*				*Tetramorium*
	Tetramorium	sp.	SL015	*	*		*				currently
	Tetramorium	sp.	SL020	*	*		*				being
	Tetramorium	sp.	SL054	*	*	*	*				determined by
	Tetramorium	sp.	SL055	*	*	*	*				S. Yamane
	Tetramorium	sp.	SL058	*	*	*	*				
	Tetramorium	sp.	SL059	*			*				
	Tetramorium	sp.	SL05A	*	*	*	*				
	Tetramorium	sp.	SL05B	*	*	*					
	Tetramorium	sp.	SL082	*	*	*	*	*			
	Tetramorium	sp.	SL117	*	*	*					
	Tetramorium	sp.	SL118		*	*	*				
	Tetramorium	sp.	SL123	*	*	*	*				
	Tetramorium	sp.	SL127	*		*	*				
	Tetramorium	sp.	SL134	*		*	*				
	Tetramorium	sp.	SL135	*							
	Tetramorium	sp.	SL162			*	*				
	Tetramorium	sp.	SL184				*				
	Tetramorium	sp.	SL191				*	*			
	Tetramorium	sp.	SL197				*	*			
	Tetramorium	sp.	● SL210						*		
	Tetramorium	sp.	● SL211						*		
	Tyrannomyrmex	sp.	SL151			*					G. Alpert
	Vollenhovia	sp.	SL033	*	*	*					
	Vollenhovia	sp.	SL115	*	*	*	*				
	Vollenhovia	sp.	SL149			*					
	Vollenhovia	sp.	SL177				*				
	Vollenhovia	sp.	SL200				*				

Subfamily	Genus	Species	Code	L	U	FDP	E	D	H	Keys used	Det. by
Ponerinae	*Anochetus*	sp. nr *longifossatus* Mayr small	SL035	*			*			Brown 1978	N. Gunawardene
	Anochetus	sp. nr *nietneri* (Roger)	SL037	*	*	*	*			Brown 1978	N. Gunawardene
	Anochetus	sp. nr *longifossatus* Mayr big	SL042	*	*	*	*			Brown 1978	N. Gunawardene
	Anochetus	sp. nr *nietneri* (Roger)	SL168			*				Brown 1978	N. Gunawardene
	Cryptopone	*testacea* Emery	SL010	*	*	*	*			Bingham 1903	N. Gunawardene
	Discothyrea	sp.	SL050		*	*					
	Harpegnathos	*saltator* Jerdon	SL071		*	*			*	Bingham 1903	N. Gunawardene
	Hypoponera	sp.	SL016	*	*	*	*				*Hypoponera*
	Hypoponera	sp.	SL051		*		*				currently
	Hypoponera	sp.	SL052		*		*				being
	Hypoponera	sp.	SL066	*		*					determined by
	Hypoponera	sp.	SL114	*	*	*					T. Varghese
	Leptogenys	sp.	SL041		*						
	Leptogenys	sp.	SL065	*	*	*					*Leptogenys*
	Leptogenys	sp.	SL072		*	*					currently being
	Leptogenys	sp.	SL125		*	*	*				determined by
	Leptogenys	sp.	SL155				*				T. Varghese
	Leptogenys	sp.	SL175			*					
	Leptogenys	sp.	SL176			*					
	Leptogenys	sp.	SL199				*				
	Myopias	*amblyops* Roger	SL132	*						Bingham 1903	N. Gunawardene
	Odontomachus	sp. nr *haematodes* Linnaeus	SL153				*	*		Bingham 1903	N. Gunawardene
	Pachycondyla	*(Bothroponera) rufipes* Jerdon	SL046	*	*	*				Bingham 1903	N. Gunawardene
	Pachycondyla	*(Mesoponera) melanaria* Emery	SL053	*	*	*	*			Bingham 1903	N. Gunawardene
	Pachycondyla	*(Bothroponera) sulcata* Frauenfeld	SL096			*	*			Bingham 1903	N. Gunawardene
	Pachycondyla	*(Ponera) truncata* Smith	SL100	*	*	*				Bingham 1903	N. Gunawardene
	Pachycondyla	*(Brachyponera) jerdoni* Forel	SL154				*			Bingham 1903	N. Gunawardene
	Ponera	sp.	SL048	*	*	*	*				
Pseudomyrmecinae	*Tetraponera*	*difficilis* (Emery)	SL121	*						Ward 2001	N. Gunawardene
	Tetraponera	*attenuata* F. Smith	SL166			*				Ward 2001	N. Gunawardene