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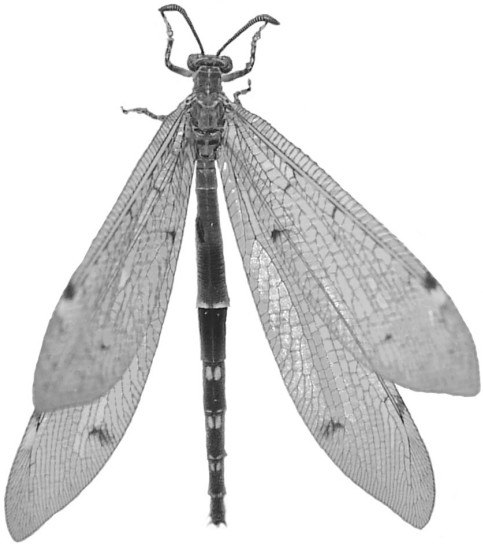

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Dynamics of *Aneuretus simoni* Emery, 1893 (Formicidae: Aneuretinae) nest density and the first ant inventory of Indikada Mukalana Forest Reserve in western Sri Lanka

Динамика плотности гнезд *Aneuretus simoni* Emery, 1893 (Formicidae: Aneuretinae) и первая инвентаризация фауны муравьев заповедника Индикада Мукалана в западной части Шри-Ланки

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Key words: Formicidae, Aneuretinae, Indikada Mukalana Forest Reserve, Sri Lankan relict ant, ant inventory.
Ключевые слова: Formicidae, Aneuretinae, лесной заповедник Индикада Мукалана, реликтовый муравей Шри-Ланки, инвентаризация фауны муравьев.

Abstract. Island-endemic *Aneuretus simoni* Emery, 1893 was discovered in a selected region of Indikada Mukalana Forest Reserve in 2015 and the survey conducted by quadrat method and pitfall trapping at two elevations was extended to February, May and July in 2016 to investigate the dynamics of its nest attributes and worker occurrence in dry and rainy months. In addition, soil sifting alone was also conducted at the same region in December, 2017. Selected environmental parameters were recorded to characterize the habitat of the species. The first, updated inventory of ant community in the region was prepared. Considerable mean nest density of *A. simoni*, 0.06, 0.24 and 0.08 m^{-2}, with the rank of 4, 3 and 4 on three occasions and mean frequency of worker occurrence 15.8%, in the pitfall traps showed that it was locally-dominant at the Locality B of 291 m elevation. Significant differences were evident ($p < 0.05$) among the mean nest density of the species observed on the four occasions and a significantly higher value was observed in rainy months ($p < 0.05$) than that in the dry months. Twenty species in 18 genera of 5 subfamilies, Aneuretinae, Dolichoderinae, Formicinae, Myrmicinae and Ponerinae recorded in December, 2015 rose to 45 species, 27 genera in 7 subfamilies, with the addition of Dorylinae and Pseudomyrmecinae. The pooled list of ants can be considered an updated, first inventory of the selected region and the mean values at the habitat of *A. simoni*, 21.7 ± 1.9 °C and 24.7 ± 0.6 °C of soil and air temperature, 5.7 ± 0.77 cm of litter depth, 48.8 ± 22% of soil moisture and 18.8 ± 5.8% of soil organic matter were recorded as the favourable levels of environmental parameters.

Резюме. Эндемик Шри-Ланки *Aneuretus simoni* Emery, 1893 был обнаружен в лесном заповеднике Индикада Мукалана в 2015 году. В феврале, мае и июле 2016 года методом квадратов и с помощью ловушек на двух участках заповедника изучена динамика плотности гнезд и присутствие рабочих особей в сухие и дождливые месяцы. В декабре 2017 года проведено просеивание почвы в том же районе. Высокая средняя плотность гнезд *A. simoni* с показателями 0.06 в феврале, 0.24 в мае и 0.08 m^{-2} в июле (4, 3 и 4 места среди других видов по месяцам соответственно) и средняя частота появления рабочих в ловушках 15.8% свидетельствуют о том, что вид локально доминирует на одном из исследованных участков (291 м н.у.м). Обнаружены значительные различия ($p < 0,05$) в средней плотности гнезд видов, наблюдавшихся в четырех случаях, и зарегистрирована гораздо более высокая плотность ($p < 0,05$) в дождливые месяцы.

Измерены отдельные параметры окружающей среды для характеристики местообитания *A. simoni*. Следующие параметры среды являются благоприятными для вида: температура почвы 21.7 ± 1.9 °C и воздуха 24.7 ± 0.6 °C, глубина подстилки 5.7 ± 0.77 см, влажность почвы 48.8 ± 22% и содержание органического вещества в почве 18.8 ± 5.8%.

Проведена первая инвентаризация фауны муравьев заповедника. В декабре 2015 года было зарегистрировано 20 видов из 18 родов 5 подсемейств, Aneuretinae, Dolichoderinae, Formicinae, Myrmicinae и Ponerinae, по результатам нашего исследования их количество выросло до 45 видов из 27 родов из 7 подсемейств, с добавлением Dorylinae и Pseudomyrmecinae.

Introduction

The Sri Lankan relict ant, *Aneuretus simoni* Emery, 1893 (Fig. 1) of the subfamily Aneuretinae, is an island-endemic [Wilson et al., 1956; Jayasuriya, Traniello, 1985; Bolton, 1994; Dias, 2014], endangered [Dias et al., 2012]

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Fig. 1. Lateral view of *Aneuretus simoni* worker [from https://www.antweb.org/bigPicture.do?name=casent0102369&number=1&shot=p].
Рис. 1. *Aneuretus simoni*, рабочий, вид сбоку [по https://www.antweb.org/bigPicture.do?name=casent0102369&number=1&shot=p].

species. It has a characteristic long peduncle followed by a posterior petiolar node consisting of dorsal and lateral swellings [Bolton, 1994]. Presence of workers or nests of the species earlier and its mean nest density and nest occurrence in the quadrats laid at five forests were reported recently from the wet and intermediate zones of Sri Lanka [Dias et al., 2013; Dias, Ruchirani, 2014; Dias, Udayakantha, 2016a] and are summarized in Table 1.

Indikada Mukalana Forest Reserve, a 572 ha, wet evergreen mixed dipterocarp rainforest, is the second largest forest in Colombo District of the Western Province in Sri Lanka. The forest receives a mean annual rainfall of 3000–3500 mm from the southwest (April – July) and northeast monsoons (October – December), and inter-monsoonal rains [Ediriweera et al., 2011] while mean air temperature ranges from 26–26.5 °C [Ediriweera et al., 2011; Dias, Udayakantha, 2016b]. Clearing of parts of IMFR in 1960's made it a secondary rainforest but highly diverse and endemic vertebrate fauna and butterflies [Chamikara, 2011] and dragonflies [Sumanapala et al., 2016] inhabit the forest. Dias and Udayakantha [2016b] reported that Indikada Mukalana Forest Reserve was a habitat of *Aneuretus simoni* while reporting a mean nest density of 0.18 m^{-2} and the nest occurrence in 9.7% quadrats at a locality of 291 m elevation in December, 2015. The survey on ants conducted in December, 2015 [Dias, Udayakantha, 2016b] was repeated using the quadrat method for calculation of nest density and the pitfall trapping for the calculation of worker occurrence in February, May and July in 2016 to determine the dynamics of nest density, percentage nest occurrence and percentage worker occurrence on rainy and dry occasions and to prepare the first updated ant inventory of the selected region of the forest.

Table 1. Climatic zones and the district of previously recorded habitats of *Aneuretus simoni* and its mean nest density and nest occurrence mentioned in the references.
Таблица 1. Климатические зоны, районы расположения ранее зарегистрированных местообитаний *Aneuretus simoni*, средняя плотность и частота регистрации гнезд в квадратах по литературным данным.

Climatic zone and district Климатическая зона и район	Forest or Forest Reserve / Лес или лесной заповедник	Nest density (nests m^{-2}) / Плотность гнезд	Occurrence in quadrats / Встречаемость гнезд в исследованных квадратах	Reference Литературный источник
Wet zone, Ratnapura Влажная зона, Ратнапура	Adam's peak Forest Reserve	–	–	Wilson et al., 1956
Wet zone / Влажная зона	"Udawatta Kele"	–	–	Wilson et al., 1956
Wet zone / Влажная зона	"Pompekelle"	–	–	Wilson et al., 1956; Dias, 2014
Wet zone / Влажная зона	Gilimale Forest Reserve	–		Wilson et al., 1956; Jayasuriya, Traniello, 1985; Dias, Perera, 2011
Wet zone / Влажная зона	Mulawella region of Sinharaja Forest Reserve	–	–	Perera et al., 2006; Gunawardene et al., 2008
Wet zone / Влажная зона	Kirikanda forest	0.10, 0.15	3/80	Dias et al., 2013
Intermediate zone, Kandy Промежуточная зона, Канди	Morella Forest	–	–	Karunarathna, Karunaratne, 2013
Intermediate zone, Matale / Промежуточная зона, Матале	Rambukoluwa Forest	–	–	Karunarathna, Karunaratne, 2013
Wet zone, Kalutara Влажная зона, Калутара	Kalugala Proposed Forest Reserve	0.3	7.5%	Dias, Ruchirani, 2014
Wet zone, Galle Влажная зона, Галле	Kuluna Kanda Proposed Forest Reserve	0.93	23.3%	Dias, Ruchirani, 2014
Wet zone, Matara Влажная зона, Матара	Wilpita "Aranya Kele"	0.27	6.7%	Dias, Ruchirani, 2014
Wet zone, Gampaha Влажная зона, Гампаха	Meethirigala Forest Reserve	0.2–0.8	4/40, 8/40	Dias, Udayakantha, 2016a

Material and methods

Description of localities and ant sampling. Two, 100 m^2 (10 × 10 m) plots at each Locality A in lower elevation (06°87′49.97″N / 80°16′36.90″E and 06°87′49.97″N / 80°16′36.90″E), 159 m, and Locality B in upper elevation (06°87′27.47″N /80°16′09.49″E and 06°87′21.88″N / 80°16′09.06″E), 291 m, in Indikada Mukalana Forest Reserve that were approximately of 150 m apart were surveyed by quadrat sampling and pitfall trapping on three additional occasions, from 15–17 February, 4–6 May and 22–24 July in 2016. Soil sifting for cryptic ants was conducted once from 10–12 December, 2017. Locality A consisted of moist, clay mixed sandy floor and a taller canopy formed by trees such as Dipterocarpus zeylanicus Thwaites, Artocarpus nobilis Thwaites, Gyrinops walla Gaertn. and Pericopsis mooniana Thwaites which shaded the area. Lower canopy was also present while the forest floor was covered with a leaf litter layer. Locality B had moist clay soil covered with a thin layer of leaf litter and small to large pieces of decaying wood on the ground [Dias, Udayakantha, 2016b].

Estimation of nest density, frequency of nest occurrence and species richness using quadrat method. Twenty, 1 × 1 m quadrats were laid, at least 0.5 m apart, covering each of the two 100 m^2 plots marked at each locality. Within each quadrat, nests of the ant species were observed by careful checking, breaking decaying pieces of wood, removing leaf litter and examining the soil. Three worker ants from each nest were preserved in the glass bottles (7 ml) filled with 80% ethanol with appropriate labels. Collected ants were identified using a Low Power Stereo-microscope with reference to Bingham [1903], Bolton [1994, 2003], Eguchi [2001], Dias et al. [2012], Dias [2014], Hita Garcia and Fisher [2014], Schmidt and Shattuck [2014], Sarnat et al. [2015], and AntWeb [http://www.antweb.org]. Species richness and the diversity of ant community were recorded. Also, mean nest density (MND, number of nests of the species per locality / sum of the quadrat areas at the locality, 40 m^2) and frequency of nest occurrence (FNO, number of quadrats with nests of the focal species / total number of quadrats laid) of each species were calculated. Nest density values of *Aneuretus simoni* recorded at the first occasion (0.18 m^{-2} [Dias, Udayakantha, 2016b]) was pooled with current nest density values (0.06, 0.24 and 0.08 m^{-2}), where necessary, for the statistical analysis of data. One Way Analysis of Variance followed by Tukey's test (Minitab 14.0) was conducted to test significant differences among mean nest density values of *A. simoni* observed on the four occasions. Student t-test was conducted to test any significant difference between the mean nest density of the species during rainy and dry periods.

Calculation of worker occurrence by pitfall trapping. One hundred honey-baited pitfall traps (diameter = 7.5 cm, volume = 80 ml) were set at 4 m distance along each of the four, 100 m transects laid at each elevation outside of each 100 m^2 plot marked for the quadrat method. All pitfall traps were collected after 6 hours and collected ants were preserved and identified to the furthest possible taxonomic levels as described previously. Frequency of worker occurrence (FWO, number of pitfall traps with the focal species / total number of pitfall traps (= 100)) of each ant species was calculated. Species of ants recorded on the first occasion [Dias, Udayakantha, 2016b] were added to the current findings to prepare the updated inventory of ants.

Soil sifting for cryptic ants. One hundred soil samples, each of 10 × 10 × 10 cm, collected at 1 m distance along each 100 m transect laid at each of the elevations were sifted using a sieve and a white tray. Ants fallen to the white tray were preserved in 70% ethanol and identified as mentioned earlier to the furthest possible taxonomic levels.

Measurement of selected environmental factors. Each parameter was measured at three representative places at each locality and mean values were calculated. Air and soil temperature were measured using a mercury thermometer. The depth of leaf litter was measured using a ruler. Three soil samples from each plot were collected into polythene bags; a known weight of soil from each sample was dried in an oven at 105 °C until a steady dry weight was observed and the soil moisture content was calculated according to Brower et al. [1998]. Oven dried soil samples were kept in a muffle furnace at 450 °C for 24 hours and soil organic matter content in each sample was calculated according to Sutherland [2006]. Mean monthly rainfall for the region was obtained from Meteorological Department in Colombo. Recorded values of environmental parameters in Dias and Udayakantha (2016b) were also used in the statistical analysis of the data. Any significant difference among the values of each environmental parameter recorded on the four occasions was analyzed using One Way ANOVA followed by Tukey's test in Minitab 14.0.

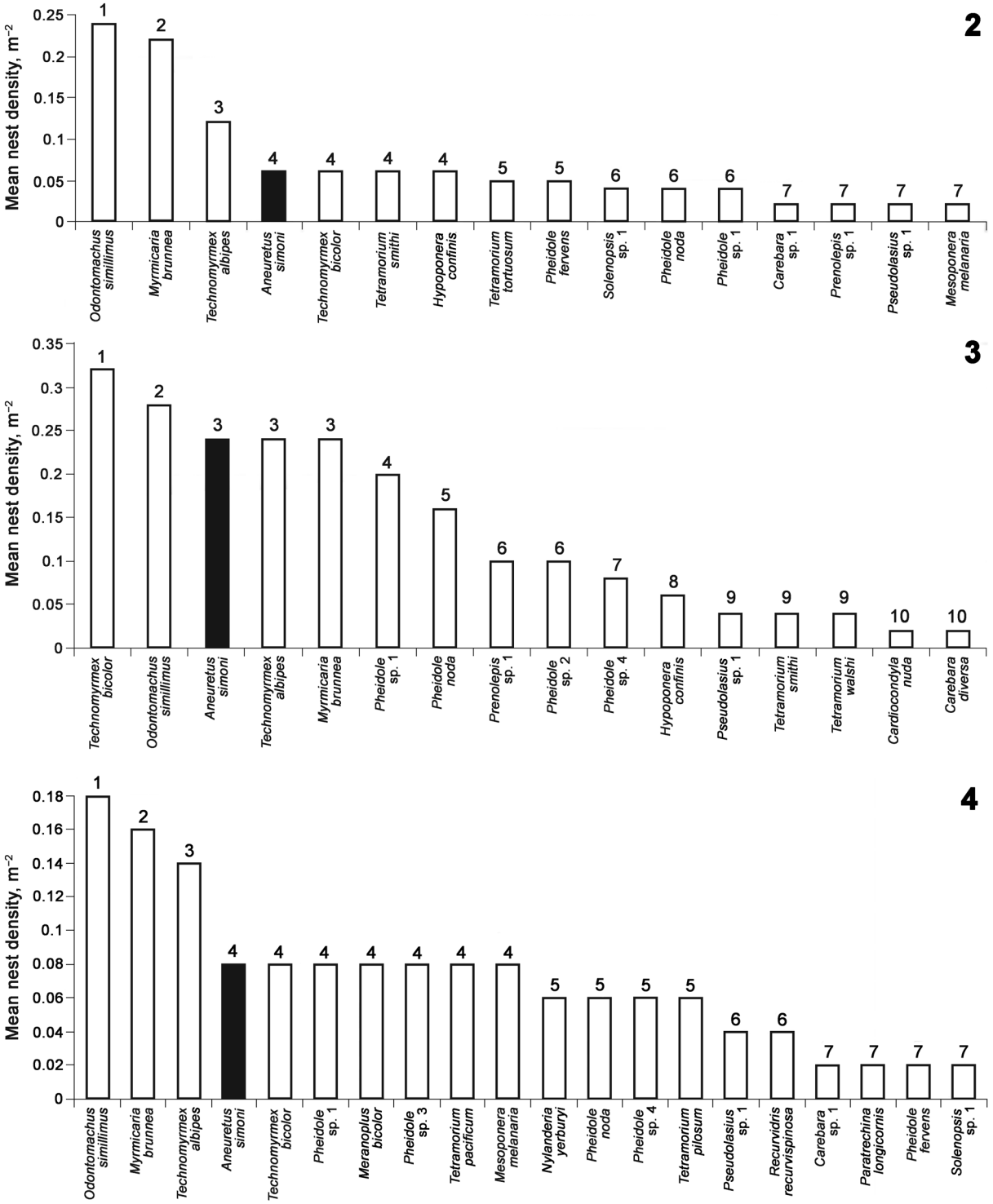
Association between the nest density of *A. simoni* (and log nest density) recorded on the four occasions and the values (and log values) of soil temperature, soil moisture content, soil organic matter content and monthly rainfall was analyzed using the Pearson's correlation analysis.

Results

Mean nest density and frequency of nest occurrence. Table 2 shows that mean nest density of each ant species fluctuated during the study period. Nests of *A. simoni* were detected only at the Locality B. Mean nest density of the species was 0.06 m^{-2}, 0.24 m^{-2} and 0.08 m^{-2} at the Locality B in February, May and July, respectively and was significantly higher ($p < 0.05$) in May. Ranked mean nest density of ant taxa observed at the Locality B (Figs 2–4) in February, May and July showed that *A. simoni* had the 4th, 3rd and 4th ranks on each occasion, respectively. Mean nest density of several other species also had the 4th rank in February and July whereas that of *Myrmicaria brunnea* had the 3rd rank in May. MND of *Aneuretus simoni* on rainy occasions (0.21 ± 0.05 in December, 2015 and May, 2016) was significantly higher ($p < 0.05$) than that observed on the dry occasions (0.07 ± 0.03 in February and July, 2016). MND of *A. simoni* was significantly lower ($p < 0.05$) than that of *Odontomachus simillimus*, *Technomyrmex albipes* and *Myrmicaria brunnea* in February and July. In May, MND of *Aneuretus simoni* was significantly lower ($p < 0.05$) than that of *Odontomachus simillimus* and *Technomyrmex bicolor*.

Frequency of nest occurrence of *Aneuretus simoni* were 3, 10 and 5 within 40 quadrats laid at the Locality B in February, May and July, respectively and a considerable mean percentage frequency of nest occurrence was observed for the species at the locality (Table 2).

FWO (%) in the pitfall traps. Only at the Locality B, *A. simoni* workers were found in the pitfall traps fixed on each occasion. FWO values of *A. simoni* observed in February (7%), May (6%) and July (9%) were lower than those of *Odontomachus simillimus* and *Pheidole noda*



Figs 2–4. Ranked mean nest density of each ant species observed at Locality B of Indikada Mukalana Forest Reserve in 2016. Numbers above the columns indicate the rank of nest density of each ant species.

1 – February; 2 – May; 3 – July.

Рис. 2–4. Средняя плотность гнезд каждого вида муравьев на участке Б в заповеднике Индикада Мукалана в 2016 году. Число над столбцом указывает место вида по плотности гнезд среди других видов.

1 – февраль; 2 – май; 3 – июль.

observed on each occasion. Also, FWO of *Aneuretus simoni* was lower than that of *Technomyrmex bicolor* and *Pheidole* sp. 2 in February, *Technomyrmex albipes* and *Myrmicaria brunnea* in May and *Technomyrmex bicolor* in July (Table 2).

Ant taxa recorded by soil sifting. Soil sifting alone resulted total of 31 species (Table 2) and added 7 species in 6 genera belonging to 3 subfamilies to the list of ant taxa recorded from other two methods. Two cryptic ants, *Ooceraea biroi* and *Strumigenys emmae*, and *Brachyponera jerdonii* were among them.

Species richness and updated inventory of ants. Ant species of the two study sites are summarized in Table 2. Twenty three, 24 and 27 ant species were observed by the quadrat method in February, May and July, respectively from the two localities (Table 2). Overall species richness rose to 33 after pooling the ant community observed by the quadrat method on the three occasions. In the pitfall traps, 23, 27 and 28 species in 17, 21 and 17 genera, respectively of above subfamilies and Pseudomyrmecinae were observed and the overall species richness rose to 37 and 24 genera. Species richness of 38 was recorded by the two methods. *Camponotus* sp. 1 and *Cardiocondyla nuda* were observed by the quadrat method only whereas *Polyrhachis bugnioni*, *Brachyponera* sp. 1 and *Tetraponera allaborans* were observed only in the pitfall traps. Soil sifting alone resulted 31 species, including 3 additional species, in 18 genera and 6 subfamilies. Hence, 45 species in 27 genera of 7 subfamilies are included in the updated ant inventory for the region (Table 2).

Nests of *Aneuretus simoni*. Hollow cavities of decaying fallen twigs, leaf litter, bark of rotting logs, superficial soil layer and decaying stems of Dillenia retusa Thunb., and Artocarpus nobilis Thwaites were identified as the nesting substrates at the Locality B. Very small cavities in the decaying wood pieces and the chambers in surface soil were noticeable while termite species also occupied the same wood piece or nearby soil.

Environmental parameters. Table 3 shows that mild air temperatures existed throughout study period. The lowest soil temperature was recorded in July. The highest soil humidity and mean rainfall ($p < 0.05$) were recorded in May. Significantly lower soil organic matter content ($p < 0.05$) was recorded in December, 2015. Significant association ($p > 0.05$) was not evident between the MND (or log MND) of *Aneuretus simoni* and the values (or log values) of each parameter.

Discussion

The presence of *Aneuretus simoni* nests in the selected region of Indikada Mukalana Forest Reserve reported previously [Dias, Udayakantha, 2016b] was confirmed by the current findings. Locality B of the forest is a habitat of the species because it was recorded with nest density values in both rainy and dry occasions irrespective of the fluctuations in surface run-off in the region. During heavy rainfall, the forest ground was washed away by the fast-flowing water but the ant species including *A. simoni* were able to survive in the region. Dynamics of ant nest density, frequency of nest occurrence and frequency of worker occurrence in the region of Indikada Mukalana Forest Reserve in rainy and dry weather were reported for the first time while recording environmental parameters and provides insight into the survival of ant nests in highly variable environmental conditions. Presence of *A. simoni* nests at a soil moisture content as high as 69% in a forest was reported for the first time in May, 2016. Fluctuations in nest density of many species were observed at the Locality B (Table 2) and only 7 species, *Technomyrmex albipes*, *T. bicolor*, *Pseudolasius* sp. 1, *Myrmicaria brunnea*, *Pheidole noda*, *Pheidole* sp. 1 and *Odontomachus simillimus*, were permanent inhabitants and coexisted with the *Aneuretus simoni* population throughout the study period.

The highest nest density of *A. simoni* recorded from Locality B was higher than the nest density (0.18 m^{-2}) reported by Dias and Udayakantha [2016b]. Lower nest density values of the species than that recorded from Kuluna Kanda Proposed Forest Reserve, Kalugala Proposed Forest Reserve, Wilpita "Aranya Kele" [Dias, Ruchirani, 2014] and Meethirigala Forest Reserve [Dias, Udayakantha, 2016a] and higher nest density values than those observed at Kirikanda Forest [Dias et al., 2013] were observed at the selected region of Indikada Mukalana Forest Reserve. Frequency of nest occurrence at the Locality B of the current forest (15.8%) was higher than that observed at the Kirikanda Forest and Wilpita "Aranya Kele" but lower than those reported earlier at Kuluna Kanda Proposed Forest Reserve and Meethirigala Forest Reserve.

Current findings and the previous observations [Dias, Udayakantha, 2016b] indicated that air temperature between 24–26.5 °C and leaf litter depth between 2.3–6.5 cm were comparable with those recorded at its other habitats, Pompekelle [Dias, 2004], Sinharaja Forest Reserve [Perera et al., 2006], Gilimale Forest Reserve [Dias, Perera, 2011], Kirikanda Forest [Dias et al., 2013], Kalugala Proposed Forest Reserve, Kuluna Kanda Proposed Forest Reserve, Wilpita "Aranya Kele" [Dias, Ruchirani, 2014] and Meethirigala Forest Reserve [Dias, Udayakantha, 2016b]. A lower soil temperature range, 20–24.8 °C, and wider ranges of soil humidity, 16–69%, and soil organic matter content, 7.8–24.9%, than those recorded at recently reported other habitats were observed at the current region. With the addition of current findings, the range of 21–30.2 °C of air temperature, 20–28.3 °C of soil temperature, 11.9–69% of soil humidity, 4.3–24.9% of soil organic matter content and 0–6.5 cm of leaf litter depth could be reported as favourable for the *A. simoni* occurrence in any habitat and this information would be very useful in the future surveys.

Types of *A. simoni* nests reported from other habitats [Wilson et al., 1956; Jayasuriya, Traniello, 1985; Dias, 2004; Dias, Perera, 2011; Dias, Udayakantha 2016a] and Indikada Mukalana Forest Reserve earlier [Dias, Udayakantha, 2016b], hollow cavities of decaying fallen twigs, leaf litter and bark of rotting logs, superficial soil were also observed throughout the current survey. Decaying stems of Dillenia retusa Thunb., and Artocarpus nobilis Thwaites, were identified for the first time as the nesting substrates so that the regions with the two tree species and the above ranges of environmental conditions could be surveyed for the species in the future.

Table 2. Ant species, mean nest density of each species, $FNO_{overall}$ (mean percentage frequency of nest occurrence for the three occasions) and FWO_{overal} (percentage frequency of worker occurrence for the three occasions) observed at Locality A and Locality B of Indikada Mukalana Forest Reserve in February, May, July in 2016 and December (soil sifting only) in 2017.

Таблица 2. Виды муравьев, средняя плотность гнезд каждого вида, средняя частота регистрации гнезд в трех случаях ($FNO_{overall}$) и частота регистрации рабочих муравьев в трех случаях ($FWO_{overall}$) на участках А и Б в заповеднике Индикада Мукалана в феврале, мае, июле 2016 года и в декабре (только просеивание почвы) 2017 года.

	Ant species Вид	Locality A Участок А					Locality B Участок Б					December, 2017 (soil sifting) Декабрь 2017 (просеивание почвы)
		Mean nest density ± SD (m^{-2}) / Средняя плотность гнезд ± стандартное отклонение			$FNO_{overall}$, %	$FWO_{overall}$, %	Mean nest density ± SD (m^{-2}) / Средняя плотность гнезд ± стандартное отклонение			$FNO_{overall}$, %	$FWO_{overall}$, %	
		February, 2016 Февраль 2016	May, 2016 Май 2016	July, 2016 Июль 2016			February, 2016 Февраль 2016	May, 2016 Май 2016	July, 2016 Июль 2016			
1	*Aneuretus simoni* Emery, 1893	–	–	–	–	–	0.06 ± 0.03	0.24 ± 0.06	0.08 ± 0.06	15.8	35	+
2	*Technomyrmex albipes* Smith, 1861	0.1 ± 0.06	0.21 ± 0.04	0.08 ± 0.04	18.3	53	0.12 ± 0.09	0.27 ± 0.11	0.23 ± 0.04	26.7	41	+
3	*Technomyrmex bicolor* Forel, 1909	0.14 ± 0.08	0.22 ± 0.06	0.13 ± 0.04	24.2	47	0.08 ± 0.11	0.32 ± 0.08	0.28 ± 0.11	26.7	38	+
4	*Ooceraea biroi* (Forel, 1907)	–	–	–	–	–	–	–	–	–	–	+
5	*Camponotus compressus* (Fabricius, 1787)	–	–	–	–	1	–	–	–	–	–	–
6	*Camponotus* sp. 1	0.04 ± 0.06	–	0.03 ± 0.04	5	–	–	–	–	–	–	–
7	*Nylanderia yerburyi* (Forel, 1894)	–	–	0.1 ± 0.0	4.2	9	–	–	0.08 ± 0.04	2.5	4	+
8	*Oecophylla smaragdina* (Fabricius, 1775)	–		–	–	–	–	–	–	–	0.13	+
9	*Polyrhachis bugnioni* Forel, 1908	–	–	–	–	1	–	–	–	–	1	+
10	*Paratrechina longicornis* (Latreille, 1802)	–	–	–	–	–	–	–	0.03 ± 0.04	0.8	1	+
11	*Pseudolasius* sp. 1	–	–	–	–	12	0.02 ± 0.03	0.04 ± 0.06	0.03 ± 0.04	4.2	14	+
12	*Prenolepis* sp. 1	–	0.14 ± 1.1	–	5	8	0.02 ± 0.03	0.1 ± 0.03	–	5	8	–
13	*Cardiocondyla nuda* (Mayr, 1866)	0.2 ± 0.03	–	–	1.6	–	–	0.02 ± 0.03	–	0.8	1	–
14	*Carebara diversa* (Jerdon, 1851)	–	–	0.05 ± 0.07	1.7	10	0.2 ± 0.06	0.02 ± 0.03	–	2.5	7	+
15	*Carebara* sp. 1	–	0.03 ± 0.04	–	0.8	4	0.02 ± 0.03	–	0.03 ± 0.04	2.5	5	+
16	*Cataulacus* sp.	0.02 ± 0.03	0.03 ± 0.04	0.03 ± 0.04	4.2	6	–	–	–	–	4	+
17	*Meranoplus bicolor* (Guérin-Méneville, 1844)	0.2 ± 0.03	0.04 ± 0.06	0.18 ± 0.04	9.2	10	–	–	0.13 ± 0.04	4.2	9	+
18	*Myrmicaria brunnea* Saunders, 1842	0.22 ± 0.03	0.2 ± 0.03	0.18 ± 0.11	8.9	31	0.22 ± 0.0	0.24 ± 0.03	0.25 ± 0.07	35	32	+

Table 2 (continuation).
Таблица 2 (продолжение).

	Ant species Вид	Locality A Участок А					Locality B Участок Б					December, 2017 (soil sifting) Декабрь 2017 (просеивание почвы)
		Mean nest density ± SD (m^{-2}) / Средняя плотность гнезд ± стандартное отклонение			$FNO_{overall}$, %	$FWO_{overall}$, %	Mean nest density ± SD (m^{-2}) / Средняя плотность гнезд ± стандартное отклонение			$FNO_{overall}$, %	$FWO_{overall}$, %	
		February, 2016 Февраль 2016	May, 2016 Май 2016	July, 2016 Июль 2016			February, 2016 Февраль 2016	May, 2016 Май 2016	July, 2016 Июль 2016			
19	*Pheidole noda* Smith, 1874	0.06 ± 0.0	0.08 ± 0.0	0.1 ± 0.07	11.7	69	0.04 ± 0.17	0.16 ± 0.06	0.08 ± 0.04	10.8	58	+
20	*Pheidole fervens* Smith, 1858	–	–	0.13 ± 0.18	4.17	14	–	–	0.03 ± 0.04	0.8	5	–
21	*Pheidole* sp. 1	0.2 ± 0.11	0.16 ± 0.0	0.13 ± 0.04	27.5	36	0.04 ± 0.06	0.2 ± 0.11	0.03 ± 0.04	10.8	37	+
22	*Pheidole* sp. 2	0.19 ± 0.04	0.14 ± 1.1	–	20.8	21	0.15 ± 0.03	0.1 ± 0.07	–	15.3	26	+
23	*Pheidole* sp. 3	–	–	0.05 ± 0.0	1.7	18	–	–	0.1 ± 0.0	3.3	10	+
24	*Pheidole* sp. 4	–	0.1 ± 0.0	0.05 ± 0.0	5.0	4	–	0.08 ± 0.03	0.13 ± 0.04	6.7	14	–
25	*Pheidole* sp. 5	–	–	–	–	–	–	–	–	–	–	+
26	*Pheidole* sp. 6	–	–	–	–	–	–	–	–	–	–	+
27	*Recurvidris recurvispinosa* (Forel, 1890)	–	–	–	–	6	–	–	0.05 ± 0.0	1.7	6	–
28	*Solenopsis* sp. 1	0.09 ± 0.01	0.08 ± 0.04	0.1 ± 0.0	13.3	8	0.09 ± 0.13	–	0.03 ± 0.04	8.3	8	+
29	*Strumigenys emmae* (Emery, 1890)	–	–	–	–	–	–	–	–	–	–	+
30	*Tetramorium bicarinatum* (Nylander, 1846)	–	–	0.13 ± 0.04	4.2	7	–	–	–	0.8	1	+
31	*Tetramorium smithi* Mayr, 1879	–	0.05 ± 0.0	–	0.02	10	0.06 ± 0.0	0.04 ± 0.0	–	6.7	14	–
32	*Tetramorium pacificum* Mayr, 1870	–	–	–	–	2	–	–	0.08 ± 0.04	2.5	6	+
33	*Tetramorium pilosum* Emery, 1893	–	–	0.1±0.07	0.03	–	–	–	0.05 ± 0.0	1.7	5	+
34	*Tetramorium tortuosum* Roger, 1863	0.07 ± 0.01	0.03 ± 0.04	–	14.2	4	0.09 ± 0.04	–	–	7.5	6	–
35	*Tetramorium walshi* (Forel, 1890)	0.06 ± 0.06	0.06 ± 0.02	0.08 ± 0.04	0.10	7	–	0.04 ± 0.06	–	1.7	7	+
36	*Tetramorium* sp. 1	–	–	–	–	–	–	–	–	–	1	+
37	*Brachyponera luteipes* (Mayr, 1862)	–	–	–	–	10	–	–	–		8	+
38	*Brachyponera jerdonii* (Forel, 1900)	–	–	–	–	–	–	–	–	–	–	+
39	*Hypoponera confinis* (Roger, 1860)	–	0.03 ± 0.04	–	1.7	5	0.06 ± 0.09	0.06 ± 0.03	–	6.7	5	+

Table 2 (completion).
Таблица 2 (окончание).

	Ant species Вид	Locality A Участок А					Locality B Участок Б					December, 2017 (soil sifting) Декабрь 2017 (просеивание почвы)
		Mean nest density ± SD (m^{-2}) / Средняя плотность гнезд ± стандартное отклонение			$FNO_{overall}$, %	$FWO_{overall}$, %	Mean nest density ± SD (m^{-2}) / Средняя плотность гнезд ± стандартное отклонение			$FNO_{overall}$, %	$FWO_{overall}$, %	
		February, 2016 Февраль 2016	May, 2016 Май 2016	July, 2016 Июль 2016			February, 2016 Февраль 2016	May, 2016 Май 2016	July, 2016 Июль 2016			
40	*Hypoponera* sp. 1	–	–	–	–	–	–	–	–	–	–	+
41	*Leptogenys chinensis* (Mayr, 1870)	–	–	–	–	–	–	–	–	–	–	+
42	*Odontomachus simillimus* Smith, 1858	0.14 ± 0.0	–	0.04 ± 0.04	24.2	70	0.24 ± 0.06	0.28 ± 0.03	0.4 ± 0.07	42.5	88	+
43	*Mesoponera melanaria* (Emery, 1893)	0.06 ± 0.03	0.36 ± 0.11	0.04 ± 0.07	20.8	7	0.02 ± 0.03	–	0.1 ± 0.07	5	18	–
44	*Pseudoneoponera rufipes* (Jerdon, 1851)	–	0.03 ± 0.04	–	0.8	3	–	–	–	–	–	–
45	*Tetraponera allaborans* (Walker, 1859)	–	–	–	–	1	–	–	–	–	–	–

Table 3. Mean value ± S.D. of each environmental parameter recorded at the selected region in Indikada Mukalana Forest Reserve in February, May and July in 2016.

Таблица 3. Среднее значение ± стандартное отклонение каждого параметра окружающей среды, измеренного в исследуемом районе заповедника Индикада Мукалана в феврале, мае и июле 2016 года.

Environmental parameter Параметр окружающей среды	February, 2016 Февраль 2016	May, 2016 Май 2016	July, 2016 Июль 2016
Air temperature, °C Температура воздуха, °C	24 ± 0.0	25 ± 0.0	25 ± 0.0
Soil temperature, °C Температура почвы, °C	23.7 ± 0.2	21.5 ± 0.03	20 ± 0.08
Depth of leaf litter, cm Глубина листовой подстилки, см	5.5 ± 0.3	6.5 ± 0.5	5 ± 0.9
Soil humidity, % Влажность почвы, %	25 ± 5.7	69 ± 6.7	52.3 ± 3.2
Soil organic matter content, % Содержание органических веществ в почве, %	24.9 ± 4.3	13.3 ± 5.8	18.3 ± 4.1
Monthly mean rainfall, mm* Среднемесячные осадки, мм*	59.6	1021.3	183.2

Note. * – from Meteorological Department, Colombo, Sri Lanka.
Примечание. * – данные Метеорологического департамента, Коломбо, Шри-Ланка.

The cryptic ants, *Ooceraea biroi* of the subfamily Dorylinae and *Strumigenys emmae* of Myrmicinae, recorded by the soil sifting were not found by the other two methods and this was the first record of the two species from the region of Indikada Mukalana Forest Reserve. Also, the ponerine, *Brachyponera jerdonii* was a new record in the selected region.

According to the current findings and Dias and Udayakantha [2016b], 45 species in 27 genera and 7 subfamilies, Aneuretinae, Dolichoderinae, Dorylinae, Formicinae, Myrmicinae, Ponerinae and Pseudomyrmecinae reported from the repeated survey can be considered an updated first inventory of ant community

at the selected region in Indikada Mukalana Forest Reserve and the ecology of ant species that co-occurred with the *Aneuretus simoni* should be investigated in the future.

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