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Aneuretus simoni



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Aneuretus simoni, commonly known as the Sri Lankan Relict Ant, is the only known extant member of the subfamily Aneuretinae. Several other genera are described from Tertiary fossils found in Baltic amber, Russia and the USA, indicating a previous much wider distribution and diversity [11].

Physical Features

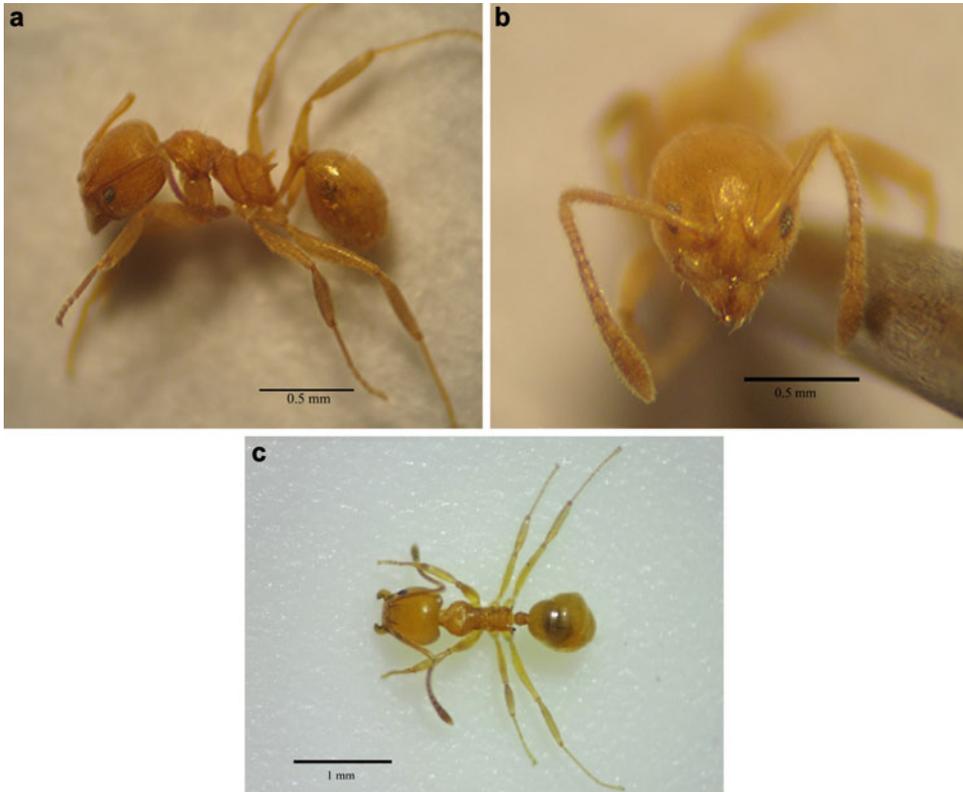
In major and minor workers, body color varies from light yellow to medium yellowish orange. Antennae 12-segmented. Clypeus broad and flat. Three segmented maxillary palp and four segmented labial palp present. Mandibles triangular, with three prominent teeth and several denticles; their size gradually decreases from apex to the base. A pair of spike-like, posterior, propodeal spines taper abruptly towards the tips. Anterior peduncle of the petiole is long and slender, somewhat narrowed towards its anterior attachment. The petiolar node is well differentiated from the anterior peduncle by dorsal and lateral swellings. Sting at the tip of the gaster is well developed and

sclerotized. The major worker differs from the minor worker primarily in its proportionately larger and broader head and relatively shorter and stouter propodeal spines. Total length and head length of a major worker range from 2.2 to 2.3 mm and 0.54 to 0.58 mm, respectively, while those of a minor worker range from 1.7 to 1.9 mm and 0.44 to 0.55 mm, respectively [3].

Life History

The worker caste in *A. simoni* is dimorphic, with no intermediates between the major and minor workers [11] (Fig. 1). As in most ants, queens are much larger than workers. They are initially winged (Fig. 2), losing their wings after mating (dealate queens) (Fig. 3), while males remain winged throughout their short adult lives (Fig. 4). The mouthparts of the minor worker closely resemble those of several dolichoderine and many ponerine ants [11]. The venom apparatus is well developed [1, 11].

The several studied colonies were found to have 18–106 minor workers and just 1–3 major workers. Major workers undertake a more limited set of colony-maintaining tasks, which appear not to include brood care or any defense against intruders. Minor workers care for the brood (including assisting in their pupation and eclosion) and the queen, maintain and defend the nest, and forage outside the nest. Where a colony



Aneuretus simoni, Fig. 1 Minor worker of *Aneuretus simoni*: (a) lateral view, (b) full face view, and (c) dorsal view

Aneuretus simoni, Fig. 2 Lateral view of an alate (winged) queen. Photo by Sudesh Udayakantha



has two queens, they are both observed to lay eggs without any evident aggression [6, 11].

As eggs are laid, they are placed in a pile by workers [6]. In laboratory colonies, workers were

also observed to lay infertile trophic eggs [9]. Upon hatching, larvae are cleaned up by the workers and then placed directly on food consisting of fresh insect fragments. Prior to

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Fig. 3 Lateral view of a dealate queen. Photo by Sudesh Udayakantha



pupation, larvae are licked clean by workers and then covered with soil particles. Cocooning and pupation take about 4 h, after which the workers remove the debris and carry the pupa to a different area of the nest where it will remain until adult emergence. Shortly before emergence, workers gather around a pupa, make small incisions in the cocoon, and extract the callow adult, which remains inactive for a day or more [6]. In the laboratory, workers complete development from egg to adult in 4 weeks [9].

Distribution and Habitats

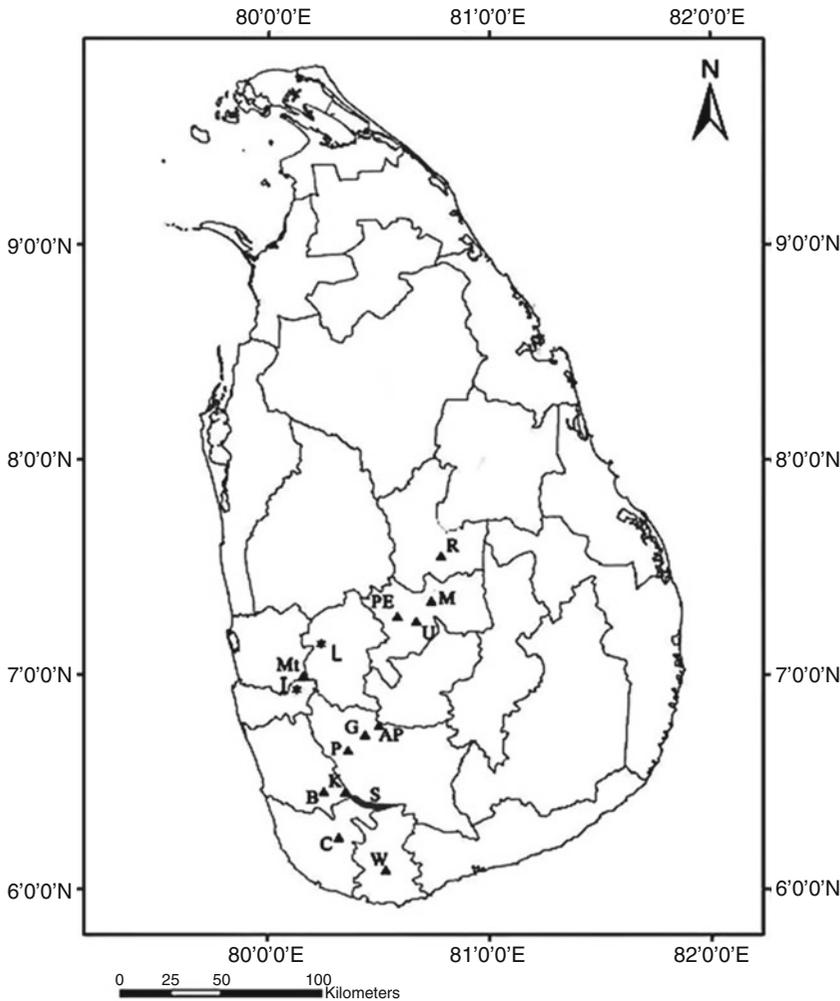
The species was first reported from Kandy, Sri Lanka, and has since been recorded from many

localities in southern and central parts of the island (Fig. 5): Peradeniya area of Kandy District in Central Province [10], Pompekelle Forest Reserve (6° 41' to 6° 42' N; 80° 23' and 80° 24' E) in Ratnapura (Sabaragamuwa Province) [2, 10], Adam's Peak Forest Reserve, Gilimale Forest Reserve (6° 47' N and 80° 28' E; 152 m average elevation) [10] and Sinharaja Forest Reserve (Sabaragamuwa Province) [3], Kirikanda Forest (06°25.306' to 06°25.240' N and 080°20.065' to 080°19.925' E, Kalutara District, Western Province) [10] and Kalugala Proposed Forest Reserve (06°26.77' N and 080°15.23' E; 95 m elevation; Kalutara District, Western Province) and Kuluna Kanda Proposed Forest Reserve (06°19.59' N and 080°20.047' E; 250 m elevation; Galle District, Southern Province) and Wilpita "Aranya Kele"

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Fig. 4 Lateral view of a male. Photo by Sudesh Udayakantha





Aneuretus simoni, Fig. 5 Sri Lanka, showing the known distribution of *Aneuretus simoni*. AP- Adam's peak Forest Reserve; B- Kalugala proposed Forest Reserve; C-Kulunakanda proposed Forest Reserve; G-Gilimale Forest Reserve; I- Indikada Mukalana Forest

Reserve; K- Kirikanda Forest; L- Lenagala Forest Reserve, M- Moraella forest; Pompekelle Forest; PE- Peradeniya; R- a forest in Rambukoluwa; S- Sinharaja Forest Reserve; U- Udawatta Kele, Kandy; W- Wilpita Aranya Kele. Map by Krishan Rajapaksa & W. S. Udayakantha

(06°5.59' N and 080°31.56' E; 104 m elevation; Matara District, Southern Province) and two forests in Moraella and Rambukoluwa in the Central Province (Intermediate zone) [10]. Recently, nests of the species were discovered from Meethirigala Forest Reserve (06° 59.769' to 06° 59.797' N and 80° 10.412' to 80° 10.638' E; 57 m) in Gampaha District (Western Province) [4], Indikada Mukalana Forest Reserve (06°87'27.47" to 06°87'21.88"N and 80°16'09.49" to 80°16'09.06"; 291 m elevation) in Colombo District (Western Province) [5] and Lenagala Forest

Reserve (7°07'32.5" to 7°07'18.0"N and 80°14'54.2" to 80°15'01.1"E; 255 m and 280 m elevation) in Kegalle District (Sabaragamuwa Province) [10] in the wet zone of Sri Lanka.

Ecology

This is mainly a ground-level forest ant, nesting in such situations among the leaf litter, in dead wood (Fig. 6a–c), superficial soil layers (Fig. 6d), and recesses in boulders (Fig. 6e). In Meethirigala



Aneuretus simoni, Fig. 6 Nests of *Aneuretus simoni* in (a–c) decaying wood pieces of various size, (d) the superficial soil layer, and (e) a recess in the boulder

Forest Reserve, *A. simoni* nests were also observed in decaying stems of the common bamboo *Fargesia* sp. A mature colony of *A. simoni* is usually divided into two or three neighboring groups. The subunits were not always connected by galleries, but major workers often transfer brood and queens between them [9].

Favorable environmental conditions include high rainfall (2000 mm or more per years), mean daily air temperature of 26–29 °C, mean soil temperature of 24–29 °C and 13–40% soil moisture, and around 8% soil organic matter [2, 4, 5, 7, 10].

Few studies have quantified the nest densities of *A. simoni*. Three study plots in Gilimale Forest Reserve showed 0.017, 0.023, and 0.033 colonies per m² [6], while some other study areas had higher nest density of the species [4, 10].

Foragers have generalized habits, best characterized as omnivorous scavengers with occasionally feeding on rotten fruit and nectar, as very small insects encountered in the leaf litter. Prey are paralyzed by stinging [6].

Exocrine System, Chemical Communication, and Social Behavior

Recruitment communication among workers is mediated by the secretions of the sternal gland, while alarm substances are produced in the pygidial gland [8]. The sternal gland, which produces a long-lasting mass recruitment pheromone, comprises a glandular epithelium and an associated reservoir located in the seventh sternum. The pygidial gland opens between the sixth and seventh terga. Although *A. simoni* has many primitive features, in its extensive use of chemical signals, it shows a level of sophistication comparable to that of “advanced” ant groups [1, 8].

The morphology of the 11 exocrine glands of the workers was described recently [1]. A profile drawing of a minor worker shows a well-developed intramandibular gland, epithelial gland, mandibular gland, propharyngeal gland, post-pharyngeal gland, labial gland (salivary gland), a paired metapleural gland with the lowest number of secretory cells known in ants [1], a well-developed venom gland with long and slender secretory filaments, a bilobed Pavan’s (sternal) gland [1], Dufour’s gland, and the pygidial gland. It is suggested that yet other glands may be discovered in the legs, which have not yet been studied [1].

The size of the minor workers’ behavioral repertoire resembles that of some dolichoderine ants. There is also much overlap with behavior patterns recorded from various formicine and myrmicine genera. Trophallaxis, trail communication, movement of workers between nests, chemically organized nest emigration, and group retrieval of prey are prominent features of *A. simoni*’s foraging [6]. Transportation of adults begins with a brief interchange of invitation signals that induce tonic immobility in the individual to be carried, which is not recorded from dolichoderines, but is present in many other ants.

Conservation Status

Most known *A. simoni* localities are in forest reserves, so that the species is protected by law. Surveys from 2001 to 2018 showed that it has a

wide distribution in disturbed forests (e.g. Pompekelle and Kirikanda forests), and at least one forest reserve in each district of Sri Lanka’s wet zone [10]. It is also recorded in two intermediate zone forests, although nowhere in the dry zone. Contrary to earlier assessments, thus, it does not appear to merit Critically Endangered status.

DNA Barcode of the Species

Global Barcode of Life Data Mirror (<http://nz.boldmirror.net/index.php/displayitem/GBAH2121-06>) provides the amino acid sequence of *A. simoni*.

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