

Eurhopalothrix elke, a new species from Borneo, and a key to the species of the *E. platisquama* group (Hymenoptera: Formicidae)

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Abstract

Eurhopalothrix elke sp.n. of the *E. platisquama* group is described from Sarawak, Borneo. A revised key is presented for the workers of this species group, together with a new record for *Eurhopalothrix dubia* TAYLOR, 1990 and a distribution map.

Key words: Ants, Formicidae, Myrmicinae, *Eurhopalothrix elke*, new species, identification key, distribution.

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Introduction

The myrmicine ant genus *Eurhopalothrix* BROWN & KEMPF, 1961 contains 37 species and is distributed in the Indo-Austral Region, Australasian Region and the Neotropics to the southern USA (BOLTON 1995, 2003). The first revision of all species was carried out by BROWN & KEMPF (1960, 1961) and later the Indo-Australian species were thoroughly revised by TAYLOR (1968, 1970, 1980, 1990). More recently, SHATTUCK (2000) presented a synopsis of the Australian species, and the Neotropical species have been keyed by KETTERL & al. (2004). There has been a long debate about the synonymy or separation of the tribes Basicerotini and Dacetini and the number of valid genera composing these tribes during the last years (e.g., BARONI URBANI & DE ANDRADE 1994, BOLTON 1995, 1998, 1999, 2000, 2003, BARONI URBANI & DE ANDRADE 2007, WARD 2007). Together with *Basicros* SCHULZ, 1906, *Creighttonidris* BROWN, 1949, *Octostruma* FOREL, 1912, *Protalaridris* BROWN, 1980, *Rhopalothrix* MAYR, 1870, and *Talaridris* WEBER, 1941, *Eurhopalothrix* is grouped in the tribe Basicerotini (BOLTON 2003), but FEITOSA & al. (2007) proposed the synonymy of *Creighttonidris* with *Basicros*.

BARONI URBANI & DE ANDRADE (2007) additionally proposed the synonymy of all former basicerotine genera under the genus *Basicros* and transferred *Basicros* to the tribe Dacetini, but see their discussion on characters found by DIETZ (2004) to separate *Eurhopalothrix* from other basicerotine genera. Due to this situation we will treat here *Eurhopalothrix* as a separate genus until the classification is resolved by proper molecular analyses.

Apart from the *Eurhopalothrix platisquama* group, no species of *Eurhopalothrix* have been grouped into species groups. This species group is well defined by the presence of large, squamiform hairs that cover most parts of the body surface (TAYLOR 1990). These hairs have feathered margins visible only in electron microscope scans and this pilosity is unique not only in the genus *Eurhopa-*

lothrix but throughout all other described basicerotine ants. Up to now, three species of this group are known: *E. platisquama* TAYLOR, 1990, *E. dubia* TAYLOR, 1990 and *E. seguensis* TAYLOR, 1990. With their exclusively Sunda-land distribution, these species were recorded from Peninsular Malaysia, Sumatra and Borneo (TAYLOR 1990). In this publication, we present a new record for *E. dubia*, a revised key to these species and the description of a new species from Gunung Mulu National Park in Sarawak, Malaysia.

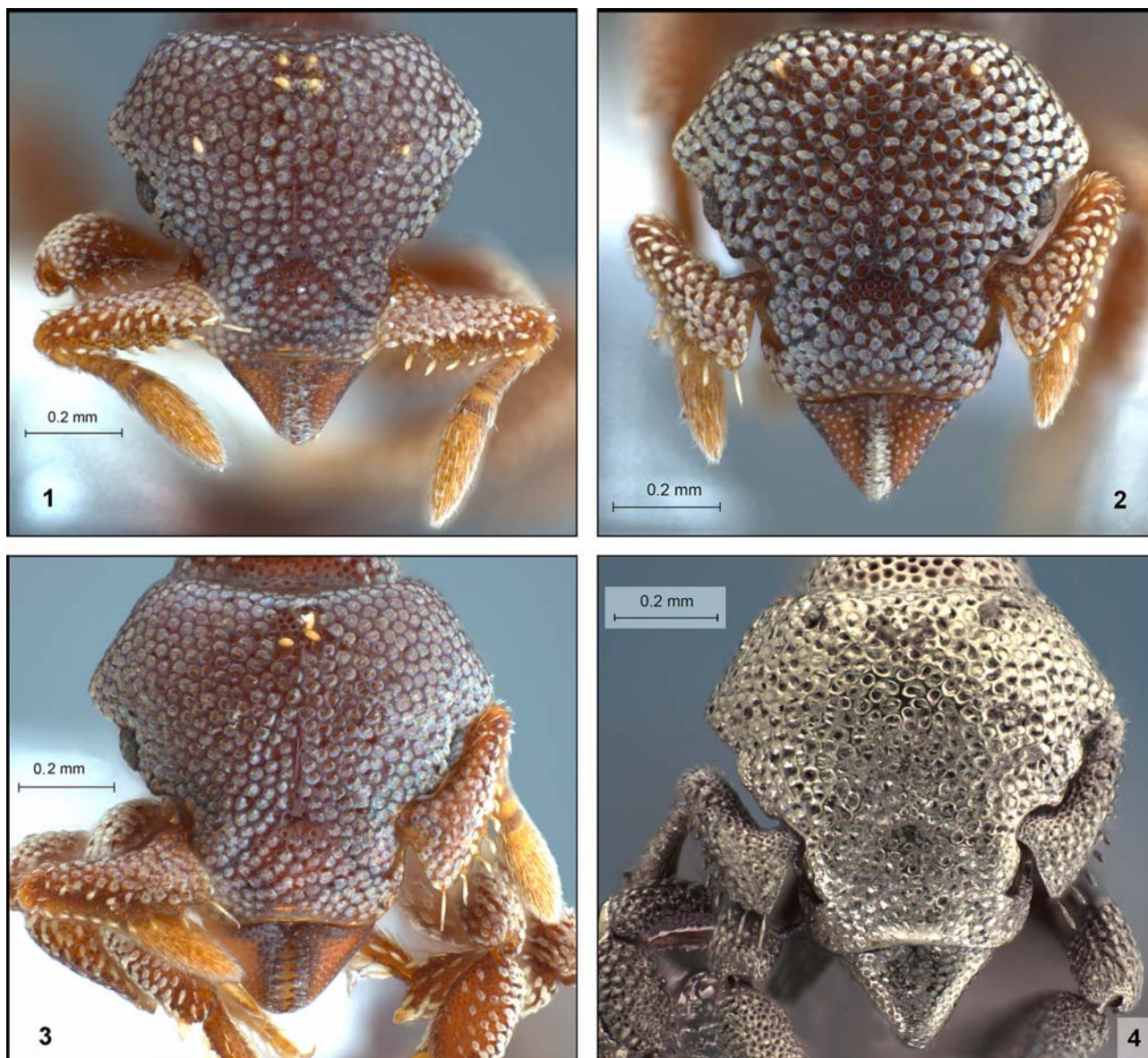
Material and methods

We checked 100 one-square-metre samples of leaf litter and soil material extracted with Winkler bags collected in Gunung Mulu National Park (D. Mezger & M. Pfeiffer, unpubl.) for specimens of the *Eurhopalothrix platisquama* group. Additionally, material from studies carried out at Gunung Kinabalu with 200 samples (BRÜHL & al. 1999, MALSCH & al. 2008) as well as from studies conducted in Eastern Sabah with 420 one-square-metre samples (BRÜHL 2001, BRÜHL & al. 2003) was also surveyed for specimens of this species group.

Specimens were analyzed and measured with a Leica MZ16 stereo microscope with magnification of up to 110× by use of a calibrated ocular micrometer. Pictures of the specimens were taken with a MacroScope (Zoom Leica Z6APO) and edited with the software Automontage©. These photographs of all species are available via <http://www.antbase.net>.

We took measurements following the convention used in TAYLOR (1990) and made additional measurements of frontal setae, eye, propodeal spiracle, petiole and postpetiole. All these measurements are in millimetres.

For measurements of distances of surface structures like squamiform hairs and diameters of foveolae we used the high resolution photographs of type specimens in fron-



Figs. 1 - 4: Frontal view of heads: (1) *Eurhopalothrix dubia* (paratype); (2) *E. elke* sp.n. (holotype); (3) *E. platisquama* (paratype); (4) *E. seguensis* (holotype), gold-coated for REM study. Note the different numbers of setae on forehead.

tal view also presented in this work (Figs. 1 - 4). These structures were measured on the posterior section of the head near the insertions of the setae. For calculation of the mean of these distances, at least ten randomly chosen measurements from every specimen (one specimen of each species) were done.

CI Cephalic index: $HW / HL \times 100$.

DSe Distance between the two outermost setae on posterior section of head, measured in same position as HW.

EY Maximum diameter of eye, measured in lateral view of head.

HL Head length: maximum length of head in full face, dorsal view; head must therefore be carefully tilted to the position yielding the true maximum. From a line tangent to anterior clypeal margin at midline to a line tangent to posteriormost projection of vertex.

HW Head width: maximum width of head in full face, dorsal view, posterior to eyes, but not including them.

ML Mandible length: measured from apex of mandible to nearest point of clypeal margin.

MW Mandible width: measured at broadest point of mandible where mandible reaches clypeus.

PeL Length of petiole, measured in lateral view.

PeW Maximum width of petiole, measured in dorsal view.

PPL Maximum length of postpetiole, measured in lateral view.

PPW Width of postpetiole, measured in dorsal view.

PSD Maximum diameter of propodeal spiracle, measured in dorsal view.

PW Pronotal width: maximum width of pronotum measured in dorsal view.

SeL Maximum length of largest seta (in lateral view of the seta itself) of posterior section of head near vertex.

SL Scape length: scape in full frontal view measured as straight line from its outermost tip to the basal lobe (including articular condyle).



Figs. 5 - 8: Lateral view: (5) *Eurhopalothrix dubia* (paratype); (6) *E. elke* sp.n. (holotype); (7) *E. platisquama* (paratype); (8) *E. seguensis* (holotype), gold-coated for REM study. All species bear full body coverage with squamiform hairs.

WL Weber's length: maximal diagonal length of mesosoma measured in lateral view from anterodorsal border of pronotum to posteriormost margin of propodeal lobe.

Abbreviations of the specimen depositories are: ABNC AntBase.Net Collection, Ulm, Germany; ANIC Australia National Insect Collection; CSIRO, Canberra, Australia; FRCK Forest Research Centre, Forestry Department, Kuching, Malaysia; SMNK Staatliches Museum für Naturkunde Karlsruhe, Karlsruhe, Germany; ZSBW Zoologische Sammlung der Bayerischen Universität Würzburg, Germany.

Identification key to the *Eurhopalothrix platisquama* group (workers only)

- 1 Two standing setae on posterior section of head near vertex, with considerable distance from midline; these setae large and well developed, without smaller setae between them (Fig. 10). No lateral setae on postpetiole (Northern Sarawak). .. *E. elke* sp.n.
- Four to six standing setae on posterior section of head, either completely at midline near occiput or in part distant from midline. Postpetiole with pair of lateral setae. 2

- 2 Array of four smaller standing setae in middle of head. Squamiform hairs on head very dense so that surface structure partly obscured. 3
- In posterior section of head one array of only two standing setae near midline, two additional setae distant from them (Fig. 12). Squamiform hairs on head well separated so that surface structure clearly visible (Southern Sarawak). *E. seguensis*
- 3 On posterior section of head no other standing setae present beside array of four setae near midline (Fig. 11) (Peninsular Malaysia, Sumatra). *E. platisquama*
- Anterior to level of array of four setae one additional seta on each side of head distant from midline (Fig. 9) (Sabah). *E. dubia*

Eurhopalothrix dubia TAYLOR, 1990 (Figs. 1, 5, 9, 13)

Type material examined. Paratypes: Malaysia: Sabah, Sepilok Forest Reserve (near Sandakan) (05° 51' N, 117° 57' E), 12.VI.1968, leg. R.W. Taylor, collection code: acc.68.451, 1 worker (ANIC); Sabah, Labuk Road, Mile 45, ex Sandakan, Lungmanis (05° 52' N, 117° 53' E), 2.-13.VI.1968, leg. R.W. Taylor, collection number: acc 68475, 2 workers (ANIC); Sabah, Umas-Umas near Tawau (04° 16'

N, 117° 54' E), 20.VI.1968, leg. R.W. Taylor, collection code: acc. 68.626, pin code: ANIC Ants Vial No. 6.15, 1 worker (ANIC).

Non-type material examined. Malaysia: Sabah Kinabalu Park, 580 - 620 m a.s.l., 960 - 1000 m (06° 01' N, 116° 44' E), 23.III.1996, leg. A. Malsch, pin codes: ZSB UW 1673-1674, 2 workers (ZSB UW); Sabah, Kinabalu National Park, Poring Hot Spring, East Ridge Trail (06° 01' N, 116° 44' E), 13.VII.1995, leg. C. Brühl, pin codes: ZSB UW 1669-1672, 4 workers (ZSB UW).

Measurements. Maximum and minimum based on all specimens ($n = 10$): CI 88 - 91, DSe 0.45 - 0.46, EY 0.08, HL 0.73 - 0.79, HW 0.76 - 0.87, ML 0.18 - 0.24, MW 0.22 - 0.28, PeL 0.30 - 0.32, PeW 0.29 - 0.30, PPL 0.20 - 0.21, PPW 0.44 - 0.45, PSD 0.05 - 0.06, PW 0.45 - 0.49, SeL 0.06, SL 0.41 - 0.49, WL 0.77 - 0.97.

Notes. Species described in detail by TAYLOR (1990). Distinguished from any other species of *E. platisquama* group by higher number of setae on upper section of head: six. Square array of four standing setae grouped in middle of head and anterior to this array two further standing setae. Postpetiole with one pair of setae. Eye with about 20 ommatidia. Squamiform ground pilosity dense, resembling *E. platisquama*. Distance between squamiform hairs 12 μ m on average, i.e., smaller than in *E. elke* sp.n. and *E. seguensis*. Rugolae with 25 μ m diameter similar to those of *E. elke* sp.n. Scape with one outer row of ten setae and one inner row of six setae (Fig. 13). Mandible 1.5 times as broad as long, comparable to that of *E. platisquama*. Masticatory margin with nine teeth.

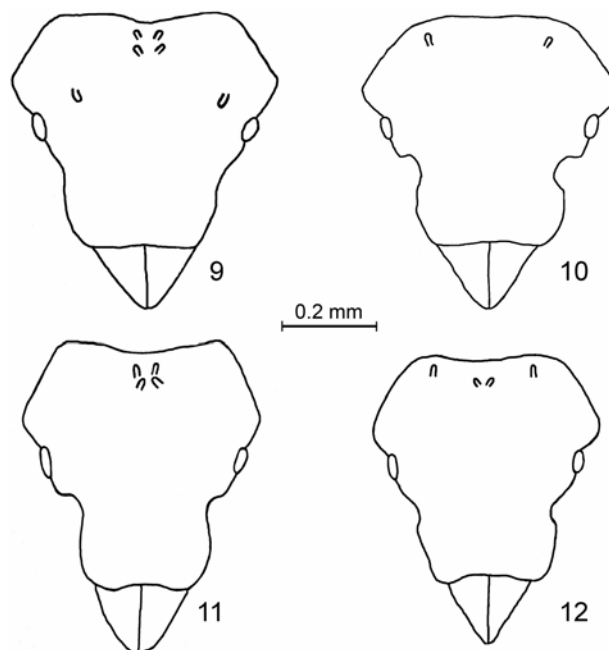
None-type material represents first record from central Sabah. Therefore, *E. dubia* is not restricted to lowland forests in Eastern Sabah, but also occurring in mid-elevation forests on slopes of Gunung Kinabalu.

***Eurhopalothrix elke* sp.n.** (Figs. 2, 6, 10, 14)

Type material. Holotype: worker. Malaysia: Sarawak, Gunung Mulu National Park, vicinity of Camp 1, 250 m a.s.l. (04° 03' 04" N, 114° 51' 43" E), 12.V.2006, leg. D. Mezger, collection code: DI 04 B (SMNK). Paratypes: same data as holotype, pin codes: AntBase.Net No. 1644 - 1645, 2 workers (ABNC), same data as holotype, 3 workers (FRCK, ANIC, SMNK); same locality, but collected on 02.IX.2006, collection code: DI 11 B, 1 worker (ANIC); same locality, but collected on 19.IX.2007, collection code: DI 19 B, 1 worker (SMNK).

Measurements. Holotype: CI 88, DSe 0.39, EY 0.08, HL 0.73, HW 0.83, ML 0.22, MW 0.24, PeL 0.40, PeW 0.31, PPL 0.22, PPW 0.48, PSD 0.06, PW 0.50, SeL 0.09, SL 0.43, WL 0.85. Paratypes: minimum and maximum ($n = 7$): CI 87 - 88, DSe 0.38 - 0.40, EY 0.07 - 0.08, HL 0.72 - 0.73, HW 0.82 - 0.85, ML 0.21 - 0.23, MW 0.24 - 0.28, PeL 0.39 - 0.40, PeW 0.29 - 0.31, PPL 0.23 - 0.24, PPW 0.47 - 0.49, PSD 0.05 - 0.06, PW 0.50 - 0.52, SeL 0.08 - 0.09, SL 0.43 - 0.44, WL 0.85 - 0.86.

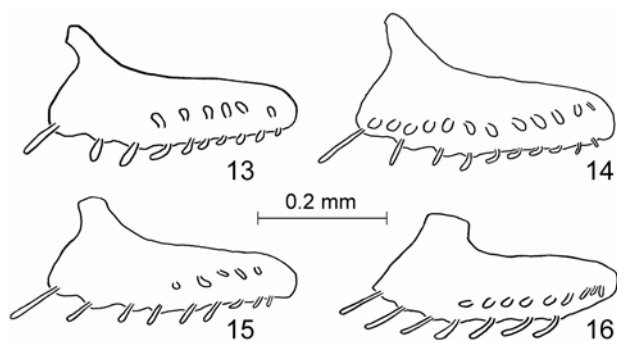
Diagnosis (worker). Separated from all other species of *E. platisquama* group by unique number of two large, erect setae on upper section of head with no additional setae near midline of head. Setae of *E. elke* sp.n. twice as long as of all other known species. Postpetiole of *E. elke* sp.n. without any erect setae, unlike all other species which show one seta on each side of postpetiole. *Eurhopalothrix seguensis* bears four erect setae on its upper section of head



Figs. 9 - 12: Heads in full face view with characteristic setae: (9) *E. dubia*; (10) *E. elke* sp.n.; (11) *E. platisquama*; (12) *E. seguensis*.

altogether, consisting of one pair of smaller setae situated in middle of posterior section of head, flanked by one single larger seta on each side posterior to it and distant from midline of head. One group of four small setae present in *E. platisquama* and *E. dubia*. *Eurhopalothrix dubia* has two further setae each on left and right side of upper section of head situated anterior and laterad of group of four setae. Surface structure differs to that from other species: distances between squamiform hairs larger than in all other species and foveolae of integument almost as large as in *E. dubia*, but smaller than in *E. platisquama* and *E. seguensis*.

Description (worker). Whole body densely foveolate. Almost all parts of head, mesosoma and gaster covered with flat-surfaced, squamiform hairs with feather-like endings, except for sides of mesosoma and underside of petiole. Head subtriangular, wider than long. Occiput concave, with shallow depression in middle, less prominent than in other species. Occipital lobes considerably rounded. On top of head only two conspicuous club-shaped standing setae, longest setae of its kind among *E. platisquama* group. Distance between setae larger than in *E. seguensis*. Eye medium large, little larger than in *E. seguensis*, but smaller than in *E. dubia*, with at least 20 ommatidia. Clypeus broader than long, faintly concave in front. Frontal carina bordering deep antennal scrobe below eye, allowing total reception of antenna. Scape expanded anterad, like in other species of group. Apart from silvery hairs of squamiform pilosity, scape bearing two rows of setae at outer edge: one directly on corner with ten thick, long setae getting shorter distally; second with 12 smaller setae, proximal setae same size of squamiform hairs, but getting larger distally. Antennal segments covered with fine simple hairs. Triangular mandible with small, squamiform hairs, 1.1 times as broad as long, i.e., ratio smaller than in *E. dubia* and *E. platisquama*. Masticatory margin with 11 almost identical teeth.



Figs. 13 - 16: Scapes including the two rows of setae: (13) *Eurhopalothrix dubia*; (14) *E. elke* sp.n.; (15) *E. platisquama*; (16) *E. seguensis*. Only setae and no squamiform hairs shown.

Mesosoma convex, but declivity of mesosoma less steep than in *E. seguensis*. Anterior part covered with dense squamiform hairs, which also occur on lateral pronotum. Mesopleuron and metapleuron without any pilosity. Propodeal spiracle conspicuous, same size as in *E. dubia* and *E. platisquama*, but little larger than in *E. seguensis*.

Petiole and postpetiole: Upper parts densely covered with squamiform hairs, on ventral parts such pilosity absent. Shape and pilosity almost identical to that of other species of group, but in contrast to those lacking conspicuous setae.

Pilosity on gaster much less dense than on mesosoma. Pilosity of first tergite with silvery squamiform hairs, some foveolae present between them but without standing setae. Second tergite with four squamiform hairs and two setae. Third tergite with four squamiform hairs and four setae. Fourth tergite with three pairs of setae, but no squamiform hairs.

First sternite glossy, with only few small, shallow foveolae and few squamiform hairs. Lateral margin of first sternite with some larger and deeper foveolae, bearing some small setae. Second sternite: six setae and same number of squamiform hairs present on each side. Third sternite: six setae and four squamiform hairs. Fourth sternite with four setae.

All parts of legs densely foveolate. Coxae with only few squamiform hairs. On femurs some squamiform hairs distally. Tibiae distally with some setae; smooth transition between them and pilosity on proximal part of more squamiform character. Pretarsi with six setae each, beside simple hairs. Other tarsal segments only with simple hairs.

Colour: basic colour dark reddish brown on all body parts. Mandible, antenna and legs slightly paler. Squamiform ground pilosity of silvery white colour, setae on head and gaster white to ivory. Pilosity of antenna and legs similar but colour of pilosity brighter than ground pilosity.

Queen and male. Unknown.

Etymology. Named in dedication to Mrs. Elke Mezger, mother of the first author. Together with her husband, Mr. Karl-Heinz Mezger, she has been supporting her son in his study of biology from the very first and thus enabled the discovery of this species. The specific name is an arbitrary combination, to be treated as a noun in apposition.

Distribution and biology. All eight known specimens of *E. elke* were extracted from topsoil of primary hill dipterocarp forest by Winkler extractors. The type locality is

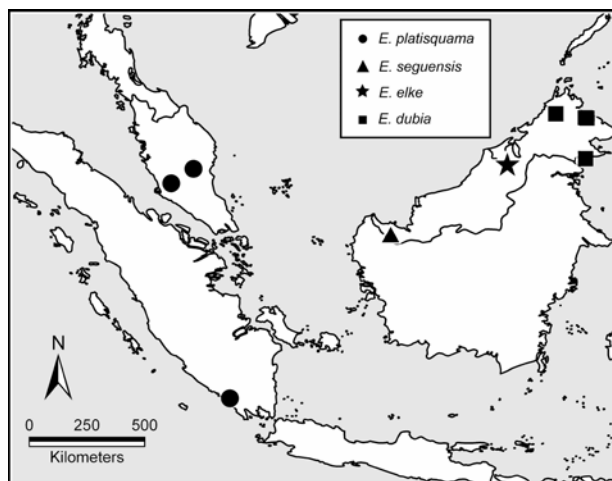


Fig. 17: Distribution of the four species of the *Eurhopalothrix platisquama* group in South-East Asia.

situated at the slopes at Gunung Mulu in about 250 m a.s.l. in the centre of Gunung Mulu National Park in Sarawak, Malaysia. This species is only known from this area (Fig. 17).

***Eurhopalothrix platisquama* TAYLOR, 1990**
(Figs. 3, 7, 11, 15)

Type material examined. Paratypes: Indonesia: Sumatra, Liwa (05° 04' S, 104° 03' E), 05.IV.1984, leg. M.S. Harvey, pin code: ANIC ANTS Vial 3835, 3 workers (ANIC). Malaysia: Pahang / Perak, Cameron Highlands (05° 12' N, 101° 15' E), 08.VIII.1984, leg. D.H. Murphy, collection code: Berlese No. 242, 1 worker (ANIC).

Measurements. Maximum and minimum (n = 4): CI 89 - 92, DSe 0.06 - 0.07, EyD 0.09, HL 0.78 - 0.79, HW 0.86 - 0.88, ML 0.18 - 0.20, MW 0.30 - 0.35, PeL 0.34 - 0.35, PeW 0.29 - 0.31, PPL 0.22 - 0.23, PPW 0.45 - 0.47, PSD 0.05 - 0.06, PW 0.51 - 0.52, SeL 0.05, SL 0.43 - 0.45, WL 0.87 - 0.89.

Notes. Detailed description of this species given by TAYLOR (1990). A cluster of four standing setae on posterior section of head, without any other setae on head, characterises this species. Postpetiole bears one pair of setae. Eye with about 18 ommatidia. Scape with two rows of setae, outer row with nine setae, inner row with five setae (Fig. 15). Distances between ground pilosity with 6 µm much smaller than in all other species of *E. platisquama* group, but diameter of foveolae with 29 µm larger than in all other species. Mandible shape similar to that of *E. dubia*, 1.7 times as broad as long; masticatory margin with nine teeth.

***Eurhopalothrix seguensis* TAYLOR, 1990**
(Figs. 4, 8, 12, 16)

Type material examined. Holotype: Malaysia: Sarawak, Kampong Segu, 20 miles SW Kuching (01° 18' N, 110° 18' E), 04.VI.1968, leg. R.W. Taylor, collection code: RWT-68.289 (ANIC).

Measurements. The only known specimen measured: CI 88, DSe 0.34, EY 0.07, HL 0.72, HW 0.82, ML 0.21, MW 0.23, PeL 0.32, PeW 0.25, PPL 0.22, PPW 0.45, PSD 0.04, PW 0.49, SeL 0.04, SL 0.39, WL 0.85.

Notes. Described by TAYLOR (1990), being separated from all other species by combination of four distinct setae on posterior section of head. Medium pair of these setae close together at midline of head, other pair wider separated and closer to occiput. Each of these setae 0.04 mm long. Postpetiole with one seta at each side. Eye with 20 ommatidia. Ground pilosity less dense with mean distance of squamiform hairs 18 μ m and diameter of foveolae around 28 μ m, i.e., distances between squamiform hairs large and resembling *E. elke* sp.n., but diameter of foveolae more similar to *E. platisquama*. Scape with two rows of setae, one outer row with seven setae and one inner row with nine setae (Fig. 16). Mandible 1.1 times as broad as long. Due to extensive gold-coverage for former SEM studies no information on number of teeth available.

Discussion

The type locality of *E. elke* sp.n. is situated in the centre of the distribution of the *E. platisquama* group (Fig. 17). Our observations support the assumption of TAYLOR (1990) that all species of the *E. platisquama* group are allopatrically distributed. Only *Eurhopalothrix* species not belonging to the *E. platisquama* group occur in distribution ranges of species of this group (TAYLOR 1990). In the area of Gunung Mulu National Park, which is covered by several forest types, two further *Eurhopalothrix* species were recorded (D. Mezger & M. Pfeiffer, unpubl.). *Eurhopalothrix jennya* TAYLOR, 1990, a species endemic to the north-western part of Borneo, was collected in leaf litter and soil of limestone forest at the lower slopes of Gunung Api. *Eurhopalothrix omnivaga* TAYLOR, 1990, which is found in large parts of Sundaland (Peninsular Malaysia, Sumatra and Borneo) as well as in Sulawesi, is widely distributed in the area of Gunung Mulu National Park. Most specimens were found in the litter of hill dipterocarp forest, but some were also recorded from alluvial and limestone forest. *Eurhopalothrix omnivaga* was collected at the type locality of *E. elke* near Camp 1, but not at the same sample sites. At this locality, *E. omnivaga* was more abundant than *E. elke*; eight of 20 sample sites were inhabited by *E. omnivaga*, but only three by *E. elke*. While *E. elke* was restricted to the top soil, *E. omnivaga* was found both in leaf litter and soil. Nothing is known on the behaviour of *E. elke*. It therefore can only be speculated if it could resemble other species like *Eurhopalothrix heliscata* WILSON & BROWN, 1985 from Singapore which are solitary hunters of arthropods, mainly of termites (WILSON & BROWN 1985). Termite feeding is known from species of *Basiceros*, too (WEBER 1950, BROWN 1974, FEITOSA & al. 2007).

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Zusammenfassung

Eurhopalothrix elke sp.n. aus der Gruppe der *E. platisquama* TAYLOR, 1990 wird aus Sarawak (Borneo) beschrieben. Im Rahmen dieser Neubeschreibung werden ein überarbeiteter Bestimmungsschlüssel für Arbeiterinnen der *E. platisquama*-Gruppe, ein weiterer Nachweis für *Eurhopalothrix dubia* TAYLOR, 1990 sowie eine Verbreitungskarte präsentiert.

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