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Rostrormyrmex, a new genus of myrmicine ants from Peninsular Malaysia (Hymenoptera: Formicidae)

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Rostrormyrmex, a new genus of myrmicine ants from Peninsular Malaysia is described on the basis of workers, dealate females, and a single male. Analysis of characters suggests a closest relationship with either *Lordomyrma* or the *Solenopsis* genus group.

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Introduction

During a biodiversity study in a primary lowland rain forest, the Pasoh Forest Reserve, Negeri Sembilan, Peninsular Malaysia, a number of undescribed species of ants were found. Among these were specimens of a new myrmicine genus, collected by hand in rotten wood.

Methods

Total length (TL). Sum of the following lengths: (1) head in full-face view from apex of mandibles to occipital margin (more precisely: to midpoint of a line connecting posterolateral projections of head), (2) alitrunk in dorsal view from anterior pronotal margin (excluding neck) to narrow constriction of petiolar peduncle at its insertion on propodeum, (3) petiolar peduncle in dorsal view from constriction to node, (4) nodes of petiole and postpetiole in dorsal view, and (5) gaster in dorsal view.

Head length (HL). In full-face view from the anteriormost point of clypeus (in this case clypeal projection: 'rostrum') to midpoint of a line connecting posterolateral projections of head.

Head width (HW). Maximum width in full-face view (excluding the eyes in worker and queen, including the eyes in male).

Cephalic index (CI). $HW \times 100 / HL$.

Scape length (SL). Maximum length excluding basal constriction, in frontal view as seen in Fig. 1.

Scape index (SI). $SL \times 100 / HW$.

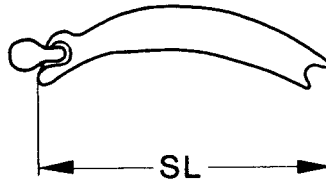


Fig. 1. Measurement of the scape length (SL).

Pronotal width (PW). Maximal width in dorsal view.

Alitrunk length (AL). Diagonal length in lateral view from anterior margin of pronotum (excluding neck) to posterior margin of propodeal lobe. [According to P. Ward, pers. comm., the term 'propodeal lobe' is more appropriate than 'metapleural lobe' as it is derived from the propodeum, not from the metapleuron. Other synonyms are 'infrapropodeal lobes' and 'inferior propodeal plates'.]

Measurements, in millimetres, were taken with an ocular micrometer on a Zeiss microscope. Indices were calculated before converting micrometer units to millimetres. The terminology for sculpture follows Harris (1979), for wing venation in males Brown & Nutting (1950).

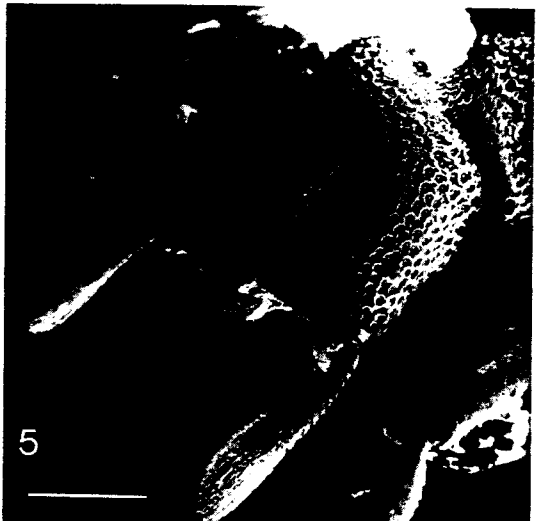
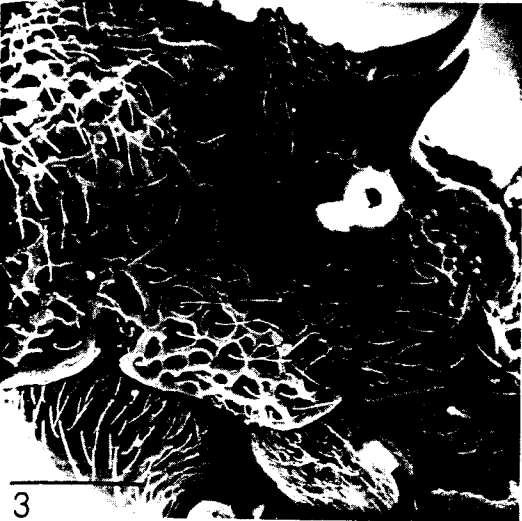
Depositories. - Staatliches Museum für Naturkunde, Karlsruhe, Germany (SMNK); The Natural History Museum [= British Museum (Natural History)], London, U.K. (BMNH).

***Rostromyrmex* gen. n.**Type-species: *Rostromyrmex pasohensis* sp. n.**Diagnosis**

Monomorphic ants belonging to the subfamily Myrmicinae, with the following combination of characters.

- Worker.** - 1. Mandibles broad triangular, 6- to 7-dentate (6-dentate in paratypes, 7-dentate in holotype, basal tooth very small; in all cases only one mandible clearly visible). Dentition decreasing in size from apex to base. Apical and subapical teeth separated from other teeth by short diastema.
2. Palp formula 2,2. Palpi very short, basal segment of maxillary palp distad strongly dilated (Fig. 7).
3. Antennae 9-segmented, with distinct, 3-segmented apical club.
4. Eyes strongly reduced.
5. Anterior clypeal margin entire, convex, with median projection beneath 'rostrum'.
6. Lateral portions of clypeus not raised posteriorly into a shield wall in front of antennal insertions.
7. Median portion of clypeus raised, forming striking prominence ('rostrum') projecting forward between levels of frontal lobes and anterior clypeal margin.
8. Median clypeal carina present, running from projection of anterior clypeal margin, over 'rostrum' to posterior clypeal margin.
9. Median clypeal seta present. Anteromedian portion of clypeus with 5 long setae: a pair laterally on 'rostrum' (anterodorsad directed), a pair beside median clypeal carina at midlength between 'rostrum' and median projection of anterior clypeal margin (anterodorsad directed), and single median seta directly above median projection of anterior clypeal margin (anteroventrad directed). Laterally of median seta 3 pairs of shorter setae. Dorsally of this row some other short setae and hairs.
10. Frontal lobes very closely approximated, separated by narrow median strip of cuticle which is somewhat depressed and shining.
11. Typical frontal triangle absent. Instead, the strip of cuticle between the frontal lobes widens posteriorly into an elongate, narrow, somewhat rhomboidal area which is depressed, smooth and shining.
12. Antennal scrobes present, large but shallow, deepest in the lower part near antennal sockets, and not sharply defined.

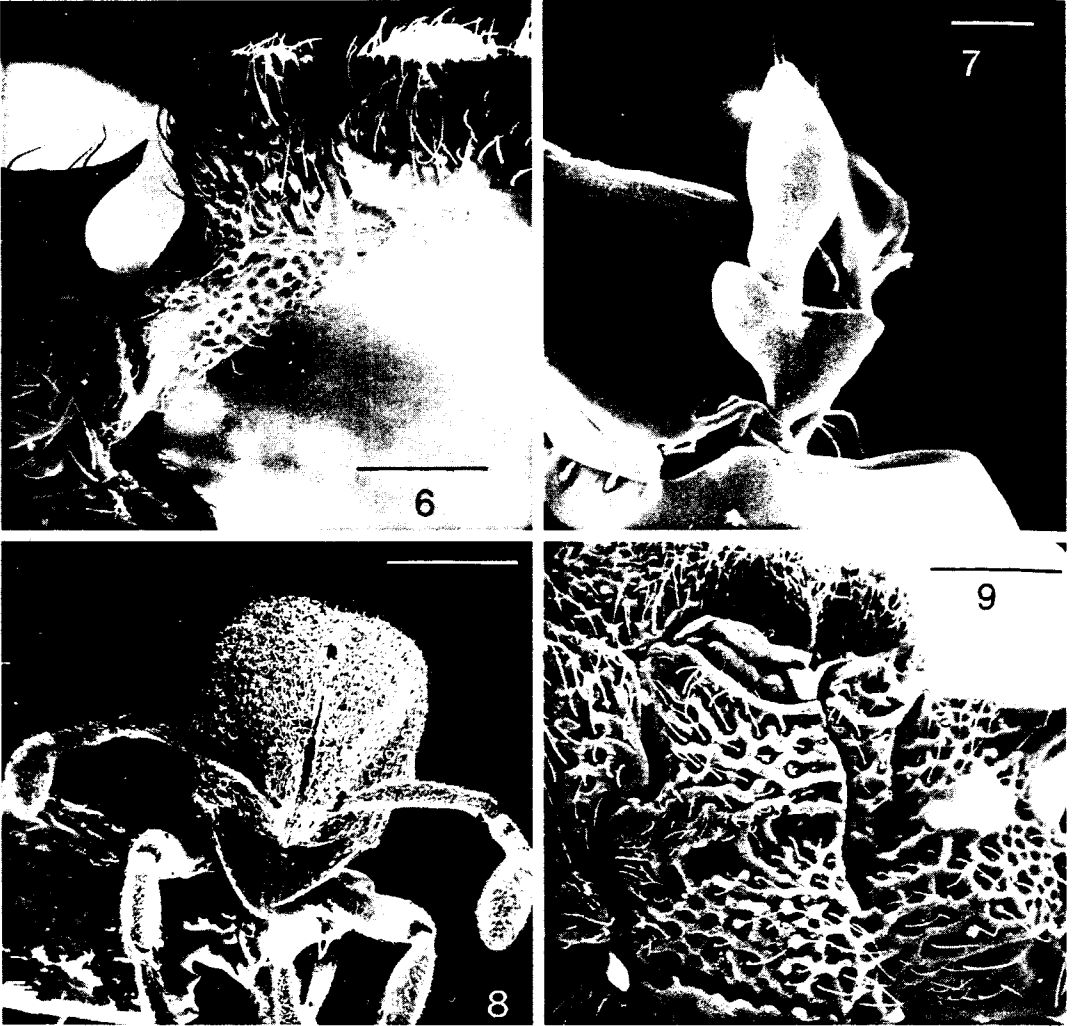
13. Frontal carinae very short, not extending posteriorly of frontal lobes.
14. A carina on ventrolateral margins of head present, extending from occipital margin approximately to eye level.
15. Alitrunk compact, slightly convex throughout in lateral view, propodeum separated from promesonotum by small but distinct metanotal groove which is bordered by a raised ridge posteriorly.
16. Pronotal angles (anterior ventrolateral margins of pronotum) sharp, but without distinct tooth.
17. Thorax strongly constricted laterally between mesonotum and propodeum (best seen in dorsal view).
18. Propodeal spines present, moderately large, directed postero dorsally and somewhat dorsally curved distad.
19. Propodeal spiracles conspicuous, situated above midheight and behind midlength of the propodeum, close to the margin of the declivity, some distance in from bases of propodeal spines.
20. Metapleural gland bullae large, a short distance from propodeal spiracles.
21. Propodeal lobes moderately large, broadly rounded, connected to propodeal spines by carinae. In lateral view they seem to form one carina.
22. Metasternal process absent.
23. Petiole with long peduncle and strongly developed node, spiracles located behind midlength of peduncle.
24. Tibial spurs absent from middle and hind legs.
25. First tergite forms more than half length of gastral dorsum.
26. Sting (Figs 10, 11) not heavily sclerotized, but probably able to sting, without any lobular flange near apex.
27. Entire body except gaster, legs, antennal funiculi and mandibles strongly sculptured.
- Queen.** - General characters as in workers, with following differences.
1. Slightly larger than workers.
 2. Mandibles 7-dentate.
 3. Segments of maxillary palp partly fused.
 4. Eyes well developed.
 5. Alitrunk slightly convex as in workers, but propodeum on lower level, separated from remaining alitrunk by a deep step.
 6. Thorax not strongly constricted laterally between mesonotum and propodeum.



Figs 2-5. *Rostrormyx pasohensis*, worker: (2) general habitus, lateral view (scale = 0.5 mm); (3) middle and posterior parts of alitrunk, lateral view (scale = 0.1 mm); (4) head and anterior part of alitrunk, dorsolateral view (scale = 0.25 mm); (5) head, dorsolateral view (scale = 0.25 mm).

- 7. Propodeal spines more posteriorly directed and almost straight.
- 8. Propodeal spiracles situated on the declivity itself, very close to metapleural gland bullae.
- 9. Carinae connecting metapleural lobes and propodeal spines weaker than in workers.
- 10. Several gland-like structures on katapisternum present (visible in SEM) (Fig. 9). According to Billen (pers. comm.), they might represent glands of an unknown type. However, for a morphological study living material is necessary.

- Male.* - 1. Total length slightly larger than in workers.
- 2. Palp formula 2,1 (in situ count; small labial palp difficult to see).
 - 3. Mandibles small, triangular, without any teeth, narrowed to a blunt tip.
 - 4. Antennae 10-segmented.
 - 5. 'Rostrum' absent. Median portion of clypeus raised, dome-shaped, without carina.
 - 6. Anterior clypeal margin broadly rounded, with row of 7 setae which are shorter than in females.



Figs 6-9. *Rostromyrmex pasohensis*, worker (6-7), queen (8-9): (6) petiolus and postpetiolus, lateral view (scale = 0.25 mm); (7) maxillary palp (scale = 0.01 mm); (8) head, frontal view (scale = 0.25 mm); (9) middle and posterior parts of alitrunk, lateral view (scale = 0.1 mm).

7. Antennal scrobes present, but shorter than in females.

8. Frontal carinae present, though weak.

9. Frontal lobes as narrow, widely separated strips, only partly concealing antennal articulations.

10. Frontal triangle present, broad, not sharply demarcated.

11. Parapsidal lines on dorsum of mesoscutum present, notauli absent.

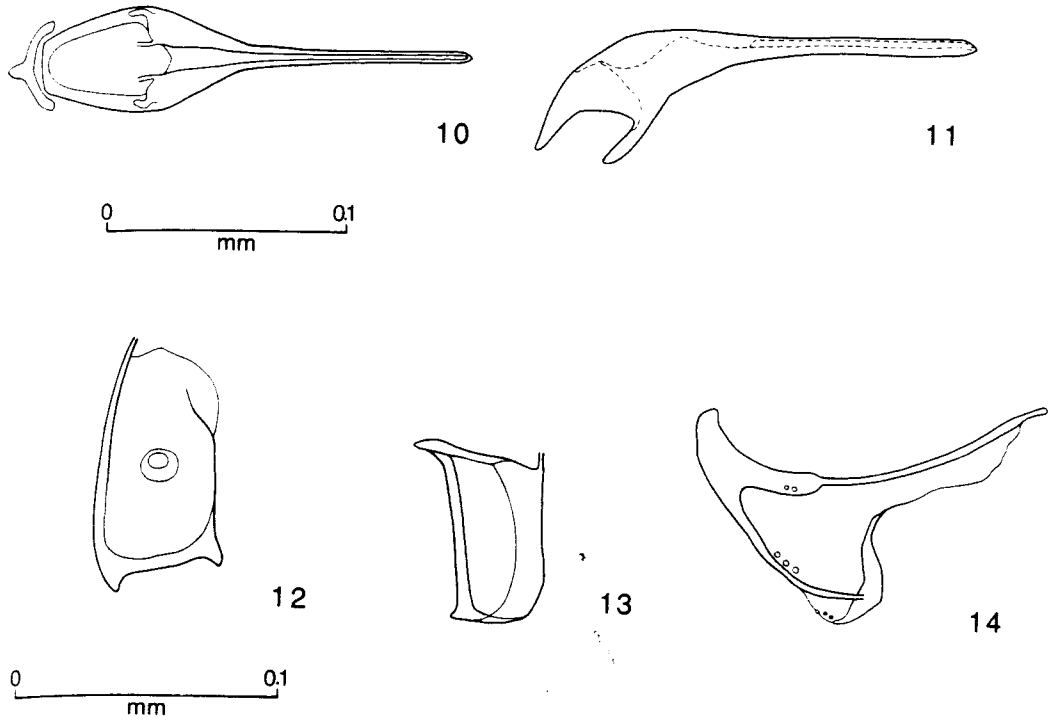
12. Posterior part of mesoscutum separated from

larger anterior part by a sulcus and raised, forming cone-shaped elevation which surpasses dorsal line of alitrunk in lateral view. This affiliates it more closely with auxillae and scutellum than with anterior part of mesoscutum.

13. Propodeal spines absent.

14. Propodeal spiracles situated high up, close to junction of metapleuron.

15. Petiolar peduncle long, gradually swollen posteriorly to a low node, spiracle located behind



Figs 10-14. *Rostromyrmex pasohensis*, sting apparatus: (10) sting and furcula, ventral view; (11) sting, lateral view; (12) spiracular plate; (13) quadrate plate; (14) oblong plate.

midlength of peduncle. Postpetiolar node low.
 16. Metapleural lobes small, broadly rounded, restricted to sides of propodeal foramen.
 18. Head except mandibles and antennal funiculi strongly sculptured.
 19. Wings with venation as in Figs 18 and 19, covered with abundant decumbent pilosity.
 20. Eyes large, with conspicuous, short, suberect pilosity.

***Rostromyrmex pasohensis* sp. n.**

(Figs 1-19)

With characters of generic diagnosis.

Holotype worker. - TL 2.17, HL 0.54, HW 0.45, CI 83, SL 0.33, SI 73, PW 0.34, AL 0.59. Habitus as in Fig. 2 (brighter coloration of some body parts is an artifact of the scanning electron microscopy).

Strongly reduced eyes situated at about 1/3 head length on sides of head (measured from mandibular insertions to occipital margin) and measure 0.037

mm in diameter. Length of 'rostrum' in dorsal view is 0.06 mm. Antennal segments 3-6 about 2 times as broad as long, segment 7 slightly broader than long. Apical club more than 2 times longer than remainder funiculus. Sides of head in face view slightly narrowing towards mandibles and rounded towards feebly and shallowly concave occipital margin. Propodeal spines as in Fig. 3, length 0.10 mm. Propodeal declivity almost vertical, slightly sloped dorsad, meeting propodeal dorsum at an angle of about 45° at anterior level of spine bases. A thin, transverse ruga lies between propodeal faces. It may be followed by one or two rugae on propodeal declivity. Metanotal groove in dorsal view at narrowest point of alitrunk and continues laterally as a suture to ventrolateral incision above middle and hind coxae. The suture is interspersed with transverse cross-ribs (Fig. 3). Petiolar peduncle relatively long and slender, subpetiolar process (anterior to and below petiolar spiracles) very small. Petiolar node distinct, high, ascending almost vertically, rounded dorsally, slightly broad-

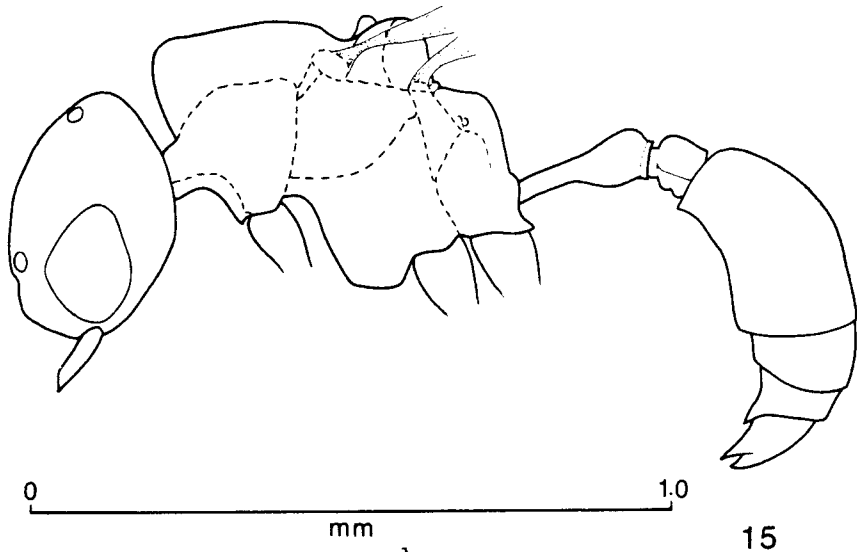


Fig. 15. *Postromyrmex pasohensis*, male, lateral view.

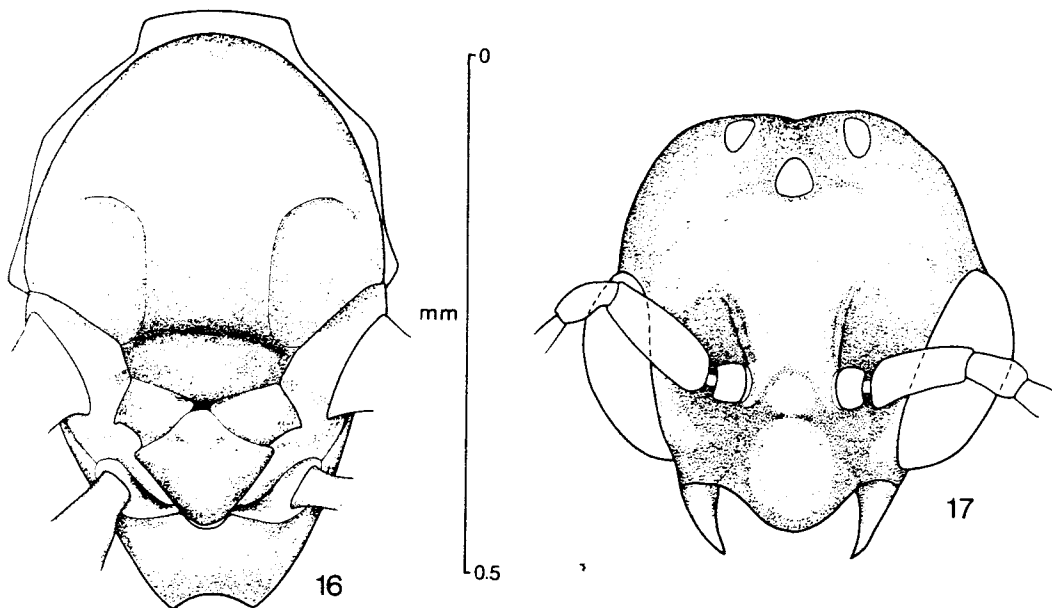
er than long (Fig. 6), without a visible step posteriorly. Postpetiole in lateral view slightly lower than petiole, shallowly rounded dorsally, broader than long. Postpetiolar process small and rounded, with two pairs of hairs laterally.

Sculpture of head, alitrunk, petiolus and postpetiolus as in Figs. 2-6. As part of sculpture, small knobs occur on dorsum of head, alitrunk and nodes of petiole and postpetiole. They are readily seen by SEM, less easily under a light microscope. Sculpture on sides of head (including antennal scrobes and base of mandibles) foveate-reticulate with hairs in the pits, sculpture more diluted on ventral side of head capsule. Surface of 'rostrum' with traces of sculpture laterally, moderately shining. Anterolateral portion of clypeus smooth and shining. Scape sculptured dorsally (Fig. 5). Maxillary palp as in Fig. 7. Mandibles, except laterobasally, smooth and shining. Dorsum of head with irregular sculpture, partly diluted between pits and, particularly towards occiput, equipped with small knobs. Alitrunk sculpture similar, except pits around propodeal spiracle (except ventrad) and on pronotal dorsum small and without hairs (Fig. 3). Propodeal declivity, beneath posterior level of spine bases, smooth and shining. Sculpture of nodes almost entirely consisting of knobs, petiolar peduncle foveate (Fig. 6). Gaster smooth and shining. Hind parts of coxae and basal parts of femora with weak impres-

sions. Distal parts of femora smooth and shining ventrally, this area flattened and without hairs. Remainder of legs, as well as antennal funiculus, without or with only traces of sculpture, moderately shining. Pilosity moderately dense on whole body, sparse only on meso- and metapleuron and on petiolar peduncle. Gaster with pilosity less dense than on head and alitrunk. Hairs mostly short, approx. 0.025 mm long, hooked, decumbent to suberect, appressed on legs and antennae. Scattered long hairs present. Maximal hair length on head dorsum 0.036 mm, on alitrunk dorsum 0.086 mm and on gaster 0.049 mm. Length of setae on anteromedian portion of clypeus as follows: setae on 'rostrum' 0.074 mm, setae between 'rostrum' and projection of anterior clypeal margin 0.098 mm, single median seta 0.074 mm. Body colour uniformly dull red, legs, antennal funiculi, mandibles and 'rostrum' somewhat lighter.

Paratype worker. - TL 2.10, HL 0.52, HW 0.43, CI 82, SL 0.31, SI 73, PW 0.32, AL 0.57. One pair of hairs laterally on postpetiolar process. Petiolar node with a small step posteriorly. Other characters as in holotype worker. Two more paratype workers are present in BMNH, London.

Paratype queen (Figs 8, 9). - TL 2.34, HL 0.55, HW 0.47, CI 84, SL 0.34, SI 72, PW 0.36, AL 0.66. Differs from workers as follows. Slightly larger.



Figs 16-17. *Rostromyrmex pasohensis*, male: (16) alitrunk, dorsal view; (17) head, frontal view.

Eyes well developed, maximal diameter 0.12 mm. Head in frontal view as in Fig. 8. Small black spots present around ocelli. Metapleural lobes somewhat weaker developed. Sculpture on meso- and metasternum as in Fig. 9. Petiolar node provided with small step posteriorly.

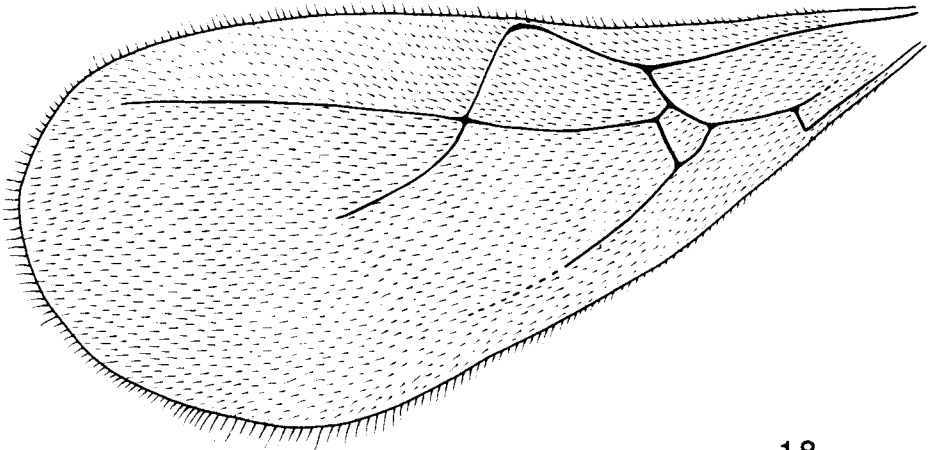
Paratype male (Figs 15-19). - TL 1.74 [petiolar node and peduncle measured in combination], HL 0.38, HW [including eyes] 0.40, CI 104.84, SL 0.13, SI 33.85, PW 0.34, AL 0.63.

Median 3 setae on anterior clypeal margin about same length (ca. 0.06 mm), 4 lateral setae are somewhat shorter. Antennal scrobes relatively short (reaching about $\frac{2}{3}$ of HL), shallow and poorly delimited, deepened beneath antennal sockets. Frontal carinae not bordering antennal scrobes dorsally, but following their declivity. A weak carina on ventrolateral margin of head extends from occipital margin to about level of eyes. Eyes large (max. diameter 0.19 mm), occupying most of anterolateral head, extending posteriorly to about level of antennal scrobes. Antennae with all segments longer than wide (pedicellus only slightly so because distally somewhat thickened). Terminal segment slightly longer than the two preceding segments together. Scape relatively short, somewhat

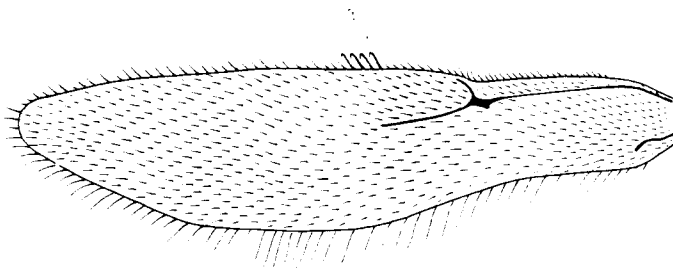
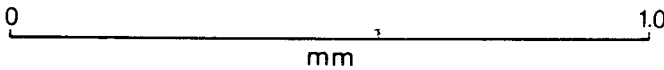
flattened dorsoventrally. Head (Fig. 17) slightly wider across eyes than long. Head in full-face view broadest before midlength. Sides of head slightly narrowing towards occiput and rounded towards feebly and shallowly concave occipital margin. Mesonotum almost vertically raised anteriorly, concealing most of pronotum in dorsal view. Metanotum small, strap-like, slightly elevated, just visible in dorsal view beneath scutellum. Dorsal face of propodeum relatively short, declivitous face almost vertical. Two small elevations present on transition between dorsal and declivitous faces of propodeum, thus the faces meet in a sharp angle in lateral view. Sides of propodeum rounded. Petiolar node broadly rounded dorsally, posteriorly descending without a step. Subpetiolar process absent. Postpetiole somewhat flattened dorsally, distinctly wider than long and wider than petiolar node in dorsal view. Postpetiolar process small and rounded, with one pair of hairs.

Wings with venation as in Figs 18-19. Fore wing with one cubital cell, radial cell open. Mf1 arises distal of cu-a, 1r and r-m absent. Stigma absent, replaced by thickening of the vein. 2r very long, possibly aligned with Rsf4. Hind wing with no closed cells, venation strongly reduced.

Sculpture on head as in female castes, i.e. foveate-



18



19

Figs 18, 19. *Rostrormyx pasohensis*, male: (18) fore wing; (19) hind wing.

reticulate with hairs in the pits. Knobs not recognizable under the light microscope (80x). Dorsum of mesoscutum dull, punctate. Punctures shallow, scattered, much more sparse than foveae of head. Scutellum with several large pits. Propodeum foveolate posterolaterally. Pronotum punctate laterally, remainder of pronotum and lateral sides of alitrunk dull with scattered, very shallow pits, absent on smooth and shining anterior and ventrolateral parts of katapisternum. Petiolar peduncle foveolate, laterally with pits extending to ventral and posterior parts of node. Petiolar and postpetiolar nodes from dorsal view dull, sculpture diluted. Pilosity on head including clypeus moderately dense. Hairs decumbent to suberect, mostly short,

about 0.025 mm long, on vertex and genae longer, up to 0.06 mm. Mandibles with some decumbent to appressed hairs, antennae with dense, decumbent to suberect pilosity. Eyes with short, suberect pilosity. Alitrunk dorsum, sides of petiole and postpetiole, and gaster covered with relatively sparse, appressed to suberect pilosity, occasionally longer hairs present. Scutellum with several long hairs (up to 0.06 mm) which arise from large pits. Remaining alitrunk bare, except for some hairs on anterior and dorsal parts of pronotum and on propodeum. Some short appressed hairs ventrally on petiolar peduncle.

Genitalia not examined.

Type material. - Holotype worker, West Malaysia: Negeri

Sembilan, Pasoh Forest Reserve, in rotten wood on forest floor, 10.iii.1990, FN 27 (K. Rościszewski) (SMNK). Paratypes: 2 workers with same data as holotype (BMNH), 2 workers, 1 queen from same locality, beneath rotten wood on forest floor, 6.iii.1990, FN 15 (K. Rościszewski) (SMNK), 1 male from same locality, colony found on 31.iii.1992 in rotten wood on forest floor, bred in captivity, 23.vi.1992, FN 2430 (K. Rościszewski) (SMNK).

Discussion

The assessment of character state polarities is based on comparisons with the *Myrmica*- and *Tetramorium* genus groups which are considered in most respects to exhibit the ancestral myrmicine condition (Bolton 1987). The following characters from the generic diagnosis of workers are considered as plesiomorphic: 1, 13, 18, 26, the following as apomorphic by reduction: 2, 3, 4, 24, and the characters 7-11 as apomorphic by development. The following characters are plesiomorphic in the Myrmicinae (Bolton 1988): median portion of clypeus broadly inserted between widely separated frontal lobes, and frontal triangle sharply demarcated. The striking clypeal prominence ('rostrum') is developed from the bicarinate *Lordomyrma*-pattern by extreme narrowing of the median portion of the clypeus, fusion of its carinae, and projection of the resulting lamella (Bolton, pers. comm.). Thus the median clypeal carina, which is a plesiomorphic state, is regarded as apomorphic in *Rostromyrmex*. The posterodorsal position of the propodeal spiracle (character 19) is considered as apomorphic. The plesiomorphic location of this spiracle is considered to be anterodorsal (Lattke 1990). In the male the absence of cross-vein r-m and the open radial cell in the fore wing are apomorphic states. The missing stigma and very long 2r (aligned with Rsf4?) are regarded as autapomorphic states.

The assignment of *Rostromyrmex* to any of the established tribes or genus groups is difficult. The characters of the clypeus, sting and wing venation rule out a placement in the *Myrmica*- or *Tetramorium* genus groups. The strongly carinate clypeus and the open radial cell plead against a placement in the *Pheidologeton* genus group (Ettershank 1966, Bolton 1987). According to Bolton (pers. comm.), *Rostromyrmex* is very close to *Lordomyrma* Emery, with which it shares a number of characters: frontal lobes, antennal scrobes, strong sculpturing of the body, conspicuous first gastral tergite, and absence of tibial spurs on middle and hind legs (Wheeler 1919). Also the shape of the clypeus can be derived from the *Lordomyrma* pattern. However, the fore

wing venation in the male differs considerably from that illustrated by Wheeler (1919: 105) for *Lordomyrma* (still, its variability has never been assessed - Bolton, pers. comm.). Other important differences, which however may be interpreted as further transformation of the *Lordomyrma* characters (Ward, pers. comm.), are (in the females) the reduction of frontal carinae, 6- or 7-dentate mandibles, 9-segmented antennae, and a long petiolar peduncle. The antennal scrobes in *Lordomyrma* are bordered with frontal carinae and are differently sculptured from the remainder of the head - which is not the case in *Rostromyrmex*. The sting in *Rostromyrmex* (Figs 10, 11) differs from that of *Lordomyrma* (Kugler 1978): not cuneiform, shaft long, sting base not vertical in profile. The strong basal ridge and well developed furcula with a long dorsal arm, as found in *Rostromyrmex*, are absent in the *Lordomyrma* (= *Promeranoplus*) genus group according to Kugler. The sting and furcula resemble those of some species of the *Solenopsis* genus group (Kugler 1978), but other characters of the sting apparatus are different: spiracular plate with dorsal notch, and oblong plate without noticeable posterior incision. The fore wing venation: cross-vein r-m absent, and radial cell open, except for the reduced stigma, is similar in the *Solenopsis* genus group and *Megalomyrmex* (Ettershank 1966, Bolton 1987). A strong median seta on anterior clypeal margin is characteristic of the *Solenopsis* genus group (also present in some *Rogeria* - Bolton, pers. comm.). A similar but weaker seta is also present in females of *Rostromyrmex* but, considering the peculiar development of clypeus, it is probably not homologous. Further differences from the *Solenopsis* genus group (see Bolton 1987) include mandibles with more than 5 teeth, antennal scrobes, well developed propodeal spines, strong sculpture on promesonotum, and 10-segmented antennae in the males.

Biology

The ants were collected in the litter layer of the forest floor. In one case three specimens were found (1 queen and 2 workers) below a piece of dead wood. Further, 5 workers and 1 queen were found with some brood in a piece of strongly rotten wood. In the third case a similar small colony (6 workers, 1 queen, and some brood) were found in the same microhabitat. The male was bred in captivity. Unfortunately, during a long absence of the author the colony died and the specimens were partly de-

stroyed by mould (and therefore not useful as paratypes).

The ants can easily be overlooked because of their small size, slow movements and dark colouration. They are apparently inhabitants of rotten wood on the ground, forming small, probably monogyne colonies. Their diet is not known. Kept in captivity, the ants were not observed eating the offered honey or dead insects.

Acknowledgments

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