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PO Box 3300, South Brisbane 4101, Australia  
Phone 06 7 3840 7555  
Fax 06 7 3846 1226  
Email [qmlib@qm.qld.gov.au](mailto:qmlib@qm.qld.gov.au)  
Website [www.qm.qld.gov.au](http://www.qm.qld.gov.au)

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A REVIEW OF THE *POLYRHACHIS* ANTS OF SULAWESI  
WITH KEYS AND DESCRIPTIONS OF NEW SPECIES  
(HYMENOPTERA: FORMICIDAE: FORMICINAE)

RUDOLF J. KOHOUT

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Eighty-four species of the ant genus *Polyrhachis* are listed from Sulawesi, including twenty-five described as new: *P. aberrans*, *P. arborea*, *P. bosi*, *P. brachyspina*, *P. brendelli*, *P. browni*, *P. chaita*, *P. cognata*, *P. deceptor*, *P. festina*, *P. gobini*, *P. hilaris*, *P. hispida*, *P. imitator*, *P. incognita*, *P. kazuoi*, *P. manni*, *P. masaokai*, *P. mellita*, *P. neglecta*, *P. ogatai*, *P. salebrosa*, *P. storki*, *P. stricta* and *P. sulawesiensis*. *Polyrhachis fornicata* Emery is re-described and the worker of *P. trispinosa* Fr. Smith, a species known only from the queen caste, is described. Five former subspecies, *P. aculeata cybele* Wheeler, *P. aculeata gibbosa* Forel, *P. fruhstorferi varicolor* Viehmeyer, *P. rastellata pagana* Santschi and *P. zopyra edentula* Emery, are raised to species. *Polyrhachis spinosa* Mayr synonymised earlier with *P. bubastes* Fr. Smith is reinstated as a valid species. *Polyrhachis tricuspis* André is considered a senior synonym of *P. ternatae* Karawajew. *Polyrhachis arcuata* (Le Guillou) and *P. muelleri* Forel are listed from Sulawesi for the first time. *Polyrhachis javanica* Mayr, previously recorded from Sulawesi, is considered not to occur there. Four new species-groups are proposed: the *P. vestita*-group within the subgenus *Myrma* Billberg, the *P. flavicornis*-group within the subgenus *Myrmatopa* Forel and the *P. aequalis*- and *P. thrinax*-groups within the subgenus *Myrmotherinax* Forel. All new and some previously described species are illustrated. □ *Polyrhachis, Sulawesi, Project Wallace, new species, synonymy*.

Rudolf J. Kohout, Biodiversity Program, Queensland Museum, PO Box 3300, South Brisbane, Qld, 4101, Australia (e-mail: rudolf.kohout@qm.qld.gov.au): 1 November 2007.

The Indonesian island of Sulawesi, formerly known as Celebes, occupies a central position in the Malay Archipelago. It is situated east of Borneo and flanked by the Makassar Strait and the Celebes, Molucca and Banda Seas. Sulawesi has traditionally been subdivided into four administrative provinces, Sulawesi Utara (North), Sulawesi Tengah (Central), Sulawesi Tenggara (South-East) and Sulawesi Selatan (South) with two more provinces, Sulawesi Barat (West) and Gorontalo, created in recent years.

In biogeographical terms, Sulawesi has always been difficult to classify. Several biogeographical lines have been drawn between the Indo-Malayan and Australasian regions based on the distributions of different taxonomic groups, but only Wallace's and Weber's lines persisted until the 20th century (Humphries, 1990). The geographical area between these two lines was named Wallacea (Dickerson, 1928) and has been used to indicate the unresolved biogeographical position of this region which, besides Sulawesi, includes the Moluccas, Lesser Sundas and

numerous smaller eastern Indonesian islands (Humphries, 1990).

Although the Sulawesi fauna and flora are not considered as rich as those of the neighbouring larger islands, they contain a vast number of endemic elements. Sulawesi is regarded as a biodiversity hotspot (see [www.biodiversityhotspots.org](http://www.biodiversityhotspots.org)) and is renowned for its biogeographical uniqueness and complexity, with the most distinctive elements found in its tropical rainforests (Marshall & Collins, 1990). However, in recent years, many farmers from Java and Bali have settled in Sulawesi resulting in increased rates of deforestation, particularly in the South and South-East provinces. It has been estimated that less than half of the island remains forested and only a fraction of it can be regarded as undisturbed, primary forest. More recently however, moves have been made to conserve Sulawesi's forests both by rehabilitating degraded forests and by preserving areas of primary forest (Kucera, 1990). To reduce the increasing pressure upon Sulawesi primary forests, a range of reserve areas have been

designated over the past few decades including Lore Lindu, Morowali and Dumoga-Bone National Parks.

For the most part this paper deals with material collected in Dumoga-Bone National Park during Project Wallace, the 1985 joint expedition of the Royal Entomological Society of London and the Indonesian Institute of Sciences (LIPI) to North Sulawesi, led by Dr N.E. Stork. Also included are sizable collections made before and after the expedition by Dr M.J.D. Brendell of the Natural History Museum, London, UK and Dr Ing. C. van Achterberg of the Nationaal Natuurhistorisch Museum, Leiden, The Netherlands. In addition, material collected by Dr Bruno Gobin of the Katholieke Universiteit, Leuven, Belgium, provided several species not collected by the expedition, including the type series of a new species. More recent material, including six new species, was collected from South and South East Sulawesi by Drs K. Ogata and K. Masaoka during the 1999 field survey jointly conducted by the Institute of Tropical Agriculture at the Kyushu University, Japan, the Indonesian Institute of Sciences (LIPI) and Hasanuddin University, Ujung Pandang. Additional material was provided by Prof. Dr Seiki Yamane, Faculty of Science, Kagoshima University, Japan, Prof. Datin Dr Maryati Mohamed, Institute for Tropical Biology and Conservation, Universiti Malaysia Sabah, Malaysia, Dr Jochen Ketterl, Staatliches Museum für Naturkunde, Stuttgart, Germany, and Dr Jerome Constant, Royal Belgian Institute of Natural Sciences, Brussels, Belgium. Most recently, a substantial collection of Sulawesi *Polyrhachis*, collected by canopy fogging in Lore Lindu National Park and surrounding cacao plantations, was received from Merijn M. Bos of Göttingen University, Germany. This material was received near the completion of the current paper and could not be fully incorporated. However, three new species have been described from this material and numerous records of other species included. Considering that Project Wallace centred on a relatively small area of Sulawesi, and that only limited collections are available from other parts of the island, I believe that the list of species presented here does not reflect the full richness of the Sulawesi *Polyrhachis* fauna.

#### HISTORICAL REVIEW

In 1860 and 1861 Frederick Smith described the first twenty-five species of *Polyrhachis* from Sulawesi, from specimens collected in

1856 and 1857 at Makassar (= Ujung Pandang) and in 1859 at Menado (= Manado) by Alfred Russel Wallace. In following years, a further twenty-one new species and subspecific forms were added by various authors, including Emery, Forel and Viehmeyer, bringing the number of *Polyrhachis* species described from the island to forty-six. This number includes eight species (and subspecies) described from copal and eleven which are now considered junior synonyms of senior taxa described from Sulawesi or from elsewhere in South East Asia. In addition, more than 20 extralimital species have been reported from Sulawesi by various authors, however, at least half of these records remain doubtful, while some are obviously erroneous.

#### MATERIAL AND METHODS

The present paper lists eighty-four species of *Polyrhachis* from Sulawesi, including twenty-five species described as new, and four species previously known only from other parts of Indonesia. Also included in the total are a number of species that have not recently been collected from the island, but have Sulawesi as their original provenance, or that have been confidently recorded there by reliable sources. Their absence from recent collections is in spite of a wide range of collecting methods having been employed, including canopy fogging (Martin Brendell, Nigel Stork and Merijn Bos), Malaise traps (C. van Achterberg) and general hand collecting (Bruno Gobin, Kazuo Ogata and K. Masaoka). Material examined is listed under the four traditionally recognised provinces of the island. Material from the two relatively recently created provinces, Sulawesi Barat and Gorontalo, is included within Sulawesi Selatan and Sulawesi Utara respectively.

Publication dates and the spelling of species and authors' names follow those of Bolton (1995), except for the name of Wladimir Karawajew, where the original spelling used by that author himself (e.g. 1927 etc) has been followed. Where a holotype specimen is mentioned as 'unique', this infers that it was the only specimen available for description and no syntype or paratype specimens are known to exist.

Most images were taken with a digital camera attached to a stereomicroscope and processed using Auto-Montage (Syncroscopy, Division of Synoptics Ltd, USA) and Adobe CS2 (Adobe Systems Inc, USA) software. Photographs of specimens collected by Merijn Bos were processed using Helicon Focus (Mac OSX version) and

Adobe Photoshop software. Unless otherwise indicated, all digital images of the new species depict the primary types. Those of previously described species represent the types or type-compared specimens.

The measurements (in mm) and indices follow those of Kohout (1990): TL = Total length (the necessarily composite measurement of the entire ant); HL = Head length (the maximum measurable length of the head in perfect full face view, measured from the anterior-most point of the clypeal border or teeth, to the posterior-most point of the occipital margin); HW = Head width (width of the head in perfect full face view, measured immediately in front of the eyes); CI = Cephalic index ( $HW \times 100/HL$ ); SL = Scape length (length of the antennal scape, excluding the condyle); SI = Scape index ( $SL \times 100/HW$ ); PW = Pronotal width (width of the pronotal dorsum measured at the bases of the pronotal spines, or across the humeri in species without spines); MTL = Metathoracic tibial length (maximum measurable length of the tibia of the hind leg). All measurements were taken using a Zeiss (Oberkochen) SR stereomicroscope with an eyepiece graticule calibrated against a stage micrometer.

Abbreviations and glossary of common and Indonesian terms: Barat = West; bukit = hill; fog. = fogging; for. = forest; FR = Forest Reserve; Gn. = Gunung = Mountain; I. = Island; Is = Islands; Mt = Mount; Mtn = Mountain; Mts = Mountains; NP = National Park; nat. for. = natural forest; agrof. = plantation; R. = River; rf. = rainforest; Selatan = South; Tengah = Central; Tenggara = South-East; Timur = East; Utara = North; w = worker/s.

Institutions and depositories (with the names of cooperating curators) are: AMNH – American Museum of Natural History, New York, NY, USA (Dr J.M. Carpenter); ANIC – Australian National Insect Collection, Canberra, Australia (Drs S.O. Shattuck, R.W. Taylor); BMNH – The Natural History Museum, London, UK (B. Bolton); BPBM – Bernice P. Bishop Museum, Honolulu, HI, USA (K.T. Arakaki); CASC – California Academy of Sciences, San Francisco, CA, USA (Dr B.L. Fisher); DEI – Deutsches Entomologisches Institut, Müncheberg, Germany (Dr A. Taeger); GUGG – Göttingen University, Göttingen, Germany (M.M. Bos); HNHN – Hungarian Natural History Museum, Budapest, Hungary (Dr J. Papp); IRSN – Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium (Drs P. Grootaert, P. Dessart,

J. Constant); IZAS – Institute of Zoology, Ukrainian Academy of Sciences, Kiev, Ukraine (Dr A.G. Radchenko); KUKJ – Kagoshima University, Kagoshima, Japan (Prof. Dr Seiki Yamane); KULB – Katholieke Universiteit, Leuven, Belgium (Prof. Dr J. Billen); MCSN – Museo Civico di Storia Naturale ‘Giacomo Doria’, Genoa, Italy (Drs R. Poggi, V. Raineri); MCZC – Museum of Comparative Zoology, Harvard University, Cambridge, MA, USA (Dr S.P. Cover); MHNG – Muséum d’Histoire Naturelle, Geneva, Switzerland (Drs C. Besuchet, I. Löbl, B. Mertz); MNHA – Museum of Nature and Human Activities, Hyogo, Japan (Dr Yoshiaki Hashimoto); MNHN – Muséum National d’Histoire Naturelle, Paris, France (Dr J. Casevitz-Weulersse); MNHU – Museum für Naturkunde, Humboldt-Universität, Berlin, Germany (Dr F. Koch, Ms Kleine-Möllhoff); NHMB – Naturhistorisches Museum, Basel, Switzerland (Drs M. Brancucci, D.H. Burckhardt); NHMW – Naturhistorisches Museum, Vienna, Austria (Drs M. Fischer, S. Schödl, H. Zettel); NMNH – National Museum of Natural History, Smithsonian Institution, Washington DC, USA. (Drs T. R. Schultz, D.R. Smith); NRMS – Naturhistoriska Riksmuseet, Stockholm, Sweden (Drs K-J. Hedquist, F. Ronquist, B. Viklund); OXUM – Hope Entomological Collections, University Museum, Oxford, UK (Drs C. O’Toole, D.J. Mann); PUPI – Punjabi University, Patiala, India (Dr Himender Bharti); QM – Queensland Museum, Brisbane, Australia (Drs C.J. Burwell, G.B. Monteith); RMNH – Nationaal Natuurhistorisch Museum, Leiden, The Netherlands (Dr Ing. C. van Achterberg); FIS – Forschungsinstitut Senckenberg, Frankfurt am Main, Germany (Drs J.-P. Kopelke, W.H.O. Dorow); SMNS – Staatliches Museum für Naturkunde, Stuttgart, Germany (Dr J. Ketterl); SNSD – Staatliche Naturhistorische Sammlungen, Museum für Tierkunde, Dresden, Germany (Drs R. Emmrich, U. Kallweit); UCDC – University of California, Davis, CA, USA (Dr P. Ward); UDSB – Università Degli Studi di Bologna, Italy (Prof. Dr Maria M. Principi); ITBC – Institute for Tropical Biology and Conservation, Universiti Malaysia Sabah, Kota Kinabalu, Sabah, Malaysia (Prof. Datin Dr Maryati Mohamed).

## SYSTEMATICS

NOMENCLATURAL CHANGES  
TO EXTRALIMITAL TAXA

During the progress of this study I have examined numerous types and other available specimens of several taxa, which directly or indirectly relate to the Sulawesian fauna of the genus. As a result, I propose a number of nomenclatural changes that are discussed throughout the text under their appropriate subgenera and species-groups. However, four that concern taxa that are distributed outside the main geographic scope of this paper are treated below.

***Polyrhachis edentula***  
Emery, 1900 *stat. nov.*

*Polyrhachis zopyrus* var. *edentula* Emery, 1900: 712; Forel, 1911 (description of queen and male). Syntype workers. Original localities: INDONESIA, SUMATRA, D. Tolong, Balighe, Pea Ragia, Si Rambé, Pangherang Pisang (E. Modigliani), MCSN (examined).

I have examined and directly compared the holotype of *Polyrhachis zopyra* (OXUM) with the syntypes of *P. zopyra edentula* and consider they represent separate species. They differ in several characters, including the outline of clypeus that, in lateral view, is weakly, but evenly convex with a flat basal margin in *P. edentula*, while it is straight and rounds into a weakly impressed basal margin in *P. zopyra*. The pronotal and petiolar teeth are distinctly more acute in *zopyra*, while in *P. edentula* they are shorter with the dorsal petiolar teeth obtuse and situated very close together. The pubescence in *P. zopyra* is very closely appressed, smooth and rather tidy, with only a few erect hairs arising from the gaster and the dorsum of head. The pubescence in *P. edentula* is more abundant and somewhat longer, with numerous erect hairs arising from all body surfaces, including the mesosoma and petiole.

***Polyrhachis gibbosa***  
Forel, 1908 *stat. nov.*

*Polyrhachis aculeata* var. *gibbosa* Forel, 1908: 9; Forel, 1913: 139 (description of queen). Syntype workers. Type locality: SRI LANKA, Puwakpitiya (E. Bugnion), MHNG (examined).

In order to establish the status of *Polyrhachis aculeata cybele* Wheeler (see below), I examined and directly compared the types of *P. aculeata* Mayr, *P. aculeata cybele*, *P. aculeata gibbosa* and a specimen of *P. hemiopticoides* Mukerjee identified by the original author (see Mukerjee,

1934: 11). All are similar, but I am confident in assigning specific rank to both the subspecies. The characters separating these four species include the degree to which the posterior blinkers of the eyes are developed, general pilosity and the shape and length of the pronotal and petiolar spines. In *P. aculeata* and *P. hemiopticoides* the eyes are strongly truncate and the pronotal and petiolar spines rather long and slender. *Polyrhachis aculeata* has all the body surfaces covered with numerous, relatively long, erect or semierect hairs and the legs and base of the gaster reddish-brown. In *P. hemiopticoides* hairs are present only on the head and over the gastral apex, and the gaster and tarsi are black with only the femora and tibiae reddish-brown. *Polyrhachis gibbosa* differs from both species and also from *P. cybele* by its distinctly less truncate eyes, stubby body, shorter and thicker petiolar spines and the presence of a distinct pile of short, silvery or whitish, appressed pubescence that is abundant over most of the body surfaces, except the vertex, midline of the mesosoma and gastral dorsum. *Polyrhachis gibbosa* is apparently limited to Sri Lanka, while *P. aculeata* and *P. hemiopticoides* are known from India, with the latter also reported from Laos. *Polyrhachis cybele*, which occurs on Borneo, Sumatra and Sulawesi is discussed in detail under the subgenus *Myrma* below.

***Polyrhachis pagana* Santschi, 1928 *stat. nov.***

*Polyrhachis* (*Cyrtomyrma*) *rastellata* var. *pagana* Santschi, 1928: 134, fig. 2c. Holotype worker. Type locality: INDIA, Kanara (Bell), NHMB (examined).

When describing *P. rastellata pagana*, Santschi compared his new variety to *P. euryala* Fr. Smith and *P. rastellata* (Latreille). He noted that it differed from *P. euryala* by having the dorsal petiolar spines longer and finer than the lateral pair, and from *P. rastellata* by its black appendages. I have examined a syntype of *P. euryala* and the holotype of *P. rastellata pagana*, together with numerous specimens of *P. rastellata*. Moreover, during a recent visit to India (PUP), I examined the *Polyrhachis* material collected by Mukerjee (1934). Examination of all the available specimens has shown all three taxa to represent separate species. Besides the characters listed above, *P. euryala* differs from both other species by its distinctly slender mesosoma with the greatest width of the pronotal dorsum at its mid-length. In contrast, both *Polyrhachis rastellata* and *P. pagana* feature a more robust pronotal dorsum which is widest across or just behind the shoulders. The two latter species differ mainly by the colour of



their legs that are mostly light to medium-red or orange in *P. rastellata* and black in *P. pagana*. In addition, the mesosomal profile in *P. rastellata* is distinctly uneven, with a rather flat or shallowly impressed summit at the promesonotal suture and a weak depression indicating the relative position of the indistinct metanotal groove. In contrast, the mesosoma in *P. pagana* is almost evenly rounded (more like that in *P. euryala*), with only a slight change in the angle of the profile at the steeply descending propodeal declivity.

### ***Polyrhachis tricusps* André, 1887**

*Polyrhachis tricusps* André, 1887: 284. Holotype queen (alate). Type locality: INDONESIA, Ambon I., IRSN, (examined).

*Polyrhachis* (*Myrmotherinx*) *tricusps* André. Emery, 1925: 184.

*Polyrhachis* (*Myrmotherinx*) *ternatae* Karawajew, 1933: 105, fig. 7. Syntype workers. Type locality: INDONESIA, Ternate I. (F. Weyer), (W. Karawajew #5281), IZAS, QM (examined). **New synonymy.**

I have examined the unique holotype queen of *P. tricusps* and compared it directly with a single available queen of *P. ternatae* from Seram I. The latter is a part of a series of specimens collected by W.M. Mann (Ceram, Piroe, 1937 NGS SI Exp.), with accompanied workers that have been compared with the syntype of *P. ternatae* and considered conspecific. In the original description, Karawajew compared *P. ternatae* with *P. frauenfeldi* Mayr from Java, however, it is more similar to *P. aequalis* Forel from the Philippines. Both species have short, but distinct humeral teeth, almost identical sculpturation of the mesosomal dorsum, subequal petiolar spines and a reddish-brown body and appendages. They mainly differ in the form of the median portion of the anterior clypeal margin that, in *P. ternatae*, has a widely open, 'V' shaped emargination, while it is simply truncate in *P. aequalis*.

### ***Polyrhachis varicolor* Viehmeyer, 1916 stat. nov.**

*Polyrhachis* (*Campomyrma*) *fruhstorferi* ssp. *varicolor* Viehmeyer, 1916: 163. Syntype workers, queen. Type locality: SINGAPORE (H. Overbeck), MNHU (examined).

*Polyrhachis* (*Myrmatopa*) *fruhstorferi* ssp. *varicolor* Viehmeyer. Emery, 1925: 180.

I have examined two syntype workers of *P. fruhstorferi* Emery (MCSN) and three workers and a queen of the syntype series of *P. fruhstorferi varicolor* Viehmeyer (MNHU). Comparison of the types with recently collected specimens of *P. fruhstorferi* (see below) and *P. fruhstorferi varicolor* (THAILAND, Songkhla Prov., Ton Nga

Chang Wildlife Sanctuary, Surachai Tongierm and CAMBODIA, Siem Reap, Banteay Srey, Kbal Spean, G.D. Alpert), clearly shows they are distinct species. The sculpturation in both species consists of reticulate-punctuation, however, it is distinctly finer in *P. varicolor*. The petiolar spines in *P. varicolor* are longer and more slender, while in *P. fruhstorferi* they are rather stubby. The colour of the body in *P. fruhstorferi* is mostly black, with only the legs and gaster very dark reddish-brown. In contrast, the body of *P. varicolor*, including the antennae and legs, is distinctly orange or light reddish-brown with the tarsi, gaster and apices of the petiolar spines darker reddish-brown and the frontal carinae and lateral margins of mesosoma narrowly lined with dark brown.

### **KEY TO SUBGENERA AND SPECIES- GROUPS OF *POLYRHACHIS* OF SULAWESI (based on workers)**

1. Mesosomal dorsum distinctly laterally marginate along its entire length ..... 2  
Mesosomal dorsum only partly marginate or totally immarginate ..... 13
2. Pronotal humeri produced into more-or-less anteriorly directed spines (eg. Fig. 2A) ..... 3  
Pronotal humeri rounded, angular or produced into broad-based short teeth (Figs 1C, E) ..... 10
3. Propodeum usually with upturned teeth (Fig. 4B); petiole scale-like with dorsum armed or unarmed (*Myrma*, in part) ..... 4  
Propodeum with posteriorly or upwardly directed spines (Fig. 11H); petiole columnar, armed with spines or teeth of various configurations ..... 7
4. Dorsum of petiole with four spines or teeth (Fig. 2C) ..... 5  
Dorsum of petiole without spines, entire or at most obtusely jagged (Fig. 5G) ..... 6
5. Mesosoma in profile evenly convex, without distinct border between dorsum and propodeal declivity; head with distinct postocular carinae ..... *Myrma continua*-group (only *P. continua* Emery)  
Mesosoma in profile with distinct border dividing dorsum from declivity; head without postocular carinae ..... *Myrma relucens*-group
6. Large species (HL >2.30); whole body with numerous long or medium length erect hairs (Fig. 5B) ..... *Myrma vestita*-group  
Small species (HL <1.80); body with only a few short erect hairs on front of head and around gastral apex (Fig. 1H) ..... *Myrma inermis*-group
7. Dorsum of petiole armed with 3 mostly dorsoposteriorly directed spines of various lengths (Fig. 12A) (*Myrmotherinx*, in part) ..... 8  
Dorsum of petiole armed with 2 mostly horizontal spines that usually conform to shape of gaster (Fig. 9A) ..... 9
8. Petiole with spines more-or-less subequal or with

- middle spine shorter than lateral pair (Fig. 11G)  
 ..... *Myrmotherinx aequalis*-group (in part)
- Petiole with middle spine distinctly longer than lateral pair that are sometimes rudimentary  
 ..... *Myrmotherinx thrinax*-group (in part)
9. Pronotal humeri produced into broad, horizontal, dorsally flattened spines (Fig. 9A); dorsum of petiole acute with pair of intercalary teeth  
 ..... *Myrmhopla cryptoceroides*-group (only *P. cryptoceroides* Emery)
- Pronotal humeri produced into rather slender, acute spines; dorsum of petiole with posteriorly sloping platform, without intercalary teeth ..... *Hedomyrma*
10. Propodeum with short, upturned teeth ..... 11  
 Propodeum with posteriorly directed, horizontal spines ..... 13
11. Petiole scale-like; dorsum armed with four, more-or-less subequal teeth ... *Myrma zopyra*-group (only *P. zopyra* Fr. Smith)
- Petiole columnar; dorsum armed with spines and/or teeth of various configurations. .... 12
12. Dorsum of petiole with two elevated spines, or with two horizontal spines and often a pair of intercalary teeth (Figs 7A, B, 7C, D). ... *Myrmatopa flavicornis*-group
- Dorsum of petiole with three very short, erect spines, middle spine often rudimentary (Fig. 12E-F)  
 ... *Myrmotherinx* (in part) (only *P. trispinosa* Fr. Smith)
13. Pronotal humeri rounded or weakly obtusely angulate; petiole with 3 spines, middle spine distinctly elongated, lateral spines short or rudimentary; body without long hairs (Fig. 12G-H). ... *Myrmotherinx* (in part) (only *P. unicuspis* Emery)
- Pronotal humeri distinctly toothed; petiole with 2 horizontal spines conforming to shape of gaster; body with abundant long hairs (Fig. 1A-B). ... *Chariomyrma*
14. Mesosomal dorsum partly marginate (*Myrmatopa*, in part) ..... 15  
 Mesosomal dorsum totally immarginate ..... 16
15. Lateral margins of mesonotum produced into distinct dorsolateral prominences (Fig. 11B); pronotal dorsum without trace of lateral margins ... *Myrmatopa schang*-group
- Lateral margins of mesonotum relatively flat, without distinct dorsolateral prominences (Fig. 11D); pronotal margins evident only at humeral angles, vague or completely lacking posteriorly ... *Myrmatopa wallacei*-group
16. Mesonotum with pair of spines ..... 17  
 ..... *Polyrhachis* (only *P. erosispina* Emery)
- Mesonotum without spines ..... 17
17. Mesosoma strongly longitudinally and transversely convex; colour black, mostly highly polished ... 18  
 Mesosoma weakly to moderately convex; colour of body variable, never highly polished ..... 19
18. Petiole scale-like; dorsum armed with four teeth or spines of various configurations (Fig. 1C, E); sides of head with longitudinal carinae separating genae from ventral parts of head; propodeum without spines ..... *Cyrtomyrma*
- Petiole columnar; dorsum armed with two horizontal spines that conform to shape of gaster (Fig. 10A, G); sides of head without longitudinal carinae; propodeum with pair of spines ..... *Myrmhopla mucronata*-group
19. Head and body with numerous, more-or-less erect hairs ..... 20
- Head and body with only a few scattered hairs ... 22
20. Larger species (HL > 2.50) ... *Myrmhopla sexspinosa*-group  
 Smaller species (HL < 2.20) ..... 21
21. Frontal carinae distinctly elevated; head and body rather coarsely sculptured (Fig. 8G-H) ... *Myrmhopla cleophanes*-group
- Frontal carinae not distinctly elevated; head and body reticulate-punctate ..... *Myrmhopla bicolor*-group
22. Antennal scapes and tibiae distinctly flattened ..... *Myrmhopla hector*-group  
 Antennal scapes and tibiae not distinctly flattened .... 23
23. Pronotal humeri produced into distinct, acute spines; head appears normal in relation to rest of body; eyes convex (Figs 8C) ..... 24
- Pronotal humeri toothed; head disproportionately large compared to rest of body; eyes flat (Fig. 9C)  
 ... *Myrmhopla flavoflagellata*-group (only *P. storki* sp. nov.)
24. Head and body deeply sculptured, foveolate-rugose (Figs 9E-F) ..... 25  
 Head and body only weakly reticulate-punctate .... 26
25. Smaller species (HL < 1.60); body light to very dark reddish-brown with appendages distinctly lighter  
 ... *Myrmhopla furcata*-group (only *P. rufipes* Fr. Smith)
- Larger species (HL > 2.25); body, including appendages and gaster often very dark reddish-brown  
 ... *Myrmhopla armata*-group (only *P. armata* (Le Guillou))
26. Propodeal spines with their tips distinctly curved outwards  
 ... *Myrmhopla dives*-group (only *P. dives* Fr. Smith)
- Propodeal spines with their tips straight  
 ..... *Myrmhopla armata*-group (in part)

## LIST OF POLYRHACHIS OF SULAWESI

### Subgenus *Chariomyrma* Forel, 1915

### KEY TO *CHARIOMYRMA* SPECIES (based on workers)

1. Pronotal humeri toothed (Fig. 1A); propodeal spines relatively short, mostly straight, distinctly diverging  
 ..... *arcuata* (Le Guillou)
- Pronotal humeri narrowly rounded; propodeal spines longer, weakly curved posteriorly, subparallel, with tips curved weakly outwards (in copal) ... *inclusa* Viehmeier

### 1. *Polyrhachis arcuata* (Le Guillou, 1842) (FIG. 1A-B)

*Formica arcuata* Le Guillou, 1842: 315. Syntype queen, worker. Type locality: BORNEO (for queen), NORTH AUSTRALIA (for worker) (locality for worker evidently erroneous), ?MNHN (types presumed lost).  
 (For full synonymy citations see Kohout, 1998: 510).

**MATERIAL. SULAWESI UTARA:** Dumoga-Bone NP, 00°34'N, 123°54'E, nr Tumpah R., c. 220m, 11-19.xi.1985 (Malaise trap) (C. van Achterberg) (w); ditto, Rentice II, 210m, 27.x.1985, primary for. (Bosmans & Van Stalle #044) (w). **SULAWESI TENGGARA:** Watuwila, 2km E of Base Camp, 12-15.x.1989 (Malaise trap) (C. van Achterberg) (w).

REMARKS. Specimens from Sulawesi are virtually identical and undoubtedly conspecific with material of *P. arcuata* from Peninsular Malaysia, Borneo and Sumatra.

## 2. *Polyrhachis inclusa* Viehmeyer, 1912

*Polyrhachis inclusa* Viehmeyer, 1912: 13, fig. 18. Holotype worker. Type locality: INDONESIA, SULAWESI (in copal), SNSD.

REMARKS. Emery (1925) and Bolton (1995) erroneously listed the provenance of *P. inclusa* as New Guinea, probably because the original description was published in a paper entitled "Ameisen aus Deutsch Neuguinea". However, Viehmeyer (1912: 13) clearly stated: "Der *antennata* sehr nahe verwandt ist eine in Kopal eingeschlossene neue Art von Celebes: 33. *Polyrhachis inclusa* sp. nov. (Fig. 18)", followed by its description.

## Subgenus *Cyrtomyrma* Forel, 1915

### KEY TO *CYRTOMYRMA* SPECIES (based on workers)

1. Pronotal humeri toothed or angular; propodeal declivity more-or-less oblique ..... 2  
     Pronotal humeri narrowly rounded; propodeal declivity virtually vertical; body jet-black (Figs 1C,D) ..... *forcinata* Emery
2. Dorsal petiolar spines distinctly shorter than lateral pair; body black, lightly sculptured (Fig. 1E-F) . . . *gibosa* Emery  
     Dorsal petiolar spines distinctly longer than lateral pair; body jet-black (in copal) ..... *celebensis* Viehmeyer

## 3. *Polyrhachis celebensis* Viehmeyer, 1913

*Polyrhachis rastellata* var. *celebensis* Viehmeyer, 1913: 155. Syntype workers. Type locality: INDONESIA, SULAWESI (in copal), MNHU (examined).

*Polyrhachis celebensis* Viehmeyer. Kohout, 2006b: 90.

REMARKS. Viehmeyer described *P. celebensis* as a variety of *P. rastellata* and his opinion was accepted by Donisthorpe (1938). However, following the examination of both available syntypes Kohout (2006b) raised *P. celebensis* to specific status.

*Polyrhachis celebensis* is very similar to *P. forcinata* as redescribed below. Both species have a virtually identical petiole with slender and acute dorsal spines with their tips curved backwards, while the lateral spines are very short, reduced to mere angles. In lateral view the mesosoma of both species is quite similar, featuring a moderately convex pronotum and a distinct step in the mesosomal outline, indicating the position of the metanotal groove. However,

the propodeal declivity in *P. celebensis* is steeply oblique, while in *P. forcinata* it is virtually vertical. The main difference between the species is the shape of their pronotal humeri that, in *P. celebensis* are somewhat angulate, while in *P. forcinata* they are narrowly rounded. Considering the wide range of variability in the shape of the humeral angles seen in some other *P. (Cyrtomyrma)* species, such as *P. australis* Mayr, 1870 (Kohout, 2006: 93), it is possible that *P. celebensis* and *P. forcinata* are conspecific. However, without the possibility of examining the type material of *P. forcinata*, this cannot be confirmed.

## 4. *Polyrhachis forcinata* Emery, 1900 (FIG. 1C-D)

*Polyrhachis rastellata* subsp. *forcinata* Emery, 1900: 720. ?Syntype workers. Type locality: INDONESIA, SULAWESI (E. Modigliani), MCSN (type/s considered lost).

*Polyrhachis forcinata* Emery. Donisthorpe, 1938:261.

This species was originally described from Sulawesi by Emery (1900) as a subspecies of *P. rastellata* and also listed from the island the following year (Emery, 1901). The type specimen/s from Sulawesi should be lodged in the Emery collection in MCSN, however, an extensive search by Dr Roberto Poggi and the author failed to locate them in that, or any other collection examined. Consequently, specimens collected by Elio Modigliani on Sumatra, Engano (= Pulau Enggano) and Mentawai (= Kepulauan Mentawai), lodged in MCSN and labelled as 'Co-types', have been generally accepted as syntypes of this species. These specimens were listed in the original description (Emery, 1900) and bear identification tags inscribed '*Polyrhachis rastellata forcinata* Em' in Emery's handwriting. However, I have directly compared the 'Co-type' specimens from Sumatra (Balighe, x.90-iii.91, E. Modigliani) with recently acquired *Cyrtomyrma* specimens from Sulawesi (see below) and am confident that they represent two different species. The original description of *P. forcinata*, though rather short, is diagnostic and no other *Cyrtomyrma* species known to occur on Sulawesi share the characters given by Emery.

Donisthorpe (1938) regarded *P. forcinata* as a good species, but misinterpreted the short original description by stating that it differed from *P. rastellata* in "the inner teeth of the scale being less high and acute, and less distant from the lateral ones". However, Emery in the original description states that: "La *rastellata forcinata* [worker symbol] differisce dalla forma tipica per i



denti mediali della squama più alti ed acuti, quasi spiniformi, ravvicinati fra loro e più distanti dai denti laterali.”. Emery’s diagnosis describing the middle petiolar spines translates as “middle teeth of the scale higher and more acute, almost spine-like”, the direct opposite to Donisthorpe’s statement. As a result of Donisthorpe’s mistranslation, this species has largely been misunderstood and misidentified, with Than (1978) ultimately considering *P. fornicata* a synonym of *P. rastellata*.

The following redescription of *P. fornicata* is given to assist its identification and to establish its identity in relation to the other Sulawesi *Cyrtomyrma*.

**MATERIAL.** SULAWESI TENGAH: Lore Lindu NP, Toro, Baloli, 835m, 14.iv.2005, cacao agrof., fog. (M.M. Bos #26) (w); ditto, Watu Bohe, 860m, 14.iv.2005, cacao agrof., fog. (M.M. Bos). SULAWESI SELATAN: Kayulagi nr Mangktana, 02°23’S, 120°47’E, 400m, 20.x.1999 (K. Ogata & K. Masaoka #80) (w); Rantepao, Tana Traja, 02°59’S, 119°54’E, 750m, 18.x.1999 (K. Ogata & K. Masaoka #56) (w).

**REDESCRIPTION.** *Worker*. Dimensions: TL c. 6.00-6.50; HL 1.53-1.62; HW 1.50-1.65; CI 98-100; SL 1.78-1.96; SI 119-121; PW 1.18-1.34; MTL 2.09-2.25 (4 measured).

Anterior clypeal margin produced into a shallow, truncate, medially notched flange, flanked by distinct acute angles. Clypeus in profile weakly convex; medially with blunt, longitudinal carina; basal clypeal margin weakly impressed medially, not impressed laterally. Frontal triangle indistinct. Frontal carinae with margins moderately raised medially; weakly converging and rather flat posteriorly; central area concave with weakly impressed, short, frontal furrow. Sides of head in front of eyes converging towards mandibular bases in almost straight line; behind eyes sides rounding abruptly into convex occipital margin. Eyes convex, in full face view clearly breaking lateral cephalic outline. Ocelli lacking; their relative positions indicated by distinct punctures in sculpturation. Pronotal dorsum in dorsal view with greatest width just behind narrowly rounded humeri; moderately convex in lateral view with promesonotal suture well impressed; position of metanotal groove indicated by distinct step in outline and a shallow depression. Propodeal dorsum rounding smoothly into vertical, declivity. Petiole with anterior face virtually flat, posterior face weakly convex; dorsal spines situated close together, slender and acute, somewhat diverging with their tips curved backwards; lateral spines very short, reduced to mere angles in some

specimens. Subpetiolar process in lateral view relatively short, acute anteriorly, with posterior face weakly concave. Anterior face of first gastral segment lower than full height of petiole, widely rounding onto dorsum of gaster.

Mandibles very finely rugose with numerous piliferous pits. Head, mesosoma and gaster shagreened; intensity of sculpturation only marginally increasing laterally, becoming somewhat reticulate, with meso- and metapleurae and base of petiole only weakly reticulate-rugose. Whole body with numerous piliferous pits and shallow punctures.

Mandibular masticatory borders near outer margins with numerous, curved hairs. Anterior clypeal margin with three, relatively long, anteriorly directed setae medially and a few, short setae laterally. Only a few pairs of rather short, erect hairs near anterior and basal clypeal margins, along frontal carinae and a pair of longer hairs on vertex. A few longer, erect hairs on anterior and posterior faces of fore coxae. Gaster with several erect hairs along posterior margins of dorsal segments and longer and more abundant hairs over ventral surfaces.

**Colour.** Black throughout, only tips of mandibular teeth, antennal condylae, extreme tip of apical funicular segments, joints of trochanters and femora, and tarsal claws lighter, yellowish- or reddish-brown.

Sexuals and immature stages unknown.

**REMARKS.** *Polyrhachis fornicata* is apparently endemic to Sulawesi. The ‘Co-type’ specimens from Sumatra and Mentawai (MCSN, Emery coll.) mentioned above are in my opinion conspecific with *P. rastellata* (see above under nomenclatural changes to extralimital taxa).

### 5. *Polyrhachis gibba* Emery, 1901 (FIG. 1E-F)

*Polyrhachis gibba* Emery, 1901: 580, fig. E. Holotype worker. Type locality: INDONESIA, SULAWESI (H. Fruhstorfer), MCSN (examined).

**REMARKS.** As the name suggests, *P. gibba* is characterised by a highly arched (gibbose) mesosomal dorsum. The holotype and two additional specimens, putatively identified as *P. gibba* (Than, 1978), from the Andaman Islands (BMNH) and the Philippines (MCZC) were the only known specimens of this species. However, the recent fogging activities of M.M. Bos in Lore Lindu NP (Baloli, Gn. Kalabul,

Kaha) and surrounding agricultural land (cacao agrof.) provided several additional specimens of this rare species.

### Subgenus *Hedomyrma* Forel, 1915

#### KEY TO *HEDOMYRMA* SPECIES

(based on workers)

1. Distinctly bicoloured; head and tarsi black with mesosoma, petiole and femora light reddish-brown; gaster and tibiae distinctly darker ..... *fervens* Fr. Smith
- Unicoloured; black throughout (in copal) ..... *circumdata* Viehmeyer

#### 6. *Polyrhachis circumdata* Viehmeyer, 1913

*Polyrhachis circumdata* Viehmeyer, 1913: 152, fig. Syntype workers, queen. Type locality: INDONESIA, SULAWESI (in copal), MNHU (workers examined).

*Polyrhachis atropos* var. *circumdata* Viehmeyer, 1914: 52.

*Polyrhachis circumdata* Viehmeyer. Kohout, 1998: 514.

REMARKS. The syntype workers and queen of *P. circumdata*, recorded from copal, are the only known specimens. For notes on *P. circumdata* and the very similar *P. atropos* Fr. Smith see Kohout (1998).

#### 7. *Polyrhachis fervens* Fr. Smith, 1860

*Polyrhachis fervens* Fr. Smith, 1860b: 101, pl. 1, fig. 26. Holotype worker. Type locality: INDONESIA, Ambon I. (A.R. Wallace), OXUM (examined).

*Polyrhachis valerus* Fr. Smith, 1861:40, pl. 1, fig. 10. Holotype worker. Type locality: INDONESIA, SULAWESI, Tondano (A.R. Wallace), OXUM (examined). Synonymy by Kohout, 1988: 434.

(For full synonymy citations see Kohout:1988: 434).

REMARKS. The distribution of *P. fervens* extends from eastern Indonesia (Halmahera, Seram and Ambon Is) to New Guinea and south to Cape York Peninsula, Queensland. Apart from the holotype of *P. valerus*, I have seen only one additional specimen (MNHU) of this species from Sulawesi. It bears a hand written tag stating: "Kopal angeblich, Celebes, Prof. O. Schlaginhaufen?" (name illegible).

### Subgenus *Myrma* Billberg, 1820

*Myrma* was divided by Emery (1925) into five species-groups, two African (*laboriosa* and *viscosa-decemdentata*), two South East Asian (*abrupta* and *zopyrus*) and one widespread (*militaris-relucens*). In his revision of the Afrotropical species, Bolton (1973) recognised six species-groups (*alexisi*, *gamaii*, *militaris*, *monista*, *revoili* and *viscosa*), all pertinent to the Ethiopian region. The Australian *Myrma* fauna was reviewed by Kohout (1989),

who included all species in the *relucens* species-group. However, he later (1998) introduced the *continua* species-group, but did not provide a diagnosis, which I rectify here. The *continua*-group is characterised by an evenly convex mesosomal outline and the presence of postocular and lateral ridges on the head. The *inermis* species-group was introduced by Bolton (1974). Included in the group were several species placed by Emery (1925) within the very similar *zopyra*-group. Both species-groups include some of the smallest members of the subgenus. The *inermis*-group is characterised by well developed pronotal spines, a petiole with two short lateral spines and an entire, arcuate dorsal petiolar margin, and by closely approximated frontal carinae producing an extremely narrow central area. In contrast, species included here within the *zopyra*-group have the pronotal spines reduced to mere teeth, a petiole armed with four, more-or-less distinct teeth and more widely separated frontal carinae and a broader central area. Twenty-seven Sulawesi species of *Myrma* belong within the *relucens* species-group, two in the *inermis*-group and one species each in the *continua*- and *zopyra*-groups. In addition, the island also has several endemic *Myrma* species that constitute a new *vestita* species-group characterised by a scale-like petiole that lacks spines and has a dorsal margin with only blunt teeth or a shallow median emargination. This petiolar configuration resembles that of *P. abrupta* Mayr, 1867 from Halmahera, but this species differs from those of the *vestita*-group in having strongly truncate eyes and a distinct carina running from the eyes towards the occipital corners. A petiole lacking dorsal spines is also characteristic of the *inermis*-group, but its constituent species differ from those of the *vestita*-group in having their dorsal petiolar margin smooth and entire. In addition, members of the *vestita*-group are some of the largest species of *Myrma*, while the *inermis*-group includes some of the smallest.

### *Polyrhachis continua* species-group

#### 8. *Polyrhachis continua* Emery, 1887

*Polyrhachis continua* Emery, 1887: 235, pl. 4, fig. 21. Holotype worker. Type locality: INDONESIA, Ternate I., Aqai Conora (O. Beccari), MCSN (examined).

*Polyrhachis continua* var. *revocata* Viehmeyer, 1913: 151. Syntype workers. Type locality: INDONESIA, SULAWESI (in copal), MNHU (examined). Synonymy by Kohout, 1998: 519.

REMARKS. The syntypes of *P. continua revocata* appear to be the only specimens of this species

recorded from Sulawesi. *Polyrhachis continua* is known from the Moluccas (Ternate I.) and New Guinea (Paumotu R.), with other species of the *continua*-group extending to the Bismarck Archipelago and south to Cape York Peninsula in Queensland. Like other members of the species-group, *P. continua* has an evenly curved mesosomal dorsum that lacks a distinct border between the propodeal dorsum and declivity, and has postocular and lateral ridges on the head (Kohout, 1989; 1998).

### ***Polyrhachis inermis* species-group**

#### **KEY TO *INERMIS*-GROUP SPECIES (based on workers)**

1. Black throughout ..... *inermis* Fr. Smith  
Body black; tibiae light to medium reddish-brown with  
rest of legs distinctly darker ..... *orsylla* Fr. Smith

#### **9. *Polyrhachis inermis* Fr. Smith, 1858 (FIG. 1G-H)**

*Polyrhachis inermis* Fr. Smith, 1858: 68, pl. 4, figs 25, 26. Holotype worker. Type locality: INDONESIA, SULAWESI, BMNH (examined).

**MATERIAL.** SULAWESI UTARA: Dumoga-Bone NP, 400m, 11.ii.1985, fog. (N.E. Stork et al.) (w); ditto, 230m, 11.vii.1985, fog. (N.E. Stork et al.) (w); ditto, 2.xii.1985, fog. (N.E. Stork et al.) (♀); ditto, subcamp Barney's, 300m, x.1985 (Bosmans & Van Stalle #022) (♀); ditto, Maze area, 210m, 27.x.1985, sweeping (Bosmans & Van Stalle #057) (w); ditto, Toraut, 200m, 11.x.1985 (Bosmans & Van Stalle #020) (♀); ditto, 8.x.1985 (Bosmans & Van Stalle #010) (w). SULAWESI TENGAH: nr Luwuk, Salodik-Linyek, 500m, 21.-31.x.1989 (Malaise trap) (C. van Achterberg) (w). SULAWESI TENGGARA: 1-2km E of Wolasi, 42km S Kandari, c. 350m, rf, 13-14.vii.1972 (W.L. Brown) (w). SULAWESI SELATAN: Bantimurung, Ujung Pandang, 8.vii.1992 (Sk. Yamane) (w).

**REMARKS.** The holotype worker of *P. inermis* is very similar to specimens from Dumoga-Bone NP and other recently collected material from elsewhere in Sulawesi. However, the modern specimens are generally more slender than the holotype, due to a narrow pronotal dorsum. Their pronotal spines are also slightly less divergent, with the lateral pronotal margins at the bases of spines less emarginate. In addition they have rather distinct longitudinal striation on the mesosomal dorsum which is rather vague in the holotype, notably on the pronotal dorsum. The eyes are fairly convex in the holotype and clearly exceed the outline of the head in full face view, while in most of the recently collected specimens the eyes do not, or only marginally,

exceed the lateral cephalic outline. Despite these differences, the recent specimens are very similar to the holotype in most other aspects and I consider them conspecific.

*Polyrhachis inermis*, together with *P. carbonaria* Fr. Smith, *P. ceramensis* Mayr, *P. hosei* Donisthorpe, *P. orsylla* Fr. Smith, *P. ritsemai* Mayr, *P. vindex* Fr. Smith, and about ten undescribed new species from Borneo, form the distinct *inermis*-group (Bolton, 1974). The synonymy of *P. carbonaria* and *P. hosei* was discussed recently (Kohout, 1998) while the status of the remaining species appears to be clearly delimited, except for *P. orsylla*, which is discussed below.

#### **10. *Polyrhachis orsylla* Fr. Smith, 1861**

*Polyrhachis orsyllus* Fr. Smith, 1861: 39, pl. 1, figs 6, 7. Holotype worker. Type locality: INDONESIA, SULAWESI (A.R. Wallace), OXUM (examined).

**MATERIAL.** SULAWESI UTARA: Dumoga-Bone NP, 400m, 11.ii.1985, fog. (N.E. Stork) (w). SULAWESI TENGAH: Lore Lindu NP, Toro, Gn. Kalabui, 950m, 16.iv.2005, nat. for., fog. (M.M. Bos #37) (w). SULAWESI SELATAN: Cagar Alam Karaenta, Kabupaten Maros, 265-315m, iii.1996 (B. Gobin) (w); Balampeasoang For., 5-8km NE of Tanete, 400m, degraded rf., 8-10.vii.1972 (W.L. Brown) (w); Sampulage nr Mangktana, 02°16'S, 120°47'E, 1000m, 19.x.1999 (K. Ogata & K. Masaoka #70) (w).

**REMARKS.** *Polyrhachis orsylla* is undoubtedly closely related to *P. vindex* Fr. Smith and when Wheeler (1919) redescribed the latter, he suggested *P. orsylla* could represent a subspecies or synonym of *P. vindex*. Later Wheeler (1924) listed *P. orsylla* as a synonym of *P. vindex*, a decision followed by Bolton (1974) and Dorow (1995). However, Emery (1925), Karawajew (1927) and more recently Bolton (1995) listed *P. orsylla* as a separate species and I am inclined to follow their opinion. The species differ in the form of the pronotal spines which are shorter and only slightly longer than their basal widths in *P. orsylla* and about twice as long as their basal widths in *P. vindex*. Also, the sculpturation of pronotal dorsum in *P. orsylla* is distinctly finer, almost vague in some specimens, while in *P. vindex* it consists of rather distinct, more-or-less regular, striation. Both species are rather uncommon and represented by single specimens or short series in collections. *Polyrhachis orsylla* could ultimately be confirmed as an isolated population of *P. vindex* but this requires examination of worker-queen associated series

from across the range of their distribution, material that is not presently available.

### **Polyrhachis relucens** species-group

#### **KEY TO *RELUCENS*-GROUP SPECIES** (based on workers)

1. Distinctly bicoloured with body mostly black and legs, at least in part, orange or light red ..... 2  
Unicoloured; black throughout with only legs sometimes dark to very dark reddish-brown ..... 4
2. Petiole without spines or teeth, obtusely angular; femora, petiole and base of gaster light reddish-brown ..... *rufofemorata* Fr. Smith  
Petiole with spines, teeth or both in various configurations; legs distinctly orange or light red ..... 3
3. Whole body, including appendages with abundant, short to medium length hairs and somewhat untidy, relatively long appressed pubescence; propodeal dorsum with upturned teeth; declivity oblique ..... *compressicornis* Fr. Smith  
Head, mesosoma, petiole and gaster covered with short to medium length hairs and closely appressed pubescence that is completely absent from legs; propodeal dorsum without teeth; declivity very steep, virtually vertical ..... *ithona* Fr. Smith
4. Antennal scapes with bases distinctly broadened and strongly bent (Fig. 6A) ..... *bosi* sp. nov.  
Antennal scapes without bases broadened, straight. .... 5
5. Smaller species (HL <2.00) ..... 6  
Larger species (HL >2.00) ..... 9
6. Body very finely sculptured, highly polished, jet-black; medium length hairs scattered over most surfaces; closely appressed pubescence lacking (Fig. 3A-B) ..... *cybele* Wheeler  
Body reticulate-punctate, opaque below abundant, closely appressed pubescence ..... 7
7. Dorsum of mesosoma with mesonotum and propodeum virtually flat in lateral view (Fig. 2D); propodeal declivity concave; petiolar spines very short; golden appressed pubescence present over most body surfaces ..... *brachyspina* sp. nov.  
Dorsum of mesosoma evenly convex in lateral view (Fig. 3D); propodeal declivity oblique; appressed pubescence white or silvery ..... 8
8. Petiole rather robust, distinctly biconvex in profile, dorsum with very prominent lateral teeth and short, weakly dorsoposteriorly elevated spines; eyes weakly truncate posteriorly; relatively short hairs over most body surfaces, including legs ..... *numeria* Fr. Smith  
Petiole very slender with only obtusely angular, not prominent, lateral teeth and strongly dorsally elevated spines; eyes not truncate; only a few hairs arising from front of head and gastral apex, hairs completely absent from mesosomal dorsum ..... *festina* sp. nov.
9. Propodeal teeth very prominent, dorsally flattened and curved upwards and outwards (Fig. 3E-F) ..... *hastata* Fr. Smith  
Propodeal teeth not prominent, short or rudimentary (Fig. 3H) ..... 10
10. Dorsum of head and mesosoma rather regularly, more-or-less longitudinally striate. .... 11

- Dorsum of head and mesosoma more-or-less uniformly reticulate-punctate without evident longitudinal pattern ..... 16
11. Gaster distinctly, finely, longitudinally striate ..... 12  
Gaster finely reticulate-punctate ..... 14
  12. Dorsum of petiole straight with rather distinct intercalary tooth ..... *striatorugosa* Fr. Smith  
Dorsum of petiole 'U'-shaped without intercalary tooth (Fig. 4E) ..... *sculpturata* Fr. Smith
  13. Body, including appendages with abundant, medium to long erect hairs. .... 15  
Body virtually without hairs, except for a few erect hairs on front of head and around gastral apex (Fig. 3G, H) ..... *isacantha* Emery
  14. Gaster reticulate-punctate, opaque; dorsum of petiole with short intercalary tooth (Fig. 4C). .... *rixosa* Fr. Smith  
Gaster very finely shagreened, highly polished (in some specimens dorsum of first gastral segment at summit with indication of very fine longitudinal striae); intercalary petiolar tooth acute and rather prominent. .... *nigropilosa* Mayr
  15. Body with distinct, pale or rich golden, closely appressed, abundant pubescence over most dorsal surfaces .... 17  
Body with very diluted, white or greyish, appressed pubescence, virtually absent from most dorsal surfaces ..... 18
  16. Dorsal petiolar spines shorter than distance between their bases; dorsum of petiole with distinct acute intercalary tooth ..... *decipiens* Roger  
Dorsal petiolar spines very slender, curved and distinctly longer than distance between their bases; dorsum of petiole without intercalary tooth (Figs 4A, B) ..... *olena* Fr. Smith
  17. Pronotal spines virtually straight; petiole with parallel spines and rudimentary intercalary tooth (Fig. 2E) ..... *brendelli* sp. nov.  
Pronotal spines curved, bullhorn-shaped; petiole with spines diverging, dorsum without intercalary tooth (Fig. 2G). .... *brownii* sp. nov.

### **11. *Polyrhachis bosi* sp. nov.** (FIGS 2A-B, 6A)

**MATERIAL.** HOLOTYPE, SULAWESI TENGAH: Lore Lindu NP, Toro, Gn. Kalabui, 950m, 6.v.2005, nat. forest, fog., M.M. Bos (worker). PARATYPE: Lore Lindu NP, Toro, Gn. Kamonua, 1080m, nat. forest, fog., M.M. Bos (worker). Type deposition: Holotype in QM (QMT144145), paratype in GUGG (M. Bos private collection).

**DESCRIPTION.** *Worker.* Dimensions (holotype cited first): TL c. 7.96, 8.32; HL 1.93, 2.09; HW 1.50, 1.65; CI 78, 79; SL 2.15, 2.34; SI 143, 142; PW 1.18, 1.25; MTL 2.28, 2.50 (2 measured).

Anterior clypeal margin arcuate, very narrowly truncate medially. Clypeus with blunt, median carina; in profile almost straight, only weakly raised anteriorly; posteriorly rounding into shallowly impressed basal margin. Frontal triangle indistinct. Frontal carinae sinuate with sharply raised, almost



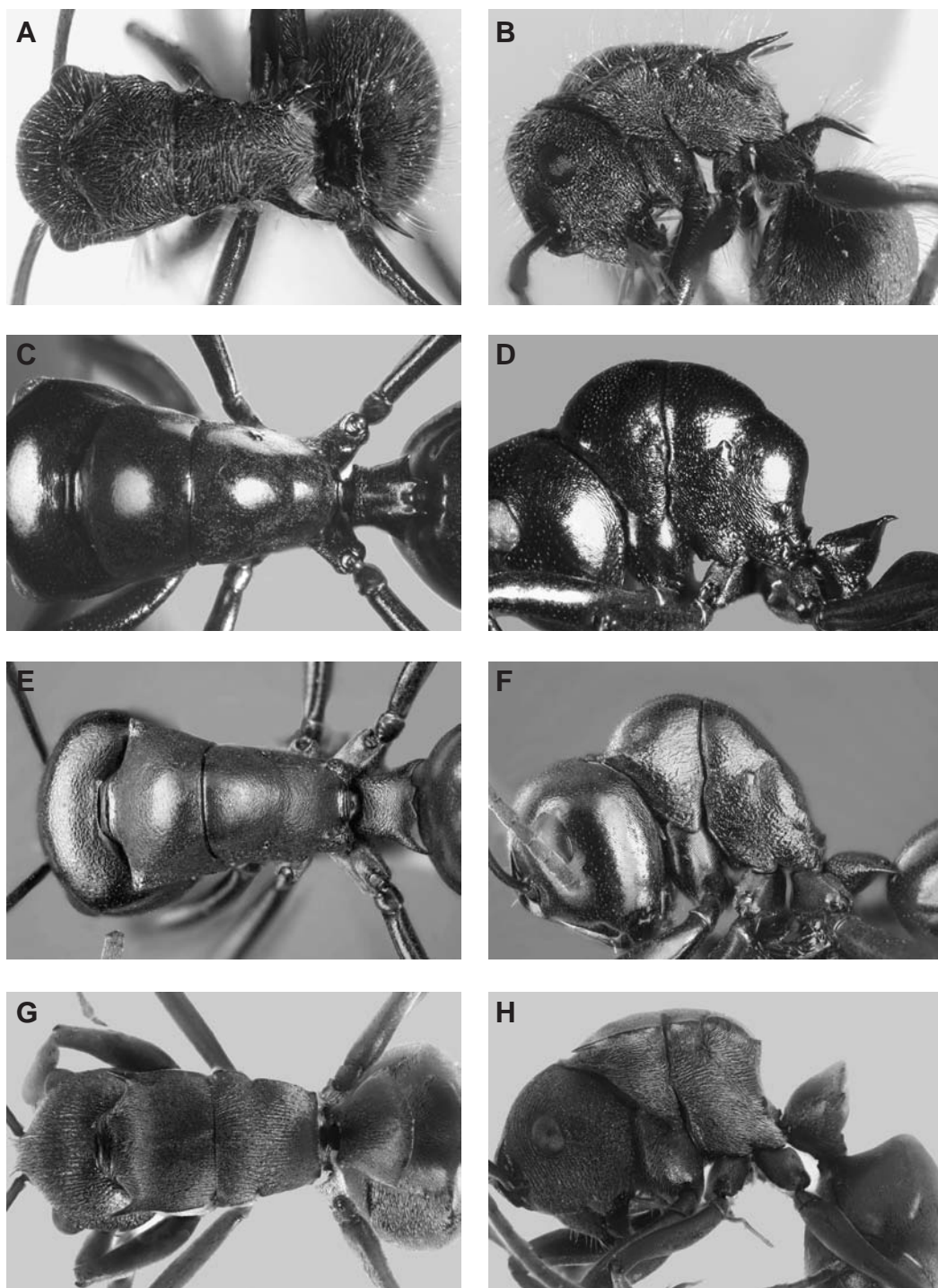


FIG. 1. *Polyrhachis* species, Dorsal (left) and lateral (right) view of mesosoma and petiole: A-B, *P. arcuata* (Le Guillou); C-D, *P. fornicata* Emery; E-F, *P. gibba* Emery; G-H, *P. inermis* Fr. Smith (not to scale).

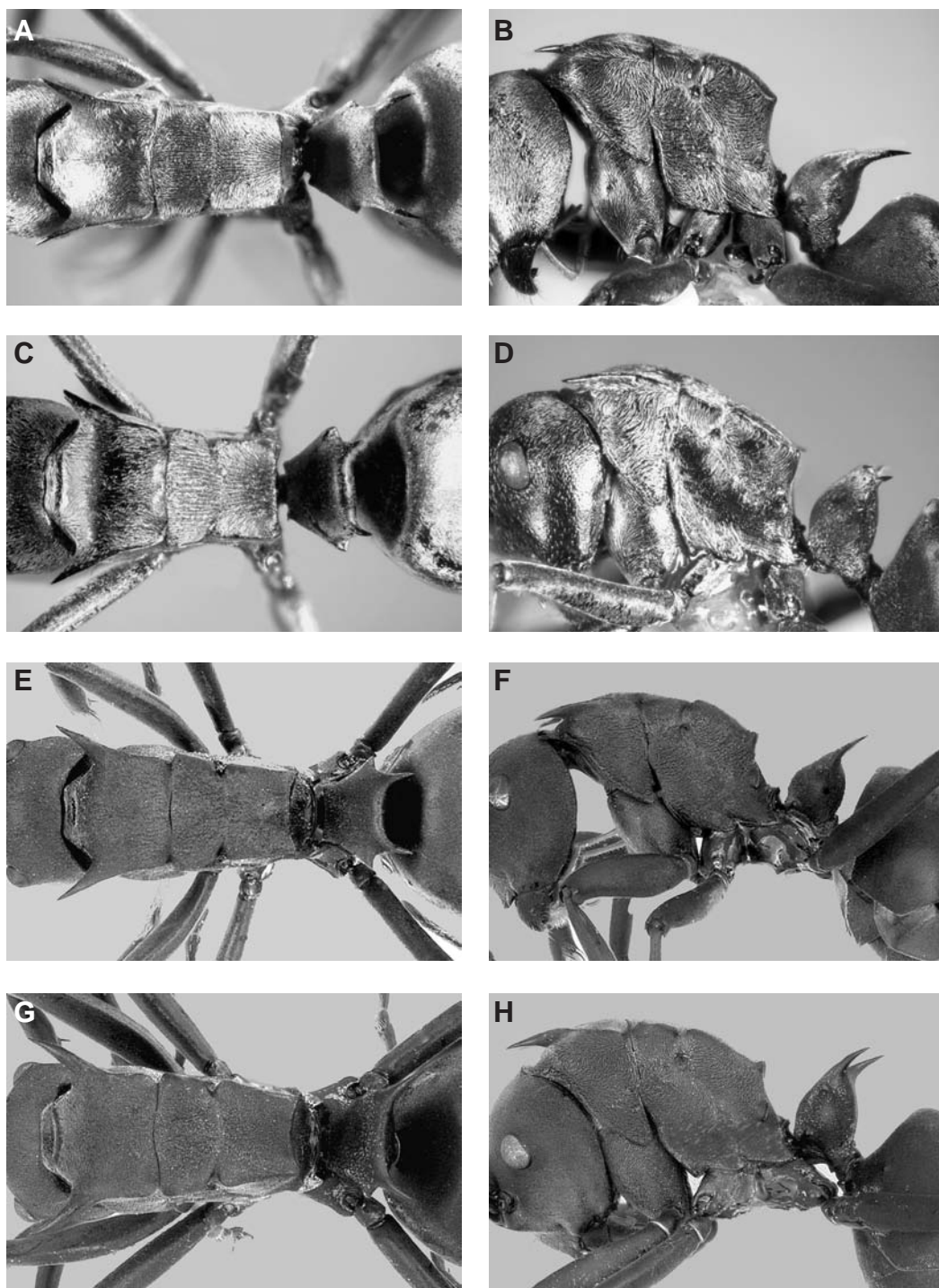


FIG. 2. *Polyrhachis* (*Myrma*) species, Dorsal (left) and lateral (right) view of mesosoma and petiole: A-B, *P. bos* sp. nov.; C-D, *P. brachyspina* sp. nov.; E-F, *P. brendelli* sp. nov.; G-H, *P. browni* sp. nov. (not to scale).

vertically laminate margins; central area extremely narrow, with clearly indicated median frontal furrow. Antennal scapes relatively short, bases distinctly broadened with excavated inner margins; in dorsal view scapes somewhat twisted and strongly bent (Fig. 6A). Sides of head in front of eyes only weakly converging anteriorly; behind eyes sides rounding into broad occipital margin. Eyes moderately convex, situated well forward from occipital corners; in full face view eyes only marginally breaking lateral cephalic outline. Lateral ocelli poorly developed; position of median ocellus indicated by distinct pit in cephalic sculpturation. Pronotal dorsum virtually flat between pair of rather long, anterolaterally directed, somewhat dorsomedially flattened, acute spines; their outer edges acute and basally continuous with lateral margins of pronotum. Mesonotal dorsum wider than pronotal dorsum at base, strongly transverse, with medially emarginate lateral margins. Propodeal dorsum slightly wider than long, virtually parallel-sided, with weakly sinuate lateral margins terminating in rounded, upturned, transverse ridges that meet medially and form an inwardly bowed carina dividing propodeal dorsum from shallowly concave declivity. Petiole biconvex in profile, armed with a pair of dorsolaterally and posteriorly directed, acute spines that are situated on dorsolateral angles (apex of left petiolar spine in holotype bent weakly, but distinctly inwards); dorsal petiolar margin between spines transverse, with indication of a median intercalary tooth; lateral margins of petiole with secondary, short, acute tooth below bases of spines. Anterior face of first gastral segment concave, with anterodorsal margin reaching height of dorsal petiolar margin.

Mandibles finely, mostly longitudinally striate. Head, petiole and gaster shagreened; dorsum of mesosoma with weakly indicated longitudinal striae; sides of mesosoma more distinctly sculptured, reticulate-punctate, with reticulae somewhat oblique. Tips of pronotal and petiolar spines rather smooth, polished.

Mandibular masticatory borders and outer margins apically with several semierect, golden hairs. Anterior clypeal margin with a few long, anteriorly directed setae medially and fringe of shorter setae laterally. Several pairs of medium length, erect, golden hairs near anterior and basal margins of clypeus and along frontal carinae; single pair on vertex arising from pits next to lateral ocelli. Antennal scapes with a few, short, erect hairs fringing apex. Pair of downwardly directed, longer hairs on anterior face of

fore coxa. Gaster with several medium length hairs on apical segments, their length distinctly increasing towards gastral apex and on ventral gastral surfaces. Most of body with rather dense, closely appressed, mostly silvery pubescence obscuring underlying sculpturation. Pubescence on dorsum of mesosoma follows longitudinal pattern of striation, distinctly longer and irregular pubescence on sides of mesosoma.

*Colour.* Black throughout.

Sexuals and immature stages unknown.

**REMARKS.** *P. bos* is somewhat similar to *P. festina*, but differs in having the base of antennal scapes distinctly widened and strongly bent (Fig. 6A), and the frontal carinae very close together, leaving the central area extremely narrow.

## 12. *Polyrhachis brachyspina* sp. nov. (FIG. 2C-D)

**MATERIAL.** HOLOTYPE, SULAWESI UTARA: Dumoga-Bone NP, 11.ii.1985, N.E. Stork et al. (worker). Type deposition: Unique holotype in BMNH.

**DESCRIPTION.** *Worker.* Dimensions: TL c. 7.76; HL 1.96; HW 1.62; CI 83; SL 2.25; SI 139; PW 1.22; MTL 2.50.

Anterior clypeal margin arcuate, entire. Clypeus with blunt longitudinal median carina; in profile shallowly concave, with distinctly raised anterior margin and flat basal margin. Frontal triangle distinct. Frontal carinae sinuate, margins weakly raised; central area flat, relatively wide with weakly impressed frontal furrow. Sides of head in front of eyes straight, weakly converging towards mandibular bases; behind eyes sides rounding into broadly convex occipital margin. Eyes moderately convex, in full face view breaking lateral cephalic outline. Ocelli lacking. Pronotal dorsum convex in outline with pair of broad-based, anterolaterally and weakly downwards directed, acute spines; lateral edges of spines continuous with weakly posteriorly converging pronotal margins. Mesonotum wider than long. Propodeum with lateral margins parallel, terminating posteriorly in distinct, upturned denticles; posterior margins meeting medially to form a distinct transverse ridge that separates propodeal dorsum from distinctly concave declivity. Petiole biconvex in profile; armed with a pair of short, acute, dorsolaterally directed, posteriorly curved spines on dorsolateral angles; spines separated by relatively wide, weakly medially convex, dorsal margin; short, acute tooth situated laterally



below base of each spine. Anterior face of first gastral segment concave with rather distinct antero-dorsal margin narrowly rounding onto dorsum of segment.

Mandibles longitudinally striate. Clypeus shagreened, sides of head rather reticulate-rugose; vertex and area between frontal carinae and eyes with irregular, mostly longitudinal striae. Central area rugose with distinct punctures; shagreened along occipital margin. Pronotal dorsum shagreened with faint longitudinal striations. Dorsa of mesonotum and propodeum somewhat irregularly, mostly longitudinally, striate-punctate; sides of mesosoma reticulate-punctate. Petiole shagreened dorsally with sculpturation coarser at base. Gaster very finely shagreened.

Mandibular masticatory borders with several yellow, curved hairs. Anterior clypeal margin with a few, anteriorly directed longer setae and several shorter setae fringing margin laterally. A few pairs of erect, medium length hairs near anterior and basal clypeal margins. Gaster with several, erect, longer hairs, arising along posterior margins of apical segments and around apex. Relatively long, appressed, yellow or golden pubescence in various densities over most dorsal body surfaces, but virtually absent from central area, vertex, sides of head and between frontal carinae and eyes. Pubescence on gaster distinctly shorter, more appressed and dense, almost completely hiding underlying sculpture.

*Colour*: Black throughout; only tips of mandibular teeth, extreme tips of apical funicular segments and tarsal claws, light reddish-yellow.

Sexuals and immature stages unknown.

**REMARKS.** *Polyrhachis brachyspina* is characterised by a rather short mesosoma with broadly-based pronotal spines and very short petiolar spines.

### 13. *Polyrhachis brendelli* sp. nov. (FIG. 2E-F)

**MATERIAL.** HOLOTYPE: SULAWESI TENGAH, nr Morowali, Ranu R. area, 27.i.-20.iv.1980, M.J.D. Brendell (B.M. 1980-280) (worker). PARATYPES: data as for holotype (23 workers). Type deposition: Holotype and most paratypes (10) in BMNH, 2 paratypes each in AMNH, ANIC, CASC, MCZC, QM, RMNH and NMNH. OTHER MATERIAL. SULAWESI TENGGARA: nr Sanggona, Base Camp, Gn Watuwila, c. 200m, 15.x-5.xi.1989 (Malaise trap) (C.van Achterberg) (w); ditto, 12-15.x.1989 (Malaise trap) (C.van Achterberg) (w); Wolasi, Pangalulu,

04°10'S, 122°30'E, 140m, 14.x.1999 (K. Ogata & K. Masaoka #52) (w). SULAWESI TENGAH: Lore Lindu NP, Toro, Kauboga, 840m, 15.iv.2005, cacao agrof., fog. (M.M. Bos #33) (w). SULAWESI SELATAN: Balampesoang Forest, 5-8km NE of Tanete, 400m, vii.1972, degraded rf. (W.L. Brown) (w).

**DESCRIPTION.** *Worker*. Dimensions (holotype cited first): TL c. 9.22, 8.77-9.73; HL 2.28, 2.25-2.40; HW 1.75, 1.68-1.81; CI 77, 73-77; SL 2.84, 2.74-2.96; SI 162, 161-169; PW 1.31, 1.26-1.36; MTL 3.18, 3.12-3.48 (24 measured).

Anterior clypeal margin arcuate, very weakly and narrowly truncate medially. Clypeus with blunt but distinct median carina; in profile clypeus sinuate with elevated anterior margin, basal clypeal margin almost flat, laterally indicated by a thin line breaking sculpturation. Frontal triangle distinct. Frontal carinae sinuate with moderately raised, laminate margins; central area concave anteriorly, flat posteriorly with distinct frontal furrow. Sides of head in front of eyes almost straight, weakly rounding into mandibular bases; behind eyes sides rounding into broad occipital margin. Eyes moderately convex, situated well forward from occipital corners; in full face view only marginally breaking lateral cephalic outline. Ocelli lacking. Pronotal dorsum with pair of acute, dorsolaterally and weakly downwards directed, somewhat dorsally flattened spines; lateral margins of spines acute and continuous with lateral margins of pronotum. Dorsum of mesonotum transverse, rather flat with weakly raised, posteriorly converging lateral margins. Propodeum with lateral margins weakly converging posteriorly and terminating in distinct, narrowly rounded, upturned ridges; posterior margins of ridges meeting medially, forming a virtually straight line separating propodeal dorsum from declivity. Petiole biconvex in profile, with two, posterodorsally directed spines; dorsal margin between spines concave with blunt intercalary denticle; lateral margin of petiole below base of each spine with a secondary, short, acute tooth. Anterior face of first gastral segment weakly concave with anterodorsal margin narrowly rounding onto dorsum of segment.

Mandibles rather polished, very finely striate with piliferous pits. Body finely and closely reticulate-punctate, opaque; dorsum of mesosoma with some reticulae irregularly, mostly longitudinally directed (evident under certain angles of lighting). Gastral sculpturation distinctly finer than on mesosoma, regularly reticulate-punctate.



Only a very few, curved, golden hairs at mandibular masticatory borders. Anterior clypeal margin with several long, anteriorly directed, golden setae medially. A few pairs of erect, medium length hairs on clypeus, along frontal carinae and single pair of anteriorly directed hairs on vertex. Only a few, relatively long, erect hairs lining posterior margins of apical gastral segments. Very short, appressed, white or greyish pubescence, rather diluted and not concealing underlying sculpturation, on most body surfaces.

*Colour.* Head, mesosoma and petiole black; mandibular masticatory borders, distal ends of antennal scapes and extreme tip of apical funicular segments reddish-brown; legs lighter, reddish-brown, except for bases of tibiae and tarsal segments that are distinctly darker. Dorsum of gaster reddish-brown with ventral surfaces distinctly lighter.

Sexuals and immature stages unknown.

**REMARKS.** *Polyrhachis brendelli* is a characteristic species that resembles *P. browni* sp. nov. and *P. olena* Fr. Smith, also described from Sulawesi, but is clearly distinct. *Polyrhachis brendelli* differs from *P. browni* by its much finer body sculpturation and in the shape of the pronotal spines. In *P. brendelli* the spines are anterolaterally directed and virtually straight. Those in *P. browni* are distinctly longer, more slender, bullhorn-shaped and project more laterally before curving anteriorly at mid length. Moreover, the spines in *P. brendelli* are somewhat dorsally flattened while in *P. browni* they are more-or-less rounded in cross-section. Also, the posterior ridge separating the propodeal dorsum from the declivity is virtually straight or only weakly bowed in *P. brendelli*, while it is more deeply bowed inwards in *P. browni*. The petiolar spines in *P. brendelli* are virtually parallel and the dorsal petiolar margin bears an intercalary denticle. In *P. browni*, the dorsal petiolar spines are much shorter, strongly diverging and more widely separated; and the dorsal petiolar margin lacks any trace of an intercalary tooth. Both species differ from *P. olena* by their distinctly opaque, closely reticulate-punctate body sculpturation that is not hidden by rather diluted pubescence. In contrast all body surfaces in *P. olena* are shagreened with the sculpturation mostly hidden by relatively dense, appressed pubescence. *Polyrhachis olena* also differs from *P. brendelli* and *P. browni* by a distinctly narrower

mesosomal dorsum, particularly the propodeum, and by its more elongated petiolar spines.

#### 14. *Polyrhachis browni* sp. nov. (FIG. 2G-H)

**MATERIAL.** HOLOTYPE: SULAWESI UTARA: Dumoga-Bone NP, 2.xii.1985, fog., N.E. Stork et al. (worker). PARATYPES: data as for holotype (worker); ditto, 11.vii.1985, fog., N.E. Stork et al. (2 workers); ditto, 25.ii.1985, N.E. Stork et al. (4 workers); ditto, 230m, 10.ii.1985, fog., N.E. Stork et al. (worker); Type deposition: Holotype and 2 paratypes in BMNH, 1 paratype each in ANIC, CASC, MCZC, QM. OTHER MATERIAL. SULAWESI UTARA: Mt Tangkoko-Batuangus Res., 10-200m, vi.1972, tropical evergreen for. (W.L. Brown) (w); Mt Klabat, SW slope, 400-600m, rf., 13-19.vi.1972 (W.L. Brown) (w). SULAWESI: 27.ii-4.xii.1984 (no further data) (w).

**DESCRIPTION.** *Worker.* Dimensions (holotype cited first): TL c. 9.42, 8.87-9.47; HL 2.40, 2.28-2.43; HW 1.75, 1.67-1.76; CI 73, 71-74; SL 2.99, 2.93-3.06; SI 171, 172-178; PW 1.40, 1.26-1.41; MTL 3.58, 3.43-3.73 (9 measured).

Anterior clypeal margin arcuate, entire. Clypeus with blunt, longitudinal carina medially; sinuate in profile with elevated anterior margin; basal clypeal margin weakly impressed, laterally indicated by a thin line breaking sculpturation. Frontal triangle distinct. Frontal carinae sinuate with laminate margins that are elevated anteriorly and posteriorly flat; central area concave anteriorly, with distinct frontal furrow. Sides of head in front of eyes straight, weakly converging towards mandibular bases; behind eyes sides weakly convex and rounding into occipital margin. Eyes convex, situated well forward from occipital corners; in full face view breaking lateral cephalic outline. Ocelli lacking, relative positions indicated by small pits in sculpturation. Pronotal dorsum with long, slender, acute spines that are directed anterolaterally and curve more anteriorly and slightly downwards at mid length. Lateral edges of spines continuous with parallel margins of pronotum. Mesonotum transverse, with raised anterior corners; lateral margins shallowly emarginate medially and rounded posteriorly. Propodeal dorsum with margins distinctly converging posteriorly and terminating in upturned, tooth-like denticles, their posterior margins meeting medially, forming an inward-bowed ridge that separates propodeal dorsum from declivity. Petiole biconvex in profile; armed with a pair of widely separated, dorsolaterally and weakly posteriorly directed, acute spines; dorsal margin between spines weakly concave, more-

or-less acute; lateral margin of petiole below base of each spine with a secondary, short, acute tooth. Anterior face of first gastral segment weakly concave with anterodorsal margin narrowly rounding onto dorsum.

Mandibles finely, mostly longitudinally striate, somewhat polished, with numerous piliferous pits towards bases. Head, mesosoma, including declivity, petiole and gaster reticulate-punctate with sculpturation very fine and rather uniformly distributed over all body surfaces, except pronotal and petiolar spines that are rather smooth and polished.

Mandibular masticatory borders with several curved, golden hairs. Anterior clypeal margin with medium length, anteriorly directed, golden setae and with a few short setae fringing margin laterally. Mostly paired, medium length, erect, yellow and golden hairs near anterior and basal clypeal margins, along frontal carinae and a single pair of hairs on vertex. Gaster with only a few, relatively long, erect hairs at apex and posterior margins of apical segments on venter.

*Colour*. Black throughout; only extreme tip of apical funicular segments and tarsal claws light reddish-brown.

Sexuals and immature stages unknown.

REMARKS. *Polyrhachis browni* is rather similar to *P. brendelli* with distinguishing characters listed under the latter.

### 15. *Polyrhachis compressicornis*

Fr. Smith, 1860

*Polyrhachis compressicornis* Fr. Smith, 1860: 69. Syntype worker, queen. Type locality: INDONESIA, SULAWESI, Makassar (A.R. Wallace), OXUM (examined).

REMARKS. *Polyrhachis compressicornis* appears to be a very rare species that was absent from all recent Sulawesi collections examined. The types in OXUM and a single worker in BMNH are the only specimens I have seen.

### 16. *Polyrhachis cybele* Wheeler, 1919 stat. nov. (FIG. 3A-B)

*Polyrhachis (Hemioptica) aculeata* ssp. *cybele* Wheeler, 1919: 126. Syntype workers. Type locality: BORNEO, SARAWAK, Kuching (J. Hewitt), MCZC (examined).

MATERIAL. SULAWESI TENGAH: Lore Lindu NP, 01°15'S, 120°20'E, nr Dongi-Dongi, c. 1010m, 4.-9.xii.1985 (Malaise trap) (C.van Achterberg) (w). SULAWESI SELATAN: Sampulage nr. Mangkrana,

02°20'A, 120°48'E, 800m, 19.x.1999 (K. Ogata & K. Masaoka) (w).

REMARKS. The characters given by Wheeler (1919) to separate *P. aculeata cybele* from *P. aculeata*, described by Mayr (1879) from India, clearly show the taxa are very distinct. *Polyrhachis cybele* is more robust with thicker and shorter pronotal and petiolar spines in comparison to the more slender *P. aculeata*. The petiole in *P. cybele* is broadly transverse with a distinctly arcuate dorsal edge and has dorsolateral spines that arise obliquely from close to the posterior face of the petiole. As a result, the dorsal edge of the petiole is clearly visible in lateral view. In contrast the dorsal edge of the petiole in *P. aculeata* is less prominent and, in lateral view, is hidden by the more upright and longer and slender dorsolateral spines. I have compared both workers from Sulawesi with the syntypes and other *P. cybele* specimens from Borneo and Sumatra and found them all remarkably similar. The characters separating *P. cybele* from *P. aculeata* are constant across their known distributions and I have no hesitation in elevating *P. cybele* to specific rank.

### 17. *Polyrhachis decipiens* Roger, 1863

*Polyrhachis decipiens* Roger, 1863: 156. Syntype workers. Type locality: INDONESIA, Batjan I., MNHU (examined).

*Polyrhachis restituta* Viehmeyer, 1913: 149, figs. Syntype workers. Type locality: INDONESIA, SULAWESI (in copal), MNHU (examined).

*Polyrhachis restituta* var. *conclusa* Viehmeyer, 1913: 151, fig. Type locality: INDONESIA, SULAWESI (in copal), MNHU (examined).

REMARKS. Apart from the types of *P. restituta* and *P. restituta conclusa* (both from copal), *P. decipiens* has apparently never been reported from Sulawesi. The above synonymy proposed by Kohout (1998) is supported by the comparison of more recently collected specimens from Halmahera and Batjan Island.

### 18. *Polyrhachis festina* sp. nov. (FIG. 3C-D)

MATERIAL. HOLOTYPE: SULAWESI SELATAN, Sampulage nr. Mangktana, 02°16'S, 120°47'E, 1200m, 19.x.1999, K. Ogata & K. Masaoka #67 (worker). Type distribution: Unique holotype in QM (QMT144146).

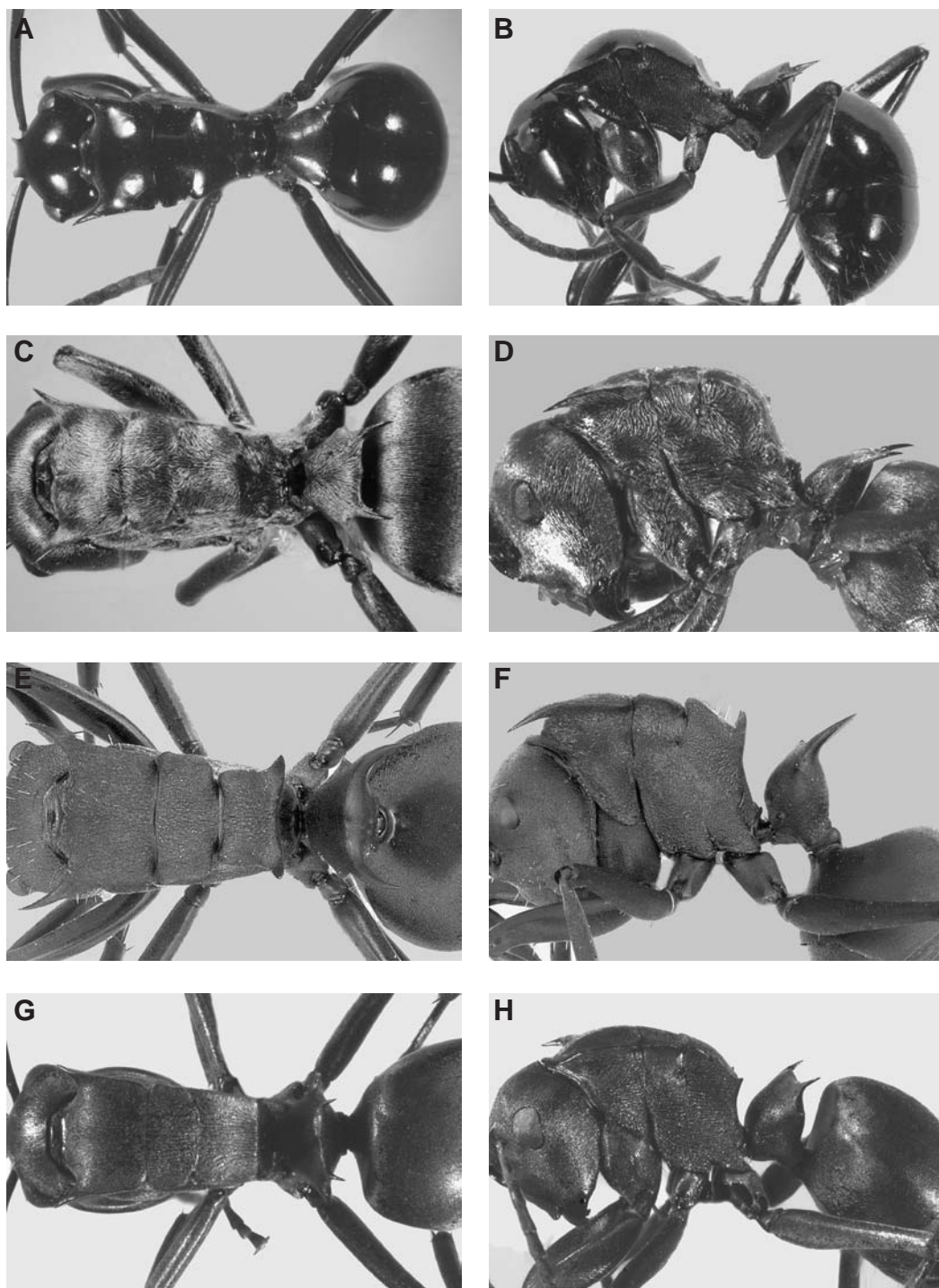


FIG. 3. *Polyrhachis* (*Myrma*) species, Dorsal (left) and lateral (right) view of mesosoma and petiole: A-B, *P. cybele* Wheeler; C-D, *P. festina* sp. nov.; E-F, *P. hastata* (Latreille); G-H, *P. isacantha* Emery (not to scale).



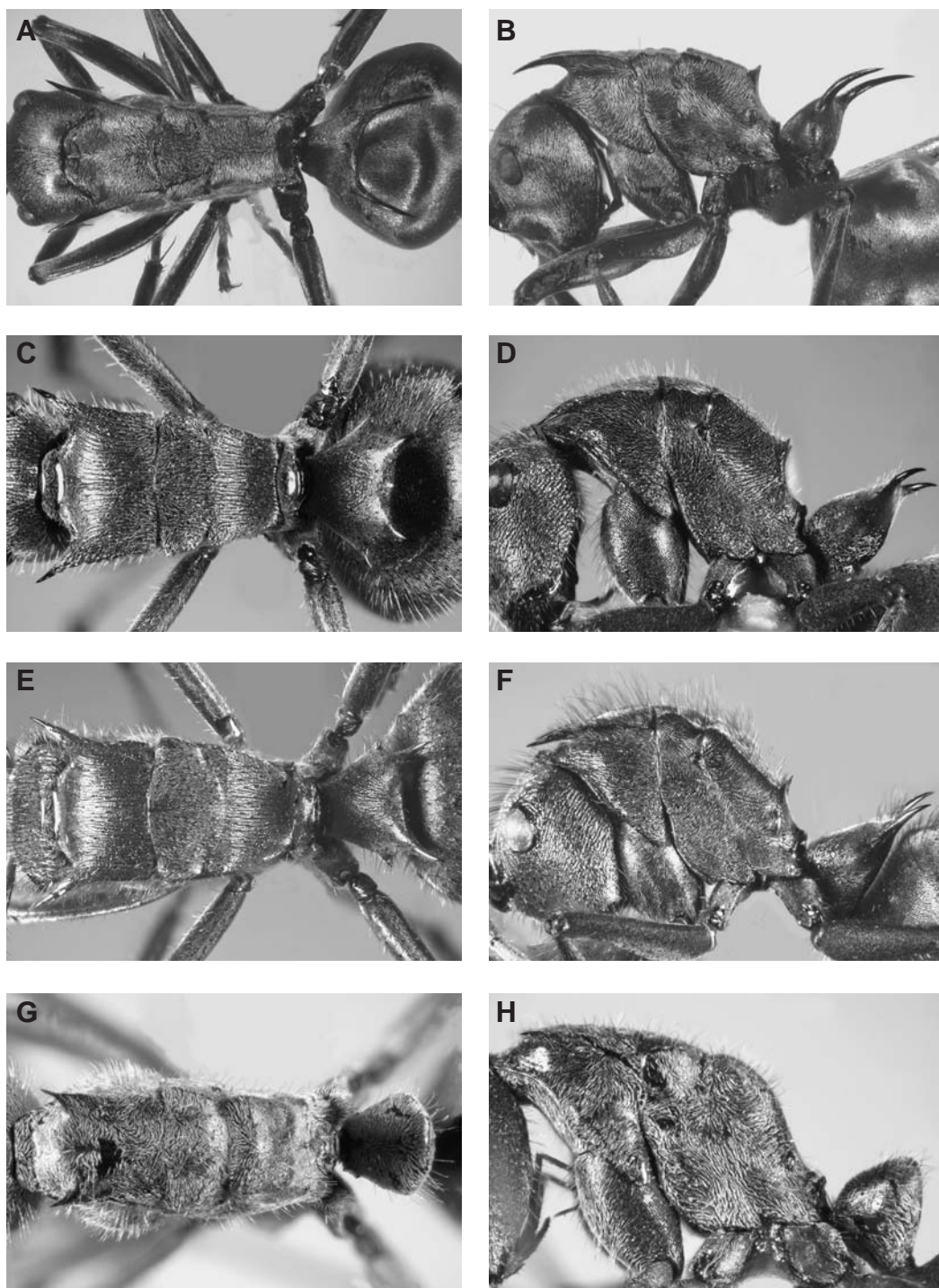


FIG. 4. *Polyrhachis* (*Myrma*) species, Dorsal (left) and lateral (right) view of mesosoma and petiole: A-B, *P. olena* Fr. Smith; C-D, *P. rixosa* Fr. Smith; E-F, *P. sculpturata* Fr. Smith; G-H, *P. gobini* sp. nov. (not to scale).



**DESCRIPTION.** *Worker.* Dimensions: TL c. 6.80; HL 1.84; HW 1.50; CI 81; SL 2.28; SI 152; PW 1.12; MTL 2.25.

Anterior clypeal margin arcuate, entire. Clypeus with blunt longitudinal carina medially; in profile clypeus very weakly sinuate, rounding posteriorly into shallowly impressed basal margin that is laterally indicated by a thin line breaking sculpturation. Frontal triangle weakly indicated. Frontal carinae sinuate with raised, laminate margins; central area with weakly impressed frontal furrow. Sides of head in front of eyes straight, weakly converging anteriorly and narrowly rounding into mandibular bases; behind eyes sides evenly rounding into convex occipital margin. Eyes convex, in full face view breaking lateral cephalic outline. Ocelli lacking. Pronotal dorsum rather flat between pair of long, anterolaterally and weakly downwards directed, somewhat dorso-medially flattened, acute spines; outer edges of spines acute and continuous with parallel, posteriorly rounded lateral margins of pronotum. Mesonotal dorsum at base wider than pronotal dorsum, strongly transverse, with weakly medially emarginate lateral margins. Propodeal dorsum with lateral margins converging posteriorly and terminating in weakly upturned, short, transverse ridges; propodeal dorsum in profile convex descending into shallowly concave declivity in medially uninterrupted line. Petiole biconvex in profile, armed with a pair of dorsolaterally and posteriorly directed, acute spines that are situated on dorsolateral angles of petiole and separated by a transverse, medially weakly raised, dorsal margin. Lateral margin of petiole below base of each spines with secondary, short, acute tooth. Anterior face of first gastral segment concave, with anterodorsal margin distinctly lower than height of petiole.

Mandibles rather distinctly, mostly longitudinally striate-rugose. Head, mesosoma, petiole and gaster shagreened, with sides of mesosoma more distinctly sculptured, reticulate-punctate. Tips of pronotal and petiolar spines rather smooth, polished.

Mandibular masticatory borders and outer margins apically with several, semierect, golden hairs. Anterior clypeal margin with a few long, anteriorly directed setae medially and fringe of shorter setae laterally. Several pairs of medium length, erect, golden hairs near anterior and basal margins of clypeus, along frontal carinae and a single pair on vertex. Antennal scapes with few, short, erect hairs fringing apex. Pair of downward directed longer hairs on anterior

face of fore coxae. Gaster with several medium length hairs on apical segments, with their length distinctly increasing towards gastral apex and over venter. Rather dense, appressed pubescence virtually hiding underlying sculpturation; pubescence distinctly longer and silvery, or white, on sides of mesosoma; shorter, much finer and with somewhat yellowish on dorsum.

*Colour.* Black throughout.

Sexuals and immature stages unknown.

**REMARKS.** The holotype is the only known specimen of this species. *Polyrhachis festina* is somewhat similar to *P. foreli*, a species known from Queensland and Papua New Guinea. However, in addition to being distinctly smaller (HL 1.84 in *P. festina* versus 2.21-2.46 in *P. foreli*), *P. festina* lacks a blunt, postocular carina, that in *P. foreli* runs from posterior margin of each eye towards the occipital corner. The dorsal margin of the petiole between the lateral spines in *P. festina* is straight, relatively narrow and only very weakly elevated medially, while in *P. foreli* the dorsal margin is broad and distinctly convex. The accessory petiolar teeth, situated below the bases of the spines, are very short and acute in *P. festina*, while they are distinctly flattened and dorsally emarginate in *P. foreli*.

### 19. *Polyrhachis hastata* (Latreille, 1802) (FIG. 3E-F)

*Formica hastata* Latreille, 1802: 129, pl. 4, fig. 23. ?Holotype worker. Type locality: ?INDONESIA ('Indes Orientales') (Riche), ?MNHN (type presumed lost).

*Polyrhachis hastata* (Latreille). Fr. Smith, 1858:59.

**MATERIAL.** SULAWESI TENGAH: nr Morowali, Ranu R. area, 27.i.-20.iv.1980 (M.J.D. Brendell, B.M. 1980-280) (w). SULAWESI TENGGARA: nr Sanggona, Base Camp, Gn Watuwila, c. 200m, 10.-15.x.1989 (Malaise trap) (C.van Achterberg) (w); ditto, 15.-19.x.1989 (Malaise trap) (C.van Achterberg) (w). SULAWESI SELATAN: Balan Ba'na nr Soroako, 02°39'S, 121°12'E, 130m, 21.x.1999 (K. Ogata & K. Masaoka #89) (w); SE of Laduladu, 02°33'S, 121°22'E, 230m, 21.x.1999 (K. Ogata & K. Masaoka #93) (w).

**REMARKS.** The type of *P. hastata* cannot be found in MNHN or in any other collection examined and must be considered lost. However, I have examined a few available identified specimens lodged in BMNH, HNHM, MCSN, MHNG and NHMW collections that conform well with the original description and illustration of *P. hastata*. These specimens are undoubtedly conspecific with the recent material from Sulawesi.

*Polyrhachis hastata* is a very distinctive and evidently rare species.

**20. *Polyrhachis isacantha* Emery, 1887**  
(FIG. 3G-H)

*Polyrhachis isacantha* Emery, 1887: 232, pl. 4, figs 22, 23. Syntype workers, queen. Type locality: INDONESIA, Goram I. (= Seram I.) (L.M. D'Albertis), MCSN (examined).

**MATERIAL.** SULAWESI UTARA: Dumoga-Bone NP, Tumpah R., vi.-4.vii.1985, for. edge (N.E. Stork et al.) (w). SULAWESI TENGAH: nr Morowali, Ranu R. area, 27.i.-20.iv.1980 (M.J.D. Brendell, B.M. 1980-280) (w).

**REMARKS.** The specimens from Sulawesi are slightly smaller than the syntypes from Seram I. (HL 2.03-2.18 versus 2.21-2.37 in syntypes) but they are essentially identical in all other aspects.

**21. *Polyrhachis ithona* Fr. Smith, 1860**

*Polyrhachis ithonus* Fr. Smith, 1860b: 99, pl. 1, fig. 18. Syntype worker, queen. Type locality: INDONESIA, Batjan I. (A.R. Wallace), OXUM (examined).

*Polyrhachis chaonia* Fr. Smith, 1861: 42, pl. 1, fig. 18. Holotype queen. Type locality: INDONESIA, Halmahera I. (A.R. Wallace), OXUM (examined). Synonymy by Bolton, 1974:177.

(For full synonymy citations see Bolton (1995: 350); also Kohout (1988: 430-431, figs 1B, 1D)

**REMARKS.** Emery (1901) listed this species from Sulawesi as *P. chaonia*, however, I have only seen specimens from Morotai (= Morty), Halmahera and Ternate Islands in the Moluccas.

**22. *Polyrhachis nigropilosa* Mayr, 1872**

*Polyrhachis nigropilosa* Mayr, 1872: 141. Syntype workers. Original localities: INDONESIA, SULAWESI (Stevens); BORNEO, Sarawak (J. Doria), NHMW (examined).

(For full synonymy citations see Kohout (1998: 522.)

**REMARKS.** *Polyrhachis nigropilosa* is a rather common species known from Borneo and Peninsular Malaysia. The syntype worker in the Mayr collection (NHMW) appears to be the only confirmed specimen from Sulawesi.

**23. *Polyrhachis numeria* Fr. Smith, 1861**

*Polyrhachis numeria* Fr. Smith, 1861: 42, pl. 1, fig. 25. Holotype worker. Type locality: SULAWESI (A.R. Wallace), OXUM (examined).

*Polyrhachis (Johnia) schizospina* Karawajew, 1927: 44. Holotype queen. Type locality: INDONESIA, Princen-Eiland in Sundastrasse (W. Karawajew #2397), IZAS (examined). Synonymy by Kohout, 1988: 527.

(For full synonymy citation see Kohout 1998: 527.)

**REMARKS.** The unique holotype is apparently the only specimen of *P. numeria* recorded

from Sulawesi. The only comparable specimens examined are the workers from Andaman Is (BMNH) and Southern Thailand (QM), and a single queen described by Karawajew as *P. (Johnia) schizospina* (IZAS) (see Kohout, 1988).

**24. *Polyrhachis olenia* Fr. Smith, 1861**  
(FIG. 4A-B)

*Polyrhachis olenus* Fr. Smith, 1861: 39, pl. 1 fig. 8. Holotype worker. Type locality: INDONESIA, SULAWESI, Tondano (A.R. Wallace), OXUM (examined).

*Polyrhachis eurytus* Fr. Smith, 1861: 43, pl. 1, fig. 24. Holotype queen. Type locality: INDONESIA, SULAWESI, Tondano (A.R. Wallace), OXUM (examined). Synonymy by Bolton, 1974: 177.

**MATERIAL.** SULAWESI UTARA: Dumoga-Bone NP, Gn Ambang F.R., nr Kotamobagu, 1200m, 18.ii.1985, fog. (N.E. Stork et al.) (w); ditto, 31.vii.1985, fog. (N.E. Stork et al.) (w); ditto, Danau Mooat, nr Kotamobagu, 1200m, v.1985 (N.E. Stork et al.) (w); ditto, 1100m, 31.vii.1985, *Pandanus* fog. (N.E. Stork et al.) (w).

**REMARKS.** Comparison of the Domoga-Bone specimens with the *P. olenia* holotype shows them virtually identical and undoubtedly conspecific. This species is most similar to *P. brendelli* and *P. browni*, both described above, with the differences between all three species given in the remarks section of *P. brendelli*.

**25. *Polyrhachis rixosa* Fr. Smith, 1858**  
(FIG. 4C-D)

*Polyrhachis rixosus* Fr. Smith, 1858: 68. Holotype queen. Type locality: INDONESIA, SULAWESI, BMNH (examined).

*Polyrhachis lycidas* Fr. Smith, 1861: 43, pl. 1, fig. 23. Holotype worker. Type locality: INDONESIA, SULAWESI, Tondano (A.R. Wallace), OXUM (examined). Synonymy by Kohout 1998: 523.

**MATERIAL.** SULAWESI UTARA: Dumoga-Bone NP, 1985 (R.H.L. Disney #74) (w, alate ♀); ditto, 400m, 11.ii.1985, fog. (N.E. Stork et al.) (w); ditto, 25.iv.1985 (N.E. Stork et al.) (w, ♂); ditto, 7.vi.1985 (N.E. Stork et al.) (w); ditto, 8.ii.1985, 200-400m, lowland for., fog. (P.M. Hammond) (w); ditto, 19.vii.1985, fog. (N.E. Stork et al.) (w); ditto, Maze Toraut R., 00°34'N, 123°54'E, c. 250m, 16-23.xi.1985 (C.van Achterberg) (w); Mt Klabat, Air Madidi slope, 400-600m, 13-19.vi.1972, wet for. (W.L. Brown) (w); Tanghoko-Duasudara Res., 01°29'N, 125°11'E, 100m, 1.vii.2001, lowland rf. (D.M. Olson) (w). SULAWESI TENGAH: nr Batul, Seseba, c. 375m, 6-9.xi.1989 (Malaise trap) (C.van Achterberg) (w); Lore Lindu NP, nr Dongi-Dongi shelter, 01°15'S, 120°20'E, c. 1100m, 6-9.xii.1989 (Malaise trap) (C.van Achterberg) (w). SULAWESI TENGGARA: Silea, 28km W of Kendari, 150m, rf., 12-14.vii.1972 (W.L. Brown) (w). SULAWESI SELATAN: Balampesoang For., 5-8km NE of Tanete, 400m, 8-10.vii.1972, degr. rf. (W.L. Brown) (w).

REMARKS. Kohout (1998) provided characters to distinguish *P. rixosa* from the similar *P. sculpturata* Fr. Smith.

## 26. *Polyrhachis rufofemorata* Fr. Smith, 1859

*Polyrhachis rufofemoratus* Fr. Smith, 1859: 142. Holotype worker. Type locality: INDONESIA, Aru Is (A.R. Wallace), OXUM (examined).

*Polyrhachis merops* Fr. Smith, 1860b: 98, pl. 1, fig. 17. Holotype worker. Type locality: INDONESIA, Batjan I. (A.R. Wallace), OXUM (examined).

(For full synonymy citations see Kohout, 1998: 523).

REMARKS. This species was listed from Sulawesi by Emery (1901; 1925) as "*P. rufofemorata* F. Sm. mit var. *merops* F. Sm.". It is known to occur from the Moluccas to New Guinea and south to Cape York Peninsula in Queensland. I have not seen any specimens originating from Sulawesi.

## 27. *Polyrhachis sculpturata* Fr. Smith, 1860 (FIG. 4E-F)

*Polyrhachis sculpturata* Fr. Smith, 1860a: 70. Syntype worker, queen. Type locality: INDONESIA, SULAWESI, Makassar (A.R. Wallace), OXUM (examined).

*Polyrhachis sumatrensis* r. *hamulata* Emery, 1887: 234. Syntype workers, queen. Type locality: INDONESIA, SULAWESI, Kandari (O. Beccari), MCSN (examined). Synonymy by Kohout, 1998: 524.

MATERIAL. SULAWESI TENGGARA: nr Sagona, Base Camp, Gn. Watuwila, c. 200m, 10.-15.x.1989 (Malaise trap) (C.van Achterberg) (w); ditto, 15.x.-5.xi.1989 (Malaise trap) (C.van Achterberg) (w); ditto, 225m, 15.x.-5.xi.1989 (Malaise trap) (C.van Achterberg) (w); ditto, 12.-15.x.1989 (Malaise trap) (C.van Achterberg) (w). SULAWESI SELATAN: SE of Laduladu, 02°33'S, 121°22'E, 230m, 21.x.1999 (K. Ogata & K. Masaoka #95) (w); Karaentha, 05°02'S, 119°44'E, 270m, 23.x.1999 (K. Ogata & K. Masaoka #98) (w, ♀); Sampulage nr Mangktana, 02°20'S, 120°48'E, 800m, 19.x.1999 (K. Ogata & K. Masaoka #74) (w).

REMARKS. Notes on *P. sculpturata*, including its synonyms and similarity to *P. rixosa* Fr. Smith, were given by Kohout (1998) under the latter species.

## 28. *Polyrhachis striatorugosa* Mayr, 1862

*Polyrhachis striatorugosus* Mayr, 1862: 686, pl. 19, fig. 9. Syntype workers. INDONESIA, JAVA (Sichel), NHMW (examined).

(For full synonymy citations see Kohout, 1998: 524).

REMARKS. This species occurs sporadically throughout Indonesia on Sumatra, Java and several other islands, including Flores. It was listed from

Sulawesi by Emery (1901) but I have not seen any specimens originating from the island.

## *Polyrhachis vestita* species-group

### KEY TO *VESTITA*-GROUP SPECIES (based on workers)

1. Larger species (HL >3.10); dorsum of petiole acute in lateral view (Fig. 5D, H) ..... 2  
Smaller species (HL <2.75); dorsum of petiole rounded in lateral view (Fig. 4H) ..... *gobini* sp. nov.
2. Antennal scape with distinct process near apex (Fig. 6B) ..... *ogatai* sp. nov.  
Antennal scape without process near apex ..... 3
3. Whole body with rather thick, relatively long hair (Figs 5B, F) ..... 4  
Body with only diluted, relatively short hair (Fig. 5D) ..... *masaokai* sp. nov.
4. Pubescence distinctly rusty-red. .... *cognata* sp. nov.  
Pubescence rich golden or pale yellow. .... *vestita* Fr. Smith

## 29. *Polyrhachis cognata* sp. nov. (FIG. 5A-B)

MATERIAL. HOLOTYPE: SULAWESI TENGGARA, Wolasi, Pangalulu, 04°10'S, 122°30'E, 140m, 13.x.1999, K. Ogata & K. Masaoka (worker). PARATYPE: data as for holotype (worker). Type distribution: Holotype in QM (QMT144147), paratype in MCZC.

DESCRIPTION. *Worker*. Dimensions (holotype cited first): TL c. 14.01, 13.91; HL 3.53, 3.48; HW 2.62, 2.57; CI 74, 74; SL 4.64, 4.64; SI 177, 180; PW 2.07, 2.07; MTL 5.44, 5.39 (2 measured).

Anterior clypeal margin arcuate, very shallowly and widely emarginate medially. Clypeus with rather blunt median carina and shallow depressions just behind weakly raised median portion of anterior margin; median carina distinctly higher and more prominent posteriorly. Clypeus in profile straight for most of its length, posteriorly rounding into moderately impressed basal margin, laterally indicated by a flat, thin line. Frontal triangle distinct. Frontal carinae with sharp, high and steeply elevated laminate lobes; central area concave with poorly defined frontal furore. Sides of head in front of eyes converging towards mandibular bases in weakly convex line; behind eyes sides rounding into convex, medially narrowly upturned and weakly emarginate, occipital margin. Eyes convex, in full face view just reaching or marginally breaking lateral cephalic outline. Ocelli lacking. Pronotal dorsum weakly convex, with pair of long, slender, anterolaterally directed, horizontal spines; dorsolateral edges

of spines continuous with parallel-sided pronotal margins. Mesonotal dorsum rather flat, strongly transverse, with laminate, anteriorly upturned lateral margins that are rounded in dorsal view. Propodeum with lateral margins forming anteriorly rounded and upturned laminae; posterior margins weakly converging into upturned posterior angles. Propodeal dorsum rounding into steep declivity in medially uninterrupted curve. Petiole biconvex in profile; dorsum armed medially with a pair of blunt, broad-based teeth; margin between teeth emarginate and somewhat jagged laterally, terminating in weakly upturned denticles. Anterior face of first gastral segment rather flat basally, with anterodorsal margin widely rounding onto dorsum of gaster.

Mandibles distinctly, longitudinally striate. Head, mesosoma, petiole and gaster generally very finely reticulate-punctate with sculpturation on vertex of head and dorsum of mesosoma organised into fine, longitudinal striae.

Mandibles along outer margins and masticatory borders with numerous, relatively long, erect and semierect, golden hairs. Anterior clypeal margin fringed medially with medium length, anteriorly directed, golden setae, reducing in length laterally. Leading edge of antennal scapes with numerous short, erect, black hairs; a few hairs arising along inferior edge distally. Front and sides of head with medium length, erect, black hairs, those on vertex distinctly longer and more anteriorly directed. Mesosomal dorsum with numerous, long, anteriorly curved, black hairs, those on sides of mesosoma distinctly shorter. Coxae with several long, black and rusty-brown hairs. Legs with abundant, black and rusty-brown hairs, notably on tibiae, basal segments of tarsi and ventral surfaces of femora. Dorsal surfaces of fore femora hairless; middle and hind femora with only a few, short hairs along dorsal surfaces distally. Petiole with several short, black hairs fringing dorsal margin. Gaster with abundant, relatively long, somewhat posteriorly directed, black and brown hairs. Very short, dense, appressed, rusty-red pubescence over most body surfaces, notably over anterior portion of pronotal dorsum and meso- and metapleurae; somewhat longer, more erect, yellowish pubescence on pronotal collar.

**Colour:** Black, with legs dark reddish-brown.

Sexuals and immature stages unknown.

**REMARKS.** *P. cognata* is relatively similar to the other species of the *vestita*-group, notably to *P. ogatai* with which it shares the characteristic

rusty red and black pilosity and pubescence. It differs by its smaller size and by lacking the peculiar antennal process found in the unique holotype of *P. ogatai* holotype (Fig. 6B).

### 30. *Polyrhachis gobini* sp. nov. (FIG. 4G-H)

**MATERIAL.** HOLOTYPE: SULAWESI SELATAN, Cagar Alam Karaenta, Kabupaten Maros, c. 05°00'S, 119°45'E, c. 265-315m, iii.1996, secondary rf. on limestone karst hills, B. Gobin (worker). PARATYPES: data as for holotype (10 workers, 1 dealate queen). Type deposition: Holotype (QMT144148), 1 paratype worker and paratype queen in QM; 1 paratype worker each in AMNH, ANIC, BMNH, CASC, MCZC and NMNH; 3 paratype workers in KULB (B. Gobin private collection).

**DESCRIPTION.** *Worker.* Dimensions (holotype cited first): TL c. 10.03, 9.07-10.78; HL 2.50, 2.32-2.72; HW 1.59, 1.51-1.71; CI 64, 63-65; SL 3.15, 2.87-3.33; SI 198, 190-198; PW 1.03, 0.91-1.11; MTL 3.21, 2.82-3.43 (12 measured).

Anterior clypeal margin arcuate, entire. Clypeus in profile weakly sinuate with median carina, that is low and blunt anteriorly, more distinctly elevated posteriorly; clypeus rounding into moderately impressed basal margin that is well defined laterally. Frontal triangle weakly impressed. Frontal carinae sinuate, with highly raised, laminate margins; central area concave, very narrow anteriorly, flat and wider posteriorly; frontal furrow indistinct. Head widest just in front of eyes with sides weakly convex and converging anteriorly towards mandibular bases; behind eyes sides converging in weakly convex line into a very narrow occipital margin. Eyes convex, almost protuberant, situated well forward from occipital corners; in full face view clearly breaking lateral cephalic outline. Ocelli lacking, relative position of median ocellus indicated by distinct puncture. Pronotal dorsum with pair of relatively short, acute, anteriorly directed, horizontal spines; their lateral edges continued for a short distance and merging with rather blunt, parallel, pronotal margins that run to about mid length; posterior half of pronotal dorsum immarginate. Mesonotal dorsum transverse, with distinct lateral margins anteriorly, rounding onto sides posteriorly. Propodeal dorsum convex in profile with lateral margins narrowly rounded anteriorly, poorly defined posteriorly and terminating in more-or-less distinct denticles or tuberculae; propodeal dorsum rounding into declivity in medially uninterrupted, oblique curve. Petiole biconvex, only marginally higher than width at base, with virtually hexagonal outline



in frontal view; dorsal margin blunt, rather flat medially, angular laterally and descending towards blunt lateral angles. Anterior face of first gastral segment low, distinctly lower than height of petiole; rather flat at base and rounding onto dorsum of segment.

Mandibles at masticatory borders smooth and polished; finely, longitudinally striate towards bases. Head reticulate-punctate with sculpturation distinctly increasing in intensity to rugose along sides and somewhat rugose-striate between eyes and frontal carinae. Dorsum of mesosoma and gaster finely shagreened, weakly polished, with sides of mesosoma more-or-less reticulate-punctate.

Mandibles along outer margins and masticatory borders with numerous, curved, golden hairs and with closely appressed hairs towards bases; several longer, erect hairs arising from outer margins near bases. Anterior clypeal margin with a few long, anteriorly directed golden setae medially and several short setae fringing margin laterally. Head with abundant, medium length to long, erect and somewhat anteriorly directed, mostly yellow hairs. Antennal scapes with shorter, erect hairs, most numerous along leading edge, and with fringe of hairs at apex. Mesosomal dorsum and petiole with numerous erect, semierect and variously curved, medium length, yellow and light yellowish-brown hairs, with those on sides somewhat shorter and less abundant. Legs with numerous, medium length, erect hairs on most surfaces, except dorsa of middle and hind femora where they are rather diluted; hairs completely absent from dorsa of front femora. Gaster with relatively long, erect, somewhat posteriorly curved, yellow or yellowish-brown hairs, most abundant and more golden around apex. Relatively long, closely appressed, mostly golden pubescence in various densities over most body surfaces, somewhat diluted near occipital corners, pronotal dorsum between spines and laterally on first gastral segment.

*Colour.* Black, with only tips of mandibular teeth reddish-brown; extreme tip of apical funicular segments yellowish-brown. Legs distinctly light orange or yellowish-red, with distal ends of

femora and proximal ends of tibiae shade darker; tarsi black.

*Queen.* Dimensions: TL c. 11.14; HL 2.72; HW 1.79; CI 66; SL 3.17; SI 177; PW 1.66; MTL 3.17 (1 measured).

Queen slightly larger than worker with usual characters identifying full sexuality, including three ocelli, complete thoracic structure and wings. Pronotum with pair of short, broad-based, anteriorly and weakly downward directed spines. Mesoscutum almost as long as wide; lateral margins strongly converging anteriorly into rather narrowly rounded anterior margin; median line distinct; parapsides flat, only weakly raised posteriorly; mesoscutum in profile with relatively low, widely rounded anterior face and flat dorsum. Mesoscutellum very weakly convex and only marginally elevated above dorsal plane of mesosoma; metanotal groove distinct. Propodeum convex in outline with sides terminating posteriorly into very short, medially directed ridges; propodeal dorsum descending into oblique declivity in medially uninterrupted line. Sculpturation of body, pilosity, pubescence and colour virtually as in worker.

Male unknown; immature stages (larvae and pupae) in KULB (B. Gobin private collection).

**REMARKS.** *P. gobini* is a very distinct member of the *vestita* species-group. Although it shares several characters with the other species of the group, it does not seem closely related to any species in particular. The rather narrow and elongated mesosomal dorsum somewhat resembles that of *P. philippinensis* Fr. Smith, but their other characters differ widely. The pronotal spines in *P. philippinensis* are relatively long and project anterolaterally, while in *P. gobini* they are rather short and project anteriorly. Moreover, the petiole in *P. philippinensis* is slender, with its dorsolateral edge armed with a pair of spines, while in *P. gobini* the petiolar dorsum is entire and unarmed.

*Polyrhachis gobini* appears endemic to Sulawesi with its known distribution limited to the type locality. The following information on the species nesting habits are an extract from the field observations made by the collector Bruno Gobin: "[...] I was especially interested in the *Diacamma* sp. and kept confusing them with the foragers of *Polyrhachis* sp. Nest sites and foraging workers really looked alike. It [*Polyrhachis gobini*] is an arboreal ant nesting in cavities in trees. They more-or-less seal the

nest entrance with detritus and pulp of rotten wood which they seem to excavate. They appear to forage singly. I sampled 2 nests in which there were larvae and cocoons, but no queen(s), suggesting they are polydomous. [Later] I found a founding queen with two workers in a small cavity without nest material [...] I tried to raise the nest but the queen died." (B. Gobin, *pers. comm.*).

**31. *Polyrhachis masaokai* sp. nov.**  
(FIG. 5C-D)

**MATERIAL.** HOLOTYPE: SULAWESI SELATAN, Sampulage nr Mangktana, 02°16'S, 120°47'E, 1000m, 19.x.1999, K. Ogata & K. Masaoka (worker). PARATYPE: data as for holotype (worker). Type distribution: Holotype in QM (QMT144149), paratype in MCZC.

**DESCRIPTION.** *Worker.* Dimensions (holotype cited first): TL c. 12.50, 12.80; HL 3.12, 3.12; HW 2.34, 2.32; CI 75, 74; SL 4.23, 4.23; SI 181, 182; PW 2.02, 2.07; MTL 4.74, 4.63 (2 measured).

Anterior clypeal margin arcuate, very shallowly and obtusely truncate medially. Clypeus with distinctly raised median carina; clypeus in profile straight for most of its length, narrowly rounding into weakly impressed basal margin, indicated laterally by a very thin line breaking sculpturation. Frontal triangle weakly impressed. Frontal carinae with sharp, highly and steeply elevated laminate lobes; central area deeply concave with weakly impressed frontal furrow. Sides of head in front of eyes converging towards mandibular bases in very weakly convex line; behind eyes sides rounding into convex, medially strongly narrowed and posteriorly weakly emarginate, occipital margin. Eyes convex, in full face view marginally exceeding lateral cephalic outline. Ocelli lacking, relative positions poorly indicated by shallow punctures. Pronotal dorsum weakly convex in profile, with pair of long, slender, anterolaterally directed, horizontal spines; their dorsolateral edges continuous with weakly laminate lateral margins of pronotum. Mesonotal dorsum strongly transverse, with laminate, weakly upturned, posteriorly converging lateral margins. Propodeum with lateral margins weakly laminate, narrowly rounded and upturned anteriorly, posteriorly produced into distinct, strongly upturned teeth; propodeal dorsum descending into oblique declivity in medially uninterrupted line. Petiole in profile with anterior and posterior faces convex at base, strongly converging dorsally; dorsum margin medially with a pair of blunt, broad-based teeth and additional

blunt denticles laterally before terminating in rather distinct, strongly upturned, dorso-laterally directed teeth. First gastral segment flat at base with anterior face widely rounding onto dorsum.

Mandibles distinctly and regularly, longitudinally striate. Head, mesosoma, petiole and gaster mostly shagreened, with sculpturation on vertex and sides of head distinctly more intense, somewhat reticulate; sides of mesosoma and base of petiole reticulate, finely wrinkled dorsally.

Mandibles with several, curved hairs near masticatory borders and along outer margins; several appressed hairs arising from pits towards bases. Anterior clypeal margin with several relatively long, anteriorly directed, golden setae and a few shorter setae fringing margin laterally. Clypeus, front and sides of head and mesosoma with numerous, short to medium length, erect, hairs. Vertex of head and dorsum of mesosoma with abundant, distinctly longer, erect and somewhat curved, mostly anteriorly directed hairs. A few, very short, erect hairs on leading edge of antennal scapes; one or two hairs arising from inferior edge distally. Fore coxae and legs, excluding dorsal surfaces of femora, with medium length, erect, mostly golden hairs. Petiole with several shorter hairs near dorsal margin. Gaster with patch of posteriorly curved, rather long hairs at anterodorsal margin and shorter, erect hairs lining posterior margins of dorsal and ventral surfaces of apical segments. A very few, short erect hairs arising from dorsum of first gastral segment. Short, silvery white or greyish, closely appressed, rather dense pubescence on most body surfaces.

**Colour.** Black throughout, with only mandibular masticatory borders diffusely dark reddish-brown.

Sexuals and immature stages unknown.

**REMARKS.** Like other members of the *vestita*-group, *P. masaokai* has a scale-like petiole with its dorsal margin arcuate, more-or-less entire or only weakly and obtusely dentate or jagged. *Polyrhachis. masaokai* differs from all the other known species of the group in having the dense body pubescence silvery white, while in *P. cognata* and *P. ogatai* the pubescence is distinctly rusty red and in *P. vestita* rich golden or yellow. It also differs from *P. ogatai* in lacking the peculiar process near apex of the antennal scapes found in that species. *Polyrhachis masaokai* differs from *P. vestita* by the shape of dorsal petiolar margin

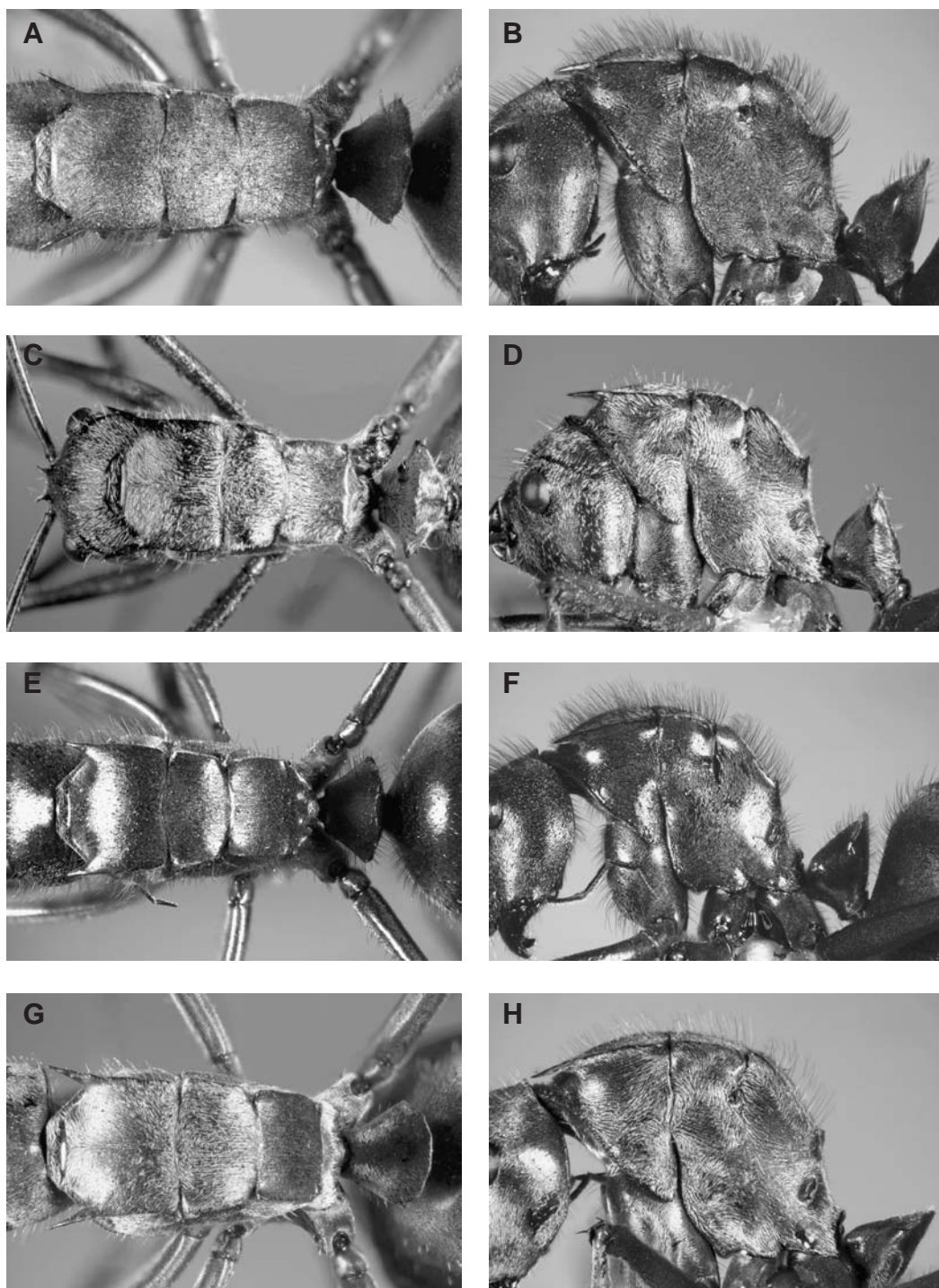


FIG. 5. *Polyrhachis* (*Myrma*) species, Dorsal (left) and lateral (right) view of mesosoma and petiole: A-B, *P. cognata* sp. nov.; C-D, *P. masaokai* sp. nov.; E-F, *P. ogatai* sp. nov.; G-H, *P. vestita* Fr. Smith (not to scale).



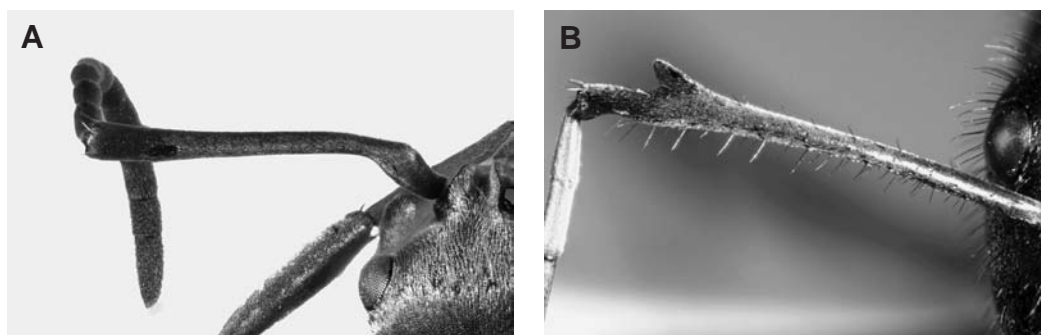


FIG. 6. *Polyrhachis* (*Myrma*) species, Antennal scapes. A, *P. bosi* sp. nov., dorsal view; B – *P. ogatai* sp. nov., frontal view (not to scale).

that, in *P. vestita* is virtually entire, while it is dentate with distinct lateral teeth in *P. masaokai*.

### 32. *Polyrhachis ogatai* sp. nov. (FIGS 5E–F, 6B)

**MATERIAL.** HOLOTYPE: SULAWESI SELATAN, Kayulagi nr Mangktana, 02°23'S, 120°47'E, 600m, 20.x.1999, K. Ogata & K. Masaoka (worker). Type distribution: unique holotype in QM (QMT144150).

**DESCRIPTION.** *Worker.* Dimensions of holotype: TL c. 15.12; HL 3.63; HW 2.77; CI 76; SL 4.69; SI 169; PW 2.47; MTL 5.64.

Anterior clypeal margin arcuate, with two shallow notches medially. Clypeus in profile sinuate, shallowly concave anteriorly, with short, distinct carina before posteriorly rounding into well impressed basal margin, laterally indicated by a thin line breaking sculpturation. Frontal triangle indistinct. Frontal carinae with anteriorly sinuate, highly and steeply raised laminate lobes; rather flat posteriorly; central area concave with short frontal furrow. Antennal scapes distinctly broadened apically, somewhat dorso-ventrally compressed and shallowly excavated on ventral aspect, with dorsally projecting, blunt process (Fig. 6B) near their apices. Sides of head in front of eyes only weakly convex, converging towards mandibular bases; behind eyes sides rounding into convex, strongly narrowed and medially emarginate, occipital margin. Eyes convex, in full face view not reaching lateral cephalic outline. Ocelli lacking. Pronotal dorsum with pair of relatively short, anteriorly directed spines; lateral edges of spines continuous with weakly posteriorly converging pronotal margins. Mesonotum wider than long with lateral margins converging posteriorly. Propodeal dorsum only marginally wider than long with lateral margins parallel,

terminating posteriorly in short, weakly raised ridges; margins of ridges continued inwards and slightly downwards for a short distance; propodeal dorsum descending into declivity in only weakly curved, medially uninterrupted line. Petiole with anterior and posterior faces virtually flat in profile, strongly converging dorsally; dorsal petiolar margin shallowly emarginate medially, somewhat jagged laterally and terminating in short denticles. Anterior face of first gastral segment very high, distinctly higher than petiole, broadly rounding onto dorsum.

Mandibles rather polished with fine, longitudinal striae. Clypeus, front and sides of head rather distinctly reticulate-punctate, with reticulae on clypeus somewhat antero-medially converging. Vertex, dorsum of mesosoma, petiole and gaster more finely reticulate-punctate with weak satin gloss.

Mandibles along outer margin and near masticatory borders with several golden hairs with a distinct rusty-red tint. A few, relatively long setae of same colour arising medially from anterior clypeal margin with shorter setae fringing margin laterally. Numerous, semierect and erect, mostly black or dark brown, medium length hairs on clypeus, sides of head and along frontal carinae. Distinctly longer, longest almost as long as the greatest diameter of eye, somewhat anteriorly curved, black or rusty-brown hairs, rather abundant on vertex and mesosomal dorsum; shorter, dorsally curved, dark brown or rusty-brown hairs on sides of mesosoma. Front coxae and legs, except dorsal surfaces of femora, with numerous black and brown hairs. Middle and hind femora towards distal ends with some shorter, erect hairs dorsally. Petiole with numerous, mostly black, shorter hairs. Gaster dorsally and ventrally with black and brown, relatively long, posteriorly directed, hairs. Closely



appressed, rusty brown pubescence on most body surfaces, except mandibles, clypeus, front and sides of head; pubescence most dense and distinctly longer on mesosoma and extremely short, with very distinct rusty-red tint on vertex, petiole and gaster.

**Colour.** Black throughout; only apical mandibular teeth and extreme tip of apical funicular segments reddish- or yellowish-brown.

Sexuals and immature stages unknown.

**REMARKS.** *Polyrhachis ogatai* is easily recognised among members of the *vestita*-group by its large size and the peculiar process at the apex of antennal scape.

### 33. *Polyrhachis vestita* Fr. Smith, 1860 (FIG. 5G-H)

*Polyrhachis vestitus* Fr. Smith, 1860a: 71. Holotype worker. Type locality: INDONESIA, SULAWESI, Makassar (A.R. Wallace), OXUM (examined).

*Polyrhachis vestita* var. *unicolor* Emery, 1898: 242. Syntype workers. Type locality: INDONESIA, SULAWESI (H. Fruhstorfer), MCSN (examined). Synonymy by Kohout, 1998: 525.

**MATERIAL.** SULAWESI UTARA: Dumoga-Bone NP, 1985 (R.H.L. Disney #44) (w); ditto, 400m, 11.ii.1985, fog. (N.E. Stork et al.) (w); ditto, 6.-13.ii.1985 (N.E. Stork et al.) (w); ditto, 7.vi.1985 (N.E. Stork et al.) (w); ditto, 230m, 10.iii.1985, fog. (N.E. Stork et al.) (w); ditto, 400m, 19.vii.1985, fog. (N.E. Stork et al.) (w); ditto, Gn. Mogogonipa, 22-25.viii.1985 (J. Huijbregts RMNH/HH 430) (w). SULAWESI TENGAH: Mt Tambusisi, 01°38'S, 121°23'E, 6500', 8.-9.iv.1980 (M.J.D. Brendell, B.M. 1980-280) (w); Lore Lindu NP, nr Dongi-Dongi shelter, 01°15'S, 120°20'E, c. 1000m, 4-9.xii.1985 (Malaise trap) (C.van Achterberg) (w); ditto, c. 1100m, 6.-9.xii.1985 (Malaise trap) (C.van Achterberg) (w); ditto, c. 975m, 6.xii.1985 (C.van Achterberg) (w); ditto, Toro, Bulu Lonca, 1130m, 27&29. iv.2005, nat. for., fog. (M.M. Bos #4) (w); ditto, Toro, Gn. Kalabul, 950m, 5.v.2005, nat. for., fog. (M.M. Bos #4) (w); ditto, Toro, Kole Wuri, 1010m, 27.iv.2005, nat. for., fog. (M.M. Bos #4) (w). SULAWESI SELATAN: nr Bantimurung Karaenta N.R., 250-300m, 18.iv.1991 (C.van Achterberg) (w); Cagar Alam Karaenta, Kabupaten Maros, 265-315m, iii.1996 (B. Gobin) (w); Balampesoang For., 5-8km NE of Tanete, 400m, degr. rf., 8-10.vii.1972 (W.L. Brown) (w); Bengonbengo nr Camba, 05°01'S, 119°46'E, 520m, 8.x.1999 (K. Ogata & K. Masaoka) (w).

**REMARKS.** *Polyrhachis vestita* was discussed in detail by Kohout (1998: 525).

### *Polyrhachis zopyra* species-group

#### 34. *Polyrhachis zopyra* Fr. Smith, 1861

*Polyrhachis zopyrus* Fr. Smith, 1861: 43, pl. 1, fig. 22. Holotype worker. Type locality: INDONESIA, SULAWESI, Tondano (A.R. Wallace), OXUM (examined).

**MATERIAL.** SULAWESI UTARA: Dumoga-Bone NP, 9.-16.v.1985 (N.E. Stork et al.) (w, ♀); ditto, 00°34'N, 123°54'E, c. 220m, 9.-19.xi.1985 (Malaise trap) (C.van Achterberg) (w); ditto, Tumpah R., 11.-19. xi.1985 (Malaise trap) (C.van Achterberg) (w); ditto, Maze Toraut R., 16.-23.xi.1985 (Malaise trap) (C.van Achterberg) (w); ditto, Tumpah R., 19.-23.xi.1985 (Malaise trap) (C.van Achterberg) (w); ditto, Base camp, 200m, 13.x.1985, pitfall trap (Bosmans & Van Stalle #024) (w); ditto, Tumpah R., 7.x.1985 (Bosmans & Van Stalle #004) (w); subcamp Barney's, 300m, 7.xi.1985 sweeping (Bosmans & Van Stalle #085) (♀). SULAWESI TENGAH: nr Morowali, Ranu R. area, 27.i.-20.iv.1980 (M.J.D. Brendell B.M. 1980-280) (w); Kebung Kopi nr Palu (Sk. Yamane) (w). SULAWESI TENGGARA: Lanowulu, Rowa Apa Watumohae NP, 04°28'S, 122°08'E, 40m, 12.x.1999 (K. Ogata & K. Masaoka #34. SULAWESI: Latimodjong Mts (Clagg) (w).

**REMARKS.** *Polyrhachis zopyra* is the only member of the *zopyra* species-group endemic to Sulawesi. It is very similar to *P. edentula* described by Emery from Sumatra, and can be distinguished by the characters listed under that species (see under Nomenclatural changes to extralimital fauna).

#### Subgenus *Myrmatopa* Forel, 1915

The subgenus *Myrmatopa* was divided by Emery (1925) into two species-groups (the *wallacei*- and *schang*-groups) and this arrangement was followed by Dorow (1995). However, I am further subdividing the *wallacei*-group and placing several of its constituent species into a new *flavicornis*-group. This group is characterised by the mesosomal dorsum being distinctly marginate along its entire length and by the black colour of the body (thus closely resembling some species of the subgenus *Campomyrma*). In contrast, the mesosoma of the redefined *wallacei*-group, is distinctly marginate only along the mesonotal and propodeal dorsa. The pronotal margins are completely lacking or evident only at the anterior pronotal angles and the colour of the body is yellowish- or light reddish-brown. The species of the *schang* species-group differ from members of the other two groups in having the lateral margins

of the mesonotum distinctly raised dorsally (Fig. 11B) and a completely immarginate pronotal dorsum.

### ***Polyrhachis flavicornis* species-group**

#### **KEY TO *FLAVICORNIS*-GROUP SPECIES (based on workers)**

1. Dorsal body surfaces, including appendages, with numerous, relatively long, erect hairs (Fig. 7A-B) . . . . . *chaita* sp. nov.  
Dorsal body surfaces without erect hairs . . . . . 2
2. Larger species (HL >1.53) . . . . . 3  
Smaller species (HL <1.50) . . . . . 4
3. Propodeal dorsum strongly transverse, more than twice as wide as long; petiolar dorsum with distinct pair of acute intercalary spines (Fig. 7G, H) . . . . . *sulawesiensis* sp. nov.  
Propodeal dorsum only weakly transverse, only marginally wider than long; petiolar dorsum without intercalary teeth or spines (Fig. 7E, F) . . . . . *neglecta* sp. nov.
4. Petiolar dorsum with pair of slender, strongly diverging, lateral spines and pair of short, acute, intercalary spines or teeth (Fig. 7C, D) . . . . . *hilaris* sp. nov.  
Petiolar dorsum with pair of rather thick, weakly diverging lateral spines; intercalary teeth lacking, or only feebly indicated in some specimens. . . . . *fruhstorferi* Emery

### **35. *Polyrhachis chaita* sp. nov. (FIG. 7A-B)**

**MATERIAL.** HOLOTYPE: SULAWESI UTARA: Dumoga-Bone NP, 400m, 11.ii.1985, fog., N.E. Stork et al. (worker). PARATYPES: data as for holotype (13 workers, 1 alate queen). Type deposition: Holotype, 5 paratype workers and paratype queen in BMNH; 2 paratype workers in ANIC, CASC, MCZC and QM. **ADDITIONAL MATERIAL.** SULAWESI TENGAH: Lore Lindu NP, Toro, Gn. Kalabui, 950m, 16.& 20.iv.& 5.v.2005, nat. for., fog. (M.M. Bos #10, 12) (w, ♀); ditto, Toro, Gn. Kamouna, 1080m, 20.iv.2005, nat. for., fog. (M.M. Bos #10) (w); ditto, Toro, Bulu Lonca, 1130m, 29.iv.2005, nat. for., fog. (M.M. Bos #10) (w); ditto, Toro, Kole Wuri, 1010m, 27.iv.2005, nat. for., fog. (M.M. Bos #10) (w).

**DESCRIPTION.** *Worker.* Dimensions (holotype cited first): TL c. 6.00, 5.74-6.35; HL 1.56, 1.50-1.59; HW 1.22, 1.12-1.25; CI 78, 75-81; SL 1.87, 1.78-1.93; SI 153, 151-159; PW 1.09, 0.90-1.09; MTL 1.72, 1.65-1.72 (14 measured).

Anterior clypeal margin medially with shallow, truncate flange, laterally flanked by acute denticles. Clypeus in profile very weakly convex, rounding posteriorly into moderately impressed basal margin, laterally basal margin partly concealed by coarse sculpturation. Frontal triangle distinct. Frontal carinae sinuate with margins moderately raised; central area concave with poorly indicated frontal furrow. Sides of head in front of eyes

straight, anteriorly converging; behind eyes sides rounding into convex occipital margin. Eyes convex, in full face view clearly breaking lateral cephalic outline. Ocelli lacking. Lateral margins of pronotal dorsum widely rounded with humeri bluntly angular; mesonotal dorsum with lateral margins converging posteriorly, weakly raised towards rounded posterior angles. Propodeal dorsum transverse, lateral margins terminating posteriorly in somewhat flattened, dorsally rounded ridges, appearing in profile as acute teeth; inner margins of teeth continued medially only for a short distance, so that propodeal dorsum descends into declivity in medially uninterrupted curve. Petiolar dorsum armed with two, strong, acute spines, arising dorsolaterally from their bases and widely curving at mid length with their tips directed posterodorsally. Anterior face of first gastral segment flat at base, widely rounding onto dorsum.

Mandibles rather smooth, with very weakly, mostly longitudinal striae basally and numerous piliferous pits. Head, mesosoma and gaster very coarsely reticulate-rugose, reticulae on pronotal dorsum somewhat longitudinally oriented. Antennal scapes and petiolar spines with shallow rugae and piliferous pits. Fore coxae finely and shallowly reticulate. Gaster shagreened with numerous piliferous pits.

Very hairy. Mandibular masticatory borders with several curved hairs; outer mandibular margin fringed with numerous, short, erect hairs. Anterior clypeal margin with one long seta medially and few short setae fringing margin laterally. Whole body covered with whitish and/or pale yellow, short to medium length, erect and variously curved hairs; shorter hairs on antennal scapes and dorsal surfaces of femora. Mostly white, decumbent or semierect, scarce pubescence over most dorsal surfaces, dense and more appressed on gaster.

**Colour.** Black. Mandibles reddish-brown at bases, distinctly lighter towards masticatory borders. Antennal scapes and basal funicular segments dark reddish-brown, with subsequent segments lightening towards apices; condylae, base of antennal scapes and apical funicular segments distinctly light yellow. Coxae black; femora and proximal ends of tibiae very dark reddish-brown with tibiae a shade lighter distally; tarsi light reddish-brown. Gaster dorsally very dark,

reddish-brown; sides with somewhat diffuse reddish tint.

*Queen*. Dimensions: TL c. 7.41; HL 1.72; HW 1.28; CI 74; SL 2.12; SI 166; PW 1.18; MTL 1.68 (1 measured).

Queen very similar to worker, with characters identifying full sexuality, including three ocelli, complete thoracic structure and wings. Pronotal shoulders widely rounded. Mesoscutum only marginally wider than long with lateral margins converging anteriorly, forming moderately rounded anterior margin; median line distinct; parapsides weakly raised posteriorly; anterior face of mesoscutum relatively low in profile; dorsum only weakly convex anteriorly, flat posteriorly. Mesoscutellum only marginally raised above dorsal plane of mesosoma, convex and strongly rounding into distinctly impressed metanotal groove. Propodeal dorsum convex in profile with lateral margins terminating posteriorly in upturned ridges identical to those in worker. Petiolar spines similar to those in worker, slightly shorter. Sculpturation, pilosity and colour scheme virtually as in worker.

Male and immature stages unknown.

**REMARKS.** *Polyrhachis chaita* is somewhat similar to *P. elii*, described by Emery (1900) from Mantawai I. They both have a distinct cover of whitish- or yellowish-grey, mostly short to medium length, erect hairs. However, *P. chaita* differs markedly by its distinctly smaller size (HL 1.50-1.59 in *P. chaita* versus HL 1.84-1.90 in *P. elii*), bluntly angular humeri and distinctly longer, widely diverging and somewhat curved petiolar spines. In contrast, the pronotal humeri in *P. elii* are armed with short, but distinct teeth and the petiolar spines are rather short, stubby and only weakly curved inwards. The sculpturation in *P. chaita* is coarsely rugose and rather irregular, while in *P. elii* the reticulate-rugose sculpturation is finer and somewhat longitudinally directed, notably on the pronotal dorsum.

Specimens from Lore Lindu NP differ from the type series specimens from Dumoga-Bone in having the petiolar spines more steeply raised, only weakly divergent and curved inwards. Also, the pronotal humeri are distinctly rounded without any indication of humeral angles, while they are bluntly angular in the Dumoga-Bone specimens. However, all the workers are very similar in all other aspects and, since the queens are virtually identical, I consider that

they represent different populations of a single biological species.

### 36. *Polyrhachis fruhstorferi* Emery, 1898

*Polyrhachis fruhstorferi* Emery, 1898: 238. Syntype workers.  
Type locality: INDONESIA, SULAWESI, Toli-Toli (H. Fruhstorfer), MCSN (examined).

**MATERIAL.** SULAWESI UTARA: Dumoga-Bone NP, 200-400m, lowland for., 8.ii.1985, fog. (P.M. Hammond) (w); ditto, 400m, 11.ii.1985, fog. (N.E. Stork et al.) (w); ditto, nr Danau Mooat, 1100m, 1.viii.1985, coffee fog. (N.E. Stork et al.) (w); ditto, 400m, 19.vii.1985, fog. (N.E. Stork) (w); ditto, c. 220m, nr Base Camp Torau R., 00°34'N, 123°54'E, 16.v.1985, at light (C. van Achterberg) (♀). SULAWESI TENGAH: Palolo Valley, Nopu (N6), 27.vi.2001 (J. Ketterl #Ants sp. 4) (♀); Lore Lindu NP, Toro, Gn. Kamonua, 1080m, 20.iv. & 5.v.2005, nat. for. fog. (M.M. Bos #5a, 7) (w, ♀); ditto, Toro, Gn. Kauboga, 840m, 4.v.2005, cacao agrof., fog. (M.M. Bos #5a) (♀); ditto, Kole Wuri, 1010m, 16.iv.2005, nat. for., fog. (M.M. Bos #7, 15) (w); ditto, Toro, Foot of Bulu Lonca, 830m, 30.iv.2005, cacao agrof., fog. (M.M. Bos #7) (w); ditto, Toro, Kaha, 920m, 15.iv.2005, cacao agrof., fog. (M.M. Bos #5a) (♀); ditto, Toro, W foot of Gn. Kalabui, 825m, 30.iv.2005, cacao agrof., fog. (M.M. Bos #11) (w); ditto, Toro, Bulu (Dusun Dua), 21.iv.2005, cacao agrof., fog. (M.M. Bos #11) (w).

**REMARKS.** I have examined and directly compared two syntype workers of *P. fruhstorferi* (MCSN Emery coll.) with the more recently collected material and found all specimens very similar and undoubtedly conspecific. *Polyrhachis fruhstorferi* bears a close resemblance to *P. flavicornis*, a species described by Fr. Smith (1857) from Singapore and widely distributed throughout South East Asia, including Borneo. In contrast, *P. fruhstorferi* appears to be endemic to Sulawesi. The outline and sculpturation of the head and mesosoma is very similar in both species and they have an almost identical configuration of the petiolar spines. I believe that *P. fruhstorferi* could prove to be just a population of *P. flavicornis*, but a more detailed study of the geographic variation of the latter species will be necessary to ascertain their true relationship. *Polyrhachis fruhstorferi* is also closely related to a newly described *P. neglecta*, with the main differences listed in remarks section under that species.

### 37. *Polyrhachis hilaris* sp. nov. (FIG. 7C-D)

**MATERIAL.** HOLOTYPE: SULAWESI UTARA: Dumoga-Bone NP, nr Danau Mooat, 1100m, 1.viii.1985, coffee fog., N.E. Stork et al. (worker).

PARATYPES: data as for holotype (8 workers); ditto, 230m, 5.ii.1985, fog., N.E. Stork et al. (worker); ditto, 230m, 11.vii.1985, fog., N.E. Stork et al. (3 workers); ditto, 230m, 2.xii.1985, fog., N.E. Stork et al. (2 workers). Type distribution: Holotype and (5) paratypes in BMNH; 2 paratypes each in ANIC, CASC, MCZC and QM.

**DESCRIPTION.** *Worker.* Dimensions (holotype cited first): TL c. 5.00, 4.38-5.19; HL 1.31, 1.15-1.37; HW 1.06, 0.90-1.06; CI 81, 78-84; SL 1.56, 1.40-1.65; SI 147, 144-159; PW 0.87, 0.65-0.87 MTL 1.37, 1.28-1.47 (17 measured).

Anterior clypeal margin medially with shallow, truncate flange, laterally flanked by blunt denticles. Clypeus with poorly defined, blunt median carina; in profile clypeus weakly convex with shallowly impressed basal margin. Frontal triangle distinct. Frontal carinae sinuate with weakly raised margins; central area weakly concave; frontal furrow indistinct. Sides of head in front of eyes straight, rather strongly converging towards mandibular bases; behind eyes sides rounding into evenly convex occipital margin. Eyes convex, in full face view clearly breaking lateral cephalic outline. Ocelli lacking. Pronotal humeri angular, shallowly emarginate behind angles and widely rounded posteriorly; greatest width of pronotal dorsum at mid-length of segment. Mesonotum with lateral margins very weakly raised, converging posteriorly. Propodeal dorsum transverse, with lateral margins terminating posteriorly in dorsally rounded ridges, appearing in profile as acute teeth; ridges continued medially for a short distance with propodeal dorsum between them descending into declivity in medially uninterrupted curve. Petiole armed with pair of relatively long, widely diverging, acute spines; dorsal margin between spines with pair of distinct, acute, intercalary teeth. Anterior face of first gastral segment flat at base, widely rounding onto dorsum.

Mandibles very finely longitudinally striate near bases, rather smooth at masticatory borders with numerous piliferous pits. Head, mesosoma and petiole rather coarsely reticulate-punctate with reticulae on pronotum somewhat irregularly, mostly longitudinally, directed. Antennae finely, legs and gaster more distinctly and closely reticulate-punctate.

Mandibles with several curved, short hairs at outer margins near masticatory borders. Anterior clypeal margin with one long, seta medially and several short setae fringing margin laterally. A few paired, short and medium length, erect,

yellow hairs near anterior and basal clypeal margins, along frontal carinae and a single pair of anteriorly curved hairs on vertex. Anterior face of fore coxae with pair of long, erect hairs. Gaster with rather short, golden hairs lining posterior margins of dorsal apical segments; ventral gastral surface with several erect, distinctly longer hairs and numerous, posteriorly curved, shorter hairs. Appressed, white, rather diluted pubescence on dorsum of gaster, virtually absent from other body surfaces.

**Colour.** Black. Mandibles very dark reddish-brown at their bases, distinctly lighter apically with teeth dark brown. Antennal scapes and basal funicular segments dark reddish-brown, with subsequent segments gradually lightening; condylae, base of antennal scapes and apical funicular segments distinctly light, yellow. Legs distinctly bi-coloured with coxae and femora black, tibiae and tarsi yellow; first tarsal segment shade darker. Gaster dorsally very dark, reddish-brown; sides a shade lighter with somewhat reddish tint.

Sexuals and immature stages unknown.

**REMARKS.** *Polyrhachis hilaris* is relatively close to *P. fruhstorferi* from Sulawesi and *P. flavicornis* from South East Asia. It differs from both in the form of the petiole which has more slender and widely diverging lateral petiolar spines and a pair of short, acute dorsal, intercalary teeth that are absent in the other species.

### 38. *Polyrhachis neglecta* sp. nov. (FIG. 7E-F)

**MATERIAL.** HOLOTYPE: SULAWESI UTARA: Dumoga-Bone NP, 230m, 10.iii.1985, fog., N.E. Stork et al. (worker). PARATYPE: data as for holotype, 30.ix.1985, fog., (N.E. Stork et al.) (worker). Holotype in BMNH, paratype in QM. **ADDITIONAL MATERIAL.** INDONESIA, JAVA, Semarang (no further data) (w); Bogor, 4-8.xi.1985 (Sk. Yamane) (w).

**DESCRIPTION.** *Worker.* Dimensions (holotype cited first): TL c. 6.90, 5.90; HL 1.72, 1.53; HW 1.40, 1.25; CI 81, 82; SL 1.87, 1.72; SI 133, 138; PW 1.18, 1.00; MTL 2.00, 1.72 (2 measured).

Anterior clypeal margin widely truncate medially; truncate portion weakly notched in middle and flanked by distinct denticles. Clypeus with blunt median carina, more distinct posteriorly; clypeus convex in profile but rather flat in middle, posteriorly rounding into moderately impressed basal margin; laterally basal margin forms a dis-



tinct, sculpturation breaking line. Frontal triangle distinct. Frontal carinae sinuate with highly raised margins; central area concave with distinct frontal furrow. Sides of head in front of eyes straight, distinctly converging towards mandibular bases; behind eyes sides rounding into convex, medially emarginate occipital margin. Eyes in full face view clearly breaking lateral cephalic outline; when viewed from behind, eyes distinctly more convex laterally than medially (Fig. 7 E). Ocelli lacking. Pronotal dorsum in dorsal view with humeri armed with distinct teeth; lateral pronotal margins emarginated behind teeth and rounded posteriorly; greatest width of pronotal dorsum at about mid-length of segment. Mesonotal dorsum with lateral margins raised and converging posteriorly; anterior corners narrowly and posterior corners widely rounded. Propodeal dorsum virtually parallel sided with lateral margins terminating posteriorly in very distinct, upturned, acute teeth; posterior margins of teeth continued inwards and somewhat downwards for a short distance, failing to meet in middle where propodeal dorsum meets vertical declivity in an uninterrupted curve. Petiole armed with two strong, relatively long, dorsolaterally and posteriorly directed spines; apices of spines very weakly diverging in dorsal view, almost parallel; dorsal margin between spines with two, rather indistinct, blunt tuberculae. Anterior face of first gastral segment shallowly concave, distinctly higher than dorsal petiolar margin.

Mandibles very finely reticulate with numerous piliferous pits. Head, mesosoma and petiole rather distinctly reticulate-punctate. Gaster more finely sculptured, very closely punctate. Sculpturation on pronotal and mesonotal dorsa somewhat more longitudinally directed. Antennal scapes and legs finely reticulate-punctate.

Mandibular masticatory borders with a few, curved, rather short, golden hairs. Truncate portion of anterior clypeal margin with single, long, anteriorly directed seta medially and distinct fringe of very short setae laterally. Antennal scapes with a few, short hairs fringing apices. Fore coxae and gaster apically and ventrally with several, relatively long, erect hairs. Dorsal surfaces of head, mesosoma, petiole and gaster, except apical antennal segments, completely hairless. White, closely appressed pubescence on clypeus, anterior face of fore coxae and ventral aspect of gaster, where it is somewhat longer and rather diluted; pubescence virtually absent elsewhere.

*Colour.* Black, with narrow, transverse, light reddish band at bases of mandibular teeth. Antennae and legs very dark reddish-brown with condylae, tip of last funicular segments, distal margins of trochanters and apical tarsal segments light, yellowish-brown.

Sexuals and immature stages unknown.

**REMARKS.** In general appearance, *P. neglecta* is rather similar to *P. fruhstorferi* and the most obvious difference between the species is their relative size (HL 1.53-1.75 in *P. neglecta* versus HL 1.34-1.40 in *P. fruhstorferi*). The eyes in *P. neglecta* are distinctly more convex laterally, which is most evident when they are viewed from behind, while the eyes are evenly convex and somewhat larger in *P. fruhstorferi*. The petiolar spines are distinctly stronger, longer and more posteriorly curved in *P. neglecta*, while they are more stubby and dorsally directed in *P. fruhstorferi*. *Polyrhachis neglecta* is almost uniformly black, with only the appendages very dark, reddish-brown. In contrast, the body in *P. fruhstorferi* is black, with the mandibles, antennae, legs and gaster medium reddish-brown. All the dorsal body surfaces in *P. neglecta* are virtually devoid of pilosity, while in *P. fruhstorferi* the dorsal surfaces of the head and gaster bear numerous, short erect hairs. *Polyrhachis fruhstorferi* also has the dorsum of gaster covered with a distinct pile of short, appressed hairs that are lacking in *P. neglecta*.

### 39. *Polyrhachis sulawesiensis* sp. nov. (FIG. 7G-H)

**MATERIAL.** HOLOTYPE: SULAWESI UTARA: Dumoga-Bone NP, 400m, 11.ii.1985, fog., N.E. Stork et al. (worker). PARATYPES: data as for holotype (worker); ditto, 230m, 11.vii.1985, fog., N.E. Stork et al. (worker); ditto, 7.vi.1985, N.E. Stork et al. (worker). Type deposition: Holotype and paratype in BMNH; 1 paratype each in MCZC and QM.

**DESCRIPTION.** *Worker.* Dimensions (holotype cited first): TL c. 7.36, 6.95-7.76; HL 1.87, 1.87-1.90; HW 1.56, 1.53-1.56; CI 83, 81-82; SL 1.78, 1.75-1.84; SI 114, 114-118; PW 1.28, 1.29-1.37; MTL 1.93, 1.93-2.06 (4 measured).

Anterior clypeal margin with shallow, medially notched flange, laterally flanked by distinct, blunt denticles. Clypeus with poorly defined, blunt, median carina; clypeus straight in profile with weakly impressed anterior margin, posteriorly rounding into shallow basal margin, laterally indicated by a thin line breaking sculpturation.

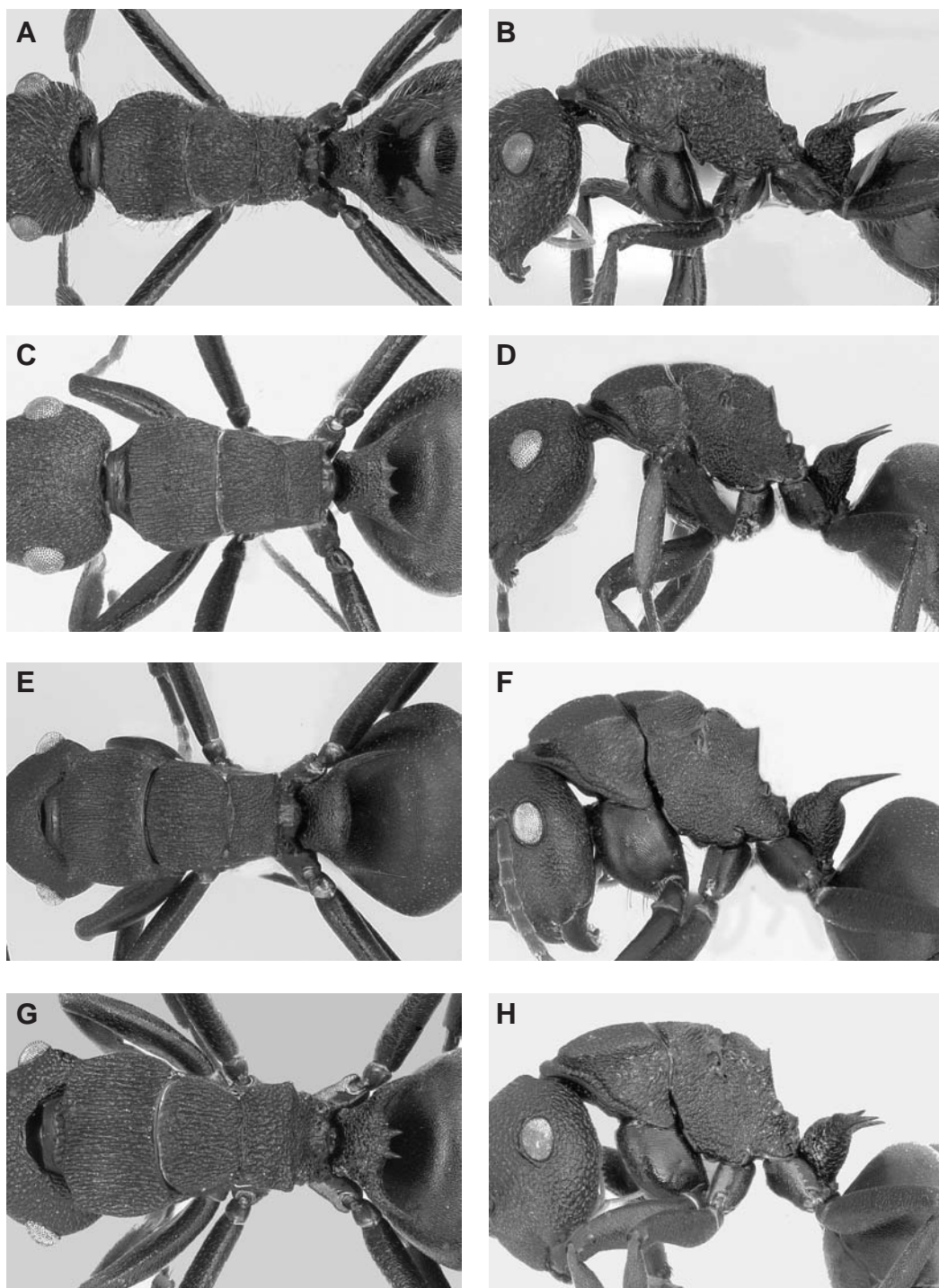


FIG. 7. *Polyrhachis* (*Myrmatopa*) species, Dorsal (left) and lateral (right) view of mesosoma and petiole: A-B, *P. chaita* sp. nov.; C-D, *P. hilaris* sp. nov.; E-F, *P. neglecta* sp. nov.; G-H, *P. sulawesiensis* sp. nov. (not to scale).

Frontal triangle distinct. Frontal carinae sinuate with margins only weakly raised; central area shallow with weakly impressed frontal furrow. Sides of head in front of eyes straight, converging towards mandibular bases; behind eyes sides rounding into convex, medially narrowly emarginated, occipital margin. Eyes convex, in full face view distinctly exceeding lateral cephalic outline; more convex laterally than medially, notably when viewed from behind. Ocelli lacking. Mesosoma with pronotal and propodeal dorsa distinctly wider than dorsum of mesonotum. Pronotal humeri angular with lateral margins weakly and narrowly emarginate behind angles, rounded posteriorly; greatest width of pronotal dorsum at or just behind mid-length of segment. Propodeum distinctly transverse, wider than long; anterior propodeum distinctly wider than posterior width of mesonotum; lateral propodeal margins terminating posteriorly in short, upturned teeth; posterior margins of teeth continued inwards and somewhat downwards for a short distance but not meeting; propodeal dorsum descending into vertical declivity in medially uninterrupted line. Petiole armed with a pair of dorsolaterally directed, divergent lateral spines and a pair of very distinct, acute, intercalary spines arising from dorsal margin medially. Anterior face of first gastral segment rather flat, only marginally higher than height of petiole, with anterodorsal margin widely rounding onto dorsum.

Mandibles very finely reticulate with numerous piliferous pits. Head, mesosoma and petiole rather coarsely reticulate-rugose; gaster finely reticulate-punctate. Sculpturation somewhat longitudinally directed on pronotal dorsum, distinctly irregular elsewhere. Antennal scapes and legs reticulate-punctate.

Mandibular masticatory borders with several curved, golden hairs. Anterior clypeal margin fringed with several rather short, anteriorly directed setae. Two pairs of very short, erect hairs along frontal carinae and single pair of anteriorly directed, very short hairs on vertex. A few very short, erect hairs fringing apices of antennal scapes and a few slightly longer hairs arising from anterior faces of fore coxae. Several distinctly longer, erect hairs on ventral surface of gaster and fringing gastral apex.

*Colour.* Black, with appendages and gaster very dark reddish-brown. Mandibular teeth, condylae,

extreme tip of apical funicular segments and trochanters mostly reddish-brown.

Sexuals and immature stages unknown.

**REMARKS.** *Polyrhachis sulawesiensis* is a very distinct species of *Myrmatopa* that superficially resembles some species of the subgenus *Campomyrma*. It also resembles *P. neglecta*, described above, but differs in several characters. The head and body sculpturation in *P. sulawesiensis* is reticulate-rugose and distinctly coarser than the reticulate-punctate sculpturation in *P. neglecta*. The pronotal and propodeal dorsa in *P. sulawesiensis* are distinctly wider than dorsum of the mesonotum. In contrast, the pronotal, mesonotal and propodeal dorsa in *P. neglecta* become progressively narrower posteriorly. The lateral petiolar spines in *P. sulawesiensis* are distinctly divergent and dorsum of petiole bears a pair of acute intercalary spines. The lateral petiolar spines in *P. neglecta* are longer, more strongly posteriorly directed and are almost parallel at their tips, and the dorsal petiolar margin has a pair of rather indistinct tuberculae.

#### ***Polyrhachis schang* species-group**

#### **KEY TO *SCHANG*-GROUP SPECIES (based on workers)**

1. Frontal carinae distinctly elevated (in copal) ..... *excitata* Viehmeyer  
Frontal carinae not distinctly elevated ..... 2
2. Larger species (HL 1.62-1.84); whole body more-or-less uniformly orange with yellowish or light brownish tint (Fig. 11A, B) ..... *mellita* sp. nov.  
Smaller species (HL 1.53-1.57); body light yellowish-brown and diffusely blotched with dark reddish-brown ..... *alata* Forel

#### **40. *Polyrhachis alata* Forel, 1904**

*Polyrhachis gracilis* r. *alata* Forel, 1904: 177. Holotype worker.  
Type locality: INDONESIA, SULAWESI, Patuhuang (H. Fruhstorfer), MHNG (examined).

**MATERIAL.** SULAWESI UTARA: Dumoga-Bone NP, nr Danau Mooat, 1100m, 1.viii.1985, coffee fog., (N.E. Stork et al.) (w). SULAWESI TENGAH: Lore Lindu NP, Toro, Foot of Gn. Kamanua, 845m, 28.iv.2005, cacao agrof., fog. (M.M. Bos #27) (w); ditto, Toro, Baloli, 835m, 14.iv.2005, cacao agrof., fog. (M.M. Bos #48) (w).

**REMARKS.** *Polyrhachis alata* was discussed in relation to the Dumoga-Bone specimens by Kohout (1998). It differs from the very similar *P. schang* Forel 1879, in having higher and more acute dorsolateral mesonotal prominences, higher



and longer and more slender petiolar spines, and by its conspicuous bicoloured pattern.

#### 41. *Polyrhachis excitata* Viehmeyer, 1913

*Polyrhachis excitata* Viehmeyer, 1913: 147, fig. Holotype worker. Type locality: INDONESIA, SULAWESI (in copal), MNHU (examined).

*Polyrhachis schang* var. *excitata* Viehmeyer. Viehmeyer, 1914: 48, fig. 8. Reduced in rank to variety of *P. schang*.

*Polyrhachis excitata* Viehmeyer; Kohout, 1998: 507. Status reversal.

**REMARKS.** The holotype from copal is apparently the only specimen of *P. excitata* known. Its status and distinguishing characters were discussed by Kohout (1998).

#### 42. *Polyrhachis mellita* sp. nov. (FIG. 11A-B)

**MATERIAL. HOLOTYPE:** SULAWESI UTARA: Sulawesi Utara, Dumoga-Bone NP, 400m, 11.ii.1985, fog., N.E. Stork et al. (worker). **PARATYPES:** data as for holotype (8 workers); ditto, 11.ii.1985 (worker). Type deposition: Holotype and (3) paratypes in BMNH, 2 paratypes each in ANIC, MCZC and QM. **ADDITIONAL MATERIAL.** SULAWESI TENGAH: Lore Lindu NP, Toro, Foot of Gn. Kalabui, 815m, 19.iv.2005, cacao agrof., fog. (M.M. Bos #13, 38) (w, ♀); ditto, Toro, Foot of Bulu Lonca, 830m, 30.iv.2005, cacao agrof., fog. (M.M. Bos #13) (w); ditto, Dusun Tuju, 815m, 3.v.2005, cacao agrof., fog. (M.M. Bos #13) (w); ditto, Toro, Haloda, 815m, 21.iv.2005, cacao agrof., fog. (M.M. Bos #13) (w); ditto, Toro, Baloli, 835m, 14.iv.2005, cacao agrof., fog. (M.M. Bos #38) (♀); ditto, Toro, Kaha, 920m, 15.iv.2005, cacao agrof., fog. (M.M. Bos #38) (♀); ditto, Toro, Foot of Gn. Kamanua, 845m, cacao agrof., fog. (M.M. Bos #38) (♀); ditto, Toro, Watu Bohe, 860m, 14.iv.2005, cacao agrof., fog. (M.M. Bos #38) (♀).

**DESCRIPTION.** *Worker.* Dimensions (holotype cited first): TL c. 7.00, 6.40-7.51; HL 1.75, 1.62-1.84; HW 1.28, 1.15-1.31; CI 73, 70-72; SL 2.62, 2.31-2.71; SI 205, 207-214; PW 0.97, 0.69-0.90; MTL 2.68, 2.34-2.90 (10 measured).

Anterior clypeal margin with rather narrow, widely emarginate median flange, flanked laterally by distinct, acute denticles. Clypeus in profile only very weakly convex, rounding posteriorly into moderately impressed basal margin, laterally margin indicated by a thin line. Frontal triangle weakly indicated. Frontal carinae with raised margins sinuate anteriorly, parallel posteriorly; central area concave with poorly indicated frontal furrow. Sides of head in front of eyes converging in virtually straight line into mandibular bases; behind eyes sides strongly converging into rather narrow occipital margin. Eyes convex,

in full face view clearly breaking lateral cephalic outline. Pronotum with lateral margins indistinct; mesonotum laterally marginate, margins strongly raised dorsally, forming elevated ridges. Propodeum with lateral margins narrowly raised anteriorly, weakly converging and terminating posteriorly in elevated, dorsally rounded angles; propodeal dorsum descending into steep declivity in medially uninterrupted curve. Petiole with a pair of relatively long, slender, only weakly diverging lateral spines with dorsal margin between them concave. Anterior face of first gastral segment widely rounding onto dorsum.

Mandibles finely reticulate-rugose at bases; sculpture distinctly finer and polished towards masticatory borders. Head, mesosoma and gaster very finely shagreened; intensity of sculpturation increasing posteriorly and laterally, with mesonotal and propodeal dorsa, sides of mesosoma and petiole distinctly reticulate-punctate.

Mandibular masticatory borders with numerous, semierect, golden hairs and numerous very short appressed hairs towards bases. Anterior clypeal margin with long median seta and numerous short setae lining margin laterally. A few paired short, erect hairs near anterior and basal clypeal margins and along frontal carinae. Gaster with numerous, relatively long, erect hairs lining margins of ventral segments and fringe of hairs at gastral apex. Extremely short, closely appressed, golden pubescence in various densities over all dorsal body surfaces.

**Colour.** Body uniformly yellow, with a light brownish tint in some specimens. Antennae and legs yellowish-brown. Masticatory borders, inner mandibular margins, frontal carinae, pronotal collar, lateral margins of mesonotal and propodeal dorsa and ventral margins of meso- and metapleurae narrowly bordered with dark brown.

Sexuals and immature stages unknown.

**REMARKS.** *Polyrhachis mellita* is relatively similar to *P. leviuscula*, described by Viehmeyer (1916) from Singapore. However, while the head and pronotal dorsum are very smooth and highly polished in *P. leviuscula*, they are finely sculptured in *P. mellita*. The pronotal dorsum in lateral view is evenly convex in *P. leviuscula*, while it is distinctly flatter in *P. mellita*. The anterior face of the petiole in *P. mellita* is very low and, in lateral view, rounds smoothly onto its dorsum, forming a continuous plane with the petiolar spines (Fig. 11B). In contrast, the anterior face of petiole in *P. leviuscula* is higher and more



angular in lateral view, with spines arising from petiolar dorsum at a distinct angle. The available specimens of *P. leviuscula* (including a syntype) are somewhat smaller (HL <1.62) than *P. mellita* (HL > 1.62) and are more yellow-orange in colour compared to the distinctly lighter, uniformly yellow *P. mellita*.

### **Polyrhachis wallacei** species-group

#### **KEY TO WALLACEI-GROUP SPECIES** (based on workers)

1. Body and appendages covered with rather abundant, semierect to erect, bristle-like hairs (Fig. 11C, D) ..... *hispidia* sp. nov.  
Body and appendages with only a few erect hairs on head and apical segments of gaster ..... 2
2. Pronotal humeri produced into blunt, minute teeth; body mostly light to medium yellowish-brown. *wallacei* Emery  
Pronotal humeri rounded without an indication of humeral teeth; body very dark reddish-brown, with sides of mesosoma, propodeum and petiole virtually black (Fig. 11E, F) ..... *kazuoi* sp. nov.

#### **43. Polyrhachis hispidia** sp. nov. (FIG. 11C-D)

**MATERIAL.** HOLOTYPE: SULAWESI UTARA: Dumoga-Bone NP, nr Danau Mooat, 1100m, 1.viii.1985, coffee fog., N.E. Stork et al. (worker). Type deposition: Unique holotype in BMNH.

**DESCRIPTION.** *Worker.* Dimensions: TL c. 5.19; HL 1.37; HW 1.15; CI 84; SL 1.62; SI 141; PW 0.72; MTL 1.81 (1 measured).

Anterior clypeal margin with median, relatively wide, shallowly and widely emarginate flange, flanked laterally by distinct, acute denticles. Clypeus with strong, distinctly raised median carina; in profile clypeus straight, very shallowly impressed anteriorly, posteriorly rounding into well impressed basal margin, laterally indicated by sculpture-breaking line. Frontal triangle weakly indicated. Frontal carinae sinuate with narrowly raised margins; central area wide with frontal furrow only weakly indicated. Sides of head in front of eyes straight, converging anteriorly towards mandibular bases; behind eyes sides rounding into convex occipital margin. Eyes convex, relatively large, in full face view clearly breaking lateral cephalic outline. Ocelli lacking. Pronotum in dorsal view with evenly rounded lateral margins that are poorly indicated posteriorly. Dorsum of mesosoma with lateral margins very weakly raised and converging posteriorly. Metanotal groove forming a thin, posteriorly bowed line. Propodeum with lateral margins terminating in upturned,

acute teeth; inner margins of teeth continued medially and meeting, forming a short, rather weak, transverse ridge, separating propodeal dorsum from declivity. Petiole with anterior and posterior faces virtually straight; dorsum armed with a pair of slender, acute, dorsolaterally directed, widely diverging spines. Anterior face of first gastral segment distinctly higher than full height of petiole, widely rounding onto dorsum.

Mandibles very finely striate at bases; very smooth and polished towards masticatory borders with numerous piliferous pits. Head, mesosoma and petiole mostly finely reticulate-punctate with sculpturation on vertex, sides of mesosoma and petiole more densely punctate. Clypeus anteriorly and laterally with reticulae longitudinally directed. Antennal scapes very densely reticulate-punctate. Pronotal dorsum with irregular longitudinal striate that curve outwards posteriorly. Mesonotum more regularly, longitudinal striate; propodeal dorsum reticulate-punctate. Legs, including coxae, rather shallowly reticulate punctate. Gaster finely shagreened, rather polished.

Mandibles with numerous, short and medium length, curved, golden hairs. Anterior clypeal margin with one long seta medially and numerous short setae fringing margin laterally. Antennae, including funiculi, with numerous short and medium length, mostly erect hairs. Front of head with numerous, rather long hairs, some almost as long as greatest diameter of eye; hairs erect on clypeus and somewhat anteriorly curved along frontal carinae and on vertex. Numerous, semierect hairs fringing outline of head in full face view. Pronotal and mesonotal dorsa with numerous erect hairs, a little shorter than those on dorsum of head. Propodeum with very short, semierect, anteriorly directed hairs on dorsum; declivity with hairs lacking, smooth and polished. Gaster with abundant, relatively long hairs over all surfaces, except anterior face. Relatively long, appressed and decumbent, golden pubescence in various densities over all dorsal surfaces of head; somewhat shorter, more silvery pubescence on dorsum of mesosoma; gastral dorsum with rather dense, white-greyish pubescence.

Whole body distinctly orange; head, notably upon vertex, and sides mesosoma with reddish hue. Dorsum of first gastral segment paler, yellowish-orange. Outer and masticatory margins of mandibles, anterior clypeal margin, frontal carinae, pronotal collar and ventral margins of meso- and metathoracic sternites narrowly bordered with dark brown.

REMARKS. *Polyrhachis hispida* is most similar to *P. wallacei* Emery, however, it differs in having the body covered with abundant, relatively long, hairs.

**44. *Polyrhachis kazuoi* sp.nov.**  
(FIG. 11E-F)

MATERIAL. HOLOTYPE: SULAWESI SELATAN, Mt Kaleakan, Tana Traja, 02°58'S, 119°54'E, 1080-1140m, 17.x.1999, K. Ogata & K. Masaoka #57 (worker). PARATYPES: data as for holotype (2 workers). Type deposition: Holotype in QM (QMT144151), 1 paratype each in BMNH and MCZC.

DESCRIPTION. *Worker*. Dimensions (holotype cited first): TL c. 5.74, 5.39-5.74; HL 1.47, 1.43-1.47; HW 1.25, 1.18-1.25; CI 85, 82-85; SL 1.84, 1.72-1.84; SI 147, 146-148; PW 0.87, 0.81-0.87; MTL 1.93, 1.78-1.93 (3 measured).

Anterior clypeal margin with median truncation flanked laterally by distinct, acute denticles. Clypeus with poorly defined, blunt median carina; in profile clypeus weakly convex posteriorly narrowly rounding into relatively shallow basal margin, laterally margin indicated by a sculpture-breaking line. Frontal triangle distinct. Frontal carinae sinuate with narrowly raised, well separated margins; central area rather wide; frontal furrow clearly impressed. Sides of head in front of eyes straight, converging anteriorly towards mandibular bases; behind eyes sides rounding into convex occipital margin. Eyes convex, relatively large, in full face view clearly breaking lateral cephalic outline. Ocelli lacking; positions indicated by shallow punctures in sculpturation. Pronotal dorsum with poorly defined median depression; lateral pronotal margins narrowly rounding into distinct promesonotal suture. Dorsum of mesosoma with lateral margins converging into distinct, posteriorly bowed, metanotal groove. Propodeum with lateral margins terminating in short, upturned, weakly diverging, acute spines. Petiole with anterior and posterior face straight, parallel in lateral view; dorsum virtually flat, armed with a pair of slender, acute, widely diverging spines. Anterior face of first gastral segment distinctly higher than full height of petiole, widely rounding onto dorsum.

Mandibles very finely, longitudinally striate with numerous piliferous pits. Head densely reticulate-punctate with sculpturation on clypeus and central area somewhat finer. Pronotal dorsum with irregular longitudinal striae that curve outwards posteriorly. Mesonotum regularly, longitudinally striate. Sides of mesosoma, propodeal dorsum and

petiole distinctly reticulate-punctate. Gaster finely shagreened, rather polished.

Mandibles with numerous curved, medium length, golden hairs near masticatory borders and numerous short, appressed hairs towards mandibular bases. Anterior clypeal margin with a long median seta and numerous short setae fringing margin laterally. Several medium length, paired hairs near anterior and basal clypeal margins, along frontal carinae and single pair on vertex. Two long hairs on anterior faces of fore coxae; single shorter hairs on venter of trochanters and femora. Gaster with several medium length hairs lining posterior margins of apical segments, hairs more numerous over gastral venter.

Generally medium reddish-brown with mandibles, clypeus and central area distinctly lighter. Mandibular teeth and antennae, except apical segments, dark reddish-brown. Frontal carinae narrowly lined with black. Mesosoma becoming progressively darker posteriorly, with sides of mesonotum, propodeum, petiole and coxae very dark, almost black. Legs dark reddish-brown with trochanters and apical tarsal segments a shade lighter. Gaster medium reddish-brown, with posterior margins of segments widely lined with dark brown.

REMARKS. *Polyrhachis kazuoi* is relatively similar to *P. wallacei*, sharing with that species the characteristics of the *wallacei*-group, including a lack of lateral mesonotal prominences and indistinct pronotal margins. However, the pronotum of *P. wallacei* has minute humeral teeth that are completely lacking in *P. kazuoi*. The pronotal and mesonotal dorsa are very finely, longitudinally striate in *P. kazuoi*, while in *P. wallacei* the whole dorsum of the body is irregularly, shallowly reticulate. The body of *P. wallacei* is light to medium yellowish-brown with the clypeus distinctly lighter. In contrast, *P. kazuoi* is generally darker, reddish-brown, with the sides of mesonotum, propodeum and petiole almost black.

**45. *Polyrhachis wallacei* Emery, 1887**

*Polyrhachis wallacei* Emery, 1887: 223. Syntype workers, queen. Type locality: INDONESIA, SULAWESI, Kandari (O. Beccari), MCSN (examined).

MATERIAL. SULAWESI TENGAH: Lore Lindu NP, nr Dongi-Dongi shelter, 01°15'S, 120°20'E, ca 1020m, 4-9.xii.1985 (Malaise trap) (C. van Achterberg) (w); ditto, Toro, Bulu (Dusun Dua), 820m, 21.iv.2005, cacao agrof. (fog.) (M.M. Bos) (w); ditto, Watu Bohe, 860m, 25.iv.2005 cacao agrof. (fog.) (M.M. Bos) (w).

REMARKS. Specimens from Lore Lindu compare well with two available syntypes of *P. wallacei* and I am confident they are conspecific.

#### Subgenus **Myrmhopla** Forel, 1915

Dorow (1995) recognised sixteen species-groups, within the subgenus *Myrmhopla*. The thirty-one species of *Myrmhopla* from Sulawesi fall within ten of these (*armata*-, *bicolor*-, *cleophanes*-, *cryptoceroide*-, *dives*-, *flavoflagellata*-, *furcata*-, *hector*-, *mucronata*- and *sexspinosa*-group).

#### **Polyrhachis armata** species-group

##### KEY TO *ARMATA*-GROUP SPECIES (based on workers)

*Polyrhachis peregrina* is known only from the queen caste and is not included in the following key.

1. Head, mesosoma and petiole deeply and coarsely foveolate-rugose (Figs 8C, D) . . . *armata* (Le Guillou)  
Head, mesosoma and petiole reticulate-punctate or weakly and shallowly rugose-punctate (Figs 8A, B) . . . . . 2
2. Dorsum of petiole medially with two short, acute, intercalary spines (Fig. 8A) . . . . . 3  
Dorsum of petiole medially with only vague rudimentary tuberculae . . . . . *nudata* Fr. Smith
3. Propodeal spines virtually subparallel; whole body with distinct pile of pale-golden appressed pubescence . . . . . *aberrans* sp. nov.  
Propodeal spines strongly diverging; whole body with rather diluted, silvery-white appressed pubescence . . . . . 4
4. Larger species (HL > 1.95); pronotal spines massive, strongly curved downwards (Fig. 8F) . . . . . *strictifrons* Emery  
Smaller species (HL < 1.65); pronotal spines horizontal, rather broad, but not massive . . . . . 5
5. Eyes rather flat; pronotal spines short, hardly longer than width at base; pronotal dorsum between spines distinctly rugose-punctate . . . . . *diaphanta* Fr. Smith  
Eyes convex; pronotal spines more slender, almost twice as long as width at base; pronotal dorsum uniformly and finely reticulate-punctate . . . *saevissima* Fr. Smith

#### **46. *Polyrhachis aberrans* sp. nov.** (FIG. 8A-B)

MATERIAL. HOLOTYPE: SULAWESI UTARA: Dumoga-Bone NP, 400m, 11.ii.1985, fog., N.E. Stork et al. (worker). PARATYPES: data as for holotype (5 workers); ditto, 230m, 11.vi.1985, fog., N.E. Stork et al. (2 workers); ditto, 230m, 30.ix.1985, fog., N.E. Stork et al. (2 workers); ditto, Subcamp Barney's, 300m, x.1985 (Bosmans & Van Stalle #022) (w). Type deposition: Holotype and (5) paratypes in BMNH, 2 paratypes each in ANIC, MCZC and QM, 1 paratype in IRSN.

DESCRIPTION. *Worker*. Dimensions (holotype cited first): TL c. 7.46, 6.60-8.06; HL 1.68, 1.56-

1.89; HW 1.34, 1.27-1.47; CI 80, 78-81; SL 2.28, 2.09-2.50; SI 170, 164-173; PW 1.25, 1.18-1.43; MTL 2.37, 2.18-2.62 (10 measured).

Anterior clypeal margin with medially notched, truncate flange, flanked laterally by acute angles. Clypeus with distinct, posteriorly raised median carina, terminating just short of basal margin; in profile clypeus straight with basal margin well impressed, laterally basal margin indicated by obscure, thin line. Frontal triangle indistinct. Frontal carinae sinuate with moderately raised margins; central area relatively wide and shallowly concave with frontal furrow weakly indicated. Sides of head in front of eyes converging anteriorly in virtually straight line; behind eyes sides rounding into convex occipital margin. Eyes convex, in full face view clearly breaking lateral cephalic outline. Ocelli lacking. Pronotum armed with pair of anterolaterally and weakly downward-directed acute spines. Propodeum with pair of strong, horizontal, posteriorly directed, acute spines. Petiole with anterior face straight, abruptly rounding onto dorsum; posterior face strongly convex; dorsum armed with a pair of lateral, widely diverging, horizontal spines; bases of spines clearly situated below summit of dorsum; apices of spines strongly curved downwards and weakly outwards; dorsum of petiole also with pair of slender, acute, horizontally and posteriorly directed intercalary spines with their tips curved downwards. Subpetiolar process acute anteriorly, widely rounding posteriorly. Anterior face of first gastral segment distinctly lower than height of petiole, widely rounding onto dorsum.

Mandibles finely reticulate-rugose with numerous piliferous pits. Head, mesosoma, petiole and gaster shagreened with summit of pronotum and mesonotum distinctly coarsely punctate. Sculpturation increasing in intensity laterally with sides of mesosoma and petiole reticulate-punctate. Apices of spines rather smooth and polished.

Mandibular masticatory borders with only a few, curved hairs and numerous very short appressed hairs arising from pits. Anterior clypeal margin with 3 long, anteriorly directed setae and several short setae fringing margin laterally. A few pairs of hairs near anterior and basal clypeal margins, along frontal carinae and a single pair on vertex. A very few erect hairs on fore coxae and single hair arising from ventral surface of each trochanter and femur. Gaster with medium length, golden, erect hairs lining posterior margins of apical gastral segments with hairs more abundant dorsally. Body with relatively

long, mostly appressed, pale golden, pubescence; most abundant on head and dorsum of mesosoma, but rather diluted on vertex, midline and posterior half of mesonotal dorsum. Pubescence almost completely absent from summit of pronotal dorsum and tips of spines. Gastral dorsum with pubescence shorter, more closely appressed and dense, almost completely hiding underlying sculpturation.

**Colour.** Black; mandibles black with narrow band across masticatory borders and apical teeth reddish-brown. Funiculi with distal segments progressively lighter and tip of apical segment yellowish-brown. Tibiae light reddish-brown, except proximal ends narrowly black.

Sexuals and immature stages unknown.

**REMARKS.** Direct comparison of *P. aberrans* workers with the unique holotype queen of *P. peregrina* Fr. Smith (OXUM) has shown them to be superficially very similar. Both species have the characteristic appressed, pale golden pubescence, which is particularly distinct on the sides of the mesosoma and the propodeal dorsum, petiole, gaster and spines (except their extreme tips). However, they distinctly differ in a number of characters on the head. The frontal carinae in *P. aberrans* are only moderately elevated, with the central area relatively wide and shallowly concave. In contrast the frontal carinae in *P. peregrina* are prominent and markedly closer together, creating a very narrow and deeply excavated central area. The eyes in *P. aberrans* are moderately convex, clearly breaking the lateral outline of the head in full frontal view, while in *P. peregrina* the eyes are weakly convex, barely breaking the lateral cephalic outline. The clypeus in *P. aberrans* features a distinct, posteriorly raised, median carina that terminates just short of the deeply impressed basal margin. In *P. peregrina* the median clypeal carina is feebly indicated posteriorly and, in profile, the basal clypeal margin is only shallowly impressed. In addition, the pronotal spines in *P. aberrans* are moderately divergent and longer than their basal widths, while in *P. peregrina* they are short, only slightly longer than their basal widths and strongly turned outwards and curved downwards. The shape of the petiole is almost identical in both species, featuring a narrow dorsal margin and posteriorly divergent, almost arrow-shaped spines. The propodeal spines are relatively long and somewhat downturned in *P. aberrans*, but distinctly shorter and straight in *P. peregrina*. In both species the dorsum of the petiole bears two short, acute, posteriorly

directed intercalary spines that are much closer together in *P. aberrans*. Both species are black, but *P. aberrans* has the extreme tips of the apical antennal segments and the tibiae, except their proximal ends, light reddish-brown.

#### 47. *Polyrhachis armata* (Le Guillou, 1842) (FIG. 8C-D)

*Formica armata* Le Guillou, 1842: 313. Holotype queen.  
Type locality: PHILIPPINES, MINDANAO, Zamboanga,  
?MNHN (type presumed lost).

*Polyrhachis armata* (Le Guillou); Roger, 1863: 9.

**REMARKS.** This is a relatively common species that extends from the Andaman Islands and Indo-China, including Myanmar, Peninsular Malaysia, Singapore, Thailand and Vietnam, eastwards to the Philippines and south to Borneo, Sumatra and Java. It was listed from Sulawesi by Emery (1901), however, I have not seen any specimens originating from east of Wallace's line.

#### 48. *Polyrhachis diaphanta* Fr. Smith, 1861

*Polyrhachis diaphantus* Fr. Smith, 1961: 40, pl. 1, fig. 12.  
Holotype worker. Type locality: INDONESIA, SULAWESI,  
Tondano (A.R. Wallace), OXUM (examined).

**MATERIAL.** SULAWESI UTARA: Dumoga-Bone NP, 230m, 2.xii.1985, fog. (N.E. Stork et al.) (w). SULAWESI TENGAH: Lore Lindu NP, Toro, Gn. Kamonua, 1080m, 20.iv.2005, nat. for., fog. (M.M. Bos #43, 41) (w, ♀); ditto, Toro, Gn. Kalabui, 950m, 5.v.2005, nat. for., fog. (M.M. Bos #43) (w); ditto, Toro, Bulu Lonca, 1130m, 29.iv.2005, nat. for., fog. (M.M. Bos #43) (w).

**REMARKS.** *Polyrhachis diaphanta* was considered by Emery (1900) to be a junior synonym of *P. acantha* Fr. Smith and later (1925) as a variety of that species. Donisthorpe (1932) regarded *P. diaphanta* a valid species and, after examining the primary types of all the relevant species, including *P. acantha*, *P. acasta*, *P. saevissima* and *P. romanovi*, I came to the same conclusion (Kohout, 1998).

#### 49. *Polyrhachis nudata* Fr. Smith, 1860

*Polyrhachis nudatus* Fr. Smith, 1860a: 71. Holotype worker.  
Type locality: INDONESIA, SULAWESI, Makassar (A.R. Wallace), OXUM (examined).

**MATERIAL.** SULAWESI UTARA: Domoga-Bone NP, 230m, 5.v.1985, fog., (N.E. Stork et al.) (w); ditto, 30.ix.1985, fog. (N.E. Stork et al.) (w). SULAWESI TENGAH: Lore Lindu NP, Toro, Bulu Lonca, 1130m, 27.iv.2005, nat. for., fog. (B.B. Bos #24) (w); ditto, Toro, Kauboga, 840m, 4.v.2005, cacao agrof., fog. (M.M. Bos #31) (w); ditto, Toro, Gn. Kamonua, 1080m, 20.iv.2005, nat. for., fog. (M.M. Bos #22) (♀); ditto, Toro, Gn. Kalabui, 950m, 16.iv.2005, nat. for.,



fog. (M.M. Bos #22) (♀). SULAWESI TENGGARA: nr Sanggona, Base Camp, Gng Watuwila, c. 200m, 13.-15.x.1989 (Malaise trap) (C.van Achterberg) (w); 1-2km E of Wolasi, 42km S of Kendari, c. 350m, rf., 13-14.vii.1972 (W.L. Brown) (w). SULAWESI SELATAN: Balampesoang For., 5-8km NE of Tanete, 400m, degr. rf., 8-10.vii.1972 (W.L. Brown) (w); Karaentha, 05°0.2'S, 119°44'E, 270m, 23.x.1999 (K. Ogata & K. Masaoka #100) (w).

REMARKS. The examined specimens listed above compare well with the *P. nudata* holotype.

### 50. *Polyrhachis peregrina* Fr. Smith, 1860

*Polyrhachis peregrinus* Fr. Smith, 1860a: 71. Holotype queen. Type locality: INDONESIA, SULAWESI, Makassar (A.R. Wallace), OXUM (examined).

REMARKS. *Polyrhachis peregrina* is very similar to *P. aberrans* described above and their relationship is discussed in detail under that species. No worker specimens comparable with the unique holotype queen were found in the material available for this study.

### 51. *Polyrhachis saevissima* Fr. Smith, 1860

*Polyrhachis saevissimus* Fr. Smith, 1860a: 71. Holotype worker. Type locality: INDONESIA, SULAWESI, Makassar (A.R. Wallace), OXUM (examined).

*Polyrhachis acantha* Fr. Smith, 1860b: 98, pl. 1, fig. 16. Holotype worker. Type locality: INDONESIA, Batjan I. (A.R. Wallace), OXUM (examined). Synonymy by Bolton, 1974: 178.

(For full synonymy citations see Bolton, 1974: 178 and 1995: 356.)

MATERIAL. SULAWESI UTARA: Dumoga-Bone NP, 25.ii.1985 (mangrove fog. (N.E. Stork et al.) (w); ditto, 25.ii.1985 (N.E. Stork et al.) (w); ditto, 9.-16.v.1985 (N.E. Stork et al.) (w); mid vi.-4.vii.1985, Tumpah R., for. edge (N.E. Stork et al.) (w); Gn. Ambang F.R., nr Kotamobagu, 1200m, 18.ii.1985, fog. (N.E. Stork et al.) (w). SULAWESI TENGAH: nr Luwuk, Bunga, c. 300m, 21.-31.x.1989 (C.van Achterberg) (w); ditto, 1.-14.xi.1989 (C.van Achterberg) (w); nr Luwuk, Salodik-Linyek, 500m, 21.-31.x.1989 (C.van Achterberg) (w); Palolo Valley, Sintuwu (S1), 28.vi.2001 (J. Ketterl #Ants sp. 5) (w); ditto, except (S3), 29.vi.2001 (J. Ketterl #Ants sp. 16) (♀); Lore Lindu NP, Toro, Gn. Kalabui, 950m, 5.v.2005, nat. for., fog. (M.M. Bos #43) (w); ditto, Toro, Bulu Lonca, 1130m, 29.iv.2005, nat. for., fog. (M.M. Bos #43) (w); ditto, Toro, Powawua, 810m, 18.iv.2005, cacao agrof., fog. (M.M. Bos #40) (w); ditto, Toro, W foot of Gn. Kalabui, 825m, 17.iv.2005, cacao agrof., fog. (M.M. Bos #40) (w); ditto, Toro, Foot of Gn. Kamanua, 845m, 28.iv.2005, cacao agrof., fog. (M.M. Bos #49) (♀); ditto, Toro, Dusun Tuju, 815m, 3.v.2005, cacao agrof., fog., M.M. Bos #40) (w); ditto, Toro, Kauboga, 840m, 4.v.2005, cacao agrof., fog. (M.M. Bos #40) (w); ditto, Toro, Haloda, 815m, 21.iv.2005, cacao agrof., fog. (M.M. Bos #40) (w). SULAWESI TENGGARA: nr Saggona,

Base Camp, Gng Watuwila, c. 200m, 13.-15.x.1989 (C.van Achterberg) (w); ditto, 15.x.-5.xi.1989 (C.van Achterberg) (w) (all specimens collected by C.van Achterberg originated from Malaise traps); Poniponiki nr Raterate, 04°02'S, 121°53'E, 100m, 13.x.1999 (K. Ogata & K. Masaoka #43) (w). SULAWESI SELATAN: Mt Kaleakan, Tana Traja, 02°58'S, 119°54'E, 1080-1140m, 17.x.1999 (K. Ogata & K. Masaoka #57) (w); Soroako, 02°32'S, 121°22'E, 100m, 21.x.1999 (K. Ogata & K. Masaoka #86) (w); Balan Ba'na nr Soroako, 02°39'S, 121°12'E, 130m, 21.x.1999 (K. Ogata & K. Masaoka #89) (w).

REMARKS. All the above listed specimens conform with the characters of this species as delimited by Bolton (1974) and further discussed by Kohout (1998). In view of its widespread distribution and variability, *P. saevissima* is either a single species with numerous variable, local populations, or it may be a complex of a number of closely related species.

### 52. *Polyrhachis strictifrons* Emery, 1898 (FIG. 8E-F)

*Polyrhachis strictifrons* Emery, 1898: 242, fig. 14. Syntype workers. Type locality: INDONESIA, SULAWESI, Toli-Toli (H. Fruhstorfer), MCSN (examined).

MATERIAL. SULAWESI UTARA: Kalabat, c. 250m, iii.1931 (G. Heinrich) (w). SULAWESI TENGGARA: Wolasi, Pangalulu, 04°10'S, 122°30'E, 140m, 14.x.1999 (K. Ogata & K. Masaoka #52) (w).

REMARKS. *Polyrhachis strictifrons* is a very distinct, rather rare species. The single workers from Kalabat and Wolasi are the only specimens I have ever seen in addition to the types. Both specimens are very similar to the syntypes and the only noticeable difference relates to the petiole. The lateral petiolar spines in the modern specimens diverse more strongly from their bases and their intercalary teeth are shorter than those of the syntypes. Dorow (1995: 61) followed Emery (1925: 196) in stating that *P. strictifrons* was "described on a female", however, both syntypes are workers.

### *Polyrhachis bicolor* species-group

#### KEY TO *BICOLOR*-GROUP SPECIES (based on workers)

1. Distinctly bicoloured; head, mesosoma and petiole black with mandibles, antennae, legs, including coxae and gaster orange or light reddish-brown. . . . *bicolor* Fr. Smith  
Unicoloured; body black with only mandibles rusty-red and tibiae dark reddish-brown (in copal) . . . *subfossa* Viehmeyer

### 53. *Polyrhachis bicolor* Fr. Smith, 1858

*Polyrhachis bicolor* Fr. Smith, 1858: 65. Holotype queen.

Type locality: BURMA, BMNH (examined).  
(For full synonymy citation see Bolton, 1995: 344.)

**MATERIAL.** SULAWESI SELATAN: Pantai Tapejava nr Takalar, 05°31'S, 119°26'E, sea level, 10.x.1999 (K. Ogata & K. Masaoka #28) (w).

**REMARKS.** The three workers from Pantai Tapejava are fairly similar to other available *P. bicolor* specimens and for the purpose of this paper I consider them conspecific. *Polyrhachis bicolor* is a widespread and relatively common species, extending from South East Asia south to Indonesia, New Guinea and Northern Australia. Across its distribution, *P. bicolor*, as currently interpreted, consists of a large number of overlapping populations that differ to varying extents from the holotype from Burma (= Myanmar). About eleven infraspecific forms are presently associated with *P. bicolor*, many clearly representing valid species. In addition, at least twice as many closely related new species are presently in collections awaiting description. This widespread and complicated group is in great need of revision but this is beyond the scope of the present paper.

#### 54. *Polyrhachis subfossa* Viehmeyer, 1913

*Polyrhachis subfossa* Viehmeyer, 1913: 154, fig.. Holotype worker. Type locality: INDONESIA, SULAWESI (in copal), SNSD.

**REMARKS.** I did not have the opportunity to examine the unique holotype of *P. subfossa* but from its description and accompanying illustration it appears that it is not conspecific with any of the following *P. (bicolor)* species.

The following five taxa belong to a complex of species closely allied to *P. bicolor weyeri* Karawajew from Ambon I., and to *P. longipes* Fr. Smith from the Aru Is. Three are represented by single workers and two by single queens. They all appear to represent new species, but given the complexity of the group, they are not described here. Consequently I list them as *P. (bicolor)* sp. A, B, C, D and E and provide their collection data and a key to those species represented by workers, for future reference.

1. Body black with only mandibles and apical antennal segments yellow or light orange; relatively long, erect hairs and appressed silvery pubescence abundant over all dorsal body surfaces; pronotal spines curved upwards ..... *(bicolor)* sp. A  
Body black with mandibles and apical antennal segments yellow or light orange; gaster and femora very dark reddish-brown ..... 2
2. Body with only relatively short, somewhat suberect, sporadic hairs; pronotal spines relatively short, straight

..... *(bicolor)* sp. B  
Body with long, erect hairs and somewhat brassy, rather diluted, appressed pubescence, except propodeal and gastral dorsa where it is more dense; pronotal spines distinctly upturned ..... *(bicolor)* sp. C

#### 55. *Polyrhachis (bicolor)* sp. A

**MATERIAL.** SULAWESI UTARA: Dumoga-Bone NP, nr Danau Mooat, 1100m, 1.viii.1985, coffee fog. (N.E. Stork et al.) (worker).

#### 56. *Polyrhachis (bicolor)* sp. B

**MATERIAL.** SULAWESI TENGAH: Lore Lindu NP, nr Dongi-Dongi shelter, 01°15'S, 120°20'E, ca 1000m, 4.-9.xii.1985, Malaise trap (C.van Achterberg) (worker).

#### 57. *Polyrhachis (bicolor)* sp. C

**MATERIAL.** SULAWESI UTARA: Dumoga-Bone NP, 400m, 19.vii.1985, fog. (N.E. Stork et. al.) (worker).

#### 58. *Polyrhachis (bicolor)* sp. D

**MATERIAL.** SULAWESI TENGAH: Palolo Valley, Nopu (N5), 27.vi.2001 (J. Ketterl #Ants sp. 6) (queen).

#### 59. *Polyrhachis (bicolor)* sp. E

**MATERIAL.** SULAWESI TENGAH: Palolo Valley, Sintuwu (S4), 29.vi.2001 (J. Ketterl #Ants sp. 17) (queen).

### *Polyrhachis cleophanes* species-group

#### KEY TO *CLEOPHANES*-GROUP SPECIES (based on workers)

1. Body with numerous erect hairs; dorsum of mesosoma coarsely and deeply reticulate-rugose ..... 2  
Body virtually without erect hairs; dorsum of mesosoma transversely wrinkled ..... *smithi* Emery
2. Pronotal spines closely approximated, width of pronotal dorsum between their bases distinctly shorter than length of spines; body black with legs reddish-brown ..... *cleophanes* Fr. Smith  
Pronotal spines situated further apart, width of pronotal dorsum between their bases distinctly greater than length of spines; body and appendages virtually black ..... *salebrosa* sp. nov.

#### 60. *Polyrhachis cleophanes* Fr. Smith, 1861

*Polyrhachis cleophanes* Fr. Smith, 1861: 41, pl. 1, fig. 14. Holotype worker. Type locality: INDONESIA, SULAWESI, Tondano (A.R. Wallace), OXUM (examined).

*Polyrhachis vibida* Fr. Smith, 1861: 42, pl. 1, fig. 17. Holotype queen. Type locality: SULAWESI, Tonadano (A.R. Wallace), OXUM (examined). Synonymy by Forel, 1911: 299.

**MATERIAL.** SULAWESI UTARA: Dumoga-Bone NP, Danau Mooat, nr Kotamobagu, 1200m, 25.i.1985

(N.E. Stork et al.) (w); ditto, v.1985 (N.E. Stork et al.) (w); ditto, 1100m, 31.vii.1985, *Pandanus* fog. (N.E. Stork et al.) (w); Gn. Ambang F.R., 1200m, nr Kotamobagu, 18.ii.1985, fog. (N.E. Stork et al.) (w, ♀); Gn. Mogonipa, 1000m, 26.iv.-22.v.1986 (N.E. Stork et al.) (w). SULAWESI SELATAN, Batu Tumonga, Tana Traja, 02°55'S, 119°53'E, 1260m, 18.x.1999 (K. Ogata & K. Masaoka # 62) (w).

REMARKS. The specimens listed above are closely comparable with the holotype of *P. cleophanes* and I consider them conspecific.

**61. *Polyrhachis salebrosa* sp. nov.**  
(FIG. 8G-H)

MATERIAL. HOLOTYPE: SULAWESI SELATAN, Kayulagi nr Mangktana, 02°23'S, 120°47'E, 600m, 20.x.1999, K. Ogata & K. Masaoka # 79 (worker). PARATYPE: data as for holotype (1 worker). Type deposition: Holotype in QM (QMT144155); paratype in MCZC.

DESCRIPTION. *Worker*. Dimensions (holotype cited first): TL c. 8.16, 8.57; HL 2.06, 2.12; HW 1.56, 1.62; CI 76, 76; SL 2.46, 2.59; SI 158, 160; PW 0.90, 0.97; MTL 2.68, 2.78 (2 measured).

Anterior clypeal margin with narrow, median incision. Clypeus with distinctly elevated median carina and depressions running on both sides parallel with anterior margin; clypeus straight in profile with shallowly impressed basal margin, laterally basal margin indicated by a thin, sculpture-breaking line. Frontal triangle indistinct. Frontal carinae sinuate, with highly elevated, laminate margins; central area deeply excavated with frontal furrow replaced anteriorly by rather distinct carina. Sides of head in front of eyes weakly convex, converging towards mandibular bases; behind eyes sides rounding into highly convex occipital margin. Eyes relatively small and highly convex, protuberant; in full face view clearly breaking lateral cephalic outline. Ocelli lacking. Pronotal dorsum convex; humeri armed with pair of spines that arise well inside the lateral pronotal outline in dorsal view; spines projecting dorsolaterally then curving forward and weakly downward. Mesonotum convex in outline; metanotal groove somewhat concealed by overlying sculpturation. Propodeal dorsum with acute, dorsolaterally and posteriorly directed spines, their inner margins forming an evenly curved 'U'-shape in frontal view; propodeal declivity oblique in lateral view. Petiole biconvex in profile; anterior face with distinct teeth near base; dorsum armed with pair of slender, acute, dorsolaterally and posteriorly directed, divergent spines with their bases

situated below summit of transversely convex dorsum. Anterior face of first gastral segment widely rounding onto dorsum.

Mandibles with a few longitudinal striae near masticatory borders, rather smooth and polished towards bases with very shallow piliferous pits. Clypeus distinctly reticulate-punctate with several deep punctures. Laminate margins of frontal carinae very finely punctate, rather polished. Head, mesosoma and petiole very coarsely and deeply reticulate-rugose, almost foveolate in parts. Antennal scapes and legs very densely reticulate-punctate. Spines rather smooth and polished. Gaster very finely punctate and highly polished on exposed surfaces.

Mandibles with a number of short, curved, golden hairs at masticatory borders and more erect hairs along outer margins. Anterior clypeal margin with a few long and several short, golden setae, with distinct reddish tint, medially. Antennae with numerous, relatively short, erect hairs along leading edges and a few hairs along inferior margins. Whole body, including gaster and legs, with abundant medium length, mostly erect, variously curved, whitish or pale golden hairs, longest hairs almost equal to greatest diameter of eye. Relatively abundant, somewhat uneven and rough, rather long, appressed, silvery and white pubescence on dorsal body surfaces, except tips of spines. Pubescence on gastral dorsum medially converging; both specimens with pubescence missing from various parts of dorsum, notably from shoulders of first gastral segment, probably due to abrasion.

*Colour*. Black; mandibular teeth, condylae and extreme tips of apical funicular segments reddish-brown.

Sexuals and immature stages unknown.

REMARKS. *Polyrhachis salebrosa* is relatively similar to *P. cleophanes*. Both have the head, mesosoma and petiole deeply rugose. *Polyrhachis salebrosa* is generally larger (HL 2.06-2.12 versus 1.84-1.96 in *P. cleophanes*) and has the dorsum of petiole transversely convex between distinctly elevated, shorter spines. In contrast, the dorsum of the petiole in *P. cleophanes* is almost flat, with the spines distinctly longer and more-or-less horizontal. The pronotal and propodeal spines in *P. cleophanes* are also distinctly longer and the gastral pubescence is much finer, more appressed and tidy, forming



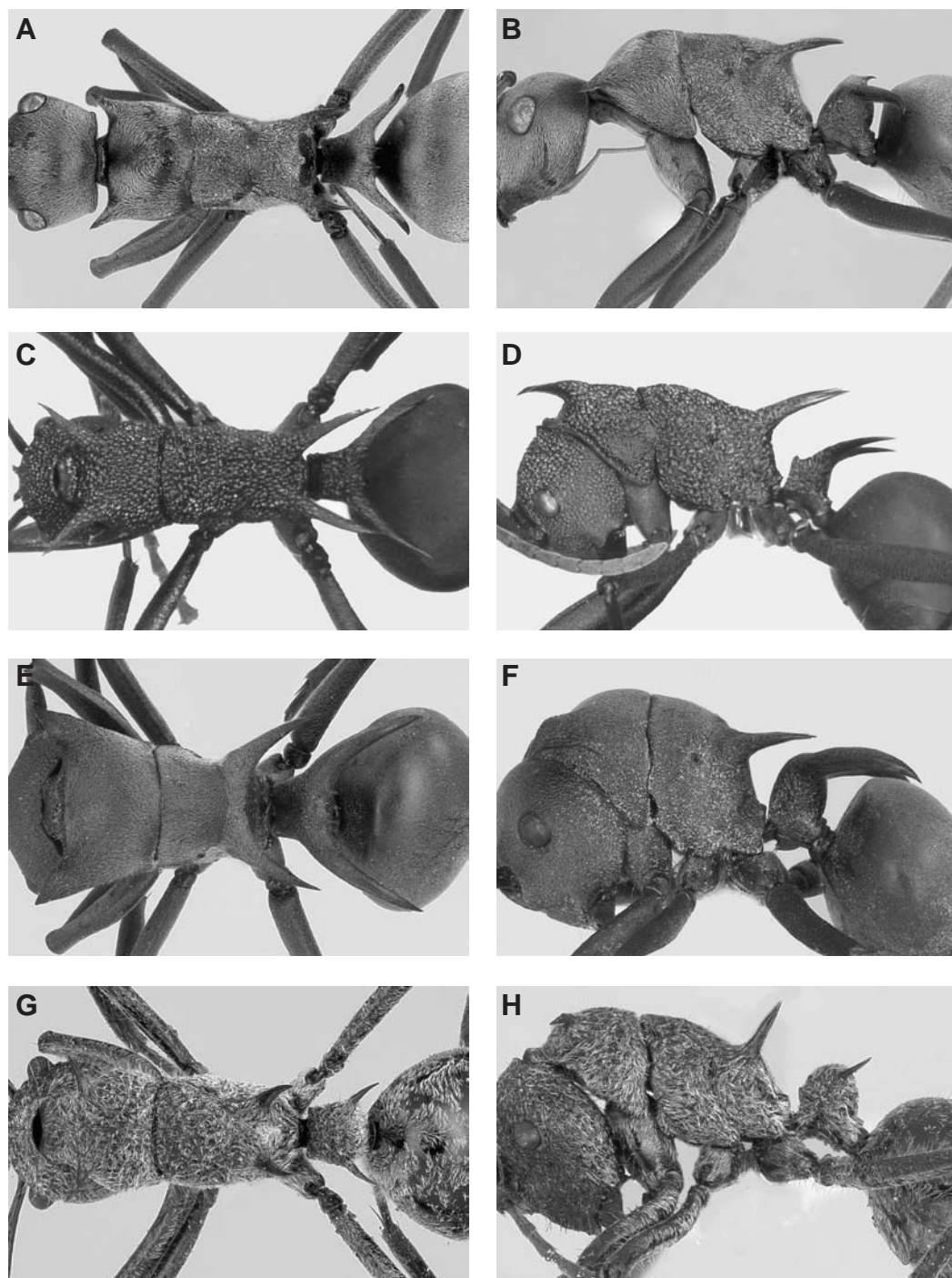


FIG. 8. *Polyrhachis* (Myrmhopla) species, Dorsal (left) and lateral (right) view of mesosoma and petiole: A-B – *P. aberrans* sp. nov.; C-D – *P. armata* (Le Guillou); E-F, *P. strictifrons* Emery; G-H, *P. salebrosa* sp. nov. (not to scale).



a clearly defined median line, similar to that in *sexspinosa*-group species.

## 62. *Polyrhachis smithi* Emery, 1901

*Polyrhachis smithi* Emery, 1901: 579. Holotype worker. Type locality: INDONESIA, SULAWESI ('Gipfel des Sudara') (P. & F. Sarasin), ?MCSN (depository of holotype unknown).

REMARKS. I have been unable to examine the unique holotype of *P. smithi*, but it is apparently most similar to *P. cleophanes* and *P. salebrosa*. It differs from both in having the mesosoma somewhat flattened, the sculpturation of mesosomal dorsum transversally wrinkled and by the almost complete lack of erect hairs (Dorow, 1995).

## *Polyrhachis cryptoceroides* species-group

## 63. *Polyrhachis cryptoceroides* Emery, 1887 (FIG. 9A-B)

*Polyrhachis cryptoceroides* Emery, 1887: 228, pl. 3, fig. 14. Syntype workers. Type locality: INDONESIA, SULAWESI, Macassar (O. Beccari), MCSN (examined).

*Polyrhachis (Aulacomyrma) mystica* Karawajew, 1927: 41, fig. 19. Syntype workers, queens, males. Type locality: INDONESIA, JAVA, Buitenzorg (= Bogor) (W. Karawajew), IZAS, QM (examined). Synonymy by Dorow, 1995: 51.

MATERIAL. SULAWESI UTARA: Dumoga-Bone NP, 25.ii.1985 (N.E. Stork et al.) (w); ditto, 230m, 10.iii.1985, fog. (N.E. Stork et al.) (w); ditto, 11.vii.1985, fog. (N.E. Stork et al.) (w); ditto, Maze Toraut Riv., 00°34'N, 123°54'E, c. 220m, 1.-9.xi.1985 (Malaise trap) (C.van Achterberg) (w).

REMARKS. Direct comparison of Dumoga-Bone specimens with the syntype workers of *P. cryptoceroides* and *P. mystica* shows them undoubtedly conspecific. The *cryptoceroides*-group was recently reviewed by Kohout (2006a).

## *Polyrhachis dives* species-group

## 64. *Polyrhachis dives* Fr. Smith, 1857

*Polyrhachis dives* Fr. Smith, 1857: 64. Holotype worker. Type locality: SINGAPORE (A.R. Wallace), BMNH (examined).

*Polyrhachis mutiliae* Fr. Smith, 1861: 39, pl. 1, figs 15, 20. Holotype worker. Type locality: INDONESIA, SULAWESI, Tondano (A.R. Wallace), OXUM (examined). Synonymy by Bolton, 1974: 173.

*Polyrhachis democles* Fr. Smith, 1861: 40, pl. 1, fig. 9. Holotype queen. Type locality: INDONESIA, SULAWESI, Tondano (A.R. Wallace), OXUM (examined). Synonymy by Forel, 1911: 298.

(For full synonymy citations see Bolton, 1974: 173 and 1995: 347).

MATERIAL. SULAWESI UTARA: Dumoga-Bone NP, Tumpah R., 7.x.1985 (Bosmans & Van Stalle #004) (w). SULAWESI TENGAH: Lore Lindu NP, nr Dongi-Dongi shelter, 01°15'S, 120°20'E, c. 975m, 4.xii.1985 (C.van Achterberg) (w); ditto, c. 1020m, 4.-9.xii.1985 (Malaise trap) (C.van Achterberg) (w, ♀).

REMARKS. *Polyrhachis dives* is a widespread species with a range that exceeds even that of *P. bicolor*. However, *P. dives* is less variable than the latter species, with specimens from South East Asia very similar to those from New Guinea and Northern Australia.

## *Polyrhachis flavoflagellata* species-group

## 65. *Polyrhachis storki* sp. nov. (FIG. 9C-D)

MATERIAL. HOLOTYPE: SULAWESI UTARA: Dumoga-Bone NP, 25.ii.1985, mangrove fog., N.E. Stork et al. (worker). PARATYPES: data as for holotype (1 worker). SULAWESI TENGAH: Lore Lindu NP, Toro, Watu Bohe, 860m, 14.iv.2005, cacao agrof., M.M. Bos #34 (1 worker). EAST MALAYSIA, SABAH: Kinabalu Park, Poring, c. 600m, vii.1991, M. Dill (1 worker). WEST MALAYSIA: Negara Sembilan, Pasoh FR, xi.1994, fog., M. Brendell, K. Jackson & S. Lewis (3 workers). Type deposition: Holotype and 1 paratype in BMNH, 1 paratype each in ANIC, FIS, MCZC and QM. ADDITIONAL MATERIAL. EAST MALAYSIA, SABAH: Forest Camp, 19km N of Kalabakan, 60m, 25.x.1962 (K.J. Kuncheria) (w).

DESCRIPTION. *Worker*. Dimensions (holotype cited first): TL c. 6.85, 6.40-7.00; HL 1.72, 1.65-1.75; HW 1.53, 1.47-1.56; CI 89, 89-91; SL 1.72, 1.68-1.81; SI 112, 112-117; PW 1.12, 1.06-1.15; MTL 2.18, 2.12-2.31 (6 measured).

Anterior clypeal margin produced medially into a bilobed, deeply emarginate prominence. Clypeus with blunt, weakly indicated median carina; clypeus in profile very weakly sinuate, shallowly impressed anteriorly, weakly elevated posteriorly with flat, clearly defined basal margin. Frontal triangle distinct. Frontal carinae sinuate, virtually flat, with very weakly raised margins; central area relatively wide, flat; frontal furrow indicated by break in sculpture. Sides of head in front of eyes distinctly converging anteriorly, almost straight, only weakly rounding into mandibular bases; behind eyes strongly rounding into virtually flat occipital margin. Eyes large, weakly convex, in full frontal view situated at posterolateral corners and distinctly breaking lateral cephalic outline. Ocelli lacking. Pronotal humeri armed with distinct, acute teeth. Mesosomal dorsum in profile with

distinct, but flat promesonotal suture; metanotal groove indistinct dorsally, weakly indicated laterally; mesonotal and propodeal dorsa almost flat, with poorly defined, blunt, lateral margins. Propodeum armed with pair of dorsoposteriorly directed spines; declivity short, oblique in profile. Petiolar dorsum armed with pair of dorsolaterally directed spines. Anterior face of first gastral segment relatively low with base weakly concave; anterodorsal margin widely rounded.

Mandibles finely, longitudinally striate with numerous piliferous pits. Head, mesosoma and petiole finely and closely reticulate-punctate with sculpturation along occipital margin and on propodeal dorsum somewhat transversely reticulate, wrinkled. Antennal scapes, legs and gaster more finely reticulate-punctate.

Mandibular masticatory borders with several curved, pale golden hairs. Anterior clypeal margin with single, medium long seta medially and several shorter setae fringing margin laterally. Apex of antennal scapes with very few short hairs. Gaster with only few, short, erect hairs at margins of apical dorsal segments, with somewhat longer hairs lining segments on ventral surfaces. Pale golden, short, closely appressed pubescence in various densities over most body surfaces, notably on mesosoma, petiole and gaster, but nowhere so dense as to hide underlying sculpturation. Pubescence most diluted on head, where it is almost completely absent from clypeus, sides and frontal area, except some scattered, extremely short, appressed hairs raising from piliferous pits.

**Colour.** Generally dark brown-black with somewhat reddish-brown, almost metallic, hue. Mandibular teeth narrowly reddish-brown; condylae, extreme tip of apical funicular segments and tarsal claws yellowish-brown. Legs very dark reddish-brown with distal portion of front tibiae shade lighter.

Sexuals and immature stages unknown.

**REMARKS.** Like *P. flavoflagellata* Karawajew, 1927 itself, *P. storki* is a widespread but rare species. They are superficially very similar, but undoubtedly distinct. Distinguishing characters include the relative length of the antennal scapes (SI <117 in *P. storki* versus SI >122 in *P. flavoflagellata*) and the shape of the anterior clypeal margin. The clypeus of *Polyrhachis storki* has a bilobed, medially emarginate prominence, while the anterior clypeal margin in *P. flavoflagellata* is widely truncate with a minute median incision. *Polyrhachis storki* has a widely rounded petiolar

dorsum that bears only a pair of lateral, very weakly elevated spines. In *P. flavoflagellata* the petiolar dorsum is rather narrow and bears a pair of dorsolaterally directed spines as well as a pair of distinct intercalary teeth.

### ***Polyrhachis furcata* species-group**

#### **66. *Polyrhachis rufipes* Fr. Smith, 1858 (FIG. 9E-F)**

*Polyrhachis rufipes* Fr. Smith, 1858: 66, pl. 4, fig. 28. Holotype worker. Type locality: BORNEO, SARAWAK, BMNH (examined).

*Polyrhachis exasperatus* Fr. Smith, 1861: 41, pl. 1, fig. 16. Holotype worker. Type locality: INDONESIA, SULAWESI, Tondano (A.R. Wallace), OXUM (examined). Synonymy by Bolton, 1974: 178.

(For full synonymy citations see Bolton, 1974: 178 and 1995: 355).

**MATERIAL.** SULAWESI SELATAN, Cagar Alam Karaenta, Kabupaten Maros, c. 265-315m, iii.1996 (B. Gobin) (♀).

**REMARKS.** A single alate queen collected by Bruno Gobin closely matches type compared material (queen and workers) from Borneo.

### ***Polyrhachis hector* species-group**

#### **KEY TO *HECTOR*-GROUP SPECIES (based on workers)**

1. Smaller (HL <2.00); body very slender with disproportionately long ('spider-like') appendages. . . . . *muelleri* Forel  
Larger (HL >2.20) with appendages proportional to rest of body. . . . . 2
2. Gaster opaque, reddish or black; propodeal spines more-or-less horizontal . . . . . *abdominalis* Fr. Smith  
Gaster highly polished, black with dark reddish hue; propodeal spines distinctly obliquely elevated. . . . *pressa* Mayr

#### **67. *Polyrhachis abdominalis* Fr. Smith, 1858 (FIG. 9G-H)**

*Polyrhachis abdominalis* Fr. Smith, 1858: 63. Holotype worker. Type locality: BURMA, BMNH (examined).

*Polyrhachis phyllophillus* Fr. Smith, 1860a: 69. Holotype worker. Type locality: INDONESIA, SULAWESI, Makassar (A.R. Wallace), OXUM (examined). Synonymy by Mayr, 1886: 367.

(For full synonymy citations see Dorow, 1995: 54.)

**MATERIAL.** SULAWESI UTARA: Dumoga-Bone NP, 11.ii.1985 (N.E. Stork et al.) (w); ditto, 22.ii.1985 (N.E. Stork et al.) (w); ditto, 7.vi.1985 (N.E. Stork et al.) (w); ditto, 400m, 11.ii.1985, fog. (N.E. Stork et al.) (w); ditto, 230m, 10.iii.1985, fog. (N.E. Stork et al.) (w); ditto, 230m, 11.vii.1985, fog. (N.E. Stork et al.) (w, ♀); ditto, 400m, 19.vii.1985, fog. (N.E. Stork et al.) (w); ditto, 8.-18.ii.1993 (Maryati Mohamed) (w). SULAWESI TENGAH: Kebung Kopi nr Palu,

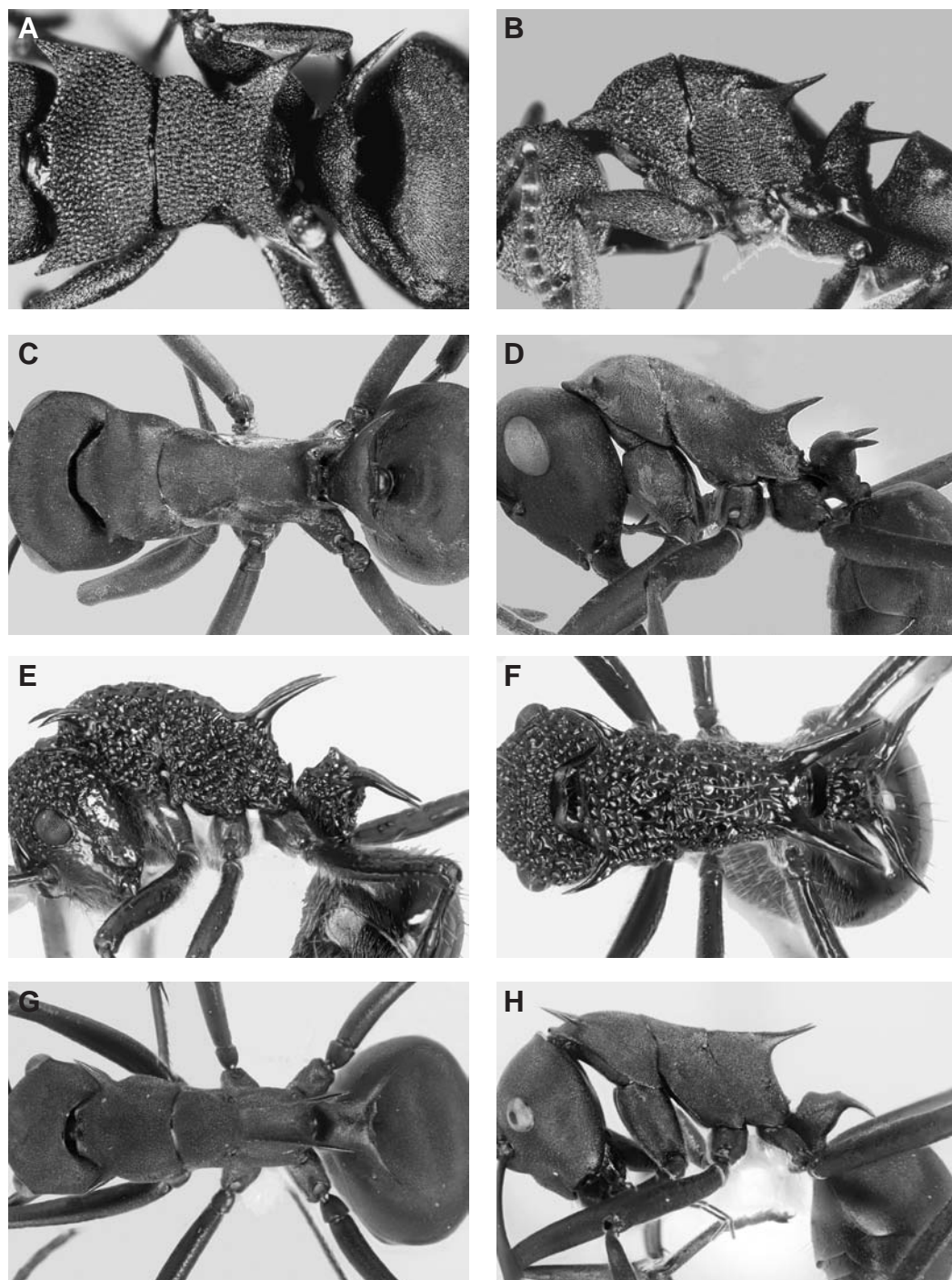


FIG. 9. *Polyrhachis* (Myrmhopla) species, Dorsal (left) and lateral (right) view of mesosoma and petiole: A-B, *P. cryptoceroides* Emery; C-D, *P. storki* sp.nov.; E-F – *P. rufipes* Fr. Smith; G-H, *P. abdominalis* Fr. Smith (not to scale).



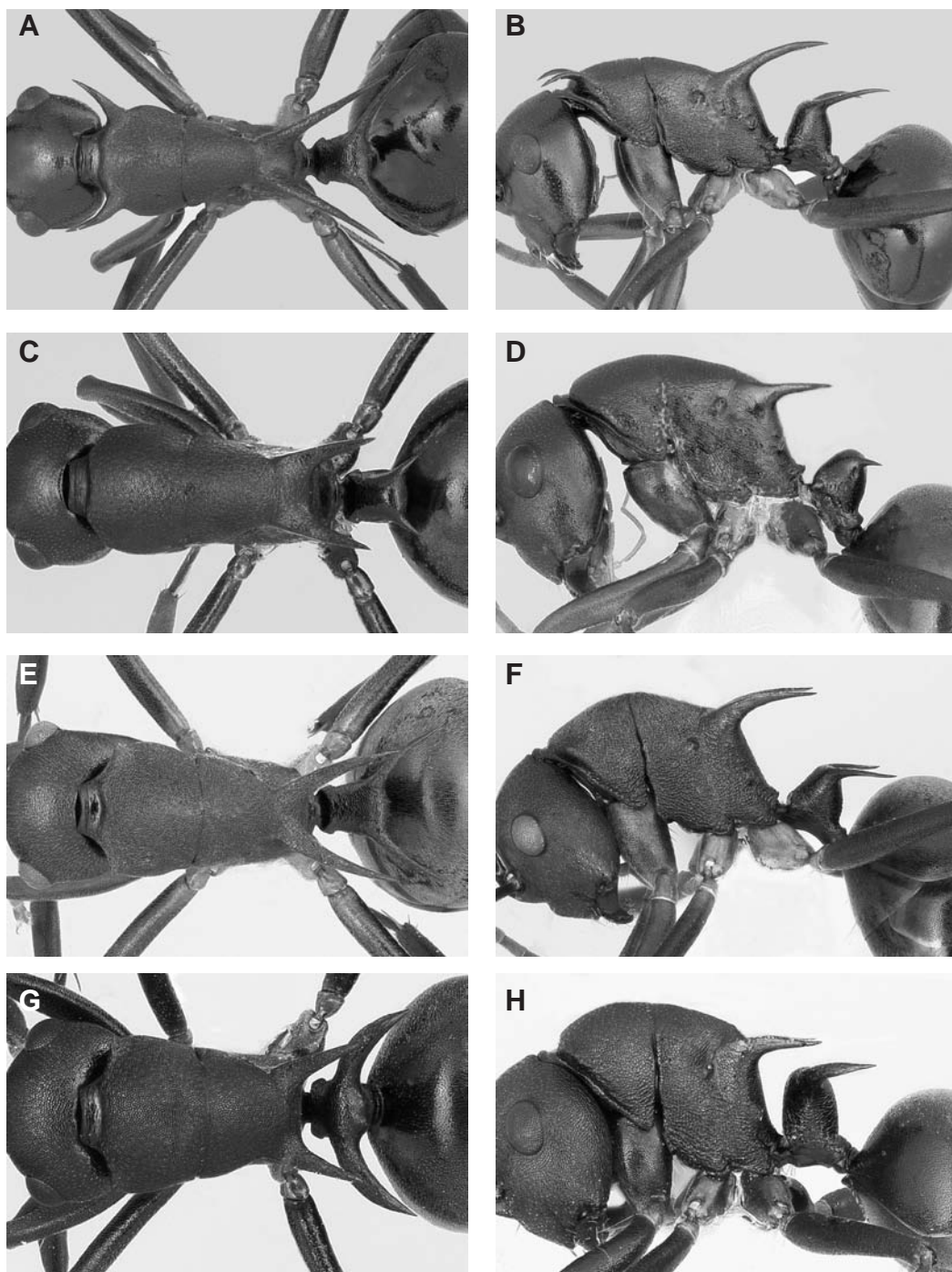


FIG. 10. *Polyrhachis* (Myrmhopla) species, Dorsal (left) and lateral (right) view of mesosoma and petiole: A-B, *P. amana* Fr. Smith; C-D, *P. arborea* sp. nov.; E-F, *P. hippomanes* Fr. Smith; G-H, *P. manni* sp. nov. (not to scale).



16.viii.1992 (Sk. Yamane) (w); Lore Lindu NP, Toro, Baloli, 835m, 14.iv.2005, cacao agrof., fog. (M.M. Bos #1) (w); ditto, Toro, Bulu (Dusun Dua), 820m, 6.v.2005, cacao agrof., fog. (M.M. Bos #1) (w); ditto, Toro, Kaha, 920m, 15.iv.2005, cacao agrof., fog. (M.M. Bos #1) (w); ditto, Toro, Dusun Tuju, 815m, 3.v.2005, cacao agrof., fog. (M.M. Bos #1) (w); ditto, Toro, Watu Bohe, 860m, 14.iv.2005, cacao agrof., fog. (M.M. Bos #1) (w). SULAWESI SELATAN: Sampulage nr Mangktana, 02°16'S, 120°47'E, 1000m, 19.x.1999 (K. Ogata & K. Masaoka #69) (w).

**REMARKS.** Bolton (1974) synonymised *P. abdominalis* and *P. hector* Fr. Smith, however, Dorow (1995) considered them separate species. I have examined a vast number of specimens from across their distributions and am inclined to agree with Dorow's opinion. Specimens of *P. hector* feature a set of distinct, spur-like spines along the inner edge of the hind tibia, that are lacking in *P. abdominalis*. The latter species is also distinctly more slender.

### 68. *Polyrhachis muelleri* Forel, 1893

*Polyrhachis muelleri* Forel, 1893: 23, 32. Syntype workers. Type locality: SINGAPORE (A. Müller), MHNG (examined).

*Polyrhachis muelleri* Forel, 1901:302 (description of queen and male); Emery, 1925: 193 (combination in *P. (Myrmhopla)*).

(For full synonymy citations see Dorow, 1995: 55)

**MATERIAL.** SULAWESI TENGAH: Lore Lindu NP, Toro, Watu Bohe, 860m, 25.iv.2005 (cacao agrof.) (M.M. Bos #8) (w); ditto, Kauboga, 840m, 4.v.2005 (cacao agrof.) (M.M. Bos #35) (w); ditto, Toro, Foot of Gn. Kamanua, 845m, 28.iv.2005 (cacao agrof.) (M.M. Bos #30) (♀); ditto, Toro, Bulu (Dusun Dua), 820m, 6.v.2005 (cacao agrof.) (M.M. Bos #36) (♀).

**REMARKS.** I have compared the Lore Lindu specimens with type-compared vouchers of *P. muelleri* from Malaysia and found them undoubtedly conspecific. *Polyrhachis muelleri* is a widespread species recorded from Thailand, Malaysia, Singapore, Borneo, Sumatra and Java. The biology of *P. muelleri* was described in detail by Dorow et al. (1990). The specimens collected by M.M. Bos are the first recorded from Sulawesi.

### 69. *Polyrhachis pressa* Mayr, 1862

*Polyrhachis pressus* Mayr, 1862: 681. Syntype workers, queen. Type locality: INDONESIA, JAVA, Batavia (= Jakarta) (Novara), NHMW (examined).

**MATERIAL.** SULAWESI UTARA: Dumoga-Bone NP, 8.-18.ii.1993 (Maryati Mohamed) (w). SULAWESI TENGAH: Lore Lindu NP, Toro, Haloda, 815m, 21.iv.2005, cacao agrof., fog. (M.M. Bos #3) (w).

**REMARKS.** This is a very characteristic, relatively rare species that is also known from Java and Borneo. It was reported from Sulawesi by Emery (1901: 569) but the workers from Lore Lindu and Dumoga-Bone National Parks are the only specimens I have seen from the island. The Sulawesi specimens are generally smaller than those from Java and Borneo (HL 2.15-2.46 versus HL 2.40-2.68) but they are otherwise identical and I consider them to represent an isolated population of *P. pressa*.

### *Polyrhachis mucronata* species-group

#### KEY TO *MUCRONATA*-GROUP SPECIES (based on workers)

1. Pronotal humeri produced into slender, acute spines (Fig. 10A-B) ..... *amana* Fr. Smith  
Pronotal humeri angular or produced into broad-based short teeth (Fig. 10E, G) ..... 2
2. Body with rather dense, closely appressed, silvery-white or greyish pubescence ..... *retrorsa* Emery  
Body jet-black with only very diluted appressed pubescence arising from minute shallow pits ..... 3
3. Petiole with short lateral spines that are as long as, or shorter than distance between their bases (Fig. 10C); no intercalary spines present; pronotal humeri rounded, with or without indication of rudimentary teeth ..... *arborea* sp. nov.  
Petiole with relatively long lateral spines, conforming to shape of first gastral segment, and pair of intercalary teeth; pronotal humeri distinctly toothed (Fig. 10E, F) ..... 4
4. Petiolar spines rather broad and massive (Fig. 10G); propodeal spines about as long as distance between their bases; generally black with coxae and proximal ends of femora distinctly light to medium reddish-brown ..... *manni* sp. nov.  
Petiolar spines very slender (Fig. 10E); propodeal spines distinctly longer than distance between their closely approximate bases; generally black with legs dark reddish-brown; coxae a shade lighter ..... *hippomanes* Fr. Smith

### 70. *Polyrhachis amana* Fr. Smith, 1861 (FIG. 10A-B)

*Polyrhachis amanus* Fr. Smith, 1861: 41, pl. 1, fig 13. Syntype workers. Type locality: INDONESIA, SULAWESI, Tonadano (A.R. Wallace), OXUM, BMNH (examined).

**MATERIAL.** SULAWESI UTARA: Dumoga-Bone NP, Danau Mooat, 1100m, 31.vii.1985 (*Pandanus* fog.) (N.E. Stork et al.) (w). SULAWESI TENGAH: Lore Lindu NP, Toro, Kole Wuri, 1010m, 27.iv.2005, nat. for., fogging (M.M. Bos #25) (w). SULAWESI SELATAN: Mt Kaleakan, Tana Traja, 02°58'S, 119°54'E, 18.x.1999, 1000m (K. Ogata & K. Masaoka #63) (w).

**REMARKS.** The specimens from Dumoga-Bone are larger than the syntype examined (HL 1.90-2.00 versus HL 1.75 in a syntype) and differ in a number of characters. The clypeus in lateral view is distinctly sinuate in modern specimens, while in the syntypes it is virtually straight anteriorly and deeply impressed basally. The lateral outline of mesosoma of the modern specimens is moderately convex with its highest point located just behind the promesonotal suture. The mesosomal outline in the syntypes is more strongly convex with the highest point at the promesonotal suture itself. In the modern specimens the pronotal and propodeal spines are more divergent, the base of petiolar node in profile is broader and the petiolar spines are less elevated and almost straight. In the syntype the tips of the petiolar spines are slightly bent downwards. The colour of the body and appendages in modern specimens is uniformly black, with only the coxae and the proximal ends of femora reddish-brown. The body and most of the antennal scapes of the syntype are black, with the legs and antennal funiculi generally light to medium yellowish-brown. In spite of these differences I consider the modern material and syntype conspecific.

**71. *Polyrhachis arborea* sp. nov.**  
(FIG. 10C-D)

**MATERIAL.** HOLOTYPE: SULAWESI TENGAH: nr Morowali, Ranu R. area, 27.i.-20.iv.1980, M.J.D. Brendell, B.M. 1980-280 (worker). PARATYPES: data as for holotype (14 workers). SULAWESI UTARA: Dumoga-Bone NP, 9.-16.v. 1985 (N.E. Stork et al.) (worker); ditto, 230m, 2.xii.1985, fog., N.E. Stork et al. (worker). Type deposition: Holotype and (8) paratypes in BMNH; 2 paratypes each in ANIC, MCZC and QM.

**DESCRIPTION.** *Worker.* Dimensions (holotype cited first): TL c. 6.25, 5.90-6.70; HL 1.59, 1.47-1.68; HW 1.22, 1.12-1.25; CI 77, 73-77; SL 2.09, 1.96-2.18; SI 171, 171-182; PW 0.87, 0.84-0.97; MTL 2.25, 2.09-2.34 (17 measured).

Anterior clypeal margin with median truncation, flanked by distinct, blunt denticles. Clypeus with blunt median carina that is weakly elevated posteriorly; clypeus in profile straight, rounding posteriorly into moderately impressed basal margin, laterally basal margin consisting of a thin, sculpture-breaking line. Frontal triangle distinct. Frontal carinae sinuate with distinctly raised margins; central area concave with rather short frontal furrow. Sides of head in front of eyes converging towards mandibular bases in weakly convex line; behind eyes sides rounding

into relatively narrow, convex occipital margin. Eyes convex, in full face view clearly breaking lateral cephalic outline. Ocelli lacking. Pronotal humeri produced into blunt angles, rather indistinctly in some specimens. Mesosoma in profile with pronotal dorsum weakly convex; promesonotal suture distinct; mesonotal dorsum flat. Metanotal groove a distinct, posteriorly bowed line. Propodeal dorsum very short, with lateral margins terminating in broad-based, horizontal, weakly laterally and posteriorly directed spines; inner margins of spines curving onto propodeal dorsum, forming weakly open 'U' in dorsal view; declivity relatively high, oblique in profile. Petiole with pair of widely diverging, relatively short spines; petiolar dorsum rounded in profile, spines arising from below summit. Anterior face of first gastral segment widely rounding onto dorsum.

Mandibles finely, longitudinally striate, with numerous piliferous pits. Head shallowly reticulate-punctate, more distinctly on vertex. Mesosoma sculpturation ranging from very dense punctation overlying larger, rather shallow depressions in some specimens to simply reticulate-punctate in others; general appearance ranging from opaque to moderately smooth and polished. Gaster finely shagreened.

Mandibular masticatory borders with several curved, golden hairs and numerous short, closely appressed hairs towards bases. Anterior clypeal margin with a few longer setae medially and a pair of rather short hairs arising laterally behind margin. Anterior face of fore coxae with one or two longer, erect hairs. Gaster with several medium length, erect hairs along dorsoapical margins segments; hairs more numerous and distinctly longer on gastral venter. Closely appressed, very short, golden pubescence arising from numerous pits over all body surfaces.

**Colour.** Head, mesosoma, petiole and mid and hind coxae black. Mandibles, clypeus and front of head blotched with diffuse reddish-brown. Antennae, legs and gaster medium reddish-brown with tarsi distinctly darker. Narrow band across bases of mandibular teeth, condylae, funicular segments towards apex and apical segment of tarsi, light yellowish-brown.

Sexuals and immature stages unknown.

**REMARKS.** The body sculpturation of *P. arborea* is rather variable. In most specimens of type series it consists of small punctures that are superimposed over larger, very shallow depressions. However, in the specimens from Lore Lindu the sculpturation

is simply reticulate-punctate. *Polyrhachis arborea* resembles *P. moesta* Emery and *P. orpheus* Forel. It differs from both in having considerably longer and more slender antennal scapes. The propodeal spines are also longer and virtually horizontal in *P. arborea*, while they are oblique in profile in the other two species.

**72. *Polyrhachis hippomanes* Fr. Smith, 1861**  
(FIG. 10E-F)

*Polyrhachis hippomanes* Fr. Smith, 1861: 43, pl. 1, fig. 21.  
Holotype worker. Type locality: INDONESIA, SULAWESI, Tondano (A.R. Wallace), OXUM (examined).

**MATERIAL.** SULAWESI UTARA: Dumoga-Bone NP, Danau Mooat, 1100m, 31.vii.1985, *Pandanus* fog., (N.E. Stork et al.) (w). SULAWESI SELATAN: Sampulage nr Mangkana, 02°16'S, 120°47'E, 1000m, 19.x.1999 (K. Ogata & K. Masaoka #69) (w); ditto, 02°20'S, 120°48'E, 800m, 19.x.1999 (K. Ogata & K. Masaoka #73) (w).

**REMARKS.** Both specimens of *P. hippomanes* from Dumoga-Bone are very similar to the holotype but differ slightly in the colour of their legs. In the holotype they are uniformly dark brown, apart from the trochanters and proximal ends of femora that are a shade lighter. In the modern specimens the coxae, trochanters and the proximal halves of the femora are distinctly light reddish-brown. The propodeal and petiolar spines are also more widely divergent in the modern specimens. However, in all other aspects both match the *P. hippomanes* holotype and I am confident they are conspecific.

**73. *Polyrhachis manni* sp. nov.**  
(FIG. 10G-H)

**MATERIAL.** HOLOTYPE: SULAWESI SELATAN: Karaenta, 05°0.2'S, 119°44'E, 270m, K. Ogata & K. Masaoka #99 (worker). PARATYPES: data as for holotype (worker); SE of Laduladu, 02°33'S, 121°22'E, 230m, 21.x.1999, K. Ogata & K. Masaoka #95 (worker); Bantimoerong (= Bantimurung), 1937, W.M. Mann, NGS SI Exp. (3 workers). SULAWESI UTARA: Dumoga-Bone NP, Rentice II, 280m, 1-24.xi.1985, malaise trap (Bosmans & Van Stalle #106) (worker). Type deposition: Holotype (QMT144152) and 1 paratype in QM; 1 paratype each in ANIC, BMNH, IRSN, MCZC and NMNH. **ADDITIONAL MATERIAL.** SULAWESI TENGAH: Lore Lindu NP, Toro, Taiti, 840m, 26.iv.2005, cacao agro., fog. (M.M. Bos #13a) (♀).

**DESCRIPTION.** *Worker.* Dimensions (holotype cited first): TL c. 5.19, 5.04-5.49; HL 1.40, 1.33-1.40; HW 1.20, 1.12-1.20; CI 86, 84-86; SL 1.65,

1.56-1.65; SI 137, 137-145; PW 0.94, 0.87-1.00; MTL 1.68, 1.65-1.78 (6 measured).

Anterior clypeal margin with rather shallow, medially notched, rectangular flange, flanked by acute denticles. Clypeus with blunt median carina that is indistinct anteriorly; clypeus in profile convex, posteriorly rounding into weakly impressed basal margin, laterally basal margin indicated by thin, sculpture-breaking line. Frontal triangle shallowly impressed. Frontal carinae sinuate with raised margins; central area with weakly impressed frontal furrow. Sides of head in front of eyes convex, rounding into mandibular bases; behind eyes sides rounding into convex occipital margin. Eyes convex, in full face view breaking lateral cephalic outline. Ocelli lacking. Pronotal humeri armed with small, distinct teeth; lateral pronotal margins shallowly emarginate behind spines and rounded posteriorly. Promesonotal suture distinct; mesonotum rather strongly narrowed posteriorly; metanotal groove a distinct line, posteriorly bowed and weakly raised medially. Propodeal dorsum extremely short, with lateral margins forming outer edges of divergent, horizontal spines with their tips weakly bent downwards; declivity relatively high, very steep. Petiole with anterior face straight, posterior face convex; dorsum armed with a pair of horizontal curved spines that conform to the shape of gastral base in dorsal view and a pair of very short, acute, dorsoposteriorly directed, intercalary teeth. Anterior face of first gastral segment with flat base and anterodorsal margin widely rounding onto dorsum.

Mandibles finely longitudinally striate with numerous piliferous pits. Head, mesosoma and petiole reticulate-punctate with sculpturation on meso- and metapleurae somewhat wrinkled. Gaster finely shagreened.

Mandibular masticatory borders and outer margins with numerous, relatively long, curved, golden hairs. Anterior clypeal margin with a few longer, anteriorly directed setae medially and several shorter setae fringing margin laterally. Two pairs of relatively short, erect hairs arising near anterior clypeal margin, one pair near basal margin and a few very short hairs fringing apex of antennal scapes. Posterior faces of fore coxae with several medium length, downward-directed hairs. Subpetiolar process anteriorly with tuft of short hairs. Gaster with only a few erect hairs lining apical segments dorsally; distinctly longer, more abundant hairs lining segments on venter. Extremely short, appressed, very diluted pubescence over most dorsal surfaces; pubescence on

gastral dorsum more abundant, but not so dense as to hide underlying sculpturation.

**Colour.** Black; mandibles, antennal scapes, fore coxae and tibiae medium reddish-brown with femora very dark reddish-brown. Small patch on mandibular masticatory borders, condylae, apical funicular segments, coxae of middle and hind legs and all trochanters very light yellowish-brown, with coxae blotched reddish-brown. Apical gastral segments, notably on ventral aspect, diffusely reddish-brown.

**Queen.** Dimensions: TL c. 7.21; HL 1.62; HW 1.34; CI 83; SL 1.87; SI 139; PW 1.53; MTL 2.09 (1 measured).

Very similar to worker but larger and with usual differences indicating caste, including three ocelli and complete thoracic structure. Pronotal humeri armed with distinct teeth; mesoscutum almost as long as wide, with anterior face and dorsum forming a continuous, weakly convex line in lateral view; mesoscutellum convex. Propodeal dorsum short, descending into oblique declivity in medially uninterrupted line; spines broad-based, about twice as long as their basal widths. Petiole similar to that in worker with spines distinctly shorter. Sculpturation of body, pilosity and colour virtually as in worker.

Males and immature stages unknown.

**REMARKS.** *Polyrhachis manni* is undoubtedly closely related to *P. lucidula* Emery and to *P. ridleyi* Forel. In addition to their similar general appearance, they all have rather broad petiolar spines. However, the spines in *P. manni* are distinctly less massive than in the other two species and the dorsum of the petiole bears two short, acute, intercalary spines that are lacking in both *P. lucidula* and *P. ridleyi*. For additional notes on the latter two species see Kohout (1998: 516).

#### 74. *Polyrhachis retrorsa* Emery, 1900

*Polyrhachis retrorsa* Emery, 1900: 719. Syntype worker, queens. Type locality: INDONESIA, Mentawai I., Sipora, Sereinu (E. Modigliani), MCSN (examined).

**MATERIAL.** SULAWESI UTARA: Dumoga-Bone NP, 400m, 11.ii.1985, fog., (N.E. Stork et al.) (w); ditto, 9.-16.v.1985 (N.E. Stork et al.) (w); ditto, 19.vii.1985, fog., (N.E. Stork et al.) (w). SULAWESI TENGAH: Lore Lindu NP, Gn. Kamonua, 1080m, 20.iv.2005, nat. for., fog. (M.M. Bos #42) (w). SULAWESI TENGGARA: 1-2km E of Wolasi, 42km S of Kendari, c. 350m, rf, 13-14.vii.1972 (W.L. Brown) (w).

**REMARKS.** *Polyrhachis retrorsa* bears a very close resemblance to *P. mitrata* Menozzi from the Philippines but direct comparison of the types of both species supports their separate specific status. *Polyrhachis mitrata* has a narrower mesosoma with the pronotal humeri angular and the propodeal and petiolar spines distinctly more slender. The petiole in lateral view has a weakly convex anterior face, an almost straight posterior face and a rather narrow dorsum that bears a pair of minute, posteriorly directed, intercalary teeth. *Polyrhachis mitrata* is black with the legs and gaster medium reddish-brown and the antennae a shade darker and the body is covered with whitish pubescence that is rather diluted, notably on dorsum of the head, mesosoma and gaster. However, the syntype examined appears to be a worn specimen. In contrast, the pronotal humeri in *P. retrorsa* are unarmed and widely rounded and the propodeal spines shorter and broader at their bases. In profile, both faces of the petiole are convex and only slightly converge towards the widely rounded dorsum. The petiole generally lacks intercalary teeth, although rudimentary teeth are evident beneath the pubescence in a few specimens. *Polyrhachis retrorsa* is black with reddish-brown appendages and has relatively long, appressed, silvery-grey pubescence that clearly distinguishes the species from the other, mostly jet black members of the *mucronata*-group.

#### *Polyrhachis sexspinosa* species-group

##### KEY TO *SEXSPINOSA*-GROUP SPECIES (based on workers)

1. Pronotal spines short, straight, directed laterally in virtually right angle to main axis of body . . . *rugifrons* Fr. Smith  
Pronotal spines bull-horn shaped, curving laterally and anteriorly . . . . . *spinosa* Mayr

#### 75. *Polyrhachis rugifrons* Fr. Smith, 1860

*Polyrhachis rugifrons* Fr. Smith, 1860a: 70. Syntype worker, queen. Type locality: INDONESIA, SULAWESI, Makassar (A.R. Wallace), OXUM (examined).

**MATERIAL.** SULAWESI UTARA: Dumoga-Bone NP, Tumpah R., mid vi.-4.vii.1985, for. edge (C.van Achtenberg) (w); SULAWESI TENGAH: Lore Lindu NP, Toro, Gn. Kalabui, 950m, 16.iv.2005, nat. for., fog. (M.M. Bos #39) (w); ditto, Toro, Kaha, 920m, 15.iv.2005, cacao agrof., fog. (M.M. Bos #39) (w, ♀); ditto, Toto, Gn. Kamonua, 1080m, 20.iv.2005, nat. for., fog. (M.M. Bos #39) (♀); SULAWESI TENGGARA: Wolasi, Pangalulu, 04°10'S, 122°30'E, 140m, 13.x.1999 (K. Ogata & K. Masaoka #46) (w). SULAWESI SELATAN: Gn. Bulusaraung, nr Camba Malawa, c. 750m, 7.ii.-28.iii.1995 (Malaise trap) (C.van



Achterberg & Y. Yasir (w); Bantimurung, Ujung Pandang, 8.viii.1992 (Sk. Yamane) (w); Bantimoerong (= Bantimurung), 1937 (W.M. Mann, NGS SI Exp.) (w).

**REMARKS.** The syntype worker of *P. rugifrons* compares well with the specimens listed above. *Polyrhachis rugifrons* and *P. spinosa* Mayr, listed below, appear to be the only representatives of the *sexspinosa*-group in Sulawesi. However, while the distribution of *P. spinosa* is centered on Halmahera, with only a few collections known from elsewhere (Morotai I.), *P. rugifrons* appears to be endemic to Sulawesi.

#### 76. *Polyrhachis spinosa* Mayr, 1867 stat. rev.

*Polyrhachis spinosa* Mayr, 1867:43, pl. 2, fig.2. Syntype worker, queen. Type locality: INDONESIA, HALMAHERA, Dodinga (Forsten), RMNH (examined).

*Polyrhachis spinosa* Mayr. Bolton, 1975: 6. (considered a junior synonym of *P. bubastes* Fr. Smith).

**MATERIAL.** INDONESIA, SULAWESI: (as Celebes) in copal, (Franklin Müller) (w) (DEIE).

**REMARKS.** A single specimen from copal appears to be the only record of this species from Sulawesi. *Polyrhachis spinosa* is known from Halmahera and Morotai I. (= Morotai I. in Maluku Utara). Bolton (1975) synonymised *P. spinosa* with *P. bubastes* and assumed that the types of the former had been lost. However, I have discovered the *P. spinosa* syntypes (worker and queen) in the RMNH collection and following their comparison with the *P. bubastes* types (OXUM), I am confident that they represent separate species. In his original description, Mayr (1867) illustrated both castes and listed characters separating *P. spinosa* from the closely allied species, *P. sexspinosa*, *P. rugifrons* and *P. bubastes*. Some of the more useful characters distinguishing this group of species are discussed below. The occipital margins of *P. sexspinosa* and *P. spinosa* feature lateral angular prominences or lobes that are clearly visible in full face view. These lobes are weakly developed and barely visible in *P. bubastes* and *P. rugifrons*. In profile, the pronotal dorsum is strongly swollen and dome-like in *P. bubastes* and *P. sexspinosa*, while it is only moderately convex in the other two species. The pronotal spines are strongly curved forwards in *P. sexspinosa*, *P. spinosa* and *P. bubastes*, but in *P. rugifrons* they are short, straight and project laterally, almost at right angles to the main axis of the body. A mesopleural tooth is strongly developed in *P. bubastes*, while it is a simple, non-dentiform lobe in *P. sexspinosa* and *P. rugifrons* and virtually absent in *P. spinosa*. Although the propodeal spines are

variable in length and degree of elevation in *P. sexspinosa*, they are generally long and vertical to the main axis of the body, or even inclined anteriorly. The propodeal spines are curved backwards in the other species, but while they are long in *P. rugifrons* and *P. spinosa*, they are distinctly shorter in *P. bubastes*. The form of the petiolar spines varies considerably among the species. In *P. rugifrons* they are long and slender and embrace the base of first gastral segment. In *P. sexspinosa* they are long, slender, strongly elevated and weakly curved. The spines are short, slender, only weakly elevated, and divergent in *P. bubastes*, while they are long, relatively thick, strongly elevated and subparallel in *P. spinosa*. *Polyrhachis sexspinosa* and *P. rugifrons* have the body covered with mostly yellowish or off-white, rather dense pubescence, that almost completely or partly hides the underlying sculpturation respectively. In contrast, *P. bubastes* and *P. spinosa* have the body clothed with numerous, rusty brown or black, short, erect hairs that do not mask the underlying sculpturation.

#### Subgenus *Myrmothrinax* Forel, 1915

The subgenus *Myrmothrinax* has never been formally subdivided, but with the number of its constituent species rapidly increasing, I am proposing two species-groups, based on the most characteristic feature in the workers, the relative lengths of the petiolar spines. The *aequalis*-group includes species with the petiolar spines more-or-less subequal or with the middle spine shorter than the lateral pair. The *thrinax*-group includes those species with a distinctly elongated middle spine.

*Polyrhachis javanica* Mayr, a member of the *aequalis*-group, was reported from Sulawesi by Emery (1901, 1925) but I consider this record erroneous. Emery evidently based his record on specimens collected from Sulawesi by Fruhstorfer that were identified by Mayr. I have examined four of these specimens (MCZC) bearing original identification tags inscribed as follows: (1) specimen from Patunuang – “*Polyrhachis thrinax* Rog. v. *javanica* Mayr det. Mayr”; (2) specimen from Toli-Toli – “*Polyrhachis thrinax* Rog. det. Mayr”, “var. *javana* Mayr det. Mayr”; (3) specimen from Toli-Toli: “*P. thrinax* Rog. v. *javanica* det. Mayr”; (4) specimen from Patunuang “*Polyrhachis thrinax* Rog. det. Mayr”, “var. *javana* Mayr det. Mayr”. Mayr described *P. thrinax javanica* in 1867 and about thirty years passed before the identifications of Fruhstorfer’s specimens.

By then the unique holotype of *P. thrinax javanica* had been returned to its owners and Mayr evidently lacked any material for comparison. Consequently, the accuracy of his identifications was compromised and ultimately incorrect. Moreover, Fruhstorfer's specimens comprised two, superficially similar, but distinct species, both described below. Specimens (1) and (2) are *P. incognita* sp. nov., while specimens (3) and (4) are *P. deceptor* sp. nov..

Mayr (1867), in his original description, designated a holotype for *P. thrinax javanica*. However, there are two available specimens in NRMS that are undoubtedly from the original series. Of these, I consider the specimen bearing Mayr's identification tag to be the holotype. The holotype is pinned and in relatively good condition. It agrees with Mayr's short description of that species to the extent that "[...] petiolus nodiformis supra spinis 3 gracilibus, subaequilongis, erectis, Paulo postice directis et rectis" and further on "... während bei dem von mir untersuchten Exemplare der mittlere Dorn nur um Weniges länger ist als die seitlichen Dornen". However, Mayr failed to mention that the apex of the middle spine is shallowly emarginated. The second specimen, once apparently pinned, is fragmented with the pronotum missing and the head, mesonotum, propodeum, petiole, gaster and two legs glued separately onto a card. Both specimens are exceptionally small (HL 1.37) and do not match any of the recently examined *Myrmotherinax* specimens from Sulawesi. They each bear two identical locality labels inscribed 'Java' and 'Kinb.', with the holotype also bearing Mayr's identification tag – "*P. thrinax* v. *javana* det. Mayr". It is surprising that Mayr frequently used '*javana*' (including on the holotype tag), instead of '*javanica*' as it was originally published. The incorrect spelling '*javana*' was also used by Emery (1887) and Forel (1893).

### ***Polyrhachis aequalis* species-group**

#### **KEY TO *AEQUALIS*-GROUP SPECIES** (based on workers)

1. Pronotal humeri with distinct teeth or short spines (Fig. 12A) ..... 2  
Pronotal humeri widely rounded, without teeth or spines; petiolar spines very short with middle spine shorter or rudimentary in some specimens (Fig. 12E) ..... *trispinosa* Fr. Smith
2. Body generally light reddish-brown, with appendages and gaster a shade darker ..... *deceptor* sp. nov.  
Body generally black, or dark reddish-brown, with appendages sometimes a shade lighter ..... 3

3. Smaller species (HL <1.56); pronotal humeri produced into short teeth ..... *aequalis* Forel  
Larger species (HL >1.65); pronotal humeri produced into short, distinct spines ..... 4
4. Body and appendages black; propodeal spines relatively short, wide-based, somewhat triangular in lateral view (Fig. 12D) ..... *incognita* sp. nov.  
Body very dark reddish-brown to black, appendages and gaster medium to dark reddish-brown; propodeal spines relatively long and slender (Fig. 12B) ..... *imitator* sp. nov.

### **77. *Polyrhachis aequalis* Forel, 1910**

*Polyrhachis textor* var. *aequalis* Forel, 1910: 129. Syntype workers, queen. Original localities: PHILIPPINES, LUZON, Province of Zambales, Olongapo (C.S. Banks); NEGROS Occ., Maaao (C.S. Banks), BSMP (types destroyed – see Balthasar, 1966: 284), MHNG, QM (examined).  
*Polyrhachis aequalis* Forel. Kohout, 1998: 509.

**MATERIAL.** SULAWESI UTARA: Dumoga-Bone NP, nr Toraut bank cl., 00°34'N, 123°54'E, 10.-18. xi.1985 (C. van Achterberg) (w).

**REMARKS.** Two workers from Dumoga-Bone NP compare well with the *P. aequalis* syntypes and other available specimens of the species from the Philippines.

### **78. *Polyrhachis deceptor* sp. nov.** (FIG. 11G-H)

**MATERIAL.** HOLOTYPE: SULAWESI UTARA: Dumoga-Bone NP, nr Danau Mooat, 1100m, 1.viii.1985, coffee fog., N.E. Stork et al. (worker). **PARATYPES:** data as for holotype (6 workers). Type deposition: Holotype and 2 paratypes in BMNH; 1 paratype each in ANIC, CASC, MCZC and QM. **ADDITIONAL MATERIAL.** SULAWESI TENGAH: Lore Lindu NP, Toro, Kaha, 920m, 15.iv.2005, cacao agrof., fog. (M.M. Bos #18, 19) (w, ♀); ditto, Toro, Baloli, 835m, 14.iv.2005, cacao agrof., fog. (M.M. Bos #2) (♀); ditto, Toro, Foot of Gn. Kamanua, 845m, 28.iv.2005, cacao agrof., fog. (M.M. Bos #20) (♀).

**DESCRIPTION.** *Worker.* Dimensions (holotype cited first): TL c. 6.15, 6.10-6.75; HL 1.65, 1.59-1.75; HW 1.40, 1.34-1.50; CI 85, 84-86; SL 2.03, 1.93-2.18; SI 145, 141-150; PW 0.90, 0.84-1.00; MTL 2.21, 2.15-2.40 (7 measured).

Anterior clypeal margin with medial, widely and shallowly emarginate truncation, flanked by distinct teeth. Clypeus with blunt, posteriorly distinct median carina; clypeus very weakly convex in profile, abruptly rounding into rather shallow basal margin, laterally basal margin indicated by a thin, sculpture-breaking line. Frontal triangle indistinct. Frontal carinae sinuate with margins very narrowly, vertically raised; central area relatively wide, weakly convex medially, with shallow frontal furrow. Sides of

head in front of eyes weakly convex, converging towards mandibular bases; behind eyes sides broadly rounding into convex occipital margin. Eyes convex, in full face view clearly exceeding lateral cephalic outline. Ocelli lacking. Pronotal humeri armed with relatively long, laterally directed spines; outer edges of spines continuous with somewhat sinuate lateral pronotal margins. Promesonotal suture distinct. Mesonotum with lateral margins strongly converging and somewhat raised posteriorly, shallowly emarginate medially; dorsum in profile distinctly stepping down into metanotal groove. Propodeum rather flat with lateral margins terminating posteriorly in almost vertically elevated, gently curved, weakly divergent spines; propodeal dorsum descending into oblique declivity in medially uninterrupted line. Petiole with anterior face flat, posterior face convex; dorsum armed with three, rather long, acute, dorsoposteriorly directed, subequal spines, lateral pair distinctly diverging. Anterior face of first gastral segment widely rounding onto dorsum.

Mandibles very finely reticulate. Head, mesosoma and petiole reticulate-punctate; pronotal dorsum with weak, irregular but largely longitudinal striae that are bowed towards posterolateral pronotal angles. Dorsum of mesonotum and propodeum reticulate-rugose, with sides of mesosoma densely and regularly reticulate-punctate. Gaster finely shagreened.

Mandibular masticatory borders with only a few, curved, golden hairs and numerous very short hairs arising from pits towards bases. Anterior clypeal margin with several rather short setae. A few pairs of relatively short, erect hairs near anterior and basal clypeal margins, along frontal carinae and a single pair of slightly longer hairs on vertex. Anterior face of fore coxae with pair of erect hairs that are almost as long as greatest diameter of eye. Gaster with very short erect hairs on posterodorsal margins of apical segments; more abundant, longer hairs lining margins of segments on gastral venter. Very short, closely appressed, somewhat diluted, golden pubescence over most body surfaces; pubescence dense and pale on dorsum of first gastral segment, almost white towards sides.

*Colour.* Distinctly light reddish-brown, with clypeus, central area, condylae and most of last funicular segment lighter, yellow-orange. Vertex with dark reddish, diffuse patch medially. Mandibles, coxae and legs very dark, reddish-brown, with antennal scapes almost black. Anterior clypeal

margin, frontal carinae, condylae, mandibular bases, border along pronotal collar and very narrow border along lateral margins of pronotum, mesonotum and propodeum, including spines, very dark reddish-brown. Dorsum of first gastral segment reddish-brown, distinctly more yellowish than head and mesosoma. Rest of gaster distinctly darker, reddish-brown with segments somewhat diffusely bordered with very dark reddish-brown.

*Queen.* Dimensions: TL c. 8.21-8.52; HL 1.96-2.00; HW 1.65-1.68; CI 84-86; SL 2.21-2.34; SI 134-139; PW 1.62-1.65; MTL 2.46-2.58 (3 measured).

Very similar to worker with usual differences indicating caste, including three ocelli and complete thoracic structure. Pronotal humeri produced into blunt teeth; mesoscutum with lateral margins converging anteriorly towards rather narrowly rounded anterior margin; median line distinct, bifurcate; parapsides flat; mesoscutellum moderately elevated above dorsal plane of mesoscutum. Propodeum armed with somewhat dorsally flattened, weakly divergent, upturned spines; petiolar spines more massive and shorter than in worker, with median spine marginally shorter than lateral pair. Dorsum of mesoscutum and mesoscutellum with numerous, moderately long, semierect hairs that are completely absent in workers. Sculpturation and colour virtually as in worker.

Males and immature stages unknown.

**REMARKS.** *Polyrhachis deceptor* is similar to *P. abnormis* Donisthorpe from New Guinea, and to several undescribed species of the subgenus from Borneo. *Polyrhachis deceptor* and *P. abnormis* have the pronotal dorsum irregularly, but mostly longitudinally striate, elongated pronotal spines that are longer than their basal widths, strongly elevated propodeal spines and subequal petiolar spines. *Polyrhachis deceptor* differs from *P. abnormis* in having shorter, horizontal and more laterally directed pronotal spines and gently curved, distinctly divergent propodeal spines. The pronotal spines in *P. abnormis* are distinctly elevated and anterolaterally directed and the propodeal spines are very slender, almost vertical and parallel. The overall colour pattern of both species is similar, yellowish- or light reddish-brown, but the appendages in *P. abnormis* are concolourous with the rest of the body, while they are dark to very dark brown in *P. deceptor*. The specimens of *P. abnormis* from Lore Lindu differ in colour from those from Dumoga-Bone. The type



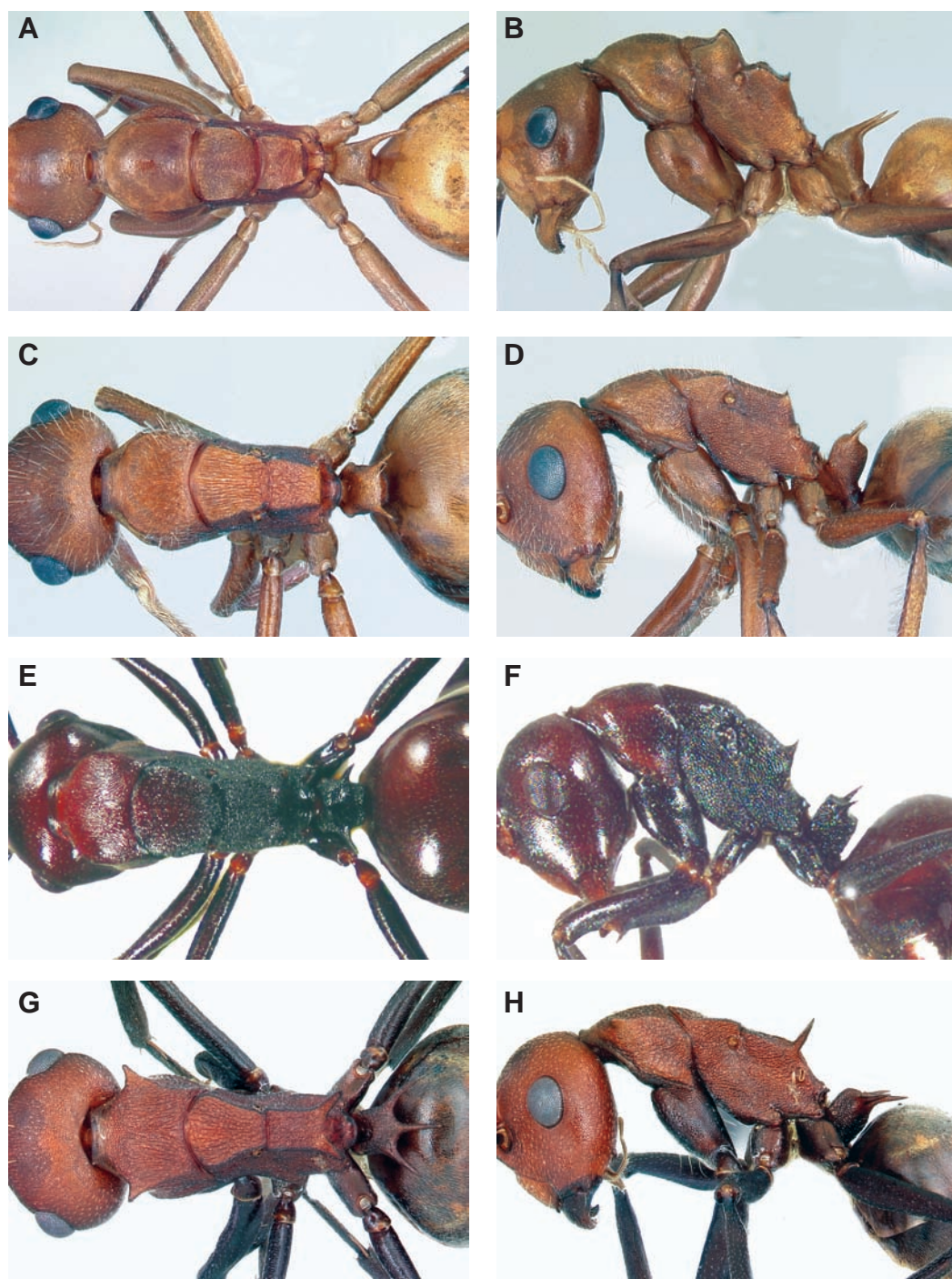


FIG. 11. *Polyrhachis* (*Myrmatopa* & *Myrmotherinax*) species, Dorsal (left) and lateral (right) view of mesosoma and petiole: A-B, *P. mellita* sp. nov.; C-D, *P. hispida* sp. nov.; E-F, *P. kazuoi* sp. nov.; G-H, *P. deceptor* sp. nov. (not to scale).



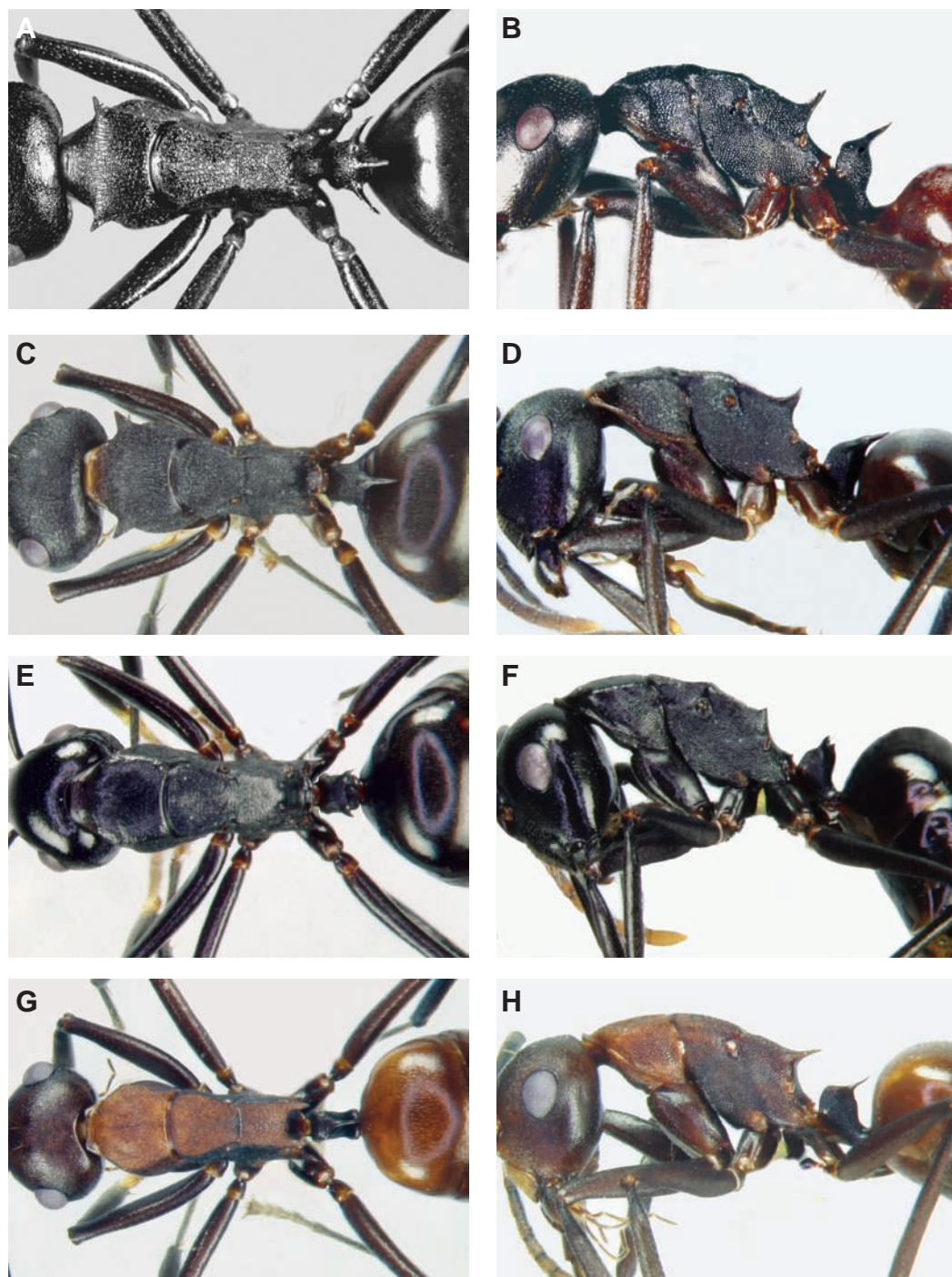


FIG. 12. *Polyrhachis* (Myrmotherinax) species, Dorsal (left) and lateral (right) view of mesosoma and petiole: A-B, *P. imitator* sp. nov.; C-D, *P. incognita* sp. nov.; E-F, *P. trispinosa* Fr. Smith; G-H, *P. unicuspis* Emery (not to scale).

series specimens are distinctly reddish-brown, while those from Lore Lindu are yellowish-brown without a reddish hue. However, they are virtually identical morphologically and I consider them conspecific.

**79. *Polyrhachis imitator* sp. nov.**  
(FIG. 12A-B)

**MATERIAL.** HOLOTYPE: SULAWESI TENGAH, Lore Lindu NP, Toro, Haloda, 815m, 17.iv.2005, cacao fog., M.M. Bos (worker). PARATYPES: data as for holotype (10 workers, 1 queen). Type distribution: Holotype worker (QMT144153), 2 paratype workers and paratype queen in QM; 2 paratype workers each in ANIC, BMNH, GUGG (Bos coll.) and MCZC.

**DESCRIPTION.** *Worker.* Dimensions (holotype cited first): TL c. 6.55, 6.50-7.21; HL 1.68, 1.65-1.72; HW 1.47, 1.43-1.53; CI 87, 87-91; SL 1.96, 1.93-1.98; SI 133, 128-137; PW 0.94, 0.90-1.00; MTL 2.18, 2.12-2.25 (11 measured).

Anterior clypeal margin medially with wide, relatively shallow, 'V'-shaped emargination, flanked by distinct teeth. Clypeus with short median carina; convex in profile, rounding into deeply impressed basal margin, laterally basal margin indicated by thin, sculpture-breaking line. Frontal triangle weakly indicated. Frontal carinae sinuate with narrowly raised margins; central area relatively wide with weakly impressed frontal furrow. Sides of head in front of eyes converging towards mandibular bases in almost straight line; behind eyes sides widely rounding into weakly convex occipital margin. Eyes convex, in full face view clearly exceeding lateral cephalic outline. Ocelli lacking; relative positions of lateral ocelli indicated by shallow punctures. Pronotal dorsum weakly convex in profile; humeri with spines marginally longer than their basal widths; outer margins of spines continuous with posteriorly converging lateral pronotal margins. Promesonotal suture distinct; mesonotal dorsum weakly concave between slightly raised, posteriorly converging lateral margins. Propodeal dorsum with lateral margins parallel, terminating posteriorly in relatively long, slender, virtually parallel, dorsoposteriorly directed spines; propodeal dorsum descending into oblique declivity in medially uninterrupted line. Petiole with anterior face straight, posterior face convex; dorsum armed with three, slender, subequal spines; apex of median spine weakly upturned and shallowly emarginate (in holotype and some paratypes) or pointed; lateral spines weakly curved posterolaterally from their bases.

Anterior face of first gastral segment flat, widely rounding onto dorsum.

Mandibles very finely, mostly longitudinally rugose with numerous shallow pits. Clypeus finely striate-punctate. Head and mesosoma reticulate-punctate; pronotal dorsum with somewhat irregular, longitudinal, posteriorly bowed rugae. Sides of mesosoma and petiole distinctly reticulate. Gaster finely shagreened.

Mandibles with a few, moderately long, suberect, golden hairs at masticatory borders and extremely short, closely appressed hairs towards their bases. Anterior clypeal margin with a few longer setae medially and fringe of a few, short setae laterally. A few pairs of short, erect hairs near anterior and basal clypeal margins, along frontal carinae and a single pair on vertex. Anterior, posterior and ventral faces of fore coxae with a few, relatively long hairs; mid and hind coxae with a few shorter, erect hairs ventrally. Femora and trochanters each with a single, medium length, erect hair on ventral surfaces. Gaster with a few shorter erect hairs along apical segments dorsally; hairs longer and more abundant on gastral venter. Very short, appressed, mostly white pubescence on dorsum of gaster; pubescence virtually absent from rest of dorsal body surfaces.

**Colour.** Dark reddish-brown, with mandibles, clypeus, coxae, most of legs and gaster medium reddish-brown; condylae, apical segments of funiculi and mandibular masticatory borders, light yellowish-brown.

**Queen.** Dimensions: TL c. 9.78; HL 2.25; HW 1.90; CI 84; SL 2.40; SI 126; PW 1.84; MTL 2.93 (1 measured).

Apart from sexual characters and larger size, closely resembling worker except: pronotal humeri armed with blunt teeth; mesoscutum with virtually flat dorsum and lateral margins converging anteriorly towards rather narrowly rounded anterior margin; median line distinct, parapsides flat; mesoscutellum marginally elevated above dorsal plane of mesoscutum. Propodeum armed with strong, somewhat dorsally flattened, obliquely directed spines; petiolar spines shorter than in worker, median spine marginally shorter than lateral spines. Sculpturation and colour virtually as in worker.

Males and immature stages unknown.

**REMARKS.** *Polyrhachis imitator* is very similar to *P. incognita* described below, with

the main distinguishing characters listed in the remarks section of the latter. It also bears some resemblance to *P. aequalis* from the Philippines and newly recorded from Sulawesi above. However, *P. imitator* is larger (HL >1.65 versus <1.56 in *P. aequalis*) and has well developed pronotal spines that are reduced to short teeth in *P. aequalis*.

**80. *Polyrhachis incognita* sp. nov.**  
(FIG. 12C-D)

**MATERIAL.** HOLOTYPE: SULAWESI TENGAH, Lore Lindu NP, Toro, Powawua, 810m, 18.iv.2005, cacao fog., M.M. Bos (worker). PARATYPES: data as for holotype (2 workers, 1 queen). SULAWESI UTARA, Dumoga-Bone NP, Tumpah R., 7.x.1985, Bosmans & Van Stalle #004 (1 worker). Type deposition: Holotype worker (QMT144154) and paratype queen in QM; 1 paratype worker each in GUGG (Bos coll.), IRSN and MCZC. **ADDITIONAL MATERIAL.** SULAWESI SELATAN (as S. Celebes on locality label): Patunuang, i.1896, H. Fruhstorfer (worker). PARATYPE: SULAWESI TENGAH (as Nord-Celebes on locality label): Toli-Toli, xi.-xii.1895, H. Fruhstorfer (worker).

**DESCRIPTION.** *Worker.* Dimensions (holotype cited first): TL c. 6.80, 6.65-7.61; HL 1.75, 1.68-1.75; HW 1.53, 1.47-1.53; CI 87, 87; SL 2.12, 2.03-2.21; SI 138, 138-147; PW 1.06, 1.00-1.06; MTL 2.34, 2.18-2.53 (4 measured).

Anterior clypeal margin medially with wide, deep, 'V'-shaped emargination, flanked by rather blunt teeth. Clypeus with short median carina; clypeus weakly convex in profile, rounding into deeply impressed basal margin, laterally basal margin indicated by thin, sculpture-breaking line. Frontal triangle weakly indicated. Frontal carinae sinuate with narrowly raised margins; central area relatively wide with poorly indicated frontal furrow. Sides of head in front of eyes converging towards mandibular bases in almost straight line; behind eyes sides widely rounding into weakly convex occipital margin. Eyes convex, in full face view clearly exceeding lateral cephalic outline. Ocelli lacking. Pronotal dorsum flat; humeri with spines distinctly longer than their basal widths, directed anterolaterally and weakly downward; outer margins of spines merging with posteriorly converging, lateral pronotal margins. Promesonotal suture distinct; mesonotal dorsum weakly concave in profile; lateral mesonotal margins distinctly raised and strongly converging towards distinct metanotal groove. Propodeal dorsum relatively narrow with lateral margins parallel, terminating posteriorly in rather short,

broad-based, upturned spines; propodeal dorsum descending into oblique declivity in medially uninterrupted line. Petiole with anterior face straight, posterior face convex; dorsum armed with three, broad-based, subequal spines; lateral pair weakly curved posterolaterally from their bases. Anterior face of first gastral segment flat, widely rounding onto dorsum.

Mandibles very finely striate with numerous shallow pits. Clypeus finely, anteromedially striate-punctate. Sides of head and vertex reticulate-punctate with sculpture in front of eyes mostly longitudinally directed. Pronotal and mesonotal dorsa longitudinally striate-punctate with striae on pronotum bowed towards posterior corners. Sides of mesosoma reticulate-punctate with petiole distinctly punctate-rugose. Gaster finely shagreened.

Mandibles with a few, short, mostly erect, golden hairs at masticatory borders and extremely short, closely appressed hairs towards bases. Anterior clypeal margin with a few longer setae medially and fringe of short setae laterally. A few pairs of short, erect hairs near anterior and basal clypeal margins, along frontal carinae and a single pair on vertex. Anterior, posterior and ventral faces of fore coxae with a few, relatively long, somewhat curved hairs; mid and hind coxae with a few shorter erect hairs ventrally. Femora with a few, medium length, erect hairs on ventral surfaces. Gaster with few short, erect hairs lining apical segments dorsally, more abundant, longer hairs on gastral venter. Very short, appressed, mostly white pubescence on dorsum of gaster; pubescence virtually absent from rest of dorsal body surfaces.

**Colour.** Holotype and associated queen black, with mandibular masticatory border, condylae and apical segments of funiculi medium to dark reddish-brown. Paratypes generally a shade lighter with legs, including coxae, and gaster dark to very dark reddish-brown.

**Queen.** Dimensions: TL c. 8.26; HL 2.00; HW 1.68; CI 84; SL 2.18; SI 130; PW 1.56; MTL 2.53 (1 measured).

Apart from sexual characters and larger size, closely resembling worker except: pronotal humeri armed with blunt, but distinct teeth; mesoscutum with virtually flat dorsum; lateral margins rather strongly converging anteriorly, forming narrowly rounded anterior margin; median line short; mesoscutellum marginally elevated above dorsal plane of mesoscutum. Propodeum armed



with strong, relatively short, upturned spines; petiolar spines subequal, shorter than in worker. Sculpturation and colour virtually as in holotype worker.

Males and immature stages unknown.

**REMARKS.** *Polyrhachis incognita* can be distinguished from the other Sulawesi *Myrmotherinx* species (except *P. imitator*), by the deep, 'V'-shaped median emargination of the anterior clypeal margin and its large size and mostly black head and mesosoma. It differs from *P. imitator* by its virtually flat pronotal dorsum, somewhat longer antennal scapes (SL >2.00 versus SL <2.00 in *P. imitator*), distinctly shorter, wide-based, upturned propodeal spines and generally darker body. The two non-type specimens collected by Fruhstorfer compare well with the holotype and I consider them conspecific. Both bear identification tags in Mayr's handwriting as indicated in the above notes on *P. javanica*.

**81. *Polyrhachis trispinosa* Fr. Smith, 1861**  
(FIG. 12E-F)

*Polyrhachis trispinosus* Fr. Smith, 1861: 40, pl. 1, fig. 11.  
Holotype queen. Type locality: INDONESIA, SULAWESI,  
Tondano (A.R. Wallace), OXUM (examined).

**MATERIAL.** SULAWESI TENGAH: Lore Lindu NP, Toro, Gn. Kalabui, 950m, 20.iv.2005, nat. for., fog. (M.M. Bos #6) (w, q); ditto, 815m, 19.iv.2005, cacao agrof., fog. (M.M. Bos) (w); ditto, Kauboga, 840m, 4.v.2005, cacao agrof., fog. (M.M. Bos #6, 46) (w); ditto, 15.iv.2005, cacao agrof., fog. (M.M. Bos) (♀); ditto, Watu Bohe, 860m, 25.iv.2005, cacao agrof., fogging (M.M. Bos) (♀).

The worker caste of the species was previously unknown and is described below.

**DESCRIPTION.** *Worker.* Dimensions: TL c. 6.45-7.66; HL 1.56-1.81; HW 1.22-1.43; CI 78-80; SL 1.96-2.18; SI 149-163; PW 0.84-0.90; MTL 2.15-2.59 (8 measured).

Anterior clypeal margin with wide, medially notched truncation, flanked by acute teeth. Clypeus with blunt median carina that is less distinct anteriorly; clypeus weakly convex in profile, narrowly rounding into moderately impressed basal margin. Frontal triangle poorly indicated. Frontal carinae sinuate with margins weakly and narrowly raised; central area relatively wide, weakly raised medially with shallowly impressed frontal furrow. Sides of head in front of eyes converging into mandibular bases in almost straight line; behind eyes sides broadly rounding into convex occipital margin. Eyes weakly convex, in full face view

exceeding lateral cephalic outline. Ocelli lacking, positions indicated by shallow pits in cephalic sculpture. Mesosomal dorsum laterally marginate, rather narrow and slender. Pronotal dorsum with shallow, longitudinal median depression; humeri subangular; promesonotal suture distinct. Mesonotal dorsum with posteriorly raised lateral margins; metanotal groove distinct. Propodeal dorsum longer than wide with lateral margins terminating posteriorly in upturned, acute teeth; propodeal dorsum descending into oblique declivity in medially uninterrupted line. Petiole relatively low, with anterior face widely rounding onto dorsum; posterior face almost straight; dorsum of petiole armed with three spines; lateral pair longer and acute, somewhat dorsolaterally and weakly posteriorly directed; middle spine very short, broad-based and tooth-like, rudimentary in some specimens; position of middle spine variable, situated well behind lateral spines and clearly visible in side view in most specimens but situated more anteriorly and virtually hidden by lateral spines in some specimens. Anterior face of first gastral segment flat, widely rounding onto dorsum.

Mandibles very shallowly, finely longitudinally reticulate. Head, mesosoma and petiole very closely, mostly irregularly reticulate-punctate with sculpturation slightly more coarse on sides of mesosoma. Gaster very finely shagreened, rather polished.

Mandibles with a few, rather short, mostly erect, yellowish-golden hairs at masticatory borders and extremely short, closely appressed hairs towards bases. Anterior clypeal margin with a fringe of short setae lining margin medially and laterally. Clypeus with numerous, relatively long, erect hairs and a few pairs of somewhat shorter erect hairs lining frontal carinae. Anterior and posterior faces of fore coxae with a few, relatively long hairs; mid and hind coxae with a few shorter erect hairs ventrally. Femora with a few, medium length, erect hairs on ventral surfaces. Gaster with a few short, erect hairs along apical segments dorsally; more abundant, longer hairs on gastral venter. Extremely short, closely appressed, silvery or pale golden pubescence very scarcely distributed over all body surfaces, a little more abundant on dorsum of first gastral segment.

**Colour.** Mostly black or very dark reddish-brown; mandibles dark reddish-brown with teeth black and narrow yellowish band at masticatory borders; clypeus and gastral segments blotched dark reddish-brown; basal funicular and tarsal



segments black with subsequent segments progressively lighter; five apical segments of funiculi and terminal segments of tarsi, including claws, very light yellow.

*Queen.* Dimensions (holotype queen cited first, compared queen second, 3 *microgynous* queens last): TL 9.88, 9.88, 7.56-7.81; HL 2.21, 2.15, 1.72-1.78; HW 1.72, 1.72, 1.34-1.40; CI 78, 80, 77-80; SL 2.62, 2.71, 2.12-2.18; SI 152, 157, 156-158; PW 1.81, 1.78, 1.50-1.62; MTL 3.18, 3.12; 2.37-2.43.

Queen very similar to worker with usual differences indicating caste; mesosoma rather slender as in worker; configuration of petiolar spines indetical to worker with lateral spines short and acute and median spine very short or rudimentary.

**REMARKS.** The holotype queen of *P. trispinosa* (OXUM) is undoubtedly conspecific with a queen collected by M.M. Bos at Lore Lindu National Park. Bos also collected a short series of distinctly smaller queens that also closely match the holotype but have proportionally wider pronotal dorsums and more widely rounded anterior margins of the mesoscutum. However, the smaller queens share the characteristic configuration of the petiolar spines found in the holotype, and I consider them *microgynous* queens of *P. trispinosa*.

The workers of *P. trispinosa* closely resemble those of *P. subtridens* Emery, 1900, from Mentawai I. and *P. solivaga* Menozzi, 1926, from the Philippines. I have compared the syntypes and other specimens of all three species and found them very similar. All feature a shallow, longitudinal, median depression on the pronotal dorsum and an almost identical configuration of the petiolar spines, featuring rather short lateral spines and a rudimentary middle spine. They differ in several characters, including the width of pronotal dorsum, the length of the mesosoma and the colour of the body. In *P. subtridens* and *P. solivaga* the pronotal dorsum is wider with its sides rounded and the median depression rather distinct. The propodeal declivity is steeply oblique and the lateral petiolar spines range from short to rudimentary within single populations. In contrast, the narrower pronotal dorsum in *P. trispinosa* specimens has sides ranging from weakly rounded to almost straight and has a less distinct median depression. In addition, the mesosoma of *P. trispinosa* is distinctly more slender and longer with the propodeal declivity less steeply oblique. The colour of the body

in *P. subtridens* and *P. solivaga* specimens is generally medium reddish-brown, while it is distinctly darker, virtually black, in most *P. trispinosa* specimens.

### **Polyrhachis thrinax** species-group

#### **KEY TO *THRINAX*-GROUP SPECIES**

(based on workers)

1. Frontal carinae distinctly elevated; propodeal spines upturned; lateral petiolar spines shorter than middle spine, but always present; body generally very dark reddish-brown (in copal) ..... *cincta* Viehmeyer
- Frontal carinae with margins only narrowly and weakly elevated; propodeal spines horizontal; lateral petiolar spines very short, often rudimentary; body generally very light to medium yellowish- or reddish-brown ..... *unicuspis* Emery

#### **82. *Polyrhachis cincta* Viehmeyer, 1913**

*Polyrhachis dahli* var. *cincta* Viehmeyer, 1913: 149. Syntype workers. Type locality: INDONESIA, SULAWESI (in copal), SNSD, MNHU (examined).

*Polyrhachis cincta* Viehmeyer. Kohout, 1998: 510.

**REMARKS.** The two syntype workers from copal are the only known specimens of *P. cincta*. The differences between this species and the very similar *P. dahli* Forel and *P. queenslandica* Emery were discussed by Kohout (1998).

#### **83. *Polyrhachis unicusps* Emery, 1898** (FIG. 12G-H)

*Polyrhachis unicusps* Emery, 1898: 240, fig. 13. Holotype worker. Type locality: INDONESIA, SULAWESI, Toli-Toli (H. Fruhstorfer), MCSN (examined).

**MATERIAL.** SULAWESI: Ayermaid (W.M. Mann) (w). SULAWESI TENGAH: Lore Lindu NP, Toro, Kauboga, 840m, 4.v.2005, cacao agrof., fog. (M.M. Bos #46) (w); ditto, Gn. Kalabui, 950m, 20.iv.2005, nat. for., fog. (M.M. Bos) (w); ditto, Toro, Foot of Gn. Kamanua, 845m, 28.iv.2005, cacao agrof., fog. (M.M. Bos) (♀); ditto, Toro, Baloli, 835m, 14.iv.2005, cacao agrof., fog. (M.M. Bos) (♀); ditto, Toro, Kaha, 920m, 15.iv.2005, cacao agrof., fog. (M.M. Bos) (♀); ditto, Toro, Kauboga, 840m, 4.v.2005, cacao agrof., fog. (M.M. Bos) (♀).

**REMARKS.** *Polyrhachis unicusps* is characterised by a relatively long middle petiolar spine and rudimentary lateral spines. However, in the available queens, the lateral spines are developed as short, but distinct and acute spines. This is apparently a rare species and until very recently I had seen only the holotype and a single

specimen collected in 1937 by W.M. Mann at Ayermaidi (= Air Madidi).

#### Subgenus **Polyrhachis** Fr. Smith, 1857

#### **84. Polyrhachis erosispina** Emery, 1900

*Polyrhachis bellicosa* var. *erosispina* Emery, 1900: 713 (footnote). Syntype workers. Original localities: NEW GUINEA, Ramoi (O. Beccari); INDONESIA, SULAWESI, Kانداري (O. Beccari), MCSN (examined).

*Polyrhachis erosispina* Emery. Kohout, 1988: 419. Lectotype and paralectotypes designated.

**MATERIAL.** SULAWESI UTARA: Mt Klabat, Air Madidi slope, 400-600m, wet for., 13-19.vi.1972 (W.L. Brown) (w). SULAWESI TENGGARA: nr Sagona, Base Camp, I Watuwila, c. 200m, 15.x.-5.xi.1989 (Malaise trap) (C.van Achterberg) (w); 1-2km E of Wolasi, 42km S of Kendari, c. 350m, rf, 13-14.vii.1972 (W.L. Brown) (w). SULAWESI SELATAN, Cagar Alam Karaenta, Kabupaten Maros, c. 265-315m, iii.1996 (B. Gobin) (w).

**REMARKS.** *Polyrhachis erosispina* is very similar to *P. bellicosa* Fr. Smith, 1859, from Indonesia and New Guinea and the main differences between them were discussed in detail by Kohout (1988a: 418-422). Comparison of the above listed workers with the paralectotype of *P. erosispina* collected by O. Beccari proves them undoubtedly conspecific.

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