A review of the Australian *Polyrhachis* ants of the subgenera *Myrma* Billberg, *Myrmatopa* Forel, *Myrmothrinax* Forel and *Polyrhachis* Fr. Smith (Hymenoptera: Formicidae: Formicinae)

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ABSTRACT

Australian *Polyrhachis* species of the subgenera *Myrma, Myrmatopa, Myrmothrinax* and *Polyrhachis* are reviewed. A total of ten Australian species are recognised; four in the subgenus *Myrma*, three in *Myrmatopa*, two in *Myrmothrinax* and a single species in *Polyrhachis*. *Polyrhachis inusitata* Kohout and *P. yarrabahensis* are reinstated as valid species. *Polyrhachis sericeopubescens* Donisthorpe and *P. lombokensis* are considered extralimital and removed from the list of Australian species. *Polyrhachis alphea* Fr. Smith and *Polyrhachis menozzii* Karavaiev are reported from Australia for the first time. The extralimital species *Polyrhachis dolomedes* Fr. Smith is considered a senior synonym of *Polyrhachis schang* var. *amboinae* Santschi. The former subspecies, *P. relucens* var. *breviorspinosa* Donisthorpe is raised to specific status. A replacement name, *Polyrhachis luteogaster*, is proposed for the former subspecies and junior primary homonym *P. alpheus* var. *rufiventris* Emery. A lectotype of *P. semitestacea* Emery is designated. All species are illustrated and their known distributions and nesting habits summarised. Keys to the Australian species of the subgenera *Myrma*, *Myrmatopa*, *Myrmothrinax* are included. ❐ *Polyrhachis, Myrma, Myrmatopa, Myrmothrinax, Australia, distribution.*

This is the third in a series of papers reviewing the Australian ants of the genus *Polyrhachis* (Kohout 2007, 2010). It includes four subgenera that are essentially exotic, having a very limited distribution within the Australian mainland. Species included in these subgenera are confined mostly to the lowland tropical rainforests of north Queensland, including a few, more-or-less isolated patches of monsoonal rainforest on Cape York Peninsula and in the Northern Territory. Most of the species are arboreal nesters, except for the mostly lignicolous species of the subgenus *Myrma*.

METHODS

Publication dates and the spelling of species epithets and authors' names follow Bolton *et al.* (2007). This study is principally based on the worker caste but notes are provided on associated queens. Males of some species are known and their presence in the ANIC and/or QM spirit collections is noted under the particular species headings. However, the diagnosis of males is beyond the intended scope of this paper and has not been attempted.

Localities at which ants were collected by the Bishop Museum's collectors, were checked against that institution's list of New Guinean localities (BPBM, 1966, *unpublished*). In some cases the latitude and longitude co-ordinates, or altitude, are only roughly approximate. The use of the terms 'Moluccas', 'Bismarck Archipelago' and 'New Guinea' alone indicates the delimitation of these islands in a biogeographic sense regardless of current political boundaries.

Illustrations. Photographs of specimens were taken with a digital camera attached to a stereomicroscope. The images were then processed using Helicon Focus (Mac OSX version) or Auto-Montage (Syncroscopy, Division of Synoptics Ltd, USA) and Adobe Photoshop CS2 (Adobe Systems Inc., USA) software. The holotype of *P. inusitata* Kohout; paratype of *P. foreli* Kohout; syntypes of *P. alpheus rufiventris* Emery, *P. antoniae* Stitz, *P. dahlii* Forel, *P. dahli unisculpta* Viehmeyer, *P. delicata* Crawley, *P. litigiosa* Emery, *P. lombokensis* Emery, *P. menozzii* Karavaiev, *P. omyrmex* (Donisthorpe), *P. queenslandica* Emery, *P. relucens sericeopubescens* Donisthorpe and *P. schang amboinae* Santschi; paralectotype of *P. semitestacea* Emery; and type-compared voucher specimens from Australian localities of *P. alphea* Fr. Smith, *P. andromache* Roger, *P. bellicosa* Fr. Smith and *P. rufofemorata* Fr. Smith are illustrated.

Standard measurements and indices. Measurements and indices follow those of Kohout (2008a): TL = Total length (the necessarily composite measurement of the outstretched length of the entire ant measured in profile); 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 x 100/HL); SL = Scape length (excluding the condyle); SI = Scape index (SL x 100/HW); PW = Pronotal width (greatest 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 SR stereomicroscope with an eyepiece graticule calibrated against a stage micrometer. All measurements are expressed in millimetres (mm).

Abbreviations. Names of the most frequently listed collectors are abbreviated as follows: ANA - Alan N. Andersen; CJB - C.J. Burwell; DJC - D.J. Cook; EOW – E.O. Wilson; GBM - G.B. Monteith; JEF - J.E. Feehan; RJK - R.J. Kohout; RWT - R.W. Taylor; SKR - S.K. Robson. Other abbreviations used in specimen data are: Ck – Creek; I. – Island; Is – Islands; NP - National Park; nr – near; Pen. - Peninsula; PNG - Papua New Guinea; Plant. – Plantation; Prov. – Province; Pt – Point; R. - River; Ra. - Range; Rd - Road; rf. - rainforest; Stn - Station; V. – Valley; w - worker/s.

Institutions and depositories. (Including the names of cooperating curators): AMNH – American Museum of Natural History, New York, NY, USA (Dr J.M. Carpenter); AMSA – Australian Museum, Sydney, NSW, Australia (Drs D. Britton, D. Smith); ANIC - Australian National Insect Collection, CSIRO, Canberra, Australia (Dr S.O. Shattuck); BMNH - The Natural History Museum, London, UK (B. Bolton); BPBM – Bernice P. Bishop Museum, Honolulu, HI, USA (K.T. Arakaki); FISF – Forschungsinstitute Senckenberg, Frankfurt am Main, Germany (Drs J.-P. Kopelke, W.H.O. Dorow); HNHM – Hungarian Museum of Natural History, Budapest, Hungary (Dr J. Papp); JCUT - James Cook University, Townsville, Queensland, Australia (Dr S.K.A. Robson); JWGU - Johan Wolfgang Goethe-Universität, Frankfurt am Main, Germany (Prof. Dr U. Maschwitz); MCZC - Museum of Comparative Zoology, Harvard University, Cambridge, MA, USA (Dr S. Cover); MHNG – Muséum d'Histoire Naturelle, Geneva, Switzerland (Drs C. Besuchet, I. Löbl, B. Mertz); MNHA – Museum of Nature and Human

Activities, Hyogo Pref. University, Hyogo, Japan (Dr Y. Hashimoto); MNHN – Muséum National d'Histoire Naturelle, Paris, France (Dr J. Casevitz Weulersse); MNHU – Museum für Naturkunde, Humboldt-Universität, Berlin, Germany (Dr F. Koch); MSNG – Civic Museum of Natural History 'G. Doria', Genova, Italy (Drs R. Poggi, F. Penati); MVMA – Museum of Victoria, Melbourne, Vic., Australia (Dr K. Walker); NHMB – Naturhistorisches Museum, Basel, Switzerland (Drs M. Brancucci, D.H. Burckhardt); NMNH – National Museum of Natural History, Washington, DC, USA (Dr T.R. Schultz); 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); QM – Queensland Museum, Brisbane, Australia (Dr C.J. Burwell); TERC – Tropical Ecosystems Research Centre, CSIRO Sustainable Ecosystems, Darwin, NT, Australia (Dr A.N. Andersen).

SYSTEMATICS

NOMENCLATURAL CHANGES AND NOTES ON EXTRALIMITAL TAXA

During the course of this study it was necessary to examine numerous extralimital taxa, notably from New Guinea, Bismarck Archipelago, Solomon Islands and eastern Indonesia, which directly or indirectly relate to the Australian fauna. As a result, I propose a number of nomenclatural changes and include additional notes on earlier proposed synonymies of the following species.

Polyrhachis (Myrma) breviorspinosa Donisthorpe, 1947 stat. nov. (Fig. 5B, F-G)

Polyrhachis (Myrma) relucens v. *breviorspinosa* Donisthorpe, 1947: 194. Syntype workers. Type locality: NEW GUINEA, Liki I., Maffin Bay, viii.1944 (E.S. Ross), CASC (examined).

Donisthorpe (1947) described *P. relucens breviorspinosa* in one short sentence by stating that it 'Differs from the typical form in having shorter spines to the pronotum and the petiole'. During a visit to the CASC, I examined the syntypes and additional specimens from the original series (E.S. Ross coll.) and compared them with a type compared voucher specimen of *Polyrhachis relucens* (Latreille). The two taxa are rather dissimilar and I am confident they represent separate species. *Polyrhachis breviorspinosa* is clearly distinguished by its more gracile stature, markedly slender pronotal spines and propodeum, which lacks a distinct border between the dorsum and declivity. In contrast, *P. relucens* has a distinctly broader body, notably across the mesosoma, broadly based pronotal spines and a propodeal dorsum that is clearly separated from the declivity *breviorspinosa* is armed with distinctly short and slender spines and the dorsum between them is relatively narrow, weakly concave and without an intercalary spine or tooth. In contrast, the petiolar spines in *P. relucens* are relatively thick and the petiolar dorsum furnished with a distinct intercalary tooth. *Polyrhachis breviorspinosa* is more similar to *P. litigiosa* Emery (Fig. 5C, H-I) from New Guinea; both are slender in stature and have a uniformly black body and appendages. However, *P. breviorspinosa* has a distinctly less transverse mesonotal dorsum, shorter petiolar spines and markedly less abundant erect pilosity that is much diluted on the mesosomal dorsum and the gaster, and is completely missing from the antennal scapes and petiole. In contrast, the mesonotal dorsum in *P. litigiosa* is distinctly wider, the petiolar spines longer, the dorsum of the petiole has a minute intercalary tooth or distinct tubercula and erect to semierect, medium length hairs are abundant over most of the body surfaces, with a fringe of short hairs lining the leading edges of the antennal scapes.

Polyrhachis breviorspinosa appears to be a rather uncommon species, endemic to the islands along the north-western coast of New Guinea. Besides the specimens of the original series from Liki Island, the only other comparable specimens seen were collected on Biak Island (Biak I., beach area, 17.vii.1957, D. Elmo Hardy; Biak I., 22-30.vi.1962, J.L. Gressitt – all BPBM).

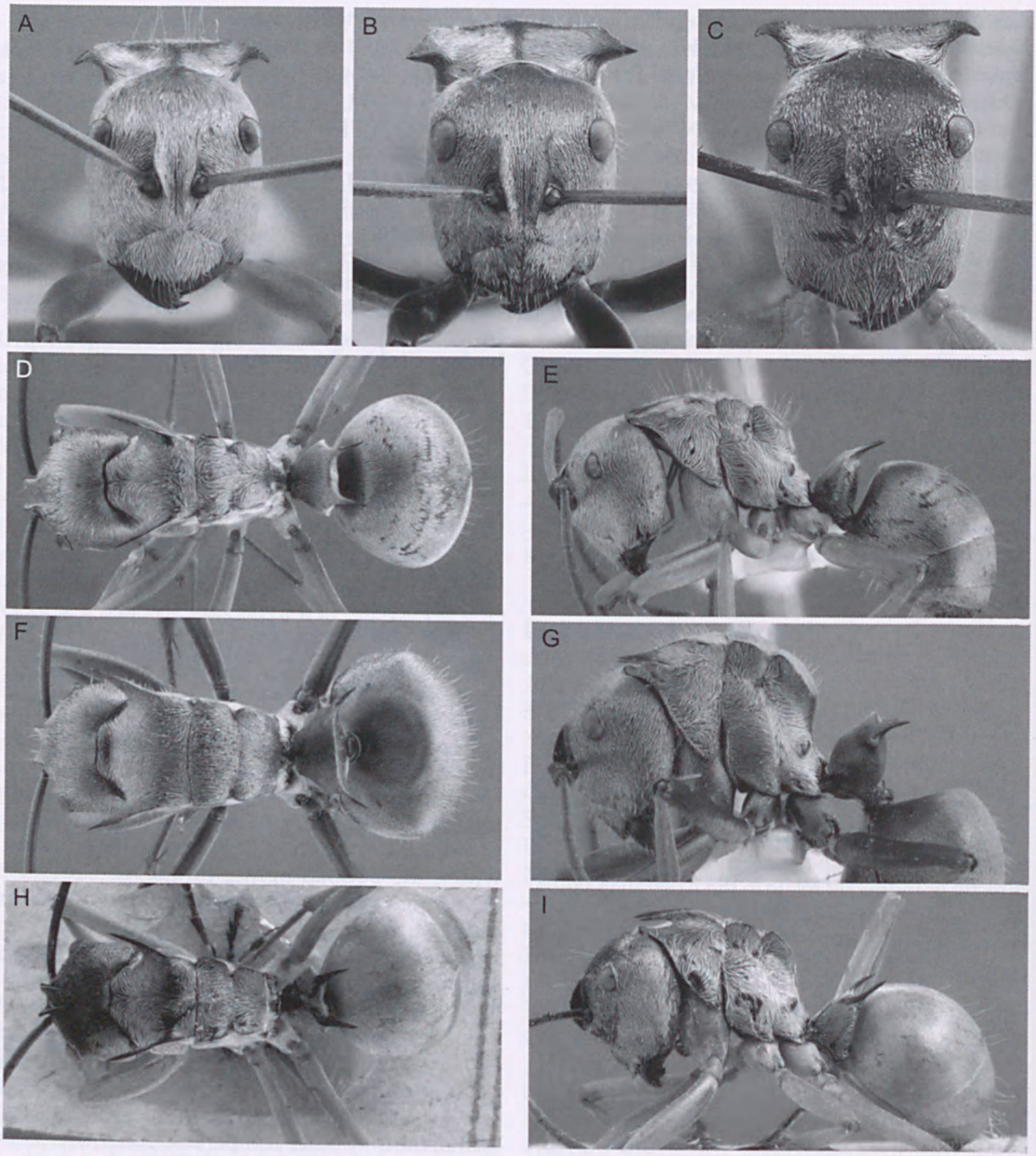

FIG. 1. *Polyrhachis* (*Myrma*) species from Australia and New Guinea. Head in full face view (top), dorsal habitus (left), lateral habitus (right). A, D-E, *P. andromache* Roger; B, F-G, *P. foreli* Kohout (paratype); C, H-I, *P. semitestacea* Emery (paralectotype) (not to scale).

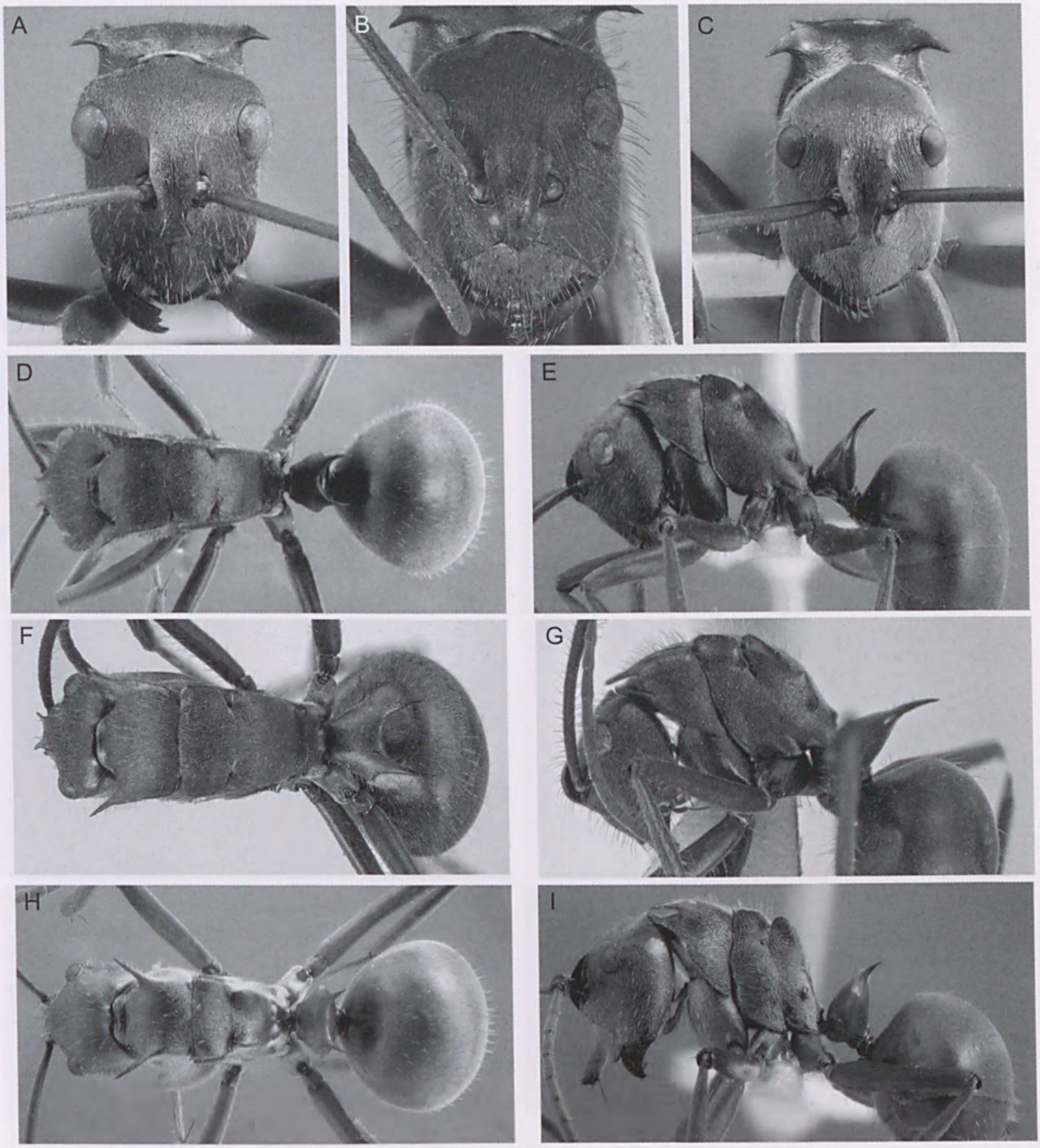

FIG. 2. *Polyrhachis (Myrma)* species from Australia and New Guinea. Head in full face view (top), dorsal habitus (left), lateral habitus (right). A, D-E, *P. inusitata* Kohout (holotype); B, F-G, *P. sericeopubescens* Donisthorpe (syntype); C, H-I, *P. rufofemorata* Fr. Smith (not to scale).

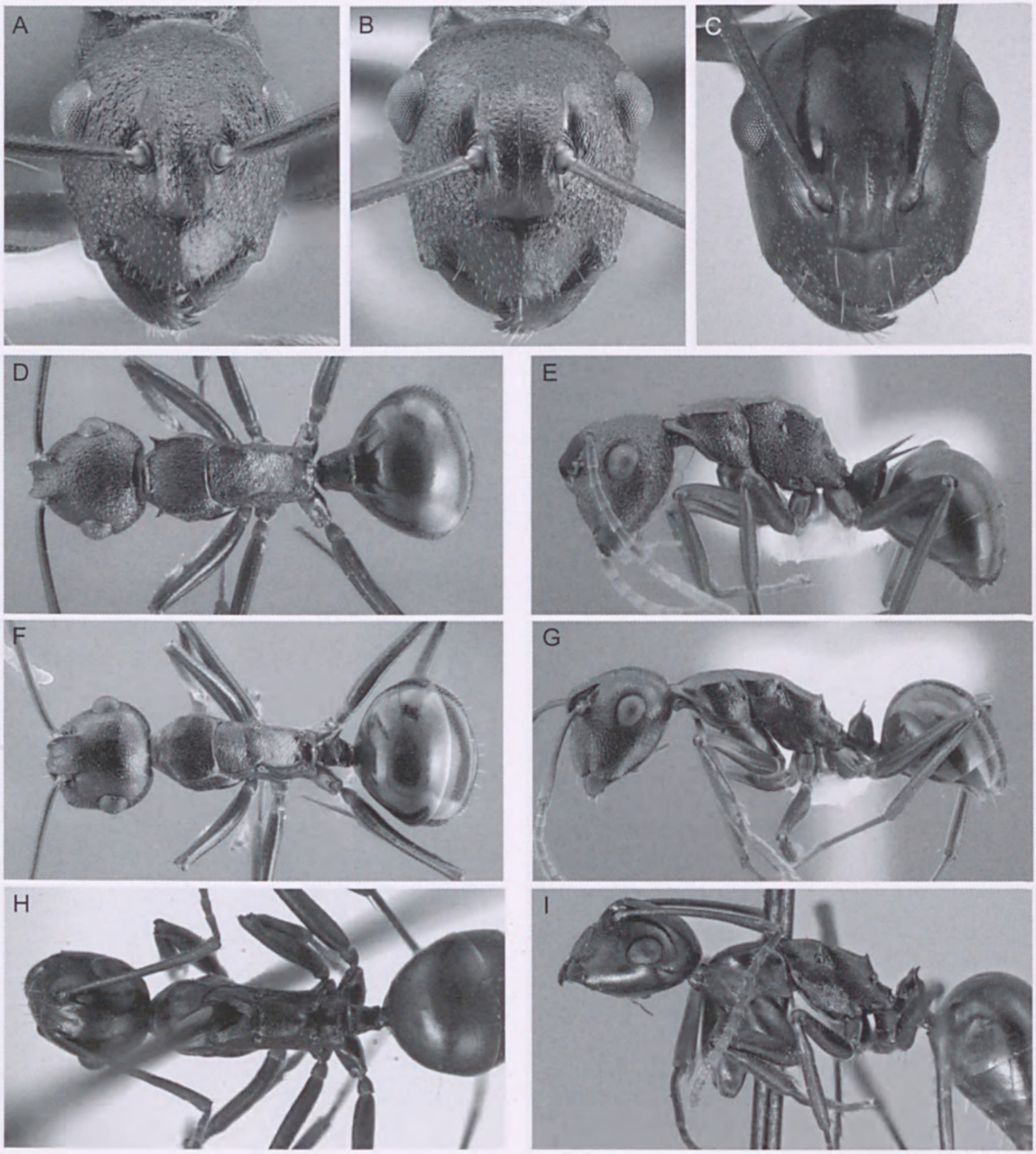

FIG. 3. *Polyrhachis (Myrmatopa)* species from Australia and Indonesia. Head in full face view (top), dorsal habitus (left), lateral habitus (right). A, D-E, *P. alphea* Fr. Smith; B, F-G, *P. yarrabahensis* Forel (topotype); C, H-I, *P. lombokensis* Emery (syntype) (not to scale).

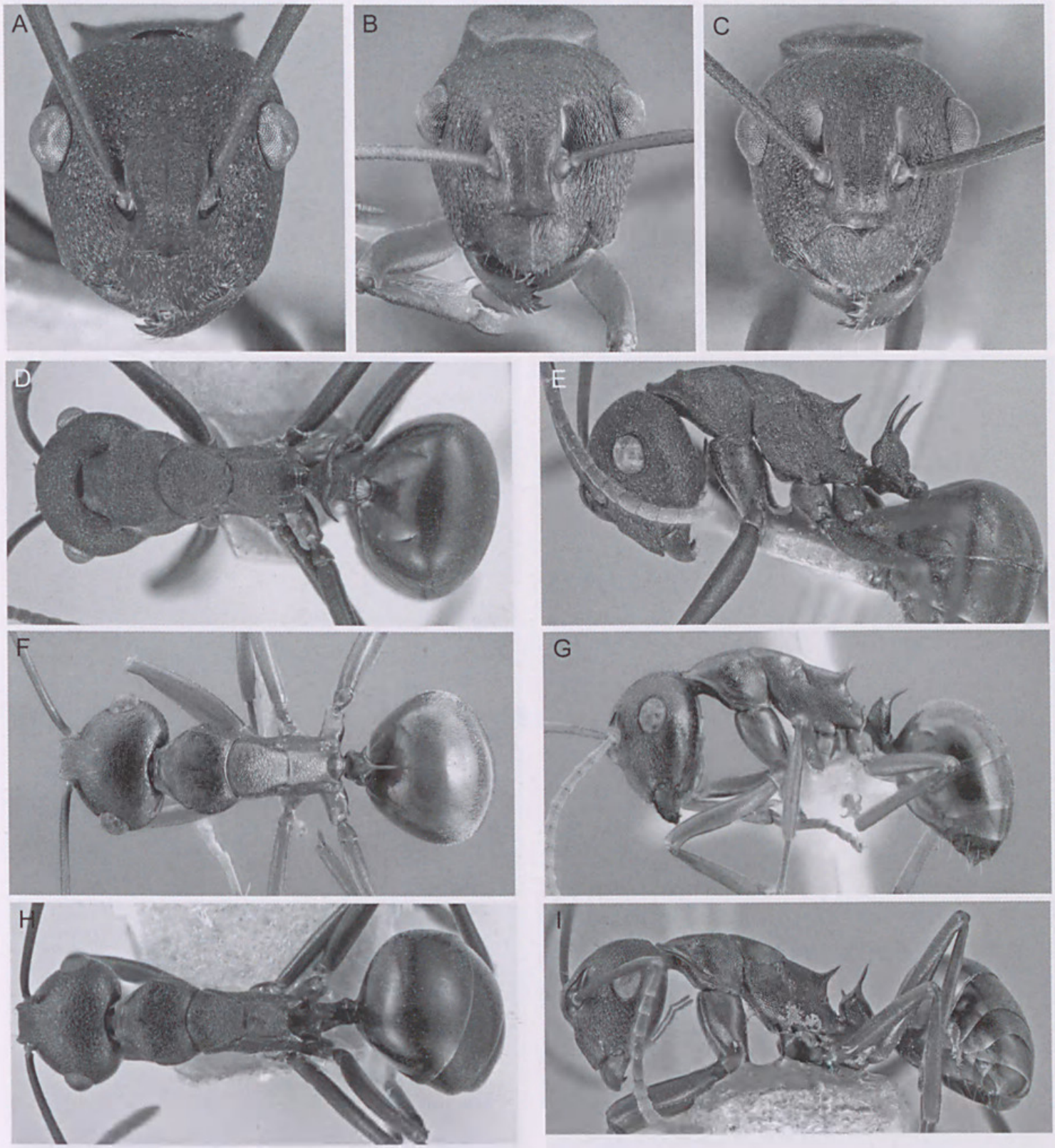

FIG. 4. *Polyrhachis* species from Australia. Head in full face view (top); Dorsal habitus (left), lateral habitus (right). A, D-E, *P. (Myrmatopa) menozzii* Karavaiev (syntype); B, F-G, *P. (Myrmothrinax) delicata* Crawley (syntype); C, H-I, *P. (Myrmothrinax) queenslandica* Emery (syntype) (not to scale).

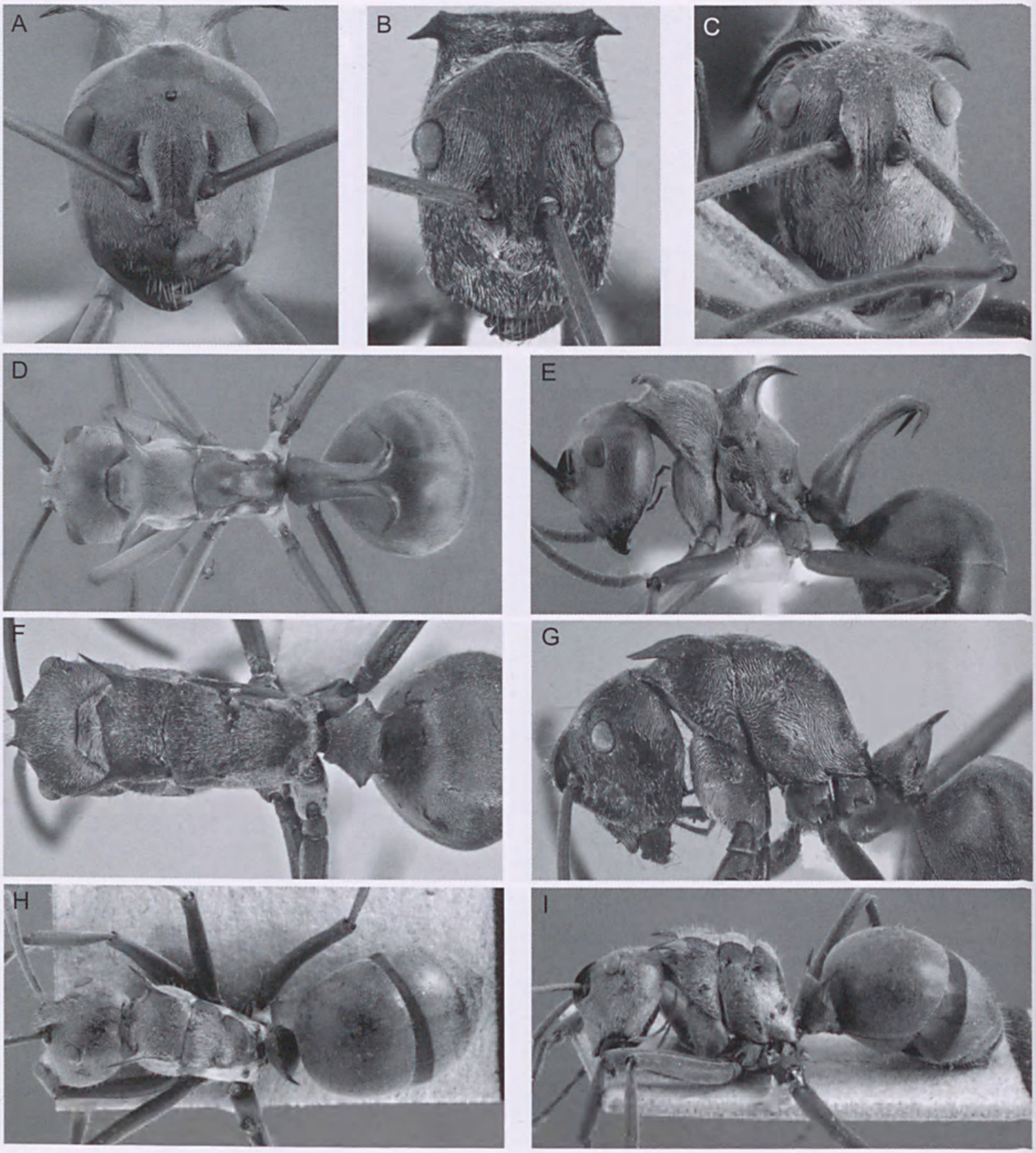

FIG. 5. *Polyrhachis* species from Australia and New Guinea. Head in full face view (top), dorsal habitus (left), lateral habitus (right). A, D-E, *P. (Polyrhachis) bellicosa* Fr. Smith; B, F-G, *P. (Myrma) breviorspinosa* Donisthorpe (original series); C, H-I, *P. (Myrma) litigiosa* Emery (syntype) (not to scale).

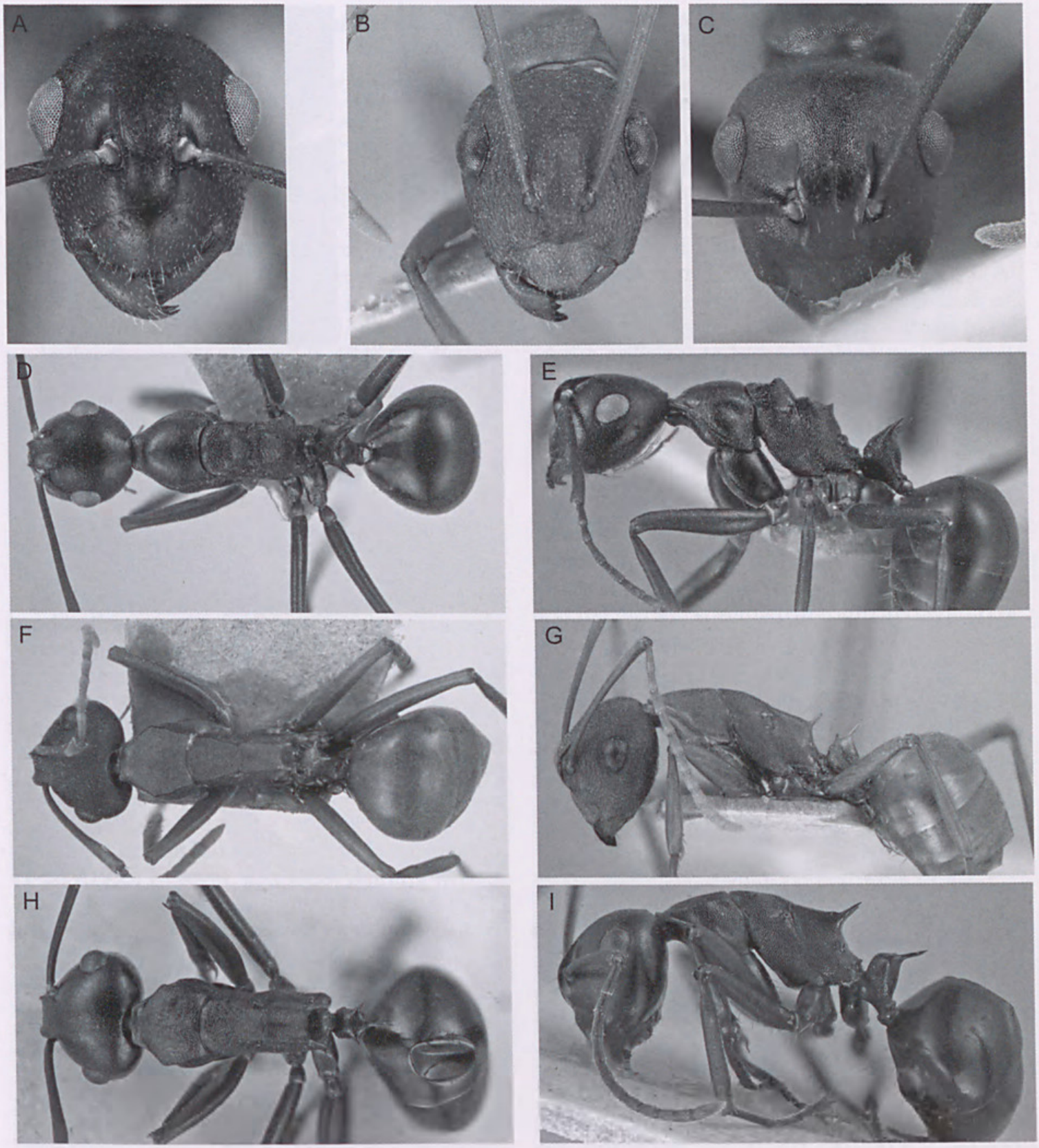

FIG. 6. *Polyrhachis* species from Indonesia and New Guinea. Head in full face view (top), dorsal habitus (left), lateral habitus (right). A, D-E, *P. (Myrmatopa) schang amboinae* Santschi (= *P. dolomedes* Fr. Smith); B, F-G, *P. (Myrmothrinax) dahlii* Forel; C, H-I, *P. (Myrmothrinax) dahli unisculpta* Viehmeyer (= *P. queenslandica)* (all syntypes) (not to scale).

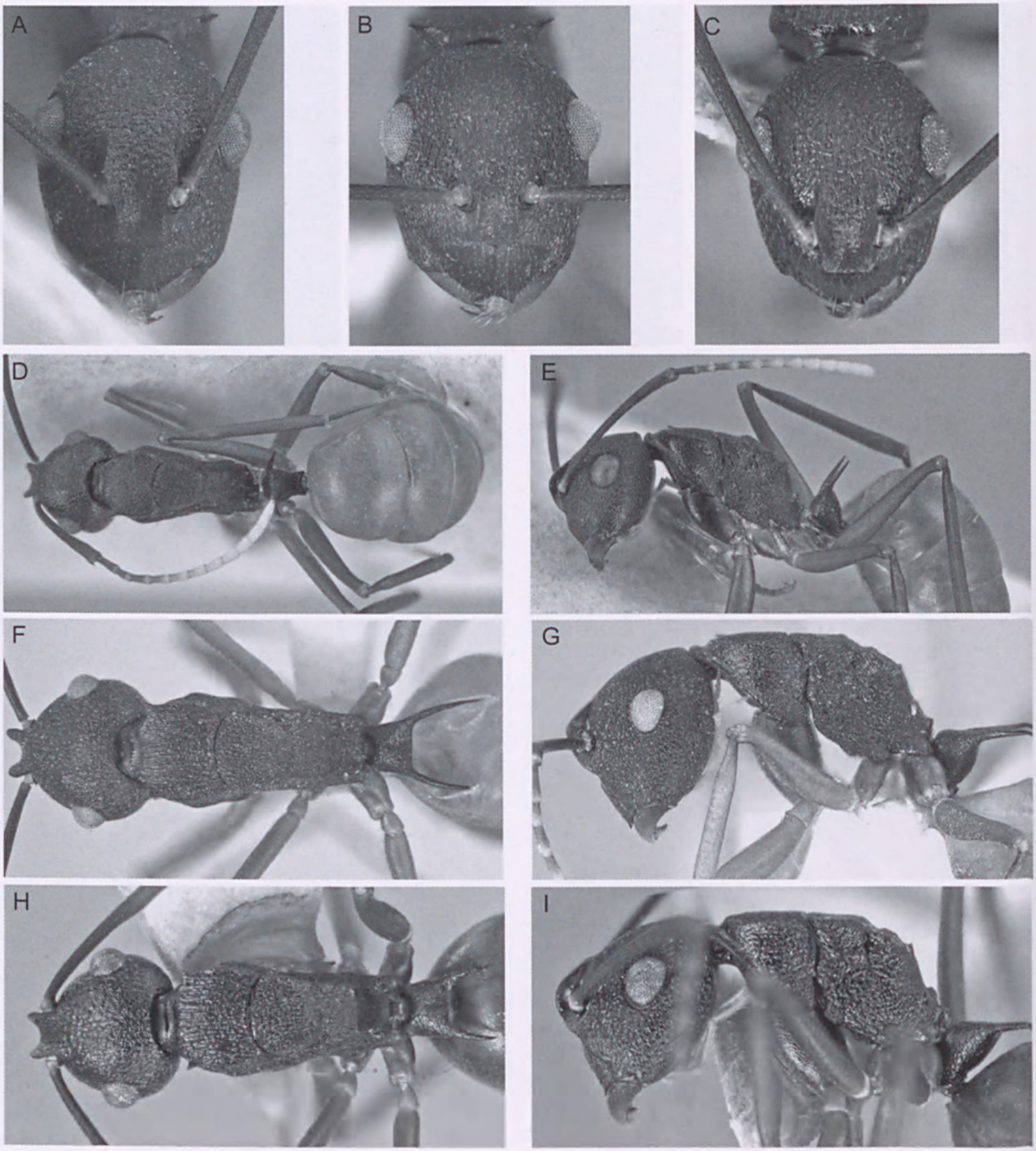

FIG. 7. *Polyrhachis (Myrmatopa)* species from New Guinea. Head in full face view (top), dorsal habitus (left), lateral habitus (right). A, D-E, *P. luteogaster* Kohout (= *P. alpheus rufiventris* Emery); B, F-G, *P. antoniae* Stitz; C, H-I, *P. omyrmex* (Donisthorpe) (all syntypes) (not to scale).

Polyrhachis (Myrmothrinax) dahlii Forel, 1901 (Fig. 6B, F-G)

Polyrhachis dahlii Forel, 1901: 30. Syntype workers. Type locality: BISMARCK ARCHIPELAGO, Ralum, 17.iii.97 (F. Dahl), MNHU, MHNG, QM (examined).

Polyrhachis (Myrmothrinax) dahli (sic.) Forel; Mann, 1919: 378. Combination in *P. (Myrmothrinax)*.

Kohout (1998) suggested *P. dahli unisculpta* (Fig. 6C, H-I) to be a junior synonym of *P. queenslandica* and, consequently, a separate taxon from *P. dahlii*. To verify the identity of the three names, I directly compared the syntypes of all taxa and can confirm that *P. queenslandica* and *P. dahli unisculpta* are undoubtedly conspecific and *P. dahlii* is a distinct species. The most obvious character separating *P. dahlii* from *P. queenslandica* is colour which, in the former, is yellow or very light yellowish-brown with only the mandibular teeth, anterior clypeal margin, frontal carina and the lateral margins of pronotum and mesonotum narrowly bordered with brown. In contrast, *P. queenslandica* is virtually black or dark reddish-brown with the head a shade darker. The sculpturation of the head and mesosoma in *P. dahlii* is rather coarsely reticulate-punctate, while it is distinctly finer in *P. queenslandica*. The gaster in both species is very finely shagreened and highly polished.

As already noted by Mann (1919), *P. dahlii* appears to be a relatively rare species, with its distribution centred on the Bismarck Archipelago. However, there are a few records of the species from New Britain (Gazelle Peninsula, Vunakanau, 11-20.v.1955; Kerevat, 2.ix.1955; Baining Mts, St Pauls, 4.ix.1955 – all J.L. Gressitt), and from the Solomons (San Christoval, Wainoni Bay; Three Sisters, Malapaina; Malaita, Auki; Florida, Tulagi – all W.M. Mann; Guadalcanal, Honiara, 13-16. xi.1953, J.D. Bradley).

Polyrhachis (Myrmatopa) dolomedes Fr. Smith, 1863 (Fig. 6A, D-E)

Polyrhachis dolomedes Fr. Smith, 1863: 14. Syntype workers, queen. Type locality: INDONESIA, Seram I. (A.R. Wallace), OXUM, BMNH (see note below) (examined).

Polyrhachis (Myrmatopa) schang var. *gracilior* Karavaiev, 1927: 11. Syntype workers, queens, males, ergatogynes. Type locality: INDONESIA, Ambon I. (Leitimor, Hito) (V. Karavaiev # 2501, 2503), IZAS, QM (examined). Junior homonym of *P. gracilior* Forel, 1893: 25.

Polyrhachis (Myrmatopa) schang var. *amboinae* Santschi, 1928: 139. Replacement name. Syn. nov.

I have examined two workers and a queen of *P. schang amboinae* and compared them with earlier type-compared voucher and additional specimens of *P. dolomedes* (Seram I., Manusela NP, Wae Mual Plain, 25.vii.-9.ix.1987, M.J.D. Brendel; Seram I., 8.viii.1989, M.C. Day). All specimens are virtually identical and I am confident that there is no justification for *P. schang amboinae* to be recognised as a separate taxon from *P. dolomedes*.

Barry Bolton supplied me with a copy of his unpublished 'Catalogue of F. Smith type-material from UM, Oxford' which contains the following notes on the syntype material of *P. dolomedes*: 'Syntypes 1 worker and 1 ♀ in UM, Oxford. One further syntype (worker) in BMNH. The UM Oxford specimens bear a Donisthorpe type-label and the BMNH specimen a 'compared with type' label of Donisthorpe. However, if the writing on the underside of the stage cards is consulted it becomes obvious that all three specimens were originally mounted together and that the card has been divided at a later date. The underside of the stage card of the BMNH specimen has '*P. /*' (part of the 'D') and 'Ceram'. The Oxford specimens have '*Dolomedes*' (with part of the 'D' missing). The two cards fit together perfectly to read '*P. Dolomedes*. Ceram'' (Bolton unpublished data).

Polyrhachis (Myrmatopa) luteogaster nom. nov. (Fig. 7A, D-E)

Polyrhachis alpheus var. *rufiventris* Emery, 1911: 256. Syntype workers, queen. Type locality: NEW GUINEA, Merauke, MSNG (examined). Junior primary homonym of *P. gestroi* var. *rufiventris* Forel, 1911: 391.

According to Article 60.1 of 'The Code', and in the absence of any potentially valid synonyms, I am replacing the junior primary homonym *Polyrhachis alpheus rufiventris* Emery, 1911 with *Polyrhachis luteogaster* nom. nov. Also, according to Recommendation 60A of 'The Code', I have

used the original syntype specimens to establish the new name as an objective replacement.

The two syntype specimens in the Emery collection (MSNG) are card-mounted on a single pin. Both are in relatively good condition, although one has the head detached from the body. The specimens are furnished with the following hand written original labels: 'N. Guinea, Merauke' and '*Polyrhachis alpheus* F. Sm. var. *rufiventris* Emery'. Also attached are the following printed labels of later origin: 'SYNTYPI, *Polyrhachis alpheus* var. *rufiventris* C. Emery, 1911' (red tag) and 'MUSEO GENOVA coll. C. Emery (dono 1925)'.

Other material. INDONESIA, IRIAN JAYA, Vogelkop, Kebar, W of Manokwari, 00°52'S, 134°05'E, 550 m, 4-31.i.1962 (S. Quate) (w). PAPUA NEW GUINEA, North Distr., Managalese Area, 2500-3000ft, viii.1965 (R. Pullen) (w); Bulolo, 07°12'S, 146°39'E, 3000', 18.xii.1967 (B.B. Lowery) (w, ♀); Central Prov., Karema, Brown R., 09°12'S, 147°14'E, 8/11.iii.1955 (E.O. Wilson) (w, ♀) (compared with type by EOW).

Direct comparison of syntypes of *P. luteogaster*, *P. antoniae* Stitz (Fig. 7B, F-G) and a type-compared specimen of *P. omyrmex* (Donisthorpe) (Dutch New Guinea, Japen Is., Mt. Baduri, 1,000ft, viii.1938, L.E. Cheesman, B.M.1938-593, identified by H. Donisthorpe, 14.ix.1939) (Fig. 7C, H-I), showed all specimens to be remarkably similar but not conspecific. Their small size and striking colour scheme, with black body and yellow gaster, immediately separate them from the closely allied *P. alphea* Fr. Smith (Fig. 3A, D-E) and all other described species of the *P. flavicornis*-group. *Polyrhachis luteogaster* is most similar to *P. antoniae* but differs in several characters, including the shape of the anterior clypeal margin. The median portion of the anterior clypeal margin in *P. luteogaster* is only shallowly emarginate and laterally flanked by rather obtuse angles, while in *P. antoniae* the margin is deeply 'V' shaped and flanked by rather prominent acute teeth (see Fig. 7B). The clypeus in *P. luteogaster* is convex in profile, widely rounding into a moderately impressed basal margin (Fig. 7E), while in *P. antoniae* the clypeus is straight, only narrowly rounding into a rather shallow basal margin (Fig 7G). The head and body in both species are distinctly reticulate-punctate. However the sculpturation in *P. antoniae* forms more-or-less regular, longitudinal striae, notably on mesosomal dorsum, while it is mostly irregular in *P. luteogaster*. *Polyrhachis omyrmex* is similar to both the previous species but is smaller (HL 1.43-1.59 in *P. antoniae* and *P. luteogaster* versus 1.28 in *P. omyrmex*) and has distinctly shorter pronotal and petiolar spines with the later virtually parallel. The gaster and appendages in *P. omyrmex* are medium yellowish-brown, while they are light yellow in *P. antoniae* and *P. luteogaster*.

A short series of specimens in MCZC that are very similar to *P. luteogaster* (Papua, Karema, Brown R., Mar. 8/11-1955, lowl. rainfor., E.O. Wilson #586, 588, w, ♀), are furnished with the label '*P. rufiventris* Emery, comp. w. type, Wilson, 1955'. However, in spite of the obvious similarity in their colour scheme, they are much larger (HL 1.72) and probably represent an undescribed species.

Polyrhachis (Myrma) semitestacea Emery, 1900 (Fig. 1C, H-I)

Polyrhachis andromache var. *semitestacea* Emery, 1900: 334. Lectotype and paralectotype workers. Type locality: NEW GUINEA, Friedrich-Wilhelmshafen (= Madang) (L. Biró), HNHM, MSNG, QM (examined).

Polyrhachis semitestacea Emery; Kohout, 1998: 524. Raised to species.

Other material. PAPUA NEW GUINEA, West Sepik Prov., Pes Mission, c. 12 km WSW of Aitape, 03°11'S, 142°15'E, <50 m, 31.vii-3.viii.1984 (RJK accs 84.200, 206) (w, ♀); Torricelli Mts, Lumi, 03°28'S, 142°02'E, 400-550 m, 4-13.viii.1984 (RJK accs 84.249, 272, 283) (w, ♀); Morobe Prov., nr Wampit, c. 35 km W of Lae, 06°45'S, 146°40'E, c. 50 m, 24-27.viii.1984 (RJK acc. 84.353) (w); Kar Kar I., Kurum, Bagiai Crater Trail, viii.1968 (N.L.H. Krauss) (w); Bulolo-Lae Rd., 200 m, 1.v.1965 (J. Sedláček) (w).

Kohout (1998) raised *P. semitestacea* to specific rank but did not designate a lectotype. In order to ensure the stability of the species and as a result of a request by the curator of the Hungarian Natural History Museum, Budapest, I have

decided to designate a lectotype from a syntype series lodged in that institution, that houses the bulk of the material collected by Lajos Biró (as per Recommendation 74D of 'The Code').

Lectotype designation. The lectotype was selected from 25 available syntypes lodged in the Biró collection (HNHM). The specimen is card mounted and in good condition. It bears the following printed labels: 'N. Guinea, Biró 96' and 'Friedrich-Wilh.-hafen'. In addition it also bears an original name-tag in Emery's handwriting, reading '*Polyrhachis andromache* Rog. var. *semitestacea* Emery'. It has been furnished with an additional tag indicating its new status, with the remaining 24 specimens deemed paralectotypes and labelled appropriately. Two of the paralectotypes were generously donated to the QM collection.

As mentioned earlier (Kohout, 1998), *P. semitestacea* is rather similar to *P. andromache* Roger (Fig. 1A, D-E), with relatively subtle differences separating them. However, these differences appear constant and serve to clearly separate the species. The most obvious difference is the colour of the gaster which is honey-yellow in *P. semitestacea* and contrasts with the dark mesosoma (Fig. 1H-I), while in *P. andromache* the gaster is black and concolorous with the rest of the body. When directly compared, *P. semitestacea* is distinctly more slender and has a petiole armed with more closely spaced spines and lacking a dorsal intercalary tooth. In contrast, *P. andromache* appears more robust, has more widely spaced petiolar spines and the dorsal edge of petiole is armed with a minute intercalary tooth.

Queen. (not yet described) Dimensions: TL c. 10.53-10.89; HL 2.62-2.72; HW 2.07-2.17; CI 79-80; SL 3.02-3.12; SI 144-146; PW 2.02-2.17; MTL 3.28-3.33 (2 measured).

Apart from sexual characters, very closely resembling worker. Pronotal humeri armed with moderately long, acute and weakly downturned spines; their dorsolateral margins continued posteriorly only for a short distance. Mesoscutum wider than long with lateral margins converging anteriorly into moderately rounded anterior margin; median line well indicated, relatively short; parapsides rather flat; mesoscutum in profile relatively low with anterior margin rounding onto weakly convex dorsum; mesoscutellum weakly convex, only marginally elevated above dorsal plane of mesosoma. Propodeal dorsum with lateral margins rounded posteriorly and continued inwards for a short distance, but not meeting; dorsum descending rather abruptly into vertical declivity. Petiole armed with two short, somewhat flattened, blunt spines and distinct intercalary tooth. Sculpturation, pilosity and colour virtually as in worker.

AUSTRALIAN SPECIES

Genus ***Polyrhachis*** Fr. Smith, 1857

Polyrhachis Fr. Smith, 1857: 58. Type species: *Formica bihamata* Drury, 1773: 73, pl. 38, figs 7, 8, worker; by original designation.

Subgenus ***Myrma*** Billberg, 1820

Myrma Billberg, 1820: 104. Type species: *Formica militaris* Fabricius, 1781: 493; by subsequent designation of Wheeler, 1911: 859.

Myrma Billberg; Wheeler, 1911: 859 (as genus and senior synonym of *Polyrhachis* Fr. Smith, 1857).

Myrma Billberg; Wheeler, 1922: 993 (as subgenus of *Polyrhachis* Fr. Smith, 1857).

(For full list of citations with synonymy see Dorow, Kohout & Taylor, 1997).

The Australian species of the subgenus *Myrma* were reviewed by Kohout (1989) who listed four species. He described *Polyrhachis inusitata* as a new species, but later (Kohout, 1998) synomised it with *P. sericeopubescens* Donisthorpe, 1941 from Japen Island, New Guinea (= Pulau Yapen, Irian Jaya). However, a subsequent direct comparison of the types of both species, and the examination of several additional specimens, has confirmed they represent separate taxa. As a result, *P. inusitata* is reinstated to its original specific status. All four Australian species were described at length by Kohout (1989) and their diagnoses are not repeated here.

Diagnosis. *Worker*. Australian species of the subgenus are medium to relatively large-sized ants (HL >1.90) with characteristics of the genus. Mandibles with 5 teeth, finely longitudinally striate at their bases. Anterior clypeal margin arcuate, often bluntly truncate medially. Frontal carinae distinctly raised with central area between them relatively narrow. Eyes rather large, situated well back, giving the face a somewhat elongated appearance. Ocelli generally lacking with median ocellus only rarely indicated (as in *P. rufofemorata* Fr. Smith). Dorsum of mesosoma distinctly laterally marginate with margins interrupted only at promesonotal suture and metanotal groove. Pronotum armed with a pair of relatively long, anterolaterally and weakly downwards directed, acute spines, their outer edges continuous basally with pronotal margins. Propodeum unarmed or with tubercles or small teeth. Petiole scale-like, usually armed with a pair of dorsal spines, each with laterally oriented tooth or blunt angle below its base; dorsum of petiole often with more-or-less distinct intercalary tooth (e.g. *P. andromache* Roger). First gastral tergite basally truncate or shallowly concave. Head, mesosoma and petiole mostly finely reticulate; gaster shagreened. Body black with appendages black or dark reddish-brown (as in *P. foreli*), or black with appendages yellow or light yellowish-brown (as in *P. andromache*), or distinctly bicoloured with petiole, base of gaster and legs light to medium reddish-brown (as in *P. rufofemorata*).

Queen. Apart from sexual characters, closely resembling worker except: distinctly larger (HL > 2.40); pronotal spines distinctly shorter; petiolar spines reduced to short teeth or mere denticles (as in *P. rufofemorata*). Sculpturation, pilosity and colour essentially as in worker.

Male. Males of most Australian species are known and present in the ANIC and/or QM spirit collections, but their diagnosis is beyond the purpose and scope of this paper.

Distribution and biology. The distribution of the subgenus *Myrma* ranges throughout the Indo-Malayan, Oriental and Australian regions extending east to the Solomons and south to northern Australia. In Asia its range extends northwards to China and westwards into the countries of the Middle East. *Myrma* is the only known subgenus of *Polyrhachis* known from Africa with numerous species inhabiting the tropics (Bolton 1973). The nesting habits of species of *Myrma* are extremely varied, ranging from arboreal and lignicolous to terrestrial, with both mono- and polydomous nests reported (Robson & Kohout 2007).

KEY TO AUSTRALIAN SPECIES OF *MYRMA*

1. Mesosoma in profile evenly convex, without distinct ridge-like border between dorsum and propodeal declivity (Fig. 2E); head with distinct postocular carinae; antennal scapes relatively long (SL >180) (*P. continua*-group) ..... *inusitata* Kohout
– Mesosoma in profile with more-or-less distinct border dividing dorsum from rather abrupt declivity (e.g. Fig. 1G); head without postocular carinae; antennal scapes relatively shorter (SL <170) (*P. relucens*-group) ..... 2.
2. Petiolar spines arising from dorsolateral angles of node, widely separated by transversely convex dorsum (Fig. 1F) ..... *foreli* Kohout
– Petiolar spines arising sublaterally from dorsal edge of node, situated relatively closer together (e.g. Fig. 1D) ..... 3.
3. Propodeal dorsum transversely narrow, concave, with lateral margins forming vertically raised laminate flanges; antennal scapes with numerous short erect hairs ..... *rufofemorata* Fr. Smith
– Propodeal dorsum relatively wide, virtually flat, with lateral margins distinct, but not laminate; antennal scapes without erect hairs ..... *andromache* Roger

Polyrhachis continua species-group

Polyrhachis inusitata Kohout, 1989 stat. rev. (Figs 2A, D-E, 8C)

Polyrhachis inusitata Kohout, 1989: 513, figs 4, 5, 9. Holotype and paratype workers. Type locality: AUSTRALIA, QUEENSLAND, Cape York Pen., West Claudie R., Iron Range area, 12°44'S, 143°14'E, 3-10.xii.1985 (G.B. Monteith & D. Cook), QM (examined).

Polyrhachis (Myrma) sericeopubescens Donisthorpe, 1941: 61. Erroneous synonymy by Kohout, 1998: 520.

Other Material. AUSTRALIA, QUEENSLAND, Cape York Pen., 6 km ENE of Mt Tozer, 12°44'S, 143°16'E, 30.vi.1986 (T. Weir & A. Calder) (w); McIlwraith Ra, Leo Ck Rd, 13°43'S, 143°19'E, 10-20.vii.1976 (*P.* Filewood) (paratype w).

Remarks. *Polyrhachis inusitata* is closely related to *P. sericeopubescens* (Fig. 2B, F-G) with which it was erroneously synonymised by Kohout (1998). However, *P. inusitata* differs from *P. sericeopubescens* by its smaller size and the form of the sculpturation on the sides of the mesosoma which is reticulate-rugose in the former and distinctly longitudinally striate in *P. sericeopubescens*. The lateral petiolar teeth in *P. inusitata* are reduced to more-or-less distinct denticles, while they are produced into distinct short teeth in *P. sericeopubescens*. The gastral pilosity in *P. inusitata* is shorter and more abundant, while it is markedly longer but more sparse in *P. sericeopubescens*. *Polyrhachis inusitata* is also similar to *P. continua* Emery, 1887, however it differs from that species by its distinctly slender body, reticulate-rugose sculpturation and the abundant short hairs distributed over most of the body. In contrast, the body in *P. continua* is wider and relatively robust, the sculpturation on head and mesosoma more-or-less regularly longitudinally striate and the hairs distinctly longer and much diluted.

Polyrhachis relucens species-group

Polyrhachis andromache Roger, 1863 (Figs 1A, D-E, 8A)

Polyrhachis hector Fr. Smith, 1859: 142. Holotype worker. Type locality: INDONESIA, Aru Is (A.R.Wallace), OXUM (examined). Junior homonym of *Polyrhachis hector* Fr. Smith, 1857.

Polyrhachis andromache Roger, 1863b: 8, 46. Replacement name.

Polyrhachis connectens var. *australiae* Emery, 1887: 231. Syntype workers, queen. Type locality: AUSTRALIA, Cape York, Somerset (L.M. D'Albertis), MSNG (examined). Synonymy by Kohout, 1988b: 431.

(For full list of citations see Kohout, 1988b, 1998).

Other material. INDONESIA, Aru I. (no further data) (w); ditto, Wokan, 1873 (O. Beccari) (w). WEST IRIAN, 12 km S of Sorong, 11.iii.1981 (W.L. Brown) (w); nr Kampong Garam, N of Sorong, 14.iii.1981 (W.L. Brown) (w); Nabire, S Geelving Bay, 1-4.ix.1962 (J. Sedláček) (w, ♀); Maffin Bay, 20.vi.1944 (E.S. Ross) (w). NEW GUINEA, Ighibirei, vii-viii.1890 (L. Loria) (w); Dilo vi-vii.1890 (L. Loria). PAPUA NEW GUINEA, Eastern Highlands Prov., Kratke Ra., Mt Piora, 12.vi.1966 (O.R. Wilkies) (w); Morobe Prov., Huon Pen., Finschhafen, iv.1944 (E.S. Ross) (w); Trobriand Is, Kaileuna I., SE of Tauwema, 08°29'S, 150°56'E, 6.& 23-25.vi.1992 (Aniruddh D. Patel) (w, ♀); ditto, Tuma I., 08°22'S, 150°52'E, 10.vi.1992 (Aniruddh D. Patel) (w); Normanby I., Wakaiuna, Sewa Bay, 1-16.xii.1956 (W.W. Brandt) (w, ♀); New Britain Prov., Kimbe Distr., Kavui Subdiv., 13.ii.1981 (W.L. Brown) (w); Northern Prov., Popondetta, 14-15.i.1971 (BBL) (w); Oro Bay, 30 mi S of Popondetta, 14.i.1971 (BBL) (w, ♀); Mt Piora, 2100 m, 12.vi.1966 (O.R. Wilkes) (w); Western Prov., Middle Morehead R., c. 08°50', 141°30'E, viii.1967 (R. Pullen) (w); Oriomo Gov. Stn, 26-28.x.1960 (J.L. Gressitt) (w); Daru I. (w.w. Froggatt #53F) (w); Central Prov., Brown R., 21-25.v.1956 (E.J. Ford Jn.); Kerema, Brown R., 8-11. iii.1955 (E.O. Wilson #574) (w); Laloki R., nr Little Mt Lawes, 8.iii.1958 (E.O. Wilson #526) (w); Bisianumu Stn, NNW of Port Moresby, 29.iv.1960 (C.W. O'Brien) (w); Aroa Estate, W of Redscar Bay, 29.ix.1958 (J.L. Gressitt) (w); Fairfax Harbour (B.F. Hill) (w); Milne Bay, iii-iv.1944 (H.R. Roberts) (w); ditto, xii. (G.H. Bick) (w). AUSTRALIA, QUEENSLAND,Torres Strait, Badu I., 10°07'S, 142°07'E, 18.ii.1984 (J.H. Sedláček) (w); Prince of Wales I., viii.1920 (J.A. Kusche) (w); Thursday I., viii.1949 (N.L.H. Krauss) (w); Cape York, 16.iv.1928 (W.B. Barnard) (w); ditto (Turner); Cape York Pen., Lockerbie Scrub, 10°46'S, 142°29'E, i.1975 (GBM) (w); ditto, xii.1983 (J.H. Sedláček) (w); ditto, 9-11.xii.1986 (J. Gallon) (w, ♀); ditto, 19-23.iii.1987 (RJK accs 87.19, 25, 49, 59, 73) (w, ♀); Bamaga, 10°53'S, 142°23'E, 21.i-12.ii.1984 (J.H. Sedláček) (w); ditto, 18-24.iii.1987 (RJK acc. 87.5) (w); Iron Ra., 12°44'S, 143°14'E, 1-3.vii.1976 (*P.* Filewood) (w); ditto, 1-17.vii.1978 (S.van Dyck) (w); ditto, 3-10.xii.1985 (GBM & DJC) (w); ditto, 26-31. vii.1981 (RJK accs 81.130, 166, 194, 197, 214, 215) (w, ♀); ditto, 17.iii.1984 (J.H. Sedláček) (w); ditto, 6.xii.1985 (GBM & DJC) (w); ditto, i.1958 (Darlingtons) (w); West Claudie R., 6 km ENE of Mt Tozer, 12°44'S, 143°16'E,

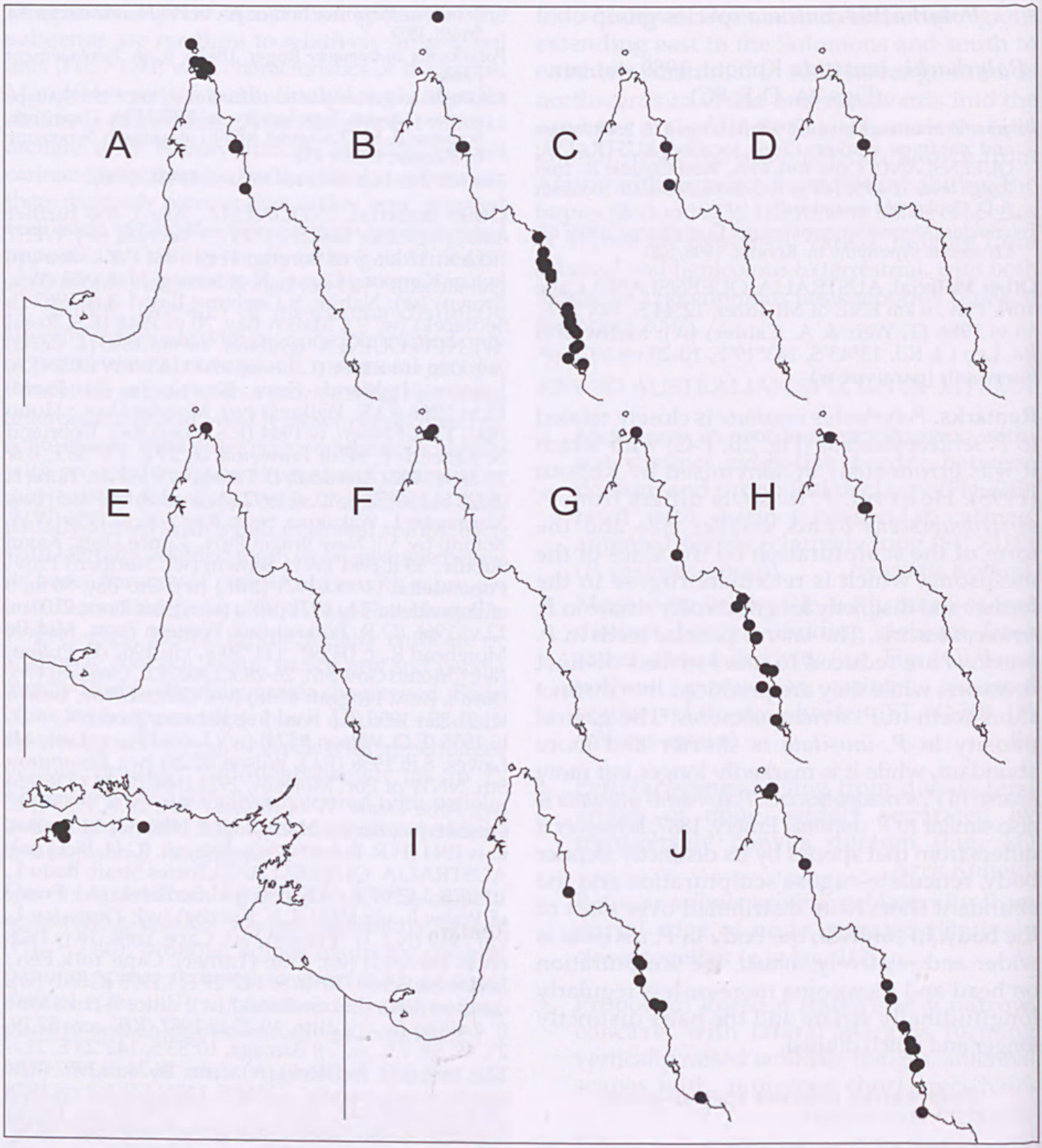

FIG. 8. Australian distributions of *Polyrhachis* species of the subgenera *Myrma* (A-D), *Myrmatopa* (E-G), *Polyrhachis* (H) and *Myrmothrinax* (I-J). A, *P. andromache*; B, *P. foreli*; C, *P. inusitata*; D, *P. rufofemorata*; E, *P. alphea*; F, *P. menozzii*; G, *P. yarrabahensis*; H, *P. bellicoa*; I, *P. delicata*; J, *P. queenslandica*.

3-10.xii.1985 (GBM & DJC) (w); ditto, 30.vi.1986 (T. Weir & A. Calder) (w); Tozer Gap, i.1958 (Darlingtons) (w); Rocky R., NE of Coen, 500 m, 1-2.v.1961 (L.& M. Gressitt) (w); ditto, vi.1958 (P.F. Darlington) (w).

Remarks. In Australia, *P. andromache* is restricted to the lowland rainforests of Cape York Peninsula north of the 14° parallel where it is relatively common. It is characterised by its abundant, distinctly golden or silvery pubescence and yellow or orange-coloured appendages. *Polyrhachis andromache* builds nests of silk and vegetation debris in various tree cavities, but also within the hollow internodes of standing bamboo (Kohout 1988b, 1989, 1999; Robson & Kohout 2007).

Polyrhachis foreli Kohout, 1989
(Figs 1B, F-G, 8B)

Polyrhachis foreli Kohout, 1989: 510, figs 2, 2a, 7, 11. Holotype worker. Type locality: QUEENSLAND, nr Clump Point, NE Tully, 17°52'S, 146°07'E, 30.iv.1969 (R.W. Taylor acc. 69.123), ANIC (examined).

'*Polyrhachis (Myrma) relucens* r. *andromache* var. *andromeda*' Forel, 1915: 110. Workers. Original locality: Queensland, Bellenden Ker (E. Mjöberg), NRMS, MHNG, ANIC (examined). Unavailable name. Material referred to *foreli* by Kohout, 1989: 510; 1998: 521.

'*Polyrhachis relucens* subsp. *decipiens* var. *papuana*' Emery, 1897: 580. Workers, queens. Original localities: New Guinea, Dilo, Bara Bara, Goodenough I. (L. Loria), MHNG, MSNG (examined). Unavailable name. Material referred to *foreli* by Kohout, 1998: 521.

Other material. PAPUA NEW GUINEA, D'Entrecasteaux Is, Goodenough I. (L. Loria) (w); Normanby I., Barara (L. Loria) (w, ♀); Dilo, vi-vii.1890 (L. Loria) (w); Oro Bay, 30 mi S of Popondetta, 14.i.1971 (BBL) (w); Musa R. Valley, Safla, 5.vi.1972 (RWT) (w); Varirata NP, 5.ii.1981 (W.L. Brown) (w); Eilogo Rd, ESE of Sogeri, 09°25'S, 147°27'E, 500 m, 4.ix.1984 (RJK) (w); Brown R., 23.v.1956 (E.J. Ford jr) (w); 5-6 km W of Brown R., c. 80 m, 3.ii.1981 (W.L. Brown) (w); Laloki R., nr Little Mt Lawes, 8.iii.1955 (E.O. Wilson #531) (w, ♀); Otomata Plant., E of Port Moresby, 2.xi.1960 (J.L. Gressitt) (w); Bisianumu, E of Port Moresby, 500 m, 23.ix.1955 (L.J. Gressitt) (w); Daradae, nr Javarere, Musgrove R., 2.x.1958 (J.L. Gressitt) (w). AUSTRALIA, QUEENSLAND, Torres Strait, Saibai I., 09°22'S, 142°37'E, 27.ii.2001 (K.L. Anderson #71) (♀); Cape York Pen., Iron Ra., 12°44'S, 143°14'E, 1-3.vii.1976 (*P.* Filewood) (w); ditto, 26-31.vii.1981 (RJK acc. 81.182) (w); 13 km WNW of Lockhard River, W of Claudie R., 12°44'S, 143°13'E, 26.viii.2004 (G.D. Alpert) (w); West Claudie R., 6 km ENE of Mt Tozer, 12°44'S, 143°16'E, 3-10.xii.1985 (GBM & DJC) (w); Mt Webb NP, 15°04'S, 145°07'E, 27-30.iv.1981 (J.E. Feehan) (w); Cooktown, 15°28'S, 145°15'E (Staudinger & Bang-Hass) (w); Helenvale, 15°42'S, 145°13'E, 10-20.vii.1976 (*P.* Filewood) (w); Home Rule Stn, 15°45'S, 145°17'E, 9-11.vi.1996 (RJK et al. acc. 96.43) (w); Mt Hartley, 15°46'S, 145°19'E, 200-500 m, 11.vi.1996 (CJB) (w); Shipton's Flat, 35 km S of Cooktown, 15°48'S, 145°16'E, 22.iv.1982 (GBM) (w); Mt Finnigan, via Helenvale, 15°50'S, 145°16'E, 19-21.iv.1982 (GBM) (w, ♀); Gap Ck, Twelvemile Scrub, 15°50'S, 145°19'E, 27.xi.1975 (V. Davies & R. Monroe) (w); Emmagen Ck, 16°03'S, 145°27'E, 19-28.ix.1982 (GBM, D. Yeates & G. Thompson); 4.5 km NNW of Cape Tribulation, 16°2'20'S, 145°27'E, 10 m, 28.viii.2004 (G.D. Alpert) (w); Pilgrim Sands, c. 1 km NW of Cape Tribulation, 16°04'S, 145°28'E, 12-15.vi.1996 (RJK et al. acc. 96.47) (w); ditto, 25.viii.1998 (Raven, Churchill & Gallon) (w); Cape Tribulation, 16°04'S, 145°27'E, 29.xii.1983-8.i.1984 (GBM) (w); ditto, 6.xii.1985 (RJK) (w); ditto, 25.ix.1992 (D.G. Furth) (w); Canopy Crane site, nr Cape Tribulation, 16°06'S, 145°27'E, 20-21.ii.2000 (RJK accs 2000.18, 21, 22, 28) (w, ♀); Deeral Landing, nr Cairns, swampy rf., 4.viii.1975 (BBL) (w, ♀); Yarrabah, 16°54'S, 145°51'E, 22, 24.vii.1980 (RJK acc. 80.119) (w); ditto, 25.viii.1996 (SKR #418) (w); Bell Peak Nth, 20 km S of Cairns, 17°05'S, 145°53'E, 16.ix.1981 (GBM & DJC); Bellenden Ker (E. Mjöberg) (w in MHNG, NRMS); Russell R., Bellenden Ker Landing, 17°16'S, 145°54'E, 1-9.xi.1981 (GBM & Earthwatch Exp.) (w); Russell R., 4.viii.1975 (BBL) (w); Babinda, 1920 (J.F. Illingworth) (w); Seymour Ra., Garradunga, c. 7 km N of Innisfail, 17°28'S, 146°01'E, <100 m, 5-6.vi.1996 (RJK et al. acc. 96.29) (w, ♀, ♂); Etty Bay, 17°33'S, 146°05'E, 29.ix.1996 (J.& *P.* Hasenpush) (♀); NE Tully, nr. Clump Point, 17°52'S, 146°07'E, 30.iv.1969 (RWT acc. 69.123) (w, ♀, ♂); Sth Mission Beach, c. 6 km W, 17°56'S, 146°02'E, 18-19.vii.1980 (RJK acc. 80.60) (w); Kirrama Ra., c. 9 km W of Kennedy, 18°12'S, 145°52'E, 31.xii.1999 (SKR #812) (w); Hinchinbrook I., Gayundah Ck, 18°21'S, 146°14'E, 100-500 m, 8-18.xi.1984 (GBM) (w).

Remarks. The distribution of *P. foreli* consists of two, substantially disjunct populations, Papuan and Australian. Apart from the specimens of the original series of '*relucens decipiens papuana*' from the D'Entrecasteaux Islands, there is a relatively small number of additional specimens from the Papuan population, where the species appears fairly rare. On the other hand, in Australia ('*relucens andromache andromeda*') the species appears relatively common and ranges from Iron Range on Cape York Peninsula, throughout Queensland's Wet Tropics to about

Mission Beach and Hinchinbrook Island in the south. *Polyrhachis foreli* is a rainforest species commonly nesting in rotting logs, tree stumps and epiphytes or in the ground (Kohout 1989, 1998; Robson & Kohout 2005, 2007).

Polyrhachis rufofemorata Fr. Smith, 1859 (Figs 2C, H-I, 8D)

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

Polyrhachis biroi var. *bidentata* Stitz, 1912: 512. Syntype workers. Type locality: NEW GUINEA, Sattelberg (Lauterbach), MNHU (examined). Synonymy by Kohout, 1998: 523.

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

Other material. INDONESIA, N.C. SERAM, Manusela N.P., Wae Mual Plain, 25 vii-9 ix 1987, Op. Raleigh (M.J.D. Brendell, B.M.1987-262); ditto, Piroe, 1937 (W.M. Mann, NGS SI Exp.); AMBON I., 1898 (L. Biró); WEST IRIAN, Ifar, Cyclops Mts, 300-500 m, 23-26. vi.1962 (J. Sedláček) (w); Waigiou I. (Bates) (w); 12 km S of Sorong, 11.iii.1981 (W.L. Brown) (w); Maffin Bay, 22.vi.1944 (E.S. Ross) (w). PAPUA NEW GUINEA, West Sepik Prov., Torricelli Mts, Lumi, 400-550 m, 03°28'S, 142°02'E, 4-13.viii.1984 (RJK accs 84.176, 228, 283) (w, ♀); ditto, x.1984 (D. Waisi) (w); Pes Mission, <50 m, c 12 km WSW of Aitape, 03°11'S, 142°15'E, 31.vii-3. viii.1984 (RJK acc 84.176) (w, ♀); Oenake Ra., 3-5 km W of Warimo, 03°40'S, 141°12'E, 200-300 m, 15.viii.1984 (RJK acc. 84.288) (w); Morobe Prov., Huon Pen., Wareo (Wagner) (w); Finschhafen, 7.v.1944 (E.S. Ross) (w); Mongi Watershed, Joangeng, 7-8.iv.1955 (E.O. Wilson) (w); Mongi-Mape Watershed, Boingbongen, 900-1000 m, 5.iv.1955 (E.O. Wilson #730) (w); lower Busu R., 28.iv.1955 (E.O. Wilson #879) (w); Boana, Bunbok Valley, nr Lae, 25.v.1955 (E.O. Wilson #1122, 1123) (w); c. 35 km W of Lae, nr Wampit, 06°45'S, 146°40'E, 24-27.viii.1984 (RJK accs 84.353, 365) (w, ♀); Markham R. Valley, Nadzab, v.1944 (K.V. Krombit) (♀); ditto, 20-22.v.1955 (E.O. Wilson #1086, 1099) (w); Lae, Didiman Ck, 27.iii.1955 (E.O. Wilson #701) (w); Northern Prov., Pongani R., Boikiki Plant., 09°06'S, 148°25'E, c. 500 m, 29-30.viii.1984 (RJK acc. 286) (w); Owen Stanley Ra., Mamba Plant., nr Kokoda, 08°51'S, 147°41'E, 31.viii-1.ix.1984 (RJK accs 84.400, 403); Star Mts, nr Tabubil, 05°15'S, 141°13'E, 16.viii.1989 (Aniruddh D. Patel #291) (w); Bisianumu, nr Sogeri, 500 m, 15-20.iii.1955 (E.O. Wilson #607, 616) (w, ♀); ditto, 500 m, 23-24.ix.1955 (L.J. Gressitt) (w); Otomata Plant., E of Moresby, 2.xi.1960 (L.J. Gressitt) (w); Western Prov., Oriomo Govt. Stn, 26-28.x.1960 (J.L. Gressitt) (w); Milne Bay, 4.iii.1944 (H.R. Roberts) (w). AUSTRALIA, QUEENSLAND, Cape York Pen., Iron Ra., 12°44'S, 143°14'E, 1-3.vii.1976 (P. Filewood) (w); ditto, 26-31.vii.1981 (RJK accs 81.182, 191, 198) (w); West Claudie R., 6 km ENE of Mt Tozer, 12°44'S, 143°16'E, 3-10.xii.1985 (GBM & DJC) (w).

Remarks. The known distribution of *P. rufofemorata* extends from the Moluccas and New Guinea to northern Australia, where it occurs at Iron Range on Cape York Peninsula. As indicated earlier (Kohout 1989, 1998), *P. rufofemorata* appears in two distinct forms that differ primarily in the development of the petiolar node. In the nominal form, including most of its synonyms (*P. merops* Fr. Smith, 1860, *P. biroi* Forel, 1907 and *P. biroi paprika* Forel, 1911), the petiole is simply angulate or at most minutely dentate, while it is clearly spinose in *P. biroi bidentata*. Both forms are relatively common throughout New Guinea and are occasionally sympatric. However, it appears that Indonesian populations of *P. rufofemorata* include only the nominal form, while Australian populations are characterised by the distinctly spinose petiole. Queens of both forms are very similar with only a little variability demonstrated between various populations. *Polyrhachis rufofemorata* is lignicolous, selecting various plant cavities for its nesting sites, with most colonies found occupying hollow internodes of standing dead bamboo.

Subgenus *Myrmatopa* Forel, 1915

Myrmatopa Forel, 1915: 107 (as subgenus of *Polyrhachis* Fr. Smith). Type species: *Polyrhachis schang* Forel by original designation.

Myrmatopa Forel; Emery, 1925: 180 (diagnosis).

Myrmatopa was established by Forel (1915) as a subgenus of *Polyrhachis* Fr. Smith, 1857, with *P. schang* Forel, 1879 from China as the type species. Forel did not define the new subgenus, but he listed the 'Gruppe *Wallacei* Em. and *Schang* For. etc.', established earlier by Emery (1896), as its constituents. However, Emery considered the *P. wallacei*-group to be a part of his 'Manipulus 1 (*P. clypeata*)', that was later included within the subgenus *Campomyrma* (Wheeler 1911), while he listed *P. schang* as a '*Species incertae sedis*'. Later Emery (1925) delimited *Myrmatopa* and divided it into two species-groups (*P. wallacei*- and *P. schang*-

groups). This arrangement was followed by Dorow (1995), until Kohout (2008a) subdivided the *wallacei*-group further by placing several of its constituents into a newly established *P. flavicornis*-group. Of the three species groups, the *flavicornis*- and *wallacei*-groups are relevant to the Australian fauna.

Diagnosis. *Worker.* Mostly small to medium-sized ants (HL 1.28-2.08) with general characteristics of the genus. Mandibles smooth or very finely, longitudinally striate. Anterior clypeal margin with shallow, central, medially emarginate flange, laterally flanked by teeth or acute angles, or simply truncate. Eyes in most species moderately to strongly convex, clearly exceeding lateral cephalic outline in full face view. Frontal carinae low, separated by rather broad frontal area (as in extralimital *P. wallacei* Emery), moderately raised (as in *P. lombokensis* Emery), or strongly raised as triangular projections (as in extralimital *P. derecyna* Fr. Smith). Mesosoma fully or partly laterally marginate or totally immarginate; humeri armed with acute, triangular teeth or bluntly angular. Lateral mesonotal margins flat or distinctly dorsally raised (as in *P. schang*-group species). Petiole armed with a pair of acute spines, rarely with intercalary spines or teeth (as in extralimital *P. subtridens* Emery). Sculpturation of head and mesosoma mostly smooth with fine punctation, but may be rather coarsely reticulate-punctate or longitudinally striate. Gaster shagreened or finely reticulate-punctate. All body surfaces usually without abundant pilosity or pubescence, except in some extralimital species (e.g. *P. elii* Emery and *P. chaita* Kohout). Body more-or-less uniformly black or yellowish- to reddish-brown (as in *P. lombokensis*) or distinctly bicoloured with head and body black and gaster and appendages light to medium yellowish- to reddish-brown (as in extralimital *P. alphea rufiventris* Emery).

Queen. Apart from sexual characters, very similar to worker. Armament of pronotum, propodeum and petiole somewhat reduced, with spines shorter and stronger. In several species (e.g. *P. alphea)* intercalary petiolar tooth or tubercule is evident in queen but completely absent in worker. Sculpturation, pilosity and colour very similar to those of worker.

Distribution and biology. Members of the subgenus *Myrmatopa* are distributed throughout south-east Asia, extending south to Indonesia, New Guinea, the Solomons and northern Australia. They are typical arboreal nesters building polydomous nests of silk and vegetation debris between the leaves of rainforest trees and shrubs (Kohout 1999; Robson & Kohout 2005, 2007). Similar to species of the subgenus *Cyrtomyrma* Forel, pupae of all known *Myrmatopa* species are naked, i.e. not enclosed in cocoons.

KEY TO AUSTRALIAN *MYRMATOPA* SPECIES (based on workers)

1. Lateral margins of mesonotum produced into distinct dorsolateral prominences (Fig. 6E) (extralimital) ..... (*P. schang*-group)
– Lateral margins of mesonotum rather flat, without distinct dorsolateral prominences (Figs 3E, 3G, 4E) ..... 2.

2. Pronotal humeri produced into distinctly upturned, acute teeth (Fig. 3D); head and body black with gaster and appendages medium to dark reddish-brown (*P. flavicornis*-group) ..... 3.
– Pronotal humeri obtusely angulate (Fig 3F, H); body and appendages more-or-less uniformly medium reddish-brown, with head usually a shade darker (*P. wallacei*-group) ..... *P. yarrabahensis* Emery

3. Larger (HL >2.00); antennal scapes relatively short (SI<140); propodeal spines rather long, strongly upturned (Fig. 4E) ..... *P. menozzii* Karavaiev
– Smaller (HL <1.70); antennal scapes relatively long (SI >160); propodeal spines reduced to short acute teeth (Fig. 3E) . .*P. alphea* Fr. Smith

Polyrhachis flavicornis species-group

Polyrhachis alphea Fr. Smith, 1863
(Figs 3A, D-E, 8E)

Polyrhachis alpheus Fr. Smith, 1863: 14. Holotype worker. Type locality: NEW GUINEA, Waigeo I. (A.R. Wallace), OXUM (examined).

Other material. INDONESIA, WEST IRIAN, Bodem, 11 km SE of Oerbefareh, 01°58'S, 138°44'E, 100 m, 7-17.vii.1959 (T.C. Maa) (w). PAPUA NEW GUINEA, Amok, N of Maprik, 03°35'S, 142°57'E, 165 m, 6.i.1960 (T.C. Maa) (w); Western Prov., Oriomo Govt. Stn, 08°48'S, 143°05'E, 26-28.x.1960 (J.L. Gressitt); West Sepik Prov., nr Vanimo, 02°40'S, 141°18'E, rf., c. 50 m, 10-11.vii.1972 (R.W. Taylor); Central Prov., Karema, Brown R., 09°12'S, 147°14'E, 8-11.iii.1955, lowland rf. (E.O. Wilson #586) (w, ♀). AUSTRALIA, QUEENSLAND, Cape York Pen., Lockerbie Scrub, 10°46'S, 142°29'E, 19-23.iii.1987, rf., ex nest between leaves (RJK accs 87.29, 61 (w, ♀); ditto, at light (♀).

Worker. Dimensions: TL c. 5.14-6.75; HL 1.34-1.68; HW 1.06-1.31; CI 77-82; SL 1.79-2.18; SI 161-174; PW 0.75-0.94; MTL 1.81-2.25 (12 measured).

Anterior clypeal margin truncate medially; truncate portion widely and shallowly emarginate and flanked by blunt angles. Clypeus with short, median carina, flat in profile, posteriorly rounding into moderately impressed basal margin. Frontal triangle distinct. Frontal carinae sinuate with distinctly raised margins; central area relatively narrow, deeply concave; frontal furrow poorly indicated. Sides of head in front of eyes converging towards mandibular bases in virtually straight line; behind eyes sides rounding into convex occipital margin. Eyes relatively large, strongly convex, in full face view clearly exceeding lateral cephalic outline. Ocelli lacking. Mesosomal dorsum distinctly laterally marginate. Pronotal dorsum flat; humeri with rather short, acute, anterolaterally directed spines; pronotal spines mostly horizontal, but distinctly upturned in some specimens, with lateral edges continuous with weakly rounded pronotal margins. Promesonotal suture distinct. Mesonotum posteriorly with weakly raised lateral margins that converge towards rather shallowly impressed metanotal groove. Propodeal dorsum marginally wider than long, lateral margins terminating posteriorly in short, transverse ridges that appear as upturned teeth in profile; ridges continued medially for a short distance with propodeal dorsum between them descending into oblique declivity in medially uninterrupted curve. Petiole with anterior face very low, posterior face convex and distinctly higher; dorsum armed with pair of relatively long, more-or-less diverging, dorsoposteriorly directed, acute spines; dorsum between them narrowly rounded or with indication of intercalary teeth or tubercles in some specimens. Anterior face of first gastral segment flat at base, widely rounding onto dorsum.

Mandibles finely longitudinally striate with numerous piliferous pits. Head rather coarsely sculptured, deeply irregularly rugose with superimposed small punctures; sculpture somewhat less intense on clypeus and on vertex near occipital margin. Dorsum of mesosoma and petiole, except spines, coarsely reticulate-punctate with sculpture on pronotum more-or-less longitudinally directed. Gaster finely shagreened, highly polished.

Mandibles with several curved, golden hairs near masticatory borders. Anterior clypeal margin with one longer median seta and fringe of relatively short setae laterally. A pair of longer, erect or semierect hairs near anterior clypeal margin and along frontal carinae; fore coxae with several relatively long, semierect hairs; somewhat shorter, single hairs on venter of trochanters and femora. Gaster with several golden, semierect hairs lining dorsoposterior margins of apical segments; distinctly longer hairs on gastral venter. Appressed, golden or off-white, rather diluted pubescence on dorsum of gaster, virtually absent from other body surfaces.

Colour. Black. Mandibles dark reddish-brown at bases, distinctly lighter apically with dark teeth. Antennal scapes and basal funicular segments dark reddish-brown, subsequent segments progressively lighter; base of scapes and apical antennal segments orange. Legs, including coxae

generally reddish-brown; fore coxae usually darker or almost black in some specimens. Gaster dark reddish-brown, with posterior margins of segments lined with dark brown or black.

Queen. Dimensions: TL c. 8.32-8.87; HL 1.93-2.09; HW 1.50-1.59; CI 75-79; SL 2.43-2.56; SI 158-169; PW 1.65-1.87; MTL 2.65-2.81 (9 measured). Apart from sexual characters, very similar to worker except: distinctly larger; pronotal humeri with somewhat flattened acute teeth. Mesoscutum as long as wide, with lateral margins strongly converging anteriorly, forming distinctly narrowly rounded anterior margin; anterior face of mesoscutum low, with dorsum forming continuous, moderately convex line in lateral view; median line flat anteriorly, weakly raised dorsoposteriorly; parapsides distinct, weakly raised posteriorly. Mesoscutellum not raised above dorsal plane of mesosoma, flat anteriorly, widely rounding posteriorly into deeply impressed metanotal groove. Propodeal dorsum with blunt lateral margins terminating posteriorly in short, upturned, transverse ridges. Petiolar spines virtually identical to those in worker. Sculpturation, pilosity and colour as in worker.

Males unknown. Immature stages (eggs, larvae and pupae) in QM spirit collection.

Remarks. Australian specimens differ slightly from those from New Guinea, notably in the intensity and density of sculpturation. The coarse rugosity of the head is somewhat less pronounced in Australian specimens and confined mostly to the front of the head, with the vertex only reticulate-punctate. The rugosity is also weaker on the sides of the mesosoma and petiole. The petiolar spines in New Guinean specimens, when viewed from the front, form a rather narrow 'U' with the tips of the spines weakly turned inwards. In contrast, the petiolar spines in Australian specimens are straight, more slender and distinctly diverging (Fig. 3D-E). The legs of Australian specimens are generally darker, reddish-brown, while in the holotype and most other New Guinean specimens examined, they are relatively light, yellowish-brown. However, in spite of these differences, the Australian and New Guinean specimens are very similar and I am reluctant to consider them separate species. Until more New Guinean material, including nest series, becomes available, I consider both forms to represent different populations of a single species.

Polyrhachis alphea appears rather uncommon with a patchy distribution extending across New Guinea and neighbouring islands to the extreme tip of Cape York Peninsula. A single colony, including a dealate queen, and several alate queens collected at light trap represent the only Australian records of *P. alphea*.

Polyrhachis menozzii Karavaiev, 1927
(Figs 4A, D-E, 8F)

Polyrhachis (Myrmatopa) menozzii Karavaiev, 1927: 9. Syntype workers, queen. Type locality: INDONESIA, Aru Is, Wammar, 16.iii.1913 (V. Karavaiev #2596 for w, #2982 for ♀) IZAS, QM (examined).

Other material. INDONESIA, WEST IRIAN, Genjam, 40 km W of Hollandia, 02°46'S, 140°12'E, 100-200 m, 1-10.iii.1960 (T.C. Maa) (w); River To (mouth), 4 km E of Hol Maffin, 02°32'S, 140°42'E, 1.vi.1952, light trap (T.C. Maa) (♀); W. Sentani, SW Cyclop Mts, 02°36'S, 140°37'E, 80 m, 22-27.vi.1959 (T.C. Maa) (♀); Tigi Lake, Wisselmeren, Waghete, 04°00'S, 136°13'E, 1700 m, 15.viii.1955 (J.L. Gressitt) (w). PAPUA NEW GUINEA, West Sepik Prov., Torricelli Mts, Lumi, 03°28'S, 142°02'E, 400-550 m, 4-13.viii.1984 (RJK acc. 84.285) (w); Victor Emanuel Ra., Telefomin, 05°07'S, 141°38'E, 1550 m, 17-19.viii.1984, swamp rf. (RJK acc. 84.331) (w, ♀); Kalalo, 06°04'S, 147°11'E, 750 m, 20-30.viii.1966 (G.A. Samuelson) (w); Northern Prov., Pongani R., Boikiki Plant., 09°06'S, 148°25'E, 500 m, 29-30.viii.1984 (RJK acc. 84.387) (w); Western Prov., Oriomo Govt. Stn, 08°48'S, 143°05'E, 26-28.x.1960 (J.L. Gressitt) (w); Central Prov., Laloki R., 20 km N of Port Moresby, 09°15'S, 147°05'E, 3.xii.1979 (E. Brough) (w); Brown R., 5 m, 23.x.1960 (J.L. Gressitt) (♀). AUSTRALIA, QUEENSLAND, Cape York Pen., Lockerbie Scrub, 10°46'S, 142°29'E, 19-23.iii.1987, rf., at light (RJK acc. 87.61) (♀); Bamaga, 10°53'S, 142°23'E, 24-25.iii.1987, rf. margin, at light (RJK acc. 87.84) (♀).

Worker. Dimensions (syntype cited first): TL c. 8.57, 7.56-8.67; HL 2.18, 2.06-2.25; HW 1.87, 1.75-1.93; CI 86, 85-86; SL 2.50, 2.43-2.53; SI 134,

131-139; PW 1.22, 0.97-1.22; MTL 3.12, 2.96-3.24 (1+4 measured).

Anterior clypeal margin medially with wide, deep, 'V'shaped emargination, delimited laterally by acute teeth. Clypeus with median carina; virtually straight in profile, posteriorly rounding into distinctly impressed basal margin. Frontal triangle distinct. Frontal carinae sinuate with steeply raised margins; central area flat with frontal furrow partly obscured by cephalic sculpturation. Sides of head in front of eyes converging towards mandibular bases in virtually straight line; behind eyes sides rounding into weakly convex occipital margin. Eyes convex, in full face view clearly exceeding lateral cephalic outline. Ocelli lacking. Pronotal dorsum flat; humeri with short, rather blunt, somewhat upturned spines; their lateral edges continuous with posteriorly converging, lateral pronotal margins. Promesonotal suture distinct; mesonotal dorsum flat in profile with weakly raised lateral margins. Metanotal groove distinct; propodeal dorsum with subparallel, somewhat dorsally raised lateral margins, terminating posteriorly in moderately long, strongly oblique, acute spines; propodeal dorsum between spines rounding into weakly concave declivity in medially uninterrupted line. Petiole with anterior face straight, posterior face convex; armed with two, relatively long, widely diverging acute spines; dorsal margin between spines with distinct, acute, intercalary tooth. Anterior face of first gastral segment flat at base, widely rounding onto dorsum.

Mandibles very finely longitudinally striate with numerous piliferous pits. Head and dorsum of mesosoma rather coarsely and deeply reticulate punctate, with rugae on clypeus mostly longitudinally directed. Sides of mesosoma and petiole distinctly less coarsely sculptured. Antennae and legs finely and closely reticulate-punctate. Gaster finely shagreened, polished.

Mandibular masticatory borders with several relatively long, curved, golden hairs. Anterior clypeal margin with a single long seta and a pair of shorter setae within median emargination and numerous shorter setae lining margin laterally. A few paired, semierect, medium length, yellow hairs near anterior and basal clypeal margins and in central area along frontal carinae. Several relatively long hairs on fore coxae; somewhat shorter hairs on venter of trochanters and femora. Gaster with several hairs lining dorsoposterior margins of apical segments; distinctly longer and more numerous hairs on gastral venter. Appressed, very short, yellowish or off-white, rather diluted pubescence on dorsum of gaster; pubescence virtually absent from other body surfaces.

Colour. Black. Mandibles distinctly lighter, reddish-brown, towards masticatory borders; teeth black. Antennal scapes and basal funicular segments very dark reddish-brown, subsequent segments progressively lighter towards antennal apices. Legs, including coxae, black or very dark reddish-brown. Gaster very dark, virtually black, dorsally; sides and margins of segments on venter a shade lighter with somewhat reddish tint.

Queen. Dimensions: TL c. 9.12-11.69; HL 2.28-2.65; HW 2.06-2.21; CI 82-90; SL 2.46-2.90; SI 119-133; PW 1.96-2.25; MTL 2.93-3.63 (8 measured). Apart from sexual characters, closely resembling worker except: pronotal humeri with rather short, blunt teeth; mesoscutum wider than long, with lateral margins converging anteriorly, forming moderately rounded anterior margin; median line distinct; parapsides flat; anterior face of mesoscutum in lateral view widely rounding onto flat dorsum. Mesoscutellum with flat dorsum, only marginally elevated above dorsal plane of mesosoma. Propodeum armed with obliquely directed spines. Petiole with lateral spines marginally shorter and intercalary tooth stronger and more distinct than in worker. Sculpturation and colour virtually identical to worker.

Males unknown. Immature stages in ANIC spirit collection.

Remarks. The only specimens of *P. menozzii* known from Australia are numerous alate queens from light traps set in lowland rainforest at Lockerbie Scrub and Bamaga. Their identity has been confirmed by comparison with the syntypes of the species and worker-associated queens from a nest series from PNG. The distribution of *P. menozzii* appears to be centred on New Guinea, with the type series specimens collected on the Aru Islands. *Polyrhachis menozzii* builds polydomous nests from silk and vegetation debris upon the leaves of rainforest trees apparently high above ground, with both available nests from PNG collected from the canopy of recently felled rainforest trees.

Polyrhachis wallacei species-group

Polyrhachis yarrabahensis Forel, 1915 (Figs 3B, F-G, 8G)

Polyrhachis (Myrmatopa) lombokensis var. *yarrabahensis* Forel, 1915:115. Syntype worker, queen. Original localities: AUSTRALIA, QUEENSLAND, Yarrabah (for w), Malanda (for ♀) (E. Mjöberg), NRMS (examined).

Polyrhachis yarrabahensis Forel; Kohout & Taylor, 1990: 520. Raised to species.

Polyrhachis lombokensis Emery. Erroneous synonymy by Kohout, 2000: 205.

Other material. INDONESIA, WEST IRIAN, Waris, S of Hollandia, 03°30'S, 140°55'E, 450-500 m, 17.viii.1959 (T.C. Maa) (w). PAPUA NEW GUINEA, Louisiade Archipelago, Misima I., 10°40'S, 152°45'E, (Rev. H.K. Bartlett) (w); Adelbert Mts, Wanuma, 04°36'S, 145°06'E, 800-1000 m, 25.x.1958 (J.L. Gressitt) (w); Kumun, Upper Jimmi Valley, 05°25'S, 144°23'E, 1000 m, 13.vii.1955 (J.L. Gressitt) (w). AUSTRALIA, QUEENSLAND, Cape York Pen., Lockerbie Scrub, 10°46'S, 142°29'E, 19-23.iii.1987, rf., at light (RJK acc. 87.61) (♀); Massy Spur Creek, nr Silver Plains Stn, 13°56'S, 143°29'E, 20.ix.1956 (J.L. Wassell) (w); Mt Webb NP, 15°04'S, 145°07'E, 27-30.iv.1981 (J.E. Feehan) (w); 14 km WbyN of Hope Vale Mission, 15°16'S, 144°59'E, 7-10.v.1981 (J.E. Feehan) (w); Home Rule Stn, 15°45'S, 145°17'E, c. 200 m, rf. margin, 9-11. vi.1996 (RJK & JCB acc. 96.41) (♀); Pilgrim Sands, 16°04'S, 145°28'E, <10 m, 12-15.vi. 1996, rf. margin (RJK acc. 96.50) (w); Cape Tribulation, Canopy Crane site, 16°06'S, 145°27'E, 15.x.1999, rf (N. Blüthgen) (w); ditto, 21.ii.2000 (N. Blüthgen #1004) (w, ♂); ditto, 20-21.ii.2000 (RJK acc. 2000.37) (w); Kamerunga, 10 km NW of Cairns, 16°53'S, 145°41'E, 13.vii.1960 (G.W. Saunders) (w); Yarrabah, c. 11 km E of Cairns, 16°56'S, 145°52'E, 22-24.vii.1980 (RJK accs 80.125, 126, 127, 133, 135, 136, 137, 144, 145, 148) (w, ♀, ♂); Canal Ck, nr. Innisfail, 23.v.1993 (L.R. Ring) (w, ♀); Kennedy, 18°12'S, 145°57'E, 4.x.1955 (G. Saunders) (w).

Worker. Dimensions: TL c. 5.44-6.80; HL 1.43-1.68; HW 1.15-1.40; CI 78-83; SL 1.78-2.12; SI 147-159; PW 0.69-0.90; MTL 1.81-2.25 (30 measured).

Anterior clypeal margin with wide median truncation flanked by blunt denticles. Clypeus with poorly defined, blunt, median carina; clypeus in profile straight for most of its length, abruptly rounding into moderately impressed basal margin. Frontal triangle distinct. Frontal carinae sinuate with only moderately raised margins; central area relatively wide; frontal furrow distinct anteriorly, poorly indicated posteriorly. Sides of head in front of eyes converging towards mandibular bases in virtually straight line; behind eyes sides rounding into evenly convex occipital margin. Eyes convex, in full face view clearly breaking lateral cephalic outline. Ocelli lacking. Pronotal humeri obtusely angular, almost rounded in some specimens; lateral pronotal margins rather blunt posteriorly; promesonotal suture strongly impressed. Mesonotum with lateral margins strongly converging posteriorly; metanotal groove distinct. Propodeum with lateral margins blunt, terminating posteriorly in poorly developed, right-angled teeth. Petiole armed with a pair of relatively short, dorsally and weakly posteriorly directed, 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 distinctly reticulate-punctate, sculpturation more intense towards mandibular bases and sides of head. Dorsum of mesosoma and petiole more finely reticulate-punctate with pronotal sculpture consisting of irregular, mostly longitudinal and laterally curving fine striae. Sides of mesosoma finely, mostly obliquely, reticulate. Antennal scapes finely, closely punctate. Fore coxae and gaster very finely shagreened, highly polished.

Mandibles with a few curved, golden hairs near masticatory borders and numerous short, appressed hairs towards mandibular bases. Anterior clypeal margin with fringe of short setae. Several medium length, paired hairs near anterior and basal clypeal margins and along frontal carinae. A few somewhat longer hairs on fore coxae and single shorter hairs on venter of trochanters and femora. Gaster with several longer hairs lining dorsoposterior margins of apical segments, hairs more numerous on gastral venter.

Colour. Generally medium to dark reddish-brown; head mostly dark reddish-brown to black, with mandibles and anterior portion of clypeus distinctly lighter. Mandibular teeth and anterior clypeal margin narrowly lined with dark brown. Dorsum of mesosoma often blotched dark reddish-brown, almost black in some specimens, with pronotal collar, sutures and sides of mesosoma distinctly lighter. Antennae and legs, including coxae, mostly light to medium reddish-brown. Petiole and gaster reddish-brown; base and venter of gaster a shade lighter; margins of segments lined with dark brown.

Queen. Dimensions: TL c. 8.01-8.87; HL 1.90-1.96; HW 1.47-1.57; CI 77-83; SL 2.28-2.34; SI 149-156; PW 1.62-1.75; MTL 2.43-2.56 (12 measured). Apart from sexual characters, closely resembling worker except: distinctly larger; pronotal humeri bluntly angular; mesoscutum as long as wide, with lateral margins converging anteriorly, forming rather narrowly rounded anterior margin; median line distinct; parapsides flat; anterior margin in side view widely rounding onto flat dorsum. Mesoscutellum convex, elevated above dorsal plane of mesoscutum. Propodeum immarginate; dorsum posteriorly armed with short, upturned teeth. Petiolar spines virtually identical to those in worker. Sculpturation and pilosity as in worker. Generally darker coloured than worker with head and dorsum of mesosoma very dark reddish-brown or black; mandibles, pronotal collar and sides of pronotum, mesopleuron, petiole and appendages a shade lighter, reddish-brown. Colour of gaster as in worker.

Males and immature stages (eggs, larvae and pupae) in QM spirit collection.

Remarks. Kohout & Taylor (1990: 520) raised *P. lombokensis* var. *yarrabahensis* to species level and noted: 'With some hesitation we consider them to represent separate species. We are hesitant to synonymise the names because of the great distance separating the known ranges of these taxa and because no material is known from areas in between'. However, the discovery of a few additional specimens from Papua New Guinea (Misima I., Rev. H.K. Bartlett) led me to conclude (Kohout 2000: 205) that the slight differences in characters given by Kohout & Taylor (1990) to differentiate the taxa were insignificant and that *P. yarrabahensis* represented an isolated population of *P. lombokensis* (Fig. 3C, H-I).

I have since re-examined the syntypes of both species, including queens, together with a vast number of additional specimens from Cape York Peninsula, north Queensland, and recently discovered specimens from New Guinea (IRIAN JAYA, Waris, 17.viii.1959, T.C. Maa; PNG, Popondetta, 6.xii.1972, P.M. Room; Kokoda, 1.vi.1972, P.M. Room; Wanuma, 25.x.1958, J.L. Gressitt; Upper Jimmi Valley, 13.vii.1955, J.L. Gressitt – ANIC, MCZC and BPBM). As a result, I now consider that both taxa do represent separate species. In addition to trivial differences in the degree of the descending angle of the propodeal declivity, the convexity of the eyes and the outline of pronotal humeri (listed by Kohout & Taylor 1990), the most obvious characters separating them are the intensity of sculpturation, their colour and the development of the propodeal teeth. In *P. yarrabahensis* the sculpturation, notably of the head, is distinctly reticulate-punctate, with the intensity increasing in front of the eyes and towards the sides of the head (see Fig. 3B). The colour of the head is distinctly darker, almost black in some specimens, contrasting with the mostly medium to dark reddish-brown colour of the rest

of the body. In contrast, the sculpturation of the head in *P. lombokensis* is very fine, rather polished (see Fig. 3C) and the body, including the head, is more-or-less uniformly medium reddish-brown. The propodeal teeth in *P. yarrabahensis* are rather poorly developed and more-or-less angular, while they are distinctly upturned and acute in *P. lombokensis*. The differences in the queens of the species are even more distinct. The sculpturation, notably of the head, in *P. lombokensis* is very fine and highly polished, while in the queen of *P. yarabahensis* it is markedly more distinct than in the worker, consisting of small punctures superimposed upon rather irregular reticulation. In *P. yarrabahensis* the mesoscutum in dorsal view is about as long as wide, with the lateral margins strongly converging anteriorly, forming a rather narrowly rounded anterior margin. In profile, the mesoscutellum is convex and distinctly elevated above dorsal plane of mesosoma. In contrast, the mesoscutum in *P. lombokensis* is distinctly wider than long, with a rather widely rounded anterior margin. The mesoscutellum is only weakly raised above dorsal plane of mesosoma, and is virtually flat before rounding into the propodeal groove. In addition, the mesosomal dorsum of *P. lombokensis* has several medium length, erect hairs that are completely absent in *P. yarrabahensis*.

The known distribution of *P. yarrabahensis* extends from New Guinea south to northern Queensland, where it appears to be most abundant within the Wet Tropics region. It is an arboreal nester, building polydomous nests of silk and vegetation debris upon the leaves of various lowland rainforest trees, shrubs and vines (Kohout 1999; Robson & Kohout 2005, 2007).

Subgenus *Myrmothrinax* Forel, 1915

Myrmothrinax Forel, 1915: 107 (as subgenus of *Polyrhachis* Fr. Smith). Type species: *Polyrhachis thrinax* Roger by original designation.

Myrmothrinax Forel; Emery, 1925: 182 (diagnosis).

The subgenus *Myrmothrinax* was introduced by Forel (1915) as a subgenus of *Polyrhachis* Fr. Smith, 1857, with *Polyrhachis thrinax* Roger, 1863a, as the type species. Forel did not define the new subgenus but listed *Myrmothrinax* as a direct replacement for the 'Manipulus 3 (*P. thrinax*)' of the earlier classification of Emery (1896). The first description of *Myrmothrinax* was given by Emery (1925), who included 27 species and subspecific forms as its constituents. Both Emery (1925) and Dorow (1995) considered *Myrmothrinax* to be a relatively homogenous subgenus and did not subdivide it into species-group. However, more recently Kohout (2008a) recognised two species-groups (*aequalis*- and *thrinax*-groups), based on the relative length of the petiolar spines. The subgenus is in great need of revision as the discovery of numerous new, mainly south-east Asian species is rapidly increasing, due to the employment of modern collecting methods, notably insecticidal fogging of the rainforest canopy.

Diagnosis. *Worker*. Small to relatively large (HL 1.35-2.25) ants with characteristics of the genus. Anterior clypeal margin medially truncate or with more-or-less distinct median emargination, laterally flanked by teeth or acute angles. Frontal carinae low or only moderately raised. Eyes in most species relatively large, exceeding lateral cephalic outline in full face view. Ocelli lacking. Mesosomal dorsum relatively slender, laterally marginate; pronotal humeri ranging from rounded or subangular (as in extralimital *P. trispinosa* Fr. Smith) to angular (as in *P. queenslandica* Emery), or distinctly spinose (as in numerous extralimital species). Promesonotal suture and metanotal groove distinct; propodeum terminating posteriorly in acute teeth (as in *P. trispinosa*) or more commonly in variously elevated, acute spines. Dorsum of petiole armed with three spines (except in extralimital *P. unicuspis* Emery), that are either subequal in length, or with middle spine shorter than lateral pair (*P. equalis*-group) or with middle spine distinctly elongated (*P. thrinax*-group). Sculpturation of head and mesosoma mostly reticulate-punctate, however, dorsum of mesosoma in many extralimital species with more-or-less distinct, longitudinal reticulate-

striation. Gaster shagreened or finely reticulate-punctate. Pilosity and pubescence rather sparse over most body surfaces, except dorsum of head and mesosoma, where it is virtually lacking. Body uniformly yellowish-brown (as in extralimital *P. dahlii* Forel) or reddish-brown (as in *P. delicata* Crawley) or rarely bicoloured with head and body black and gaster and appendages light to medium reddish-brown (as in extralimital *P. textor brunneogaster* Donisthorpe).

Queen. Apart from sexual characters, very similar to worker except: distinctly larger (HL >1.95); armament of pronotum, propodeum and petiole distinctly reduced, with spines shorter and stronger; petiolar spines in most species more-or-less subequal, even in species of *thrinax*-group (e.g. *P. queenslandica*). Sculpturation, pilosity and colour virtally as in worker.

Distribution and biology. The distribution of the subgenus *Myrmothrinax* is very similar to that of the subgenus *Myrmatopa*, with most species occurring in south-east Asia, including India, Sri Lanka, Myanmar, Malaysia, Indochina, Thailand, Philippines and Vietnam. Both subgenera extend throughout Indonesia, Papua New Guinea, the Bismarck Archipelago and the Solomons to northern Australia. The nesting habits of both subgenera are virtually identical and Australian *Myrmothrinax* and *Myrmatopa* species are often found nesting together at suitable localities in north Queensland. They are all typical arboreal nesters building polydomous nests of silk and vegetation debris between the leaves of rain-forest trees and shrubs (Robson & Kohout 2005, 2007). However, in contrast to species of *Myrmatopa*, the pupae of all known species of *Myrmothrinax* are enclosed in cocoons.

KEY TO AUSTRALIAN *MYRMOTHRINAX* SPECIES
(Based on workers)

1. Generally reddish-brown; propodeal spines mostly upturned; petiolar node relatively slim, narrowed dorsally; petiolar dorsum in lateral view forming a single continuous line with dorsoposteriorly elevated median spine (Fig. 4G) ..... *P. delicata* Crawley
– Generally black or very dark reddish-brown; propodeal spines distinctly less elevated, oblique; petiolar node in lateral view distinctly thicker; petiolar dorsum virtually flat with leading edge of median spine more steeply elevated (Figs 4I, 6I) ..... *P. queenslandica* Emery

Polyrhachis thrinax species-group

Polyrhachis delicata Crawley, 1915
(Figs 4B, F-G, 8I)

Polyrhachis delicata Crawley, 1915: 238. Syntype workers. Type locality: AUSTRALIA, NORTHERN TERRITORY, Darwin, 16.iv.1913 (G.F. Hill), BMNH, QM (examined).

Polyrhachis lysistrata Santschi, 1920: 569. Syntype workers. Type locality: AUSTRALIA, QUEENSLAND, Townsville (F.P. Dodd), NHMB, QM (examined). Synonymy by Kohout, 1994: 135.

Other material. AUSTRALIA, NORTHERN TERRITORY, Holmes Jungle, c. 15 km NE of Darwin, 12°25'S, 130°58'E, monsoon rf., 16.xi.1993 (RJK accs 93.39, 40, 44 (w, ♀, ♂); ditto, 2.vi.2002 (RJK accs 02.10, 11) (w); Darwin, 12°27'S, 130°50'E, 16.iv.1913 (G.F. Hill) (w); Darwin, East Pt Reserve, 21.vi.1984 (M.B. Malipatil) (w); Kakadu NP, Ubirr-Manngarre, 12°25'S, 132°57'E, monsoon rf., 4.vi.2002 (RJK acc. 02.15) (w); Berry Springs NP, 12°42'S, 130°59'E, monsoon rf., 10.ii.1994 (RJK acc. 94.3) (w); ditto, 12.iii.1961 (J.L.& M. Gressitt). QUEENSLAND, Cape York Pen., Silver Plains, Station Ck, 13°59'S, 143°33'E, 4.i.1959 (J.L. Wassell) (w, ♀, ♂); Home Rule Stn, 15°45'S, 145°17'E, c.200 m, rf. margin, 9-11.vi.1996 (RJK & CJB acc. 96.42, 43) (w, ♀); Fritz Ck, Mt Finlay S slope, 15°50'S, 145°21'E, 5.xii.1975 (Davies & Monroe) (♀); Daintree, 8.viii.1975, rf. (BBL) (w); Caravonica, 11 km NW of Cairns, 16°51'S, 145°41'E, 19.ii.2000 (RJK & SKR acc. 2000.7) (w, ♀); Yarrabah, c. 9 km E of Cairns, 16°54'S, 145°51'E, 22-24.vii.1980 (RJK accs 80.124, 128, 132, 139, 140, 142, 143) (w, ♀); ?Townsville, 30.iv.1902 (F.P. Dodd) (w).

Worker. Dimensions (syntype cited first): TL c. 6.55, 5.39-6.90; HL 1.62, 1.43-1.72; HW 1.40, 1.22-1.47; CI 84, 82-93; SL 2.06, 1.84-2.15; SI 147, 142-153; PW 0.92, 0.78-0.97; MTL 2.18, 1.84-2.28 (37 measured).

Anterior clypeal margin with wide median truncation flanked by small teeth. Clypeus with

median carina; straight in profile, posteriorly rounding into moderately impressed basal margin. Frontal triangle distinct. Frontal carinae sinuate with margins only weakly raised at midlength; central area almost flat with poorly indicated frontal furrow. Sides of head in front of eyes converging towards mandibular bases in virtually straight line; behind eyes sides widely rounding into convex occipital margin. Eyes convex, in full face view clearly breaking lateral cephalic outline. Ocelli lacking; position of lateral pair indicated by shallow punctures in sculpturation. Pronotal dorsum often with poorly defined median longitudinal depression; pronotal humeri angular with lateral margins converging posteriorly into distinct promesonotal suture. Dorsum of mesosoma with lateral margins converging posteriorly in weakly sinuate line; metanotal groove well defined. Lateral margins of propodeum subparallel, terminating in strongly upturned, weakly diverging, acute spines. Petiole with anterior and posterior faces almost straight, converging dorsally in lateral view; petiolar dorsum a flat, posteriorly rising platform, armed with two widely diverging, short lateral spines and a long, acute, dorsoposteriorly elevated median spine. Anterior face of first gastral segment distinctly higher than full height of petiole, widely rounding onto gastral dorsum.

Mandibles finely longitudinally striate with numerous piliferous pits; sculpture finer and rather polished towards masticatory borders. Clypeus more-or-less longitudinally reticulate-striate. Intensity of sculpturation increasing posteriorly, with vertex, mesosoma and petiole distinctly reticulate-punctate. Gaster very finely shagreened, highly polished.

Mandibular masticatory borders with numerous, semierect, golden hairs and very short, closely appressed hairs towards bases. Clypeus with relatively short setae lining anterior margin and several relatively short, paired hairs near anterior and basal margins. A few slightly longer, semierect hairs along frontal carinae and on vertex, very few erect hairs on front coxae. Pubescence almost completely absent from mesosoma and petiole. Gastral venter and apical gastral tergites with numerous, relatively long hairs. Dorsum of gaster with very short, closely appressed, much diluted golden pubescence.

Colour. Body mostly medium to dark reddish-brown, often variously blotched light orange or red; head in fully pigmented specimens distinctly darker, usually very dark reddish-brown or black, with mandibles, except masticatory borders, middle portion of clypeus and central area along frontal carinae usually distinctly lighter; appendages mostly light to medium reddish-brown, with distal funicular segments progressively lighter towards antennal apex. Mandibular masticatory borders, anterior clypeal margin and frontal carinae narrowly lined with brown.

Queen. Dimensions: TL c. 8.11-8.67; HL 1.93-1.96; HW 1.61-1.65; CI 83-84; SL 2.28-2.34; SI 139-144; PW 1.59-1.68; MTL 2.43-2.59 (5 measured). Apart from sexual characters, closely resembling worker except: pronotal humeri obtusely angular. Mesoscutum about as wide as long, lateral margins converging anteriorly and forming moderately rounded anterior margin; median line distinct; parapsides flat. In profile, anterior face of mesoscutum widely rounding onto virtually flat dorsum. Mesoscutellum weakly convex, moderately raised above dorsal plane of mesosoma, strongly rounding into distinctly impressed metanotal groove. Propodeal dorsum with lateral margins indistinct; propodeal spines somewhat flattened dorsally, shorter than distance between their bases, oblique to main axis of body; their inner margins continued medially and forming an open 'U' in anterior view. Petiole with anterior and posterior faces converging dorsally; spines shorter and thicker than in worker; median spine only marginally longer than lateral pair with its apex more-or-less emarginated.

Males and immature stages (eggs, larvae and pupae) in QM spirit collection.

Remarks. As indicated earlier (Kohout 1994), the most obvious differences between *P. delicata* and *P. queenslandica* are their colour and the orientation of their propodeal spines. However, due to a high degree of variability, notably within Queensland populations of both species, these characters can be unreliable and, while both species are usually separable, no single character is universally diagnostic. The propodeal spines in *P. delicata* are generally more strongly upturned (Fig. 4G), but the actual angle of elevation varies between specimens, even those of the same nest series. The propodeal spines in *P. queenslandica* are distinctly less elevated with only a small amount of variation between the specimens examined (Figs 4I, 6I). The colour of the body appears to be a more reliable character to separate the species but only in fully pigmented specimens. A mostly red or reddish-brown mesosoma, gaster and appendages, contrasting with a darker head (almost black in some specimens) characterises *P. delicata*, while the body in *P. queenslandica* is mostly uniformly black or very dark reddish-brown. The sculpturation of the head and mesosoma in *P. delicata* is rather distinctly reticulate-punctate and opaque, while it is markedly more finely and closely punctate in *P. queenslandica*. The petiolar node in *P. delicata* is relatively slim and distinctly narrows dorsally in lateral view, with the anterior face smoothly curving onto the petiolar dorsum in an uninterrupted line that incorporates the anterior edge of the dorsoposteriorly elevated median spine. In contrast, the petiolar node in *P. queenslandica* is distinctly thicker in lateral view, with the anterior face curving onto a virtually flat dorsum and the median petiolar spine dorsoposteriorly elevated at a distinctly steeper angle. The latter character does not serve to separate the queens of the two species, however, the median petiolar spine in the queen of *P. queenslandica* is simply pointed, while its apex is clearly emarginated in *P. delicata*.

Both Australian *Myrmothrinax* species are arboreal nesters, using silk to join the leaves of various lowland rainforest trees and shrubs (Kohout 1999, 2000; Robson & Kohout 2005, 2007). *Polyrhachis delicata* is known from two disjunct populations, one in the Northern Territory around Darwin and the other in northern Queensland, ranging from about Coen on Cape York Peninsula south to Cairns. The specimens of the type series of the junior synonym *P. lysistrata* were allegedly collected 'near Townsville' by F.P. Dodd on 30.iv.1902, however, I have seen no other specimens of this species collected that far south.

Polyrhachis queenslandica Emery, 1895
(Figs 4C, H-I, 6C, H-I, 8J)

Polyrhachis queenslandica Emery, 1895: 356. Syntype workers. Type locality: AUSTRALIA, QUEENSLAND, Kamerunga (M. Podenzana), MHNG, MSNG (examined).

Polyrhachis dahli var. *unisculpta* Viehmeyer, 1914: 48. Syntype workers. Type locality: NEW GUINEA, Huon Pen., Wareo, MNHU (examined). Synonymy by Kohout, 1998: 510

Other material. PAPUA NEW GUINEA, Kokoda, 08°53'S, 147°45'E, 400 m, 18.xi.1966 (J. Sedláček) (w). AUSTRALIA, QUEENSLAND, Cape York Pen., Lockerbie Scrub, 10°46'S, 142°29'E, 19-23.iii.1987 (RJK accs 87.22, 45, 50, 55, 58, 61) (w, ♀, ♂); Bamaga, 10°53'S, 142°23'E, 18.iii.1987, rf. (RJK acc. 87.12) (♀); West Claudie R., 9 km ENE of Mt Tozer, 12°43'S, 143°17'E, 5-10.vii.1986 (J.C. Cardale) (w); ditto, 3-10. xii.1985, rf. (GBM & DJC) (w); Iron Ra, 12°43'S, 143°18'E, 26-31.vii.1981 (RJK accs 81.131, 135, 154, 155, 157, 158, 171, 186, 188) (w, ♀); Gap Ck, 5 km ESE of Mt Finnigan, 15°50'S, 145°20'E, 13-16.v.1981 (JEF) (w); Cooper Ck, nr Daintree, 16°11'S, 145°26'E, 22.vi.1971 (RWT & JEF) (w); Cairns Botanic Gardens, 16°54'S, 145°45'E, 18.i.1997 (SKR #490) (w); Bellenden Ker, Cableway Base Stn, 17-24.x.1981 (Earthwatch & QM Exp.) (w); Seymour Ra., Garradunga, c. 7 km N of Innisfail, 17°28'S, 146°01'E, <100 m, 5-6.vi.1996 (RJK & CJB acc. 96.31) (w); Canal Ck, nr Innisfail, 23.v.1993 (L.R. Ring) (w, ♀, ♂); N. Mission Beach, nr Tully, 25.vi.1962 (RWT) (w); c. 6 km W of Sth Mission Beach, 17°56'S, 146°02'E, 18-19.vii.1980 (RJK accs 80.68, 71, 72, 73, 74) (w, ergatogyne); Little Crystal Ck, Paluma, 28.viii.1995 (SKR #7) (w).

Worker. Dimensions (syntypes [5] cited first): TL c. 5.95-6.70, 5.09-6.71; HL 1.50-1.65; 1.34-1.65; HW 1.26-1.42, 1.15-1.47; CI 82-88, 82-89; SL 1.90-2.03, 1.72-2.12; SI 141-153, 141-155; PW 0.87-0.97, 0.75-1.00; MTL 2.06-2.28, 1.78-2.40 (74 measured).

Anterior clypeal margin with wide median truncation flanked by small teeth. Clypeus with median carina; straight in profile, posteriorly

rounding into moderately impressed basal margin. Frontal triangle distinct. Frontal carinae sinuate with margins only weakly raised at midlength; central area weakly convex with poorly indicated frontal furrow. Sides of head in front of eyes converging towards mandibular bases in weakly convex line; behind eyes sides widely rounding into convex occipital margin. Eyes convex, in full face view clearly breaking lateral cephalic outline. Ocelli lacking; position of lateral pair indicated in some specimens by shallow punctures in sculpturation. Pronotal dorsum often with poorly defined median longitudinal depression; pronotal humeri angular with lateral margins converging posteriorly into distinct promesonotal suture. Dorsum of mesosoma with lateral margins converging posteriorly into well defined metanotal groove. Lateral margins of propodeum subparallel, terminating in obliquely elevated, subparallel, acute spines. Petiole with anterior face straight, posterior face weakly convex; petiolar dorsum a virtually flat platform, armed with two widely diverging, short lateral spines and a long, acute, dorsoposteriorly elevated median spine. Anterior face of first gastral segment distinctly higher than full height of petiole, widely rounding onto gastral dorsum.

Mandibular bases finely longitudinally striate-rugose, sculpture distinctly finer and polished towards masticatory borders. Head mostly finely reticulate-punctate, feebly polished. Intensity of sculpturation somewhat increasing posteriorly, with mesosoma and petiole more closely and distinctly reticulate-punctate. Gaster very finely shagreened, highly polished.

Mandibular masticatory borders with several, semierect, golden hairs and very short, closely appressed hairs towards bases. Anterior clypeal margin with a fringe of a few, rather short setae; clypeus with pair of relatively short hairs near anterior and basal margins; slightly longer, semierect hairs along frontal carinae, on vertex and front coxae. Pilosity and pubescence almost completely absent from mesosoma and petiole. Gastral venter and apical gastral tergites with numerous, relatively long hairs. Dorsum of gaster with very short, closely appressed, much diluted golden pubescence.

Colour. Head and body in fully pigmented specimens mostly black or very dark reddish-brown. Mandibles, except masticatory borders, clypeus and central area, legs, including coxae and base of gastral dorsum usually dark reddish-brown; funicular segments progressively lighter, yellowish-brown, towards antennal apex. Mandibular masticatory borders, anterior clypeal margin and frontal carinae narrowly lined with black or very dark brown.

Queen. Dimensions: TL c. 8.11-9.17; HL 1.87-1.96; HW 1.59-1.68; CI 84-87; SL 2.25-2.34; SI 134-144; PW 1.58-1.68; MTL 2.46-2.59 (10 measured). Apart from sexual characters, closely resembling worker except: pronotal humeri obtusely angular. Mesoscutum about as wide as long, lateral margins converging anteriorly and forming moderately rounded anterior margin; median line distinct, bifurcate dorsally; parapsides flat, only marginally raised posteriorly. In profile, anterior face of mesoscutum widely rounding onto weakly convex dorsum. Mesoscutellum raised above dorsal plane of mesosoma, strongly rounding posteriorly into distinctly impressed metanotal groove. Propodeal dorsum with lateral margins indistinct; propodeal spines somewhat flattened dorsally, about as long as distance between their bases, oblique to main axis of body; their inner margins continued medially and forming an open 'U' in anterior view. Petiole with anterior face rounding onto posteriorly elevated dorsum; spines shorter and thicker than in worker; middle spine only marginally longer than lateral pair, acute.

Males and immature stages (eggs, larvae and pupae) in QM spirit collection.

Remarks. *Polyrhachis queenslandica* bears a very close resemblance to *P. delicata*, with differences between them discussed in length under the latter species.

The distribution of *P. queenslandica* is divided between New Guinea and northern Queensland, where it overlaps with *P. delicata*. The syntypes of the synonym *P. dahli unisculpta*, collected at Wareo on Huon Peninsula, and a single worker from Kokoda, are the only known records of the species from New Guinea. In Australia it is relatively common, though somewhat less abundant than *P. delicata*, particularly towards the southern limit of its distribution. The known Australian range extends from the tip of Cape York Peninsula south to about the Paluma Range. Its nesting habits are identical to *P. delicata* (see above).

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

Polyrhachis Fr. Smith; Wheeler, 1911: 859 (as subgenus of *Polyrhachis* Fr. Smith, 1857). Type species: *Formica bihamata* Drury, 1773: 73 by subsequent designation.

Polyrhachis Fr. Smith; Emery, 1925: 181 (as subgenus of *Polyrhachis* Fr. Smith) (diagnosis).

The subgenus *Polyrhachis* was established by Wheeler (1911) to replace the 'cohors' Polyrhachides hamatae of Emery's (1896) older generic classification. Wheeler (1911) listed *Polyrhachis bihamata* Drury as the type species but Emery (1925) was the first to define the subgenus. Emery also subdivided *Polyrhachis* into two species-groups; the *lamellidens*-group for species with the mesosoma laterally marginate and the *bihamata*-group for species with an immarginate mesosoma. The subgenus comprises nine species, with only one (*P. bellicosa* Fr. Smith) relevant to the Australian fauna.

Diagnosis. *Worker*. Medium to large-sized ants (HL 1.50-3.00) with characteristics of the genus. Mandibles finely and densely longitudinally striate. Anterior clypeal margin arcuate; clypeus convex in profile with basal margin distinctly impressed (as in *P. bellicosa* Fr. Smith) or virtually straight with basal margin flat (as in extralimital *P. craddocki* Bingham). Sides of head in front of eyes converging towards mandibular bases in more-or-less convex line; rounding behind eyes into convex occipital border. Eyes only moderately convex, in full face view not, or only marginally exceeding lateral cephalic outline. Median ocellus present in most species (except in *lamellidens*-group), but lateral ocelli mostly obscure or lacking. Pronotum immaginate, armed with anterolaterally projecting, gently downcurved, slender spines (as in *P. bellicosa*), or very stout spines that project outwards, with their tips curved slightly backwards and downwards (as in extralimital *P. ypsilon* Emery); or in contrast, armed with anterolaterally projecting, virtually straight, horizontal spines, with their lateral borders continued towards promesonotal suture and forming laminate pronotal margins (as in *P. craddocki* and *P. lamellidens* Fr. Smith). Mesonotum convex, bearing a pair of pyramidal, dorsoposteriorly projecting spines (as in *bihamata*-group), or with lateral margins distinctly raised dorsally, forming dorsolaterally curved flat spines (as in *lamellidens*-group). Propodeal dorsum weakly marginate, terminating posteriorly in medially directed short ridges (as in *P. bellicosa*), or immarginate, terminating in short spines (as in extralimital *P. olybria* Forel), or fully marginate, terminating in more-or-less horizontal, dorsoventrally flattened, blunt spines (as in *lamellidens*-group species). Petiole columnar, bearing a pair of hook-shaped, subparallel (e.g. *P. bellicosa*), or widely divergent (e.g. *P. ypsilon*) spines. Gaster with basal segment usually covering less than half of dorsum. Body mostly finely reticulate-punctate, gaster very finely shagreened and moderately polished, except in species with abundant gastral pubescence (e.g. *P. ypsilon* or *P. montana* Hung), or head and gaster fairly smooth and polished, with mesosoma and petiole, except tips of spines, distinctly more coarsely sculptured, opaque. Pubescence and pilosity variable between species, ranging from very sparse (as in *P. bellicosa*) to rather abundant (as in *P. ypsilon*). Generally bicoloured; head and gaster mostly black (very dark reddish-black in *lamellidens*-group species), with base of first gastral segment in some species (e.g. *P. olybria*) distinctly lighter, reddish-brown; mesosoma and petiole reddish-brown, ranging from relatively

light (e.g. *P. bellicosa*) to very dark reddish-black (as in *P. craddocki*).

Queen. Very different from the worker and as a result of their dissimilarity, *P. olybria*, originally described from two queens, was not only considered by Forel to be a different species from the associated workers, but was placed in a different subgenus (*Myrmhopla* Forel) (see Kohout 1998).

Queen distinctly larger than worker with usual characters identifying full sexuality. Spines distinctly shorter, with pronotal spines virtually straight and anterolaterally and slightly ventrally directed. Mesonotal spines absent and petiolar spines greatly reduced, short and widely diverging with their tips simply curving backwards (see Kohout 1988, figs 2A-F, 5B, D). Sculpturation similar to that in worker, except in extralimital *P. lamellidens*, where entire body is very smooth and highly polished. Generally black with parts of pronotum, petiole below stigma, dorsum of first gastral segment and appendages, light to medium reddish-brown.

Distribution and biology. The distribution of the subgenus is centered on south-east Asia, extending from Japan and China to the Philippines, Malaysia, Indochina and south throughout Indonesia to New Guinea and northern Australia. Nesting habits of species of *Polyrhachis* range from arboreal to lignicolous and terrestrial, with nests of *P. lamellidens* usually found in rotten logs (Hung 1970).

Polyrhachis bihamata species-group

Polyrhachis bellicosa Fr. Smith, 1859
(Figs 5A, D-E, 8H)

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

Polyrhachis bellicosa var. *crudelis* Emery, 1887: 238. Syntype workers. Type locality: INDONESIA, Mortly I. (= Morotai) (Gribodo), MSNG (examined). Synonymy by Hung, 1970: 5.

Polyrhachis (Polyrhachis) bellicosa Fr. Smith; Hung, 1970: 5 (in part).

Polyrhachis bellicosa Fr. Smith; Kohout, 1988a: 418.

Other material. PHILIPPINES, MINDANAO, Agusan, 10 km SE S. Francisco, 12.xi.1959 (L.W. Quate & C.M. Yoshimoto) (w); NEGROS OR., Dumaguete, 5.i.1922 (J.W. Chapman) (w). MALAYSIA, SELANGOR, Ulu Gombak Research Centre, 18.i.1986 (W.H.O. Dorow #139) (w, ♀); ditto, 8.i.1994 (C. Liefke) (w). BORNEO, BRUNEI, Belait Distr., Melilas (school yard), 20.iv.1993 (RJK acc. 93.31) (w); 1-2 km SE of Melilas Longhouse, 16.vii.1994 (RJK at al. acc. 94.123 (w). INDONESIA, SERAM I. (as Goram I.), Marzo,1872 (L.M. D'Albertis) (w); ditto, Manusela NP, Wae Mual Plain, 25.vii-9.ix.1987 (M.J.D. Brendell, B.M. 1987-262) (w). AMBON, 11.iii.1965 (A.M.R. Wegner) (w). IRIAN JAYA, 50 km S of Manokwari, Arfak Mts Nat. Reserve, 25 m, 24.ii.1995 (G.D. Alpert) (w); Maffin Bay, 01°57'S, 138°51'E, vi-ix.1944 (E.S. Ross) (w); Nabire, S Geelwing Bay, 10-40 m, 2.x.1962 (H. Holtmann) (w). PAPUA NEW GUINEA, East Sepik Prov., Angoram, 04°04'S, 144°03'E, 10 m, 13.viii.1969 (J.L. Gressitt) (w); Dreikikir, W of Maprik, 03°34'S, 142°44'E, 350-400 m, 23.vi.1961 (J.L.& M. Gressitt) (w); West Sepik Prov., Torricelli Mts, Lumi, 400-550 m, 03°28'S, 142°02'E, 4-13.viii.1984 (RJK accs 84.243, 260, 284) (w, ♀); ditto, x.1984 (D. Waisi) (w, ♀); Pes Mission, 03°11'S, 142°15'E, <50 m, 31.vii-3.viii.1984 (RJK acc. 84.206) (w); Morobe Prov., Finschhafen, 06°34'S, 147°51'E, iv.1944 (E.S. Ross) (w)nr Wampit, 06°45'S, 146°40'E, 24.& 27.viii.1984 (RJK accs 84.345, 365, 377) (w, ♀); Lae, 06°43'S, 147°00'E, <50 m, 17.vi.1972 (RWT acc. 72.371) (w); Chimbu Prov., Keglsugl, 05°44'S, 145°04'E, 2600 m, 13.viii.1969 (J.L. Gressitt) (w); Madang Prov., Wanuma, Albert Mts, 04°36'S, 145°06'E viii.1968 (N.L.H. Kraus) (w); Northern Prov., Owen Stanley Ra., 500 m, Mamba Pltn c. 7 km WNW of Kokoda, 08°51'S, 147°41'E, 31.viii.1984 (RJK acc. 84.403) (w, ♀); Pongani R., Boikiki Pltn, c. 8 km NNE of Afore, c. 09°06'S, 148°25'E, c. 500 m, 29-30.ix.1984 (RJK acc. 84.382) (w); Mt Lamington, 08°50'S, 148°08'E (T.C. McNamara) (w); Tapini, Owen Stanley Ra., 08°21'S, 146°59'E, 1000-1100 m, 18.v.1961 (J.L.& M. Gressitt) (w); Central Prov., 25 km NE of Sogeri, Musgrave R., 09°33'S, 147°38'E, 25.x.1984 (T. Mala) (w), Varirata NP, 760 m, 5.ii.1981 (W.L. Brown) (w); Milne Bay (Province), c.10°22'S, 150°30'E, iii-iv.1944 (H.R. Roberts) (w); New Britain Prov., Gazelle Pen., Maining Mts, nr Gaulim, 04°28'S, 152°07'E, c. 150 m, 13.vii.1984 (RJK accs 84.52, 58, 59) (w); 12 km SW of Vudal Agric. College, 04°25'S, 151°57'E, c. 200 m, 15.vii.1984 (RJK acc. 84.83) (w); Kimbe Distr., Kavui Subdiv., 13.ii.1981, lowland rf. (W.L. Brown) (w); New Ireland Prov., 3 km S of Konos, 03°08'S, 151°43'E <50 m, 22.vii.1984 (RJK 84.112, 117) (w, ♀). AUSTRALIA, QUEENSLAND, Cape York Pen., Bamaga, 10°54'S, 142°23'E, 18-24.iii.1987 (RJK acc. 87.3); Iron Ra., 12°43'S, 143°18'E, 26-31.vii.1981 (RJK accs 81.138, 216) (w); ditto, 1-3.vii.1976 (*P.* Filewood)

(w); West Claudie R., Iron Ra. area, 3-10.xii.1985 (GBM & DJC) (w).

Worker. Dimensions (holotype cited first): TL c. 8.98, 7.30-8.98; HL 2.06, 1.80-2.12; HW 1.75, 1.56-1.96; CI 85, 83-97; SL (antennae missing), 2.27-2.72; SI (missing), 132-154; PW 1.03; 0.86-1.03; MTL 3.65, 3.07-3.68 (57 measured).

Mandibles with 5 teeth reducing in length towards base. Anterior clypeal margin arcuate, entire. Clypeus produced medially into short, blunt carina; convex in profile with basal margin moderately impressed. Frontal triangle distinct. Frontal carinae sinuate with margins distinctly raised at midlength, converging posteriorly; central area flat with clearly indicated frontal furrow. Sides of head in front of eyes very weakly convex; behind eyes sides widely rounding into narrow occipital margin. Eyes only moderately convex, in full face view only marginally breaking lateral cephalic outline. Ocelli present; median ocellus fully developed, lateral ocelli obscure in most specimens. Pronotum with spines long and acute, rising dorsally and turning anterolaterally with their tips gently downcurved; lateral edges of spines continued towards promesonotal suture forming ill-defined lateral pronotal margins. Mesonotum convex, bearing pair of pyramidal, dorsoposteriorly projecting spines with laterally curved tips. Metanotal groove poorly indicated. Propodeal dorsum with weak lateral margins that terminate posteriorly in medially directed, short, transverse ridges, partly separating propodeal dorsum from shallowly concave declivity. Petiolar column, armed with a pair of subparallel, hook-shaped, spines, that occur in two forms; more commonly with spines somewhat flattened and their tips weakly curved outwards, or less commonly (as in holotype), with anterior section of column distinctly swollen and spines more strongly curved posteriorly (see Kohout 1988: 418, figs 1E, F versus 1A, C). Gaster with first segment covering usually less than half of gastral dorsum.

Mandibles finely longitudinally striate with numerous piliferous pits. Head, including clypeus, finely reticulate-punctate, feebly polished. Mesosoma and petiole generally reticulate-punctate, with pronotal dorsum and apices of spines fairly smooth and polished. Gaster very finely shagreened, moderately polished.

Mandibles with numerous, semierect, golden hairs and very short appressed hairs towards bases. Anterior clypeal margin with several longer setae medially and fringe of short setae lining margin laterally. Clypeus with a pair of longer hairs anteriorly; a few slightly longer hairs on front coxae and subpetiolar process. Gaster with several, relatively long hairs dorsally on apical segments and numerous hairs on gastral venter. Appressed to sub-erect pubescence, yellowish to golden on head and gaster and off-white on mesosoma and petiole, rather abundant over entire body, including appendages, without obscuring underlying sculpturation.

Mandibles, head, antennae, tips of spines, tibiae and tarsi black; mesosoma, petiole, coxae and femora, except their apical portions, light to medium reddish-brown. Gaster mostly black with base and lateral portions of subsequent segments blotched dark reddish-brown.

Queen. Dimensions: TL c. 9.77-10.08; HL 2.12-2.22; HW 1.56-1.66; CI 74-76; SL 2.95-3.02; SI 181-189; PW 1.41-1.51; MTL 3.93-4.03 (12 measured). Queen larger than worker with usual characters identifying full sexuality. Mandibles with 4 teeth, apical tooth almost three times longer than other teeth. Anterior clypeal margin arcuate; clypeus strongly produced medially into short, blunt carina; convex in profile. Sides of head immediately in front of eyes virtually parallel and weakly concave towards mandibular bases. Eyes relatively large, convex, in full face view clearly exceeding lateral cephalic outline. Mesoscutum about as wide as long with flat dorsum; median line distinct; parapsides rather flat anteriorly, weakly raised posteriorly. Mesoscutellum convex, moderately raised above dorsal plane of mesosoma. Pronotal spines distinctly shorter than in worker, virtually straight, anterolaterally

and slightly ventrally directed. Mesonotal spines absent. Propodeal dorsum immarginate with posterior angles terminating in upturned, medially directed transverse ridges, partly separating propodeal dorsum from oblique declivity. Petiolar spines greatly reduced, short and widely diverging with tips simply curving backwards (see Kohout 1988, figs 2A-C). Sculpturation similar to that in worker, except dorsum of mesosoma closely reticulate-punctate, opaque. Whole body black, with only mandibles, pronotal collar, lateral portions of pronotum, petiole below stigma and appendages medium to dark reddish-brown.

Males and immature stages (eggs, larvae and pupae) in JWGU and QM spirit collections.

Remarks. *Polyrhachis bellicosa* is the only member of the nominal subgenus that occurs in Australia. Its distribution extends from south-east Asia to Indonesia, New Guinea and south to Cape York Peninsula in Queensland. It is a relatively rare species towards the northern limits of its distribution (Philippines, Malaysia and Borneo), where the very similar and rather common *P. olybria* Forel is often misidentified as *P. bellicosa* (see Kohout 1998: 508-509). *Polyrhachis bellicosa* is much more common in New Guinea, where it occurs sympatrically with *P. erosispina* Emery. The relationship and differences between both species were discussed in detail by Kohout (1988a: 418-422).

The nesting habits of *P. bellicosa* appear highly diverse with collection records listing terrestrial, lignicolous and arboreal nesting sites. Two nests located at Iron Range on Cape York Peninsula were both situated about 2-4 metres above the ground and attached to tree trunks using lianas and a strong network of tendrils from other climbers for support. The nests consisted of various vegetation debris bound together by a yellowish-brown silk (Kohout 1988a, 1999; Robson & Kohout 2005, 2007).

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