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A review of the Australian *Polyrhachis* ants of the subgenera *Myrmhopla* Forel and *Hirtomyrma* subgen. Nov. (Hymenoptera: Formicidae: Formicinae)

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ABSTRACT

The Australian species of the *Polyrhachis* subgenus *Myrmhopla* are revised. A total of eight Australian species are recognised in four species-groups; four species in the *sexspinosa*-group, two species in the *bicolor*-group and single species in each of the *dives*- and *mucronata*-groups. A new subgenus *Hirtomyrma* is proposed to house ten species formerly included within the *P. viehmeyeri*-group of the subgenus *Myrmhopla*. *Polyrhachis dispar* sp. nov. is described and placed in the *sexspinosa*-group. *Polyrhachis bicolor nigripes* is raised to specific status and reported from Australia for the first time. The extralimital species *P. cyrtomyrmoides* Donisthorpe is considered synonymous with *P. mucronata* Fr. Smith. A neotype for *P. sexspinosa* (Latreillei) and lectotype for *P. reclinata* Emery are designated. All species are illustrated and their distribution and nesting habits are summarised. Keys to the subgenera of Australian *Polyrhachis* and to species of *Myrmhopla* and *Hirtomyrma* are included. ❐ *Polyrhachis*, *Myrmhopla*, *Hirtomyrma*, *bicolor-group*, *dives-group*, *mucronata-group*, *sexspinosa-group*, *Australia*, *distribution.*

Myrmhopla was established by Forel (1915) as a subgenus of *Polyrhachis* Fr. Smith, 1857, with *Formica armata* (Le Guillou, 1842) as the type species. Forel did not define his new subgenus but Emery (1925) later delimited *Myrmhopla* as follows (translation): "*Worker*. - Dorsum of thorax rounded, that is to say not marginate, except in some species (groups *cryptoceroides* and *viehmeyeri*); pronotal spines shorter than propodeal, sometimes absent; metanotal groove variable. Petiole variable amongst the groups and species; body of petiole in form of an elongate node, angled anterodorsally in profile or, to the contrary, forming a thick scale, higher than long, angular or rounded in front; generally bearing single pair of spines very variable in form, size and direction; rarely the spines are hook-like; in many species where they form a gaster embracing arc, there is between spines also a pair of teeth or small vertical spines. First gastral segment large. *Female*. - Very similar to the worker, with spines usually stronger and shorter."

When Emery published his diagnosis of *Myrmhopla*, the subgenus already included some 140 species and subspecific forms. In an attempt to partition the high degree of diversity within such a large subgenus, he subdivided *Myrmhopla* into six species-groups. Dorow (1995) divided the subgenus further, recognising 16 species-groups, the six proposed by Emery and ten that he established as new. Five of these groups are

relevant to the Australian fauna; the *bicolor*, *dives*, *mucronata*, *sexspinosa* and *viehmeyeri*-groups.

However, as mentioned by previous authors (Bolton, 1975; Dorow, 1995), the large degree of morphological diversity within *Myrmhopla* presents problems with maintaining the subgenus as it was originally perceived. Virtually none of the characters originally used by Emery (1925) to define *Myrmhopla* consistently apply to the species currently placed within the subgenus and some characters vary within a single species-group. The concept of the subgenus has widely been criticised (Hung, 1967) and the formation of numerous species-groups within *Myrmhopla* has only partially alleviated the problem.

Considerable morphological differences between various species-groups are evident throughout the subgenus *Myrmhopla*, but nowhere as markedly as in relation to the *P. viehmeyeri*-group. For example, a marginate mesosoma is a particularly significant character separating species of the *viehmeyeri*-group from the rest of *Myrmhopla*, except perhaps some species of the extralimital *P. cryptoceroides*-group (e.g. *P. cryptoceroides* Emery) (Kohout, 2006a). In some respects, *viehmeyeri*-group species resemble members of the subgenus *Hedomyrma* Forel as they share a spinose and marginate mesosoma and a petiole featuring a more-or-less flat dorsum. However the characteristic vermiculate sculpturation, bristle-like pilosity and distinct reddish-brown colouration of species of the *viehmeyeri*-group clearly separate them from *Hedomyrma* species. The most remarkable feature of *viehmeyeri*-group species is their subterranean nesting habit combined with a sophisticated parasitic relationship with certain groups of ectatommine and poneroid ants (Maschwitz *et al.*, 2003). The morphological and behavioural distinctness of the *viehmeyeri*-group is further supported by a preliminary molecular phylogeny of *Polyrhachis* (S.K.A. Robson, *pers. comm.*) that places the *viehmeyeri*-group (i.e. *P. loweryi*) closest to species of the subgenus *Chariomyrma* Forel (*P. lata* Emery and *P. sokolova* Forel) and rather distant from representatives of other *Myrmhopla* species-groups. Considering these facts, I believe that the *viehmeyeri*-group should be removed from the subgenus *Myrmhopla* and a new subgenus *Hirtomyrma* is proposed below to incorporate its constituent species.

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. Associated males of only a few species are known and present in the ANIC and/or QM spirit collections. Their diagnosis is beyond the intended scope of this paper and has not been attempted.

The 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 'New Guinea' or 'Bismarck Archipelago' alone indicate the delimitation of these regions in a biogeographic sense regardless of current political boundaries.

Illustrations. Photographs of specimens were taken with an Olympus SZX12 Stereomicroscope and DP70 digital camera. Images were processed using Helicon Focus (Mac OSX version) and Photoshop CS2 (Adobe Inc., USA) software. The holotypes of *P. dispar* sp. nov., *P. bamaga* Kohout, *P. eremita* Kohout and *P. rustica* Kohout, the paratype of *P. loweryi* Kohout and type-compared specimens from Australian localities of other species are illustrated. The illustrations of *P. sexspinosa* (Latreille) are of the neotype designated below.

Standard measurements and indices. Measurements and indices follow those of Kohout (2006):

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 × 100/HL); SL = Scape length (excluding the condyle); SI = Scape index (SL × 100/HW); PW = Pronotal width (greatest width of the pronotal dorsum); 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; GBM - G.B. Monteith; RJK - R.J. Kohout; RWT - R.W. Taylor; SKR - S.K. Robson. Other abbreviations used in specimen data are: NP - National Park; Pen. - Peninsula; PNG - Papua New Guinea; R. - River; Ra. - Range; Rd - Road; rf. - rainforest; Stn - Station; w - worker/s.

Institutions and depositories. (with 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); HNHM – Hungarian Natural History Museum, Budapest, Hungary (Dr J. Papp); IZAS – Institute of Zoology, Ukrainian Academy of Sciences, Kiev, Ukraine (Dr A.G. Radchenko); 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); 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); MSNG - Civic Museum of Natural History "G. Doria", Genova, Italy (Drs R. Poggi, V. Raineri); MVMA – Museum of Victoria, Melbourne, Vic., Australia (Dr K. Walker); NMNH – National Museum of Natural History, Washington, DC, USA (Dr T.R. Schultz); OXUM – Hope Entomological Collections, University Museum, Oxford, UK (Drs C. O'Toole, D.J. Mann); QM - Queensland Museum, Brisbane, Qld, Australia (Dr C.J. Burwell); TERC – Tropical Ecosysytems Research Centre, CSIRO Sustainable Ecosystems, Darwin, NT, Australia (Dr A.N. Andersen).

SYSTEMATICS

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

Polyrhachis Fr. Smith, 1857: 58. Type species: *Formica bihamata* Drury, 1773 by original designation.

KEY TO AUSTRALIAN SUBGENERA OF *POLYRHACHIS* (based on worker caste)

1. Mesonotum armed with a pair of upwards and backwards curved spines; petiole distinctly higher than full height of mesosoma, terminating in a pair of hook-like spines (Fig. 1K) (arboreal) (Cape York Pen.) . . . . *Polyrhachis* (only *P. bellicosa* Fr. Smith)

– Mesonotum without spines; petiole lower than full height of mesosoma, dorsum armed with spines or teeth of various configurations or virtually unarmed 2

2. Mesosoma completely laterally immarginate 3

— Mesosoma at least partly laterally marginate 5

3. Small species (HL 1.25-1.65); dorsum of mesosoma relatively short, strongly longitudinally and transversely convex; pronotal spines reduced to acute teeth or absent; body uniformly black, highly polished 4

— Small to large species (HL 1.40-3.60); dorsum of mesosoma elongate, only weakly to moderately convex; pronotal spines relatively long, acute; colour of body variable, mostly black, but also reddish-brown or bicoloured (Figs 1A-F, 4A-F) (arboreal or lignicolous) (tropical Qld and NT) . . . . *Myrmhopla* (part)

4. Sides of head with longitudinal carina separating gena from ventral parts of head; propodeal spines, if present, very short; petiole scale-like, armed with four spines or teeth of various lengths and configurations, (Fig. 1C) only rarely reduced to mere denticles (*P. brevinoda* Kohout) (arboreal) (NT, Qld and coastal NSW) . . . . . *Cyrtomyrma*

— Sides of head without longitudinal carina; propodeal spines long; petiole columnar, armed with a pair of horizontal spines that conform to shape of first gastral segment and a pair of distinct intercalary teeth (Fig. 3E, F) (arboreal) (Cape York Pen. and north Qld) . . . . . *Myrmhopla* (part) (only *P. mucronata* Fr. Smith)

5. Pronotal humeri simply rounded or, at most, bluntly angular (Figs 1A, D) 6

— Pronotal humeri armed with spines or acute teeth (Figs 1E, G) 9

6. Dorsum of petiole usually narrowly rounded, rarely with a distinct platform (*P. thusnelda* Forel), armed with a pair of more-or-less horizontal, backwards directed or diverging, acute spines; propodeal spines rarely hook-like (*P. ammonoeides* Roger); propodeal spines always present (Fig. 1D), mostly horizontal or weakly elevated (subterranean, rarely lignicolous or lithocolous) (Australia-wide, except south, south-west and Tasmania) . . . . . *Hagiomyrma*

— Dorsum of petiole variable, with two, three or four upward directed spines or teeth of various lengths and configurations, or petiole virtually unarmed; propodeal spines present or reduced to mere teeth 7

7. Small species (HL 1.15-1.65); petiole columnar with two or three spines; body light coloured, mostly yellowish- or reddish-brown (arboreal) (tropical north Qld and NT only) 8

— Small to large species (HL 1.10-2.80); petiole scale-like, usually with four teeth or short spines, but rarely also with one (*P. pseudothrinax* Hung) or two (e.g. *P. prometheus* Santschi) elongated spines or virtually unarmed with only shallow median emargination (Fig. 1A); body mostly black or rarely reddish-brown (*P. incerta* Kohout) (subterranean or lignicolous, nocturnal and crepuscular foragers) (Australia-wide, incl. Tasmania) . . . . . *Campomyrma*

8. Petiole armed with three spines, middle spine distinctly longer than lateral spines; propodeal spines acute, distinctly elevated or virtually vertical (Fig. 1J) (arboreal) (NT and north Qld) . . . . . *Myrmothrinax*

— Petiole armed with two short spines; propodeal spines reduced to short, upturned teeth (Fig. 1H) (arboreal) (north Qld) . . . . . *Myrmatopa* (part) (only *P. lombokensis* Emery)

9. Pronotal humeri produced into broad-based short teeth with lateral margins distinctly expanded, virtually laminate; mesonotal and propodeal margins often elaborate, variously incised or with laterally dilated laminate lobes (e.g. *P. schoopae* Forel); body mostly broad and stocky (Fig. 1B) with short appendages, generally with abundant pilosity and pubescence often masking underlying sculpturation (subterranean or rarely lignicolous) (Australia-wide, except Tasmania) . . . . . *Chariomyrma*

— Pronotal humeri produced into spines or acute teeth with lateral margins distinct,

but not laminate; mesonotal and propodeal margins simple, never elaborate; body elongate with relatively long appendages and only rarely with abundant pilosity and/or pubescence (e.g. *P. (Hedomyrma) clotho* Forel) 10

10. Pronotal humeri produced into long, horizontal, anteriorly directed spines; propodeal spines reduced to short, upturned teeth; petiole scale-like, armed with a pair of acute, upward directed spines and a tooth or blunt angle situated below their bases (Fig. 1G) (lignicolous or terrestrial) (Cape York Pen.) . . . . . *Myrma*

— Pronotal humeri produced into horizontal or variously elevated, mostly anterolaterally directed spines or acute teeth; propodeal spines present or rarely reduced to acute teeth (*P. (Myrmatopa) alphea* Fr. Smith); petiole columnar with a pair of horizontal or elevated spines 11

11. Small species (HL < 1.75); propodeal spines reduced to acute teeth; petiole armed with two, rather long, upward directed spines (arboreal) (Cape York Pen.) . . . .*Myrmatopa* (part) (only *P. alphea* Fr. Smith)

— Larger species (HL > 1.75); propodeal spines always present; petiole with more-or-less flat dorsum, armed with a pair of horizontal or variously elevated spines 12

12. Pronotal dorsum flat; humeri armed with acute, somewhat elevated, slender spines; propodeal spines acute, usually longer than pronotal pair, variously elevated; dorsum of petiole with rather vague, posteriorly sloping platform; dorsa of head, mesosoma and petiole with characteristic vermiculate sculpturation and short, bristle-like, brown hairs (Figs 1F, 6A-F, 7A-F) (subterranean) (Qld) . . . . . *Hirtomyrma*

— Pronotal dorsum more-or-less longitudinally and transversely convex; humeri armed with mostly horizontal, dorsally flattened, laterally or anterolaterally directed acute spines or teeth (Fig. 1E); propodeal spines mostly horizontal, but also elevated; dorsum of petiole with rather conspicuous platform (except in *P. clio* Forel); body sculpturation never vermiculate, ranging from rugose to rather smooth; silvery or rich golden pilosity and pubescence in various densities over most body surfaces (lignicolous or rarely lithocolous) (tropical and coastal temperate Australia, except central and southern regions) . . . . . *Hedomyrma*

Subgenus **Myrmhopla** Forel, 1915

Myrmhopla Forel, 1915: 107. Type species: *Formica armata* Le Guillou, 1842 by original designation.

KEY TO AUSTRALIAN SPECIES OF THE SUBGENUS *MYRMHOPLA* (based on worker caste)

1. Larger species (HL >2.00); all body surfaces, including appendages, with relatively long, erect hairs; appressed or suberect pubescence present in various densities but usually not completely hiding underlying sculpturation; gastral pubescence organised in midline pattern (Fig. 5C, E) (*sexspinosa*-group) . . . . . 2.

— Smaller species (HL <2.00); body pilosity and pubescence highly variable between species-groups, from rather abundant to virtually lacking; gastral pubescence, if present, not forming midline pattern (Figs 2C, E, 3C, E) 5

2. Smaller species (HL <2.70); head and anterior portion of mesosoma black with propodeum and petiole mostly reddish-brown; vertex of head coarsely rugose; pronotal dorsum rather smooth and polished or weakly and shallowly sculptured; short, sparse pubescence mostly greyish or white (Fig. 4B, E-F) *glabrinota* Clark.

— Larger species (HL >3.00); head and body mostly black; dorsum of head and pronotum reticulate-punctate or rugose beneath rather long, golden or silvery pubescence 3

3. Head strongly tapered behind eyes; occipital margin narrow, forming lateral lobes that are more-or-less visible with head in full face

view (Fig. 5A, B); antennal scapes relatively long (SI >190) 4

— Head not strongly tapered behind eyes; occipital margin broad, without distinct lateral lobes (Fig. 4A); antennal scapes relatively short (SI <160) . . . . *dispar* sp. nov.

4. Propodeal spines generally vertical to main axis of body or even inclined anteriorly; dorsum of head and mesosoma rather coarsely rugose (Fig. 5B, E-F) . . *sexspinosa* (Latreille)

— Propodeal spines oblique to main axis of body, directed posteriorly; dorsum of head and mesosoma shallowly and finely sculptured beneath dense pubescence (Fig. 5A, C-D) . . . . . *reclinata* Emery

5. Body distinctly bicoloured; head and mesosoma black with gaster orange or light reddish-brown; appendages black, brown or orange (Fig. 2A-F) (*bicolor*-group) 6

— Body unicoloured, black, with appendages black or reddish-brown (Fig. 3A-F) 7

6. Mandibles, apical antennal segments and gaster orange or light reddish-brown; antennal scapes and legs mostly black or very dark reddish-brown; mesosoma in lateral view with evenly convex outline (Fig. 2B, E-F) . . . . . *nigripes* Emery

— Mandibles, antennae, legs and gaster orange or light reddish-brown; mesosoma in lateral view with mesonotum virtually flat (Fig. 2A, C-D) . . . . . *bicolor* Fr. Smith

7. Pronotal spines relatively long and slender; body black, closely and uniformly reticulate-punctate, opaque (Fig. 3A, C-D) (*dives*-group) . . . . . *dives* Fr. Smith

— Pronotal spines reduced to minute teeth; body jet-black with legs and apical antennal segments black to medium reddish-brown; sculpturation consisting very fine, superficial reticulation with scattered shallow pits (Fig. 3B, E-F) (*mucronata*-group) . . . . . .*mucronata* Fr. Smith

POLYRHACHIS BICOLOR SPECIES-GROUP

The *Polyrhachis bicolor* species-group was established by Dorow (1995) who subdivided the former *P. dives*-group (as delimited by Emery, 1925) and transferred many of its original constituents into three, earlier established groups (*P. armata*-, *sexspinosa*- and *viehmeyeri*-groups), or into five groups he newly proposed (*P. arachne*-, *bicolor*-, *cephalotes*-, *hector*- and *mucronata*-groups). As presently defined, the *bicolor*-group includes only four species. However, about 11 infraspecific forms are currently associated with the name-bearing species, *P. bicolor*. Many of these forms apparently represent valid species and, in addition, at least twice as many closely related new species are in collections awaiting description. This relatively small, but widespread and complicated group is in great need of revision but, with only two species relevant to the Australian fauna, this is beyond the scope of the present paper.

Diagnosis. (modified from Dorow, 1995) *Worker*: Mostly small to medium-sized ants (HL 1.15-1.85) with general characteristics of the genus. Mandibles smooth or very finely, longitudinally striate, rather polished with small piliferous pits towards bases. Anterior clypeal margin with shallow, central, medially emarginate flange, laterally flanked by teeth or acute angles. Head semicircular in side view, oval in frontal view; genae immarginate. Eyes moderately to strongly convex, clearly exceeding lateral cephalic outline in full face view. Mesosoma totally immarginate, armed with rather slender spines. Petiole nodi form with a pair of lateral spines usually embracing first gastral segment, without intercalary spines or teeth. Antennal scapes and tibiae slender and long, spider-like. Sculpturation of head, mesosoma and petiole mostly a fine punctation, usually obscured by rich pubescence, producing a matt appearance. Gaster shagreened or finely reticulate-punctate, opaque. All body surfaces with abundant, relatively long, erect hairs and silvery to golden, appressed or suberect pub-

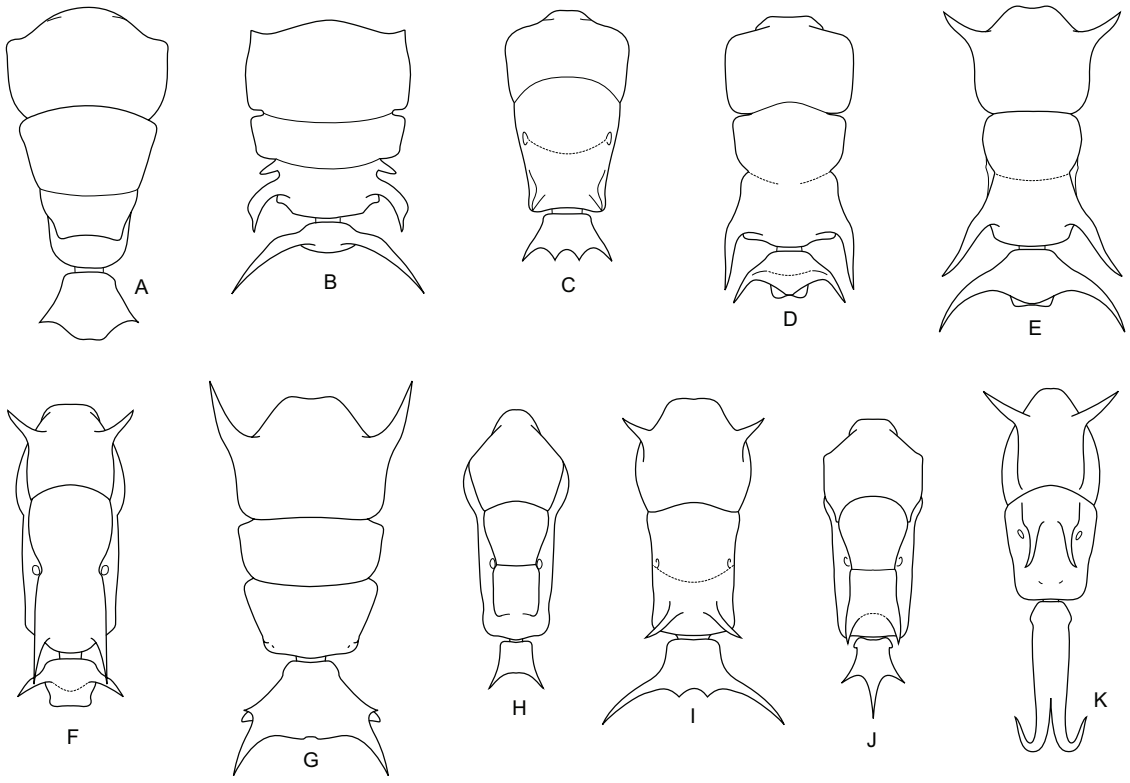

FIG. 1. Australian *Polyrhachis* subgenera, dorsal view of mesosoma and petiole in outline (pilosity omitted): A – *P. (Campomyrma) creusa* Emery; B – *P. (Chariomyrma) schoopae* Forel; C – *P. (Cyrtomyrma) australis* Mayr; D – *P. (Hagiomyrma) penelope* Forel; E – *P. (Hedomyrma) cupreata* Emery; F – *P. (Hirtomyrma) loweryi* Kohout; G – *P. (Myrma) foreli* Kohout; H – *P. (Myrmatopa) lombokensis* Emery; I – *P. (Myrmhopla) dives* Fr. Smith; J – *P. (Myrmothrinax) queenslandica* Emery; K – *P. (Polyrhachis) bellicosa* Fr. Smith (not to scale).

escence. Body bicoloured, mostly black with gaster and appendages light reddish-brown or amber-coloured (as in *P. bicolor*), or virtually unicoloured with body black and gaster, including appendages, black or very dark reddish-brown (as in *P. longipes* Fr. Smith, 1859).

Queen. Apart from sexual characters, very similar to worker. Armament of pronotum, propodeum and petiole distinctly reduced with spines shorter and stronger. Sculpturation, pilosity and colour virtually identical to worker.

Distribution and biology. *Polyrhachis bicolor*-group species are distributed throughout south-east Asia, including Myanmar, India, Thailand, Malaysia, Singapore, Vietnam and the Philippines, extending south to Indonesia, New Guinea and northern Australia. Members of the *bicolor*-group are arboreal nesters, building polydomous nests of silk and vegetation debris among the leaves of mostly rainforest trees and shrubs (Robson & Kohout, 2007).

Polyrhachis bicolor Fr. Smith, 1958
(Figs 2A, C-D, 9A, 10D)

Polyrhachis bicolor Fr. Smith, 1858: 65. Holotype queen. Type locality: BURMA (= MYANMAR), BMNH (examined).

Polyrhachis bicolor var. *concolor* Forel, 1910: 129. Syntype workers, queen, male. Type locality: PHILIPPINES, Luzon, Manila (C.S. Banks), BSMP, MHNG QM (examined). Synonymy by Kohout, 1998: 515.

Other material. INDIA, Bengal Baigachi, vi-viii.1943 (L.H. Weatherill) (w); S. Andamans, Port Blair, 4.xii.1906 (B. Osmaston) (w, ♀, ♂). S.E. THAILAND, Songkhla Prov., TonNga Chang Wildlife Sanctuary, 06º56′N, 100º14′E, 12.i.2002, lowland rf. (Surachai Tongierm) (w). SINGAPORE, Mandai, 01°27′N, 103°46′E, <5 m, 21.xi.1988 (P.S. Ward, #9581-4) (w). VIETNAM, Saigon, 8.ii.1925 (F. Silvestri) (w). PHILIPPINES, Los Baños (F.X. Williams) (w); Luzon, Manila, 20.iv.1918 (McGregor) (w); Camarines Sur, Panicuason Villiage, 18 km E of Naga City, 13°40′N, 123°19′E, 500-550m, 12.iii.2003 (D. General & G.D. Alpert) (w); Palawan, Honda Bay, ii.1988 (J.H. Martin) (w); Negros Or., Dumaguete, 1942 (J.W. Chapman) (w); Mindanao Or., Gingoog, Anakan Lbr. Co. (A. Reyes) (w). WEST MALAYSIA, Kulala Lumpur, i-ii.1989 (M. Edmunds) (w). EAST MALAYSIA, SABAH (as British Nth Borneo), W Coast Residency, Ranau, 500 m, 22-25.i.1959 (T.C. Maa) (w, ♀); Kinabalu Park, 19.v.1995 (Shanmuga Sundram) (w); Maliau Basin, Ginseng Camp, 04º44′N, 116º55′E, 700 m, 27.ii-11.iii.2005 (RJK & Effazilla Waty acc. 05.27) (w); ditto, Agathis Camp, 04º41′N, 116º54′E, c. 500 m, 16-19.iii.2005 (RJK & Lina Thomas acc. 05.70) (w). SARAWAK, Kuching (J. Hewitt) (w); Nanga Pelagus, nr Kapit, 180-585m, 7-14.viii.1958 (T.C. Maa) (w). BRUNEI, Brunei-Muara Distr., Tanjung Semesta, Brunei R., 5.vii.1994 (RJK et al. acc. 94.83) (w); Belait Distr., 1-2 km SE of Melilas Longhouse, 16.vii.1994 (RJK acc. 94.124) (w). INDONESIA, JAVA, Batavia (= Jakarta), iii.1921 (no further data) (w); Buitenzorg (= Bogor), 21.xii.1912 (V. Karavaiev #2382) (w); ditto, 4.ix.1909 (Bryant & Palmer) (w, ♀); SUMATRA, Pematang, Siantar, 1937 (W.M. Mann, NGS SI) (w, ♀). PAPUA NEW GUINEA, West Sepik Prov., Torricelli Mts, Lumi, 400-550 m, 03º28′S, 142º02′E, 4-13.viii.1984 (RJK acc. 84.283) (w), Central Prov., Thaira Boat Harbour, c. 15 km ESE of Port Moresby, 09º31′S, 147º17′E, 5.ix.1984, mangroves (RJK acc. 84.436) (w, ♀). AUSTRALIA, NORTHERN TERRITORY, Holmes Jungle, c. 15 km NE of Darwin, 12°25′S, 130°58′E, 16.xi.1993, monsoon rf. clearing (RJK acc.93.35) (w, ♀); Darwin, Nightcliff, 2.ix.1960 (J.L. Gressitt) (w); Berry Springs NP, 12º42′S, 130º59′E, 10.ii.1994 (RJK acc. 94.4) (w); ditto, 21.vii.1981 (BBL) (w).

Worker. Dimensions: TL c. 6.00-7.06; HL 1.43-1.68; HW 1.12-1.31; CI 77-79; SL 1.96-2.34; SI 172-182; PW 0.87-1.03; MTL 2.34-2.68 (10 measured)

Mandibles with 5 teeth, progressively reducing in length towards base. Anterior clypeal margin with shallow median flange, laterally flanked by acute angles. Clypeus with poorly defined, posteriorly weakly elevated, median carina; clypeus virtually straight in profile with rather shallow basal margin. Frontal carinae sinuate with well raised margins; frontal furrow indistinct. Sides of head in front of eyes converging anteriorly towards mandibular bases in virtually straight line; behind eyes sides rounding into convex occipital margin. Eyes strongly convex, in full face view clearly breaking lateral cephalic outline. Ocelli indistinct. Mesosoma laterally immarginate. Pronotal dorsum weakly convex in profile; humeri armed with slender, relatively long, acute, anterolaterally directed spines with tips slightly turned upwards. Promesonotal suture distinct; mesonotum straight in profile with metanotal groove marked by slight step in outline. Propodeal dorsum rather short with a pair of slender, obliquely elevated, subparallel, acute spines. Petiole nodiform with medially weakly elevated dorsum and pair of relatively long and slender, laterally and posteriorly curved, acute spines. Anterior face of first gastral tergite rounding in evenly convex line onto dorsum of segment.

Mandibles smooth and polished with shallow piliferous pits. Head, mesosoma and gaster closely reticulate-punctate with sculpture almost completely hidden by overlying pubescence. Spines weakly rugose at bases, smooth and polished towards tips. Gaster finelly shagreened.

Mandibular masticatory borders with curved, golden hairs. Anterior clypeal margin medially with several, medium length, anteriorly directed, golden setae. Head, including clypeus, mesosoma and gaster with numerous, mostly erect and variously curved, somewhat untidy, long silvery hairs, some longer than greatest diameter of eyes; hairs on gaster mostly posteriorly directed. Very distinct, relatively long, silvery pubescence almost completely hiding underlying sculpturation on head, mesosoma and petiole, except spines.

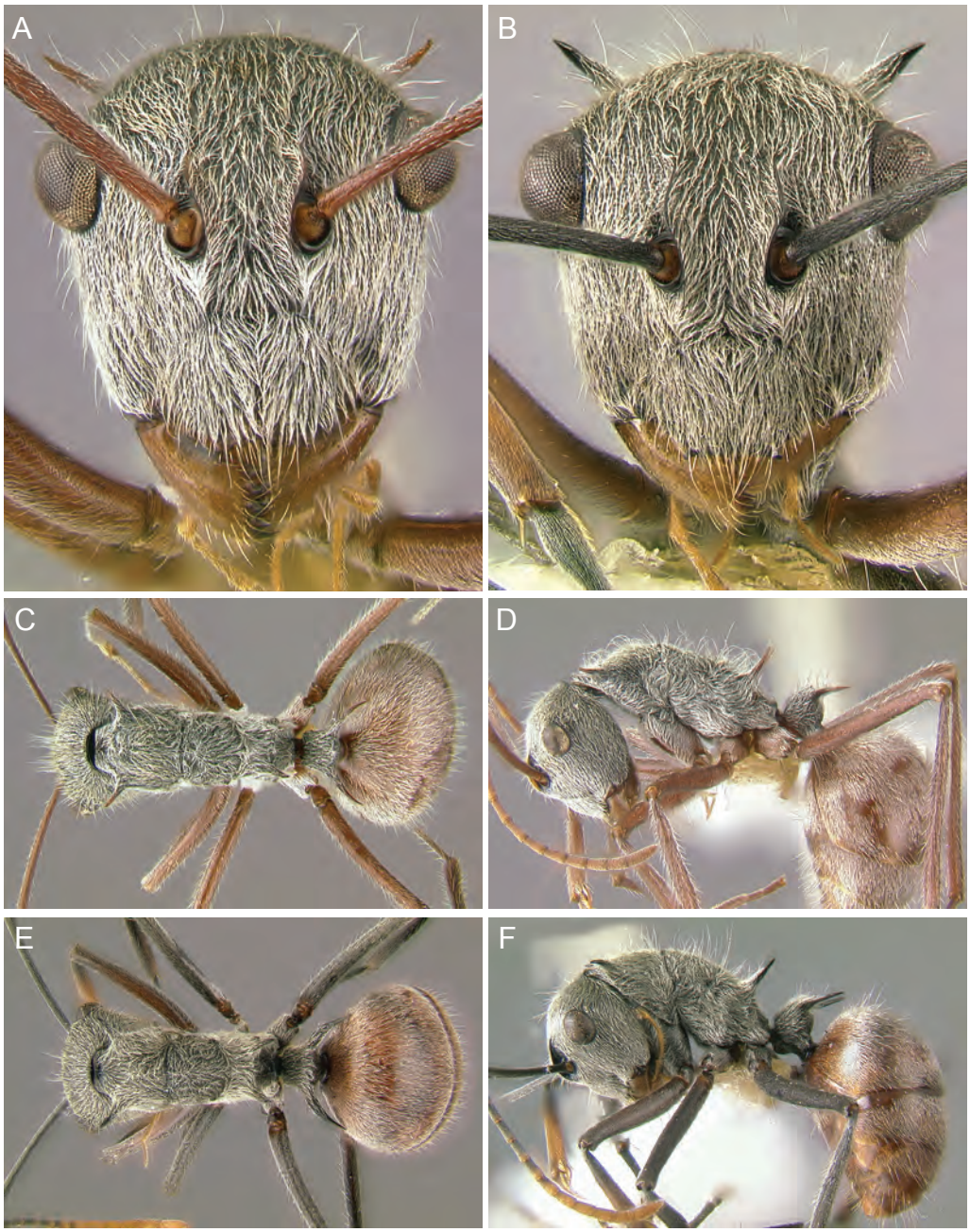

FIG. 2. *Polyrhachis (Myrmhopla)* species from Australia. Head in full face view (top); Dorsal view (left); Lateral view (right). A,C-D, *P. bicolor* Fr. Smith; B,E-F, *P. nigripes* Emery (not to scale).

Gastral pubescence more appressed and somewhat diluted, not obscuring fine sculpturation.

Head, mesosoma and petiole black; mandibles, median portion of anterior clypeal margin, antennae, legs, coxae, tips of spines, subpetiolar process and gaster, orange or light reddish-brown.

Queen. Dimensions: TL c. 8.97; HL 1.87; HW 1.40; CI 75; SL 2.62; SI 187; PW 1.78; MTL 3.06 (1 measured).

Very similar to worker and apart from sexual characters, including three ocelli, fully developed mesosoma and wings, differing as follows: Pronotal spines reduced to more-or-less triangular, acute teeth, barely longer than basal widths. Mesoscutum with anterior margin widely and evenly rounded in dorsal view; median line bifurcate anteriorly; parapsides rather flat anteriorly, raised posteriorly. Mesoscutellum weakly convex, slightly elevated above dorsal plane of mesosoma; metanotal groove distinct. Propodeal spines very short, obliquely elevated, somewhat dorsoventrally flattened, tips rounded. Petiolar spines similar to those in worker but stronger at base and distinctly shorter; dorsum of petiole with rather distinct, blunt intercalary tooth.

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

Remarks. *Polyrhachis bicolor* is a widespread species recorded from south-east Asia south to Indonesia, New Guinea and the Northern Territory in Australia. As noted by Kohout (2008: 295), across its distribution, *P. bicolor* forms a large number of overlapping populations that differ to some extent from the holotype. About eleven infraspecific forms are presently associated with *P. bicolor*, however, after examination of a large amount of material from across the entire range I consider the Australian population to represent the nominal form.

Polyrhachis bicolor is a relatively common species at suitable localities around Darwin, where it builds nests of silk and vegetation debris among the leaves of trees and shrubs notably along the margins of monsoon rainforests. In spite of being a rather common species in mangroves and lowland forests along the Gulf of Papua, it has not yet been recorded from Cape York Peninsula or elsewhere in north Queensland.

Polyrhachis nigripes Emery, 1897 **stat. nov.**
(Figs 2B, E-F, 9A)

Polyrhachis bicolor var. *nigripes* Emery, 1897: 592. Holotype worker. Type locality: NEW GUINEA: Paumomu River (= Angabanga R.) (L. Loria), MSNG. **Stat. nov.**

Other material. INDONESIA, IRIAN JAYA, Eramboe, 80 km ex Merauke, 1.ii.1960 (T.C. Maa) (w); Hollandia area, Cyclops Mts, W. Sentani, 2 00-1000m, 22-25.vi.1959 (T.C. Maa) (w). PAPUA NEW GUINEA, West Sepik Prov., Torricelli Mts, Lumi, x.1984 (D. Waisi) (w); Wum, Upper Jimmi Valley, 840m, 16.vii.1955 (J.L. Gressitt) (w); Morobe Prov., Huon Pen., lower Busu R., 27.iv-12.v.1955, lowland rf. (E.O. Wilson) (w - compared with holotype); Central Prov., Karema, Brown R., 8-11.iii.1955, lowland rf. (E.O. Wilson #601) (w); Bisianumu, E of Port Moresby, 500 m, 3.ix.1959 (T.C. Maa) (w); Catalina Estate, 48 km N of Port Moresby, 500 m, 3.iv.1959 (T.C. Maa) (w); Laloki, nr Port Moresby, 30.vii-2.ix.1959 (T.C. Maa) (w); Rouna, xi.1968 (N.L.H. Krauss) (w); Aroa Pltn, 16.v.1957 (J.H. Barrett) (w). AUSTRALIA, QUEENSLAND, Cape York Pen., Iron Ra. NP, Claudie R., 12°46'S, 143°16'E, <20m, 2.x.2000, monsoon rf. (RJK acc. 2000.136, 137) (w, ♀).

Worker. Dimensions: TL c. 5.74-6.25; HL 1.40-1.59; HW 1.15-1.31; CI 79-82; SL 1.87-2.06; SI 157-169; PW 0.87-1.03; MTL 2.18-2.46 (4 measured).

Mandibles with 5 teeth. Anterior clypeal margin with shallow, median flange, laterally flanked by rather acute teeth. Clypeus with poorly defined, posteriorly elevated median carina, weakly convex in profile with rather shallow basal margin. Frontal carinae sinuate with well raised margins; frontal furrow indistinct. Sides of head in front of eyes converging anteriorly towards mandibular bases in straight line; behind eyes sides rounding into convex occipital margin. Eyes strongly convex, relatively large, in full face view clearly breaking lateral occipital margin. Ocelli indistinct. Mesosoma laterally immarginate. Pronotal and mesonotal dorsa forming even, weakly convex line in profile;

pronotal humeri armed with fine, slender, relatively long, acute, anterolaterally directed spines, tips slightly turned downwards. Promesonotal suture distinct; metanotal groove feebly marked by rather flat, bowed line. Propodeal dorsum rather short with a pair of obliquely elevated, fine, slender, subparallel, acute spines. Petiole nodiform, dorsum medially weakly elevated, armed with a pair of relatively long, slender, laterally and posteriorly curved, acute spines. Anterior face of first gastral segment widely rounding onto dorsum of segment.

Mandibles rather smooth or very finely, longitudinally striate with shallow piliferous pits. Head, mesosoma and gaster closely reticulate punctate with sculpture almost completely hidden by overlying pubescence. Spines weakly rugose, tips rather smooth and polished. Gaster finely shagreened.

Mandibular masticatory borders with a few curved, golden hairs. Anterior clypeal margin medially with several, medium length, anteriorly directed, golden setae. Head, including clypeus, mesosoma and gaster with numerous, mostly erect and variously curved, somewhat untidy, long silvery hairs, some longer than greatest diameter of eyes; hairs on gaster somewhat shorter and mostly posteriorly directed. Very distinct, relatively long, silvery pubescence almost completely hiding underlying sculpturation on head, mesosoma and petiole, except apical portions of spines. Gastral pubescence more appressed and diluted, not obscuring fine sculpturation.

Head, including anterior clypeal margin, antennal scapes, mesosoma, including fore coxae, spines, and petiole, including subpetiolar process, black; legs, including mid and hind coxae and basal antennal segments dark to very dark reddish-brown or black; mandibles, apical antennal segments and gaster orange or light reddish-brown. Dorsum of first gastral tergite with darker, irregular, somewhat diffused, reddish-brown patch medially.

Queen. Dimensions. TL c. 8.52; HL 1.84; HW 1.50; CI 81; SL 2.34; SI 156; PW 1.75; MTL 3.81 (1 measured)

Essentially like worker and apart from sexual characters, including three ocelli and complete thoracic structure, differing as follows: pronotal spines distinctly reduced in length, about twice as long as their basal widths. Mesoscutum with anterior margin evenly rounded in dorsal view; median line bifurcate anteriorly and dorsally; parapsides weakly raised posteriorly. Mesoscutellum slightly elevated above dorsal plane of mesosoma; metanotal groove distinct. Propodeal spines short, obliquely elevated, their inner margins continued inwards but not meeting medially. Petiolar spines similar to those in worker but stronger and distinctly shorter; dorsum of petiole bluntly raised medially. Sculpturation, pilosity and colour virtually identical to worker.

Males unknown. Immature stages (eggs and larvae) deposited in the QM spirit collection.

Remarks. *Polyrhachis bicolor* and *P. nigripes* are certainly very closely related. The main differences separating them are their colour patterns which appear to be constant in all material examined. Another key difference is the profile of the mesosoma which features a virtually flat mesonotum in *P. bicolor* (Fig. 2D), while in *P. nigripes* the pronotal and mesonotal dorsa form a weak, but evenly convex line (Fig. 2F). In addition, *P. bicolor* has distinctly more slender spines, notably those on the propodeum, which, although they are closer together, are clearly separated at their bases and are parallel for their full length. In contrast the spines in *P. nigripes* are distinctly stronger, with the inner bases of the propodeal spines somewhat continuous across the propodeal dorsum, forming a medially incomplete 'U' shape in dorsal view. The propodeal spines are also slightly divergent and weakly curved along their length. New Guinean and Australian specimens of *P. nigripes* are very similar in appearance.

The distribution of *P. nigripes* in New Guinea appears to be concentrated mainly along the coast of the Gulf of Papua, with only a few doubtful records from Irian Jaya and the north of the island. In Australia, *P. nigripes* has been recorded only once from Iron Range National Park on Cape York Peninsula where a nest of silk and vegetation debris was collected on the ground in monsoon rainforest along the Claudie River. The twig and leaves upon which the nest was built were completely dry and had apparently fallen very recently from its original position higher on the tree. It contained a dealate queen, 19 workers and brood (many eggs and larvae).

POLYRHACHIS DIVES SPECIES-GROUP

The *Polyrhachis dives* species-group was originally delimited by Emery (1925) and has previously contained as many as 77 species and subspecies. Dorow (1995) redefined the group and transferred a number of species into the earlier established *P. armata*-, *sexspinosa*- and *viehmeyeri*-groups (all Emery, 1925), or into his newly proposed *P. arachne*-, *bicolor*-, *cephalotes*-, *hector*- and *mucronata*-groups. The *P. dives*-group, as presently defined, includes about 14 species and subspecies with only one Australian species, *P. dives*.

Diagnosis. (modified from Dorow, 1995) *Worker*. Mostly medium-sized ants (HL 1.40-2.00), some species exhibiting slight polymorphism. Mandibles rather densely longitudinally striate or rugose with numerous piliferous pits. Anterior clypeal margin with central, medially emarginate flange, laterally flanked by acute teeth. Head semicircular in side view, almost circular in frontal view. Genae immarginate or with a short carina running about half way from occipital margin towards mandibular bases (as in some extralimital species, e.g. *P. lacteipennis* Fr. Smith, 1858). Eyes rather flat or only moderately convex, in full face view not or only marginally exceeding lateral cephalic outline. Mesosoma totally immarginate. Pronotum armed with rather short or only moderately long spines (except in *P. dives belli* Forel, 1912, where pronotal spines are slender and relatively long); propodeal spines slender and elevated with their tips curved outwards. Petiole with lateral spines, that in most species conform to shape of gaster, and a pair of distinct intercalary teeth. Body rather distinctly, more-or-less regularly, reticulate-punctate (as in *P. dives*), moderately rugose (as in *P. lacteipennis*) or coarsely foveolate (as in *P. menelas* Forel, 1904). Gaster shagreened or closely punctate. Body with only a few, short, erect hairs; closely appressed, mostly silvery or pale golden pubescence rather sparse over head and body (as in *P. dives*) or virtually lacking (as in *P. lacteipennis*). Gaster with somewhat longer, silvery or golden pubescence, that is virtually lacking in several extralimital species. Body and appendages mostly black with gaster black or very dark reddish-brown.

Queen. Queen in several species (e.g. *P. dives*) distinctly larger than worker with usual characters identifying full sexuality, including three ocelli, complete thoracic structure and wings. Spines distinctly shorter with pronotal spines reduced to acute angles. Propodeal spines modified into blunt, horizontal, posteriorly directed and somewhat dorso-ventrally compressed stubs; petiolar spines very short, only weakly curved, almost straight. Body sculpturation, pilosity and colour identical to that in worker.

Distribution and biology. The *Polyrhachis dives* species-group is the most widespread species-group within *Myrmhopla*. It stretches from Guam Island in the Pacific, throughout east and south-east Asia (e.g. China, Japan, Taiwan, Philippines, Malaysia, Thailand, Myanmar, Nepal, India, Sri Lanka), the Middle East and Arabian Peninsula (e.g. Pakistan, Iran, Iraq, Israel, Saudi Arabia, Oman, Yemen) and reaches as far west as Morocco in northern Africa. From southern Asia it extends southwards to Indonesia, New Guinea and northern Australia. Members

of this group are mostly arboreal, building nests upon the leaves and branches of trees and shrubs, preferably in open habitats, such as grassy woodlands, open forests and swamps (Fig 10C). However, some extralimital species (e.g. *P. lacteipennis* Fr. Smith) were observed to be lignicolous or subterranean nesters. The incorporation of silk and occasionally carton occurs in all arboreal nests. These nests can be either mono- or polydomous. Single and multiple queen colonies have been documented in *P. dives* (see Robson & Kohout, 2007).

Polyrhachis dives Fr. Smith, 1857
(Figs 1I, 3A, C-D, 8A, 10C,)

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

Polyrhachis (Myrmhopla) exulans Clark, 1941: 91, pl. 13, fig. 24. (w.) Type locality: AUSTRALIA, Northern Territory, Koolpinyah (C.L. Barrett). Synonymy by Kohout, 1988: 433.

(For full synonymic citations see Bolton, 1995: 347)

Other material. CHINA, Canton (C.W. Howard) (w); Mokanshan (N. Gist Gee) (w); Amoy (S. Ling) (w); Triet Giang Prov., xii.2001 (Bui Tuan Viet #3) (w). HONG KONG (J. Fellowes #1) (w) FORMOSA, Abato (Silvestri) (w); Kusukusu, 12.iv.1932 (L. Gressitt) (w); Rokki, 17.vi.1932 (L. Gressitt); T'ai Chung, 18.iv.1962 (A.C.F. Hung) (w). GUAM I., Andersen Air Force Base, iv.& xii.2003 (L. Hansen) (w, ♀, ♂). MYANMAR (as BURMA), (no further data) (w); Carin Chebà, 900-110m, v-xii.1888 (L. Fea); Bhamo, vii.1885 (Fea) (w). ASSAM, Cherrapoonji (Smythies) (w); Misamari, iv.1944 (A.C. Cole) (w). THAILAND, Chiang Mai Prov., Doi Ithanon NP, 16.viii.1992 (D.G. Furth) (w); Khao Yai N.P., 800-1000 m, 19.viii.1992 (D.G. Furth) (w); Payao, 12.ix.1951 (D. & E. Thurman); Petchburi, Kowyoi Nongchumphon Nonpoe, 28.vi.1952 (R.E. Elbel). VIETNAM, Thua Thien Hue Prov., Phong Dien Distr., iv.2001 (Bui Tuan Viet #7, 8) (w); Lang Son Prov., Cao Loc Distr., i.2001 (Bui Tuan Viet #4) (w). SINGAPORE, (no further data) (Bryant & Palmer) (w); ditto (no further data (Baker) (w). PHILIPPINES, Luzon, Manila, 19.ii.1918 (Mc Gregor) (w); Luzon, Luneta Hill, Baguio, 1450 m, 1.v.1981 (W.L. Brown) (w, ♂); Negros Or., Dumaguete, 1923 (J.W. Chapman) (w); ditto, Horns of Negros, 3600', 1942-43 (J.W. Chapman) (w); Negros, Victorias, 20.xii.1927 (W.D. Pierce) (w); Baguio, (J.W. Chapman) (w); Mindanao, Misamis, Gingoog, Anakan Lbr. Co. (A. Reyes) (w); Bukidnon, Musuan Maramag, 3.i.1985 (C.K. Starr & Pinto) (w). WEST MALAYSIA, Selangor, Kulala Lumpur (Army Scrub Typhus Unit); Selangor, UKM campus, 30.viii.1992, D.G. Furth) (w). EAST MALAYSIA, SARAWAK, Nanga Pelagus, nr Kapit, 180-585 m, 7-14.viii.1958 (T.C. Maa). SABAH, Tawau Distr., Kalabakan, 8-15.xi.1958 (T.C. Maa); Tawau, Quoin Hill, Cocoa Res. Stn, 4.xii.1962 (Y. Hirashima); 13km N of Marak Parak, 12.v.1985 (C.K. Starr) (w, ♀). BRUNEI, Belait Distr., 1-2 km SE of Melilas Longhouse, 16.vii.1994 (RJK accs 93.10, 94.127) (w, ♀); Bandar Seri Begawan, Gadong University grounds, 11.iv.1993 (RJK acc.93.2) (♀); Tutong Distr., Bukit Sulang nr Lamunin, 20-23.vii.1994 (RJK acc. 94.129) (w, ♀). INDONESIA, KALIMANTAN BARAT, 3 km N of Putussibau, 00°51'N, 112°55'E, 19-20. vi.1996 (C. Reid) (w, ♀); KALIMANTAN TENGAH, Banjarmasin, `Suaka Insan' Hospital, 6.vi.1983 (M. Bordsen). SUMATRA, Pematang, Siantar, 1937 (W.M. Mann, NGS SI Exp.); Brastagi, 1937 (Mann, NGS SI Exp.) (w); Medan, 21.x.1993 (Y.v. Nierop) (w); Langkat, ii.1925 (N. Dengas) (w). JAVA, Kebun Raja, Bogor Botan. Gdns, 06°35'S, 106°47'E, 290 m, 7-12.ix.1999 (S.K.A. Robson #816) (w); ditto, 3.i.1993 (Yayuk R. Suhardjono) (♀); Semarang, 13.x.1927 (L.G. Kalshoven) (w); Buitenzorg (= Bogor) (J. Barbour) (w). SULAWESI, Lore-Lindu NP, nr Dongi-Dongi shelter, 975-1020 m, 01°15'S, 120°20'E, 4-9.xii.1985 (Mal. traps) (C.v. Achterberg) (w); Latimodjong Mts (Clagg) (w); Malino, viii.1937 (C.T.& B.B. Brues) (w). SERAM, Piroe, 1937 (W.M. Mann, NGS SI Exp.) (w, ♀, ♂); ditto, above Haruru, nr Masohi, 50-150 m, 18.iii.1981 (W.L. Brown) (w, ♀, ♂). SULU, Mangole, 2 km W Mandafuhi Camp, c. 70 m, 7-24.iii.1995 (Mal. traps) (C.v. Achterberg & Y. Yasir) (w). FLORES, Nangagete, c. 60 km E Maumere, 19.vii.1972 (W.L. Brown) (w). BALI, 1937 (Springer) (w). AMBON, Amboina DEI, 1938 (F.I. Buitenbos) (w); ditto, 1937 (W.M. Mann, NGS SI Exp.) (w, ♀, ♂). IRIAN JAYA, Wamena, 1700 m, 10-25.ii.1960 (T.C. Maa) (w); Hollandia, 13.iii.1960 (T.C. Maa) (w); Waris, S of Hollandia, 450-500 m, 16-23.viii.1959 (T.C. Maa) (w). PAPUA NEW GUINEA, West Sepik Prov., Torricelli Mts, Lumi, 03°28'S, 142°02'E, 400-500 m, 4-13.viii.1984 (RJK acc. 84.249) (w); ditto, x.1984 (D. Waisi) (w, ♀); nr Aitape, 03°09'S, 142°21'E, 3.viii.1984 (RJK acc. 84.218) (w, ♀); nr Yapsiei, ii.1984 (S.van Dyck) (w); Subitana, Sogeri, 26.v.1957 (J.H. Barrett) (w); New Britain Prov., Linga Linga Pltn, W of Willaumez Pen., 9.iv.1956 (J.L. Gressitt) (w); ditto, Sio N Coast, 600 m, 24.vii.1956 (E.J. Ford Jn.) (w); Morobe Prov., Huon Pen., Mongi-Mape Watersheds, Sattelberg vic., 660 m, 4.iv.1955 (E.O. Wilson #722) (w); ditto, Mongi Watershed, Gemeheng, 1200-1300 m, 11-13. iv.1955 (E.O. Wilson #773) (w); Mt Missim (Stevens) (w); Wau, Mendi, 1600-1700 m, xi.1971 (N.L.H. Krauss) (w); Lae, 19.ix.1949 (N.L.H. Krauss) (w); Port

Moresby, 7.vi.1955 (E.O. Wilson #520) (w); 7km S of Maprik, 03.42'S, 143.03'E, 120 m, 11.ii.1989 (P.S. Ward #10175) (w); West New Britain Prov., Dami Res. Stn, 12 km SW of Hoskins, 27.viii.1984 (E.J. Brough) (w); New Ireland Prov., Lelet Plateau, 03°20'S, 151°56'E, 800-1000 m, 19-24.vii.1984 (RJK acc. 84.95, 99) (w). AUSTRALIA, NORTHERN TERRITORY, Koolpinyah, 1933 (C.L. Barrett) (w); Holmes Jungle, 15 km NE of Darwin, 12°25'S, 130°58'E, 16.xi.1993 (RJK acc. 93.33) (w). QUEENSLAND, Yarrabah, c. 11 km E of Cairns, 16°56'S, 145°52'E, 22-24.vii.1980 (RJK accs 80.113, 130, 141) (w, ♀, ♂); South Mission Bch, 2 km NbyW, 17°55'S, 146°05'E, 13.vi.1980 (RJK accs 80.14, 15, 17, 18) (w, ♀) ; Tully, ii.1958 (Darlingtons) (w); 2 km NbyW of Sth Mission Beach, 17°55'S, 146°05'E, 13.vi.1980 (RJK acc. 80.14); Halifax, 8.vi.1919 (F.X. Williams) (w).

Worker. Dimensions. TL c. 5.39-7.71; HL 1.40-1.93; HW 1.18-1.65; CI 84-91; SL 1.56-1.96; SI 119-132; PW 0.87-1.15; MTL 1.87-2.56 (34 measured).

Mandibles with 5 teeth. Anterior clypeal margin with emarginate, shallow, median flange, laterally flanked by acute teeth. Clypeus virtually straight in profile, posteriorly rounding into weakly impressed basal margin. Frontal triangle distict. Frontal carinae sinuate with moderately raised margins. Sides of head in front of eyes weakly convex towards mandibular bases; behind eyes sides widely rounding into rather flat occipital margin. Eyes only moderately convex, in full face view not or only marginally exceeding lateral cephalic outline. Ocelli lacking, relative positions marked by shallow pits in cephalic structure. Mesosoma immarginate. Pronotum rather weakly convex in profile; humeri armed with straight, horizontal, anterolaterally directed, acute spines. Promesonotal suture distinct; mesonotum convex in profile. Metanotal groove poorly indicated; propodeal dorsum armed with slender, obliquely elevated, divergent spines, tips curved upwards and outwards. Petiole with dorsolaterally projecting acute spines that conform to shape of anterior gaster; dorsum medially with pair of distinct intercalary teeth. Anterior face of first gastral tergite higher than full height of petiole, widely rounding onto dorsum of segment.

Mandibles densely and closely longitudinally striate with piliferous pits. Head, mesosoma and petiole distinctly, more-or-less regularly, reticulate-punctate. Sides of mesosoma somewhat more deeply sculptured with numerous pits on meso- and metapleurae. Spines sculptured at bases, smooth and polished towards tips. Gaster finely shagreened.

Mandibles at masticatory borders with numerous, curved, golden hairs and short, appressed hairs towards bases. Anterior clypeal margin with several anteriorly projecting setae medially and a few shorter setae fringing margin laterally. Clypeus with a few, paired, medium length, erect hairs. Apical segments on dorsum and venter of gaster with a number of erect, relatively long, mostly posteriorly directed, golden hairs. Closely appressed, medium length, pale golden pubescence in various densities over most of head and body. Pubescence more silvery on sides of head, mesosoma and petiole. Gastral pubescence somewhat longer, rich golden and more abundant dorsally where it almost completely hides underlying sculpturation; pubescence paler and less dense on gastral venter.

Black, with only condylae and tip of apical antennal segments, light yellowish-brown; mandibular teeth dark reddish-brown.

Queen. Dimensions: TL c. 8.72-9.32; HL 2.03-2.18; HW 1.78-1.90; CI 85-91; SL 1.93-2.09; SI 108-112; PW 1.81-1.90; MTL 2.62-2.74 (14 measured).

Very similar to worker, apart from sexual characters, shorter spines and the following: anterior clypeal margin with median flange more deeply emarginate; clypeus with basal margin virtually flat in lateral view. Eyes more convex, always exceeding lateral cephalic outline. Pronotal spines reduced to minute teeth. Mesoscutum in lateral view relatively high, widely rounding onto flat dorsum with anterior margin evenly rounded in dorsal view; median line bifurcate anteriorly and posteriorly; parapsides flat. Mesoscutellum flat, not elevated above dorsal

plane of mesosoma. Metanotal groove distinctly impressed. Propodeal spines very short, directed posteriorly, weakly elevated dorsally. Petiolar spines short, projecting laterally, very weakly curved. Sculpturation, pilosity, pubescence and colour identical to those in worker.

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

Remarks. *Polyrhachis dives* is a very widespread species ranging from south-east Asia south to northern Australia, with recent reports of its occurrence as far east as Guam Island in the Pacific (L. Hansen *pers. comm*.). Throughout its distribution, *P. dives* is a morphologically very stable species with only a few, rather insignificant differences between individuals, even those from widely separated localities. However, south-east Asian specimens generally have a more deeply emarginate anterior clypeal margin and eyes that only rarely exceed the lateral cephalic outline. Most also have the tips of the propodeal spines more distinctly curved outwards and longer petiolar spines that are somewhat curved downwards from their midlength. In contrast, the anterior clypeal margin in Australian and New Guinean specimens is only shallowly emarginate and the eyes clearly exceed the lateral cephalic outline. The propodeal spines are only weakly curved outwards and the petiolar spines somewhat shorter and less curved.

In Australia *P. dives* is known from two isolated populations, one in the Northern Territory and the other in northern Queensland. It prefers mostly open savannah woodlands and swampy coastal plains, where it builds its silk and/or carton-based, relatively large, usually polydomous nests between the branches and leaves of small trees and shrubs (Fig. 10C).

POLYRHACHIS MUCRONATA SPECIES-GROUP

The *Polyrhachis mucronata* species-group of the subgenus *Myrmhopla* was delimited by Dorow (1995) who subdivided the earlier established *P. dives*-group (Emery, 1925). Dorow listed 36 species and subspecies within the group, however, the status of several subspecific forms still remains unresolved. Two new species were recently described from Sulawesi (Kohout, 2008) and one species is considered a junior synonym (see below). Only a single species of the group, *P. mucronata*, is relevant to the Australian fauna.

Diagnosis. (modified from Dorow, 1995) *Worker*: Small to medium-sized ants (HL 1.25-2.10) with general characteristics of the genus. Mandibles mostly longitudinally striate or finely rugose with numerous piliferous pits. Anterior clypeal margin with shallow, median flange (as in *P. mucronata*), or shallowly truncate (as in *P. retrorsa* Emery, 1900). Head usually semicircular in side view, oval in frontal view; genae immarginate. Eyes moderately to strongly convex, clearly exceeding lateral cephalic outline in full face view. Mesosoma totally immarginate, usually highly convex and relatively short (as in *P. mucronata*), but also somewhat elongated and distinctly less convex (as in *P. tristis* Mayr, 1867). Pronotum armed with acute teeth (as in *P. mucronata*), or rarely with long slender spines (as in *P. amana* Fr. Smith, 1861), or simply rounded (as in *P. moeschi* Forel, 1912). Propodeal spines relatively long and strong in most species, however, also short (as in *P. orpheus* Forel, 1911). Petiole columnar with a pair of lateral spines usually embracing first gastral segment; spines mostly slender, but also remarkably massive (as in *P. lucidula* Emery, 1893 and *P. ridleyi* Forel, 1912). Dorsum of petiole with a pair of more-or-less distinct intercalary teeth, except in some species (e.g. *P. amana* and *P. orpheus*). Sculpturation of head, mesosoma and petiole ranging from rather smooth and highly polished (as in *P. emmae* Santschi, 1920) to closely punctate (as in *P. oedacantha* Wheeler, 1919). Gaster usually more finely sculptured, shagreened and polished, only rarely closely punctate, opaque (as in *P. tristis*). Body pilosity and pubescence virtually lacking in most species, however, in

P. mitrata Menozzi, 1932 and *P. retrorsa* whole body covered with rather diluted, whitish pubescence. Body mostly black, rarely with purple metallic reflections (as in *P. oedacantha* and *P. phalerata* Menozzi, 1926). Gaster black or reddish-brown with appendages ranging from orange or light reddish-brown to black.

Queen. Queen very similar to worker with usual differences indicating caste, including three ocelli, complete thoracic structure and wings. Body armature, notably propodeal and petiolar spines distinctly shorter and stronger. Sculpturation, pilosity and colour essentially as in worker.

Distribution and biology. The *Polyrhachis mucronata* species-group is distributed throughout east and south-east Asia (China, Philippines, Laos, Malaysia, Thailand, Myanmar, India, Sri Lanka), extending south to Indonesia (Sumatra, Java, Sulawesi) and New Guinea (including Bismarck Archipelago), reaching the southern limit of its distribution in northern Queensland. The known members of this group are arboreal nesters, building nests of silk and vegetation debris upon the leaves of rainforest trees and shrubs, mostly in the lower arboreal zone (Fig. 10E).

Polyrhachis mucronata Fr. Smith, 1859
(Figs 3B, E-F, 9B, 10E)

Polyrhachis mucronatus Fr. Smith, 1859: 140. Holotype worker. Type locality: INDONESIA: Aru Is. (A.R. Wallace), OXUM (examined).

Polyrhachis (Myrmhopla) cyrtomyrmoides Donisthorpe, 1947: 195. Syntype worker, queen. Type locality: INDONESIA, IRIAN JAYA (as Dutch New Guinea), Maffin Bay, viii.1944 (E.S. Ross), CASC, BMNH (examined). **Syn. nov.**

Other material. INDONESIA, Aru I. (no further data) (w). IRIAN JAYA (as Dutch New Guinea), Maffin Bay, 17.vi.1944 (E.S. Ross) (w); Hollandia area, W. Sentani, Cyclop Mts, 150-1000 m, 16-19.vi.1959 (T.C. Maa) (w); Waris, S of Hollandia, 450-500 m, 16-23.viii.1959 (T.C. Maa) (w). PAPUA NEW GUINEA, West Sepik Prov., Torricelli Mts, Lumi, 400-550 m, 03°28′S, 142°02′E, 4-13.viii.1984 (RJK acc. 84.228, 249) (w); ditto, x.1984 (D. Waisi) (w); Morobe Prov., nr Wampit, c. 35km W of Lae, 06°45′S, 146°40′E, c. 50 m, 24& 27.viii.1984 (RJK acc. 84.365) (w); Naru, Gogol R., 20 km SW of Madang, 05°21′S, 145°41′E, 22.viii.1984 (RJK acc. 84.336) (w); Central Prov., Eilogo Rd., 4 km ESE of Sogeri, 09°25′S, 147°27′E, c. 500 m, 4.ix.1984 (RJK acc. 84.427) (w); Varirata NP, 550-760 m, 5-9.ii.1981 (W.L. Brown) (w). AUSTRALIA, QUEENSLAND, Cape York Pen., Iron Range, 12°43′S, 143°18′E, 26-31.vii.1981 (RJK accs 81.146, 147); ditto, 1-17.viii.1978 (S.van Dyck); Mt Hedley, 1-2 km N of Home Rule, 15°45′S, 145°17′E, 200-300vm, 11.vi.1996 (RJK & CJB acc. 96.44) (w); Cedar Bay NP, 15°48′S, 145°19′E, 16.vi.1997 (SKR #589) (w); Pilgrim Sands, c. 1 km NW of Cape Tribulation, 16°04′S, 145°28′E, 12-15.vi.1996 (RJK at al. acc. 96.47) (w); Cape Tribulation NP, 16°04′S, 145°27′E, 6.xii.1985 (RJK acc. 85.5) (w, ♀); Canopy Crane site, Cape Tribulation, 16°06′S, 145°27′E, 20-21.ii.2000 (RJK accs 2000.17, 21) (w, ♀); Oliver Ck, c. 8 km SW of Cape Tribulation, 16°08′S, 146°26′E, 14.vi.1998, lowland rf. (RJK acc. 98.53 (w); Mc Lean Ck, 19 km SbyW of Cape Tribulation, 16°15′S, 145°26′E, 15.vi.1996 (RJK acc. 96.54) (w); Bellenden Ker, Cableway Base Stn, 17°16′S, 145°54′E, 17-24.x.1981 (GBM & Earthwatch Exp.) (w); Russel R., Bellenden Ker Landing, 17°16′S, 145°56′E, 1-9.xi.1981 (GBM & Earthwatch Exp.) (w); Josephine Falls, 17°26′S, 145°51′E, 12.ii.1996 (GBM) (w); Garradunga, Seymour Ra., c. 7 km N of Innisfail, 17°28′S, 146°01′E, <100 m, 5-6.vi.1996 (RJK at al. 96.31) (w, ♀); Mission Bch, 17°45′S, 146°00′E, 10 m, 20.i.1996 (SKR #101) (w); Dunk I., 17°57′S, 146°09′E, viii.1927 (H. Hacker) (♀); Hinchinbrook I., Gayundah Ck, 18°21′S, 146°14′E, 100-500 m, 8-18.xi.1984 (GBM) (w).

Worker. Dimensions: (holotype cited first) TL c. 5.55, 5.34-6.50; HL 1.43, 1.40-1.65; HW 1.17, 1.12-1.31; CI 82, 76-82; SL 1.84, 1.65-2.12; SI 157, 146-164; PW 1.00, 0.94-1.15; MTL 1.93, 1.81-2.31 (31 measured).

Anterior clypeal margin medially with shallow flange, flanked laterally by acute angles. Clypeus with poorly defined median carina; clypeus in profile straight anteriorly, posteriorly rounding into moderately impressed basal margin. Frontal carinae sinuate with moderately raised margins. Sides of head in front of eyes weakly convex converging towards mandibular bases; behind eyes sides rounding into convex occipital margin. Eyes relatively large and convex, in full face view clearly exceeding lateral cephalic outline. Ocelli lacking. Mesosoma immarginate. Pronotal humeri armed with short, acute teeth. Promesonotal suture distinct; mesonotum virtually flat in profile. Mesopleural process a blunt lobe; metanotal groove indicated as a thin, bowed line. Propodeal dorsum very short, armed with rather strong, obliquely directed, diverging,

acute spines; inner borders of spines continued medially for a short distance, but failing to meet, propodeal dorsum descending into relatively high, oblique declivity in uninterrupted line. Petiole columnar, dorsum armed with two strong lateral spines that conform to shape of anterior gaster and two short, acute intercalary teeth medially. Anterior face of first gastral tergite straight, widely rounding onto dorsum of segment.

Mandibles very finely, longitudinally striate with numerous piliferous pits. Head and dorsum of mesosoma and petiole finely reticulate-punctate with sculpturation distinctly coarser on sides of mesosoma; meso- and metapleurae weakly rugose and somewhat wrinkled. Gaster finely shagreened.

Mandibles at masticatory and outer borders with a few, curved, golden hairs. Anterior clypeal margin with several anteriorly directed setae medially and a pair of longer, suberect hairs arising from just behind margin. Tuft of medium length, erect hairs in front of subpetiolar process. Apical segments on dorsum and venter of gaster with a number of semierect, posteriorly directed, golden hairs. Very short, closely appressed pubescence arising from minute punctures and pits, distributed over most body surfaces, more distinct on gastral dorsum.

Body black, polished; mandibular bases, antennal scapes, fore coxae and tarsi black or very dark reddish-brown; mandibular masticatory borders, condylae, apical antennal segments and most of legs, except tarsi, light to medium reddish-brown.

Queen. Dimensions: TL c. 6.95-7.81; HL 1.65-1.75; HW 1.25-1.34; CI 75-77; SL 1.96-2.12; SI 153-160; PW 1.56-1.68; MTL 2.18-2.37 (10 measured).

Very similar to worker with usual differences indicating caste, including three ocelli, complete thoracic structure and wings. Median clypeal carina somewhat more distinct. Pronotal teeth dorsoventrally flattened; mesoscutum in lateral view with anterior margin widely rounding onto flat dorsum; median line bifurcate anteriorly; parapsides rather flat, weakly raised posteriorly; mesoscutellum convex, elevated above dorsal plane of mesosoma; metanotal groove strongly impressed. Propodeal spines shorter than in worker, almost straight; petiolar spines similar to those in worker but shorter. Sculpturation, pilosity, pubescence and colour virtually identical to worker.

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

Remarks. Among the Australian species of *Myrmhopla*, *Polyrhachis mucronata* is very distinct, however, it superficially resembles some species of the subgenus *Cyrtomyrma* Forel. Despite their general similarity and identical nesting habits, *P. mucronata* can be easily distinguished from *Cyrtomyrma* species by the form of its petiole. The petiolar node in *P. mucronata* is columnar and armed with two, more-or-less horizontal, posteriorly directed spines that conform to the shape of the anterior gaster. The petiole also bears a pair of short, intercalary teeth. In contrast, in *Cyrtomyrma* species, the petiole is scale-like and armed with four teeth or spines of various configurations. Additionally, all Australian *Cyrtomyrma* species have a distinct posterolateral carina separating the gena from the ventral parts of the head. This carina is lacking in *P. mucronata*-group species. The two groups also differ in their immature stages with the pupae of *Myrmhopla* species being enclosed in cocoons, while in *Cyrtomyrma* species the pupae are naked (Kohout, 2006b).

Polyrhachis mucronata ranges from the islands of eastern Indonesia and New Guinea south to northern Queensland where it reaches the southern limit of its distribution. It is a relatively common species in the monsoon rainforests of Cape York Peninsula and the lowland rainforests of the Wet Tropics. Colonies of *P. mucronata* build nests the leaves of rainforest trees and shrubs,

using mostly larval silk combined with leaf fragments and other vegetation debris (Fig. 10E).

When describing *Polyrhachis cyrtomyrmoides*, Donisthorpe (1947: 195) emphasised its close resemblance to ants of the subgenus *Cyrtomyrma* but failed to note its remarkable similarity to *P. mucronata*. I had the opportunity to examine the syntypes of *P. cyrtomyrmoides*, supplemented by additional specimens in the CASC collection (Maffin Bay, 17.vi.1944, E.S. Ross). Their comparison with the holotype of *P. mucronata* (OXUM) and abundant material of that species from New Guinea and Australia (ANIC, BMNH, BPBM, MCZC and QM) revealed that the two species were very similar. As noted earlier by Kohout (2000: 206), the Australian and New Guinean populations of *P. mucronata* differ somewhat from the holotype, with some specimens from Australia being remarkably close to those of *P. cyrtomyrmoides*, sharing the rather highly polished appearance which is typical of the latter species. However, the density of the generally fine reticulate-punctate sculpturation varies not only between different populations, but also to some extent between specimens of a single colony. The colour of the legs also varies, generally being a lighter red in Australian specimens and a darker, reddish-brown in most of New Guinean specimens. In addition, the eyes vary in the degree of their convexity with specimens from the Wet Tropics having the eyes simply convex, similar to those in *P. cyrtomyrmoides*, while the eyes in specimens from the mid and northern Cape York Peninsula are virtually protuberant. When considered individually, specimens of some populations appear quite distinct, however, when all the available material from the whole distribution range is compared, no consistent differences between *P. cyrtomyrmoides* and *P. mucronata* are evident. I therefore believe that the separate specific status of the former is not justified and consider them conspecific.

POLYRHACHIS SEXSPINOSA SPECIES-GROUP

The *Polyrhachis sexspinosa* species-group of the subgenus *Myrmhopla* Forel, 1915 was established by Emery (1925), who included 12 species and subspecies from New Guinea and south-east Asia. Bolton (1975) revised the world fauna of the group and recognised 12 valid species with all of the included infraspecific taxa considered synonyms. Three new species from the Philippines were later added, one subspecies (*P. sexspinosa reclinata* Emery, 1887) raised to specific status (Kohout, 1987) and one species (*P. barnardi* Clark, 1928) synonymised (Kohout & Taylor (1990), raising the number of valid species of the group to 15. Dorow (1995) recognised 17 species as constituents of the group, including *P. melpomene* Emery, 1897 and *P. olybria* Forel, 1912. However, these two species were later transferred to different subgenera (*P. melpomene* and its junior synonym *P. dolichocephala* Viehmeyer, 1914 to subgenus *Hedomyrma* and *P. olybria* to the nominal subgenus *Polyrhachis*), and two former subspecies (*P. arcuspinosa waigeuensis* Donisthorpe, 1943 and *P. sexspinosa esuriens* Emery, 1897) were raised to specific status by Kohout (1998). At present the *P. sexspinosa* species-group comprises 19 valid species, including one (*P. spinosa* Mayr, 1867) recently elevated to its original specific status (Kohout, 2008) and one described below as new (*P. dispar*). Four species of the group are relevant to the Australian fauna with two (*P. dispar* and *P. glabrinota* Clark, 1930) considered endemic. They appear to be derived from common ancestral stock, such as the New Guinea-based species *P. aureovestita* Donisthorpe, 1937 and *P. bubastes* Fr. Smith, 1863 (Bolton, 1975) and speciated after loosing connection with the maternal New Guinean populations following the sinking of the continental bridge between New Guinea and Australia. On the other hand, the more robust populations of the relatively common *P. sexspinosa* (Latreille, 1802) and *P. reclinata* Emery, 1887 maintained most of their original

characteristics, with specimens from Cape York Peninsula indistinguishable from their New Guinean counterparts.

Diagnosis. *Worker*: Relatively large ants (HL >2.0), except for the rather small, extralimital *P. nofra* Bolton, 1975 (HL 1.52-1.53), with general characteristics of the genus. Mandibles smooth and polished apart from small piliferous pits towards bases. Anterior clypeal margin arcuate, often obtusely truncate medially or with shallow median emargination. Head contracted posteriorly, distinctly narrower behind than in front of eyes. Eyes with short, erect hairs; strongly convex or protuberant, clearly exceeding lateral cephalic outline in full face view. Occipital margin with more-or-less developed lateral angular prominences which are usually visible with the head in full face view (except in *P. dispar* and *P. glabrinota*). Mesosoma immarginate; pronotum strongly convex, humeri armed with rather strong, mostly forward curved spines. Promesonotal suture strongly impressed. Mesonotum flat or weakly convex in profile; mesopleural process present as a simple lobe (as in *P. dispar* and *P. sexspinosa*) or a dentiform structure, that can be acute or obtuse (as in *P. glabrinota* and *P. reclinata*); metanotal groove usually replaced by a minutely raised ridge. Propodeum armed with a pair of spines that are either vertical or inclined forwards (as in *P. sexspinosa*), or posteriorly reclined and often curved (as in *P. dispar*, *P. glabrinota* and *P. reclinata*). Petiole nodiform with a pair of lateral spines, without intercalary spines or teeth. Gaster, when contracted, broadly ovate. Sculpturation of head, mesosoma and petiole ranging from weak to rather heavy, gaster usually finely shagreened. All body surfaces, including appendages, with relatively long, erect hairs. Pubescence mostly appressed or suberect, somewhat radiating, present in various densities but usually not completely hiding underlying sculpturation. Pubescence on gastral dorsum organised in a characteristic midline pattern in virtually all species (except *P. nofra*) or almost completely absent (*P. exotica* Kohout, 1987). Body mostly black, or partly reddish-brown (as in *P. glabrinota*), with appendages usually lighter, reddish-brown.

Queen. Very similar to worker with usual characters of full sexuality, including three ocelli, complete thoracic structure and wings. Armament of pronotum, propodeum and petiole somewhat reduced with spines shorter, less curved and usually more stubby. Sculpturation, pilosity, pubescence and colour virtually as in worker.

Distribution and biology. *Polyrhachis sexspinosa*-group species are distributed throughout the Indo-Australian region, with only a few species known from the Oriental region and one from the Solomon Islands. In Australia, the group is limited to the northern part of Cape York Peninsula in Queensland, north of the 14°S parallel. Members of the *sexspinosa*-group are mostly arboreal nesters, building nests of silk and vegetation debris between the foliage of rainforest trees and shrubs. However, some species deviate from this behaviour and have their own characteristic methods of nesting. Colonies of *P. sexspinosa* invariably build pocket-like nests of silk, vegetation debris and bark fragments against the trunks of rainforest trees (Fig. 10A-B). In contrast, colonies of *P. dispar*, *P. glabrinota* and *P. reclinata* at Iron Range National Park were frequently found nesting within the hollow internodes of a bamboo, *Bambusa forbesii*. Only one colony of *P. reclinata* was located under the bark of a living tree, while most nests of *P. glabrinota* were constructed between leaves, usually in the lower arboreal zone, about 2-3 m above the ground.

Polyrhachis dispar sp. nov.
(Figs 4A, C-D, 8A)

Polyrhachis (Myrmhopla) barnardi Clark, 1928: 39, pl. 1, figs 37-38 (in part); Kohout & Taylor, 1990: 519.
Polyrhachis barnardi Clark; Bolton, 1975: 6 (in part).

Material. HOLOTYPE: QUEENSLAND, Cape York Pen., Iron Ra., 12º43'S, 143º18'E, 26-31.vii.1981, rf., ex nest in dry bamboo internode, R.J. Kohout acc. 81.202 (worker). PARATYPES: data (and nest) as

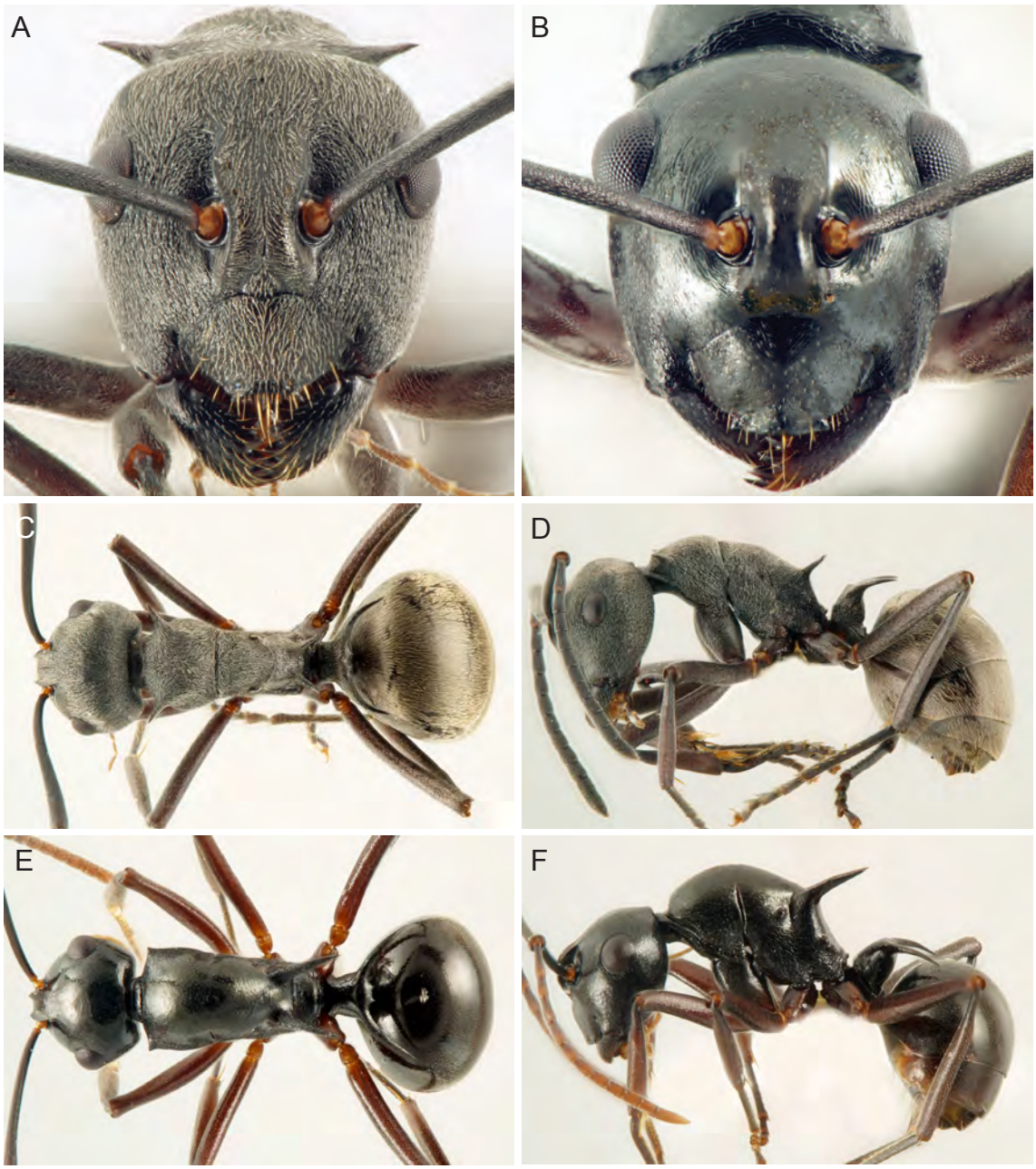

FIG. 3. *Polyrhachis (Myrmhopla)* species from Australia. Head in full face view (top); Dorsal view (left); Lateral view (right). A,C-D, *P. dives* Fr. Smith; B,E-F, *P. mucronata* Fr. Smith (not to scale).

for holotype (64 workers, alate queen); data as for holotype, except RJK accs 81.148, 195 (8 paratype workers); Cape York, W.B. Barnard (2 workers from original series of *P. barnardi* Clark in ANIC & MCZC). Type deposition: Holotype (QM T152321), most paratype workers and paratype queen (from holotype nest) in QM; 4 paratype workers (2 from holotype nest) each in ANIC, BMNH and MCZC; 2 paratype workers each in AMNH, AMSA, CASC, MHNG, MVMA, NMNH and NMHU.

Other material. QUEENSLAND, Cape York Pen., Lockerbie Scrub, 10º46′S, 142º29′E, 19-24.iii.1987, rf. (RJK acc. 87.61) (w, ♀); ditto, 25.i-12.ii.1984 (J.H. Sedláček) (♀); Iron Ra., 21.vi.1948 (D.P. Vernon) (w); ditto, viii.1949 (N.L.H. Krauss) (w).

Worker. Dimensions: (holotype cited first) TL c. 13.10, 11.39-14.10; HL 3.12, 2.87-3.40; HW 2.12, 2.02-2.44; CI 68, 68-74; SL 3.43, 3.17-3.72; SI 162, 152-165; PW 1.75, 1.51-1.96; MTL 4.33, 4.08-4.69 (25 measured).

Anterior clypeal margin arcuate, with shallow emargination medially; clypeus with distinct, blunt, median carina; clypeus virtually straight in profile, posteriorly rounding into moderately impressed basal margin. Frontal triangle distinct. Frontal carinae sinuate with acute, almost vertically raised margins; central area relatively narrow with distinct posterior carina. Sides of head in front of eyes weakly convex; behind eyes sides converging into relatively wide occipital margin. Eyes strongly convex, in full face view exceeding lateral cephalic outline. Median ocellus poorly developed, lateral ocelli lacking; positions indicated by distinctly raised cephalic sculpture. Pronotal dorsum weakly convex in profile; humeri armed with strong, acute, more-or-less horizontal, anterolaterally curved spines; promesonotal suture distinct. Mesonotum rather flat in profile; mesopleural process a blunt, simple lobe. Propodeal spines relatively long, obliquely elevated from their bases, curved posteriorly and moderately divergent. Dorsum of petiole with a pair of laterally and posteriorly directed, acute spines, with their tips turned slightly downwards.

Clypeus finely reticulate-punctate; sides of head in front of eyes smooth and polished; sculpturation on head increasing in density and intensity posteriorly, vertex and sides towards occipital margin coarsely sculptured. Dorsum and sides of mesosoma rugose; sculptural intensity decreasing posteriorly with propodeal dorsum and declivity relatively smooth. Gaster very finely shagreened.

Mostly whitish or pale yellow hairs present over all body and appendages, including antennal scapes and spines, with longest hairs on pronotal and mesonotal dorsa exceeding greatest diameter of eye in length. Rather diluted, mostly greyish, appressed or suberect pubescence variously developed, most dense and more appressed on clypeus, dorsal mesosoma and petiole, somewhat suberect and variously radiating on sides of mesosoma. Sides of head and vertex with distinctly less dense, suberect pubescence partly revealing underlying sculpturation. Gaster with relatively long, mostly golden appressed pubescence, ranging from somewhat diluted on venter to dense on dorsum, where it is arranged in a characteristic midline pattern.

Body generally black; mesosoma and petiole in some specimens very dark reddish-brown; masticatory borders of mandibles, apical antennal segments and legs, except tarsi, medium reddish-brown.

Queen. Dimensions: (paratype queen cited first) TL c. 14.08, 13.18-14.21; HL 3.17, 3.07-3.38; HW 2.17, 2.17-2.47; CI 68, 68-73; SL 3.43, 3.28-3.73; SI 158, 148-159; PW 2.37, 2.42-2.57; MTL 4.33, 4.23-4.74 (5 measured).

Very similar to worker with usual differences indicating full sexuality. Mesoscutum virtually as wide as long with lateral margins converging anteriorly into narrowly rounded margin; median line slightly raised; dorsum rather low and flat in lateral view with parapsides only weakly raised posteriorly. Mesoscutellum flat, not elevated above dorsal plane of mesosoma; metanotal groove distinct. Spines similar to those in worker, but shorter with propodeal pair distinctly less elevated. Sculpturation, pilosity, pubescence and colour virtually identical to worker.

Male unknown. Immature stages (larvae of various stages of development and pupae) in QM spirit collection.

Remarks. With its relatively broad occipital margin, *Polyrhachis dispar* is easily recognised within the *sexspinosa*-group. It is most similar to *P. reclinata* and, in addition to the lack of lateral occipital lobes, it can be distinguished by its less convex pronotal dorsum and distinctly rugose dorsum of the head and mesosoma. The pronotal dorsum in *P. reclinata* is distinctly higher and the sculpturation of the vertex, sides of head and pronotal dorsum consists of very fine reticulation beneath a rich pubescence that is much more diluted in *P. dispar*. Also, the mesopleural process in *P. dispar* is present as a blunt, simple lobe, while in *P. reclinata* the lobe is ventrally dentiform.

Kohout & Taylor (1990: 519) examined all the available specimens of the *P. barnardi* Clark, 1928 type series and concluded that it comprised two distinct species. The lectotype (originally furnished with a red tag inscribed 'Type') and two paralectotypes (all MVMA) were identified as *P. sexspinosa* (Latreille) and, consequently, *P. barnardi* has been considered a synonym of that species. Two remaining paralectotypes (that match Clark's original description and illustrations of *P. barnardi*) were deposited in other institutions (ANIC, MCZC) and are included in the type series of *P. dispar*.

Polyrhachis glabrinota Clark, 1930
(Figs 4B, E-F, 8B)

Polyrhachis (Myrmhopla) glabrinotum Clark, 1930: 13, fig. 1 nos 11, 11a. Syntype workers. Type locality: QUEENSLAND, Cape York (W.B. Barnard), ANIC, BMNH, MCZC, MVMA, (examined).

Polyrhachis glabrinota Clark; Bolton, 1975: 8.

Other material. QUEENSLAND, Cape York Pen., Lockerbie Scrub, 10º46'S, 142º29'E, 19-24.iii.1987, rf. (RJK acc. 87.38, 60, 61) (w, ♀); Bamaga, 10º53'S, 142º23'E, 18-24.iii.1987, rf. (RJK acc 87.11) (w); Jardine R., 11º08'S, 142º35'E, 14.x.1979 (M.S.& B.J. Moulds) (w); Hann Ck, W of Moreton Telegraph Stn, 28.vi.1988 (G. Kenning) (w); 14 km WSW of Captain Billy Landing, 11º41'S, 142º42'E, 9.ix.1993, rf. (S.O. Shattuck #3802-16) (w); Iron Ra., West Claudie R., 3-10.xii.1985, rf., 50 m (JBM & DJC) (w); Iron Ra., 12º43'S, 143º18'E, 1-17. viii.1978 (S.van Dyck) (w); ditto, 26-31.vii.1981 rf. (RJK accs 81.133, 134, 167, 180) (w, ♀); ditto, Gordon Ck x-ing, 6.x.2000 (RJK acc. 00.174) (w); 9 km ENE of Mt Tozer, Iron Ra. NP, 12º43'S, 143º17'E, 10.vii.1986 (D.C.F. Rentz) (w); 11 km ENE of Mt Tozer, 11-16. vii.1986 (T.Weir & A. Calder) (w).

Worker. Dimensions: (syntypes cited first) TL c. 10.18-11.00, 9.78-11.95; HL 2.50-2.64, 2.46-2.96; HW 1.62-1.69, 1.53-1.93; CI 63-66, 59-66; SL 3.12-3.32, 2.93-3.35; SI 190-197, 181-197; PW 1.44-1.48, 1.40-1.78; MTL 3.73-3.88, 3.58-4.18 (22 measured).

Anterior clypeal margin arcuate, entire. Clypeus with blunt median carina, straight or weakly convex in profile, posteriorly rounding into well impressed basal margin. Frontal triangle distinct. Frontal carinae sinuate with only moderately raised margins; central area with median longitudinal carina. Sides of head in front of eyes weakly convex; behind eyes sides distinctly tapering into relatively narrow occipital margin with lateral lobes weakly developed, not visible with head in full face view. Eyes protuberant, in full face view exceeding lateral cephalic outline. Ocelli lacking. Pronotal dorsum convex in profile; summit with more-or-less distinct, shallow, longitudinal depression; humeri armed with strong, acute, more-or-less horizontal, anterolaterally curved spines; promesonotal suture distinct. Mesonotum virtually flat in profile; mesopleural process a well-developed lobe. Propodeal spines relatively long, obliquely elevated from their bases, curved and moderately divergent. Dorsum of petiole with a pair of laterally and weakly posteriorly directed, acute spines, with their tips turned slightly downwards.

Clypeus and sides of head in front of eyes finely reticulate-punctate, rather smooth and polished; density and intensity of sculpturation increasing posteriorly with central area, vertex and sides of head towards occipital margin

deeply and coarsely sculptured. Pronotal dorsum rather smooth and polished or with shallow weak rugosity. Mesonotum, sides of mesosoma and petiole rugose with propodeal dorsum relatively smooth. Gaster very finely shagreened.

Numerous, mostly white or pale yellow, relatively short hairs, not exceeding greatest diameter of eye in length, present over entire body and appendages, including antennal scapes and spines. Rather diluted, white or grey, appressed or suberect pubescence developed in various densities over all body surfaces, more dense and closely appressed on clypeus, sides of head and fore coxae; somewhat suberect and variously radiating pubescence on sides of mesosoma. Gaster with mostly white, appressed pubescence arranged in characteristic midline pattern.

Generally bicoloured; head black, mesosoma black or dark reddish-brown with propodeum and petiole distinctly lighter. Colour variable; black in most recently collected specimens but distinctly lighter reddish-brown in some syntypes. Mandibular masticatory borders, tips of apical antennal segments, and legs, including coxae, light to medium reddish-brown.

Queen. Dimensions: TL c. 11.34-13.10; HL 2.65-2.96; HW 1.62-1.81; CI 59-64; SL 3.17-3.53; SI 183-199; PW 1.90-2.21; MTL 3.93-4.33 (9 measured).

Apart from sexual characters, very similar to worker. Mesoscutum virtually as wide as long with lateral margins converging into narrowly rounded anterior margin; median line slightly raised; dorsum flat in profile with parapsides only weakly raised posteriorly. Mesoscutellum flat, marginally elevated above dorsal plane of mesosoma, posteriorly rounding into metanotal groove. Spines similar to worker but shorter with propodeal pair horizontal. Sculpturation, pilosity, pubescence and colour identical to worker.

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

Remarks. With its smaller size, rather smooth and polished pronotal dorsum and short, sparse pubescence, *P. glabrinota* is easily distinguished from all other Australian members of the group. However, it closely resembles *P. bubastes* Fr. Smith, 1863 from New Guinea, with both species similar in size, general body form and shape of the petiole. They differ in the intensity of the pronotal sculpturation that, in *P. glabrinota*, is only weakly sculptured, rather smooth and polished, while it is very coarsely sculptured in *P. bubastes.* The body in *P. glabrinota* is also generally bicoloured with the parts of mesosoma and petiole more-or-less reddish-brown, while the body in *P. bubastes* is mostly uniformly black.

Recent examination of a considerable amount of *sexspinosa*-group material from eastern Indonesia and New Guinea has revealed a number of specimens closely comparable to *P. glabrinota*. Like that species, they have smooth pronotal dorsums and are bicoloured, but more distinctly than most of the recently collected Australian specimens. The reddish-brown colour of the specimens from Australia is somewhat darker and more-or-less restricted to the propodeum, petiole and appendages, while the specimens from the Aru Islands and New Guinean mainland are distinctly bicoloured with the head black and all of the mesosoma, petiole and appendages light to medium reddish-brown. These specimens also bear a rather prominent, median, longitudinal depression on the pronotal dorsum, which is only shallowly indicated in some of the Australian specimens. Specimens from Wammar, Aru Is (V. Karavaiev #2595, IZAS) were misidentified as *P. rugifrons* Fr. Smith (Karavaiev, 1927: 25), while a series from Wanuma, Madang District (N.L.H. Kraus, BPBM) were furnished with an identification tag of unknown origin inscribed 'cf. *bubastes* new'. In addition, two nest series of closely comparable specimens, complete with

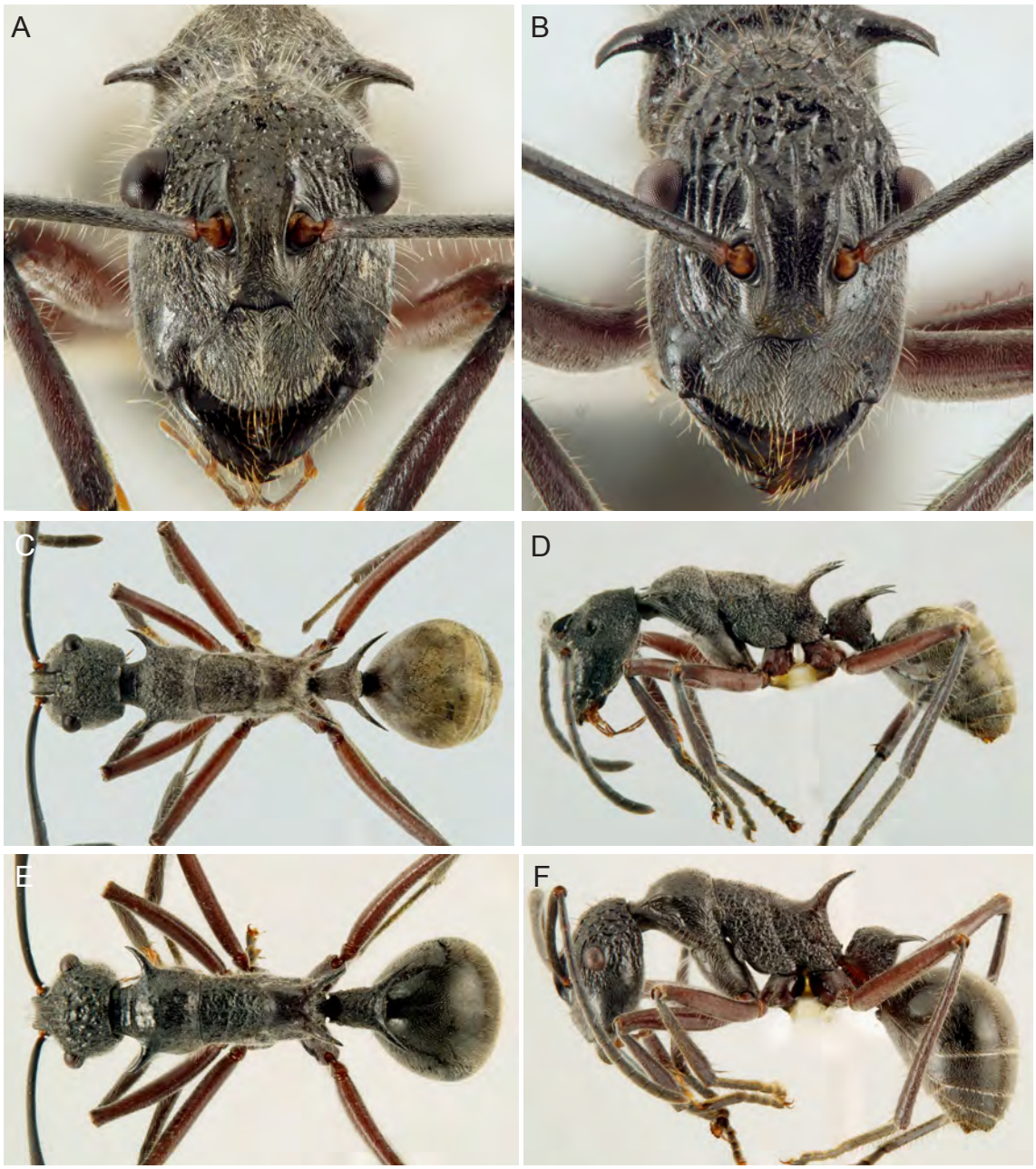

FIG. 4. *Polyrhachis (Myrmhopla)* species from Australia. Head in full face view (top); Dorsal view (left); Lateral view (right). A,C-D, *P. dispar* sp. nov.; B,E-F, *P. glabrinota* Clark (not to scale).

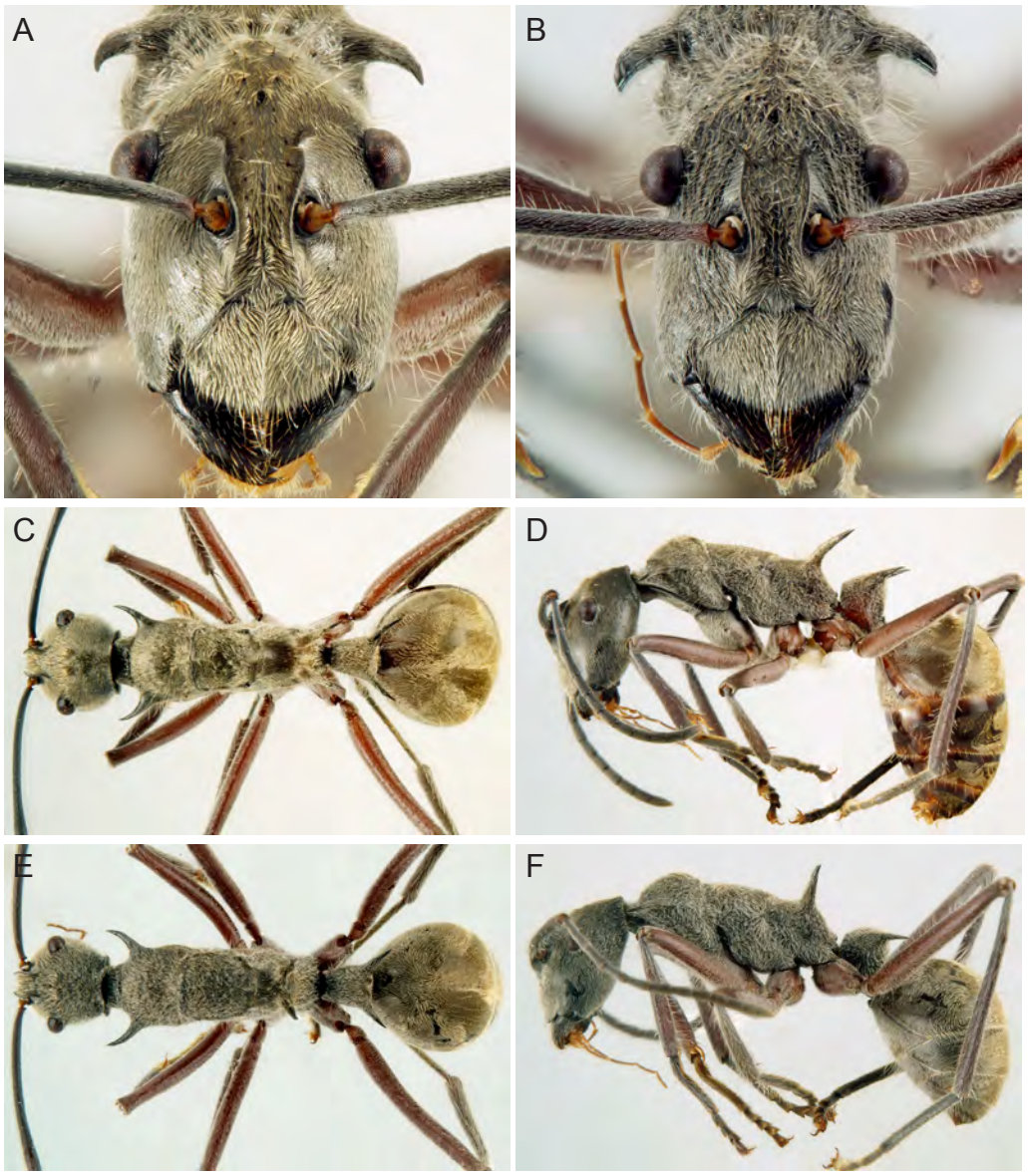

FIG. 5. *Polyrhachis (Myrmhopla)* species from Australia. Head in full face view (top); Dorsal view (left); Lateral view (right). A,C-D, *P. reclinata* Emery; B,E-F, *P. sexspinosa* (Latreille) (not to scale).

sexuals, were more recently collected at Lumi, Torricelli Mts (RJK accs 84.271, 283). Specimens of all these populations vary in several characters, including the direction and length of the propodeal spines and the relative height of the petiole, but overall the specimens are very similar. However, when directly compared with *P. glabrinota*, these specimens appear rather distinct and in spite of some similarity I am hesitant to consider them conspecific. Like Bolton (1975), I consider *P. glabrinota* to be an Australian endemic and believe that the Indonesian and New Guinean material belong to a closely allied, but separate biological species.

Polyrhachis glabrinota is a predominantly arboreal species that builds nests between leaves in the lower arboreal zone. However, several colonies were located nesting in bamboo internodes. In contrast, the nests of the closely allied, possibly polydomous, New Guinean species noted above, were collected from the crown of a recently felled rainforest tree.

Polyrhachis reclinata Emery, 1887
(Figs 5A, C-D, 8C)

Polyrhachis sexspinosa var. *reclinata* Emery, 1887: 236. Lectotype worker (by present designation) and paralectotype workers. Type locality: NEW GUINEA, Fly River, xii.75 (L.M. D'Albertis), MSNG (examined). *Polyrhachis sexspinosa* (Latreille, 1802); Bolton, 1975: 12 (in part).

Polyrhachis reclinata Emery; Kohout & Taylor, 1990: 518. Raised to species.

LECTOTYPE SELECTION

I have examined five syntypes of the original series of *P. sexspinosa reclinata*, three of which were lodged in Emery's collection and two in the separately housed main collection of the MSNG. The specimens bear the following labels: 'Nuova Guinea, Fly River, xii.75, L.M. D'Albertis', '*P. sexspinosa* Latr. var. *reclinata* Em.' and 'Collezione Emery'. Besides the syntypes, I had the opportunity to examine additional specimens identified as *P. sexspinosa reclinata* and lodged in various other collections, however, in spite of some being furnished with a tag inscribed 'Cotype', their locality labels appeared to be of doubtful origin and not identical to those on the syntypes.

To establish the nomenclatural stability of the species and to prevent any future selection of a lectotype from outside of Emery's original series, I have designated, in accordance with Article 74.7.3 of the *International Code of Zoological Nomenclature* (Fourth Edition), a syntype worker specimen as the lectotype of *Polyrhachis reclinata* Emery. The specimen is lodged in the Emery collection (MSNG) and, in addition to the labels listed above, it bears a red original tag inscribed 'Typus'. The remaining specimens of the original series consequently become paralectotypes and are labelled accordingly.

Other material. PAPUA NEW GUINEA, Morobe Prov., Huon Pen., lower Busu R., 8-10.v.1955, lowland rf. (E.O. Wilson #923, 984, 1003) (w, ♀). Western Prov., Oriomo Govt. Stn, 26-28.x.1960 (J.L. Gressitt) (w); Daru I. (no further data) (w); Central Prov., Eigolo Rd., 4 km ESE of Sogeri, 09°25'S, 147°27'E, 4.ix.1984, c. 500 m, rf. (RJK accs 84.427, 423, 424) (w, ♀). AUSTRALIA, QUEENSLAND, Cape York Pen., Lockerbie Scrub, 10°46'S, 142°29'E, 19-23.iii.1987, rf. (RJK accs 87.21, 30, 31, 32, 33, 34, 39, 48, 64, 69, 71, 72) (w, ♀); ditto, i.1958 (Darlingtons) (w); Bamaga, 10°53'S, 142°23'E, 18-23.iii.1987, rf. (RJK acc. 87.9) (w); Bamaga-Lockerbie, 25.i-12.ii.1984 (J.H. Sedláček) (w); Iron Ra., 12°43'S, 143°18'E, 1-17.viii.1978 (S. Van Dyck) (w); ditto, 1-3.vii.1976 (P. Filewood) (w); ditto, 26-31.vii.1981, rf. (RJK accs 81.145, 148, 163, 168, 185, 195, 196, 201, 209, 210, 212) (w, ♀); ditto, i.1958 (Darlingtons) (w); ditto, West Claudie R., 3-10.xii.1985, rf. (GBM & DJC) (w); ditto, Lockhard R. Ranger Stn., 12°45'S, 143°17'E, 26.viii.2004, rf edge (G.D. Alpert) (w); 11 km ENE of Mt Tozer, 12°43'S, 143°18'E (T. Weir & A. Calder) (w).

Worker. Dimensions. (lectotype cited first): TL c. 14.01,11.44-14.31; HL 3.48, 2.92-3.48; HW 2.37,1.89-2.37; CI 68, 62-68; SL 4.13, 3.53-4.13; SI 174, 174-195; PW 1.86, 1.56-1.86; MTL 5.09, 4.28-5.11 (23 measured).

Anterior clypeal margin arcuate, narrowly and shallowly emarginate medially; clypeus with blunt median carina, clypeus weakly convex in profile, posteriorly curving into shallow basal margin. Frontal carinae sinuate with acute, highly raised margins; central

area with median longitudinal carina. Sides of head in front of eyes convex; behind eyes sides strongly tapering into narrow occipital margin with rather weakly developed occipital lobes. Eyes strongly convex, in full face view clearly exceeding lateral cephalic outline. Median ocellus usually present, lateral ocelli lacking; positions indicated by distinctly raised cephalic sculpture. Pronotal dorsum weakly convex in profile with anterior slope almost flat; humeri armed with acute, more-or-less horizontal, anterolaterally directed spines; promesonotal suture distinct. Mesopleural process a simple dentiform lobe. Mesonotal dorsum flat or weakly convex in profile. Propodeal spines long, divergent, obliquely elevated from their bases and more-or-less curved posteriorly. Dorsum of petiole with a pair of slender, widely diverging, acute spines.

Clypeus and sides of head finely reticulate-punctate, distinctly smooth; intensity of sculpturation increasing posteriorly with a few shallow rugae on vertex and towards occipital margin. Mesosoma rugose dorsally and laterally, except for relatively smooth propodeal dorsum. Gaster very finely shagreened.

Mostly yellow or pale golden hairs, of variable length and density over entire body and appendages, including antennal scapes. Relatively long, suberect, mostly golden or brassy pubescence variously developed, most dense and more appressed on dorsum of head and mesosoma where it almost completely hides underlying sculpturation. Gastral pubescence ranging from somewhat diluted on venter to dense on dorsum, where it is arranged in a characteristic midline pattern.

Body generally black; propodeum and petiole often lighter, reddish-brown; masticatory borders of mandibles, antennae and legs, including coxae, medium reddish-brown with fore coxae and tarsi distinctly darker.

Queen. Dimensions: TL c. 13.55-14.46; HL 3.12-3.28; HW 1.96-2.07; CI 61-64; SL 3.83-3.88; SI 185-195; PW 2.02-2.12; MTL 4.64-4.79 (4 measured).

Differing from worker in usual characters identifying full sexuality, including three ocelli, complete thoracic structure and wings. Mesoscutum marginally wider than long with narrowly rounded anterior margin in dorsal view; median line raised; dorsum flat in lateral view with parapsides only weakly raised posteriorly. Mesoscutellum flat, not elevated above dorsal plane of mesosoma; metanotal groove distinct. Spines similar to those in worker but shorter, propodeal pair distinctly less elevated. Sculpturation, pilosity and colour virtually identical to worker.

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

Remarks. *Polyrhachis reclinata* is a rather common species closely resembling *P. sexspinosa*. However, they are easily separated by the following characters. The head in *P. sexspinosa* is strongly tapered behind the eyes and the occipital margin forms prominent, well-developed lateral lobes that are clearly visible in full face view. In addition, the vertex and sides of the head behind the eyes are rather coarsely rugose and covered with more-or-less diluted, mostly white or silvery pubescence. The propodeal spines in *P. sexspinosa* are virtually vertical to the main axis of the body, or are even inclined forwards when viewed laterally. In contrast, the head behind the eyes in *P. reclinata* is generally shorter and distinctly less strongly tapered with the lateral occipital lobes relatively weakly developed and less prominent in full face view. The sculpturation on the clypeus and sides of the head is rather smooth, with a few shallow rugae on the vertex, and is usually masked by rather dense, golden or brassy, appressed pubescence. The propodeal spines are oblique to the main axis of the body and usually curved posteriorly in side view.

The type locality of *P. reclinata* is the Fly River delta, which is only about 150 km from Cape York Peninsula on the opposite side of Torres

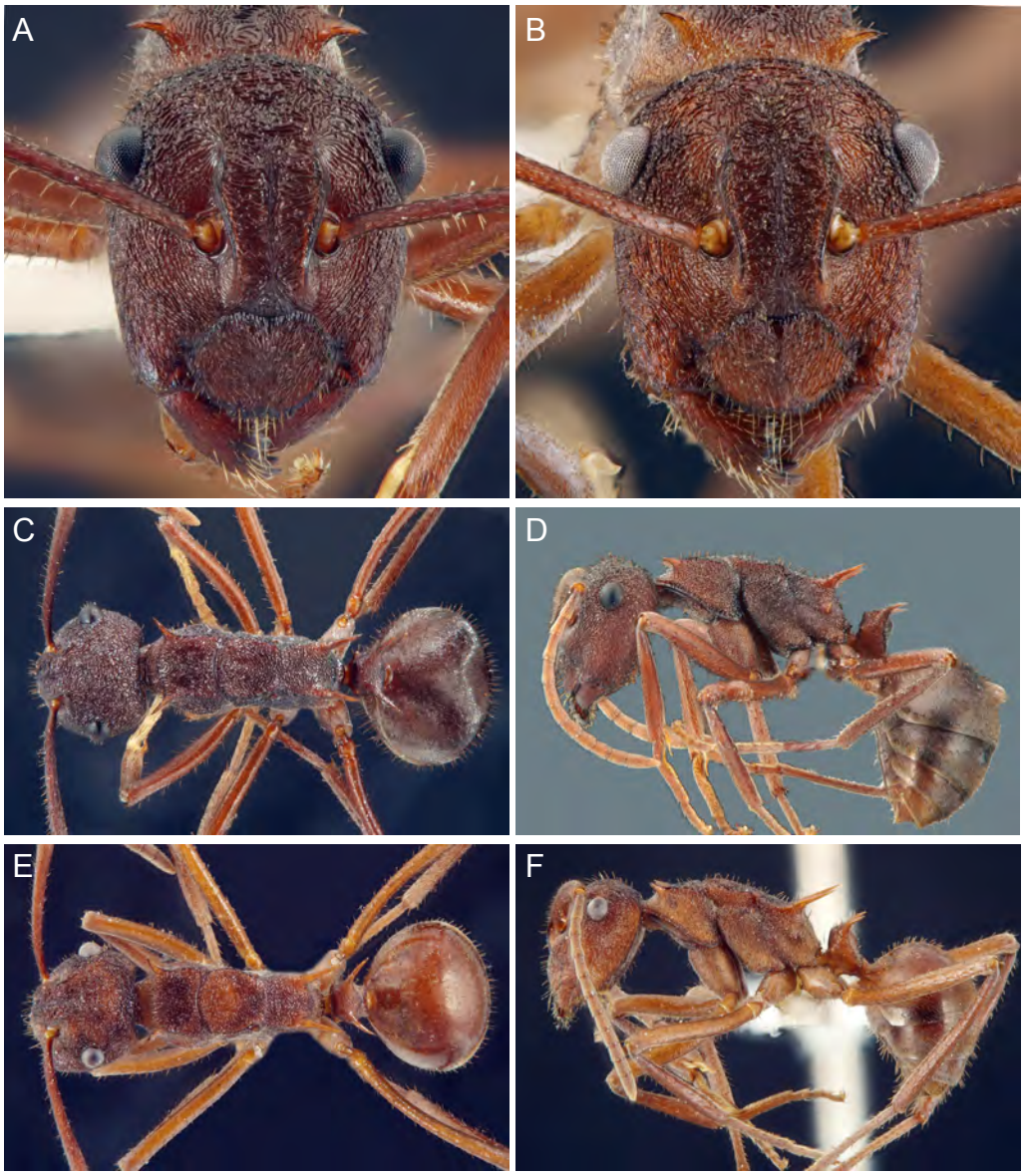

FIG. 6. *Polyrhachis (Hirtomyrma)* species from Australia. Head in full face view (top); Dorsal view (left); Lateral view (right). A,C-D, *P. bamaga* Kohout; B,E-F, *P. eremita* Kohout (not to scale).

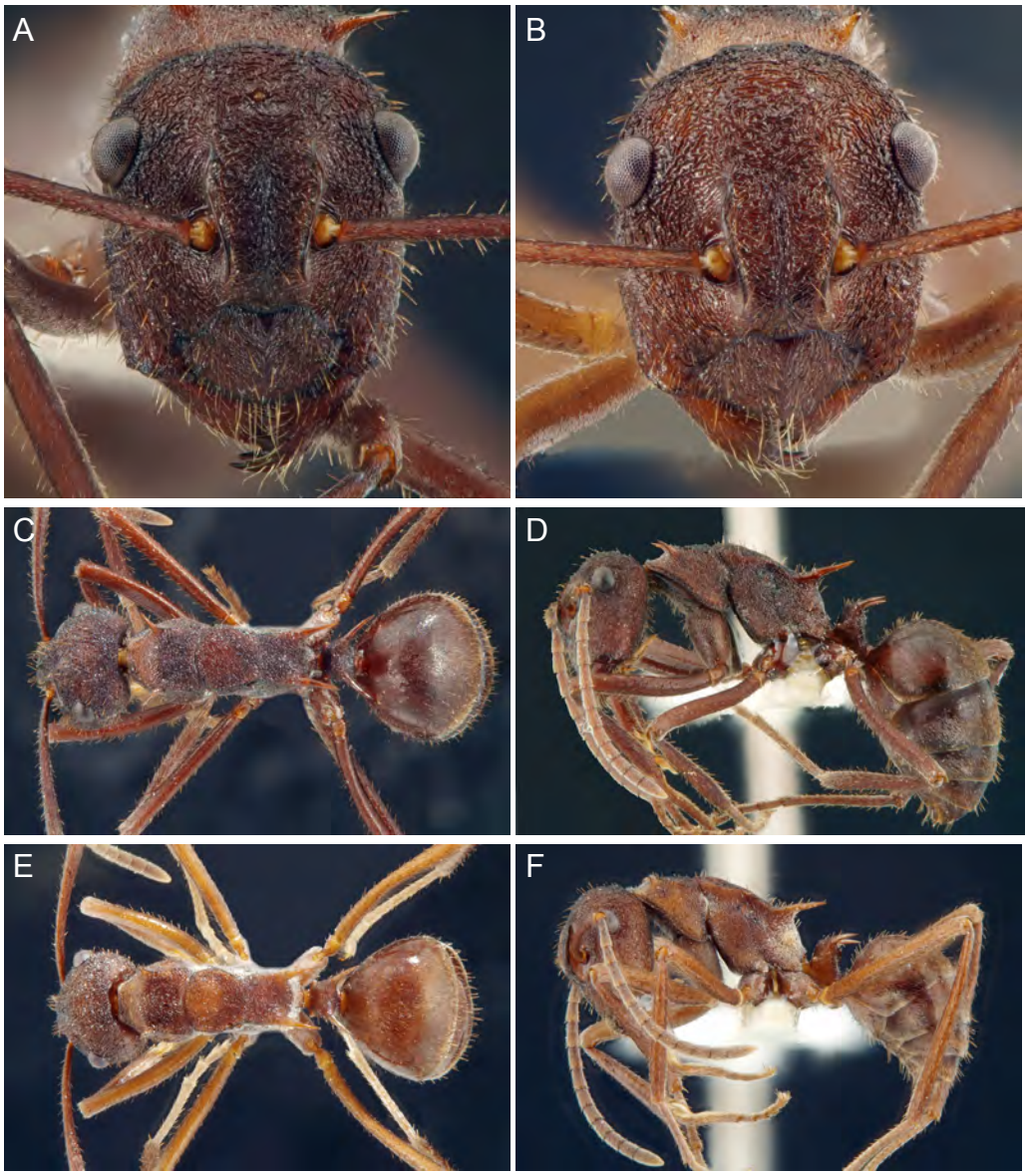

FIG. 7. *Polyrhachis (Hirtomyrma)* species from Australia. Head in full face view (top); Dorsal view (left); Lateral view (right). A,C-D, *P. loweryi* Kohout; B,E-F, *P. rustica* Kohout (not to scale).

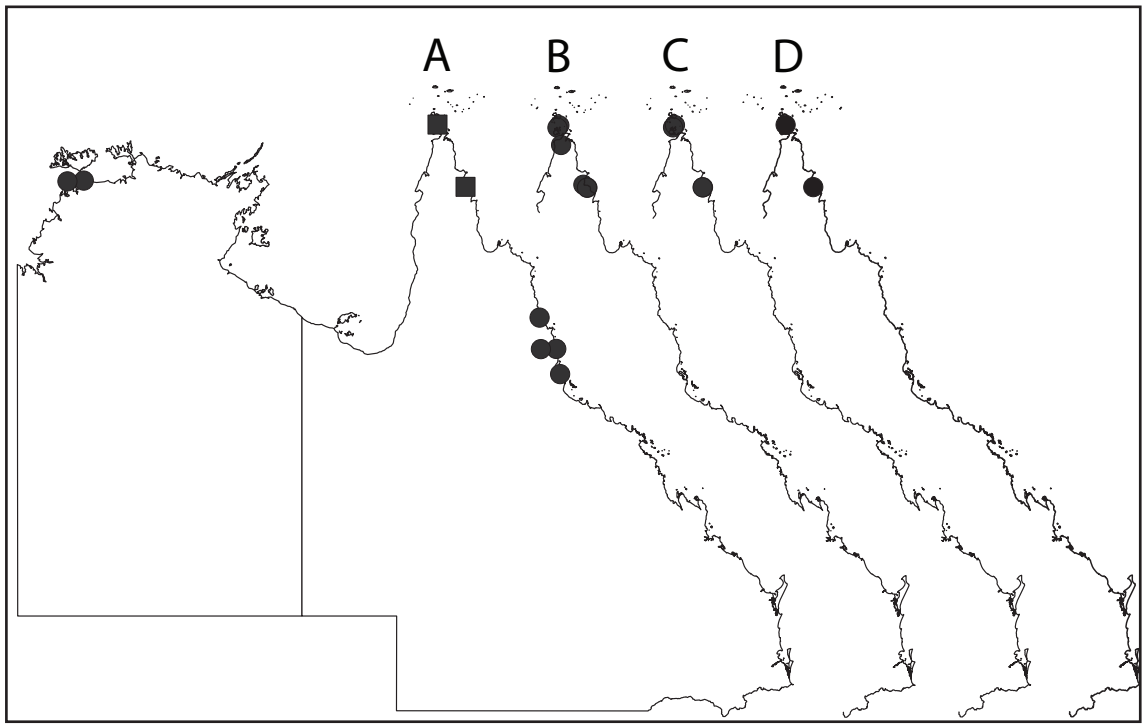

FIG. 8. Distributions of Australian *Polyrhachis* (*Myrmhopla*) species (extralimital distributions not indicated). A, ● *P. dives*, ■ *P. dispar*; B, *P. glabrinota*; C, *P. reclinata*; D, *P. sexspinosa*.

Strait. Specimens from either side of Torres Strait are closely comparable, differing only in the shape and direction of spines. The pronotal spines of the specimens from the Fly River are more slender, longer and less strongly curved forwards compared to Australian specimens. The propodeal spines are almost straight while they are shorter and more strongly curved posteriorly in Australian specimens. The mesopleural process is a simple, ventrally dentiform lobe in both New Guinean and Australian specimens.

Polyrhachis reclinata is known from lowland rainforest along the Gulf of Papua, including the Fly River delta (type locality), the lower Busu River, the Port Moresby area and Daru Island. In Australia *P. reclinata* has been collected from Lockerbie Scrub south to Iron Range. Most colonies collected at the latter locality were nesting within the hollow internodes of *Bambusa forbesii* growing as several relatively large stands within monsoon rainforest. Only a single colony of this species was located nesting under the bark of a living tree.

Polyrhachis sexspinosa (Latreille, 1802) (Figs 5B, E-F, 8D, 10A-B,)

Formica sexspinosa Latreille, 1802: 126, pl. 4, fig. 21. Neotype worker (by present designation). Type locality: PAPUA NEW GUINEA, West Sepik Prov., Pes Mission, 12 km SW of Aitape, 03°11'S, 142°15'E, <50 m, rf., 3.viii.1984 (RJK acc. 84.207), ANIC (examined).

Polyrhachis barnardi Clark 1928; 39, pl. 1, figs 37-38 (in part). Synonymy, and lectotype designated by Kohout & Taylor 1990: 519 (see under remarks section of *P. dispar* above).

Polyrhachis sexspinosa (Latreille). Fr. Smith,1858: 59; Bolton, 1975: 12.

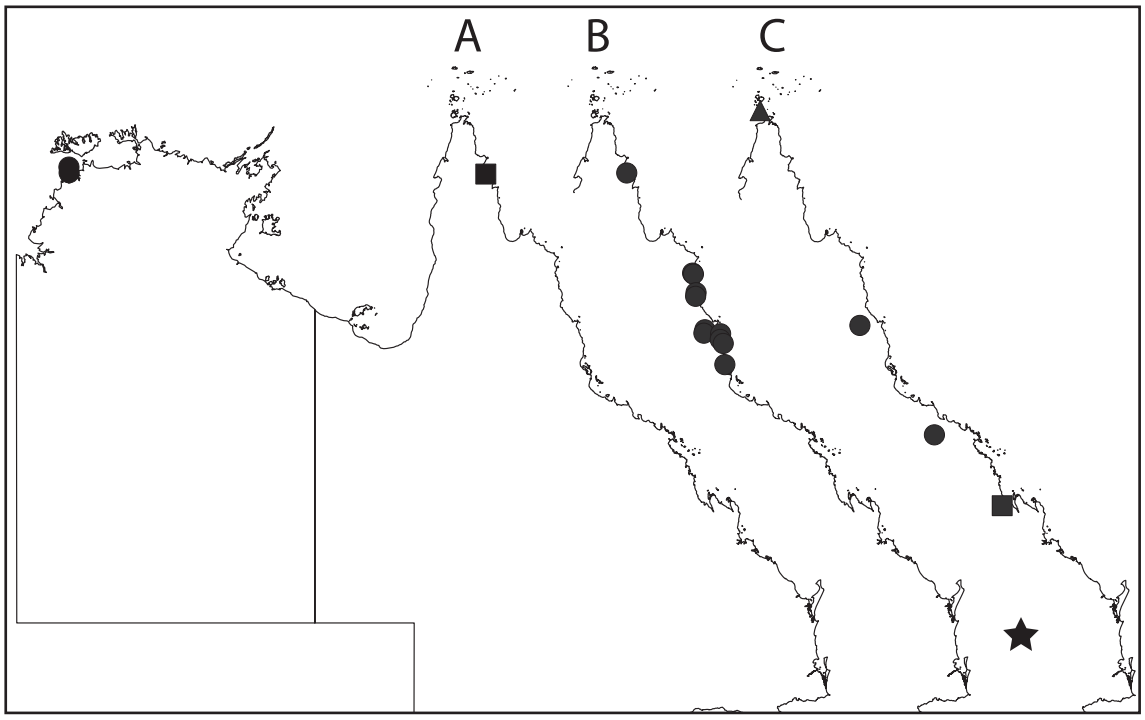

FIG. 9. Distributions of Australian *Polyrhachis* (*Myrmhopla*) and *Polyrhachis (Hirtomyrma)* species (extralimital distributions not indicated). A, ● *P. bicolor*, ■ *P. nigripes*; B, *P. mucronata*; C, ▲, *P. bamaga*, ●, *P. rustica*; ■, *P. eremita*; star, *P. loweryi*.

NEOTYPE DESIGNATION

The holotype queen of this species should be lodged in the MNHN, but an extensive search by the author failed locate it there or in any collections examined and it is considered lost. To establish the nomenclatural stability of the species, I have designated, in accordance with Article 75.3.5. of the *International Code of Zoological Nomenclature* (Fourth Edition), a worker specimen as the neotype of *Polyrhachis sexspinosa* (Latreille). The specimen was selected from a colony of 50+ workers, a dealate queen and several males collected from a pocket nest on the trunk of a rainforest tree. The neotype has been deposited in ANIC.

Other material. INDONESIA, Aru Is, Wokam, 1908 (Merton) (w); ditto, Kobror, 1925 (Karavaiev #2534) (w). 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 84.148, 171, 207) (w, ♀, ♂); Northern Prov., Owen Stanley Ra., Mamba Pltn, c. 7 km WNW of Kokoda, 08°51'S, 147°41'E, 500 m, 31.viii-1.ix.1984 (RJK accs 84.398, 399, 403) (w, ♀). AUSTRALIA, QUEENSLAND, Cape York, xi.1927 (W.B. Barnard); Cape York Pen., Lockerbie Scrub, 10°46'S, 142°29'E, 19-23.iii.1987 (RJK accs 87.40, 41, 42, 43, 48, 57, 70) (w, ♀); Iron Ra., 12°43'S, 143°18'E, 26-31.vii.1981 (RJK accs 81.162, 172, 173) (w, ♀); ditto, 1-3.vii.1976 (P. Filewood) (w); ditto, West Claudie R., 3-10.xii.1985 (GBM & DJC) (w).

*Worker***.** Dimensions. TL c. 12.60-14.76; HL 3.12-3.58; HW 1.84-2.17; CI 57-62; SL 3.78-4.48; SI 195-216; PW 1.81-2.03; MTL 4.79-5.74 (27 measured).

Anterior clypeal margin arcuate, often with very shallow median emargination. Clypeus with median carina, virtually straight in profile,

posteriorly curving into moderately impressed basal margin. Frontal carinae sinuate with acute, highly raised margins. Sides of head in front of eyes almost straight, weakly diverging towards mandibular bases; behind eyes sides strongly tapered into narrow occipital margin with strongly developed occipital lobes. Eyes strongly convex, in full face view clearly exceeding lateral cephalic outline. Ocelli lacking, positions indicated by distinctly raised cephalic sculpture. Pronotal dorsum convex in profile, distinctly higher than mesonotum; humeri armed with strong, acute, more-or-less horizontal, anterolaterally directed spines; promesonotal suture distinct. Mesopleural process a distinct, dentiform lobe. Mesonotum and propodeum weakly convex in profile. Propodeal spines relatively long, virtually straight, in lateral view usually vertical to main axis of body or inclined forwards, tips sometimes curved posteriorly or inwards. Dorsum of petiole with a pair of lateral, dorsoposteriorly directed, acute spines.

Mandibles with numerous piliferous pits. Clypeus and sides of head finely reticulate-punctate with intensity and density of sculpturation distinctly increasing posteriorly, vertex and occiput rather coarsely sculptured. Mesosomal dorsum rugose with intensity decreasing posteriorly with propodeal dorsum finely reticulate-punctate. Gaster very finely shagreened.

Mostly silvery or grey, erect or variously curved hairs of variable lengths and densities over the entire body and appendages, including antennal scapes. Longest hairs on mesosomal dorsum, clearly longer than greatest diameter of eye. Head and mesosoma with somewhat untidy, relatively long, mostly silvery, suberect pubescence that never completely hides underlying sculpturation; most dense and more appressed on dorsum of head and mesosoma, somewhat radiating on sides. Gastral pubescence ranging from diluted on venter to dense on dorsum, where it is arranged in characteristic midline pattern.

Body black; mandibles, except bases, apical antennal segments and legs, including coxae, mostly light to medium reddish-brown.

Queen. Dimensions: TL c. 13.46-16.28; HL 3.17-3.78; HW 1.86-2.37; CI 57-63; SL 3.73-4.59; SI 189-211; PW 2.02-2.82; MTL 4.74-5.64 (11 measured).

Queen very similar to worker; apart from usual characters identifying full sexuality, including three ocelli, complete thoracic structure and wings differing mainly in configuration of spines; pronotal spines shorter, projecting more anteriorly, tips directed forwards; propodeal spines distinctly shorter, oblique to main axis of body, weakly curved posteriorly; petiolar spines straight, distinctly shorter than in worker; sculpturation, pilosity and colour pattern identical to worker.

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

Remarks. *Polyrhachis sexspinosa* was originally described from a queen collected in the 'East Indies', however like Bolton (1975), I have been unable to locate the type in any of the collections examined and consider it lost. I therefore support the earlier decision of Kohout & Taylor (1990: 518-520) who recognised the specimens of a nest series from Papua New Guinea (see above) as the voucher specimens of *P. sexspinosa* by designating one of these workers as the neotype for this name (ANIC, QM).

Polyrhachis sexspinosa resembles *P. reclinata*, with their main distinguishing characters given in remarks section under the latter species. *Polyrhachis sexspinosa* is a relatively common and widespread species reported from most of the New Guinean mainland and islands of eastern Indonesia, including several doubtful records from the southern Philippines (Kohout, 1989). In Australia it ranges from Lockerbie Scrub south to Rocky River, northeast of Coen. *Polyrhachis sexspinosa* is somewhat singular within the *sexspinosa*-group in that it builds pocket-like nests

of silk, vegetation debris and bark fragments against the trunks of rainforest trees (Figs 10A-B).

Subgenus ***Hirtomyrma*** subgen. nov.

Myrmhopla Forel, 1915: 107 as subgenus of *Polyrhachis* Fr. Smith (in part).

Myrmhopla Forel; Emery, 1925 (in part – as *P. viehmeyeri*-group).

Myrmhopla Forel; Kohout, 1990 (in part – as *P. viehmeyeri*-group).

Myrmhopla Forel; Dorow, 1995 (in part – as *P. viehmeyeri*-group).

Type species. *Polyrhachis hirta* Viehmeyer, 1914.

The subgenus *Hirtomyrma* as conceived here effectively replaces the *Polyrhachis viehmeyeri*-group that was originally established by Emery (1925), within the subgenus *Myrmhopla* Forel, for two, rather unusual species from New Guinea (*P. hirta* Viehmeyer, 1913 and *P. viehmeyeri* Emery, 1921). A third species (*P. davydovi* Karavaiev) from the Aru Is, Indonesia, was described by Karavaiev in 1927. The former group was reviewed by Kohout (1990) who described four new species from northern Australia (*P. bamaga* Kohout, *P. eremita* Kohout, *P. loweryi* Kohout and *P. rustica* Kohout) and two extralimital species (*P. greensladei* Kohout from the Solomons and *P. stigmatifera* Kohout from Seram I., Indonesia). An additional species from South East Asia (*P. lama* Kohout) was described by Kohout in 1994, thus raising the number of known species of the group to ten.

Diagnosis. *Worker*. Medium sized-ants (HL 1.75-2.20) with general characteristics of the genus. Mandibles with 4 or 5 teeth, very finely longitudinally striate. Anterior clypeal margin truncate medially; posterior margin usually deeply impressed. Frontal carinae rather flat, widely separated. Eyes with numerous, short, erect hairs, strongly convex, almost hemispherical, clearly exceeding lateral cephalic outline in full face view. Median ocellus distinct (as in *P. eremita* and *P. loweryi*), vestigial (as in *P. rustica*) or lacking (as in *P. bamaga*). Pronotal and propodeal dorsa laterally marginate, virtually flat; mesonotal dorsum transversely convex with less distinct, rather blunt, lateral margins. Pronotum armed with somewhat dorsally flattened, acute spines (except in extralimital *P. lama*); their length, direction and degree of elevation usually highly variable, even asymmetrical, within a single species (as in *P. rustica*). Propodeal spines acute, usually longer than pronotal pair, variously elevated. Dorsum of petiole with poorly defined, more-or-less posteriorly sloping platform, bearing a pair of widely separated, diverging spines, without intercalary spines or teeth. Head, mesosoma and petiole with characteristic vermiculate-rugose sculpturation and bristle-like hairs, distinctly shorter than maximum eye diameter. Gaster shagreened, or with base of first tergite finely micro-reticulate and more-or-less shiny (as in most Australian species). Body mostly light to dark reddish-brown, with mandibles, clypeus, frontal carinae, spines and posterior margins of gastral tergites usually narrowly bordered very dark brown.

Queen. Differing from worker in usual characters identifying full sexuality, including three ocelli, complete thoracic structure and wings. Spines shorter and more stubby than in worker. Sculpturation, pilosity and colour essentially as in worker.

Distribution and biology. The main distribution of the subgenus *Hirtomyrma* ranges from the Moluccas, New Guinea and Bismarck Archipelago to the Solomons and extends south to northern Australia. However, the range of one species (*P. lama* Kohout, 1994) extends from Java and Hong Kong to the Tibetan Plateau in the Himalayas. All known species of this group are apparently social parasites of other ants, notably Ectatomminae and Ponerinae. The association of *P. loweryi* with the genus *Rhytidoponera* Mayr and the extralimital *P. lama*, with the genus *Diacamma* Mayr, were studied by Prof. U. Maschwitz (formerly of Johan Wolfgang Goethe-Universität in Frankfurt am Main, Germany) and his team (Maschwitz *et al.* 2000, 2003).

KEY TO AUSTRALIAN SPECIES OF THE SUBGENUS *HIRTOMYRMA*
(based on worker caste)

1. Base of first gastral tergite finely shagreened, rather polished (Fig. 6E); mandibles with 4 teeth . . . . . 2.
— Base of first gastral tergite closely, transversely striate, opaque (Fig. 6C); mandibles with 5 teeth, but with basal tooth often vestigal . . . . . *bamaga* Kohout

2. Larger species (HL >1.85); median ocellus well developed, distinct . . . . . 3.
— Smaller species (HL <1.80); median ocellus rather small, indistinct . . . . *rustica* Kohout

3. Body bicoloured, medium reddish-brown with most of head, pronotal collar and anteromedian patch on mesosomal dorsum light yellowish-brown; antennal scapes shorter (SI <144) . . . . . *eremita* Kohout
— Body more-or-less unicoloured, dark reddish-brown, with only mandibles, spines and subpetiolar process lighter; antennal scapes longer (SI >146) . . . . . *loweryi* Kohout

Polyrhachis bamaga Kohout, 1990
(Figs 6A, C-D, 9C)

Polyrhachis bamaga Kohout, 1990: 500, fig. 4. Holotype and paratype workers. Type locality: QUEENSLAND, Cape York Pen., Bamaga (R.J. Kohout), QM (examined).

Remarks. In spite of revisiting the type locality of *P. bamaga* specifically to collect more specimens (see Maschwitz *et al*., 2003), the types remain the only specimens of this species known. They were originally collected along the edge of a lowland riverine rainforest, foraging over low vegetation in association with *Polyrhachis paxilla* Fr. Smith, 1863 (see Kohout, 1990: 501).

Polyrhachis eremita Kohout, 1990
(Figs 6B, E-F, 9C)

Polyrhachis eremita Kohout, 1990: 502. Holotype and paratype workers. Type locality: QUEENSLAND, 4-10 km N of Marlborough (R.J. Kohout), QM (examined).

Remarks. A thorough search conducted at the type locality and in brigalow forest north of Marlborough (see Maschwitz *et al*., 2003), produced no nests of the large *Rhytidoponera* species with which *P. eremita* was thought to be associated. I also visited the area in 2006 and found no *Rhytidoponera* nests, as well as a general decline in the number of other ant species previously found there in 1981. This could be due to considerable degradation of the habitat, including substantial deforestation.

Polyrhachis loweryi Kohout, 1990
(Figs 1F, 7A, C-D, 9C)

Polyrhachis loweryi Kohout, 1990: 505. Holotype and paratype workers. Type locality: QUEENSLAND, Miles (B.B. Lowery), ANIC (examined).

Other material. QUEENSLAND, c. 5.5 km NNW of Miles, 26°36'S, 150°10'E, 6-8.iii.2000, dry (U. Maschwitz *et al*.) (w, ♀, ♂ - associated with *Rhytidoponera* sp.).

Queen. (not previously described) Dimensions: TL c. 9.27; HL 2.00; HW 1.56; CI 78; SL 2.34; SI 150; PW 1.81; MTL 3.22 (1 measured).

Closely resembling worker and apart from sexual characters, including three ocelli, complete thoracic structure and wings, differing as follows: pronotal spines distinctly reduced to more-or-less triangular, acute teeth. Mesoscutum with anterior margin evenly rounded in dorsal view; in profile anterior face distinctly swollen, widely rounding onto flat dorsum; median line bifurcate dorsally; parapsides flat anteriorly, weakly raised posteriorly. Mesoscutellum in lateral view elevated above dorsal plane of mesosoma, relatively flat, rounding posteriorly into distinct metanotal groove. Propodeal spines short, obliquely elevated; petiolar spines similar to those in worker but distinctly shorter, their inner margins continued medially and posteriorly, forming rather blunt, V-shaped posterior margin of petiolar dorsum. Sculturation, pilosity and colour virtually identical to worker.

Males and immature stages (eggs, larvae and pupae) originally deposited in the Forschungsinstitute Senckenberg, Frankfurt am

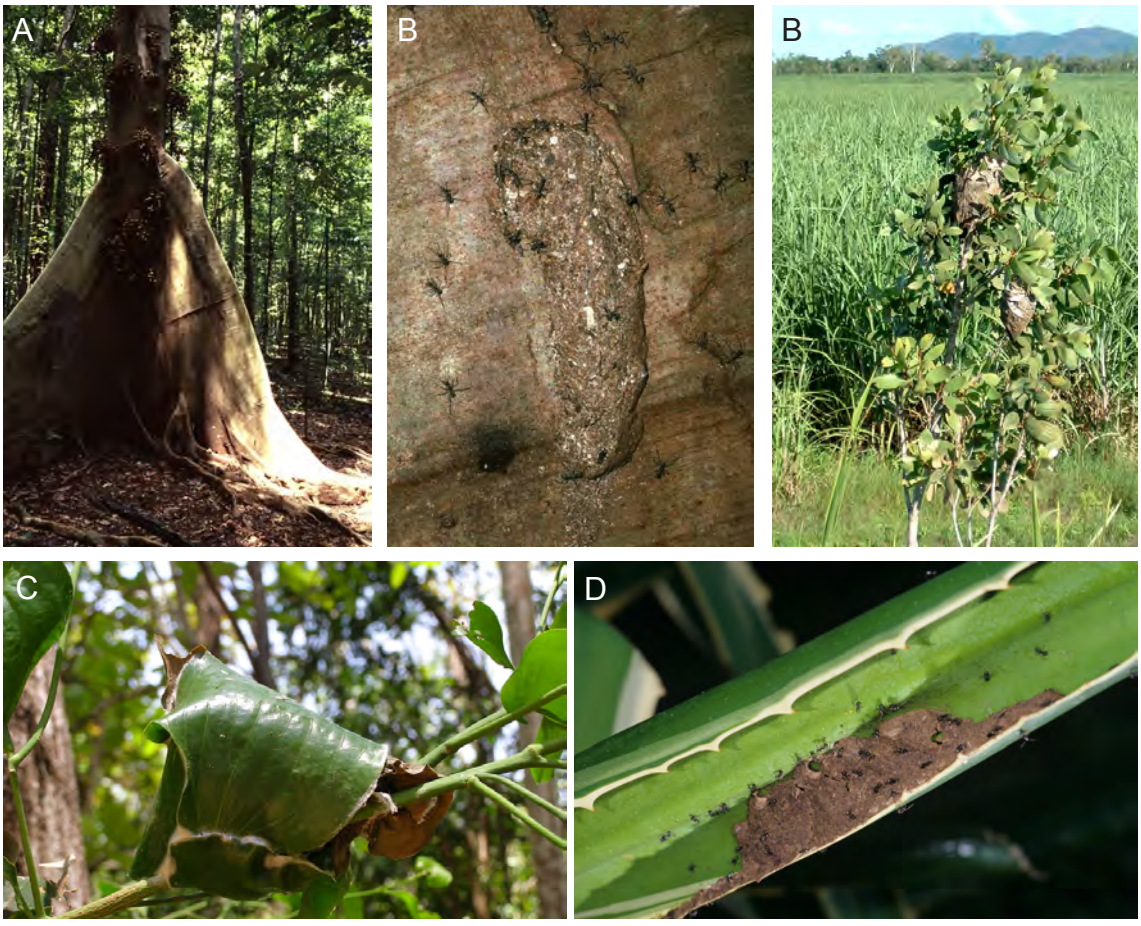

FIG. 10. Nests of Australian *Polyrhachis (Myrmhopla)* species. A-B. Pocket nest of *Polyrhachis sexspinosa* (Latreille) attached to a buttress of a caulifloral rainforest tree at Lockerbie Scrub, Cape York Peninsula (Photo R.J. Kohout); C. Polydomous nest of *Polyrhachis dives* Fr. Smith on small sapling in north Queensland (Photo S.K.A. Robson); D. Nest of *Polyrhachis bicolor* Fr. Smith in curled leaf (Photo A. N. Andersen); E. Nest of *Polyrhachis mucronata* Fr. Smith (Photo J. Wright).

Main, Germany (see Maschwitz *et al*., 2003) were accidently destroyed (Dorow, *pers. comm*.).

Remarks. A successful visit to the vicinity of Miles (see above) yielded numerous nests of *Rhytidoponera* spp. (*aciculata*- and *convexa*-groups). Following examination of ten nests of the *aciculata*-group sp. and five nests of the *convexa*-group sp., six colonies of *P. loweryi* were located within the nests of the former. However, on a subsequent visit to the same locality, several worker specimens of *P. loweryi* were also located within a nest of a *Rhytidoponera* species belonging to the *convexa*-group.

Polyrhachis rustica Kohout, 1990
(Figs 7B, E-F, 9C)

Polyrhachis rustica Kohout, 1990: 505. Holotype and paratype workers, queen. Type locality: QUEENSLAND, 4km N of Collinsville (B.B. Lowery), ANIC (examined).

Other material. QUEENSLAND, Chewko Rd. nr Mareeba, 3.viii.1975 (B.B. Lowery) (w - associated with *Rhytidoponera* ?*aurata* Roger).

Remarks. Both the original localities at Collinsville and Mareeba were visited in February, 2000 by Maschwitz *et al*. (2003) in search of *P. rustica*. However, in spite of locating and examining numerous nests of two unidentified *Rhytidoponera* species, no associated *Polyrhachis* specimens were found.

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