

## Australian species of the ant genus *Diacamma* (Hymenoptera: Formicidae)

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### Abstract

The Australian species of the ant genus *Diacamma* (subfamily Ponerinae) are revised. Four species occur in Australia: *Diacamma australe* (FABRICIUS, 1775), *D. colosseense* FOREL, 1915, *D. leve* CRAWLEY, 1915, and *D. schoedli* sp.n. They are limited to northern Queensland and the Top End of the Northern Territory. *Diacamma colosseense* and *D. leve* are removed from synonymy with *D. australe*, and a lectotype designation is proposed for *D. colosseense*.

**Key words:** Formicidae, *Diacamma*, Queensland, Northern Territory, lectotype designation, new species, revision, taxonomy.

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### Introduction

*Diacamma* MAYR, 1862 are large ants occurring from India and south-eastern Asia east to Vanuatu and south to northern Australia (BOLTON 1995). They are found in areas of high and monsoonal rainfall in wet or dry forests or savanna woodlands (SHATTUCK 1999). There are currently 42 described species and subspecies world-wide (SHATTUCK & BARNETT 2001). Colonies are small to intermediate in size with less than 100 adult workers up to as many as 500, and are queenless (reproduction being undertaken by mated workers called gamergates). Nests are generally found in loose debris on the ground's surface or less commonly in soil with a mound around the entrance. Non-Australian species are known to nest beneath stones or logs; in termite nests; in rotting logs and in arboreal sites in dead branches, rotten sections of trunks and under bark or moss. Many nests lack special structural features and are only used for a short period before the colony moves to a new site. In contrast, nests in soil can be used for many years and can develop into large mounds with a single large entrance. As far as known, these ants are generalised predators on a variety of small invertebrates, including termites, and forage singly.

*Diacamma* is notable for the development of gamergaty. This involves a unique system in which the gemma plays an important role in reproductive biology. The gemma is the reduced, seed-like mesothoracic wing which fits snugly in a small pocket, the gemmarium (Fig. 1), on the side of the mesosoma. It contains exocrine gland cells and their pores and produces a secretion that is attractive to other workers and to males seeking a mating partner. Removal of the gemmae by other workers, usually during the callow stage just after emergence from the pupal stage, leads to the regression of the reproductive function, while workers retaining the gemmae are capable of mating and oviposition. Workers which retain the gemmae are termed gamergates, or "married workers," and function as the colony's queen. For details concerning the biology of these ants see HÖLLDOBLER & ENGEL-SIEGEL (1982, exocrine glands), PEETERS & HIGASHI (1989, behaviour), BILLEN &

PEETERS (1991, thoracic glands), BITSCH & PEETERS (1991, thoracic glands), PEETERS & BILLEN (1991, thoracic glands), PEETERS & al. (1992, reproductive behaviour), PAUL (2001, mandibular movement), CUVILLIER-HOT & al. (2002, regulation of reproduction) and RAMASWAMY & al. (2004, reproductive behaviour).

**Current taxonomic status:** The species-level taxonomy of *Diacamma* is currently in a state of confusion, a situation that has impeded research on many aspects of this important taxon. This has been caused by a number of reasons, including lack of crucial material (including males) and, to a lesser extent, the earlier reliance on a limited range of morphological character systems including sculpture, pubescence, and petiolar form. The difficulty has been that these character systems often vary significantly within and among nest series and this variation hides gaps and similarities corresponding to species differences. Add to this the insular distribution of many forms, some careless descriptive taxonomy that includes the naming of many varieties, and it is easy to understand why WILSON (1958: 368-371) threw up his hands and summarily cast many of the Melanesian taxa into the synonymy of *D. rugosum* (LE GUILLOU, 1842).

Fortunately the situation within Australia is less bleak than for other regions. A careful morphological and biogeographic analysis suggests four species are present in Australia. These species possess morphological diagnostic characters and are readily identifiable as outlined below. It is quite likely that similar studies in other regions will bring clarity to the entire genus.

### Methods

Size and shape characters were quantified and are reported as lengths or indices. Measurements were made with a Zeiss Stemi SV8 stereo microscope at various magnifications using a dual-axis stage micrometer wired to digital readouts. All measurements were recorded in thousandths of millimetres, but are expressed here to the nearest hundredth as a range from minimum to maximum across all measured specimens.

The following measurements and indices are reported:

- CI Cephalic index:  $HW / HL * 100$ .  
 HL Maximum head length in full face (dorsal) view, measured from anterior-most point of clypeal margin to posterior-most point of head.  
 HW Maximum head width in full face (dorsal) view excluding eyes.  
 ML Mesosomal length measured from anterior surface of pronotum proper (excluding collar) to posterior extension of propodeal lobes.  
 MTL Maximum length of mid tibia, excluding proximal part of articulation which is received into distal end of femur.  
 PH Maximum height of petiole, measured parallel to posterior face, from dorsal-most surface (excluding spines) to ventral-most point of tergite (sternite not included in measurement).  
 PI Petiolar index:  $PL / PH * 100$ .  
 PL Length of main petiolar body measured perpendicular to posterior face and excluding anterior and posterior ventral collars.  
 SI Scape index:  $SL / HW * 100$ .  
 SL Length of scape (first antennal segment) excluding basal neck and condyle.

The acronym "ANIC" is used for the Australian National Insect Collection, CSIRO Entomology, Canberra, ACT, Australia, and "TERC" for the Tropical Ecosystems Research Centre, CSIRO Sustainable Ecosystems, Darwin, Northern Territory, Australia.

## Results and Discussion

### Diagnosis of *Diacamma*

Large black ponerine ants with a conspicuous pocket-like pit on each side of the mesosoma above the front legs and just below the upper surface (Fig. 1: a) and with a pair of spines on the upper surface of the petiolar node (Fig. 1: b). These characters will readily separate these ants from all others in Australia.

### Key to Australian species based on workers

- 1 Dorsal surfaces of pronotum and head with at most very fine, indistinct sculpturing (Fig. 9) (occurring in Northern Territory, Fig. 13). .....  
 ..... *D. leve* CRAWLEY, 1915
- Dorsal surfaces of pronotum and head with distinct rugae (Figs. 3, 9) (occurring in Queensland). ..... 2
- 2 First gastral tergite with distinct arched rugae (Fig. 4); the dorsal spines relatively widely spaced (Fig. 4); anterior face of petiolar node shorter than dorsal face and separated from it by a distinct angle (Fig. 3). .....  
 ..... *D. australe* (FABRICIUS, 1775)
- First gastral tergite weakly and indistinctly sculptured (Fig. 7); the dorsal spines relatively narrowly spaced (Fig. 7); anterior and dorsal faces of petiolar node similar in length and separated by a broad, rounded angle (however dorsal face longer in some northern samples) (Fig. 6). ..... 3

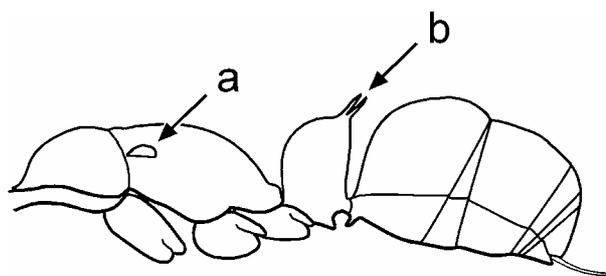


Fig. 1: Diagnostic characters of the genus *Diacamma* in Australia. a – gemmarium; b – dorsal petiolar spines.



Fig. 2: *Diacamma australe*. Head.

- 3 Smaller species (head length less than 2.8 mm, mesosomal length less than 4.1 mm); entire mandible (except along mandibular teeth) finely striate, occasionally with small scattered fovea (occurring north of Townsville, Fig. 13). ..  
 ..... *D. schoedli* sp.n.
- Larger species (head length greater than 2.8 mm, mesosomal length greater than 4.1 mm); anterior region of mandible mainly smooth, basal region weakly striate, elongate fovea present on entire surface (occurring south of MacKay, Fig. 13). ..... *D. colosseense* FOREL, 1915

### *Diacamma* MAYR, 1862

*Diacamma* MAYR 1862: 718. Type species: *Ponera rugosa* LE GUILLOU, by subsequent designation of BINGHAM 1903: 75.

### *Diacamma australe* (FABRICIUS, 1775) (Figs. 2 - 4, 13)

*Formica australis* FABRICIUS 1775: 393 (combination as *Diacamma australe* by MAYR 1862: 718). Type data: Holotype (unique syntype) from Australia (as New Holland) (The Natural History Museum, London, examined) (ZIMSEN 1964: 426).

**Material examined:** Australia: Queensland: 24 miles SSE of Townsville, 30.III.1962, leg. J. E. Dowse, 6 ♂♂



Figs. 3 - 4: *Diacamma australe*. (3) Lateral body; (4) petiole and first gastral segment.

(ANIC); 25 km S Woodstock, 11.IV.1976, leg. P.J.M. Greenslade, 1 ♂ (ANIC); 30 km N Giru, 6.VI.1980, leg. B.B. Lowery, 4 ♀♀ (ANIC); 36 km W of Townsville, 30.III.1981, leg. B.B. Lowery, 7 ♀♀ (ANIC); 45 km N Bowen, Bruce Highway, 7.IV.1981, leg. B.B. Lowery, 10 ♀♀ workers (ANIC); 4 km N Collinsville, 24.V.1981, leg. B.B. Lowery, 3 ♀♀ (ANIC); 6 km SSE Atherton, 16.I.1989, leg. P.S. Ward, 3 ♀♀ workers (ANIC); c. 40 miles SE of Ayr, 15.VIII.1975, leg. B.B. Lowery, 6 ♀♀ (ANIC); Fitzroy Island, leg. A.N. Andersen, 1 ♀ (TERC); Giru, 15.VIII.1975, leg. B.B. Lowery, 8 ♀♀ (ANIC); Hinchinbrook Island, leg. A.N. Andersen, 1 ♀ (TERC); Kuranda, 27.X.1914, leg. W.M. Wheeler, 2 ♀♀ (ANIC); Magnetic Island, 17.V.1936, leg. T. Greaves, 6 ♀♀ (ANIC); Magnetic Island, leg. A.B. Hill, 6 ♀♀ (ANIC); Millstream NP nr. Ravenshoe, 6.VIII.1975, leg. B.B. Lowery, 6 ♀♀ (ANIC); Mt. Cleveland, 25 miles from Townsville, 14.XI.1987, leg. C.P. Peeters, 2 ♀♀ and 2 ♂♂ males (ANIC); Mt. Helen Stn. flat, Ingham, VI.1962, leg. R.W. Taylor, 5 ♀♀ (ANIC); Mt. Windsor Tableland, 5.XI.1976, leg. R.W. Taylor & T.A. Weir, 14 ♀♀ (ANIC); nr. Chillagoe, 28.VI.1971, leg. R.W. Taylor & J. Feehan, 4 ♀♀ (ANIC); nr. Townsville (19° 16' S, 147° 02' E), leg. A.N. Andersen, 1 ♀ (TERC); Palm Island, leg. G.F. Hill, 1 ♀ (ANIC); Shiptons Flat, 16-18.V.1981, leg. J.E. Feehan, 2 ♀♀ (ANIC); Townsville, 1952, leg. S. Cambell, 3 ♀♀ (ANIC); Townsville, leg. G.F. Hill, 1 ♀ (ANIC).

**Diagnosis:** Dorsal surfaces of pronotum and head with distinct rugae. Petiolar spines relatively widely spaced, anterior face of node shorter than dorsal face and separated from it by a distinct angle.

**Measurements** (n = 12): HL 2.55 - 2.88 mm, HW 2.06 - 2.35 mm, CI 77 - 84, SL 2.87 - 3.27 mm, SI 133 - 148, ML 3.67 - 4.12 mm, MTL 2.34 - 2.65 mm, PH 1.26 - 1.59 mm, PL 0.95 - 1.14 mm, PI 66 - 79.

**Comments:** This species can be separated from *D. colosseense* and *D. schoedli* sp.n. by the presence of a block-like petiolar node and distinct sculpturing on the first gastral tergite. Note that this tergite is sculptured in



Fig. 5: *Diacamma colosseense*. Head.

all of these species. However, in this species the sculpturing is stronger and covers the posterior two-thirds of the segment, while in the others the sculpturing is weaker and limited to the anterior half. *Diacamma australe* is found along the northern Queensland coast and is sympatric with *D. schoedli* sp.n. in the northern part of its range.

***Diacamma colosseense* FOREL, 1915 stat.n.** (Figs. 5-7, 13)

*Diacamma australe colosseensis* FOREL 1915: 26 (junior synonym of *Diacamma australe* by TAYLOR & BROWN 1985: 29). Type data: Syntype workers from Queensland: Colosseum (not located), Chillagoe (not located), Atherton (one worker in Muséum d'Histoire Naturelle, Geneva, examined) and Gin Gin (as Gingin) (three workers in Geneva, examined, top-most specimen here de-



Figs. 6 - 7: *Diacamma colosseense*. (6) Lateral body; (7) petiole and first gastral segment.

signed as **lectotype**). The lectotype is labelled as follows ("/" indicates new text line): label 1: Red "Type"-label; label 2: "D. australe Fab. / Gin-Gin / Queensland / 201 (Fr)"; label 3: "Diacamma / australe F. / v. colosseense / [worker sign] type For."; label 4: "201 Gin Gin D.....phb. [illegible because of pin holes]"; label 5: "v. D. colosseense For."; label 6: "coll. Forel".

**Material Examined:** Australia: Queensland: 20 km S Marlborough, 26.VIII.1988, leg. B.B. Lowery, 6 ♂♂ (ANIC); 23 km SE of Marlborough, Bruce H'way, 10.II.1980, leg. B.B. Lowery, 20 ♀♀; 5 km N by E Mt. Morgan, 27.X.1976, leg. R.W. Taylor & T.A. Weir, 2 ♀♀ (ANIC); Biloela, Callide Dam, 19.XII.1972, leg. B.B. Lowery, 10 ♀♀ (ANIC); Gin Gin, 13.X.1910, leg. W.W. Froggatt, 3 ♀♀ (ANIC); Pasha Station, Emerald region, leg. A.N. Andersen, 1 ♀ (TERC); Rockhampton, G. Mayr Collection, 1 ♀ (ANIC).

**Diagnosis:** Anterior clypeal margin broadly rounded medially. Anterior region of mandible mainly smooth, basal region weakly striate, elongate foveae along entire length. Larger body size (compare head length, head width, mesosomal length, mid-tibial length and scape length). Dorsal surfaces of pronotum and head with distinct rugae. Petiolar spines relatively narrowly spaced, anterior and dorsal faces of node similar in length and separated by a broad, rounded angle.

**Measurements** (n = 8): HL 2.82 - 3.05 mm, HW 2.23 - 2.62 mm, CI 79 - 86, SL 3.22 - 3.47 mm, SI 130 - 146, ML 4.20 - 4.41 mm, MTL 2.65 - 2.86 mm, PH 1.61 - 1.78 mm, PL 1.02 - 1.15 mm, PI 62 - 67.

**Comments:** *Diacamma colosseense* is most similar to *D. schoedli* sp.n. It differs in being larger, in having weaker mandibular sculpturing and having the anterior clypeal margin broadly rounded medially (it is more angular in *D. schoedli* sp.n.). It differs from *D. australe* in the shape of the petiolar spines, shape of the node and sculpturing on the first gastral segment as outlined above under that species. This species is allopatric to other species of *Dia-*



Fig. 8: *Diacamma leve*. Head.

*camma*, occurring along the south-eastern coast of Queensland from just north of Rockhampton south to Bundaberg.

FOREL (1915) described *D. australe colosseense* based on syntypes from Colosseum, Chillagoe, Atherton, and Gin Gin, Queensland. During this study three specimens (on a single pin) from Gin Gin and a single specimen from Atherton were located in the Muséum d'Histoire Naturelle, Geneva. The Gin Gin specimens, which are in good condition, differ from the Atherton specimen and represent a separate species. These specimens match the concept of *D. colosseense* developed in this study and, with the lectotype designation proposed here, provide a name for this species.

The single Atherton specimen (which is in poor condition) is consistent with Forel's original description in the



Figs. 9 - 10: *Diacamma leve*. (9) Lateral body; (10) petiole and first gastral segment.

shape of the node, the only character mentioned in detail. This shape clearly applies to *D. australe*. Additional examination of this specimen shows that it shares a range of characters with *D. australe*, including the shape of the petiolar spines and sculpturing on the first gastral tergite. Based on these similarities this specimen is treated as conspecific with Fabricius' *D. australe* as conceived here. With the lectotype designation above this specimen becomes a secondary type (a paralectotype) and therefore does not provide a name for these taxa.

***Diacamma leve* CRAWLEY, 1915 stat.n.** (Figs. 8 - 10, 13)

*Diacamma australe levis* CRAWLEY 1915: 134 (junior synonym of *Diacamma australe* by TAYLOR & BROWN 1985: 29). Type data: Worker from near Adelaide Plains, Northern Territory (not examined).

**Material examined:** Australia: Northern Territory: Black Jungle, leg. A.N. Andersen, 1 ♂ (TERC); Darwin, 6.IV.1915, leg. G.F. Hill, 9 ♀♀ (ANIC); Howard Springs, 6.IX.1963, leg. G. Campbell, 2 ♀♀ (ANIC); Howard Springs, nr. Darwin, 19.VI.1981, leg. B.B. Lowery, 8 ♀♀ (ANIC); Howard River throughout Howard Springs region, leg. A.N. Andersen, numerous ♀♀ (TERC); Koolpinyah, 1933, leg. C. Barrett, 5 ♀♀ (ANIC); Middle Ck., near Darwin, 12.IX.1916, leg. G.F. Hill, 2 ♀♀ (ANIC); nr. Howard Springs, 14.V. 1992, leg. S.O. Shattuck, 1 ♀ (ANIC); Rola Plains, Melville Island (11.58638° S, 130.65162° E), leg. A.N. Andersen, 1 ♀ (TERC).

**Diagnosis:** Dorsal surfaces of pronotum and head with at most very fine, indistinct sculpturing.

**Measurements** (n = 6): HL 2.52 - 2.78 mm, HW 2.15 - 2.38 mm, CI 81 - 87, SL 2.84 - 3.14 mm, SI 129 - 141, ML 3.73 - 4.19 mm, MTL 2.29 - 2.59 mm, PH 1.25 - 1.50 mm, PL 0.98 - 1.06 mm, PI 70 - 84.

**Comments:** CRAWLEY (1915) correctly recognised this taxon as distinct from typical *D. australe* (the only other described species at that time), although by today's stan-

dards it warrants full-specific rather than subspecific status. It is allopatric with the other Australian species of the genus, being found in the Northern Territory while the others occur in Queensland. In the Darwin region this species is restricted to riparian areas associated with the Howard and Daly River systems (A. Andersen, pers. comm.).

*Diacamma leve* can be separated from other Australian species by the form of the sculpturing as noted above under Diagnosis. There is also a trend for the head to be broader for a given head length (as shown by the larger CI values), but some specimens overlap with specimens of all other species, reducing the usefulness of this character. It is possible that the differences in sculpturing are simply geographic variation and this taxon is conspecific with *D. schoedli* sp.n. (with which it shares petiolar shape). However, there is currently no indication of intermediate forms or clinal variation in this character and the noted differences are consistent across all available material of both taxa. Thus current material suggests two taxa are involved, rather than a single variable species. The synonymy of this species with *D. australe* by TAYLOR & BROWN (1985) is here treated as unjustified.

***Diacamma schoedli* sp.n.** (Figs. 11 - 13)

**Type material:** Holotype worker: Australia, Queensland, 14 km W by N Hope Vale Mission, 15° 16' S, 144° 59' E, 7. - 10.V.1981, leg. J.E. Feehan (ANIC Database No. 32-028250). Paratypes: 3 workers, same data as holotype (ANIC Database No. 32-006913).

**Non-type material examined:** Australia: Queensland: 1 km N Rounded Hill, 5.V.1981, leg. J.E. Feehan, 1 ♀ (ANIC); 14 km W by N Hope Vale Mission, 7.V.1981, leg. J.E. Feehan, 4 ♀♀ (ANIC); 15 km SW Lakefield, leg. A.N. Andersen, 1 ♀ (TERC); Cairns, 31. V.1928, unknown collector, 1 ♀ (ANIC); Cairns, leg. E.H. Bourne, 1 ♀ (ANIC); Cairns, 14.X.1914, leg. W.M. Wheeler, 3 ♀♀ (ANIC); Cairns district, leg. F.P. Dodd, 3 ♀♀ (ANIC); Cape York



Figs. 11 - 12: *Diacamma schoedli* sp.n. (11) Head; (12) lateral body.

Pen., Bamaga, XII.1983, leg. J. Sedlacek, 1 ♂ (ANIC); Cape York, Somerset, 7. - 12.VII.1976, leg. E. Cameron, 2 ♀♀ (ANIC); Clohesy River, 14.VI.1937, unknown collector, 1 ♀ (ANIC); Horn Island, Torres Strait, 10. - 27. VI.1974, leg. H. Heatwole & E. Cameron, 4 ♀♀ (ANIC); Lankelly Ck., McIlwraith Rge., C. York, VI.1982, unknown collector, 4 ♀♀ (ANIC); Lyrian Downs, N of Julia Ck., 10.IX.1962, leg. R. Makim, 2 ♀♀ (ANIC); Maer Island, Murray Islands, Torres Strait, VII.1974, leg. H. Heatwole, 3 ♀♀ (ANIC); McIlwraith Range, 24.VII.1977, leg. R.W. Taylor, 1 ♂ (ANIC); Meringa, 10.IV.1927, unknown collector, 1 ♂ (ANIC); Meringa, 28.V.1927, unknown collector, 1 ♂ (ANIC); Mossman, 1.IX.1934, leg. M. Geeves, 12 ♀♀ (ANIC); Pera Head, 8.X. 1957, leg. G. O. C., 1 ♀ (ANIC); Prince of Wales Island, Torres Strait, 6. - 15.II. 1975, leg. H. Heatwole & E. Cameron, 4 ♀♀ (ANIC); Ravenshoe, 25.V.1938, unknown collector, 1 ♀ (ANIC); Shiptons Flat, 16. - 18.V.1981, leg. J.E. Feehan, 2 ♀♀ (ANIC); Weipa, VII.1982, leg. J.D. Majer, 2 ♀♀ (ANIC); Weipa, A.N. Andersen, 1 ♀ (TERC).

**Diagnosis:** Anterior clypeal margin weakly angular medially. Entire mandible (except along mandibular teeth) finely striate, occasionally with small foveae. Smaller body size (compare head length, head width, mesosomal length, mid-tibial length and scape length). Dorsal surfaces of pronotum and head with distinct rugae. Petiolar spines relatively narrowly spaced, anterior and dorsal faces of node similar in length and separated by a broad, rounded angle.

**Description:** Head slightly longer than broad; erect hairs present on all surfaces as well as scapes; longitudinal rugae present posterior to frontal lobes, converging medially anterior of eyes, parallel posterior of eyes. Mandibles weakly striate along most of its length, the tip and ventral surfaces smooth. Anterior clypeal margin weakly angular medially. Mesosoma distinctly sculptured, most strongly dorsally, less so laterally and ventrally. Erect hairs present on entire dorsal surface. Petiolar node with anterior and dorsal faces rounding gently into each other; dorsal spines distinct, set relatively closely together; rugae present, horizontal, strongest anteriorly, weakest posteriorly. Gaster with first tergite essentially smooth (at most with very weak rugae), erect hairs and pubescence present. En-

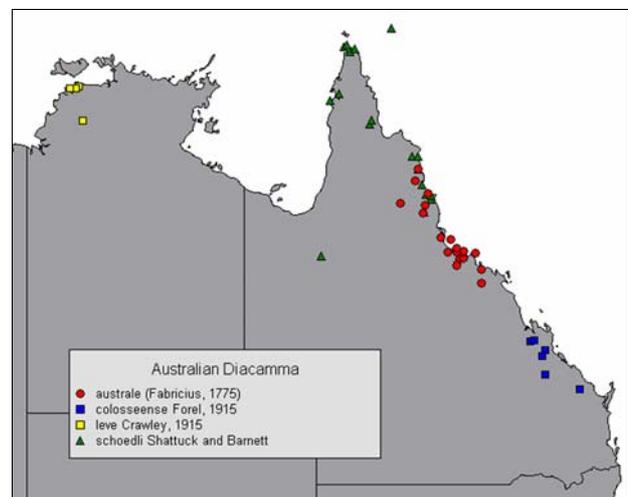


Fig. 13: Distribution of material examined during this study.

tire body dark reddish-black to black, legs (especially near joints) often slightly lighter.

**Measurements** (n = 13): HL 2.47 - 2.76 mm, HW 2.00 - 2.22 mm, CI 78 - 84, SL 2.75 - 3.20 mm, SI 136 - 149, ML 3.62 - 4.08 mm, MTL 2.22 - 2.60 mm, PH 1.25 - 1.53 mm, PL 0.96 - 1.08 mm, PI 67 - 83.

**Comments:** *Diacamma schoedli* sp.n. differs from the similar *D. colosseense* in being smaller, in the pattern of mandibular sculpturing and having the anterior clypeal margin weakly angular medially (it is rounded in *D. colosseense*). It differs from *D. australe* in the shape of the petiolar spines, shape of the node and sculpturing on the first gastral segment as outlined above under that species and in the key. Note, however, that the petiolar node shows variation in northern populations, where the shape is sometimes similar to that found in *D. australe*. In southern regions (and in areas of sympatry) the differences outlined above are consistent.

This species extends along the eastern coast of Queensland from Torres Strait and Bamaga (at the tip of Cape York Peninsula) south to Innisfail. There is also a single

record from the western Queensland Gulf Country (Lyrian Downs, N of Julia Creek), well outside the main distribution and the inland-most record of the genus in Australia. It is sympatric with *D. australe* in the area south of Cooktown. While it is currently unknown from Papua New Guinea (based on material examined during this study) it may well occur there as these two countries share many species across a range of taxonomic groups.

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We wish to dedicate this paper to Stefan Schödl. Stefan spent several weeks working in the Australian National Insect Collection as part of his studies on Australian *Meranoplus*. Unfortunately anticipated return visits were not realised. For invaluable assistance during this study we would like to thank Bernhard Merz (Département d'Entomologie, Muséum d'histoire naturelle, Geneva) for notes on and images of Forel material held in his care, and George Else and Kim Goodger (The Natural History Museum, London) for notes on and images of Fabricius specimens deposited in London. Valuable comments on the manuscript were received from Alan Andersen, Brian Heterick, Herbert Zettel, an anonymous reviewer, and the journal's editors. Funding for this study was generously provided by CSIRO Entomology.

### Zusammenfassung

Die australischen Arten der Ameisengattung *Diacamma* (Unterfamilie Ponerinae) werden revidiert. Vier Arten kommen in Australien vor: *D. australe* (FABRICIUS, 1775), *D. colosseense* FOREL, 1915, *D. leve* CRAWLEY, 1915 und *D. schoedli* sp.n. Ihre Vorkommen beschränken sich auf den Norden von Queensland und die Region Top End im Northern Territory. *Diacamma colosseense* und *D. leve* werden aus ihrer Synonymie mit *D. australe* gehoben. Für *D. colosseense* wird ein Lectotypus designiert.

### References

BILLEN, J.P.J. & PEETERS, C. 1991: Fine structure of the gemma gland in the ant *Diacamma australe* (Hymenoptera, Formicidae). – Belgian Journal of Zoology 121: 203-210.

BINGHAM, C.T. 1903: The Fauna of British India, including Ceylon and Burma. Hymenoptera. Ants and cuckoo-wasps. – Taylor & Francis, London, Vol. 2, 507 pp.

BITSCH, J. & PEETERS, C. 1991: Moignons alaires et morphologie thoracique chez l'ouvrière de la fourmi *Diacamma australe* (FABRICIUS) (Hym. Formicidae Ponerinae). – Bulletin de la Société Entomologique de France 96: 213-221.

BOLTON, B. 1995: A New General Catalogue of the Ants of the World. – Harvard University Press, Cambridge, Mass., 504 pp.

CRAWLEY, W.C. 1915: Ants from north and central Australia, collected by G. F. Hill. - Part I. – Annals and Magazine of Natural History (8)15: 130-136.

CUVILLIER-HOT, V., GADAGKAR, R., PEETERS, C. & COBB, M. 2002: Regulation of reproduction in a queenless ant: aggression, pheromones and reduction in conflict. – Proceedings of the Royal Society of London B 269: 1295-1300.

FABRICIUS, J.C. 1775: Systema entomologiae, sistens insectorum classes, ordines, genera, species adiectis synonymis, locis, descriptionibus, observationibus. – Korte, Flensburg and Leipzig, 832 pp.

FOREL, A. 1915: Results of Dr. E. Mjöberg's Swedish Scientific Expeditions to Australia 1910-13. 2. Ameisen. – Arkiv för Zoologi 9: 1-119.

HÖLLDOBLER, B. & ENGEL-SIEGEL, H. 1982: Tergal and sternal glands in male ants. – Psyche (Cambridge) 89: 113-132.

LE GUILLOU, E.J.F. 1842: Catalogue raisonné des insectes hyménoptères recueillis dans le voyage de circumnavigation des corvettes l'Astrolabe et La Zélée. – Annales de la Société Entomologique de France 10: 311-324.

MAYR, G.L. 1862: Myrmecologische Studien. – Verhandlungen der Zoologisch-Botanischen Gesellschaft in Wien 12, Abhandlungen: 649-776.

PAUL, J. 2001: Mandible movements in ants. – Comparative Biochemistry and Physiology Part A 131: 7-20.

PEETERS, C. & BILLEN, J.P.J. 1991: A novel exocrine gland inside the thoracic appendages ('gemmae') of the queenless ant *Diacamma australe*. – Experientia 47: 229-231.

PEETERS, C., BILLEN, J.P.J. & HÖLLDOBLER, B. 1992: Alternative dominance mechanisms regulating monogyny in the queenless ant genus *Diacamma*. – Naturwissenschaften 79: 572-573.

PEETERS, C. & HIGASHI, S. 1989: Reproductive dominance controlled by mutilation in the queenless ant *Diacamma australe*. – Naturwissenschaften 76: 177-180.

RAMASWAMY, K., PEETERS, C., YUVANA, S.P., VARGHESE, T., PRADEEP, H.D., DIETEMANN, V., KARPAKAKUNJARAM, V., COBB, M. & GADAGKAR, R. 2004: Social mutilation in the Ponerine ant *Diacamma*: cues originate in the victims. – Insectes Sociaux 51: 410-413.

SHATTUCK, S.O. 1999: Australian ants. Their biology and identification. – Monographs on Invertebrate Taxonomy 3: 1-226.

SHATTUCK, S.O. & BARNETT, N.J. 2001: Australian Ants Online. – <<http://www.ento.csiro.au/science/ants/default.htm>>, retrieved on 1 April 2006.

TAYLOR, R.W. & BROWN, D.R. 1985: Formicoidea. Pp. 1-149, 306-348 in: WALTON, D.W. (ed.): Zoological catalogue of Australia, vol. 2. Hymenoptera: Formicoidea, Vespoidea and Sphecoidea. – Australian Government Publishing Service, Canberra, vi + 381 pp.

WILSON, E.O. 1958: Studies on the ant fauna of Melanesia. 3. *Rhytidoponera* in western Melanesia and the Moluccas. 4. The tribe Ponerini. – Bulletin of the Museum of Comparative Zoology at Harvard College 119: 303-371.

ZIMSEN, E. 1964: The type material of I. C. Fabricius. – Munksgaard, Copenhagen, 656 pp.