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Revision of the *Iridomyrmex discors* Species-group (Hymenoptera: Formicidae)

S. O. SHATTUCK

CSIRO Division of Entomology, G.P.O. Box 1700, Canberra, A.C.T. 2601.

ABSTRACT The *discors* species-group of the ant genus *Iridomyrmex* Mayr is defined for the first time and revised at the species level. The group is composed of two species, *I. discors* Forel and *I. obscurior* Forel (the latter previously a subspecies of *I. discors*). The names *I. discors aeneogaster* Wheeler, *I. discors occipitalis* Forel and *I. discors occipitalis exilior* Forel (an unavailable infrasubspecific name) are newly synonymised with *I. discors*. *I. discors* is distributed broadly across southern Australia (excluding Tasmania) and occupies a wide range of habitats. *I. obscurior* is known from only two collections, both relatively moist sites in southeastern Australia.

Introduction

Members of the ant genus *Iridomyrmex* Mayr are common and prominent members of many Australian ecosystems (Andersen and Patel 1994; Greenslade and Halliday 1982). They are frequently encountered during ecological studies and are well represented in most entomological collections. Unfortunately, limited attention has been given to the species-level taxonomy of the genus and identifications are difficult. In the present study the *I. discors* species-group is defined and revised at the species level. The group contains five specific or subspecific names (one an unavailable infrasubspecific name). During the current study the group was found to contain two valid species, *I. discors* Forel and *I. obscurior* Forel. The remaining three names represent junior synonyms of *I. discors*. Although *I. discors* is relatively common it has received little discussion in the literature. The only detailed study is that of Cox *et al.* (1989), who examined its chemical constituents.

Taxonomic status of *Iridomyrmex* and diagnosis of the *Iridomyrmex discors* group

For the current status and identification of *Iridomyrmex* see Shattuck (1992a, b). Members of the *I. discors* group can be separated from other species in the genus by the presence of a relatively broad head (Fig. 1), short antennal scapes (Fig. 2), and erect or suberect hairs on the antennal scapes and tibiae. This group is morphologically most similar to smaller members of the *I. purpureus* group and to species related to *I. mayri* Forel. They may be separated from both of these by the head shape and scape length relative to head width, and from *I. mayri* and relatives by the larger number of erect hairs on the antennal scapes and the shorter anteromedial clypeal projection (Figs 3, 4), which projects at most 0.02 mm

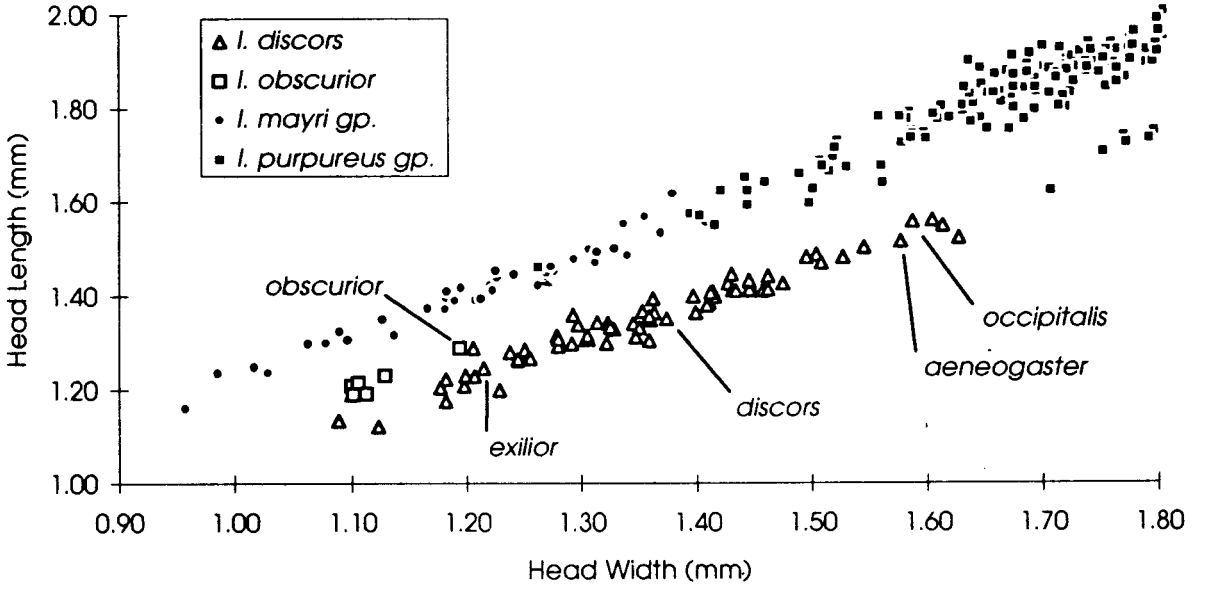


Fig. 1. Distribution of head length and width measurements (in millimetres) for *I. discors*, *I. obscurior*, *I. mayri* group and *I. purpureus* group.

anterior of the anterolateral prominences in the *I. discors* group and between 0.04 mm and 0.09 mm anterior in *I. mayri* and relatives.

Methods and abbreviations

Size and shape characters were quantified and are reported as lengths or indices. Measurements were made with a stereo microscope 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. All head measurements (EL, EW, HL, HW; see below for abbreviations) were taken in full-face (dorsal) view without moving the head between measurements. Longitudinal mesosomal length measurements (PnL, ML, PpL) were taken in lateral view, parallel to a line ("measuring axis") drawn between the anterior-most point of the pronotal collar and the posterior-most point of the propodeal process dorsal of the petiolar insertion.

Figures showing the following measurements can be found in Shattuck (1993): EL, EW, HL, HW, ML, PnL, PpL and SL.

Abbreviations used are: *Characters*: CI, cephalic index: HW/HL; EL, maximum eye length measured in full face view; EW, maximum eye width measured in full face view; HL, maximum head length in full face view, measured from the anterior-most point of the clypeal margin to the midpoint of a line drawn across the posterior margin of the head; HTL, maximum length of hind tibia, excluding the proximal part of the articulation which is received into the distal end of the hind femur; HW, maximum head width in full face view, excluding eyes; ML, mesonotal length measured from the pronotal-mesonotal suture to the metanotal groove parallel to the measuring axis (see also above); PnL, pronotal length measured from the anterior edge of the pronotal collar to the pronotal-mesonotal suture parallel to the measuring axis (see also above); PpL, propodeal length measured from the metanotal groove to the posterior-most point of the petiolar insertion parallel to the measuring axis (see also above); REL, relative eye length: EL/HW; SI, scape (first antennal segment) index: SL/HW; SL, length of the scape excluding the basal radicle. *Collectors*: BBL, B. B. Lowery; JC, J. Clark; JEF, J. E. Feehan; PJMG, P. J. M. Greenslade; RWT, R. W. Taylor; SOS; S. O. Shattuck; TG, T. Greaves. *Collections*: ANIC, Australian National Insect Collection, Canberra, A.C.T.; MCZC, Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, U.S.A.; MHNG, Muséum d'Histoire Naturelle, Geneva, Switzerland; MVMA, Museum of Victoria, Abbotsford, Victoria; NHMB, Naturhistorisches Museum, Basel, Switzerland; OXUM, Oxford University Museum, Oxford, U.K.; SAMA, South Australian Museum, Adelaide; S.A.; WAMP, Western Australian Museum, Perth, W.A.

Key to species of *Iridomyrmex discors* group (workers)

1. Head broad (CI usually greater than 0.95, occasionally lower) (Fig. 1); scapes short (SI less than or equal to 0.99) (Fig. 2); propodeal dorsum rounded in lateral profile (Figs 5-7) ..... *I. discors* Forel
   Head narrow (CI less than 0.94) (Fig. 1); scapes long (SI greater than or equal to 1.00) (Fig. 2); propodeal dorsum flatter in lateral profile (Fig. 9)..... *I. obscurior* Forel

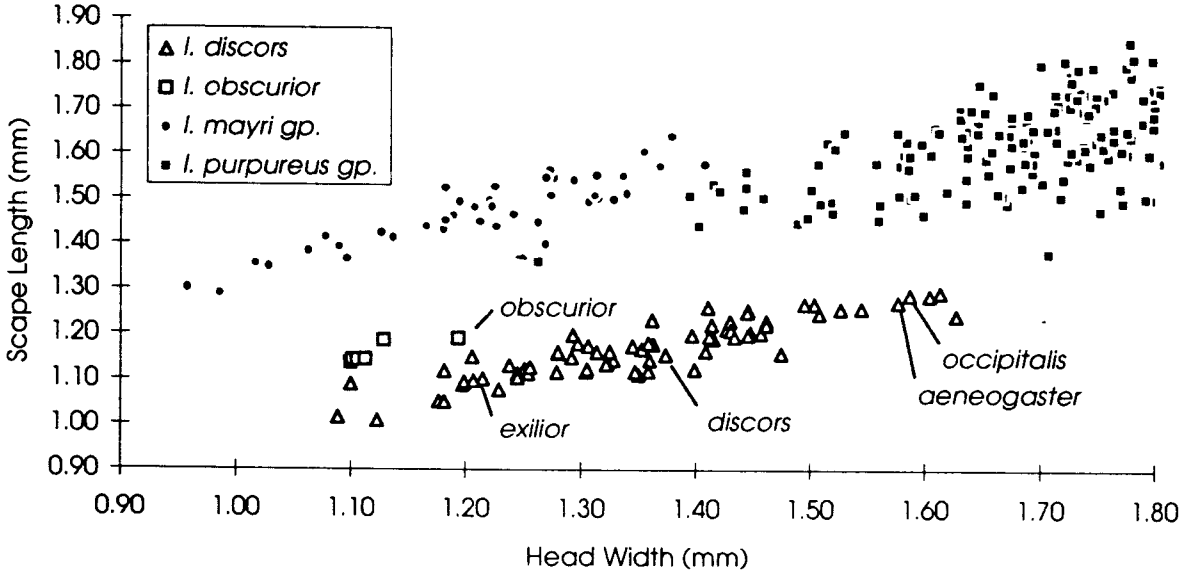


Fig. 2. Distribution of scape length and head width measurements (in millimetres) for *I. discors*, *I. obscurior*, *I. mayri* group and *I. purpureus* group.

Iridomyrmex discors Forel (Figs 1, 2, 4-7, 10)

Iridomyrmex discors Forel, 1902: 464.
Iridomyrmex discors occipitalis Forel, 1907: 294. **Syn. nov.**
Iridomyrmex discors occipitalis exilior Forel, 1907: 294 (unavailable infrasubspecific name).
Iridomyrmex discors aeneogaster Wheeler, 1915: 811. **Syn. nov.**

Types. *I. discors*: **Queensland:** 8 worker syntypes from Charters Towers (1 in NHMB, see Baroni Urbani 1977; 1 in MCZC; 1 in ANIC; 5 in MHNG).

I. discors occipitalis: **Western Australia**: 5 worker syntypes from Northampton (1 in MCZC; 1 in ANIC; 2 in MHNG; 1 in WAMP).

I. discors occipitalis exilior: **Western Australia**: unspecified material from Northampton (Forel 1907); 3 workers from south-west Australia (specific locality not given) (2 in NHMB, see Baroni Urbani 1977; 1 in OXUM); 17 workers and 7 queens from Subiaco (3 workers in MCZC; 2 workers in ANIC; 1 worker and 1 queen (missing petiole and gaster) in WAMP; 11 workers and 5 queens in MHNG; 1 queen in MVMA) (although unavailable names do not have type material, the above material was examined by Forel (1907) when describing this taxon).

I. discors aeneogaster: **South Australia**: holotype worker from Flat Rock Hole, Musgrave Ranges (SAMA).

Other material examined (in ANIC). **A.C.T.:** Black Mountain (C.M.); Canberra (TG); Capital Hill, Canberra (BBL); **New South Wales:** 130 km W of Cobar (PJMG); 1 mi (= 1.6 km) N of Mt. Woolakulkra (TG); Botany Bay breakwater, Sydney (J. Brophy); Broken Hill (BBL); Broken Hill airport, 31°59'S 141°28'E (SOS); Calsil Dune, Kurnell Peninsula, Sydney (G. Williams); Fowlers Gap Research Stn. (PJMG); Headquarters, Mungo Natl Pk, 33°43'S 143°01'E (SOS); Mootwingee, Broken Hill (BBL); Myall Lakes (B. Fox; PJMG); Myall Lakes, Big Gibber Headl. (PJMG); Myall Lakes, Hawks Nest (PJMG); Sturt Nat Pk (PJMG); Uralla (BBL); nr. Armidale, Newholme Road, 30°25'S 151°39'E (Y. Sakurai); **Northern Territory:** 37 km E of Curtin Springs, 25°13'S 132°05'E (SOS); 39 km NE of Andado HS, 25°08'S 135°31'E (JEF); 9 km E of Curtin Springs, 25°19'S 131°51'E (JEF); Alice Springs (collector unknown); Glen Helen, 23°42'S 132°40'E (SOS); Hull River, 33 km ESE of Docker River, 24°58'S 129°23'E (JEF); Kunoth Paddock, nr. Alice Springs (PJMG); New Crown HS (JEF); **Queensland:** 10 km E of Charters Towers (BBL); 10 mi (= 16 km) W of Bundaberg (A.H.W.); 18 km SW of Walkerston (BBL); 40 km E of Cameron Corner (PJMG); 75 km W of Sandringham (PJMG); 80 km W of Hughenden (PJMG); Bundaberg (TG); Charleville (S. Flahive); Charters Towers (Wiederkehr); Cooloola Natl Pk (PJMG); Cooloola Natl Pk, Burwilla (PJMG); Cooloola Natl Pk, Como Scarp (PJMG); Cooloola Natl Pk, Kabali E. (PJMG); Cooloola Natl Pk, Kabali Fan (PJMG); Cooloola Natl Pk, Kabali W. (PJMG); Cooloola Natl Pk, Noosa Plain (PJMG); Cooloola Natl Pk, Noosa R. (PJMG); Cooloola Natl Pk, Pertarrirea (PJMG); Cooloola Natl Pk, Teeworh Creek (PJMG); Cooloola Natl Pk, Upper Noosa R. (PJMG); Coolola Natl Pk, Wolvi (C. H. Thompson); Emerald (F. A. Cudmore; J. Hayes); Fraser Island (M. Dick & P. Hunt); Lorna Vale, nr. Marlborough (D. Rakemann); Mt. Garnet (BBL); Picnic Point, Toowoomba (BBL); Sandringham (PJMG); Shoalwater Bay (PJMG); Woodgate Natl Pk (BBL); Yeppoon, Great Keppel Is. (PJMG); **South Australia:** 130 km NE of Macumba HS (PJMG); 135 km ENE of Macumba HS (PJMG); 15 km E of Poeppel Corner (PJMG); 15 km S of Anna Creek HS (PJMG); 15 mi (= 24 km) SSW of Observatory Hill (R. S. McInnes & J. Dowse); 18 mi (= 28.8 km) W of Penong (TG); 20 km W of Poeppel Corner (PJMG); 23 mi (= 36.8 km) NE of Nullabor Stn (TG); 25 km WNW of Coongie (PJMG); 26 mi (= 41.6 km) SSE of Meningie (TG); 2 km NW of Kyancutta (PJMG); 2 mi (= 3.2 km) E of Streaky Bay (TG); 30 km E of Poeppel Corner (PJMG); 30 km S of Granite Downs (PJMG); 31 mi (= 49.6 km) N of Colona (R. S. McInnes & J. Dowse); 3 km W of Emu Camp (PJMG); 45 km WNW of Emu (PJMG); 50 km NE of Clifton Hills (J. Forrest); 55 km S of Birdsville (J. Forrest); 5 km E of Gibraltar Rocks, N of Tarcoola (PJMG); 65 km E of Clifton Hills (J. Forrest); 6 km W of Koonchera, Birdsville track (PJMG); Birdsville track, S of Koonchera (J. Forrest); Blande Cup Spr., nr. Conant Spr. (PJMG); Cambrai (PJMG); Ceduna (E. F. Riek); Coomaba, Eyre Penin. (PJMG); Coonanna Bore, ca. 40 km E of Lake Blanche (J. Forrest); Coongie (J. Forrest); Cooper Creek, 13 km NE by N of Etadunna HS, 28°38'S 138°42'E (JEF); Coorang Natl Pk, 9 km NW of Woods Well (PJMG); Coorang Natl Pk, Banf (PJMG); Emu Camp (PJMG); Innes Natl Pk (PJMG); Kalacoopah Creek (PJMG); Koonamore (PJMG); Kooncherra, Birdsville track (J. Forrest); Lake Acraman, Gawler Ranges (PJMG); Lake Meramangye (PJMG); Lake Oolgoopiarie (PJMG); Lloyd Bore, Anna Cr. (PJMG); Marree (R. S. McInnes); Miamia Yard, 1:250 Gason 636549 (J. Forrest); Mt. Gason, ca. 41 km SSW of Clifton Hills HS, 27°22'S 138°43'E (JEF); Mt. Gunson, SE of Woomera (PJMG); Mt. Lofty Ranges (A. H. Elston); Muloorina (PJMG); Musgrave Range (BBL); N. Lake Eyre South, 5 km W of crossing between lakes (PJMG); Port Lincoln, Coffin Bay (PJMG); Port Lincoln, E. Horse Rock (PJMG); Purni Bore, 4km W of Dune Crest (PJMG); Streaky Bay (BBL); Vokes Hill (PJMG); W. Blyth Swamp [W of Clare] (PJMG); Warburton Ra., 1:250 Gason 640554 (J. Forrest); Yardea, Gawler Ranges (PJMG); ca. 18 km SSE of Poochera, 32°52'S 134°56'E (RWT & R. J. Bartell); nr. Mt. Westall, 32°53'S 134°08'E (RWT, R. J. Bartel and BBL); **Victoria:** 20 mi (= 32 km) NW of Swan Hill (TG); Heathcote, nr. Bendigo (BBL); **Western Australia:** 10 km E of Denmark, 34°58'S 117°26'E (SOS); 11 mi (= 17.6 km) E of Madura (TG); 15 mi (= 24 km) NE of Menzies (R. S. McInnes & J. Dowse); 162 km ENE of Cosmo Newberry, 27°21'S 124°21'E (JEF); 16 km NNW of Gibson, 33°31'S 121°43'E (RWT); 20 km W of Albany, 34°59'S 117°42'E (SOS); 21 km SE of Karonie (RWT); 21 mi (= 33.6 km) E of Norseman (TG); 25 km E of Ashburton River (Nanutarra Roadhouse), 22°25'S 115°50'E (SOS); 30 km S of Jerramungup, 34°12'S 118°56'E (SOS); 32 km S of Dwellingup, 33°00'S 116°05'E (I. D. Naumann & J. C. Cardale); 43 mi (= 68.8 km) E by S of Ravensthorpe, 33°31'S 120°46'E (Key & Upton); 47 km SSW of Norseman, 32°35'S 121°34'E (I. D. Naumann & J. C. Cardale); 48 km ENE of Hopetoun, Lake Shaster Nature Reserve, 33°52'S 120°40'E (SOS); 62 km NE of Albany, Hassell Natl Pk, 34°37'S 118°23'E (SOS); 64 km W of Esperance (BBL); 74 km E by N of Cosmo Newberry, 27°55'S 123°37'E (JEF); Barrens Beach, Fitzgerald River Natl Pk, 33°56'S 120°03'E (SOS); Barrow Island, 20°46'S 115°24'E (H. Heatwole); Cape Mentelle (E. F. Riek); Carnamah (E. F. Riek); Coral Bay, 23°08'S 113°46'E (SOS); Denmark (TG); Giles Meteorological Stat. (PJMG); Gold Holes, Stirling Range (RWT); Green's Pool, William Bay Natl Pk, 35°02'S 117°13'E (SOS); Hamlin Bay, Leeuwin-Naturaliste Natl Pk, 34°13'S 115°01'E (SOS); Inlet Camp, Stokes Natl Pk, 33°49'S 121°08'E (SOS); Israelite Bay (TG; SOS); Jewel Cave, 34°16'S 115°05'E (SOS); Kings Park (BBL); Lake Grace (F. H. Kipps); Lort River Valley, 96 km W of Esperance (BBL); Lort River, 44 mi (= 70.4 km) W of Esperance (TG); Ludlow (JC); Moingup Spring, Stirling Range Natl Pk, 34°24'S 118°06'E (P. S. Ward); Mundaring (JC; TG); Perth (J. Brophy; JC); Redgate Beach, Leeuwin-Naturaliste Natl Pk, 34°02'S 114°59'E (SOS); Tammin (JC; TG); Thomas River (TG).

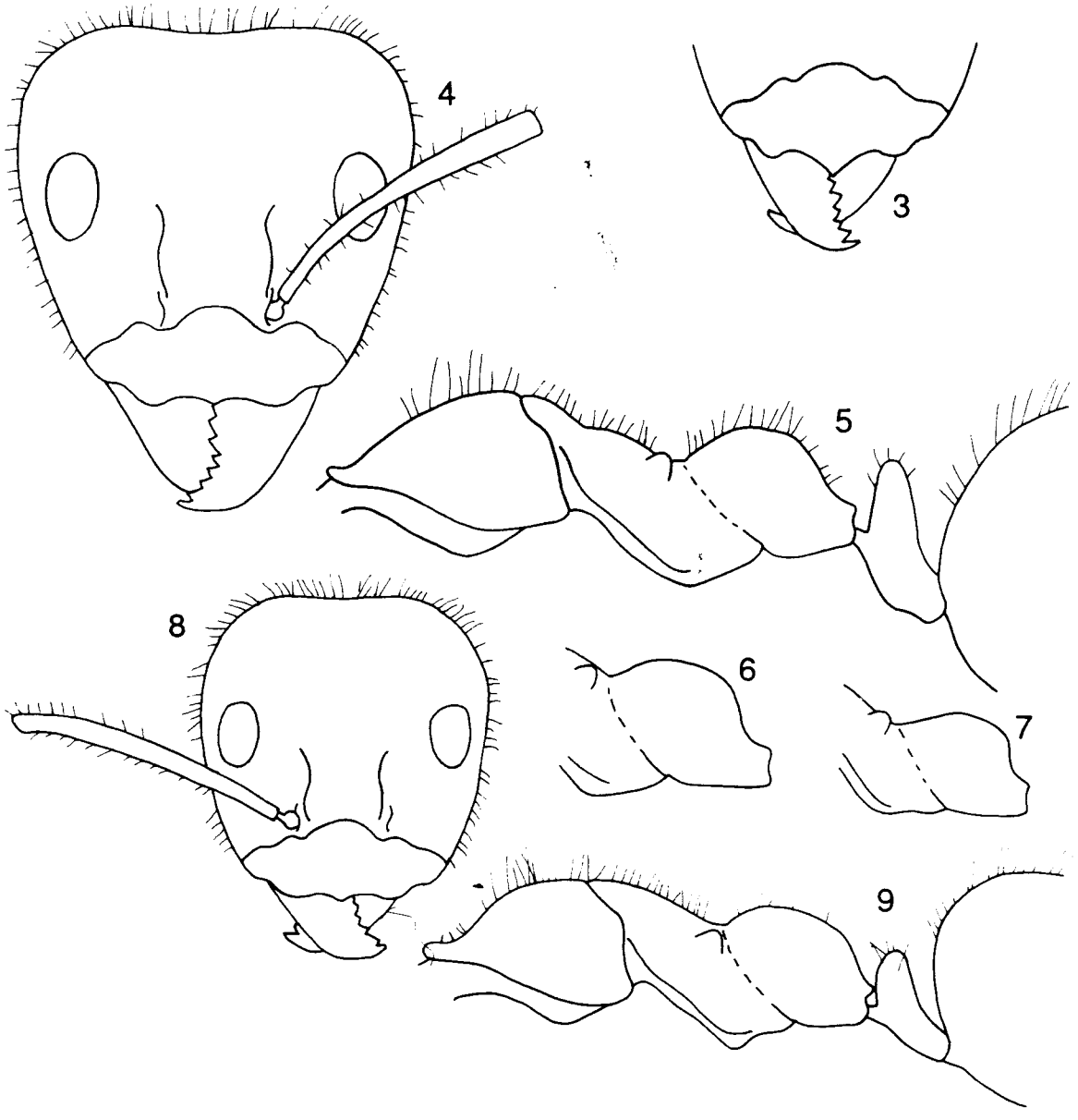
Worker diagnosis. Head broad (CI usually greater than 0.95, occasionally lower) (Fig. 1); scapes short (SI less than or equal to 0.99) (Fig. 2); propodeal dorsum rounded in lateral profile (Figs 5-7).

Worker description. Pigment colour of head and mesosoma varying from light to dark yellowish-red, with the mandibles slightly darker, and with the head and mesonotum usually similar in colour and slightly darker than the pronotum; petiole and gaster reddish brown; coxae and legs varying from

only slightly darker than the mesonotum to distinctly infuscated dark brown. Iridescence present or absent from gaster, when present green or purple. Head pilosity always present and setae numerous on occipital margin, varying from abundant to nearly absent laterally. Dorsal surfaces of mesosoma, petiole and gaster with numerous elongate erect or suberect setae; erect hairs present on all leg surfaces and antennal scapes. Shape of dorsal surface of propodeum variable in lateral profile but always rounded or arched.

Measurements. *Worker* (n = 52): CI 0.92-1.07; EL 0.25-0.35; EW 0.15-0.23; HL 1.12-1.56; HTL 1.41-1.87; HW 1.09-1.63; ML 0.45-0.77; PnL 0.56-0.83; PpL 0.54-0.76; REL 0.20-0.26; SI 0.76-0.99; SL 1.01-1.29.

Comments. *Iridomyrmex discors* shows considerable variation in the development of pilosity, especially on the lateral margin of the head; profile of the dorsal propodeum (Figs 5-7); overall size; and colour, especially the infuscation of the legs. This variability has resulted in the establishment of three subspecies and one variety



Figs 3-9. *Iridomyrmex* species, workers: **(3)** anterior region of head of *I. mayri* group; **(4)** full face view of *I. discors* (Sturt National Park, N.S.W.); **(5)** lateral view of mesosoma and petiole of *I. discors* (Sturt National Park, N.S.W.); **(6)** lateral view of propodeum of *I. discors*, pilosity omitted (Sturt National Park, N.S.W.); **(7)** lateral view of propodeum of *I. discors*, pilosity omitted (Botany Bay breakwaters, Sydney, N.S.W.); **(8)** full face view of *I. obscurior* (syntype); **(9)** lateral view of mesosoma and petiole of *I. obscurior* (syntype).

of *I. discors*. However, during this study variation in the above characters was found to be continuous and the recognition of the earlier proposed forms (except *I. obscurior*, see below) was unjustifiable. Additionally, the original descriptions provide no information helpful in separating or diagnosing these forms. The traits previously used included body colour and iridescence, development of pilosity and head shape, and these supposed differences are now known to be connected by intermediate forms which render them of little use in diagnosing species. For example, head shape was reported to be either narrow or broad. However, quantification of head shape by measuring head width and head length shows continuous variation with the type specimens of the proposed subspecies spanning nearly the complete range of this variation (Fig. 1). The variation in scape length shows a similar pattern, again with type specimens of the earlier taxa showing the extremes of the variation for this character (Fig. 2). Because of this, the names *I. discors aeneogaster* Wheeler, *I. discors occipitalis* Forel and *I. discors occipitalis exilior* Forel (an unavailable infrasubspecific name) are here considered to be junior synonyms of *I. discors*.

The known distribution of *I. discors* shows two distinct, allopatric populations, an eastern one in central and eastern Queensland and eastern New South Wales, and a western one extending from western Queensland, New South Wales and Victoria westward (Fig. 10). *I. discors* is not known to occur in the intervening region even though this area has been relatively well collected. Given that the habitat across this region is fairly uniform and changes only gradually, this disruption in distribution would suggest that two separate forms are present.

A detailed morphological analysis of material from both the eastern and western populations reveals only slight morphological differentiation. The eastern population tends to be slightly darker in overall colour compared to the western population. However, all colour forms can be found in both populations. Additionally, the anterior region of the dorsal propodeal face is flat in the eastern population (Fig. 7), while the majority of specimens from the western population have this region weakly convex (Figs 5, 6), but with a small proportion being flat (similar to Fig. 7). Thus while there is some degree of morphological divergence between these two populations neither possesses unique, diagnostic characters not shared with the other population, and therefore both populations are here considered to belong to a single species.

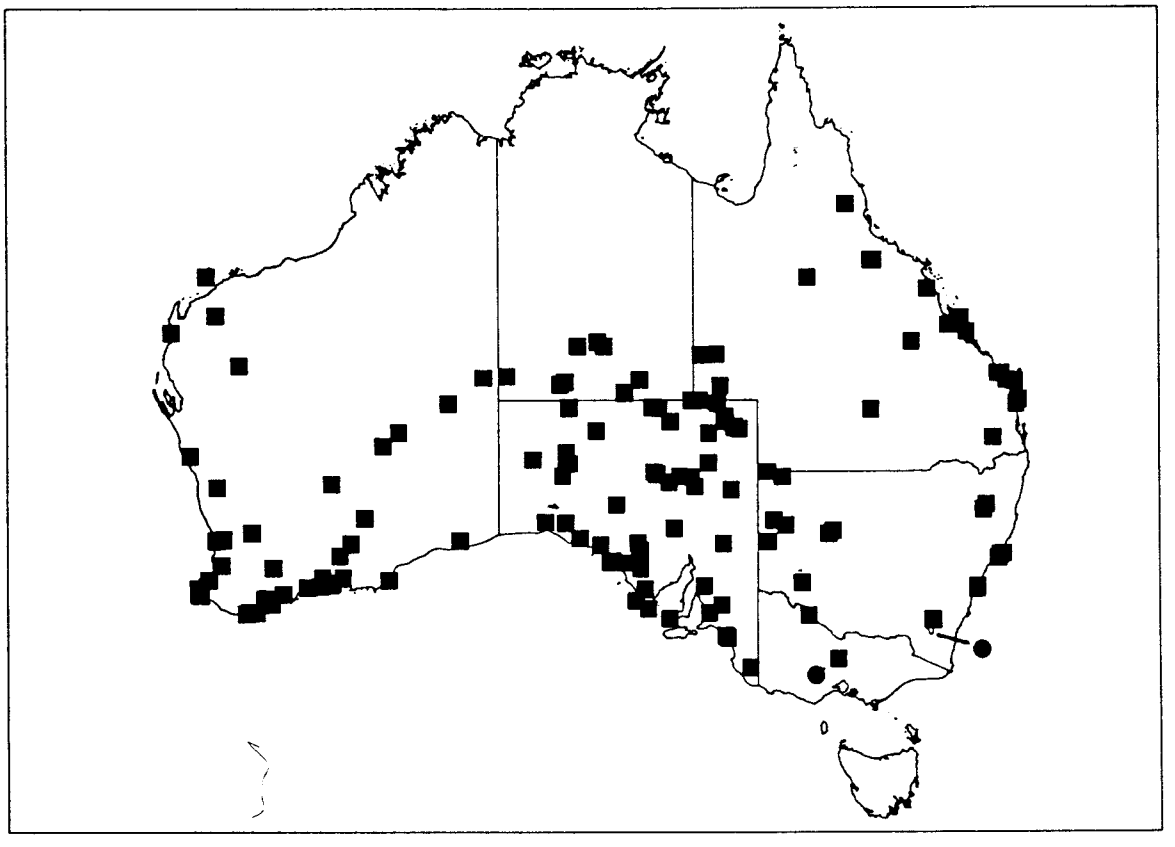


Fig. 10. Distribution of *Iridomyrmex* species examined during this study. Closed squares = *I. discors*, closed circles = *I. obscurior*.

The available biological information suggests that *I. discors* is a general predator/scavenger and occupies a variety of drier habitats, including arid and semi-arid grasslands and shrublands, dry sclerophyll and *Callitris* woodlands. Nests are in soil, often with a low, dispersed layer of loose dirt around the entrance.

Iridomyrmex obscurior Forel stat. nov. (Figs 1, 2, 8-10)

Iridomyrmex discors obscurior Forel, 1902: 465.

Types. Victoria: 5 worker syntypes from Ballarat (1 worker in ANIC; 4 workers in MHNG).

Other material examined (in ANIC). **A.C.T.:** Cotter Res., 10 mi (= 16 km) W of Canberra (P. W. Matthews).

Worker diagnosis. Head narrow (CI less than 0.94) (Fig. 1); scapes long (SI greater than or equal to 1.00) (Fig. 2); propodeal dorsum flatter in lateral profile (Fig. 9).

Worker description. Pigment colour of head and mesosoma dark yellowish-red and with the pronotum slightly lighter; petiole and gaster dark reddish-black to black; coxae and legs infuscated dark brown. Iridescence absent to weak blue on gaster. Head with numerous erect setae on occipital and lateral margins. Dorsal surfaces of mesosoma, petiole and gaster with numerous elongate erect or suberect hairs; erect hairs present on all leg surfaces and antennal scapes. Shape of dorsal surface of propodeum low and flattened medially.

Measurements. *Worker* (n = 6): CI 0.91-0.93; EL 0.25-0.27; EW 0.15-0.16; HL 1.19-1.29; HTL 1.41-1.48; HW 1.10-1.19; ML 0.52-0.57; PnL 0.57-0.67; PpL 0.61-0.66; REL 0.22-0.23; SI 1.00-1.05; SL 1.14-1.19.

Comments. *Iridomyrmex obscurior* is currently known from only two collections, the original specimens described by Forel (1902) and a second collection made recently near Canberra, A.C.T. Specimens from both collections are morphologically similar although the type material is noticeably lighter in colour compared to the A.C.T. specimens. This is presumably caused by fading of the original type specimens. *I. obscurior* is morphologically similar to *I. discors* and was originally described as a subspecies of the latter. The two species differ primarily in the scape length relative to head width, and the shape of the head and dorsal surface of the propodeum. In all known specimens the scape is longer for a given head width in *I. obscurior* than in *I. discors* (Fig. 2). Similarly, the dorsal surface of the propodeum in lateral view in *I. obscurior* is arched anteriorly and posteriorly with the central region nearly flat (Fig. 9), while this surface in *I. discors* is always approximately uniformly arched medially (Figs 5-7) although the anterior region can vary from being arched (Fig. 5) to flat (Fig. 7). Finally, head shape differs between these two species, although the difference is less than in the above characters and several individuals of *I. discors* have head length and width very similar to some individuals of *I. obscurior* (Fig. 1). For example, an individual of *I. discors* from Wolri, Cooloola National Park, Queensland, has a HW of 1.21 mm and a HL of 1.28 mm. This is very similar to the type of *I. obscurior*, which has a HW of 1.19 mm and a HL of 1.29 mm. However, other members of this same nest series have head dimensions which are more typical of *I. discors*. These individuals have HWs of 1.28 and 1.29 mm and HLs of 1.29 and 1.36 mm, respectively. The likelihood that this similarity is caused by gene flow is small given that the specimens with similar head shapes are allopatric, and therefore these taxa are maintained as valid, distinct species.

The only biological information available for this species is that the A.C.T. specimens were collected attending lycaenid pupae.

Acknowledgments

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