Revision of the Australian species of the ant genus *Anochetus* (Hymenoptera: Formicidae)

STEVEN O. SHATTUCK & EWA SLIPINSKA
CSIRO Ecosystem Sciences, P. O. Box 1700, Canberra, ACT 2601, Australia. E-mail: steve.shattuck@csiro.au

Abstract

The Australian species of the ponerine ant genus *Anochetus* are revised. Fourteen species are known from Australia with eight described here for the first time. Twelve are endemic to Australia while two are shared with Australia's northern neighbours. Most species are restricted to tropical regions with only two known from southern Australia. While the majority of species are found in forested habitats, ranging from rainforest to dry sclerophyll woodlands, in southern regions they extent into drier shrub and bush dominated sites.

Key words: Australia, Formicidae, Hymenoptera, *Anochetus*, new species

Introduction

The ponerine genus *Anochetus* contains 94 described species which are found worldwide in tropical and warm- temperate regions (Bolton, 2006; Guénard, 2011). There are an additional 8 species known from fossils. Within Australia 14 species are known, the majority of these being found in northern, tropical and subtropical regions with a limited number occurring in more southern areas. They are closely related to *Odontomachus*, sharing many morphological and behavioural characteristics (Brown, 1976; Brady et al., 2006; Ouellette et al., 2006). Brown (1978) revised the world fauna, providing extensive taxonomic and biological notes, while the Malagasy species were recently examined by Fisher et al. (2008). Andersen (2000) provides an overview of the Australian fauna as understood at that time, with notes on general distribution patterns and habitat preferences.

Within Australia these ants form small nests, usually with fewer than 100 workers, in soil, in termite nests, under logs and in rotten wood. They are predacious on small invertebrates with some species known to specialise on termites, using their trap- like jaws and sting to capture and subdue prey (Shattuck, 1999). In addition, one of the southern species, *A. renatae*, may also take some seeds as husks and other plant refuse have been found around their nests (Heterick, 2009, reported as *A. armstrongi*). Workers of *Anochetus* commonly forage in leaf litter and are less frequently found in the open (Fig. 1), especially when compared to workers of the closely related genus *Odontomachus*.

The Australian species of *Anochetus* occur primarily in forested habitats ranging from rainforest through to dry situations such as *Callitris* forest, mulga woodland and mallee. However, in drier regions *Anochetus* species can be found in more open habitats such as bluebush steppe and chenopod shrubland although these taxa appear to occur at lower densities (based on frequency of encounters during sampling programs) compared to those in forested locations. Far North Queensland holds the majority of Australian species, with nine known from Cape York Peninsula. Four species extend down the east coast into southern Queensland while three species occur in the Top End, the Kimberley region of Western Australia and extreme north-eastern New South Wales. In the drier Gulf Country as well as cooler southern regions only single species are known (Fig. 2, based on the regions proposed by Barlow, 1985).

Methods and abbreviations

Size and shape characters were quantified and are reported as lengths or indices. Measurements were made with a 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 x 100.
EI: Eye index: EL/HW x 100.
EL: Maximum measurable eye length.
HL: Maximum head length in full face (dorsal) view, measured longitudinally from the anterior- most point of the clypeal margin to the posterior- most point of the head proper, using tangential lines where required.
HW: Maximum head width in full face (dorsal) view, excluding the eyes.
HFL: Maximum length of hind femur.
ML: Mesosomal length measured from the anterior surface of the pronotum proper (excluding the collar) to the posterior extension of the propodeal lobes (excluding the metapleural flange).
MandL: Maximum length of mandible in full face (dorsal) view measured from the anterior clypeal margin to the tip with the mandibles fully closed.
MTL: Maximum length of mid tibia, excluding the proximal part of the articulation which is received into the distal end of the femur.
PronI: Pronotal index: PronW/HW x 100.
PronW: Maximum width of pronotum in dorsal view.
SI: Scape index: SL/HW x 100.
SL: Length of the scape (first antennal segment) excluding the basal neck and condyle.

Collections : ANIC, Australian National Insect Collection, Canberra, A.C.T., Australia; BMNH, The Natural History Museum, London, U. K.; CASC, California Academy of Sciences, San Francisco, California, USA; JDMC, Jonathan D. Majer Collection, Curtin University of Technology, Perth, W.A.,

Australia; MCZC, Museum of Comparative Zoology, Cambridge, Massachusetts, USA; MHNG, Muséum d'Histoire Naturelle, Genève, Switzerland; ZMHB, Museum für Naturkunde , Berlin, Germany; NHMB**:** Naturhistorisches Museum Basel, Switzerland; NHMW, Naturhistorisches Museum Wien, Vienna, Austria; NHRS, Naturhistoriska riksmuseet, Stockholm, Sweden.

Diagnosis

The genus *Anochetus* can be recognised by the presence of elongate and straight mandibles which are armed at their tips with three large teeth and are inserted in the middle of the front margin of the head; the unique head shape where, when viewed from the front, the outer surface of the head is complex, with narrow sections above and below bulging convexities which contain the eyes; and having the posterior margin of the head uniform in colour and lacking dark V-shaped apophyseal lines.

The unique shape of the head and mandibles will separate this genus from all others except the closely related *Odontomachus* . *Anochetus* differs from *Odontomachus* in being smaller in overall length, in having the upper surface of the head smooth and without a pair of dark apophyseal lines, in having the gaster with a constriction between the first and second segments and in having the upper surface of the petiole either rounded or with a pair of small teeth and never with a single elongate spine (Shattuck, 1999).

List of Australian species

alae **n. sp.**
armstrongi McAreavey
avius **n. sp.**
graeffei Mayr
    amati Karavaiev
    minutus Karavaiev
    punctiventris Mayr
    punctiventris oceanicus Emery
    punctiventris taylori Forel
    rudis Emery
    ruginotus Stitz
isolatus Mann
    rossi Donisthorpe
    splendens Karavaiev
paripungens Brown
rectangularis Mayr
    rectangularis diabolus Forel
renatae **n. sp.**
rufolatus **n. sp.**
rufostenus **n. sp.**
turneri Forel
    turneri latunei Forel

veronicae **n. sp.**
victoriae **n. sp.**
wiesiae **n. sp.**

Key to Australian *Anochetus* species based on workers

1. Propodeal angles produced as spines … 2

- Propodeal angles more or less rounded and lacking spines … 5

2. Sculpture on front of head extending only slightly beyond eyes (approximately half head length); eye larger (EL > 0.27mm); scapes surpassing posterolateral corners ('lobes') of head (SI > 100) (Fig. 4); numerous erect hairs on scapes … 3

- Sculpture on front of head extending well beyond eyes (greater than half head length); eye smaller (EL < 0.22mm); scapes not reaching posterolateral corners ('lobes') of head (SI < 100) (Fig. 4); scapes with limited number of erect hairs … 4

3. Smaller body (HL < 1.62mm, HW < 1.44mm); scapes shorter (SL < 1.50mm) (Fig. 4); sides of propodeum with coarse striations; mesonotum smooth and shining; petiolar node in side view with posterior surface less convex; pubescence on scapes limited, some areas devoid of hairs, the individual hairs only slightly overlapping … *veronicae*

- Body larger (HL > 1.78mm, HW > 1.53mm); scapes longer (SL > 1.60mm) (Fig. 4); sides of propodeum smooth and shining; mesonotum with a few transverse, irregular ridges or striations; petiolar node in side view with anterior surface more convex; pubescence on scapes abundant and covering the entire scape, the individual hairs strongly overlapping … *alae*

4. Pronotum shining but with shallow, weakly defined oval punctures; propodeal spines directed slightly posteriorly so that in profile they form an angle with the posterior propodeal face at their bases; dorsum of propodeum with appressed hairs; hind tibiae with decumbent hairs which are restricted to the inner surfaces … *paripungens*

- Pronotum smooth and shining; propodeal spines pointed anteriorly and forming a continuous surface with the posterior propodeal face in profile; dorsum of propodeum with erect hairs; hind tibiae with erect hairs on all surfaces … *wiesiae*

5. Sculpture on front of head extending well above eyes and reaching (or nearly reaching) the posterior margin of head … 6

- Sculpture on front of head extending only slightly beyond eyes and ending well before posterior margin … 7

6. Sculpturing on dorsal surface of pronotum variable, ranging from punctate medially and striate- rugulose laterally to entirely striate- rugulose, sometimes with arching striations anteriorly (which are developed to varying degrees); mesonotum striate- rugulose; sides of propodeum smooth and shining anteriorly, sculptured posteriorly; eyes smaller (EL < 0.16mm) … *graeffei*

- Dorsal surface of pronotum with distinct longitudinal striations (never rugulose); mesonotum smooth, without sculpture; sides of propodeum with coarse striation on entire surface; eyes larger (EL > 0.22mm) … *victoriae*

7. Petiolar node in front view tapering upwards into a narrowly rounded point … *isolatus*

- Petiolar node in front view narrowing only slightly dorsally, the apex broad … 8

8. Mesonotum with transverse striations; propodeum with dorsal surface rounding into sides and posterior face, the angle obscured; in side view petiolar node swollen basally and with a strong angle just below mid- height … *turneri*

- Mesonotum smooth and without sculpturing; propodeum with dorsal surface more or less flattened and with distinct propodeal angle; in side view anterior face of petiolar node weakly concave and never angled near mid-height … 9

9. Entire pronotum and sides of propodeum smooth and shining; dorsal surface of propodeum with weak transverse striations (nearly absent in some specimens); hairs on dorsal surface of propodeum very short, scattered and appressed … 10

- Pronotum partially to completely sculptured; sides of propodeum with coarse striations, dorsal surface coarsely sculptured with combination of irregular rugosity and striations; hairs on dorsal surface of propodeum longer, erect or semi- erect … 12

10. Eyes small (EL < 0.25mm, EI < 20) (Fig. 7A); scapes shorter (SL < 1.00mm) (Fig. 7B); legs shorter (MTL < 0.80mm, HFL < 1.10mm) (restricted to the northern Kimberley Region) … *avius*
- Eyes large (EL > 0.30mm, EI > 22) (Fig. 7A); scapes longer (SL > 1.05mm) (Fig. 7B); legs longer (MTL > 0.85mm, HFL > 1.18mm) … 11

11. Propodeum with transverse striations extending slightly laterally onto the sides to at least the level of the spiracle; scapes longer, reaching posterolateral corners ('lobes') of head (SL > 1.40mm); erect hairs on hind tibiae uniformly distributed on all surfaces; eyes expanded laterally so that in full face view they form outer margin of head … *renatae*

- Propodeum with weak transverse striations dorsally which rarely extend onto the sides (when present laterally they are separated from the dorsal sculpturing by a smooth gap); scapes shorter, not reaching posterolateral corners ('lobes') of head (SL < 1.35mm); erect hairs on hind tibia reduced on outer surface compared to inner surface; eyes narrower so that in full face view they do not extend beyond head capsule ... *armstrongi*

12. Petiolar node in side view tapering gradually to apex in the form of an inverted "V", with the striations fading towards the summit; propodeal angle sharply rounded ... *rectangularis*

- Petiolar node in side view narrowing only slightly towards the apex, trapezoid- shaped, with distinct striations along entire height; propodeal angle more gently rounded ... 13

13. Dorsum and sides of pronotum with distinct longitudinal striations; head shorter (HL < 1.04mm); petiolar node narrower (maximum width < 0.28mm) ... *rufostenus*

- Dorsum of pronotum smooth and shining, sides with distinct striations; head longer (HL > 1.11mm); petiolar node wider (maximum width > 0.28mm) ... *rufolatus*

Australian species of *Anochetus*

***Anochetus alae* n. sp.**
(Figs 3, 4)

Types. Holotype worker from Cairns North, Queensland, 14 August 1983, P.S. Ward, gully rainforest, under stone (ANIC32- 013813); 21 paratype workers, same data as holotype (15 in ANIC, 3 in BMNH, 3 in MCZC; ANIC32-059559).

Diagnosis. Propodeal angles produced as spines; sculpture on front of head extending only slightly beyond eyes; body large (HL > 1.78mm, HW > 1.53mm); scapes relatively long (SL > 1.60mm); mesonotum with a few transverse, irregular ridges. This species is larger than the similar *A. veronicae*, and differs in having well developed sculpturing on the mesosoma, a more convex anterior petiolar node face and more abundant pubescence on the scapes.

Worker description. Body large (HL > 1.78mm, HW > 1.53mm). Sculpturing on front of head extending slightly beyond eyes. Scapes surpassing posterolateral corners ('lobes') of head; with abundant, appressed pubescence and numerous erect hairs. Pronotum with smooth and shining dorsal surface, distinctly striate laterally. Anterior part of pronotum with transverse wrinkles and ridges. Mesonotum sculptured with a few transverse, irregular striations. Propodeum with angles produced as long spines. Propodeum rounded dorsally, with coarse transverse striations and

erect hairs. Metapleuron mostly smooth and shining. Petiolar node with apical margin concave medially and lateral corners produced as spines. Erect hairs on hind tibiae present on all surfaces. Colour light brown, head, antennae, mandibles yellow-brown and legs yellow.

Measurements. Worker (n = 5): CI 86-87; EI 20-22; EL 0.30-0.35; HL 1.79-1.81; HW 1.54-1.58; HFL 1.89-1.92; ML 2.18-2.32; MandL 1.05-1.12; MTL 1.26-1.35; PronI 55-58; PronW 0.85-0.89; SL 1.61-1.66; SI 104-106.

Comments. This rare species has been collected only a single time, a nest found by Phil Ward under a stone in a gully rainforest.

Anochetus armstrongi McAreavey
(Figs 5, 7)

Anochetus armstrongi McAreavey, 1949: 1.

Types. Holotype worker and worker and queen paratypes from Nyngan, New South Wales (holotype, 36 worker and 6 queen paratypes in ANIC; 4 worker paratypes in MCZC; additional worker paratypes in BMNH).

Diagnosis. Entire body smooth and shining except for the sculpturing between the frontal carinae and scattered very weak striations on the propodeal dorsum; eyes large (EL > 0.30mm). The only other Australian species of *Anochetus* to show similar lack of sculpturing to *A. armstrongi* is *A. avius*. *Anochetus armstrongi* can be separated from this species by its larger eye size (EL > 0.30mm vs. < 0.25mm), and longer scapes (SL > 1.05mm vs. < 1.00mm) and legs (MTL > 0.85mm vs. < 0.80mm, HFL > 1.18mm vs. < 1.10mm). It is very similar to *A. renatae* but differs in having more weakly developed sculpturing on the propodeum, reduced number of erect hairs on the hind tibiae and less bulging eyes. *Anochetus armstrongi* is also allopatric to both of these species, occurring in south-eastern Australia while *A. avius* is limited to northern Western Australia and *A. renatae* is only known from southern Western Australia.

Worker description. Sculpturing on front of head extending slightly beyond eyes. Scapes not reaching posterolateral corners ('lobes') of head; with limited pubescence and few erect hairs. Pronotum smooth and shining. Mesonotum and metapleuron without sculpture, smooth and shining. Propodeum flattened dorsally, with weak transverse striations and only a few scattered very short hairs. Propodeal angle distinct, triangular. Petiolar node in anterior view truncate or weakly concave. Hind tibiae with erect hairs limited to outer surfaces. Colour yellow-brown or light brown with legs yellow or yellow-brown.

Measurements. Worker (n = 12): CI 94-98; EI 24-27; EL 0.33-0.39; HL 1.36-1.57; HW 1.33-1.51; HFL 1.33-1.46; ML 1.69-1.89; MandL 0.67-0.75; MTL 0.95-1.14; PronI 57-60; PronW 0.77-0.87; SL 1.16-1.32; SI 85-92.

Material examined. **Australia**: *New South Wales*: 14 ml. NW of Nyngan (Greaves,T.) (ANIC); 14 mls. N of Quambone (Greaves,T.) (ANIC); 15 km Pilliga Scrub, Narrabri (Room,P.M.) (ANIC); 27km S Hillston (Lowery,B.B.) (ANIC); 5 km N of Condobolin (Lowery,B.B.) (ANIC); Bogan River (Armstrong,J.) (ANIC); Broken Hill (Shepherd,F.) (ANIC); Burke (collector unknown) (ANIC); Callubri Station (Greaves,T.) (ANIC); CSIRO Lake Mere field stn, nr. Louth (Bryannah,M.) (ANIC); Euston (Froggatt,W.W.) (ANIC); Finley (White,W.B.) (ANIC); Griffith to Leeton (Greaves,T.) (ANIC); Hillston (Lowery,B.B.) (ANIC); Hillston, Rail. Res. (Lowery,B.B.) (ANIC); Lake Mere, 40 km NNE Louth (Greenslade,P.J.M.) (ANIC); Mairjimmy SF, 12km N Finley (Lowery,B.B.) (ANIC); Nyngan (Armstrong,J.; Lowery,B.B.) (ANIC); Palmer SF, 27km E Jerilderie (Lowery,B.B.) (ANIC); Pillia E, Narrabri (Room,P.M.) (ANIC); Riverina (Froggatt,W.W.) (ANIC); Talbita (Greaves,T.) (ANIC); *Queensland*: 16 km W Cunnamulla (Greenslade,P.J.M.) (ANIC); 20 km WSW of Eungella (Gillison,A.) (ANIC); 30mi. N Tambo (Lowery,B.B.) (ANIC); 4 mi. WNW of Yelarbon (Greaves,T.) (ANIC); Fletcher (Sutton,E.) (ANIC); Helenslee Station (Greaves,T.) (ANIC); Nindigully (Greaves,T.) (ANIC); St. George (Greaves,T.; Lowery,B.B.) (ANIC); Toobeal (Greaves,T.) (ANIC); *South Australia*: 19km NbyE Renmark (Shattuck,S.O.) (ANIC); 5 ml. S of Hawker (Lowery,B.B.) (ANIC); 8km NW Morgan (Greenslade,P.J.M.) (ANIC); 8m. SW Morgan (Lowery,B.B.) (ANIC); Brookfield Cons. Park (Ward,P.S.) (ANIC); Gawler Ra., Yardea, 4 km NE AHS (Greenslade,P.J.M.) (ANIC); Moorunle, nr. Blanchetowne [Moorundie nr. Blanchetown] (Taylor,G.S. & Greenslade,P.J.M.) (ANIC); Mt. Lofty (Elston,A.H.) (ANIC); Mt. Woodroofe (foot), Musgrave Ra (Lowery,B.B.) (ANIC); Oraparinna, Flinders Ranges (Greenslade,P.J.M.) (ANIC); *Victoria*: Marysville (Barrett,C.; Clark,J.) (ANIC); Patho (Potter,H.A.) (ANIC); Ultima (Goudie,J.C.) (ANIC).

Comments. This is one of the more widely distributed Australian *Anochetus* species, occurring from central Queensland south to southern South Australia. It is also the only species occurring in the cooler south- eastern part of the country. Brown (1978) and Heterick (2009) included southern Western Australian specimens as part of this species but these are here considered to belong to the separate species *A. renatae*. Brown did, however, speculate that these western populations may represent a separate species and listed a number of characters that differ from more eastern specimens. He was reluctant to separate them because of the relatively large amount of morphological variation present and the few specimens available for study. Fortunately the situation has improved since then and the presently available material clarifies the taxonomic significance of the characters Brown discussed. It is now possible to develop well defined diagnoses to separate the eastern and western populations and the present evidence suggests that two separate but similar species are involved. As such the western populations are removed from *A. armstrongi* to the newly described species *A. renatae*.

Brown (1978) also discussed specimens from northern Western Australia which he treated as belonging to *A. armstrongi* but Bob Taylor (pers. comm.) described as being "rather like *paripungens*". In fact these specimens are not part of *A. armstrongi* but are here considered as belonging to two separate species, *A. avius* and *A. veronicae*.

Biologically, these ground nesting ants are found in a range of drier habitats including dry sclerophyll and savannah woodlands, *Callitris* forests, *Casuarina* flats, mallee, bluebush steppes and grasslands. They are almost always found as ground foragers or nesting under a wide range of objects on the ground.

***Anochetus avius* n. sp.**
(Figs 6, 7)

Types. Holotype worker from Walsh Point, Admiralty Gulf, Western Australia, 16 May 1983, J. Balderson (ANIC, ANIC32-044213); one paratype worker, same data as holotype (ANIC, ANIC32-059557); one paratype worker from Carson Escarpment, Kimberley region, Western Australia, June 1986, J.D. Majer (ANIC, ANIC32-015884); one worker paratype from Lone Dingo, Mitchell Plateau, Western Australia, 9-19 May 1983, I.D. Naumann & J.C. Cardale (ANIC, ANIC32-016070).

Diagnosis. Entire body smooth and shining except for sculpturing between frontal carinae and scattered very weak striations on propodeal dorsum; eyes small (EL < 0.25mm). This species is similar to *A. armstrongi* in lacking essentially all significant sculpturing other than on the front of the head. It can be separated from *A. armstrongi*, and the otherwise similar *A. renatae*, by its smaller eye size (EL < 0.25mm vs. > 0.30mm) and shorter scapes (SL < 1.00mm vs. > 1.05mm) and legs (MTL < 0.80mm vs. > 0.85mm, HFL < 1.10mm vs. > 1.18mm). *Anochetus avius* is also allopatric to both of these species, being the only one of these found in northern Western Australia.

Worker description. Sculpturing on front of head extending slightly beyond eyes. Scapes not reaching posterolateral corners ('lobes') of head; erect hairs present but scattered. Mesosoma smooth and shining, sculpturing limited to weak rugae or striations near the metanotal groove and on propodeal dorsum. Propodeal angles rounded. Petiolar node robust with thick truncate apex, lacking sculpture. Erect hairs on hind tibiae absent except for a few near the spurs. Colour yellow-brown to brown, head and legs slightly lighter in colour.

Measurements. Worker (n = 4): CI 88-92; EI 19-20; EL 0.17-0.22; HL 1.04-1.23; HW 0.91-1.10; HFL 0.86-1.07; ML 1.30-1.60; MandL 0.54-0.66; MTL 0.62-0.75; PronI 58-61; PronW 0.55-0.66; SL 0.83-0.98; SI 88-91.

Comments. This species is superficially similar to *A. armstrongi* and Brown (1978) considered specimens placed here as belonging to that taxon. However, as conceived in this study this species is consistently smaller than *A. armstrongi* as defined here. Additionally, these two species show distinct geographic and ecological patterns with *A. avius* being restricted to extreme northern Western Australia and *A. armstrongi* occurring broadly across south-eastern Australia, the habitats in these regions showing numerous ecological differences with essentially no overlap. Given this it seems

appropriate to consider these as two distinct taxa rather than simply forms of a single variable taxon.

The limited material currently available was collected in traps in dry sclerophyll woodlands.

***Anochetus graeffei* Mayr**
(Fig. 8)

Anochetus graeffei Mayr, 1870.
Anochetus amati Karavaiev, 1925 (junior synonym of *graeffei* by Wilson, 1959).
Anochetus minutus Karavaiev, 1925 (junior synonym of *graeffei* by Wilson, 1959).
Anochetus punctiventris subsp. *oceanicus* Emery, 1897 (junior synonym of *graeffei* by Wilson, 1959).
Anochetus punctiventris Mayr, 1879 (junior synonym of *graeffei* by Wilson, 1959).
Anochetus rudis Emery, 1889 (subspecies of *punctiventris* by Forel, 1900b, Emery, 1911; revived status as species by Bingham, 1903; junior synonym of *graeffei* by Brown, 1978).
Anochetus ruginotus Stitz, 1925 (junior synonym of *graeffei* by Brown, 1978).
Anochetus punctiventris r. *taylori* Forel, 1900b (raised to species by Bingham, 1903; junior synonym of *graeffei* by Brown, 1978).

Types. *A. graeffei*: Worker syntypes (4 examined by Brown, 1978) from Upolu Island, Samoa (NHMW). *Anochetus amati*: Queen holotype from Aru Island, Indonesia. *Anochetus minutus*: Worker and queen syntypes from Segamat, Johore, Malaysia (NHMB). *Anochetus punctiventris* subsp. *oceanicus*: Worker syntypes from Madang (as Friedrich - Wilhelmshafen) and Aitape (as Berlinhafen), Papua New Guinea. *Anochetus punctiventris*: Worker syntypes from Calcutta and the "Nuddea District", India. *Anochetus rudis*: Worker syntype(s) from Myanmar (as "Mandalay"). *Anochetus ruginotus*: Holotype worker from Luzon, Philippines (ZMHB). *Anochetus punctiventris* r. *taylori*: Worker syntype(s) from Coonoor, Madras State, India.

Diagnosis. Eyes very small (EL < 0.16mm); front of head with sculpturing extending to the posterior margin; pronotum with coarse and heavy striate-rugose sculpture; body very hairy, with abundant erect hairs on all surfaces. This is the most heavily sculptured species of *Anochetus* within Australia, approached only by *A. victoriae*. These two taxa can be separated by the rugulose rather than striate sculpturing on the dorsum of the pronotum and the smaller eye (EL < 0.16mm vs. > 0.22mm) in *A. graeffei*.

Worker description. Body smaller (HL < 1.14mm), with abundant erect or semierect hairs. Eyes very small (EL < 0.16mm). Sculpturing on front of head nearly reaching posterior margin and extending slightly laterally. Dorsum of head with abundant semierect hairs as well as a few erect hairs. Scapes not reaching posterolateral corners ('lobes') of head; with abundant,

slightly elevated pubescence and a limited number of erect hairs. Pronotum with characteristic punctate, irregularly rugose sculpture. Anterior section of pronotum with transverse wrinkles and ridges. Mesonotum and dorsum of propodeum with coarse striate-rugose sculpture. Dorsum of propodeum rounded laterally, with slightly rounded angle and numerous erect hairs. Metapleuron smooth and shining anteriorly. In anterior view petiolar node with apex rounded. Erect hairs on hind tibiae short and scattered. Colour from yellow-brown to brown, head from yellow to yellow-brown, antennae, mandibles and legs yellow or yellow-brown.

Measurements. Worker (n = 5): CI 92-93; EI 14-15; EL 0.13-0.15; HL 0.95-1.13; HW 0.89-1.06; HFL 0.77-0.89; ML 1.09-1.30; MandL 0.52-0.59; MTL 0.54-0.66; PronI 59-63; PronW 0.52-0.64; SL 0.76-0.87; SI 83-89.

Material examined. Australia: *New South Wales*: Bonalbo (Kearney,E.G.) (ANIC); Born Born State Forest 5 mi. S of Grafton (Lowery,B.B.) (ANIC); Glenugie State Forest, 15mi. S Grafton (Lowery,B.B.) (ANIC); Moobal State Forest, Burringbar Ra. [Mooball SF] (Lowery,B.B.) (ANIC); Mt. Nullum, Murwillumbah (Lowery,B.B.) (ANIC); Oxley Lookout, Tamworth (Lowery,B.B.) (ANIC); *Northern Territory*: 13km E by N of Mt. Cahill (Taylor,R.W.) (ANIC); Baroalba Ck. Gorge, 19km ex N Mt. Cahill (Taylor,R.W.) (ANIC); Baroalba Gorge (collector unknown; Taylor,R.W. & Feehan,J.E.) (ANIC); Baroalba Spring (collector unknown; Taylor,R.W.) (ANIC); East Pt nr. Darwin (Forrester,N.) (ANIC); Litchfield Nat. Pk. (Lowery,B.B.) (ANIC); West Alligator Mouth (Monteith,G.B.) (ANIC); *Queensland*: 1 km N of Rounded Hill (Calder,A. & Feehan,J.) (ANIC); 1.5km EbyN Mt. Sorrow (Calder,A. & Weir,T.) (ANIC); 10km N Mareeba (Lowery,B.B.) (ANIC); 11km ENE Mt. Tozer (Weir,T.A.) (ANIC); 14km W by N Hope Vale Mission (Calder,A. & Feehan,J.) (ANIC); 150 km S of Mackay (Lowery,B.B.) (ANIC); 18km SW Walkerston (Lowery,B.B.) (ANIC); 20 km S of Sarina (Lowery,B.B.) (ANIC); 20km N of Cairns (Lowery,B.B.) (ANIC); 30km S Sarina (Lowery,B.B.) (ANIC); 3km ENE Mt. Tozer (Weir,T.A.) (ANIC); 5 km NW Mount Macartney (Monteith,G.B.) (ANIC); 6 km E Woodstock (Greenslade,P.J.M.) (ANIC); 7km ENE Mt. Tozer (Weir,T.A.) (ANIC); 8 km SW Innisfail (Greenslade,P.J.M.) (ANIC); 9km ENE Mt. Tozer (Weir,T.A.) (ANIC); Alligator Crk. N.P., nr. Giru (Lowery,B.B.) (ANIC); Brisbane (Hacker,H.) (ANIC); Brisbane, Gold Cr. Res. (Lowery,B.B.) (ANIC); ca. 2 km E Crawfords Lkt. (Taylor,R.W.) (ANIC); Cairns (Lowery,B.B.) (ANIC); Cape Hillsborough (Monteith,G.B.) (ANIC); Cape Tribulation area (Calder,A. & Weir,T.) (ANIC); Charters Towers, goldfield area (Lowery,B.B.) (ANIC); Claudie River, Iron Range (Monteith,G.) (ANIC); Clump Point, nr. Tully (Taylor,R.W.) (ANIC); Cooloola, Como Scarp (Greenslade,P.J.M.) (ANIC); Hinchinbrook Is., Gayundah Ck. (Davies, Thompson & Gallon; Monteith, Thompson & Cook) (ANIC); Innisfail nr. Josephine Falls (Lowery,B.B.) (ANIC); Iron Ra. (Taylor,R.W. & Feehan,J.) (ANIC); Josephine Falls, Bellenden Ker N.P. (Ward,P.S.) (ANIC); Junction of Kennedy Highway, road from Mt. Garnet (Lowery,B.B.) (ANIC); Kirrama Forest (Greenslade,P.J.M.) (ANIC); Kuranda (Brown,W.L.; Dodd,F.P.; Taylor,R.W.) (ANIC); Lake Placid nr. Cairns (Taylor,R.W.) (ANIC); McNamee Creek (Taylor & Feehan) (ANIC); Miles (Lowery,B.B.) (ANIC); Millstream National Park, nr. Ravenshoe (Lowery,B.B.) (ANIC); Mossman Bluff Track, 5-10km W Mossman (Monteith, Thompson & ANZSES) (ANIC); Mt. Coot-tha

(Ward,P.S.) (ANIC); Mt. Coot- tha, Brisbane (Lowery,B.B.) (ANIC); Mt. Coot- tha, Brisbane (Taylor,R.W.) (ANIC); Mt. Mackay nr. Tully (Taylor,R.W.) (ANIC); Mt. Molloy (Lowery,B.B.) (ANIC); Mt. Sorrow summit, Cape Tribulation (Monteith,G.B.) (ANIC); nr. Babinda, Boulders N.P. (Taylor,R.W. & Feehan,J.E.) (ANIC); Pandanus Creek, Cathu SF (Monteith,G.B.) (ANIC); Pingin Hill [PinGin Hill] (Holt,J.) (ANIC); Seymour Ra. (Taylor & Feehan) (ANIC); Toowoomba (Greaves,T.) (ANIC); turnoff to Captain Billy Landing (Shattuck,S.O.) (ANIC); vic. Mt. Garnet (Taylor,R.W.) (ANIC); Wacol, Brisbane (Lowery,B.B.) (ANIC); West Claudie River, Iron Range (Monteith,G.) (ANIC); Yeppoon (Monteith,G.B.) (ANIC); *Western Australia*: SW Osborne Island, Kimberley Region (Majer,J.D.) (ANIC). **Caroline Islands**: WC Carolines: Woleai Is., Woleai Atoll (Krauss,N.L.H.) (ANIC). **Cook Islands**: Aitutaki, Motukitiu Islet (Wise,K.A.J.) (ANIC); Koromiri Islet, Rarotonga (Wise,K.A.J.) (ANIC); Rapota Islet, Aitutaki (Wise,K.A.J.) (ANIC); Taakoka Islet, Rarotonga (Wise,K.A.J.) (ANIC). **India**: Delhi (Imai,H.) (ANIC). **Indonesia**: Banda Is. (Meyer- Rochow,B.) (ANIC); *West Java*: Bandung (Imai, Kubota & Iskandar) (ANIC). **Malaysia**: *Selangor*: Malaya Ulu, Gombak nr. Kuala Lumpur (Taylor,R.W.) (ANIC). **Micronesia**: Nama Is., near Truk (Potts,R.W.L.) (ANIC). **New Caledonia**: 14km SW Thio, Kuenthio R. (Ward,P.S.) (ANIC); c.3km SE Tawainedre (Ward,P.S.) (PSWC); Fausse Yate Riv. (Ward,P.) (ANIC); Heinghene P.T.T. [Hienghene] (Ward,P.) (ANIC); Hienghene (Ward,P.) (ANIC); lower reaches of Fausse Yate R., nr. bridge (Ward,P.S.) (PSWC); Mt. Panié (Ward,P.S.) (ANIC); Riviere des Pirogues (headwaters) (Monteith,G. & Cook,D.) (ANIC). **Papua New Guinea**: *Central*: Brown R. (Lowery,B.B.) (ANIC); *Manus*: Little Drova (Room,P.M.) (ANIC); *Morobe*: Bulolo (Lowery,B.B.) (ANIC); Bulolo (Lowery,B.B.) (ANIC); *Northern*: Pati (Room,P.M.) (ANIC). **Seychelles**: Aldabra Atoll, Ile Picard Settlement (Humphreys,W.F.) (ANIC); Aldabra Atoll, Ile Polymnie, Anse Cedres (Humphreys,W.F.) (ANIC). **Singapore**: Labrador Nat. Reserve (Murphy,D.H.) (ANIC). **Solomon Islands**: Bellona Is. (Greenslade,P.J.M.) (ANIC); Santa Ysabel, 1000 Ships Bay opp. Lilihinia I. (Lawrence,P.N.) (ANIC); *Guadalcanal*: Kukum (Greenslade,P.) (ANIC); Mt. Austen (Greenslade,P.) (ANIC). **South Africa**: Telegraph Hill , Grahamstown, Cafe Prov. (Weatherill,L.H.) (ANIC). **Sri Lanka**: *North Central*: Ambagaswewa (Besuchet,C. & Lobl,I.) (ANIC).

Comments. This is one of the most widely distributed species within the genus, occurring from southern India east through SE Asia to Australia and onwards to the Cook Islands; it also one of the most morphologically variable (Brown, 1978). The concept of this species adopted here follows that proposed by Brown (1978). While a detailed study of the entire species, including examination of specimens from throughout its broad range, is outside the scope of this study, a preliminary analysis does not suggest obvious subdivisions and Brown's interpretation of the variation he noted as intra- rather than interspecific is accepted. Additionally, an examination of specimens from inland north Queensland which Brown flagged as possibly belonging to a separate but closely related species could not be confirmed and material from this region is treated as belong to *A. graeffei*.

Within Australia this is one of the most widely distributed and commonly encountered species, occurring from the Kimberley's eastward through the Top End and then throughout eastern Queensland south into north- eastern

New South Wales. It is most commonly encountered in rainforest habitats but also extends into dry sclerophyll woodlands. It has only rarely been found outside forested sites. Nests are generally under rocks or occasionally other objects on the ground but it is also known to nest directly in soil without covering, in termite nests and in rotten wood.

***Anochetus isolatus* Mann**
(Fig. 9)

Anochetus cato isolatus Mann, 1919: 302 (raised to species by Wilson, 1959: 508).
Anochetus rossi Donisthorpe, 1949: 747 (junior synonym of *isolatus* by Brown, 1978: 557).
Anochetus splendens Karavaiev, 1925: 289 (junior synonym of *isolatus* by Brown, 1978: 557).

Types. *Anochetus cato isolates*: Worker and male syntypes from "several small colonies" from Graciosa Bay, Santa Cruz Island, Solomon Islands (MCZC). *Anochetus rossi*: One worker and one queen syntype from Finschhafen, Papua New Guinea (CASC, images examined). *Anochetus splendens*: Holotype queen from Wammar, Aru Island, Indonesia.

Diagnosis. The distinctive shape of the petiolar node, being drawn dorsally into a narrow, blunt point, will separate this species from all others in Australia. Additionally, the pronotum is relatively narrower and the eye relatively smaller than in most other Australian species.

Worker description. Sculpturing on front of head extending slightly beyond eyes. Scapes just reaching posterolateral corners ('lobes') of head; lacking or with a few short, inclined erect hairs. Pronotum and mesonotum smooth and shining. Dorsal surface of propodeum with transverse striations which extend laterally to the level of the spiracle and propodeal lobe. Propodeal angles rounded. Metanotal groove with coarse striations. Petiolar node drawn dorsally into a narrow point, lacking sculpture. Erect hairs on hind tibiae short, scattered and inclined. Colour dark brown, petiole, gaster and legs yellow to yellow-red, antennae, mandibles and posterior corners of head slightly lighter in colour than remainder of head capsule.

Measurements. Worker (n = 5): CI 86-90; EI 12-15; EL 0.15-0.20; HL 1.39-1.72; HW 1.25-1.49; HFL 1.14-1.38; ML 1.68-1.99; MandL 0.76-0.93; MTL 0.82-1.04; PronI 53-55; PronW 0.68-0.80; SL 1.09-1.29; SI 87-91.

Material examined. **Australia**: *Queensland*: Lockerbie, Cape York (Monteith,G.B.) (ANIC); Torres Strait, Murray Is. (Heatwole,H. & Cameron,E.) (ANIC); Torres Strait, Saibai Island, nr. Saibai Village (Heatwole,H. & Cameron,E.) (ANIC). **Papua New Guinea**: *New Britain*: Valoka (Noona Dan. Exp. 61-62) (ANIC). **Solomon Islands**: *Choiseul*: Malangono (Greenslade,P.) (ANIC); *Guadalcanal*: Marau (Greenslade,P.) (ANIC); Mt. Austen (Greenslade,P.) (ANIC); *Rennell Is.*: Niupani (Noona Dan. Exp. 61-62) (ANIC); *San Cristobal*:

Wainoni Bay (Greenslade,P.J.M.) (ANIC); *Santa Cruz Islands*: Nemoavill, Lua Lua distr. (Greenslade,P.) (ANIC).

Comments. The concept of this species adopted here follows that developed by Brown (1978), noting that Brown left many questions concerning the taxonomy of this species and close relatives unanswered. The specific specimens included under Material Examined match each other very closely in sculpturing and show minimal variation in colour. However, a wide range of additional material is present in ANIC which varies from this pattern in the development of sculpturing and colour, most of which was outlined by Brown (1978). The true status of this and related species will require a detailed study of this additional material and extends beyond the scope of the current study.

This is a wide ranging species known from the Philippines south to the Solomon Islands and westward to the tip of Cape York Peninsula, Queensland. It is one of only two Australian *Anochetus* species which also occurs outside Australia. It is found in rainforest where it nests in rotten wood.

Anochetus paripungens **Brown**
(Figs 4, 10)

Anochetus paripungens Brown, 1978: 596.

Types. Holotype worker and 13 worker paratypes from Howard Springs, Darwin area, Northern Territory (holotype and 11 paratypes in MCZC, examined; 2 paratypes in ANIC, ANIC32-016009, examined).

Diagnosis. Propodeal angles produced as spines which are angled slightly posteriorly, the posterior face of the propodeum forming angle at the base of the spines; sculpture on front of head extending well beyond eyes and ending approximately half way between eyes and posterior margin; pronotum shining with scattered shallow, oval-shaped punctures; hind tibiae with semi-erect hairs restricted to the inner surfaces. This species is most similar to *A. wiesiae* but differs in having a more lightly coloured body, shallow punctures on the dorsum of the pronotum, more posteriorly directed propodeal spines, a narrower petiolar node with less angular sides, and the lack of erect hairs on the outer surfaces of the hind tibiae. It is also only known from the Top End of the Northern Territory while *A. wiesiae* occurs on coastal Queensland.

Worker description. Sculpturing on front of head extending approximately half way between the level of the eyes and posterior margin. Scapes not reaching posterolateral corners ('lobes') of head; with abundant, appressed pubescence and a limited number of erect hairs. Eyes relatively small (EL < 0.22mm). Pronotum shining and with scattered, weak, oval shaped punctures. Mesonotum smooth and shining. Anterior section of pronotum with transverse wrinkles and ridges. Propodeum with angles produced as

spines. Dorsum of propodeum rounded laterally, sculptured with coarse transverse striations and with inclined erect hairs. Metapleuron mostly smooth and shining. Dorsolateral corners of petiolar node with long spines. Hind tibiae with semierect hairs restricted to the inner surfaces. Colour brown, head, antennae and mandibles yellow-brown, legs yellow.

Measurements. Worker (n = 5): CI 90-93; EI 16-18; EL 0.19-0.21; HL 1.24-1.31; HW 1.12-1.21; HFL 1.11-1.14; ML 1.40-1.50; MandL 0.68-0.72; MTL 0.79-0.84; PronI 54-57; PronW 0.63-0.67; SL 1.04-1.11; SI 91-93.

Material examined. Australia: *Northern Territory*: Baroalba Spring (collector unknown; Taylor,R.W.; Taylor,R.W. & Feehan,J.) (ANIC); Caiman Creek, Coburg Peninsula (Weir,T.A.) (ANIC); Coconut Grove, Darwin (Angeles,T.) (ANIC); Gorge NE of Mt. Gilruth (Monteith,G.B.) (ANIC); Gove (Majer,J.D.) (ANIC); Holmes Jungle (Taylor,R.W.) (ANIC); Holmes Jungle, Berrimah (Monteith,G.B.) (ANIC); Howard River (Brown,W.L.) (ANIC); Howard Springs, nr. Darwin (Brown,W.L. & Bateman,W.) (ANIC); Kemp Airstrip, Middle Point (Monteith,G.B.) (ANIC); Litchfield Nat. Pk., nr. Florence Falls (Lowery,B.B.) (ANIC); Radon Creek, Mt. Brockman (Monteith,G.B.) (ANIC); Radon Creek, Kakadu Area (Kikkawa,J.) (ANIC); South Alligator Inn (Monteith,G.B.) (ANIC).

Comments. *Anochetus paripungens* is restricted to the Top End of the Northern Territory where it is found primarily in rainforest sites (with only a few records from savannah woodlands). Most specimens are encountered as foragers in leaf litter. Nests are in soil generally under objects, in rotten wood and in termite nests. The type series of this species was found nesting in a rotten log which it shared with an *A. graeffei* colony.

Anochetus rectangularis Mayr
(Fig. 11)

Anochetus rectangularis Mayr, 1876: 86.
Anochetus rectangularis var. *diabolus* Forel, 1915: 35 (junior synonym of *rectangularis* by Brown, 1978: 558).

Types. *A. rectangularis*: Holotype worker from Rockhampton, Queensland (NHMW). *A. rectangularis diabolus*: Holotype worker from Christmas Creek, Queensland (NHRS).

Diagnosis. Sculpture on front of head extending only slightly beyond eyes; pronotum smooth dorsally, sculptured laterally; mesonotum smooth and without sculpturing; petiolar node in side view tapering gradually to apex in the form of an inverted "V", with the striations fading towards the summit; propodeal angle sharply rounded. This species is similar to *A. turneri* but differs in having the anterior face of the petiolar node uniformly concave rather than angular. It differs from the otherwise similar *A. rufolatus* and *A. rufostenus* in the more narrowly tapering petiolar node (when viewed laterally) which lacks striations near the summit, and in the more sharply angular propodeal angle.

Worker description. Sculpturing on front of head extending slightly beyond eyes. Scapes not reaching posterolateral corners ('lobes') of head; with limited pubescence and a limited number of erect hairs. Pronotum smooth dorsally, striate laterally and anterior section with transverse wrinkles and ridge. Mesonotum smooth and shining. Dorsum of propodeum flattened, with coarse striate-rugose or striate sculpture and with inclined short hairs. Metapleuron with distinct transverse striations. Petiolar node slightly rounded laterally and moderately concave dorsally; in side view tapering gradually to V-shaped apex; weak striations fade dorsally. Hind tibiae with erect hairs limited to outer surfaces. Colour yellow-brown to dark brown, head yellow-brown, antennae, mandibles and legs yellow.

Measurements. Worker (n = 6): CI 88-91; EI 22-25; EL 0.23-0.26; HL 1.08-1.18; HW 0.95-1.06; HFL 0.89-0.99; ML 1.30-1.40; MandL 0.55-0.62; MTL 0.64-0.70; PronI 63-65; PronW 0.62-0.67; SL 0.85-0.92; SI 85-90.

Material examined. **Australia**: *New South Wales*: Bombala (Froggatt,W.W.) (ANIC); Warrah (collector unknown; Froggatt,W.W.) (ANIC); *Northern Territory*: 18 km SE Katherine (Greenslade,P.J.M.) (ANIC); 5km NNW of Cahills Crossing (Taylor,R.W.) (ANIC); Rimbija Is., Wessel Islands (Weir,T.A.) (ANIC); slopes above Baroalba Spring (Taylor,R.W.) (ANIC); Wildman R., Cashew Farm (Houston,W.) (ANIC); *Queensland*: 10 mi. S of Maryborough (Lowery,B.B.) (ANIC); 10 mi. SW of Charters Towers (Gay,F.J.) (ANIC); 14 ml. S of Maryborough (Greaves,T.) (ANIC); 2km N Rokeby (Zborowski,P. & Horak,M.) (ANIC); 5km N by E Mt. Morgan (Taylor,R.W. & Weir,T.A.) (ANIC); Brisbane (Hacker,H.) (ANIC); Charters Towers nr. airport (Lowery,B.B.) (ANIC); Homestead (Greaves,T.) (ANIC); Horne Creek, 23km N Coen (Ward,P.S.; Wild,A.L.) (ANIC); Karumba (Weatherill,L.) (ANIC); nr. Dimbulah (Taylor,R.W. & Feehan,J.E.) (ANIC); Prince of Wales Island, Torres Strait (Heatwole,H. & Cameron,E.) (ANIC); Scraggy Pt., Hinchinbrook Island (Shattuck,S.O.) (ANIC); St. George (Lowery,B.B.) (ANIC); Townsville (Wheeler,W.M.) (ANIC); Wacol, Brisbane (Lowery,B.B.) (ANIC); *Western Australia*: 18km S Roebourne (WA Dept. of Cons.) (JDMC); Ashburton Downs Station, 38km ESE Paraburdoo (WA Dept. of Cons.) (JDMC); Barrow Island (Callans,S. & Graham,R.; Callans,S. & Randall,N.) (JDMC).

Comments. *Anochetus rectangularis* is found in north-western Western Australia, the Top End of the Northern Territory and from Cape York south into at least south-eastern Queensland. There are two old collections from New South Wales made by W. W. Froggatt (ANIC), one from Warrah and the other from Bombala. Both of these sites are well south of other more modern records for this species and the Bombala site, at over 700m elevation, is far colder and wetter than any other locality known for the genus. Warrah is located much further north at approximately 500m elevation and two additional species, *A. armstrongi* and *A. graeffei*, occur in this same general area. Thus while it is likely that *A. rectangularis* does extend into northern New South Wales it is highly likely that the Bombala record is in error and the species does not occur this far south. In any event, the species has clearly reached the limit of the main part of its range by

southern Queensland and is at best rare in northern New South Wales. In northern Australia this species is currently unknown from the Kimberley Region. Whether this is a true absence or lack of collecting effort is uncertain at the present time.

Biologically, this species is found primarily in dry sclerophyll and savannah woodlands with only the occasional record from rainforest. Nests are in soil generally under rocks or logs but it is also known to nest in termite mounds as well as the unoccupied nests of *Iridomyrmex purpureus*.

Anochetus renatae **n. sp.**
(Figs 4, 7, 12)

Types. Holotype worker from Mt. Jackson, Western Australia, 1939, L. Glauert (ANIC, ANIC32- 015973); 18 paratype workers, same data as holotype except as follows: 5 workers, ANIC 32- 059571 (ANIC,), 4 workers collected by A. M. Douglas (ANIC, ANIC32- 015974), 9 workers collected by "W.A. Mus." (ANIC, ANIC32- 015972)

Diagnosis. Body generally smooth and shining with sculpture limited to between the frontal carinae and on the propodeum where it extends laterally to the level of the propodeal spiracle. This species is similar to *A. armstrongi* but differs in the more extensive sculpturing on the propodeum, the longer antennal scape (SL > 1.40mm vs. < 1.35mm), more numerous erect hairs on hind tibiae and the expanded eyes which form the outline of the head in full face view. It is also similar to *A. veronicae* but differs in the lack of teeth at the propodeal angle and in its smaller size.

Worker description. Sculpturing on front of head extending slightly beyond eyes. Scapes reaching posterolateral corners ('lobes') of head; with limited pubescence and a limited number of erect hairs. Pronotum smooth and shining, with distinct anterior ridge. Mesonotum and most of metapleuron without sculpture, smooth and shining. Dorsum of propodeum flattened laterally, sculptured with distinct transverse striations extending slightly onto metapleuron. Petiolar node in anterior view moderately concave with strongly angular lateral corners. Erect hairs on hind tibiae present on all surfaces. Colour dark yellow or yellow- brown, mandibles and legs yellow to dark yellow.

Measurements. Worker (n = 7): CI 89- 97; EI 27- 30; EL 0.32- 0.36; HL 1.12- 1.39; HW 1.06- 1.28; HFL 1.20- 1.45; ML 1.46- 1.92; MandL 0.64- 0.75; MTL 0.87- 1.03; PronI 57- 61; PronW 0.64- 0.76; SL 1.10- 1.26; SI 95- 104.

Material examined. **Australia**: *Western Australia*: Bindoon [South Bindoon] (Douglas,A.) (ANIC); Cue (Mercovich,C.T.) (ANIC); Meekatharra (Mercovich,C.) (ANIC); Mulga, NE Goldfields (Pringle,H.J.R.) (ANIC); Northam (Clark,J.) (ANIC); Weir (Clark,J.) (ANIC); Windimurra (Mercovich,C.) (ANIC).

Comments. Brown (1978) included specimens of this Western Australian species within what he considered to be *A. armstrongi*, noting that while they differed slightly in a number of characters from eastern populations of *A. armstrongi* the limited amount of material available at that time prevented the detailed analyses necessary to determine whether a single variable species was present or two distinct taxa. Because of this lack of evidence he expanded his concept of *A. armstrongi* to include this species as well. This treatment has been followed since, including by Heterick (2009). However, presently available specimens allow a more critical analysis of the characters outlined by Brown (1978) and provide evidence of additional characters of taxonomic significance. Together, these characters support the recognition of two distinct but similar taxa, *A. renatae* in Western Australia and *A. armstrongi* from South Australia eastward. Separation of these taxa is based on the more extensive development of sculpturing on the propodeum, the relatively smaller head and longer scape (Fig. 7), hairier legs and relatively larger and more bulging eyes in *A. renatae*. Taken together, and combined with biogeographic and ecological considerations, the evidence suggests that two distinct but similar taxa are involved rather than a single variable species as proposed by Brown (1987).

It is also worth noting that *A. veronicae* is morphologically similar to *A. renatae* and Brown may well have considered it to be part of his *A. armstrongi*. The justification for treating the more northern *A. veronicae* as a separate taxon from *A. renatae* is based on the more strongly developed propodeal teeth, the more lightly coloured head when compared to the mesosoma and the consistently larger size of *A. veronicae* over *A. renatae* (essentially all measurement characters are non-overlapping, and see Figs 4, 7). It is possible, however, that these two taxa actually form a cline extending from the Top End south into south-central Western Australia and the species recognised here are merely the end-points of this cline. Unfortunately the present material is allopatric and sympatric associations of these two species are missing. As with many closely related taxa, these hypotheses should be tested as additional material becomes available.

Biologically, the available details suggest that this species occurs in forested habitats such as mulga woodlands and nests under objects on the ground.

***Anochetus rufolatus* n. sp.**
(Fig. 13)

Types. Holotype worker from Lizard Island, Queensland, 26 February 1992, H. Reichel (ANIC, ANIC32-044217); two paratype workers, same data as holotype except one worker ANIC32-059572 (ANIC), one collected 25 February 1992 (ANIC, ANIC32-044218).

Diagnosis. Sculpture on front of head extending only slightly beyond eyes; pronotum smooth dorsally, sculptured laterally; mesonotum smooth and without sculpturing; petiolar node in side view narrowing only slightly dorsally and trapezoid-shaped, with the striations along its entire height;

propodeal angle gently rounded. This species is most similar to *A. rufostenus*, differing in having the dorsum of the pronotum smooth rather than sculptured, the head longer (HL > 1.11mm) and the petiolar node wider (maximum width > 0.28mm).

Worker description. Sculpturing on front of head extending slightly beyond eyes. Scapes not reaching posterolateral corners ('lobes') of head; with limited pubescence and a limited number of erect hairs. Pronotum with striations running transversely on anterior section, longitudinally on lateral surfaces, disappearing dorsally and becoming rugose posterolaterally. Mesonotum smooth and shining. Dorsum of propodeum slightly flattened and with coarse striate-rugose sculpture; majority of hairs only slightly raised above the underlying surface. Propodeal angles rounded. Metapleuron with coarse striations. Petiolar node robust with thick, truncate apex and sculptured with transverse striations. Erect hairs on hind tibiae limited to the outer surfaces. Colour dark brown, head and legs yellow-brown, antennae and mandibles yellow.

Measurements. Worker (n = 3): CI 78-91; EI 20-24; EL 0.21-0.26; HL 1.12-1.21; HW 0.87-1.10; HFL 0.96-1.08; ML 1.35-1.46; MandL 0.58-0.63; MTL 0.67-0.75; PronI 62-75; PronW 0.65-0.70; SL 0.85-0.98; SI 88-98.

Comments. This rare species is known from a single locality, Lizard Island, a small island located approximately 30km from the Queensland mainland. Nothing is known of its biology.

***Anochetus rufostenus* n. sp.**
(Fig. 14)

Types. Holotype worker from Hann River, Queensland, 15 September – 20 October 1993, P. Zborowski & D. Rentz (ANIC, ANIC32-031115); one paratype worker from Weipa, Queensland, July 1982, J. D. Majer (ANIC, ANIC32-015833).

Diagnosis. Sculpture on front of head extending only slightly beyond eyes; pronotum longitudinally striate both dorsally and laterally; mesonotum smooth and without sculpturing; petiolar node in side view narrowing only slightly dorsally and trapezoid-shaped, with the striations along its entire height; propodeal angle gently rounded. This species is most similar to *A. rufolatus* but differs in having the dorsum of the pronotum longitudinally striate rather than smooth, the head shorter (HL < 1.04mm) and the petiolar node narrower (maximum width < 0.28mm).

Worker description. Sculpturing on front of head extending slightly beyond eyes. Scapes not reaching posterolateral corners ('lobes') of head; with limited pubescence and a limited number of erect hairs. Pronotum with distinct longitudinal striations grading into striate-rugose sculpturing posterolaterally. Anterior section of pronotum with transverse wrinkles followed by a distinct ridge. Mesonotum smooth and shining. Dorsum of

propodeum slightly flattened laterally, with coarse striate- rugose sculpture and the majority of hairs strongly inclined. Propodeal angles rounded. Metapleuron with coarse striations. Petiolar node robust with thick, truncate apex; with transverse striations. Erect hairs on hind tibiae limited to the outer surfaces. Colour brown, head and legs yellow- brown, antennae and mandibles yellow.

Measurements. Worker (n = 2): CI 90- 95; EI 23- 24; EL 0.21- 0.23; HL 1.02- 1.03; HW 0.92- 0.97; HFL 0.85- 0.88; ML 1.26- 1.32; MandL 0.54- 0.56; MTL 0.59- 0.61; PronI 64- 64; PronW 0.59- 0.62; SL 0.78- 0.80; SI 82- 84.

Comments. This rare species has been encountered a limited number of times on Cape York Peninsula, Queensland. Available material is from pitfall traps placed in savannah woodlands.

***Anochetus turneri* Forel**
(Fig. 15)

Anochetus turneri Forel, 1900a: 55.
Anochetus turneri var. *latunei* Forel, 1915: 35 (junior synonym of *turneri* by Brown, 1978: 559).

Types. *A. turneri*: Syntype workers from Mackay, Queensland (1 worker in ANIC, examined; additional workers in MHNG). *A. turneri latunei*: Holotype worker from Yarrabah, Queensland (NHRS, examined).

Diagnosis. Sculpture on front of head extending only slightly beyond eyes; pronotum smooth dorsally, sculptured laterally; mesonotum with transverse striations which extend onto the dorsal surface of the propodeum, and never smooth; anterior face of petiolar node swollen basally and with a distinct angle near mid- height. The sculptured mesonotum and unique shape of the petiolar node will separate this taxon from all other Australian species.

Worker description. Sculpturing on front of head extending slightly beyond eyes. Scapes not reaching posterolateral corners ('lobes') of head; with abundant pubescence and a limited number of erect hairs. Pronotum smooth and shining, with anterior and lateral surfaces striate. Dorsum of propodeum rounded laterally, without defined posterolateral angles and with erect hairs. Mesonotum, propodeum and metapleuron covered with distinct transverse striations. Petiolar node rounded dorsally and in lateral view with the base swollen and an angle near mid- height. Hind tibiae with only a few erect hairs. Colour dark brown, head, mandibles and legs brown, antennae yellow- brown.

Measurements. Worker (n = 5): CI 94- 97; EI 20- 21; EL 0.28- 0.29; HL 1.45- 1.48; HW 1.36- 1.42; HFL 1.26- 1.28; ML 1.70- 1.85; MandL 0.78- 0.81; MTL 0.95- 0.97; PronI 58- 62; PronW 0.79- 0.88; SL 1.17- 1.21; SI 82- 86.

Material examined. **Australia:** *Queensland* : Mackay (Turner) (ANIC); Missionary Bay, Hinchinbrook Island (Taylor,R.W.) (ANIC); Prince of Wales Island, Torres Strait (Heatwole,H. & Cameron,E.) (ANIC); Water Park Creek, Byfield (Monteith,G.B.) (ANIC); West Claudie River, Iron Range (Monteith,G.B. & Cook,D.) (ANIC).

Comments. *Anochetus turneri* , while relatively broadly distributed from the tip of Cape York Peninsula south to approximately Rockhampton, is uncommonly collected. It has been found in rainforest and mangrove habitats in litter samples.

Anochetus veronicae **n. sp.**
(Figs 4, 7, 16)

Types. Holotype worker from 18km E The Granites, Tanami Desert, Northern Territory, 19 March 1987, S.R. Morton & P.J.M. Greenslade (ANIC, ANIC32- 015875); two paratype workers, same data as holotype (ANIC, ANIC32- 059586).

Diagnosis. Propodeal angles produced as spines; sculpture on front of head extending only slightly beyond eyes; body small (HL < 1.62mm, HW < 1.44mm); scape relatively short (SL < 1.50mm); mesonotum smooth, lacking rugae or striations. This species is similar to *A. alae* but differs in being smaller and with a shorter scape, having the mesonotum smooth and the sides of the propodeum with course striations, and with reduced pubescence on the scapes. It can be separated from the otherwise similar *A. renatae* by the presence of teeth at the propodeal angle and in its larger size.

Worker description. Sculpturing on front of head extending slightly beyond eyes. Scapes surpassing posterolateral corners ('lobes') of head; with limited pubescence and numerous erect hairs. Pronotum smooth and shining with very weak, faded striations laterally. Anterior section of pronotum with transverse wrinkles and ridges. Mesonotum smooth and shining. Propodeum with angles produced as spines. Dorsum of propodeum rounded, sculptured with coarse transverse striations; erect hairs present. Metapleuron with coarse striations. Petiolar node with apical margin more or less concave and produced lateral as corners. Erect hairs on hind tibiae present on all surfaces. Colour from yellow- brown to brown, head from yellow to yellow- brown, antennae, mandibles and legs yellow.

Measurements. Worker (n = 8): CI 88- 91; EI 26- 30; EL 0.36- 0.41; HL 1.52- 1.61; HW 1.35- 1.43; HFL 1.69- 1.78; ML 2.01- 2.16; MandL 0.74- 0.88; MTL 1.18- 1.25; PronI 58- 61; PronW 0.79- 0.85; SL 1.40- 1.48; SI 102- 105.

Material examined. **Australia:** *Northern Territory* : 23mi. SE Newcastle Waters (Greaves,T.) (ANIC); Darwin (Hill,G.F.) (ANIC); Johnstons Lagoon [Johnston Lagoon] (Greaves,T.) (ANIC); *Western Australia* : 12- 20mi. SSW Kalumburu Mission, King Edward River, N Kimberley (Leutert,W.) (ANIC); 23

mi. SSE of Roy Hill H.S. (McInnes & Dowse) (ANIC); Kimberley area nr. Kalumburu Mission (<5 mi.) (Leutert,W.) (ANIC).

Comments. *Anochetus veronicae* is the only species within the genus to invade the drier desert regions of northern Australia. However, even here the limited biological information suggests that it occurs in open woodlands, similar to the forest preferences shown by most other species.

***Anochetus victoriae* n. sp.**
(Fig. 17)

Types. Holotype worker from 9km WbyN of Mt. Tozer, Queensland, 28 June – 16 July 1986, T.A. Weir, heath country (ANIC, ANIC32- 015982); one paratype worker from 3km W Batavia Downs, Queensland, 16 September – 24 October 1992, P. Zborowski & T. A. Weir (ANIC, ANIC32- 042981).

Diagnosis. Sculpturing on front of head distinct long striations which extend to the posterior margin; dorsum of pronotum with longitudinal striations; eyes relatively large (EL > 0.22mm). This species, together with *A. graeffei*, are the only Australian species with sculpturing that extends to the posterior margin of the head when viewed in full face view. *Anochetus victoriae* can be separated from *A. graeffei* by the larger eye (EL > 0.22mm vs. < 0.16mm) and the longitudinal striations rather than rugulose sculpturing on the dorsum of the pronotum.

Worker description. Front of head with distinct long striations which extend to the posterolateral margin of head. Scapes not reaching posterolateral corners ('lobes') of head; with limited pubescence and a limited number of erect hairs. Pronotum with distinct longitudinal striations transitioning to striate- rugose sculpturing anteriorly and posterolaterally. Mesonotum smooth and shining. Dorsum of propodeum slightly flattened with coarse striate- rugose sculpture and the majority of erect hairs inclined. Propodeal angles rounded. Metapleuron with coarse striations. Petiolar node robust with thick, truncate apex and sculptured with transverse striations. Erect hairs on hind tibiae limited to the outer surfaces. Colour dark brown, head and legs brown, antennae, mandibles and tarsi yellow.

Measurements. Worker (n = 2): CI 91- 94; EI 24- 24; EL 0.23- 0.23; HL 1.01- 1.08; HW 0.95- 0.98; HFL 0.86- 0.92; ML 1.25- 1.35; MandL 0.54- 0.58; MTL 0.62- 0.68; PronI 63- 64; PronW 0.61- 0.62; SL 0.81- 0.88; SI 86- 90.

Comments. This species is known from two collections from northern Cape York Peninsula. Both are from heath habitats and specimens were recovered from traps.

***Anochetus wiesiae* n. sp.**
(Figs 4, 18)

Types. Holotype worker from Hinchinbrook Island, Gayundah Creek, Queensland, 18°22'S, 146°13'E, 10m, 10 November 1984, Davies, Thompson & Gallon, rainforest, sieved litter (ANIC, ANIC32- 015931); four paratype workers, same data as holotype except ANIC32- 059595 (ANIC); one paratype worker, same data as holotype except 11 November 1984 (ANIC, ANIC32- 015938); three paratype workers, same data as holotype except 9 November 1984 (ANIC, ANIC32- 015832); one paratype worker, same data as holotype except 8 November 1984, Monteith, Davies, Thompson & Gallon (ANIC, ANIC32- 015933).

Diagnosis. Propodeal angles produced as spines which are angled slightly anteriorly; sculpture on front of head extending well beyond eyes, extending approximately half way between the level of the eyes and posterior margin ; pronotum smooth and shining; erect hairs on hind tibiae present on all surfaces. This species differs from the otherwise similar *A. paripungens* in the darker body colour, lack of shallow punctures on the pronotum, more anteriorly directed propodeal spines, slightly broader and flatter dorsal propodeal face, broader petiolar node with more strongly angled sides, and the presence of erect hairs on the hind tibiae. It is also only known from Hinchinbrook Island, Queensland while *A. paripungens* occurs in the Top End of the Northern Territory.

Worker description. Sculpturing on front of head extending approximately half way between the level of the eyes and posterior margin. Scapes not reaching posterolateral corners ('lobes') of head; with abundant, appressed pubescence and a limited number of erect hairs. Eyes relatively small (EL < 0.22mm). Pronotum and mesonotum smooth and shining. Anterior section of pronotum with transverse wrinkles and ridges. Dorsum of propodeum rounded laterally, sculptured with coarse transverse ridges; erect hairs present. Propodeal spines strongly produced and pointed anteriorly. Metapleuron mostly smooth and shining. Dorsolateral corners of petiolar node with very long spines. Erect hairs on hind tibiae present on all surfaces. Colour dark brown- black, head brown, antennae, mandibles and legs brown- yellow.

Measurements. Worker (n = 5): CI 90- 92; EI 16- 17; EL 0.19- 0.21; HL 1.30- 1.33; HW 1.17- 1.22; HFL 1.15- 1.21; ML 1.51- 1.53; MandL 0.72- 0.77; MTL 0.84- 0.85; PronI 56- 59; PronW 0.66- 0.71; SI 91- 97; SL 1.09- 1.13.

Material examined. Australia: *Queensland* : Hinchinbrook Island, Gayundah Creek (Monteith, Thompson & Cook) (ANIC); Scraggy Pt., Hinchinbrook Island (Shattuck, S.O.) (ANIC).

Comments. *Anochetus wiesiae* appears to be endemic to Hinchinbrook Island where it occurs in rainforest habitats. Most collections have been from sieved leaf litter but one is reported from pyrethrum knockdown. Whether this last collection represents arboreal foraging (unlikely) or by-catch (more likely) remains to be confirmed.

Acknowledgements
The comments of Brian Heterick on a draft of this manuscript were most welcome. This project was supported by CSIRO Sustainable Ecosystems and the Taxonomic Research and Information Network (a Commonwealth of Australia- funded initiative).

References

Andersen, A.N. (2000) *The ants of northern Australia, a guide to the monsoonal fauna*. CSIRO Publishing, Collingwood, Victoria. 106 pp.

Barlow, B.A. (1985) A revised natural regions map for Australia. *Brunonia*, 8, 387–392.

Bolton, B., Alpert, G., Ward, P.S. & Naskrecki, P. (2006) *Bolton's Catalogue of Ants of the World: 1758–2005*. Harvard University Press, Cambridge, Massachusetts (CD- ROM).

Bingham, C.T. (1903) *The fauna of British India, including Ceylon and Burma*. Hymenoptera 2, Ants and Cuckoo- Wasps: 506 pp. London.

Brown, W.L.,Jr. (1976) Contributions toward a reclassification of the Formicidae. Part 6. Ponerinae, tribe Ponerini, subtribe Odontomachiti. Section A. Introduction, subtribal characters, genus *Odontomachus*. *Studia Entomologica* (N.S.), 19, 67–171.

Brown, W.L.,Jr. (1978) Contributions toward a reclassification of the Formicidae. Part 6. Ponerinae, tribe Ponerini, subtribe Odontomachiti. Section B. Genus *Anochetus* and bibliography. *Studia Entomologica* (N.S.), 20, 549–652.

Brady, S.G., Schultz, T.R., Fisher, B.L. & Ward, P.S. (2006) Evaluating alternative hypotheses for the early evolution and diversification of ants. *Proceedings of the National Academy of Sciences U.S.A.,* 103, 18172–18177.

Donisthorpe, H. (1949) A sixth instalment of the Ross Collection of ants from New Guinea. *Annals and Magazine of Natural History*, (12) 1 (1948), 744–759.

Emery, C. (1889) Viaggio di Leonardo Fea in Birmania e regioni vicine. 20. Formiche di Birmania e del Tenasserim raccolte da Leonardo Fea (1885- 87). *Annali del Museo Civico di Storia Naturale di Genova*, (2)**7**[27], 485–520.

Emery, C. (1897) Formicidarum species novae vel minus cognitae in collectione Musaei Nationalis Hungarici, quas in Nova Guinea, colonia germanica, collegit L. Biró. *Természetrajzi Füzetek*, 20, 571–599.

Emery, C. (1911) In Wytsman, P. *Genera Insectorum*. Hymenoptera, Fam. Formicidae, subfam. Ponerinae. Fasc. **118**, 124 pp. Bruxelles.

Fisher, B.L. & Smith, M.A. (2008) A revision of Malagasy species of *Anochetus* Mayr and *Odontomachus* Latreille. *PLoSONE*, 3(5), 1–23.

Forel, A. (1900a) Ponerinae et Dorylinae d'Australie. Récoltés par MM. Turner, Froggatt, Nugent, Chase, Rothney, J.- J. Walker, etc. *Annales de la Société Entomologique de Belgique*, 44, 54–77.

Forel, A. (1900b) Les formicides de l'Empire des Indes et de Ceylan. Part 6. 3me sous famille Ponerinae. *Journal of the Bombay Natural History Society*, 13, 52–65.

Forel, A. (1915) Results of Dr. E. Mjöberg's Swedish scientific expeditions to Australia, 1910- 1913. 2. Ameisen. *Arkiv för Zoologi*, 9(16), 1–119.
Guénard, B. (2011) Ant genera of the world. http://www.antmacroecology.org/ant_genera/Calyptomyrmex.php (visited 17 June 2011).
Heterick, B.E. (2009) A guide to the ants of south- western Australia. *Records of the Western Australian Museum Supplement*, 76, 1–206.
Karavaiev, V. (1925) Ponerinen aus dem Indo- Australischen Gebiet (Schluss). *Konowia*, 4, 276–296.
Mann, W.M. (1919) The ants of the British Solomon Islands. *Bulletin of the Museum of Comparative Zoology at Harvard College*, 63, 273–391.
Mayr, G. (1861). Die europäischen Formiciden. Nach der analytischen Methode bearbeitet. Wien: C. Gerolds Sohn. 80 pp.
Mayr, G. (1870) Neue Formiciden. *Verhandlungen der k.k. Zoologisch- Botanischen Gesellschaft in Wien*, 20, 939–996.
Mayr, G. (1876) Die australischen Formiciden. *Journal des Museum Goddefroy*, (4)12, 56–115.
Mayr, G. (1879) Beiträge zur Ameisen- Fauna Asiens. *Verhandlungen der k.k. Zoologisch- Botanischen Gesellschaft in Wien*, 28(1878), 645–686.
McAreavey, J.J. (1949) Australian Formicidae. New genera and species. *Proceedings of the Linnean Society of New South Wales*, 74, 1–25.
Ouellette, G.D., Fisher, B.L. & Girman, D.J. (2006) Molecular systematics of basal subfamilies of ants using 28S rRNA. *Molecular Phylogenetics and Evolution*, 40, 359–369.
Shattuck, S.O. (1999) Australian ants. Their biology and identification. *Monographs on Invertebrate Taxonomy*, 3, 1–226.
Stitz, H. (1925) Ameisen von den Philippinen, den malayischen und ozeanischen Inseln. *Sitzungsberichte der Gesellschaft Naturforschender Freunde zu Berlin*, 1923, 110–136.
Wilson, E.O. (1959) Studies on the ant fauna of Melanesia. 5. The tribe Odontomachini. *Bulletin of the Museum of Comparative Zoology at Harvard College*, 120, 483–510.

Figure captions

FIGURE 1. Foraging *Anochetus* workers from Queensland. A. *A. graeffei* (S. Shattuck); B. *A. rufolatus* (A. Wild).

FIGURE 2. *Anochetus* species richness within Australia. This is primarily a tropical group with the greatest diversity in tropical Far North Queensland and extending south along the east coast. Only single species have expanded into southern regions, *A. armstrongi* in eastern Australia and the morphologically similar *A. renatae* in the west.

FIGURE 3. *Anochetus alae* (Cairns North, Queensland, holotype, ANIC32-013813): A. Front of head; B. Side of body; C. Top of body; D. Distribution of material examined.

FIGURE 4. Scape length versus head width for *A. alae*, *A. renatae*, *A. paripungens*, *A. veronicae* and *A. wiesiae*.

FIGURE 5. *Anochetus armstrongi* (20 km WSW of Eungella, Queensland, ANIC32-015873): A. Front of head; B. Side of body; C. Top of body; D. Distribution of material examined.

FIGURE 6. *Anochetus avius* (Walsh Point, Admiralty Gulf, Western Australia, holotype, ANIC32-044213): A. Front of head; B. Side of body; C. Top of body; D. Distribution of material examined.

FIGURE 7. A. Eye length versus head width for *A. armstrongi*, *A. avius*, *A. renatae* and *A. veronicae*; B. Scape length versus head width for *A. armstrongi*, *A. avius*, *A. renatae* and *A. veronicae*.

FIGURE 8. *Anochetus graeffei* (1 km N of Rounded Hill, Queensland, ANIC32-016043): A. Front of head; B. Side of body; C. Top of body; D. Distribution of material examined.

FIGURE 9. *Anochetus isolatus* (Torres Strait, Saibai Island, nr. Saibai Village, Queensland, ANIC32-016928): A. Front of head; B. Side of body; C. Top of body; D. Distribution of material examined.

FIGURE 10. *Anochetus paripungens* (Baroalba Spring, Northern Territory, ANIC32-015892): A. Front of head; B. Side of body; C. Top of body; D. Distribution of material examined.

FIGURE 11. *Anochetus rectangularis* (5km N by E Mt. Morgan, Queensland, ANIC32-015829): A. Front of head; B. Side of body; C. Top of body; D. Distribution of material examined.

FIGURE 12. *Anochetus renatae* (Mulga, NE Goldfields, Western Australia, ANIC32-029652): A. Front of head; B. Side of body; C. Top of body; D. Distribution of material examined.

FIGURE 13. *Anochetus rufolatus* (Lizard Island, Queensland, holotype, ANIC32-044217): A. Front of head; B. Side of body; C. Top of body; D. Distribution of material examined.

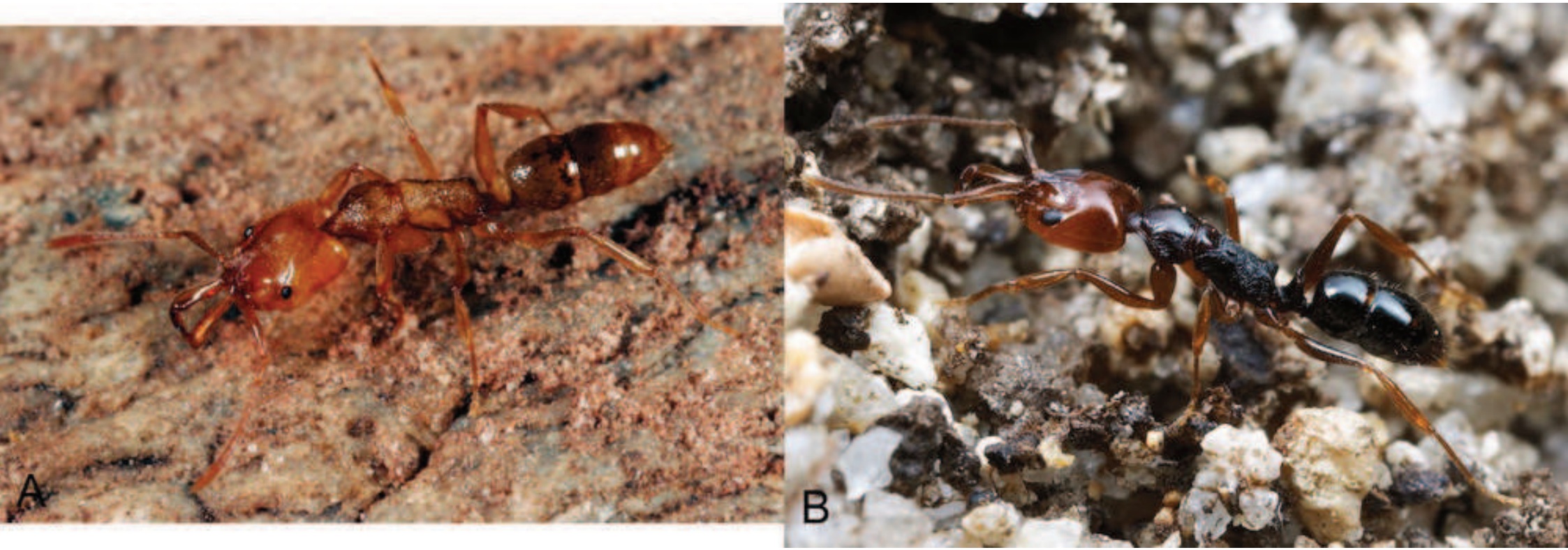
FIGURE 14. *Anochetus rufostenus* (Hann River, Queensland, holotype, ANIC32-031115): A. Front of head; B. Side of body; C. Top of body; D. Distribution of material examined.

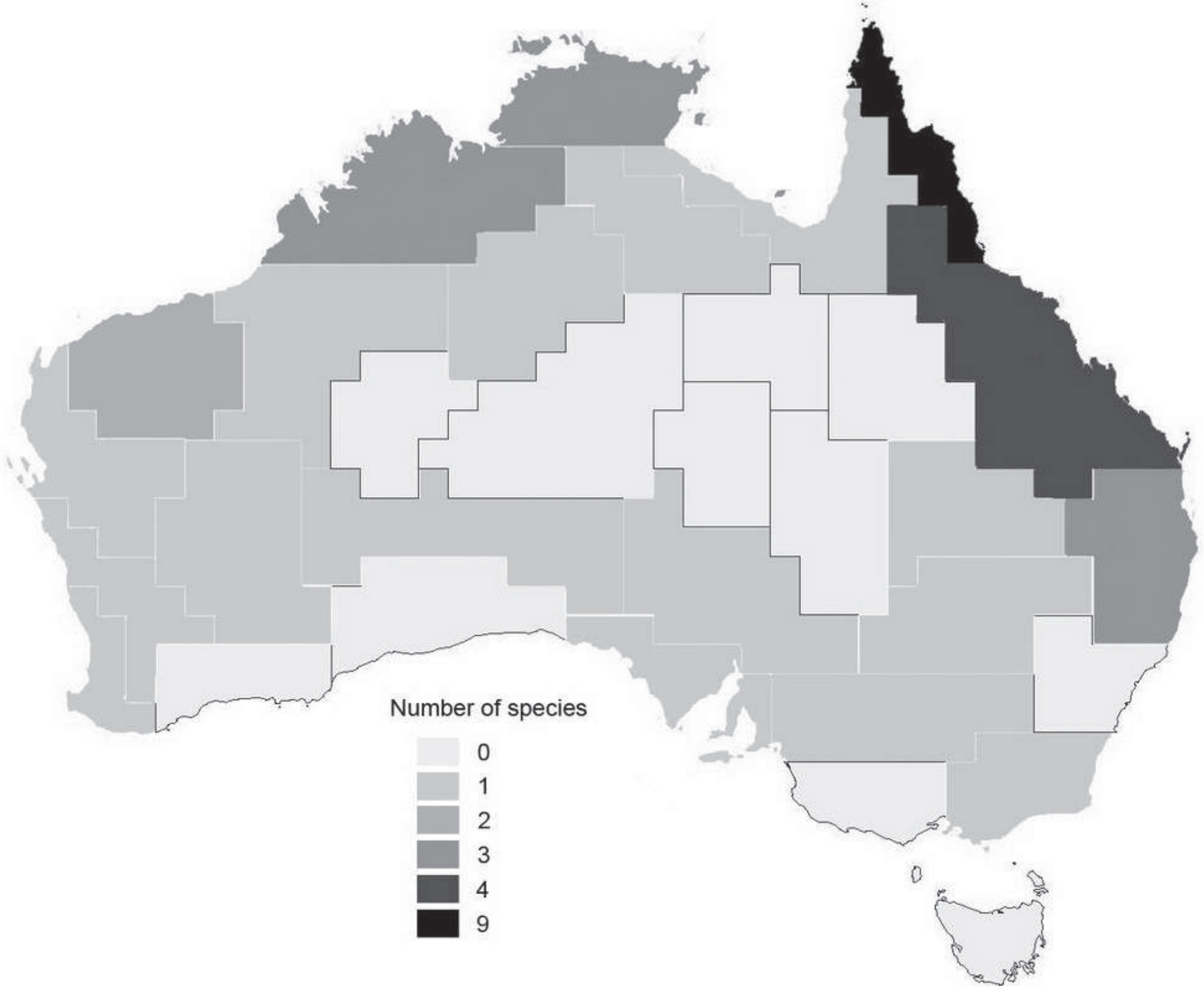
FIGURE 15. *Anochetus turneri* (West Claudie River, Iron Range, Queensland, ANIC32-015816): A. Front of head; B. Side of body; C. Top of body; D. Distribution of material examined.

FIGURE 16. *Anochetus veronicae* (18km E The Granites, Tanami Desert, Northern Territory, holotype, ANIC32-015875): A. Front of head; B. Side of body; C. Top of body; D. Distribution of material examined.

FIGURE 17. *Anochetus victoriae* (9km W by N of Mt. Tozer, Queensland, holotype, ANIC32-015982): A. Front of head; B. Side of body; C. Top of body; D. Distribution of material examined.

FIGURE 18. *Anochetus wiesiae* (Hinchinbrook Is., Gayundah Ck., Queensland, holotype, ANIC32-015931): A. Front of head; B. Side of body; C. Top of body; D. Distribution of material examined.


A
B

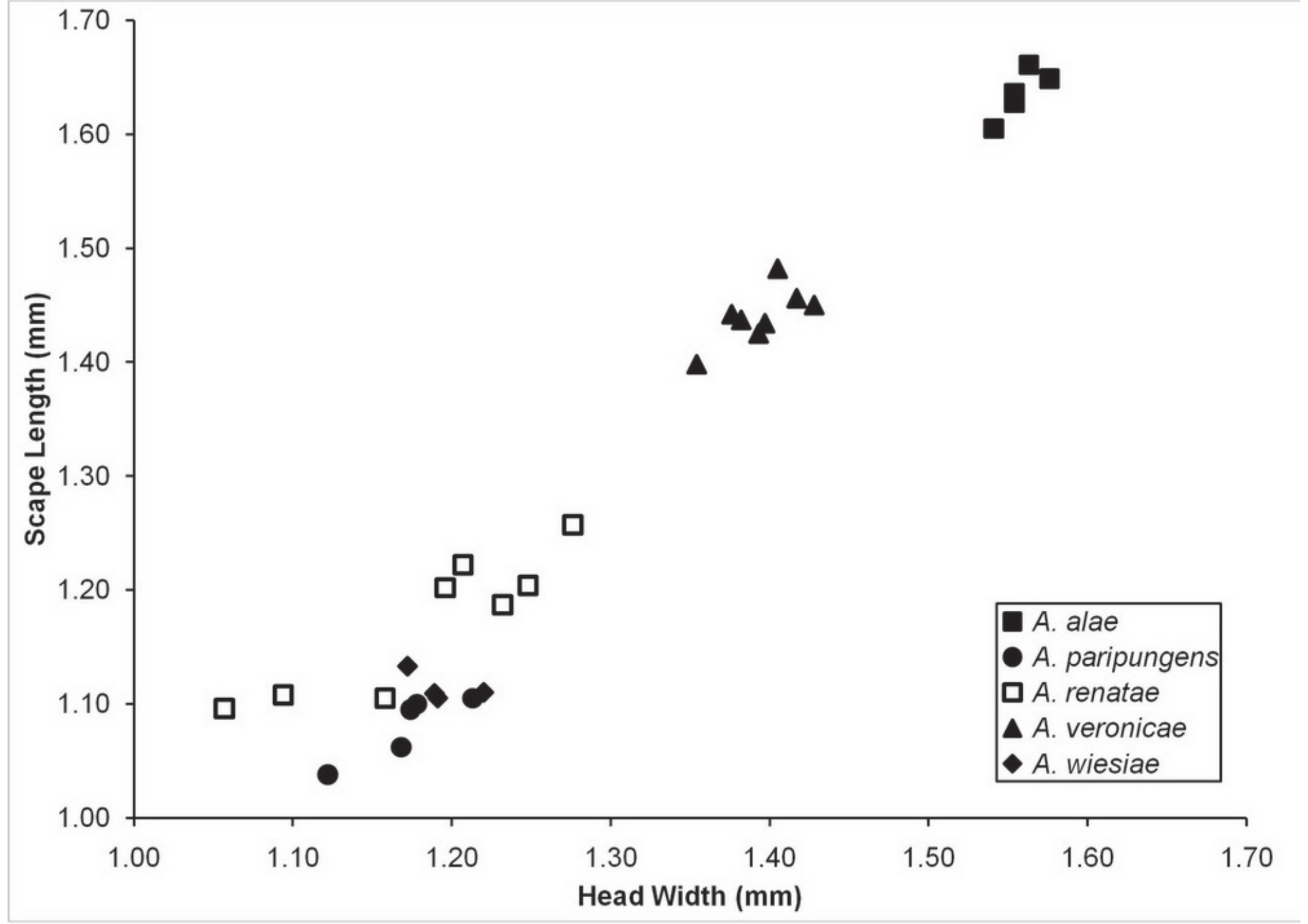

Number of species
0
1
2
3
4
9


A
1 mm


B
1 mm

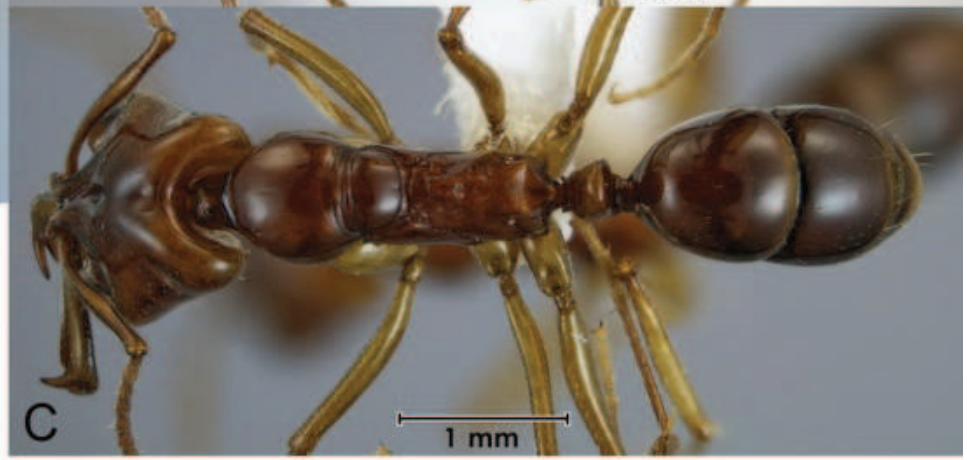

C
1 mm


D


1.70
1.60
1.50
1.40
1.30
1.20
1.10
1.00
Scape Length (mm)
1.00
1.10
1.20
1.30
1.40
1.50
1.60
1.70
Head Width (mm)
A. alae
A. paripungens
A. renatae
A. veronicae
A. wiesiae

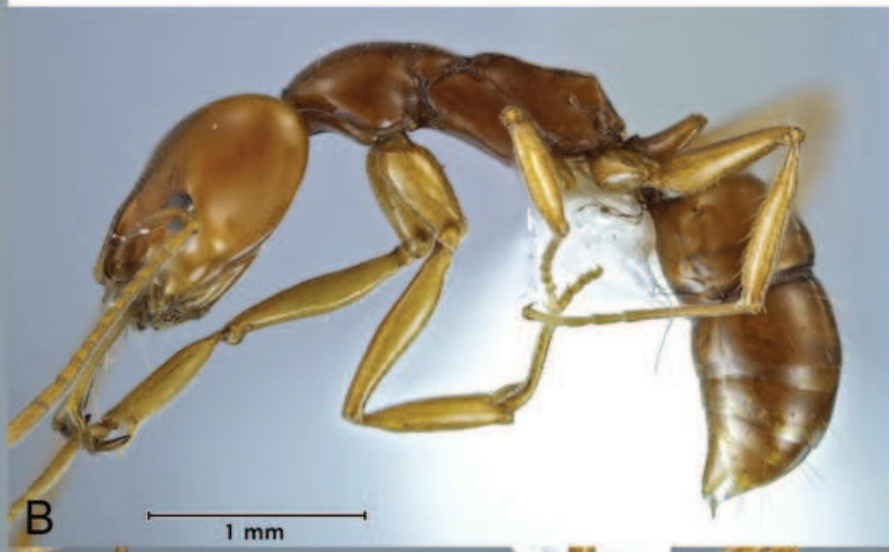

A
0.5 mm

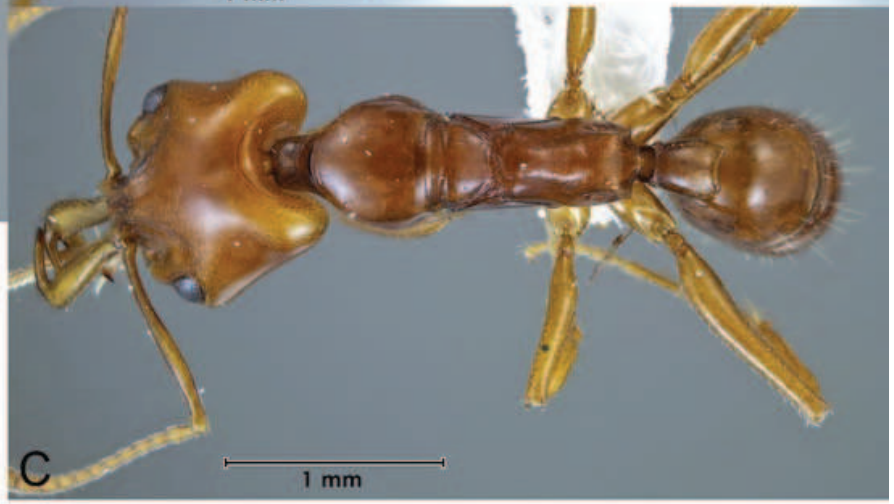

B
1 mm


C
1 mm

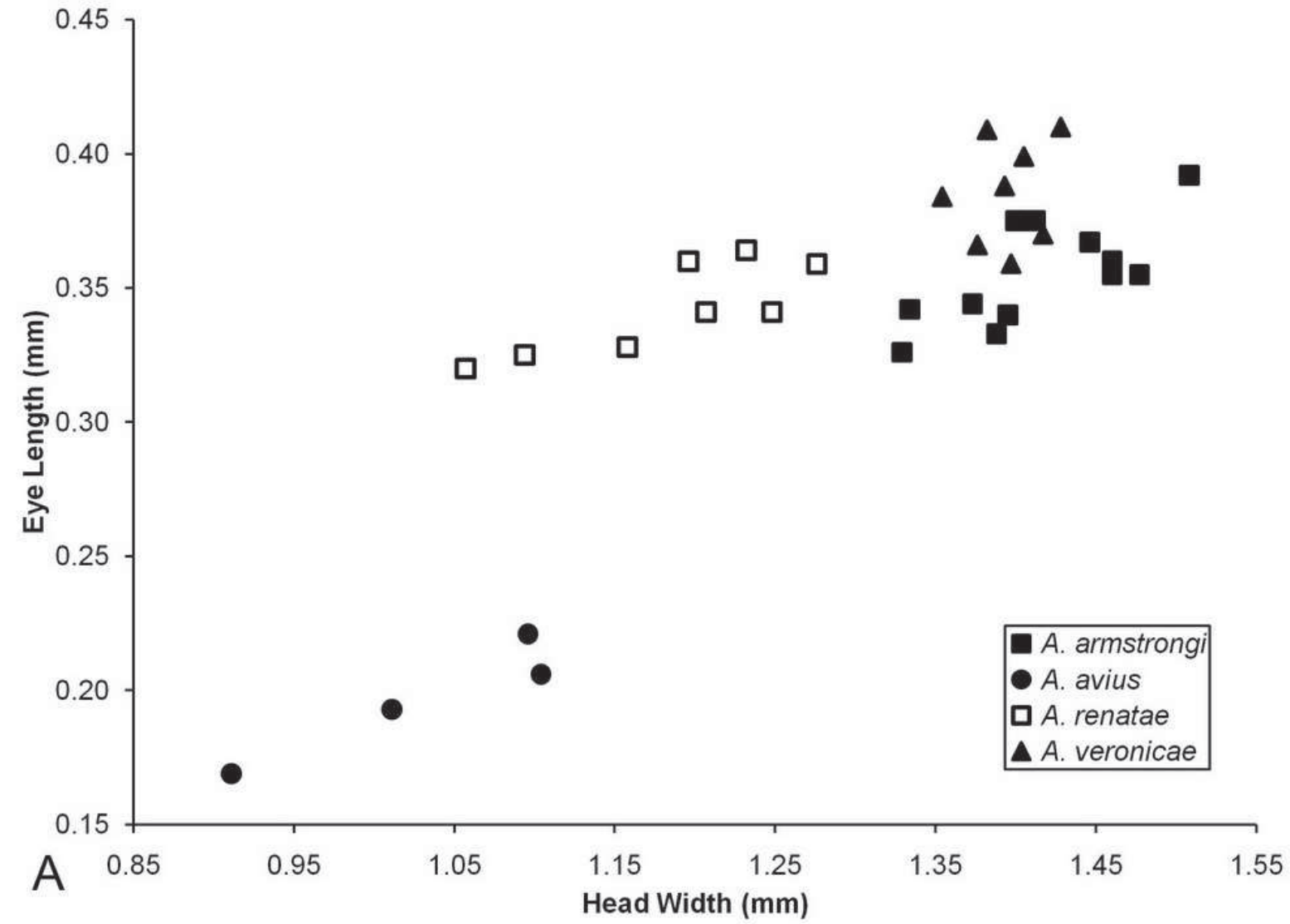

D

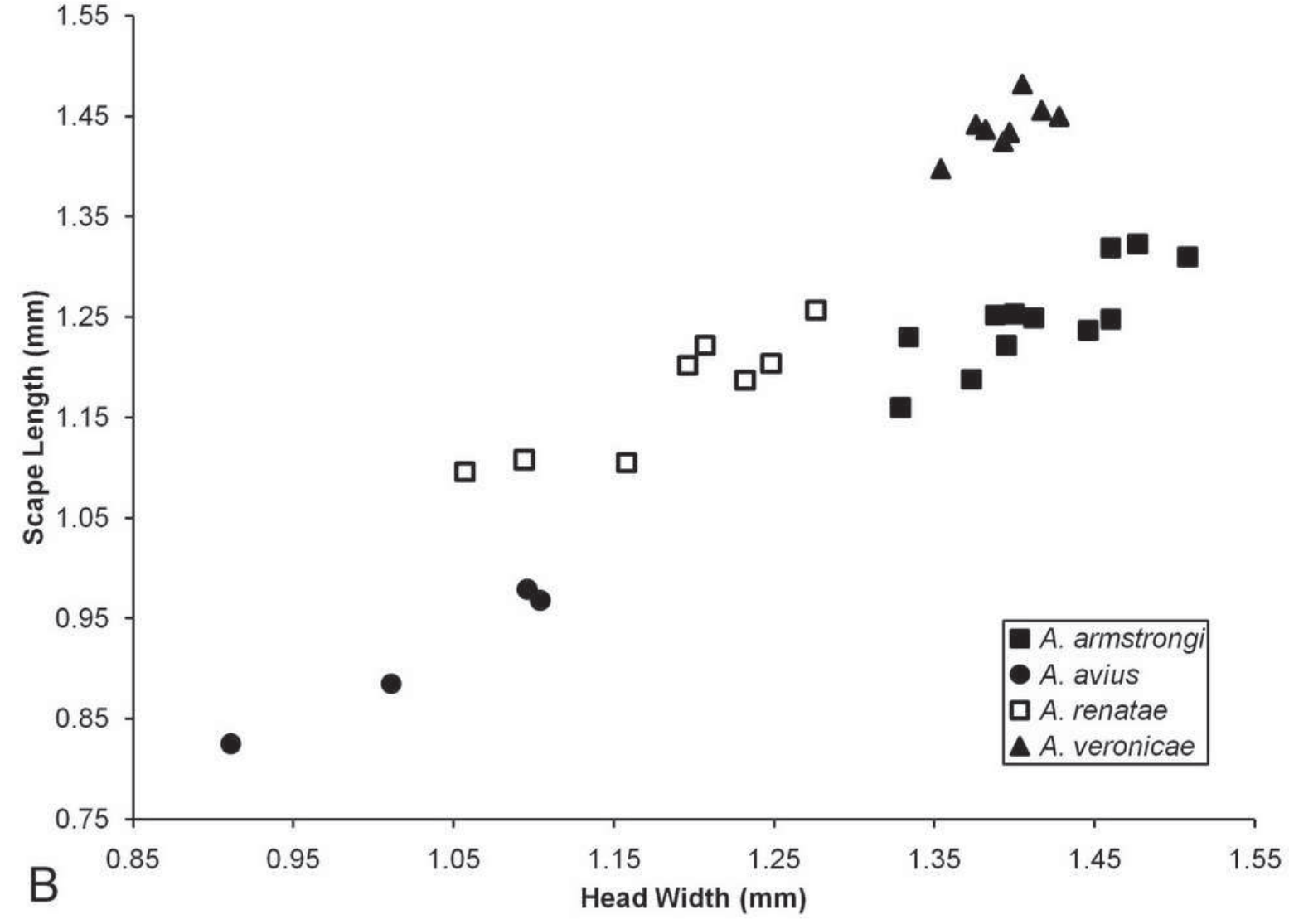

A
0.5 mm

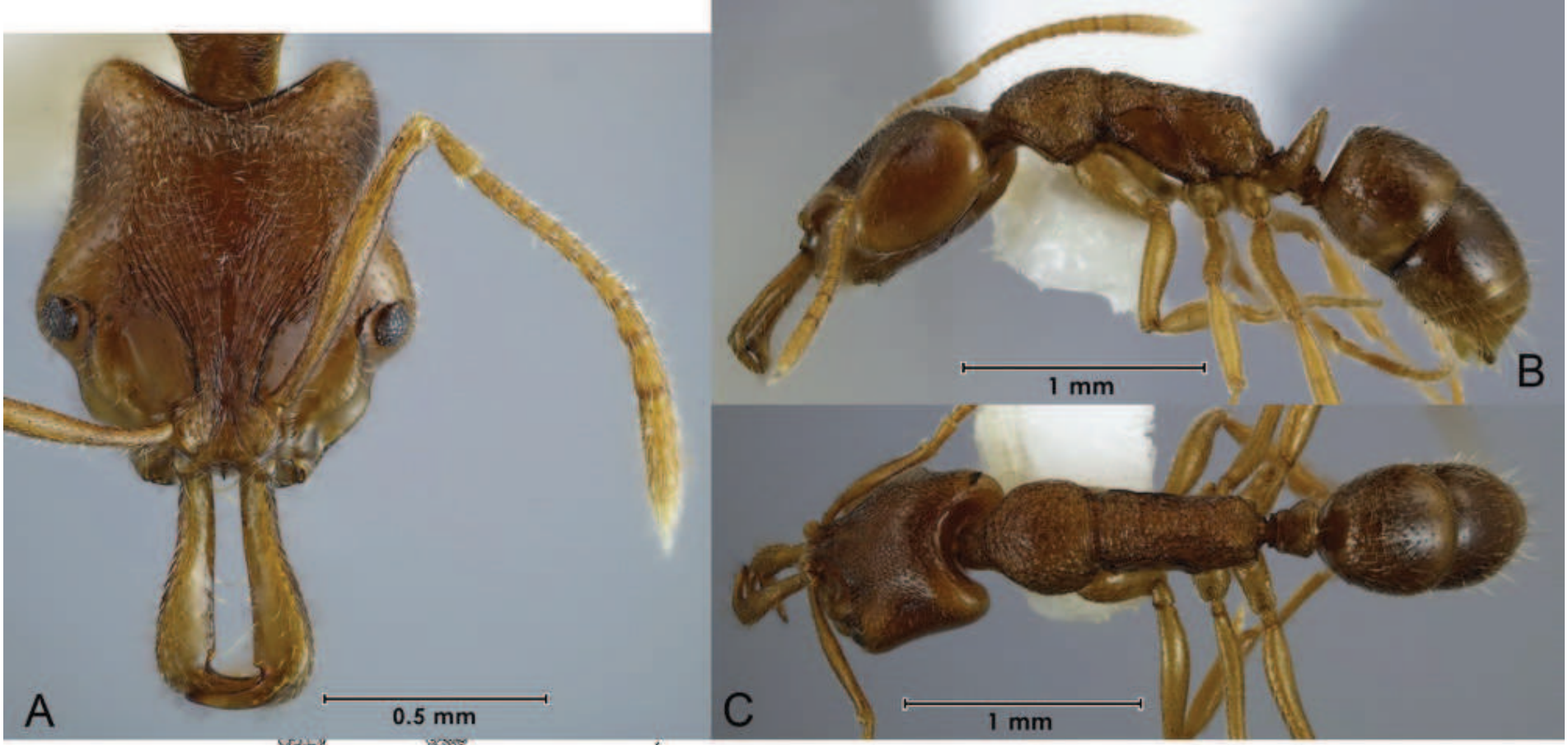

B
1 mm

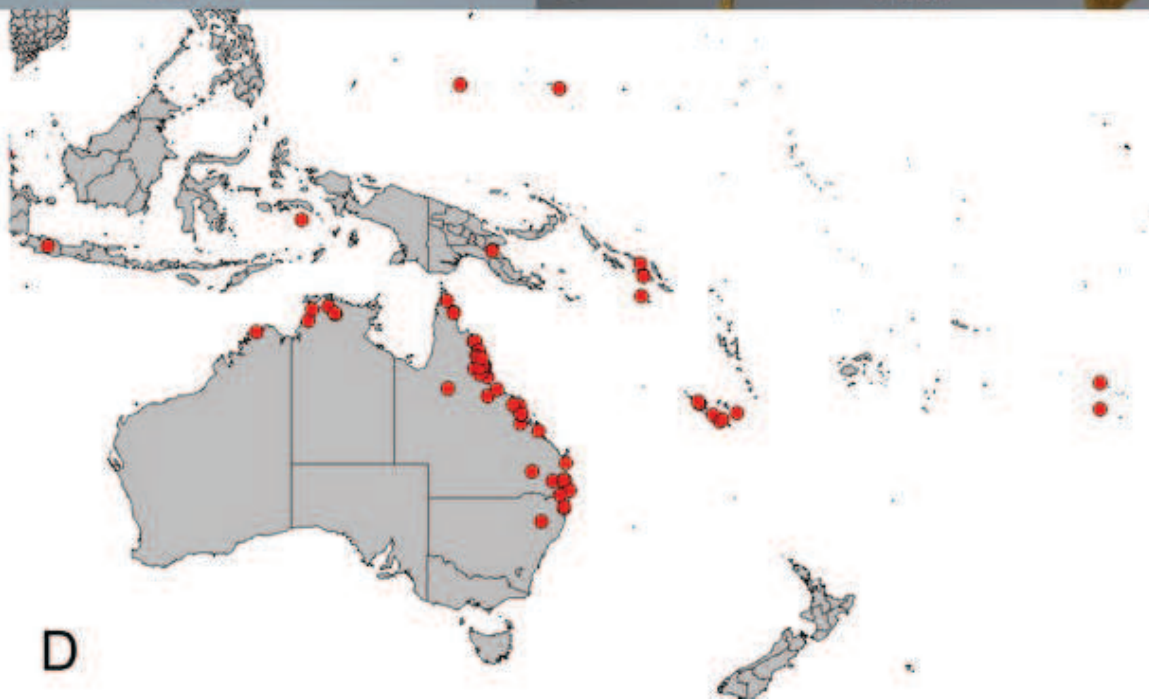

C
1 mm


D


0.45
0.40
0.35
0.30
0.25
0.20
0.15
Eye Length (mm)
0.85
0.95
1.05
1.15
1.25
1.35
1.45
1.55
Head Width (mm)
A. armstrongi
A. avius
A. renatae
A. veronicae
A


1.55
1.45
1.35
1.25
1.15
1.05
0.95
0.85
0.75
Scape Length (mm)
0.85
0.95
1.05
1.15
1.25
1.35
1.45
1.55
Head Width (mm)
A. armstrongi
A. avius
A. renatae
A. veronicae
B


A
0.5 mm
B
1 mm
C
1 mm


D


A
1 mm


1 mm
B


C
1 mm


D


A
0.5 mm


1 mm
B


1 mm
C

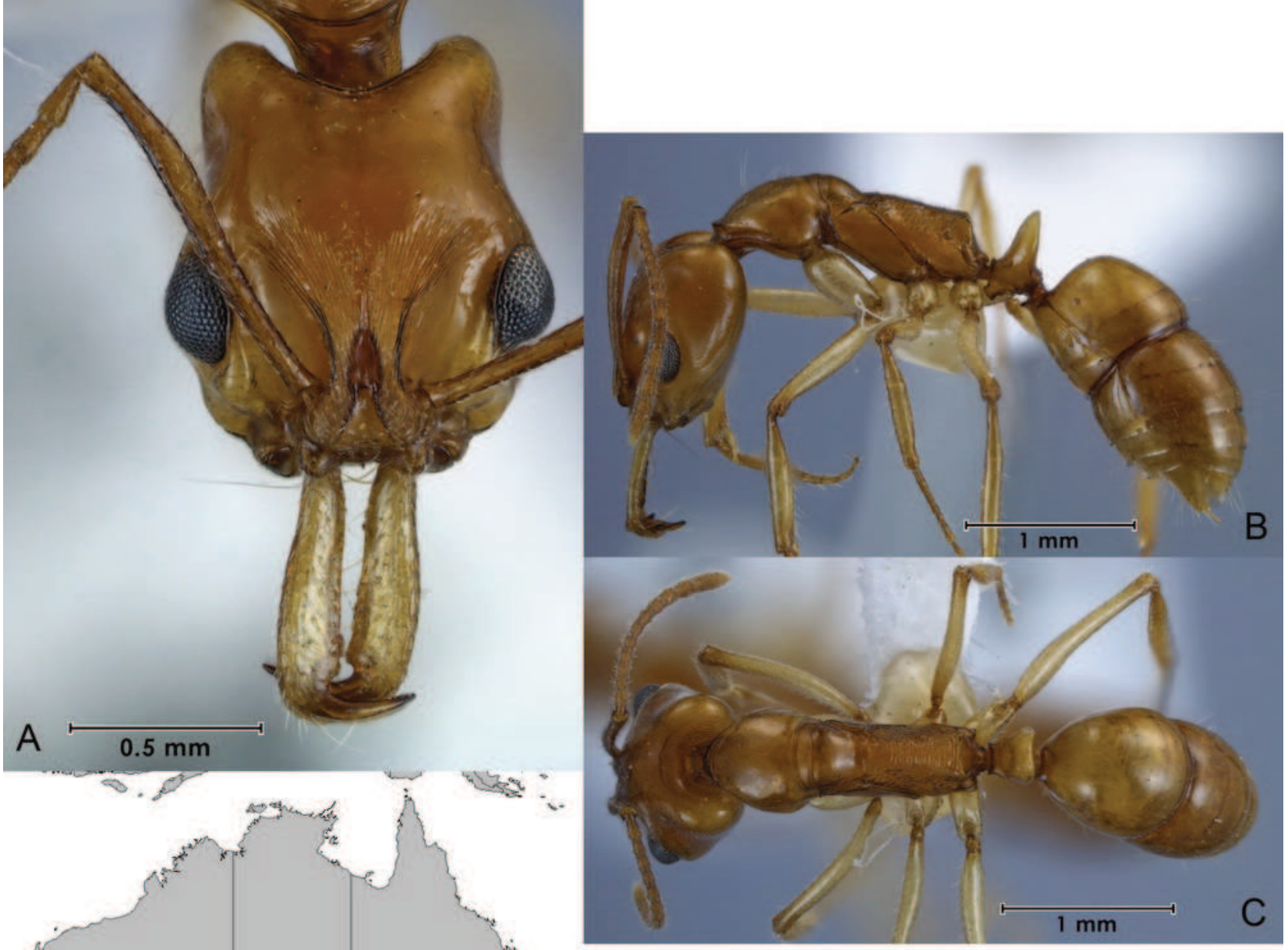

D


0.5 mm
A

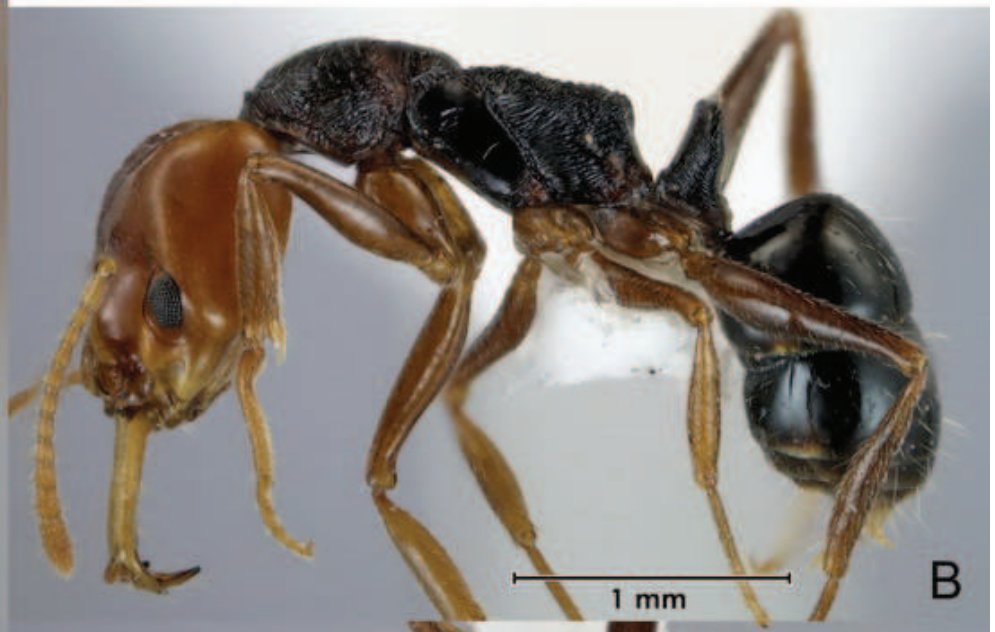

B
1 mm

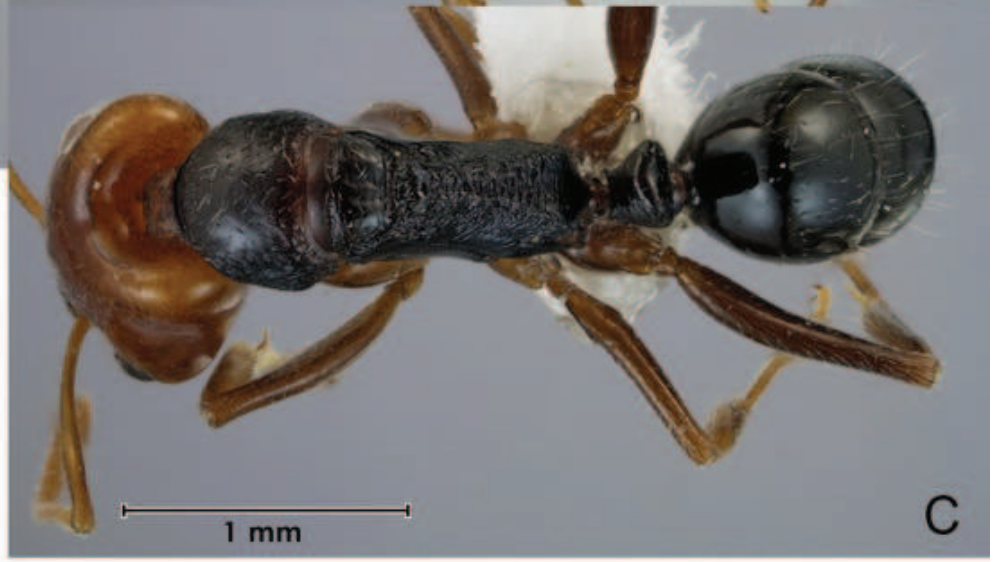

C
1 mm


D


A
0.5 mm
B
1 mm
C
1 mm
D


A
0.5 mm


1 mm
B


1 mm
C

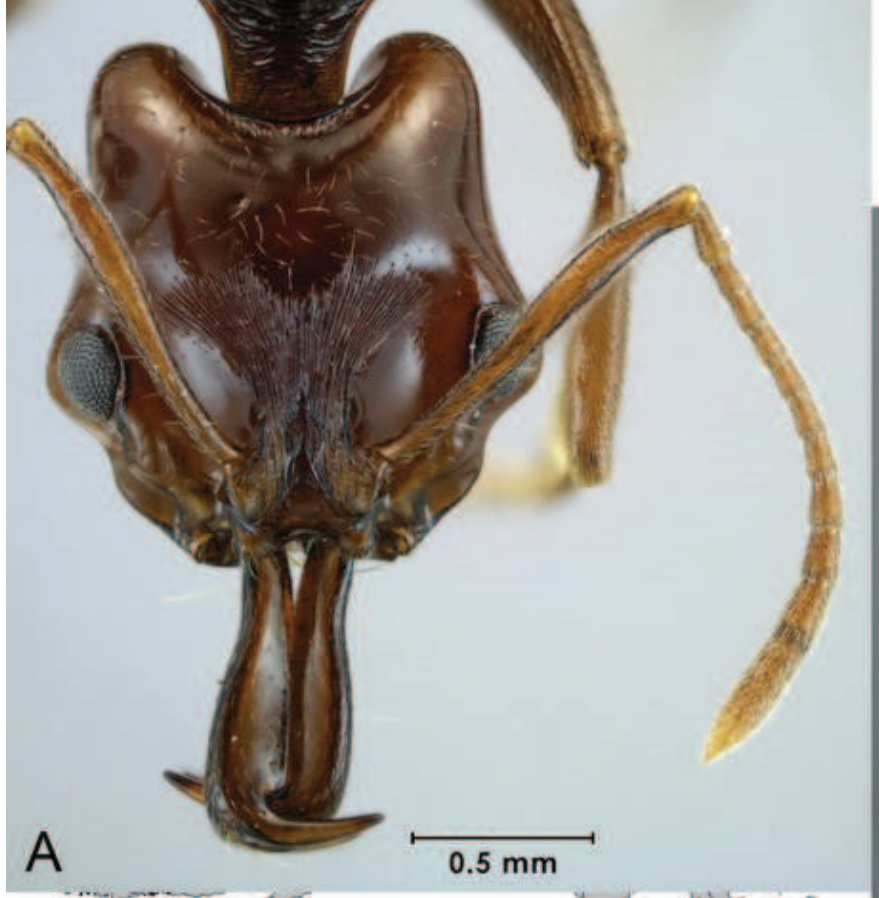

D


A
0.5 mm


B
1 mm


C
1 mm

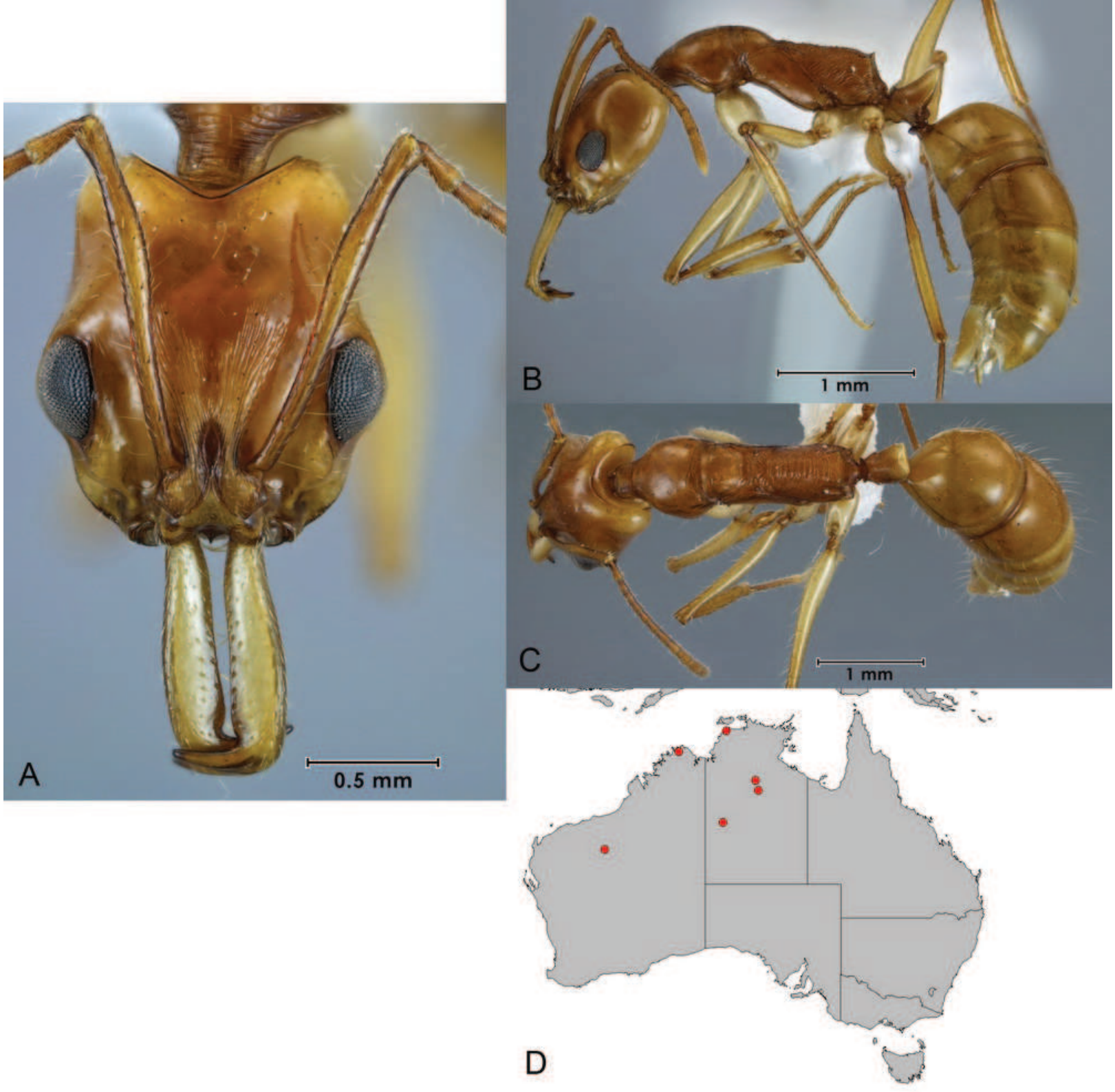

D

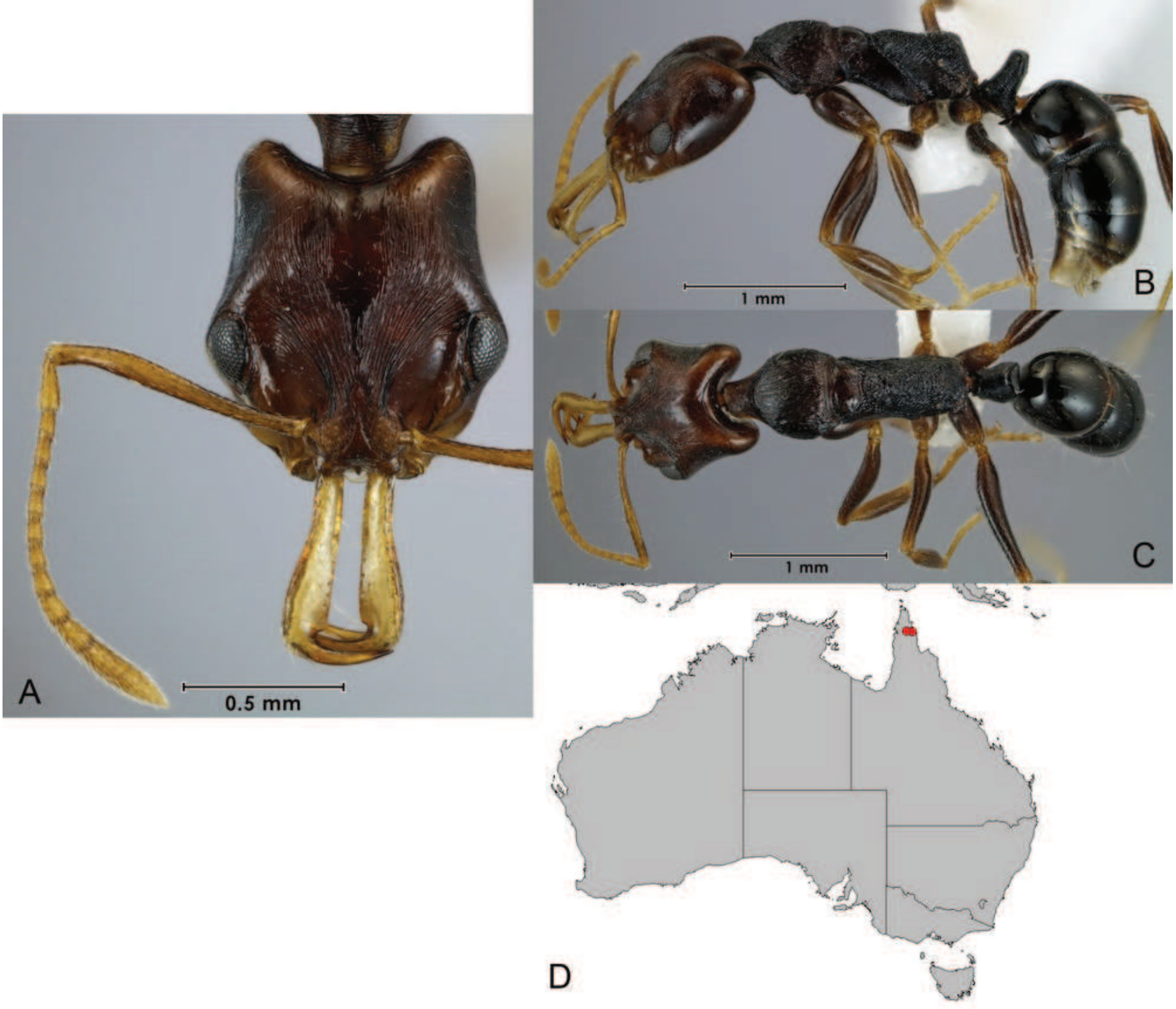

A
0.5 mm


B
1 mm


C
1 mm


D


A
0.5 mm
B
1 mm
C
1 mm
D


A
0.5 mm
B
1 mm
C
1 mm
D


A
0.5 mm


B
1 mm


C
1 mm


D