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Rediscovery of the Australian Pollen Wasp *Metaparagia doddi* (Hymenoptera: Vespidae; Masarinae)

JAMES M. CARPENTER¹ AND AMY R. DAVIDSON²

ABSTRACT

The first record of *Metaparagia doddi* Meade-Waldo since the description of the type is given, the male is described, and a host plant recorded. Characters of the male are scored in a cladistic data matrix previously published by Carpenter (1997); analysis of the revised matrix results in the same cladogram as in that study.

INTRODUCTION

Metaparagia doddi was described by Meade-Waldo (1911) from a single female collected in "Cairns, N. Queensland" by F. P. Dodd. The type is in the Natural History Museum, London, and has remained the only known specimen of this species until now. We here report the rediscovery of this species, provide the first host plant record, and describe the male.

NEW RECORDS AND HOST PLANT RECORD

On February 27–28, 2009, and March 4, 2009, we collected four females and two males

of this species at Mt. Carbine Caravan Park, 16°31'44"S 145°08'14"E and 351 m. elevation in Far North Queensland. The caravan park comprises 13.5 acres adjoining the old mining town of Brooklyn Village. All the specimens were taken in ironbark scrub on a rocky jasper hill overlooking the buildings of the park and village (fig. 1). Three of the females were taken at flowers of *Tephrosia brachyodon* (Fabaceae), which was common on the hill (fig. 2). The other female and the males were taken in flight near the legume.

The senior author has seen the type of *M. doddi*, and these specimens correspond to it in details of both morphology and color pattern. The scape is somewhat thick, the occiput in dorsal view is posteriorly truncate and nearly

¹ Division of Invertebrate Zoology, American Museum of Natural History (carpente@amnh.org).

² Division of Paleontology, American Museum of Natural History (davidson@amnh.org).



Fig. 1. Habitat where *M. doddi* was collected.

straight across mesally, the clypeus is entirely yellow and metasomal Tergum II has a spot at the posterior margin (see the key of Richards, 1962: 59). The females and one of the males have a posterior yellow spot on the scutum, mentioned by Meade-Waldo (1911), and the mandibles are yellow except for the teeth. The size of the scutal spot varies, and one of the males lacks it entirely.

We have also seen a specimen in the Australian National Insect Collection, a female labeled "15.39S 144.31E / Split Rock QLD / 18 Feb–25 Apr 1993 / Malaise Trap / P. Zborowski," to which the senior author has attached a determination label. This is slightly blacker than the other specimens, with no pale color laterally on the scutum, and metasomal Tergum VI anteriorly and Sternum VI laterally black. Due to being collected into ethanol the glossa is entirely retracted (see Concluding Remarks).

DESCRIPTION OF MALE

Key morphological features are identical to the female. The association of sexes is

therefore not in doubt. The pale markings are yellower than in the female, which has them tinged with orange. The posterior mesal spot on the second metasomal tergum is more triangular than square. The antennal apex is not modified, being conical like that in the female, unlike the case in some other species of *Metaparagia* (cf. figs. 9–11 in Snelling, 1986). The foretarsal segments are symmetrical in both sexes, and the forefemur is rounded, not angular.

Aside from the usual sexual dimorphism, the males are notably different from the female in several characters. The foretrochanter is produced, narrow, and slightly emarginate at the apex (fig. 3). This process is quite different from that in other species of *Metaparagia* (cf. figs. 7, 16–18 in Snelling, 1986). The last visible metasomal sternum has the seventh and eighth (eighth and ninth abdominal) sternites partly differentiated, not completely fused, and the seventh is cleft apically, while the eighth has a basal process that projects into the cleft. This condition is seen in other species of *Metaparagia* (cf. fig. 61



Fig. 2. Collecting site with host plant.

in Richards, 1962), as well as other masarines. The apex of the eighth sternite is produced into five points, two lateral, two dorsolateral above, and a medial one above the plane of the dorsolateral ones (fig. 3). A similar condition is seen in some species of *Paragia* (cf. fig. 30 in Snelling, 1986).

In the genitalia, the parameral spines are rather broad, curved, and with the apices produced into minute recurved tips. The parameres are laterally sharply pointed. The aedeagus is broadly rounded apically, and the volsellae are short, not reaching the apex of the aedeagus. These features are reminiscent of the condition in *M. maculata*, but the recurved tips to the parameral spines are much smaller than in that species. *Metaparagia doddi* differs from *M. maculata* in that the digitus is not fingerlike; rather it is broadly triangular.

CHARACTER CODING

The discovery of the male of *M. doddi* allows us to fill in some of the missing data

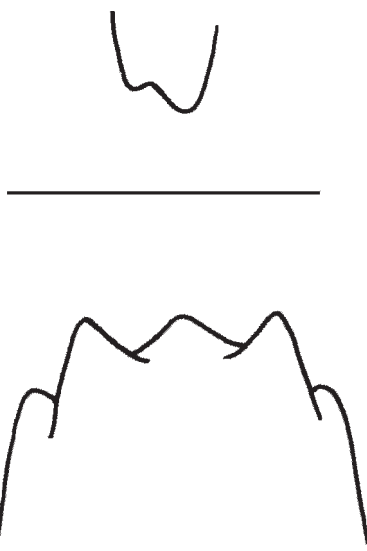


Fig. 3. Characters of male *M. doddi*. Above, apex of foretrochanter process. Below, apex of last visible metasomal sternum. Scale bar = 1 mm.

1. Forewing marginal cell: not narrower basally than apically (0); 2r-rs curving basal to insertion of RS so that it is narrower (1).
2. CuA2+A: angled where meeting (0); rounded together (1).
3. Hindwing jugal lobe: present (0); reduced (1).
4. Eye emargination: deep (0); shallow (1); absent (2).
5. Male flagellomere 12: short (0); elongate (1).
6. Interantennal carina: blunt ridge (0); tuberculate (1).
7. Clypeal apex: flat (0); bluntly pointed (1).
8. Female clypeal hairs: hairlike (0); elongate bristles (1).
9. Fusion of postocular and preoccipital carinae: absent (0); present (1).
10. Ammochaetae: absent (0); present in female (1); figs. 15, 16.
11. Maxillary palpi: 6-segmented (0); 5-segmented (1); 4-segmented (2) [nonadditive].
12. Glossal apical lobes: not longer than section basal to bifurcation (0); longer (1).
13. Hypostoma: flat (0); depressed (1).
14. Propleura: without groove (0); with medial groove (1).
15. Pronotal hairs: hairlike (0); distally clavate (1).
16. Pronotal posterior carina: present (0); blunt (1).
17. Pretegular carina: present (0); reduced (1); absent (2).
18. Pronotal groove: present (0); broad, shallow (1); absent (2) [nonadditive].
19. Pronotal angle: smooth (0); sharp (1).
20. Notauli: present (0); reduced (1).
21. Axillary process: absent (0); present (1).
22. Scutellum: posteriorly rounded (0); posteriorly truncate (1); posteriorly sloping (2); projecting (3).
23. Tegula: posteriorly blunt (0); pointed (1); pyriform (2) [nonadditive].
24. Propodeal spiracle: lateral (0); more or less dorsal (1).
25. Propodeal processes: absent (0); present (1).
26. Propodeal punctation: coarse, with dense, distinct punctures of greater diameter than intervening spaces (0); fine, with punctures of smaller diameter than intervening spaces, often indistinct (1).
27. Male foretrochanter: without process (0); with process (1); process an elongate point (2); elongate, apically blunt process (3); elongate, scooplike process (4); emarginate (5) [nonadditive].
28. Male forefemur base: rounded (0); angulate (1).
29. Female leg hairs: straight (0); curved (1).
30. Female foretarsal lobes: symmetrical (0); strongly asymmetrical (1).
31. Female tibial peglike setae: absent (0); present (1).
32. Claws: toothed (0); simple (1).
33. Tergum II: constricted basally (0); without constriction (1).
34. Last tergum margin: apical (0); ventral (1).
35. Parameral spines: sharply pointed (0); hooked (1); bluntly pointed (2); bluntly rounded (3) [nonadditive].

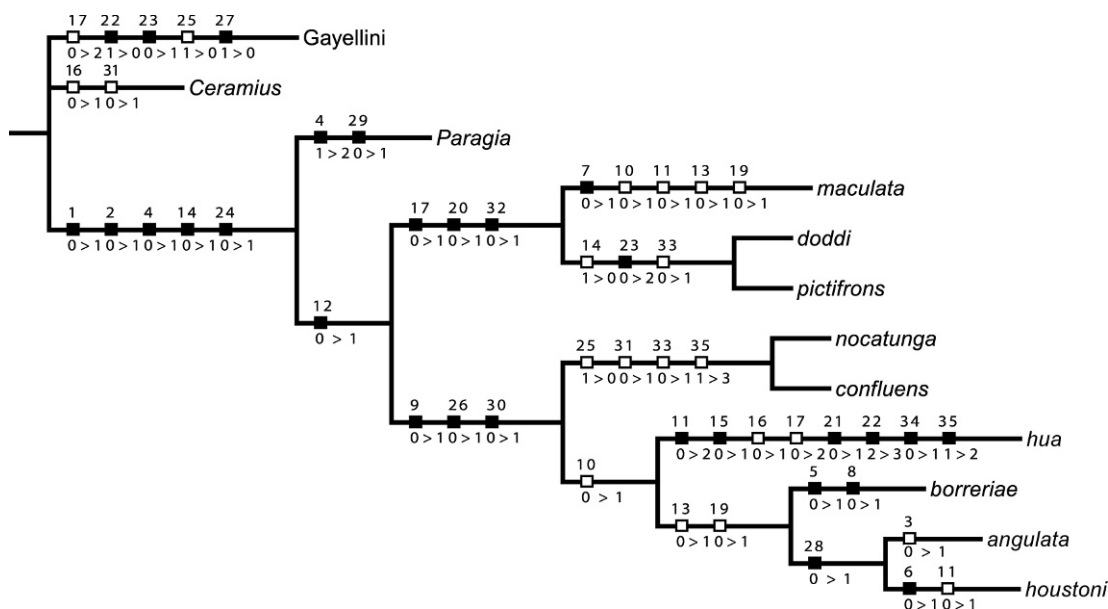


Fig. 4. Cladogram of *Metaparagia* species resulting from present analysis. The length is 65 steps, with consistency index = 0.65 and retention index = 0.73. Characters have been optimized and the cladogram plotted with the program Winclada (Nixon, 2002). Character numbers are above the hash marks; state changes are shown below, with the respective primitive and derived conditions separated by a caret, >. Filled hash marks indicate an uncontroverted step, while open hash marks indicate homoplastic change. Only unambiguous optimizations are plotted.

entries in the matrix published by Carpenter (1997). This is done in table 1. A state has been added to character 27, male foretrochanter, to denote the unique process in *M. doddi* (state 5, emarginate). We also take this opportunity to correct an erroneous entry in the previous publication: character 30, female foretarsal lobes, was incorrectly scored as state 1 (strongly asymmetrical) in *M. maculata*; it should have been scored with state 0 (symmetrical), as in table 1.

Analysis of the revised matrix using the program TNT (Goloboff et al., 2008), using implicit enumeration under either equal or implied weights results in the same cladogram as published by Carpenter (1997). It is presented here with revised character plotting as fig. 4.

CONCLUDING REMARKS

All the specimens when collected had their glossa retracted, and extruded it upon being placed in a cyanide tube. This is noteworthy

because the generic classification of Australian Masarinae was for long based on a misapprehension that some species could not retract the glossa while other species could, and several monotypic genera were accordingly described (Richards, 1962; Snelling, 1986). Carpenter (1997) pointed out that this was a mistake, and rationalized the classification to recognize two genera for Australian Masarinae, *Paragia* Shuckard and *Metaparagia* Meade-Waldo. These were the same two genera recognized by Meade-Waldo (1911), when he described both *Metaparagia* and *M. doddi*.

Meade-Waldo included three species in *Metaparagia*, and species described by Richards (1962, 1968) and Snelling (1986) in other genera and transferred to *Metaparagia* by Carpenter (1997) bring the present total in the genus to nine species. In the cladistic analysis by Carpenter (1997), and repeated here (fig. 4), *M. doddi* is the sister-group of *M. pictifrons* (Smith), and their sister-group in turn is *M. maculata* (Meade-Waldo). *Metaparagia pictifrons* remains known only

from the type and there is no host record. Hosts for *M. maculata* are known: Houston (1995) reported females foraging on flowers of *Jacksonia sericea*, *J. sternbergiana*, *J. stricta*, and *J. spinosa* (Fabaceae). Known hosts for other species of *Metaparagia* do not include Fabaceae; rather they are Goodeniaceae and Rubiaceae (Richards, 1968; Snelling, 1986; Gess, 1995; Gess et al., 1995). The finding of a host in Fabaceae for *M. doddi* thus may have phylogenetic significance, possibly being apomorphic for the clade comprising *M. doddi*, *M. pictifrons*, and *M. maculata*.

Finally, Richards (1962: 60) stated of *Paragia*, the other Australian masarine genus: "I suspect that the species were much commoner in the early days of the Australian colonies but that they have become extinct or rare with the destruction of the native vegetation." While *M. doddi* perhaps no longer occurs in the type locality, Cairns, due to development, when rediscovered more specimens were seen than ever previously known. The fact that it was found at two localities in savannah country may indicate that it is widespread in such habitat. The seeming rarity of many Australian pollen wasps may instead reflect limited and local abundance tied to appearance of host plants, and corresponding lack of collecting. Clearly there is much more entomological exploration to be done with the Australian fauna.

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REFERENCES

- Carpenter, J.M. 1997 (1996). Generic classification of the Australian pollen wasps (Hymenoptera: Vespidae: Masarinae). *Journal of the Kansas Entomological Society* 69 (4) suppl.: 384–400.
- Gess, F.W. 1995. Descriptions of the male of *Riekia nocatunga* Richards: the male and two strikingly distinct sympatric colour forms of *Riekia confluens* (Snelling) and the male of *Rolandia angulata* (Richards) (Hymenoptera: Vespidae: Masarinae) from Australia. *Journal of Hymenoptera Research* 4: 33–40.
- Gess, F.W., S.K. Gess, and R.W. Gess. 1995. An Australian masarine, *Rolandia angulata* (Richards) (Hymenoptera: Vespidae): nesting and evaluation of association with *Goodenia* (Goodeniaceae). *Journal of Hymenoptera Research* 4: 25–32.
- Goloboff, P., J.S. Farris, and K.C. Nixon. 2008. TNT, a free program for phylogenetic analysis. *Cladistics* 24: 1–13.
- Houston, T.F. 1995. Notes on the ethology of *Rolandia maculata* (Hymenoptera: Vespidae: Masarinae), a pollen wasp with a psammophore. *Records of the Western Australian Museum* 17: 343–349.
- Meade-Waldo, G. 1911. Notes on the family Masaridae (Hymenoptera), with descriptions of a new genus and three new species. *Annals and Magazine of Natural History* (8) 8: 747–750.
- Nixon, K.C. 2002. Winclada, version 1.45. Program and documentation available from the author.
- Richards, O.W. 1962. A revisional study of the masarid wasps (Hymenoptera, Vespoidea). London: British Museum (Natural History).
- Richards, O.W. 1968. New records and new species of Australian Masaridae (Hymenoptera, Vespoidea). *Journal of the Australian Entomological Society* 7: 101–104.
- Snelling, R.R. 1986. The taxonomy and nomenclature of some Australian paragine wasps (Hymenoptera, Masaridae). *Contributions in Science* (Los Angeles) 378: 1–19.

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