

Biosystematics of two new species of unusually coloured Australian mygalomorph spiders, *Arbanitis* (Araneae: Idiopidae), from south-western Australia

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Abstract

Two new unusual mygalomorph species, *Arbanitis mcmillani* and *Arbanitis ballidu*, are described from south-western Australia. In both species the integument of the carapace is white with an enamel-like sheen. The white colouring is derived presumably from pigment (possibly guanine) deposits in the cuticle. It is postulated that this unusual colour pattern of white contrasting with dark brown appendages and abdomen may render the spiders cryptic against a background habitat of litter on white or yellow sand.

Introduction

The trapdoor spider genus *Arbanitis* Koch as currently defined (Main 1985a; Raven 1985) is distributed widely in Western Australia south of the Tropic of Capricorn, and in eastern Australia from northern Queensland to Victoria and Tasmania, but appears to be absent from the Northern Territory and South Australia (Main 1985a,b, 1995). The genus also occurs in New Zealand (Main 1985b). There are currently 11 species of *Arbanitis* recognized as valid in Australia (Main 1985a,b, 1995) including three from Western Australia (Main 1985b). However it is apparent from collections that there are many more unnamed species on both sides of the continent.

Use of the name *Arbanitis* has always been problematical due to the apparent loss of the holotype of the type species *A. longipes* (Koch). Recently a specimen that is believed to be Koch's type (RJ Raven, Queensland Museum, personal communication) has been found in the Zoologisches Museum of the University of Hamburg. This may require nomenclatural changes that may later necessitate transference of the two species described here to the next available generic name *Euoplos* Rainbow.

Species of *Arbanitis*, as defined at present, all build doors to their burrows and usually occur in damp, shaded situations. Even those that occur in semi-arid regions are confined to seasonally damp microhabitats. Doors are usually thick, plug-like structures which fit tightly into the rim of the burrow. While most species occur in heavy clay or loamy soils, a few are known from sandy habitats.

Spiders of the genus *Arbanitis* are usually tan to reddish brown, or black, with glabrous carapace and

legs; the abdomen may have dorsal paler banding; the legs are generally heavily spined. Males have long legs and are sometimes very dark, or black, in colour. This paper describes two new species of *Arbanitis* in which the male has an unusual colouring of the carapace, white with an enamel-like sheen. It is possible that this seemingly stark, contrasting colour pattern of shiny white carapace and dark brown abdomen and appendages is disruptive and renders the spiders inconspicuous on white or yellowish sand amongst litter beneath shrubby vegetation.

Systematics

Abbreviations

ALE, anterior lateral eyes; **AME**, anterior median eyes; **PLE**, posterior lateral eyes; **PME**, posterior median eyes. **v**, ventral; **d**, dorsal; **p**, prolateral; **r**, retrolateral (in reference to paired tarsal claws and position of leg spines). **WAM**, Western Australian Museum.

Measurements are in millimetres.

Arbanitis mcmillani sp nov

(Figures 1, 2 A-N; Table 1)

Holotype: Male, Eneabba (sand mine rehabilitation site 7 of RGC Eneabba) now Westralian Sands Eneabba), Western Australia (29° 49' S, 115° 16' E), live spider collected by R P McMillan, April 1992 (WAM 92/517).

Paratype: Male, as for holotype (sand mine control site 8), collected by R P McMillan and P West, 8 August 1998 (WAM 98/1590).

Diagnosis (male). Medium sized, generally dark reddish brown to black, femora of all legs and patellae III and IV dark, other leg segments pale, carapace white,



Figure 1. *Arbanitis mcmillani* sp nov, male (holotype) in life. (Photo R P McMillan).

glabrous, with an enamel-like sheen, and with black, rod-like spines. Labium with a few elongate cuspules. Palpal tibia with pronounced process with many stout spines (at least 30); embolus with prong-like tip; tibia I without apophysis but with a proventral comb of three spines. Tarsi I - III without spines.

Female unknown.

Description

Male (holotype). *Colour* Carapace white, with an enamel-like sheen; bearing black, rod-like, terminally truncate spines and bristles of uniform thickness except slightly thinner at base; ocular area black. Femora of legs and patellae III and IV dark brown, other leg segments pale, tarsi reddish. Sternum and palpal coxae reddish, chelicerae dark reddish-brown. Abdomen (slightly shrivelled) black dorsally, ventrally dark except lung covers and anterior to epigastric furrow yellow. *Carapace* length 5.2 mm, width 4.5 mm; radial depressions. *Fovea* pit-like, irregular outline, almost straight with deep, bowl-like posterior depression. Eyes on a dark mound, group width 1.1 mm, length 0.6 mm; anterior row procurved. Eye diameters; ALE 0.3, AME 0.25 (left,) 0.2 (right), PLE 0.3, PME 0.2. *Chelicerae* with asymmetrical teeth numbers, (right) promargin 4 large, 3 small teeth, 2 small basal intermediate, retromargin 7 large, (left) promargin 5 large, retromargin 4 large and about 5 small, granule-like in irregular pattern. *Sternum* length 2.9 mm, posterior sigilla oblong with right sigilla damaged and fragmented into 3 pieces (paratype normal, entire). *Labium* length 0.6 mm; with 3 finely pointed cuspules. *Legs* : *Scopula* complete on tarsi I and II. *Trichobothria* all long and hair-like, about 15 on tarsi I, none baton-like or clavate. Paired *tarsal claws* long and curved, I (long teeth), p 5, r 4, II (long teeth), p 3 (basal tooth two pronged), r 3,

III (relatively short teeth), p, r 3, IV (relatively short teeth), p, r 3. *Spines* Tarsi I - III without spines, tarsus IV with pv3, rv one thin bristle-like spine, metatarsi I and II without spines, metatarsi III and IV with scattered spines on all faces. Tibia I (Fig 2 H, I) ventrally with at least 7 spines plus a retro-apical spine and pro-ventral apical comb (in place of an apophysis) of 3 spines comprised of one stout spine, one long thin spine and a shorter middle spine. Femora all with a mid-dorsal line of about 8 spines. Many spines and bristles rod-like and blunt terminally, similar to carapace spines. *Palp* (Figs 2 J - N) with prominent ventral process, with over 30, stout, tooth-like spines, embolus broad, tapering terminally, tubular and with prong-like tip. Abdomen length 4.7 mm; evenly covered with thick, terminally blunt, slightly curved setae.

Table 1

Leg dimensions of holotype male of *Arbanitis mcmillani*.
Leg formula = length of leg divided by carapace length. Tibial index = width of patella x 100 divided by length of tibia + patella (Petrunkevitch 1942).

Leg formula: 4 / 4.21, 1 / 3.25, 2 / 3.00, 3 / 2.75						
Legs	Fem	Pat	Ti	Mt	Ta	Total
I	5.3	2.4	3.6	3.6	2.0	16.9
II	4.8	2.2	3.3	3.4	2.0	15.7
III	4.2	1.8	3.0	3.3	2.0	14.3
IV	5.6	2.9	4.6	5.4	3.4	21.9
Palp	2.5	1.3	2.3	—	1.1	7.2

Width patella I at knee = 0.7. Tibial index = 11.7.
Width patella IV at knee = 0.8. Tibial index = 10.6.

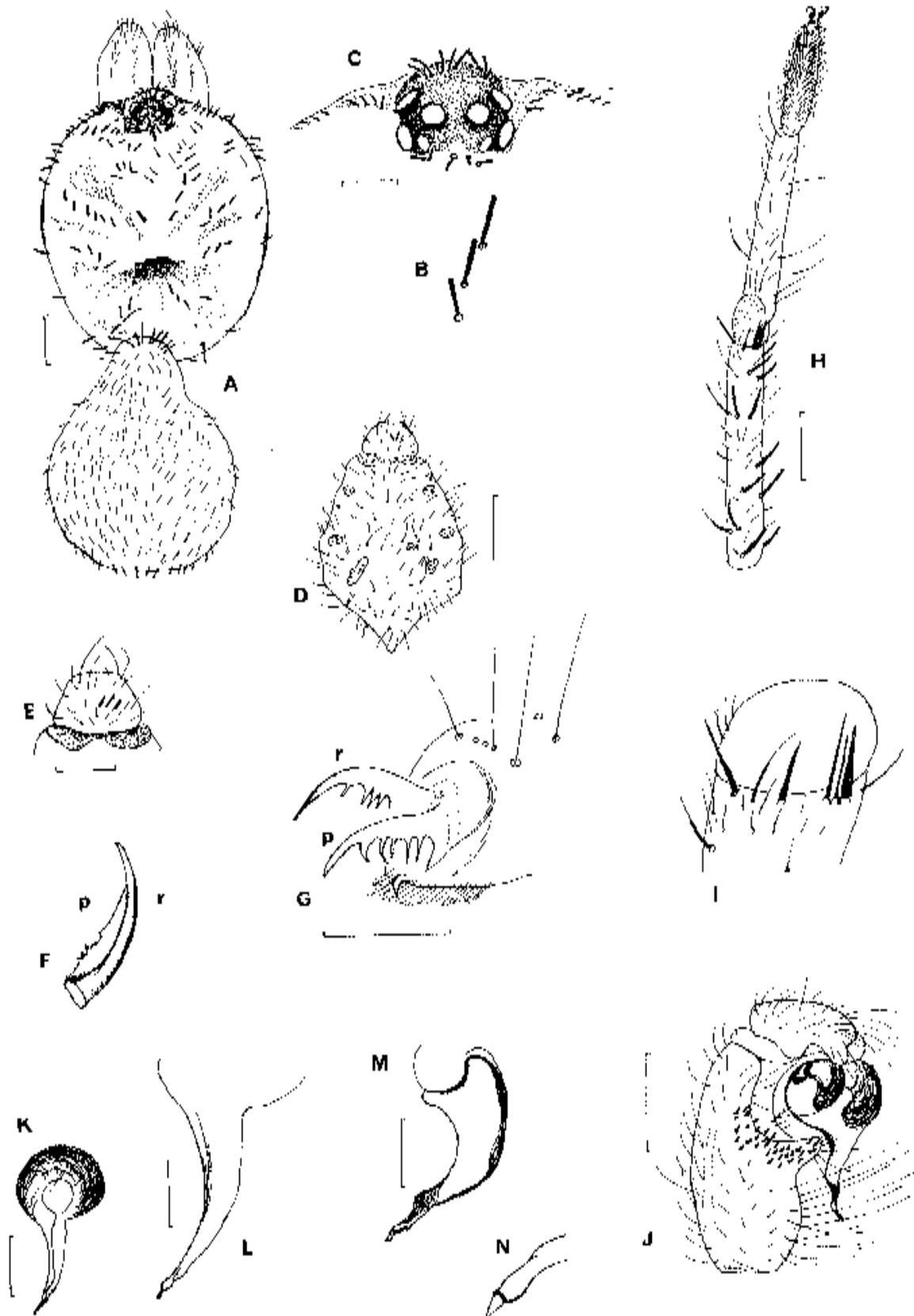


Figure 2. *Arbanitis mcmillani* sp nov, male (holotype). A, Dorsal view of spider, carapace and abdomen. B, Several spines of carapace enlarged. C, Eye group. D, Labium and sternum. E, Labium. F, Left fang, note keel and toothed promargin. G, Tarsal claws of right leg I, prolateral view (p, prolateral; r, retrolateral). H, Right leg I, tarsus, metatarsus and tibia ventral view. I, Apical ventral spines of right leg I showing proventral comb. J, Right palpal tarsus and tibia, retrolateral. K, L, Bulb and embolus, prolateral. M, Embolus, ventral. N, Embolus tip, ventral (enlargement of M view). Scale bars: A, D, H, J = 1.0 mm; C, E, K = 0.5 mm; L, M = 0.25 mm; B, F, I, N, not to scale.

Comments

The paratype is morphologically very similar to the holotype, with the same strikingly white, glabrous carapace and dark legs and abdomen. Carapace length/width, 4.9/4.3. The palp shows no distinctive variation and the tibia of the first leg similarly has a proventral, apical comb-like group of three (different sized) spines.

Habitat

Heath on white sand.

Etymology

The species is named after Peter McMillan, in gratitude for his generous and substantial donations of spider and insect collections to the WAM and in recognition of his wide entomological and natural history knowledge which always he has unstintingly shared.

***Arbanitis ballidu* sp nov**

(Figures 3 A-F, Table 2)

Holotype: Male, Ballidu, Western Australia (30° 35' 28"S, 116° 45' 25" E), from wet pitfall trap, 24 May/16 September 1996, M S Harvey, B Y Main, J M Waldoek (WAM 96/933).

Diagnosis (male). As for *A. macmillani*, carapace white, glabrous, with enamel-like sheen and scattered, black, truncate, rod-like spines, legs dark with tibia, metatarsi and tarsi paler. Labium without cuspules. Tibia I lacks apophysis, comb and heavy apical spines; a single pro-ventral, long tapering spine; tarsal claws of leg I with few teeth (fewer than *mcmillani*). Palpal tibia with slight process, few spines (no more than 20).

Female unknown.

Description

Male (holotype). *Colour* Carapace white, with black, terminally blunt spines. Appendages dark with pale terminal segments, abdomen black with small bare, white "wax" patches. *Abdomen* length 4.5 mm. *Carapace* length 4.4 mm, width 3.7 mm. Clypeus with four spines in a row and one large median spine (Fig 3A). *Eye group* width 0.9 mm, length 0.5 mm; anterior row straight. A group of about 14 rod-like spines on posterior of eye mound; four long clypeal spines, not rod-like. *Labium* length 0.4 mm, without cuspules. *Sternum* length 2.3 mm, width 2.0 mm. *Chelicerae*, asymmetrical teeth numbers, (right) promargin 5 large teeth, retromargin 6 teeth of uneven sizes, (left) promargin 5 large teeth, retromargin 5 and 2 tiny intermediate teeth. *Legs* *Scopula* dense on tarsi I and II, none on III and IV, none on metatarsi.

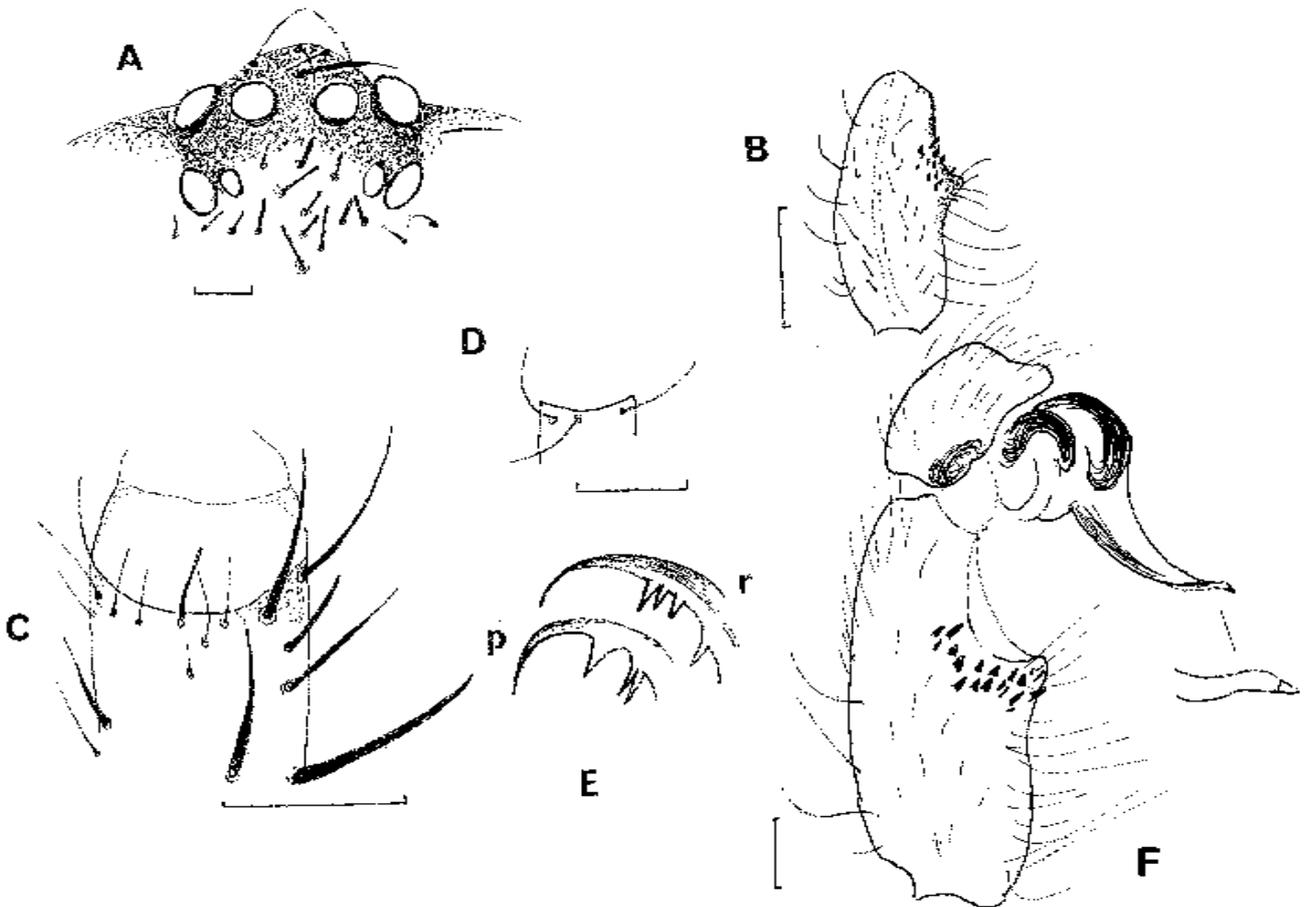


Figure 3. *Arbanitis ballidu* sp nov, male (holotype). A, Eyes. B, Right palp tibia, retrolateral. C, Tibia I, right leg, ventral view. D, Metatarsus I, right ventral, apical bristles. E, Paired tarsal claws, right leg I, prolateral (p, prolateral; r, retrolateral). F, Right palp, tarsus and bulb/embolus and tibia retroventral aspect. Scale bars: A = 2.0 mm; B, F = 1.0 mm; C, D = 0.5 mm; E, not to scale.

Table 2

Leg dimensions of holotype male of *Arbanitis ballidu* sp nov.
Leg formula and tibial index (see Petrunkevitch 1942).

Leg formula: 4 / 4.61 1 / 3.22 2 / 3.39 3 / 3.11						
Legs	Fem	Pat	Ti	Mt	Ta	Total
I	4.7	2.1	3.3	3.3	1.8	15.2
II	4.4	2.1	3.1	3.3	2.0	14.9
III	3.5	1.9	2.8	3.4	2.0	13.7
IV	5.0	2.3	4.5	5.8	2.7	20.3
Palp	2.2	1.3	2.1	—	0.9	6.5

Width patella I at knee = 0.6. Tibial index = 11.1

Width patella IV at knee = 0.7. Tibial index = 10.2.

Tarsal claws few teeth; leg I retro claw with one large proximal and 3 even sized teeth, prolateral claw with 2 small proximal and one large distal tooth. *Spines* Some large tapering spines but most spines and bristles are adpressed, rod-like and terminally truncate; tarsi I - III without spines, tarsi IV with 2 (left) and 3 (right) ventral spines.

Leg I lacks apophysis, comb or heavy apical spines; a single, long, tapering pro-ventral spine and one adjacent ventral, slightly smaller, bristle-like spine. Tarsi without spines. *Palp* tibia with slight median swelling but not a pronounced process, with about 20 short spines; embolus tip not distinctively tubular, small terminal "prong".

Habitat

Mixed open, wodjil/heath on yellow sand.

Discussion

The peculiar shiny, waxy-looking, white colour of the carapace of the spiders described is possibly due to deposition of guanine in the basal tissue of the integument. This area is surrounded by a narrow, hyaline or transparent margin, as is typical of the carapace of many species of *Arbanitis* in which the carapace is otherwise dark coloured.

Several other male *Arbanitis* specimens with pale (but yellowish rather than white carapaces) have recently been collected from a site with yellow sand near Buntine (Registration numbers WAM 1996/934,935). Although some morphological features of these specimens are similar to the *Ballidu* species (for example the undeveloped tibial protuberance with fewer spines on

the palp, bristle-like apical spines on tibia I and few teeth on the tarsal claws), they appear to represent another species. Additionally, and since this paper was prepared, a further male specimen of *Arbanitis* with a white carapace, has been found amongst some specimens collected by the late Graeme Smith and simply labelled "Kalbarri, 1982". This specimen has a very distinctive pro-ventral, apical comb of spines on tibia I and clearly represents a fourth species exhibiting the interesting colour pattern. Whether the four species are closely related or have independently developed the colour pattern cannot as yet be stated. These specimens, all lodged in the WAM, will be described later along with descriptions of other new Western Australian species of *Arbanitis*.

The remarkable contrasting pattern of glazed white carapace and dark abdomen and appendages of the above spiders may be visually disruptive and hence render the spiders cryptic against a background of white or yellow sand that is partially covered by litter. Assuming that the males wander at night like most idiopid species, the postulated camouflage may be a defence against predation by nocturnal birds, particularly ambulatory ground feeding birds such as curlews and also owls; the disruptive pattern would be equally effective during daylight.

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