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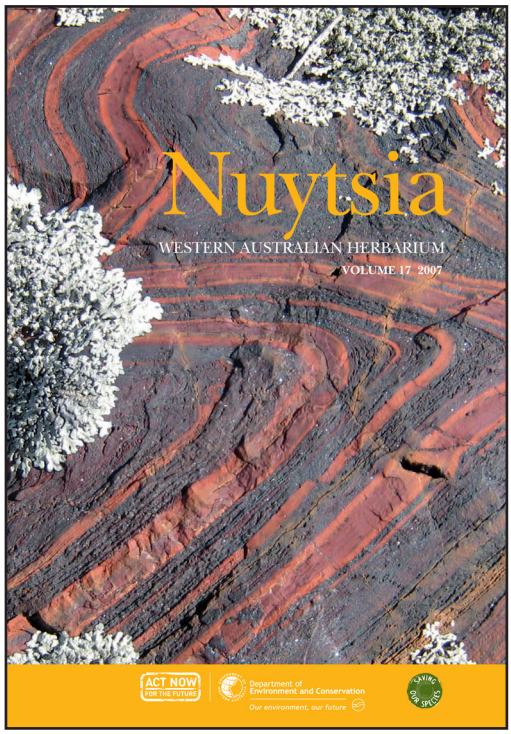

Maslin, B.R. & Buscumb, C.

Two new *Acacia* species (Leguminosae: Mimosoideae) from banded ironstone ranges in the Midwest region of south-west Western Australia

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Two new *Acacia* species (Leguminosae: Mimosoideae) from banded ironstone ranges in the Midwest region of south-west Western Australia

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Abstract

Maslin, B.R. & Buscumb, C. Two new *Acacia* species (Leguminosae: Mimosoideae) from banded ironstone ranges in the Midwest region of south-west Western Australia. *Nuytsia* 17: 263–272 (2007). The following two new species of *Acacia* Mill. from an area of banded ironstone in the Midwest region of south-west Western Australia (between Morawa and Paynes Find) area are described: *Acacia karina* Maslin & Buscumb and *A. woodmaniorum* Maslin & Buscumb. Both species are listed as a Priority Two species according to the Department of Environment and Conservation's Conservation Codes for Western Australian Flora.

Introduction

The two new species described here are confined to Banded Iron Formation (BIF) ranges in the Midwest region of Western Australia (Department of Conservation and Land Management 2006), on the border of the species-rich Transitional Rainfall Zone (Hopper 1979) and the arid zone. This area is especially rich in terms of *Acacia* Mill. species numbers (Hnatiuk & Maslin 1988). BIF ranges are located on the Yilgarn Craton (Payne *et al*. 1998), an ancient land system that has not been glaciated or inundated since the mid-tertiary, but has undergone extensive weathering resulting in a relatively subdued landscape containing a series of discontinuous, low ranges (N. Gibson, pers. comm.). Some BIF ranges contain significant deposits of hematite and magnetite and as such may be of potential high economic value. BIF ranges are believed to have acted as refugia during arid phases of the Tertiary Period (Hopper 1979). In addition to supporting widespread Eremaean taxa they may also contain a range of plant taxa and communities, which appear highly restricted, and as such many have high conservation value.

The Western Australian Department of Environment and Conservation (DEC) recently initiated a Biodiversity Conservation Initiative (now called 'Saving Our Species') aimed at researching the flora and vegetation of BIF ranges. The first phase of this 3 year project comprised surveys of six BIF ranges in the Midwest region, including those in which the two new *Acacia* species described here are found, namely, the Blue Hill Range and Mt Gibson (*fide* Markey & Dillon, in review, and references cited therein). Considerable work has also been done in the Blue Hill Ranges by Woodman Environmental Consulting as part of a mining proposal for that area (Woodman Environmental Consulting 2007).

As used here the name Blue Hill Range comprises a series of BIF ranges that extend from Mt Karara in the south-west to Windaning Hill in the east and encompasses the following geomorphological units: 'Karara Range' is an informal name used for the discrete range that incorporates Mt Karara, 'Mungada Ridge' (an informal name used for the high crescent-shaped range with Windaning Hill at its southern extremity) and Jasper Hill which is located about 5 km to the north of 'Mungada Ridge'.

The two new species described below are *Acacia karina* Maslin & Buscumb and *A. woodmaniorum* Maslin & Buscumb formerly known as *A.* sp. Karara (C. Godden 14) and *A.* sp. Blue Hill Range (R.J. Cranfield 8582) respectively. Both these taxa are listed as Priority Two species on DEC's "Declared Rare and Priority Flora List" (Atkins 2006), but a submission has been made to Gazette *A. woodmaniorum* as a Declared Rare Flora.

Taxonomy

Acacia karina Maslin & Buscumb, *sp. nov.*

Frutices 1–3 m alti. *Ramuli* glabri vel sparse appresse-pilosi, plerumque pallide brunnea vel rubella-brunnei. *Phyllodia* ad ramulos continua, filiformia, teretia, (8–)10–28(–32) cm longa, 0.6–1 mm diam., non rigida, glabra, viridia, 8-nervata, inter nervos profunde sulcata, acuta ad acuminata, innocua; pulvinus absens vel aliquando rudimentissimi. *Spicae* 15–60 mm longae, floribus laxe dispositae, pallide aureae; pedunculi 3–7.5 mm longi, ± sparse apresse pilosi. *Flores* 4-meri; calyx cupulatus, breviter dissectus, longitudine ¼–⅓ corrolla aequantius. *Legumina* sub-moniliformia, 4–20 cm longa, 4–5 mm lata, tenuiter coriacea-crustacea ad firme chartacea, ad maturitatem glabrum; nervus marginalis flavus, non vel vix incrassatus. *Semina* longitudinaliter disposita, obloidea, ellipsoidea vel leviter ovoidea, 3–3.5(–4) mm longa, 2.5(–3) mm lata, plerumque in centro minute foveata; pleurogramma obscurissimum; arillus conspicuus.

Typus: east of Morawa, Western Australia [precise locality withheld for conservation purposes], 27 June 2006, *B.R. Maslin* 8791 (*holo*: PERTH 07414951; *iso*: AD, CANB, K, MEL, NSW, NY, PERTH 07481497).

Acacia sp. Karara (C. Godden 14), Western Australian Herbarium, in FloraBase, http://florabase.dec.wa.gov.au [accessed June 2007].

Photographs. WorldWideWattle [online at www.worldwidewattle.com].

Openly branched, spreading *shrubs* 1–3 m tall, single-stemmed or dividing just above ground level into a number of slender, much-branched stems, the crowns not dense, confined to ends of branchlets the dead phyllodes do not remain attached to the branchlets for very long. *Bark* grey and smooth. *Branchlets* terete, finely ribbed, ascending to erect, straight to slightly flexuose, glabrous or (especially at extremities) sparsely appressed-hairy, light brown or reddish brown except sometimes light green towards the tips. *Phyllodes* continuous with branchlets, filiform, terete, (8–)10–28(–32) cm long, 0.6–1 mm diam., not rigid, ascending to erect, sub-straight to moderately incurved with few irregularly sinuous, glabrous except sparsely appressed-hairy towards apex of juvenile phyllodes, green; *longitudinal nerves* 8, deeply longitudinally grooved between nerves; *apices* acute to acuminate, straight to uncinate, not pungent; *pulvinus* absent or occasionally very rudimentary. *Gland* situated on upper surface of phyllode 0–7 mm above the base. *Inflorescences* simple or rudimentary racemes with axis to *c.* 1 mm long; *spikes* one or two

paired in axil of phyllodes, 15–60 mm long and 3.5–5 mm wide when dry, the flowers loosely arranged (receptacle clearly visible between flowers, best observed in mature buds), light golden; *peduncles* 3–7.5 mm long, ± sparsely appressed-hairy; *receptacle* ± sparely appressed hairy. *Bracteoles* spathulate, 0.5 mm long, the short claw about equal in length to the calyx. *Flowers* 4-merous; *calyx* cupular and ¼ to ⅓ the length of corolla, shortly dissected (for *c*. ¼ its length) into broadly triangular lobes, calyx tube nerveless and sparsely appressed-hairy; *petals* 1.5 mm long, nerveless or very obscurely 1-nerved, free almost to base, glabrous; *ovary* densely white short-tomentose. *Pods* sub-moniliform, shallowly to deeply constricted between the seeds and rounded over them, 4–20 cm long (including base of stipe *c*. 1 cm long), 4–5 mm wide, thinly coriaceous-crustaceous to firmly chartaceous, sub-straight to shallowly curved, sparsely appressed-hairy when young but glabrous when mature, light brown; *marginal nerve* yellow, not or scarcely thickened. *Seeds* longitudinal in pods, obloid to ellipsoid or slightly ovoid, 3–3.5(–4) mm long, 2.5(–3) mm wide, compressed (2–2.5 mm thick), normally minutely pitted at centre, normally with satin lustre, dark brown to black; *pleurogram* very obscure; *areole* 'u'-shaped, open towards the hilum, 0.5–0.7 × 0.4–0.5 mm; *funicle* expanded into a conspicuous terminal *aril* which is creamy white near the funicle and brown near attachment to seed. (Figure 1)

Characteristic features. Openly branched *shrubs* 1–3 m, crown not dense, the dead phyllodes not remaining attached to branchlets for very long. *Phyllodes* continuous with branchlets, filiform, terete, innocuous, (8–)10–28(–32) cm long, 0.6–1 mm diam., not rigid, mostly sub-straight to moderately incurved; *longitudinal nerves* 8, deeply grooved between nerves; *pulvinus* absent or occasionally rudimentary. *Inflorescences* simple or rudimentary racemes; *spikes* 15–60 mm long, the flowers loosely arranged; *peduncles* 3–7.5 mm long. *Flowers* 4-merous; *calyx* cupular, ¼ to ⅓ length of corolla, shortly dissected. *Pods* sub-moniliform, 4–20 cm long, 4–5 mm wide, thinly coriaceous-crustaceous to firmly chartaceous, glabrous at maturity, light brown; *marginal nerve* yellow, not or scarcely thickened. *Seeds* longitudinal in pods, normally minutely pitted at centre; *pleurogram* very obscure; *areole* very small; *funicle* expanded into a conspicuous terminal aril.

Selected specimens examined. WESTERN AUSTRALIA: [localities withheld] E of Morawa: 19 May 2006, *D. Coultas s.n.* (PERTH 07299478); 18 May 2006, *C. Godden* 14 (PERTH); 27 Sep. 2005, *A. Markey & S. Dillon* 3329 (PERTH); 27 June 2006, *B.R. Maslin* 8791A (G, NT, PERTH); 16 Nov. 2005, *G. Woodman* M 41.2 (PERTH). Mt Gibson area: 4 June 1984, *D.G. Fell* 0216 (PERTH).

Distribution. Of restricted occurrence in the Midwest region of south-west Western Australia where it is known from only two general areas (Western Australian Herbarium 1998–). Most collections are from the Blue Hill Range (about 80 km east of Morawa) and some low ranges located about 6 km to the east and south of Windaning Hill; there is also a single gathering from Mt Gibson (about 120 km south-east of Morawa). Within the Blue Hill Range it is most common on 'Karara Range' but it also occurs, in smaller numbers, on a few other hills and ranges within the area. The Mt Gibson occurrence is described as having a scattered distribution, but forming groups of individuals.

Habitat. Acacia karina is located in a semi-arid region which receives an annual rainfall of 250–300 mm, most of which falls during the winter months (June to August). In the Blue Hill Range it is mainly associated with BIF in a variety of topographical situations, namely, the crest and upper slopes, the mid to lower slopes and the flatter surrounding terrain (Markey & Dillon, in review). It grows in shallow, acidic, orange to red-brown soils comprising silty clay loam, hard clay and silty stoney clay over BIF, or occasionally granite (Markey & Dillon, in review; Woodman Environmental Consulting 2007). The Mt Gibson specimen is recorded as having been found on a moderate breakaway slope of outcropping shalestone. Associated vegetation includes thickets and shrubland dominated by *Allocasuarina* species (*A. acutivalvis, A. campestris* and *A. dielsiana*), *Grevillea paradoxa*, *Melaleuca*

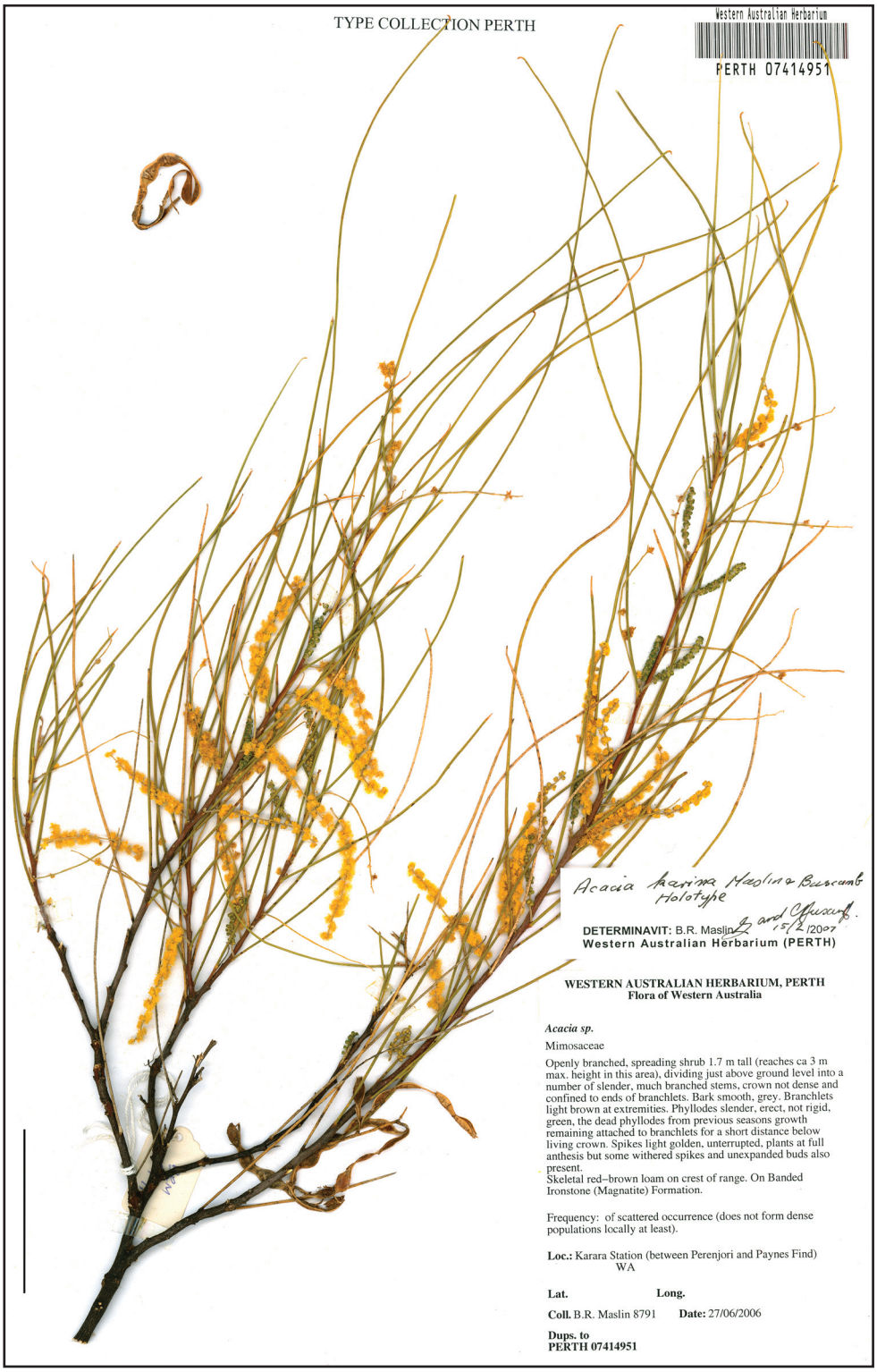

Figure 1. Holotype of *Acacia karina* (*B.R. Maslin* 8791), scale = 5cm.

species (*M. hamata* and *M. nematophylla*) and a range of *Acacia* species (e.g. *A. sibina, A. burkittii* and *A. aneura*) in Community Types 1a, 1b and 2 of Markey & Dillon (in review) and Floristic Community Types 3, 5b, 8, 10b, 12, 13 and 15 of Woodman Environmental Consulting (2007). There is no vegetation information available for the Mt Gibson occurrence.

Flowering and fruiting period. Extant collections show the species as flowering from about early May to the end of June, and judging from this material it is likely that flowering would extend to about late July. Pods with mature seeds have been collected between mid-November and late March.

Conservation status. Acacia karina is listed by Atkins (2006) as a Priority Two taxon, under *Acacia* sp. Karara (C. Godden 14).

Etymology. The botanical name honours Karina Knight who has been employed since 1984 as a technician at the Western Australian Herbarium where she currently holds the position of Collections Manager. Over the past 23 years Karina has provided excellent technical support to the first author on many projects, in particular, the "Flora of Australia" treatment of *Acacia* (Maslin 2001), the WATTLE identification key (Maslin 2001a) and numerous taxonomic publications (often co-authored by Richard Cowan, e.g. Cowan & Maslin 1993, 1995).

Common name. Karina's Wattle.

Variation. Acacia karina shows little variation over its restricted geographic range, however, phyllodes on some juvenile plants are slightly longer (to 32 cm) and are more sinuous than those found on the adults.

Affinities. *Acacia karina* is a member of *Acacia* sect. *Juliflorae* (Benth.) Maiden & Betche and is most closely related to *A. stanleyi* Maslin (2007 this issue) which occurs only about 50 km south of the southernmost occurrence of *A. karina*. *Acacia karina* resembles *A. stanleyi* in that it has the same distinctive 8-nerved, terete phyllodes which are continuous with the branchlets and 4-merous flowers that are arranged in spicate inflorescences. However, *A. stanleyi* differs in having phyllodes that are thicker (1–1.5 mm in diameter), more rigid and which persist on the branchlets for a long period upon dying. Also, the upper branchlets (where the inflorescences are produced) of *A. stanleyi* are yellow (reddish brown in *A. karina*), the flowers are densely arranged in the spikes (receptacle is not visible between adjacent flowers), the peduncles are shorter (1–2 mm compared with 3.5–7.5 mm in *A. karina*) and the bracteoles are about twice as long. The carpological features of the two species are very similar. *Acacia stanleyi* is confined to granite outcrops whereas *A. karina* grows mainly on BIF (only rarely found on granite) and flowers slightly later in the season (July–September compared with May–July in *A. karina*). Both these species are closely allied to *A. jibberdingensis* Maiden & Blakely which differs most obviously in having (commonly flat) phyllodes with a distinct pulvinus at their base (pulvinus absent or very rudimentary in *A. karina* and *A. stanleyi*).

Discovery. Judging from herbarium records *A. karina* was first discovered in June 1984 on Mt Gibson Station by D.G. Fell who lodged a flowering specimen at the Western Australian Herbarium; the species has not since been found at this locality. This specimen was judged to be taxonomically atypical but remained unnamed for many years. Twenty years later, in 2004, Greg Woodman collected the species from the Blue Hill Range to the east of Morawa (about 60 km to the northwest of Mt Gibson Station) and further gatherings were subsequently made from this same general area by staff from Woodman Environmental Consulting (namely, David Coultas, Cathy Godden and Greg Woodman) and by Adrienne Markey, Steve Dillon and the present authors from DEC.

Acacia woodmaniorum Maslin & Buscumb, *sp. nov*.

Frutices intricate ramulosi, effusi, aculeati, (0.5–)1–2 m alti. *Surculi novi* primum rubri. *Ramuli* leviter flexuosi, glabri. *Phyllodia* continuosa, bifariam decurrentia, alae oppositae (2–10 mm latae) secus ramulos facientia, coriacea, glabra, glauca; nervus marginalis flavus (ruber ubi juvenia); phyllodia parte libera 2–3 spinis rigidis acutis 3–6(–8) mm longis ornata. *Glans* sessilis. *Inflorescentiae* racemorum simplicium vel rudimentariorum; capitula globulosa, floribus 27–28, pallide aurea; pedunculi 8–15 mm longi, in fructu ad 20 mm longi. *Flores* 5-meri; sepala libera. *Legumina* anguste oblonga, 10–45 mm longa, 5–7 mm lata, recta vel varie curvata glabra. *Semina* plerumque transversa, aliquantum irregulariter formata, ad centrum elevata, versus margines angustata.

Typus: east of Morawa, Western Australia [precise locality withheld for conservation purposes], 27 June 2006, *B.R. Maslin* 8796 (*holo*: PERTH 07414897; *iso*: CANB, G, K, MEL, NSW, NY).

Acacia sp. Blue Hill Range (R.J. Cranfield 8582), Western Australian Herbarium, in FloraBase, http://florabase.dec.wa.gov.au [accessed June 2007].

Photographs. WorldWideWattle [online at www.worldwidewattle.com].

Intricately branched, sprawling, harsh, prickly *shrubs* (0.5–)1–2 m tall and up to 2 m across, the dead (grey) phyllodes persisting on lower branches below the living crown. *Bark* grey, slightly roughened. *New shoots* glabrous, red when first initiated. *Branchlets* shallowly flexuose, glabrous. *Phyllodes* continuous and bifariously decurrent to form opposite wings along the branchlets, each wing continued to the next below and notched at the nodes between adjacent phyllodes, the wings 2–10 mm broad, coriaceous, glabrous, glaucous to sub-glaucous, ± lightly pruinose and dull but aging green and ± shiny, the marginal nerve yellow (except red when young); *free portion of phyllodes* bearing 2 or 3 very prominent, rigid, straight, sharp, brown spines 3–6(–8) mm long, sinus between spines concave; with 1 or 2 main *nerves* extending from the branchlet to the lowermost point of the sinuses or to near the base of the uppermost spine, minor nerves (sub-parallel to the main nerves, or branching from main nerves) often sparingly bifurcating. *Gland* situated on upper margin of free portion of phyllode 1–6 mm above the base (often about half-way between the branchlet and the first spine), circular to elliptic, about 0.4 mm long, sessile and plane (i.e. flush with the margin, not situated on a triangular spur). *Inflorescences* simple or rudimentary racemes with axis less than 1 mm long, 1 or 2 per node; *heads* globular, 27–28-flowered, light golden; *peduncles* 8–15 mm long when in flower, to 20 mm long in fruit; *basal peduncular bracts* sub-persistent, *c*. 1 mm long, scarious, concave, obscurely striate, brown, fimbriolate otherwise glabrous. *Bracteoles* *c*. equal to sepals in length, spathulate, claws linear to narrowly oblong and glabrous or sparsely hairy; laminae dark brown and fimbriolate. *Flowers* 5-merous; *sepals* free, *c*. ½ length of petals, narrowly oblong to linear, fimbriolate at the often brown apices; *petals* 2.2 mm long, nerveless, glabrous. *Pods* narrowly oblong, flat but slightly rounded over seeds along the midline, ± thinly coriaceous-crustaceous, straight edged or very slightly constricted between seeds, 10–45 mm long, 5–7 mm wide, straight to shallowly or moderately curved, sometimes strongly recurved or twisted upon dehiscence, glabrous, dark brown; *marginal nerve* indistinct. *Seeds* mostly transverse in pods, some occasionally longitudinal, somewhat irregularly shaped, obloid to ellipsoid or ± globose, cubic or rhomboidal, obliquely truncate along edge adjacent to aril, 3–4 mm long, 3–3.5 mm wide, raised at centre and narrowed toward the margins, glossy, dark greyish brown to black; *pleurogram* very obscure; *areole* 'u' shaped, open toward hilum, *c*. 0.5–0.7 mm long; *funicle* folded beneath an expanded sometimes ± flattened white *aril*. (Figure 2)

Characteristic features. Sprawling, prickly *shrubs* (0.5–)1–2 m, up to 2 m across, the senescent phyllodes

persisting on lower branches below the living crown. New shoots red when initiated. *Phyllodes* continuous and bifariously decurrent to form opposite wings along branchlets, the wings 2–10 mm broad, glaucous to sub-glaucous and dull but aging green and ± shiny, coriaceous; *free portion of phyllodes* bearing 2 or 3 very prominent, rigid, straight, sharp, brown spines 3–6(–8) mm long; *marginal nerve* yellow (except red when young). *Gland* situated on upper margin of free portion of phyllode 1–6 mm above the base, sessile. *Heads* globular; sepals free, *c*. ½ length of petals. *Pods* narrowly oblong, straight to variously curved, ± thinly coriaceous-crustaceous. *Seeds* somewhat irregularly shaped, 3–4 mm long, raised at centre and narrowed toward the margins.

Selected specimens examined. WESTERN AUSTRALIA: [localities withheld] E of Morawa: 22 Apr. 2006, *D. Coultas* 1 & 2 (both PERTH); 22 Nov. 1992, *R.J. Cranfield* 8582 (PERTH); 24 June 2004, *C. Godden* & *G. Woodman* C 78.1 (PERTH); 5 July 2004, *G.J. Keighery* 16628 (AD, PERTH); 14 Sep. 2005, *A. Markey & S. Dillon* 3322 (DNA, PERTH).

Distribution. Of very restricted occurrence in the Midwest region of south-west Western Australia where it is known from just three populations (in close proximity to one another, i.e. about 1–5 km apart) in the Blue Hill Range about 80 km east of Morawa (Western Australian Herbarium 1998–). See under *Conservation status* below for further details.

Habitat. Acacia woodmanorium is located in a semi-arid region which receives an annual rainfall of 250–300 mm, most of which falls during the winter months (June to August). It occurs on banded ironstone ridges of hematite and magnetite and appears to be highly substrate-specific to this rock type (Markey & Dillon, in review). The soils are skeletal, acidic, red-brown loam, sandy loam or silt. Typically the species is found relatively high in the landscape (over 400 m), often growing in rock crevices on exposed, steep slopes. It grows in tall shrubland or thickets dominated by *Acacia* species, *Allocasuarina acutivalvis* and/or *Eucalyptus petraea*, in Community Types 2 and 4a of Markey & Dillon (in review) and Floristic Community Types 9–14 of Woodman Environmental Consulting (2007).

Flowering and fruiting period. Flowering commences in late June with some flowers persisting until August; the main flowering flush is in July. Pods with mature seeds have been collected between late November and late March.

Conservation status. This species is listed by Atkins (2006) under its phrase name, *Acacia* sp. Blue Hill Range (R.J. Cranfield 8582), as a Priority Two taxon. However, a submission has been made to Gazette this species as a Declared Rare Flora. *Acacia woodmaniorum* is known from just three populations over an area of about 40 km^2. The main population comprises several to many thousand individuals while the other two populations contain much smaller numbers. All three populations occur in an area covered by mining exploration leases.

Etymology. The botanical name honours the Woodman brothers, Simon, Richard and Greg, who have rendered great technical and professional help to the first author over a number of years: Simon for assistance with computing matters, including his role as 'web master' for the WorldWideWattle website (www.worldwidewattle.com), Richard for assistance with photography and the use of Photoshop, and Greg for field collections and unpublished information concerning the two new species described here.

Common name. Woodman's Wattle.

Affinities. *Acacia woodmaniorum* is a member of *Acacia* sect. *Alatae* (Benth.) Pedley. It is a very

Figure 2. Holotype of *Acacia woodmaniorum* (*B.R. Maslin* 8796), scale = 5cm.

distinctive species on account of its phyllodes, which are continuous and decurrent along the branchlets to form bifarious wings, and with the free portion of the phyllodes bearing three prominent spines. It is most closely allied to *A*. *alata* R.Br. and in particular, to the most northerly distributed variety of that species, var. *biglandulosa* Benth. (which occurs in the general vicinity of Geraldton, about 200 km to the north-east of where *A*. *woodmaniorum* is found). However *A*. *alata* var. *biglandulosa* differs significantly from the new species in a number of ways: its sepals are united and very short (about ¼ the length of the petals), there are 4–7 flowers per head and these are white in colour, and the free portion of the phyllodes bear only a single spinose point and have 2 or 3 prominent stipitate glands (situated on short but distinct triangular projections) along the margin; the pods are densely hairy and the phyllodes are normally also hairy to some degree. Very occasionally the stipitate glands of var. *biglandulosa* are replaced by rudimentary spinose structures but these are distinct from the long, rigid spines that characterize *A*. *woodmaniorum*. In the new species a single, sessile gland occurs on the upper margin of the free portion of the phyllode.

Discovery. Judging from herbarium records *A*. *woodmaniorum* was discovered in 1992 by Western Australian Herbarium botanist, Ray Cranfield, during a reconnaissance rangeland survey of the Sandstone-Yalgoo-Paynes Find area with staff from the Western Australian Department of Agriculture. The results of the survey are published in Payne *et al*. (1998) but *A*. *woodmaniorum* is not listed in this work because its taxonomic status was unknown at the time. The most significant collections of the species were made between 2004 and 2006 by two independent groups who undertook work in the area where the new species occurs, namely, staff from Woodman Environmental Consulting (David Coultas, Cathy Godden and Greg Woodman) and DEC (Adrienne Markey and Steve Dillon).

Notes. Recent observations of undisturbed sites within its native area of occurrence show *A*. *woodmaniorum* as having good seedling recruitment (regeneration is from seed).

Acknowledgements

We wish to thank Gindalbie Metals Ltd for their generous financial and other support of this study. We also thank the staff of Woodman Environmental Consulting (namely, David Coultas, Cathy Godden and Greg Woodman) for providing specimens and information concerning the two new species and the environment in which they occur. Thanks also to Steve Dillon and Adrienne Markey (DEC) for their helpful site information, botanical knowledge and collections of the two new species. Paul Wilson is thanked for providing the Latin descriptions.

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