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NOTES ON THE GENUS *MICROTIS* (ORCHIDACEAE) IN WESTERN AUSTRALIA WITH THE DESCRIPTION OF TWO NEW TAXA

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Abstract

A new key is provided for the ten species of *Microtis* recognised for Western Australia. Reasons are given for the reinstatement of *M. media* R. Br. and an expanded description given. The new combination *M. media* ssp. *densiflora* (Benth.) R. Bates is made and a new subspecies, *M. media* ssp. *quadrata* as well as *M. familiaris*, a new species with no close similarity to any other, is described. The occurrence of *M. unifolia* (Forster f.) Reichb. f. sens. str. in Western Australia is questioned. Additional notes are provided for: *M. alba*, *M. atrata*, *M. globula*, *M. orbicularis*, *M. parviflora*, *M. pulchella* and *M. rara*.

Introduction

Bates (1984) accepted only seven species of *Microtis* from Western Australia, but indicated the presence of several undescribed taxa and recognised that *M. unifolia* sens. lat. was possibly a complex of many taxa. This is confirmed here with the acceptance of *M. media* as a species with at least three subspecies all endemic to Western Australia and previously included under *M. unifolia*. A. Brown in 1985 collected plants of an obvious new species and sent material together with photographs to the author, who made further collections in 1987. This new species, previously also collected by A.S. George, is here described as *M. familiaris*. Bates (1986) confirmed the presence of *M. parviflora* in semi-arid Western Australia and speculated about many *Microtis* variants that could be attributed to hybridising and subsequent cloning through apomixy to form numerous microspecies. For this reason only widespread and relatively constant forms have been given recognition here in the form of taxa despite the author personally recording over 20 variants during field work in Western Australia in 1981, 1984 and 1987 for a total of 14 weeks.

Key to the species of *Microtis* in Western Australia

1. Labellum without callosities 2
1. Labellum with swellings or callosities 3
2. Flowers yellow-green drying back; labellum elliptic, lamina flat; lateral sepals spreading *M. atrata*
2. Flowers green or red and green, not drying back; labellum orbicular, lamina concave; lateral sepals hidden below labellum *M. orbicularis*
3. Labellum margins with granular excrescences 4
3. Labellum margins entire, crenulate or thickened but without granular excrescences 5
4. Flowers usually white or almost so; labellum clearly bilobed and with a long slender basal callus *M. alba*
4. Flowers green, yellow-green or pale green; labellum not strongly bilobed, basal callus not much longer than broad *M. media*
5. Flowers clear white *M. pulchella*
5. Flowers greenish 6
6. Flowers globular due to lateral sepals and petals curving inward *M. globula*
6. Flowers widely expanded; lateral sepals reflexed to revolute 7

7. Lateral sepals curved back to clasp ovary *M. familiaris*
7. Lateral sepals revolute, not clasping the ovary 8
8. Labellum almost triangular, margins not crenulate, with apical callus hardly developed *M. parviflora*
8. Labellum oblong, margins crenulate, with apical callus well developed 9
9. Flowers crowded; labellum less than twice as long as broad; petals partly hidden within dorsal sepal *M. unifolia* sens. lat.
9. Flowers well spaced; labellum more than twice as long as broad; petals spreading widely below dorsal sepal *M. rara* (*M. brownii* sens. strict.)

New taxa and combinations

M. familiaris R. Bates, sp. nov.

M. rara floribus minutissimis, labelli margine paene integris, sepalis lateribus implectentibus ovarium caulemque superum lateraliter compressum differt.

Holotype: Boat Harbour, in surrounds of Owingup Swamp, 17.xii.84, *A.P. Brown 171* (AD; iso.: PERTH).

Plants 10-20 cm high, very slender, almost wiry; tuber small, 6-9 mm diam., globular, glabrous, formed at end of 2-8 cm long 'dropper roots'. *Leaf* linear, terete, subtended at soil level by a cylindrical hyaline sheath 1-2 cm long, wholly green, apex erect, shorter than inflorescence. *Scape* green, filiform, emerging from the leaf 1-4 cm above soil level, average diameter 2 mm, laterally compressed above, appearing oblong in cross section. *Flowers* 10-20, very small, pale green, suberect, in loose irregular spike 3-5 cm long, each subtended by an ovate, acuminate bract c. 2 x 1 mm; pedicel 0.5-1.5 mm long, ovary ellipsoid, 4-5 mm long, strongly ribbed, not curved. *Dorsal sepal* ovate, apiculate, 2.2-2.6 x 1.4-2 mm, shallowly galeate below, arched forward to give flowers a slightly nodding appearance; lateral sepals lanceolate, 2-0.8 mm, swept backwards, clasping the ovary in a most distinctive fashion. *Petals* linear-lanceolate, falcate, 1.5 x 0.3 mm, partly within galea. *Labellum* oblong, 2-0.8 mm, abruptly bent downwards at the base and parallel with but not appressed to ovary, almost entire, narrower towards the truncate apex; basal calli saddle-shaped, minutely tuberculate on their apical margins and with a conical nectar pit at the base, apical callus minute, little more than a granular roughening of the apical median surface. *Column* 0.3 x 0.2 mm, auricles quadrate, less than 0.1 x 0.1 mm; anther about 0.1 mm high, without mucro; stigma reniform; caudicle insignificant. Fig. 1.

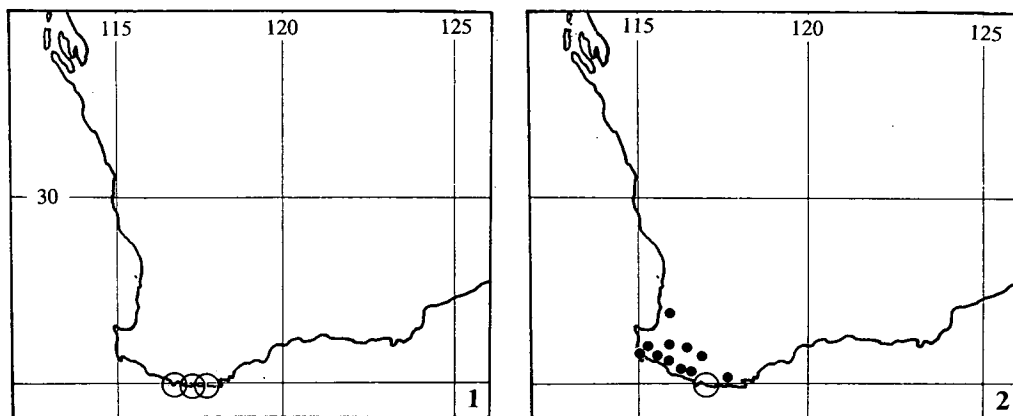
Flowering: December and January; the blooms with a faint sweet fragrance only noticeable at temperatures above 25°C.

Distribution and ecology (Map 1)

This species almost parallels the distribution of several other *Microtis* species notably *M. pulchella* and *M. globula*. These occur only in a narrow coastal strip from near Albany to east of Augusta, a distance of about 300 km.

The species is found only in coastal peat bogs with low heath and sedges, usually near running water and in the company of other *Microtis* species, but is rare. It forms small to extensive colonies, probably by vegetative increase, and flowering only after burns, particularly summer wildfires. *M. familiaris* was located in only four of about 40 similar burnt peat bogs in the Nornalup - Northcliffe area in December 1987, in all cases with *M. pulchella* present, in two cases *M. globula* and once with *M. rara*, *M. media* and *M. alba*.

Conservation status: 3RC.



Map 1. Distribution of *M. familiaris* R. Bates. Map 2. Distribution of *M. media* R. Br. ssp. *quadrata* R. Bates ○; ssp. *densiflora* (Benth.) R. Bates ●.

Notes

The very low leaf fistula, the remarkably compressed upper scape and rhachis, the very small flowers (which are about half the size of its closest ally *M. rara*), the unique ovary-clasping lateral sepals and the almost entire labellum margins make this a distinct species.

A. Brown (pers. comm. 1985) collected and photographed plants which were somewhat intermediate between *M. alba* and *M. familiaris*; they were growing at the type locality of *M. familiaris*. In view of the disparity in flower size of the two species there must be some doubt as to the interpretation of hybrids. Further work is required to ascertain whether the plants were indeed hybrids or represent a new taxon.

Etymology

The specific epithet is derived from Latin *familiaris*, friendly, being an allusion to the observation that the species grows with large populations of other *Microtis* species such as *M. pulchella*, *M. globula* and *M. rara*.

Collections seen

WESTERN AUSTRALIA; 20 km W Crystal Springs, burnt swamp along drainage line, 10.xii.1987, *R. Bates 13212* (AD); 6 km SE Walpole, burnt swamp near sea, 11.xii.1987, *R. Bates 13272* (AD); 10 km SE Nornalup, burnt swamp near sea, 11.xii.1987, *R. Bates 13278* (AD).

M. media R. Br., Prod. 321 (1810) (for full synonymy and references see Bates, J. Adelaide Bot. Gard. 7 : 82 (1984).

Type: King George Sound, 1801, *R. Brown s.n.* (lecto. designated here: BM!, isolecto: BM!; Oyster harbour, xii.1801, *R. Brown s.n.* (syn.: BM!)

Typification

The lectotype designated here is the largest and most intact specimen on a sheet of three. It is marked 'a' and best fits the original description. The selection of the lectotype was deemed necessary because of the considerable variations, particularly in labellum structure of the type specimens. The lectotype sheet bears the Bennett number 5593 and a label "3 *Microtis media* prodr. 321, King George Sound, 1801 RB". Bates (1984) had not seen this specimen.

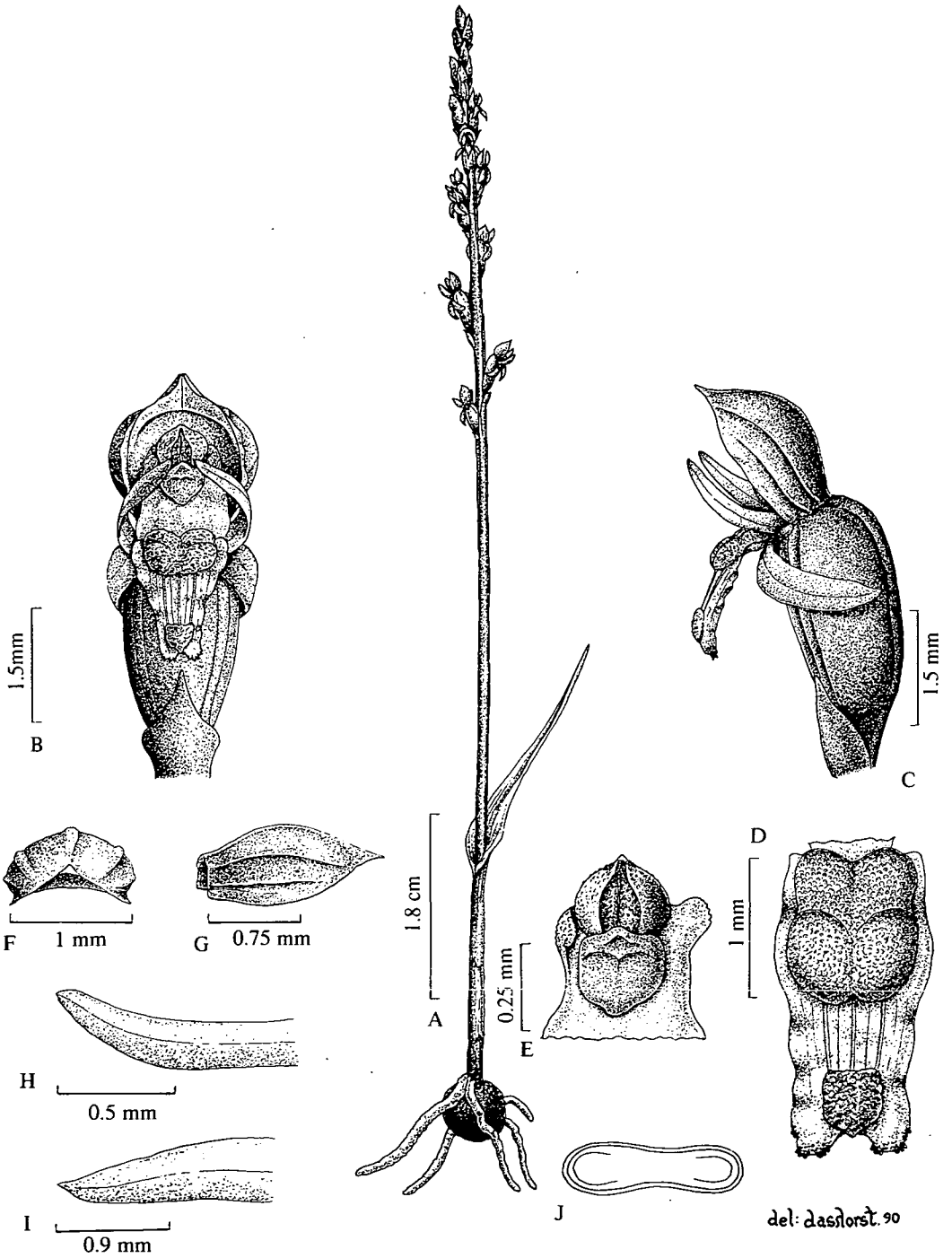


Fig. 1. *Microtis familiaris* R. Bates, based on *Bates 13212*. A, habit; B, flower in front view; C, flower in side view; D, labellum; E, column; F, dorsal sepal in top view; G, dorsal sepal in side view; H, lateral sepal; I, petal; J, transverse section through upper scape.

The Oyster Harbour collection has the Bennett No 5597. There are four specimens on it, marked a-d, and determined by A.S. George (16.xi.1968) as agreeing with the "holotype" of *M. media* and indicated by him as "probable isotypes", but they are all more slender than the lectotype and two are very different (smaller flowers, shorter callosities) as to suggest they might even represent a different taxon. This sheet also contains the lectotype of *M. alba* R. Br.

Plant 15-80 cm high, slender to robust, wholly greenish, glabrous, mucilaginous. *Leaf* exceeding inflorescence or not, but often damaged, 2-6 mm wide near base, apex lax; fistula 5-20 cm above the soil level, not much inflated. *Scape* 5-40 cm long, 2-5 mm diam. *Flowers* pale green, up to 150 in a slender to dense spike 5-20 cm long; pedicel about 1 mm long. *Ovary* pyriform, 3-6 x 2-4 mm; subtending bract ovate-lanceolate, acute, 2-3 x 1.5 mm. *Dorsal sepal* ovate to ovate-lanceolate, 1.5-3 x 1.5-2.5 mm, \pm horizontal, galeate, with a short upturned apiculus; lateral sepals oblong-lanceolate, 2.5-3 x 1-1.5 mm, recurved to strongly revolute. *Petals* lanceolate-falcate, 1.5-2 x 0.6-1 mm, subacute, spreading just below the dorsal sepal or partly within it. *Labellum* \pm oblong, 1.5-3 x 1-2 mm, margins with at least some rounded granular-papillose excrescences; lamina with 3 rather variable callosities, the basal two paired, the apical one granular. *Column* 0.5-1.5 mm high, ovate; auricles quadrate, 0.2 x 0.3 mm; anther retuse.

Notes

Noticeable features of *M. media* include the presence of irregular, granular excrescences on the labellum margin, very long comma-shaped basal calli and a very shallow dorsal sepal. These are clearly not features of *M. unifolia* or indeed of any species outside Western Australia and for this reason *M. media* is here reinstated as a species distinct from *M. unifolia* and apparently endemic to Western Australia.

It is, however, an extremely variable species particularly in labellum size, length and shape. Extensive field work by the author has shown that although some of the variants are highly localised and possibly clonal in nature (Bates 1985), there are at least three widespread forms with discrete geographical range, habitat preference and flowering time, and these are here described as separate subspecies. It should be noted that one of these subspecies (*M. media* ssp. *quadrata*) shows some of the characters of *M. unifolia*, namely the short basal callus on the labellum and a short concave dorsal sepal.

Key to the subspecies of *M. media*

1. Labellum thin textured, margins almost entire except for minor granular excrescences, apical callus much reduced b. ssp. *densiflora*
1. Labellum thick textured with many very obvious marginal excrescences, apical callus distinctly raised and well marked 2
2. Flowers yellow-green; dorsal sepal shallow; labellum basal callus longer than broad a. ssp. *media*
2. Flowers green; dorsal sepal distinctly concave; labellum basal callus as broad as long c. ssp. *quadrata*

a. ssp. **media**.

Plant 10-80 cm tall, slender to robust, yellow-green. *Dorsal sepal* ovate-lanceolate, 2-2.5 x 1.5-2 mm, shallowly galeate, not ribbed, apiculate; lateral sepals revolute, to 3 mm long. *Petals* acute, to 1.8 mm long. *Labellum* oblong, 2-3 x 1.5-1.8 mm, thick textured, recurved, margins with numerous round to irregular, granular-papillose excrescences of varying sizes; basal callus longer than broad, shaped like a toilet seat, apical callus variable but distinctly raised. *Column* 1 mm high, anther mucronate, caudicle 0.2 mm long. Fig. 2A-E.

Flowering

September to January depending on latitude, habitat and soil moisture. The flowers often have a faint sweet perfume. Flowering freely without fires in open situations but requiring fire to initiate blooming in very poor soils or amid dense vegetation.

Distribution and ecology

Common, widespread and variable taxon endemic to south-west Western Australia from the Murchison River in the north to Israelite Bay in the south-east. Usually in soils which are boggy for at least part of the year (or about rock-outcrops inland) in a wide variety of habitats from coastal heathland and swamps to along inland watercourses.

Conservation status: common and well conserved.

Selected specimens (from 56 seen)

WESTERN AUSTRALIA: York, 1903, *C. Andrews s.n.* (PERTH); Yarrowee near Jarnadup, 5.xii.1921, *I. Knox-Peden* sub *Rogers 2203* (AD); Robinsons Hill, Albany, 18.xi.1919, *A. Syme-Johnson s.n.* (AD); Fitzgerald River, 7.xi.1984, *C. Martin 4792* (AD).

b. ssp. **quadrata** R. Bates, ssp. nov.

a *M. media* ssp. *media* sepalo dorsalo concaviore atroviridi, floribus crassioribus; labello brevior et latior exrescentiis marginalis aequaliter dispositis sepalisque lateralibus indistincte revolutis differt.

Holotype: Clay swamp south-east Nornalup, 12.xii.1987, *R. Bates 13277* (AD; iso.: PERTH, wet coll. AD).

Plant 30-80 cm tall, robust, usually green. *Dorsal sepal* shortly ovate, 3-3.5 x 2.5 mm, deeply concave below, lightly ribbed above, shortly apiculate; lateral sepals not strongly revolute, to 3 mm long. *Petals* obtuse, to 1.8 mm long. *Labellum* almost quadrate, 2-2.5 x 1.7-2 mm, thick textured, strongly recurved against ovary, margins with very regular excrescences, basal callus about as long as broad, apical callus strongly raised. *Column* 1.5 mm high, caudicle 0.2 mm long. Fig. 2L-P.

Flowering: December and January; flowers not distinctly perfumed.

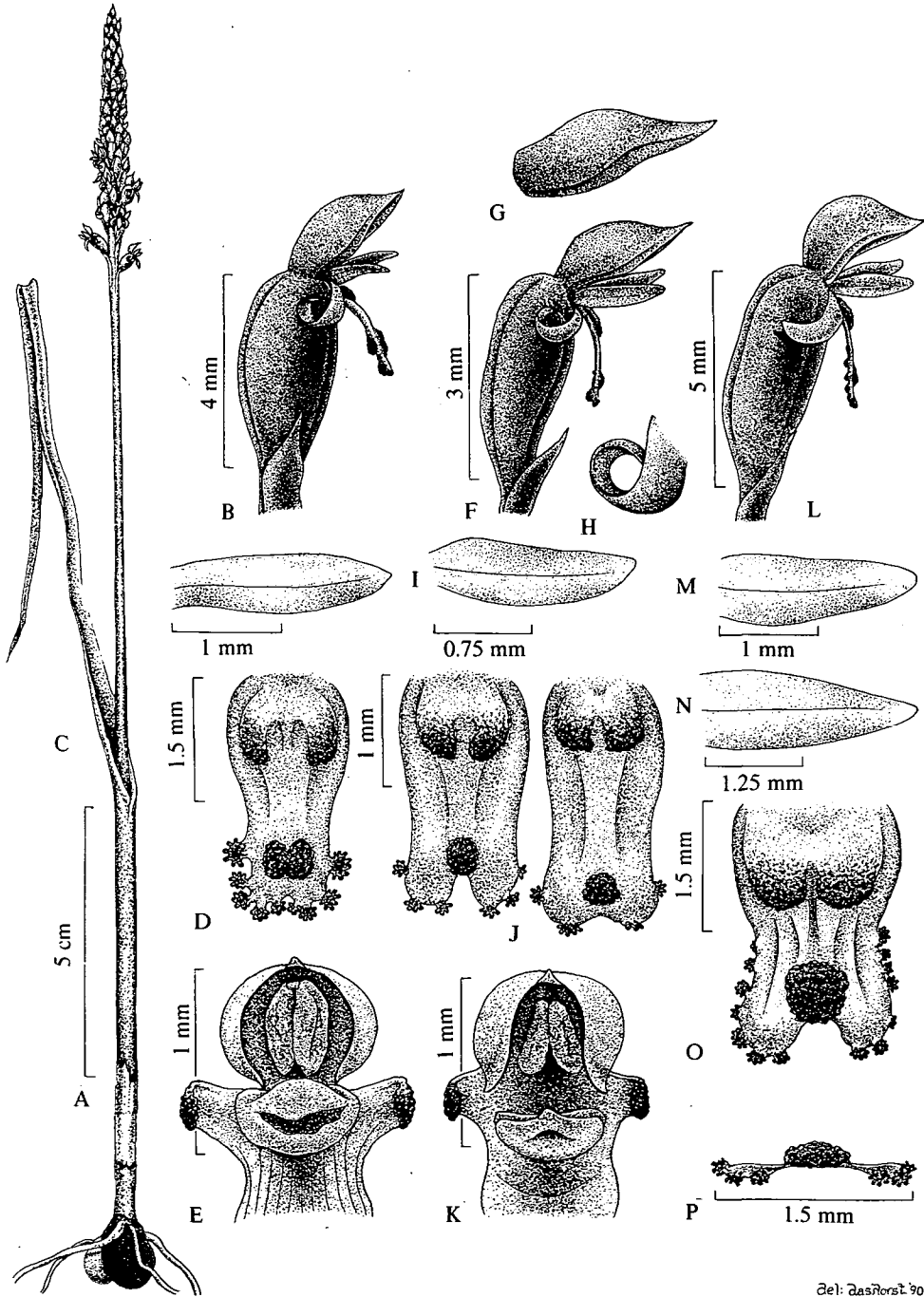
Distribution and ecology (Map 2)

Endemic to a few clay-based, coastal swamps from near Albany to Walpole, forming small colonies amongst heath and sedges but apparently only flowering after fires. *M. media* ssp. *quadrata* was noted in 1987 at several recently burnt swamps between Walpole and Denmark. In one of these it was the only *Microtis* species; elsewhere it grew near *M. pulchella*, *M. globula* and *M. media* ssp. *media*. The number of clay-based swamps on the south coast would appear to be limited, the majority of them having been converted to pasture. For this reason ssp. *quadrata* must be considered the most vulnerable of the named taxa of *Microtis*. At the type location some dozen colonies were noted; these contained between 10 and 150 plants closely packed together on low mounds set in seeping water. It is likely that these mounds never dry out. *M. media* ssp. *quadrata* is conserved only in the Walpole-Nornalup National Park.

Conservation status: 2VC (see above).

Notes

Ssp. *quadrata* differs from ssp. *media* principally in the shorter more deeply concave, ribbed



Del: R. Bates '90

Fig. 2A-E. *Microtis media* R. Br. ssp. *media*, based on *Bates 13272*; A, habit; B, flower in side view; C, petal; D, labellum; E, column; F-K. ssp. *densiflora* (Benth.) R. Bates, based on *Bates 2898*; F, flower in side view; G, dorsal sepal; H, lateral sepal; I, petal; J, labellum variation; K, column; L-P. ssp. *quadrata* R. Bates, based on *Bates 13277*; L, flower in side view; M, petal; N, lateral sepal; O, labellum in front view; P, labellum viewed from the apex.

dorsal sepal, the deeper green, more fleshy flowers, the more regular labellum with evenly spaced marginal excrescences, the shorter, blunter petals and the shorter less distinctly revolute lateral sepals. At the type location ssp. *quadrata* grew within 100 m of several other *Microtis* species, i.e. *M. rara*, *M. familiaris*, *M. alba*, *M. atrata* and a peculiar ornate species with constricted labellum and large excrescences on the apex. This last plant was not encountered elsewhere and is not named here.

Etymology

The epithet '*quadrata*' refers to the short quadrate labellum.

Specimen examined

The type collection is the only one seen.

c. ssp. *densiflora* (Benth.) R. Bates, stat. et comb. nov.

Basionym: *M. parviflora* R. Br. var. *densiflora* Benth., Fl. Austral. 6: 348 (1873).

Type: 'Western Australia', 1849, *J. Drummond 117* (holo., K!; iso.: MEL!).

M. densiflora (Benth.) M. Clements, Austral. Orch. Res. 1: 94 (1990).

M. parviflora non R. Br., sens. auctt.: Pelloe, W. Austral. Orchids 19 (1930).

Plant 10-50 cm tall, slender to robust, wholly yellow-green. *Dorsal sepal* ovate-lanceolate, 2.5-3.5 x 1-2 mm, very shallowly galeate, not ribbed, apiculate; lateral sepals revolute, to 2.5 mm long. *Petals* acute, to 1.5 mm long. *Labellum* oblong, very variable in length, 2-4 x 1-2 mm, thin textured, translucent, gradually deflexed towards ovary, margins largely entire except for irregular granular excrescences which are unevenly spaced but more frequent towards the irregular apex, each labellum even on same spike usually slightly different, basal calli comma-shaped and facing each other so as to form brackets enclosing the nectary, apical callus absent or insignificant, often appearing as a slightly raised granular area about 0.2 x 0.2 mm, like a pimple on a pumpkin. *Column* c. 1 mm high, caudicle < 0.2 mm long. Fig. 2F-K.

Flowering

October to January. It is not unusual to find both buds and dehisced seed capsules on the same spike. Not usually perfumed.

Distribution and ecology (Map 2).

Endemic to the south-western tip of Western Australia from south of Perth to near Albany in heath, woodland and clearings in forest, especially on roadsides, often with *M. alba*, but unlike that species, flowering freely without fire or disturbance. Also occurs in lightly grazed pasture like *M. parviflora* and *M. unifolia* in the eastern States.

Conservation status: common and well conserved.

Notes

The thin textured, remarkably irregular labellum with much reduced apical callus and marginal excrescences make this an easily recognised taxon. The subspecies status is indicated by the presence of intermediate forms between this taxon and ssp. *media* while the need to erect the subspecies is indicated by the very great differences between the extreme forms of ssp. *densiflora* and ssp. *quadrata*. *M. media* ssp. *quadrata* is particularly susceptible to floral

irregularities, i.e. teratological freaks such as double flowers, fasciated flower spikes and flowers without anthers are often encountered. The flowers are probably agamosperous.

The type form found behind coastal sandhills often has very dense spikes of up to 150 flowers but inland or forest plants may have fewer flowers, usually less than 50 per spike.

Selected specimens (from 12 examined)

WESTERN AUSTRALIA: Margaret River, 23.xii.1982, *R. Bates* 2898 (AD); Forest Drive near Pemberton, 9.xii.1987, *R. Bates* s.n. (AD, PERTH); Diamond Tree School near Jarnadup, 5.xii.1920, *I. Knox-Peden* sub *Rogers* 2245 (AD).

Additional notes on other species

M. alba

Several distinct forms of this species have been noted. The typical form is a tall slender plant with narrow flower spikes and clear white flowers. These have a very strong apricot odour and the labellum is deeply bilobed. It flowers in burnt forest or swampy heath. A second form with short stems and dense flower spikes occurs on coastal sandhills and heathlands. It flowers earlier than the type form, but the flowers are as for the type. It is interpreted here as an early-flowering ecotype from exposed situations; other orchids notably *Prasophyllum hians* and *Microtis media* react similarly under these conditions. A third form is more perplexing. It has a greenish tint to the flowers, which are smaller and have a less deeply bilobed labellum. It also produces an apricot odour, but this is much less obvious than in the type form. It occurs in the same habitats as the type form and blooms at the same time. It was previously interpreted as a hybrid (A. Brown 1980, Bates 1984 as *M. alba* × *M. unifolia*), but it occurs as large constant populations. Further work is required to establish if it is perhaps a stabilised hybrid between *M. alba* and *M. media*. This greenish form has in the past been occasionally interpreted as *M. media*.

M. atrata and *M. orbicularis*

A curious feature of both of these apomictic species (Bates 1984) was observed in 1987. Plants which were growing in a waterhole south of Northcliffe had been completely inundated after heavy spring rains shortly before flowering. The flowers of both species developed naturally under water except that they remained tightly closed, seed capsules swelled and seed was set as for plants flowering normally around the edge of the waterhole. From observations of all species of *Microtis* in Western Australia it seems likely that some degree of apomixy may occur in each.

M. globula

This species, first described in 1984 from limited collections, has since been found in good numbers between Albany and Northcliffe (A. Brown pers. comm. 1986, Phillips 1988). The author found it in five out of 40 burnt peat bogs examined on a visit to the Walpole area in December 1987. It appears well conserved, but must still be considered rare, and safe only if no further clearing occurs in the area. It is indeed a very constant and well marked species.

M. parviflora

This species was not recorded for Western Australia either by A.S. George (1971) or Bates (1984), but on a visit to the area in 1984 the author found *M. parviflora* to be widespread about inland rock outcrops, usually in semi-arid country (Bates 1985). At the same time A. Brown & S. Hopper (pers. comm.) also determined *M. parviflora* as occurring there, and several earlier collections were discovered at PERTH. Curiously this habitat is most unlike the type location of *M. parviflora* on the eastern coast of Australia and further research is required

to verify that they are indeed the same taxon. *M. parviflora* sens. lat. has recently been found in semi-arid parts of New South Wales and South Australia (see below).

Selected specimens (from 10 seen)

WESTERN AUSTRALIA: 30 km west Mt Magnet on rock outcrops, 2.ix.1984, *R. Bates 4175* (AD, PERTH); Newmann Rock via Balladonia, 26.x.1984, *R. Bates 4675* (AD); West of Red Kangaroo Hill via Coolgardie, xi. 1891, *R. Helms s.n.* (AD).

NEW SOUTH WALES: Nymagee, at base of granite hill, 10.x.1987, *R. Bates 11642* (AD); Cocoparra Ranges, on dry rocky ridges, 15.xi.1989, *R. Bates 21437* (AD).

SOUTH AUSTRALIA: Hiltaba, Gawler Ranges, in moss pockets near rock pool, 26.ix.1989, *R. Bates 20929* (AD, NSW).

M. pulchella

This species is often treated as endangered, but the author found it in 23 of 40 burnt peat bogs in the Walpole area in 1987; indeed it was the most abundant orchid seen in the area during three days of extensive field work. In view of this, *M. pulchella* should be removed from the endangered species list.

M. rara

Bates (1984) placed *M. brownii* H.G. Reichb. in the synonymy of *M. rara* R. Brown but Clements (1990) reinstated *M. brownii* as a species endemic to Western Australia stating that its affinities "appear to be with *M. alba* rather than the eastern Australian species *M. rara*" and that it differed from *M. rara* in "the porrect rather than erect dorsal sepal" and "widely spreading apical lobes of the labellum." However, neither of these characters are found in the type of *M. brownii*. Western Australian plants differ from most eastern States' material in having more shallowly galeate dorsal sepals and sometimes more distinctly thickened labellum margins but these features occasionally occur in eastern populations of *M. rara*. Further research is required before *M. brownii* can be confidently treated as a separate taxon.

M. unifolia sens. lat.

Most collections previously determined as *M. unifolia* from Western Australia belong to *M. media*. There are, however, collections which cannot be satisfactorily placed in *M. media* as they do not have the granular-papillose labellum margins of that species, e.g. Pinjarra Swamps, *R. Bates 4525* (AD). Nor can these collections be placed with *M. unifolia* sens. strict. as they have a shallowly galeate, acuminate dorsal sepal and large thicker labellum compared to the deeply concave dorsal sepals and small thin labellum of *M. unifolia*. It would appear that these represent undescribed taxa but there is a perplexing array of locally constant forms in both Western Australia and in the eastern States which require more detailed studies.

Acknowledgements

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References

- Bates, R. (1984). The genus *Microtis* R. Br. (Orchidaceae): A taxonomic revision with notes on biology. *J. Adelaide Bot. Gard.* 7: 45-89.
- Bates, R. (1986). The genus *Microtis* in Australia. *Orchadian* 8: 163.
- Clements, M.A. (1990). Catalogue of Australian Orchidaceae. *Austral. Orchid Research* 1: 94-96.
- Hoffman, N. & Brown, A. (1984). "Orchids of South-West Australia". (Univ. of W. Australia Press: Perth).