

A new variety of Narrow-leaved Marsh-orchid in South Hampshire (v.c.11)

M. N. JENKINSON

Merrifield House, 21 St Clair Road, Canford Cliffs, Poole, Dorset, BH13 7JP

ABSTRACT

Morphometric study of a population of *Dactylorhiza majalis* (Rchb. fil.) P. F. Hunt & Summerh. subsp. *traunsteineri* (Saut. ex Rchb. fil.) H. Sund. (Orchidaceae) near Exbury, South Hants. (v.c. 11) reveals some distinct morphological differences from most other populations of the subspecies. These differences are considered sufficient to justify the proposal of a new variety, var. *bowmanii* M. N. Jenk., var. nov., which is described. It is now known from three sites in v.c. 11 and one in Dorset (v.c. 9). Another study population, in North Hants. (v.c. 12), is determined as subsp. *traunsteineri* var. *traunsteineri*.

KEYWORDS: Orchidaceae, *Dactylorhiza*, morphometrics, multivariate analysis, Yorkshire, Berkshire, Anglesey, Hampshire.

INTRODUCTION

In 'Plant Records', *Watsonia* 19: 152 (1992), the discovery in 1984 by R. P. Bowman of a new population of *Dactylorhiza traunsteineri* (Saut. ex Rchb. fil.) Soó (Orchidaceae) in S. Hants. (v.c. 11) was reported. The find was determined by Dr Francis Rose, and is a first record for the vice-county, this taxon having been previously recorded in Hampshire only from N. Hants. (v.c. 12).

For reasons outlined in detail elsewhere (Jenkinson 1992), related to morphological overlap between taxa (cf. Bateman & Denholm 1983), and the presence of morphological intermediates, particularly in Hampshire and Dorset populations, I regard this taxon as a subspecies of *D. majalis* (Rchb. fil.) P. F. Hunt & Summerh. Although strictly objective scientific data (in the form of compatible morphometric data) to justify merging this taxon with the continental *D. traunsteineri* (Saut. ex Rchb. fil.) Soó are actually still lacking, I am persuaded by the weight of informed opinion of experts who have seen both taxa in the field that they should be regarded as conspecific. The correct nomenclature for this taxon is therefore *Dactylorhiza majalis* (Rchb. fil.) P. F. Hunt & Summerh. subsp. *traunsteineri* (Saut. ex Rchb. fil.) H. Sund. (Sundermann 1980; R. M. Bateman, pers. comm., 1987; Bateman & Denholm 1989; Jenkinson 1992).

R. P. Bowman (pers. comm., 1985) drew my attention to the Exbury population as there appeared to be some particularly interesting features of some of the plants at the site. Growing in a flushed marshy clearing in the 10-km square SU/4.0, the population of Narrow-leaved Marsh-orchid (c. 200 plants) formed a small but distinct morphological population within a much larger mixed colony of *Dactylorhiza* spp., consisting predominantly of *D. majalis* subsp. *praetermissa* (Druce) D. M. Moore & Soó, *D. fuchsii* (Druce) Soó and hybrids between the two. There was also a small number of putative hybrids between *D. fuchsii* and *D. majalis* subsp. *traunsteineri*. The whole colony numbered c. 2000 plants at that time.

The site itself is a very wet flush in a clearing between a belt of old oak woodland and a coniferous plantation. The clearing was cut as a strip through the woodland in the early 1960s to enable a gas pipeline to be installed. The site was subjected to soil-test samples by R. M. Bateman in 1986, and the pH was found to be c. 6.6, slightly lower than that of most British and Irish sites for the taxon, which is widely regarded as being restricted to calcareous fens and basic flushes. Working on the assumption that the orchids were not present in the wood before the strip was cut, it would appear that the orchid colony could not have been more than 20 years old when it was first discovered. It may be felt that this is a rather short time for a site to acquire such a large and heterogeneous colony

of *Dactylorhiza*. The oil pipeline from Wytch Farm, Dorset, to Fawley Refinery was also installed through the cut strip recently, to one side of the main concentration of orchids, without any apparent damage to the population of *D. majalis* subsp. *traunsteineri*, although on a recent visit (June 1993) it was found that much of the site had become overgrown with an umbellifer (?*Oenanthe crocata* L.) and Bracken (*Pteridium aquilinum* (L.) Kuhn), as a result of which the full extent of the mixed colony had declined somewhat.

A number of authors (e.g. Bateman & Denholm 1983; Foley 1990) have given recent detailed morphological descriptions of *D. majalis* subsp. *traunsteineri* (see Table 1). The Exbury plants are clearly distinct from *D. majalis* subsp. *praetermissa* at the site in many characters regarded as diagnostic of subsp. *traunsteineri*, such as small stature, thin stems, few narrow leaves, short lax few-flowered inflorescences, strongly reflexed lateral lobes to the labellum, and the presence (sometimes intense) of diffuse anthocyanins in upper stem and bracts. Certain other morphological features of these plants, however, are not typical of the subspecies. The most obvious of these in the field is the presence in the vast majority of plants of exceptionally deep sinuses and an unusually elongated central lobe to the labellum. In addition the labella are proportionately narrower in relation to their length than in most plants of this taxon, a feature that is exaggerated in the field by the strong reflexion of the lateral lobes. The flowers are also rather darker in base colour than those in most populations I have seen (with the exception of one Yorkshire population). The vegetative characteristics are generally more robust than most populations of the taxon (closer to some Irish populations – see Foley 1990), in some respects intermediate between this taxon and subsp. *praetermissa*. There are usually two non-sheathing leaves and three (but sometimes four) sheathing leaves, which are generally longer and broader than those of most populations of the taxon.

R. M. Bateman, having carried out a detailed morphometric comparison, expressed the opinion (pers. comm., 1986) that these plants were intermediate in overall morphology between subsp. *traunsteineri* (as epitomised by populations in Ireland and Anglesey) and subsp. *praetermissa*, but closer to, and therefore referable to, subsp. *traunsteineri*, thus concurring in essence with Rose.

It was clear, however, that whilst some vegetative characteristics could be described as 'intermediate', certain floral characters were even more extreme than most subsp. *traunsteineri*. I felt that the unusual morphology of these distinctive plants merited more detailed investigation. Accordingly in 1988 and 1989 morphometric data were obtained from recognised populations of subsp. *traunsteineri* in Oxfordshire (Berks., v.c. 22), Yorkshire (Mid-W. Yorks., v.c. 64) and Anglesey (v.c. 52), in order to incorporate the broadest possible spectrum of natural and normal variation within the taxon.

In addition, another taxonomically ambiguous colony of marsh-orchids, at Mapledurwell Fen near Basingstoke in N. Hants. (v.c. 12) in SU/6.5, was examined, as it has long been believed to contain a number of plants referable to subsp. *traunsteineri* (Doherty & Pilkington 1983), although Dr Francis Rose, in correspondence with R. P. Bowman (R. P. Bowman, pers. comm., 1984), expressed the view that it was "not quite pure" at the site, implying some introgression, presumably with *D. fuchsii* and/or *D. majalis* subsp. *praetermissa*, both of which are also present. In an attempt to resolve the status of these plants, they were incorporated into the current study.

I have since found three further smaller populations of plants similar in morphology to those at Exbury, all in the administrative county of Dorset, but two in v.c. 11 (S. Hants.) and one in v.c. 9 (Dorset). The largest population (c. 50 plants), discovered in 1988 at Avon Forest Park near Ringwood, in SU/1.0, was measured for this research. The other populations, six plants in 1992 at St Leonards near Ringwood in SU/1.0, and a single plant in 1993 on Studland Heath in SZ/0.8, were too small for significant statistical analysis. All three new populations differed from the original Exbury population in minor morphological features (Avon Forest Park, slightly more robust with slightly less deeply three-lobed lips; St Leonards, slightly paler in base colour; and Studland, with a slightly less deeply three lobed lip), but the overall similarity to the Exbury plants was such that there was no doubt that they were referable to the same taxon.

Details of the eight study populations from which data were obtained for the purpose of this research are listed on Table 2.

An interesting feature of all three recently discovered sites is that they are all in dry acid grassland. The plants are growing amongst Bracken (*Pteridium aquilinum*) and acid-soil indicators *Galium saxatile* L. and *Potentilla erecta* (L.) Raeusch. are present at all three sites. *Pteridium aquilinum* and *Potentilla erecta* are also present at Exbury. The dry grassland orchids *Orchis morio*

TABLE 1. RANGE OF VARIATION AND DESCRIPTION OF MAIN DISTINGUISHING CHARACTERS OF *DACTYLORHIZA MAJALIS* SUBSP. *TRAUNSTEINERI* AND SUBSP. *PRAETERMISSA*

Character	subsp. <i>traunsteineri</i>	subsp. <i>praetermissa</i>
1. Stem height	12–30 cm, only occasionally >30 cm	20–50 cm, often exceeding 30 cm
2. Stem width	<5 mm, flexuous	>5 mm, stout, erect
3. Sheathing leaves	Up to 3	3 or more
4. Non-sheathing leaves	0–1	2 or more
5. Length of longest leaf	Up to 12 cm, rarely more	Usually >12 cm
6. Width of widest leaf	Usually 8–12 mm, only occasionally >15 mm	Usually >15 mm
7. Leaf markings	Occasionally present, solid spots (except var. <i>eborensis</i>), 1–2 mm in diameter, round or transversely elongated, usually concentrated towards leaf-tips	Unmarked, except var. <i>junialis</i>
8. Inflorescence	Rarely >7 cm, 7–12 flowers	Usually >7 cm, usually >20 flowers
9. Peripheral bract cells mean size	60–115 μm , usually >80 μm in mean length, subacute to serrate	50–100 μm , but rarely >80 μm , rounded obtuse
10. Labellum size	>7.5 \times 9.5 mm, usually broader than long, often broadest below middle, usually c.10 mm wide	>7.5 \times 9.5 mm, usually broadest \pm at middle, usually >10 mm wide
11. Labellum shape	Usually three-lobed, central lobe often elongated (>1 mm) well beyond laterals, lateral lobes usually markedly reflexed	Usually slightly three-lobed, rarely entire, central lobe only occasionally elongated well beyond laterals, laterals usually \pm flat
12. Labellum markings	Dashes or flecks with loop markings, usually covering most of lip	Dots or dashes, more or less concentrated towards centre of lip
13. Labellum colour	Base colour variable from pale rose-pink to reddish-purple. Markings much darker, sometimes intensely so	Base colour usually pale rose-pink, rarely deeper rose-red. Markings slightly darker than base colour
14. Lateral outer perianth segments	Usually nearly vertical, rarely with annular markings	Usually more or less at 45°, unmarked
15. Spur	Occasionally <8.5 mm, usually tapering	Usually <8.5 mm, tapering
16. Anthocyanins	Stem/bract anthocyanins usually present, often intense	Stem/bract anthocyanins occasionally present, rarely intense

L. and *Spiranthes spiralis* (L.) Chevall. are present in quantity at the St Leonards site, as are *D. fuchsii* and *D. maculata* (L.) Soó: At Avon Forest Park, *D. majalis* subsp. *praetermissa* occurs in a damp hollow nearby, *Listera ovata* (L.) R. Br. and *Spiranthes spiralis* both occur occasionally with *D. majalis* subsp. *traunsteineri*, and *Orchis morio* occurs in some numbers in the vicinity. At the Studland site, the single plant occurred on a dry track verge amongst *Pteridium aquilinum* with no other orchids, although *D. majalis* subsp. *praetermissa* occurs in a damp patch of the same verge some 100 m away, and *D. incarnata* (L.) Soó subsp. *pulchella* (Druce) Soó occurs in the adjacent acid bog.

Long regarded as typically an inhabitant of wet calcareous fen or basic flushes (Heslop-Harrison 1953; Lacey 1955; Lacey & Roberts 1958; Tennant 1979; Kenneth & Tennant 1983; Bateman &

TABLE 2. STUDY POPULATIONS OF *DACTYLORHIZA* TAXA

Population	Grid Ref.	Habitat	No. plants	Accompanying <i>Dactylorhiza</i>
1. Wharfedale, Mid-W. Yorks., v.c. 64	SD/97.67	Basic flush	>200	<i>Dii</i> , <i>Df</i> , <i>Dm</i> , hybrids
2. Cothill, Berks., v.c. 22	SU/46.99	Fen	<10	<i>Df</i>
3. Parsonage Moor, Berks., v.c. 22	SU/46.99	Fen	<50	<i>Dmpr</i> , <i>Df</i> , hybrids
4. Rhos-y-Gad, Anglesey, v.c. 52	SH/51.79	Fen	>200	<i>Dmp</i> , <i>Dip</i> , <i>Dic</i> , <i>Df</i> , <i>Dm</i> , hybrids
5. Cors Erddreiniog, Anglesey, v.c. 52	SH/47.82	Fen	>1000	<i>Dmp</i> , <i>Dip</i> , <i>Dic</i> , <i>Df</i> , <i>Dm</i> , hybrids
6. Exbury, S. Hants., v.c. 11	SU/4-.0-	Neutral flush	>200	<i>Dmpr</i> , <i>Df</i> , hybrids
7. Avon Forest Park, S. Hants., v.c. 11	SU/1-.0-	Acid grassland	<50	<i>Dmpr</i> , <i>Df</i> , <i>Dm</i>
8. Mapledurwell Fen, N. Hants., v.c. 12	SU/67.52	Fen	<100	<i>Dmpr</i> , <i>Df</i> , hybrids

Key to accompanying *Dactylorhiza*: *Df* = *D. fuchsii*, *Dm* = *D. maculata*, *Dii* = *D. incarnata* subsp. *incarnata*, *Dip* = subsp. *pulchella*, *Dic* = subsp. *coccinea*, *Dmp* = *D. majalis* subsp. *purpurella*, *Dmpr* = subsp. *praetermissa*.

Note: Populations 2 and 3, as a result of county boundary changes, are now in the administrative county of Oxfordshire, and similarly, population 7 is now in the county of Dorset.

Denholm 1983; Kenneth, Lowe & Tennant 1988; Roberts 1988; Foley 1990), *D. majalis* subsp. *traunsteineri* has not hitherto been recorded, as far as is known, in any dry or markedly acid habitats in Britain, although some authorities (e.g. Davies, Davies & Huxley 1983) have cited *Sphagnum* bog as an occasional habitat for the taxon in continental Europe. It should be noted however that in the case of Davies, Davies & Huxley (1983) the authors express the cautionary opinion that this may be due to confusion between morphologically similar marsh-orchids.

Since the Narrow-leaved, Wicklow or Pugsley's Marsh-orchid was first described from Co. Wicklow in Ireland by H. W. Pugsley (Pugsley 1936), various authorities have sought to delimit the taxon more precisely. Arguably the best descriptions are those published by Bateman & Denholm (1983) and Foley (1990). These have been amalgamated and summarised in Table 1. In addition, for the purpose of comparison, a description of *D. majalis* subsp. *praetermissa* based on Bateman & Denholm (1983) and the present writer's own data has also been incorporated into Table 1.

MATERIALS AND METHODS

It was considered that in order to quantify accurately the similarities and dissimilarities of the proposed new variety with *D. majalis* subsp. *traunsteineri* as it is currently recognised in Britain, it was necessary to obtain morphometric data from a widely separated selection of well-known populations of the taxon, in order to incorporate as much as possible of the range of variation to be found, in what is a very variable taxon. 'Control samples' were therefore obtained from five populations (numbers 1-5 on Table 2) of the subspecies which have been the subject of previous morphometric research (Heslop-Harrison *et seq.* above), and which are widely recognised, well-determined sites for this taxon.

Morphometric data were obtained on a total of 59 characters for each of ten randomly selected plants of the target taxon in each population, according to criteria outlined by me elsewhere (Jenkinson 1992). These data were then subjected to the multivariate analysis described in that paper.

Two specimen plants (minus roots) were taken from the Exbury population in June 1989, and pressed and mounted. These are now conserved at BM. They were drawn prior to pressing, and that original drawing is reproduced as Fig. 1. The right-hand of the two plants is the holotype, the left-hand a paratype.

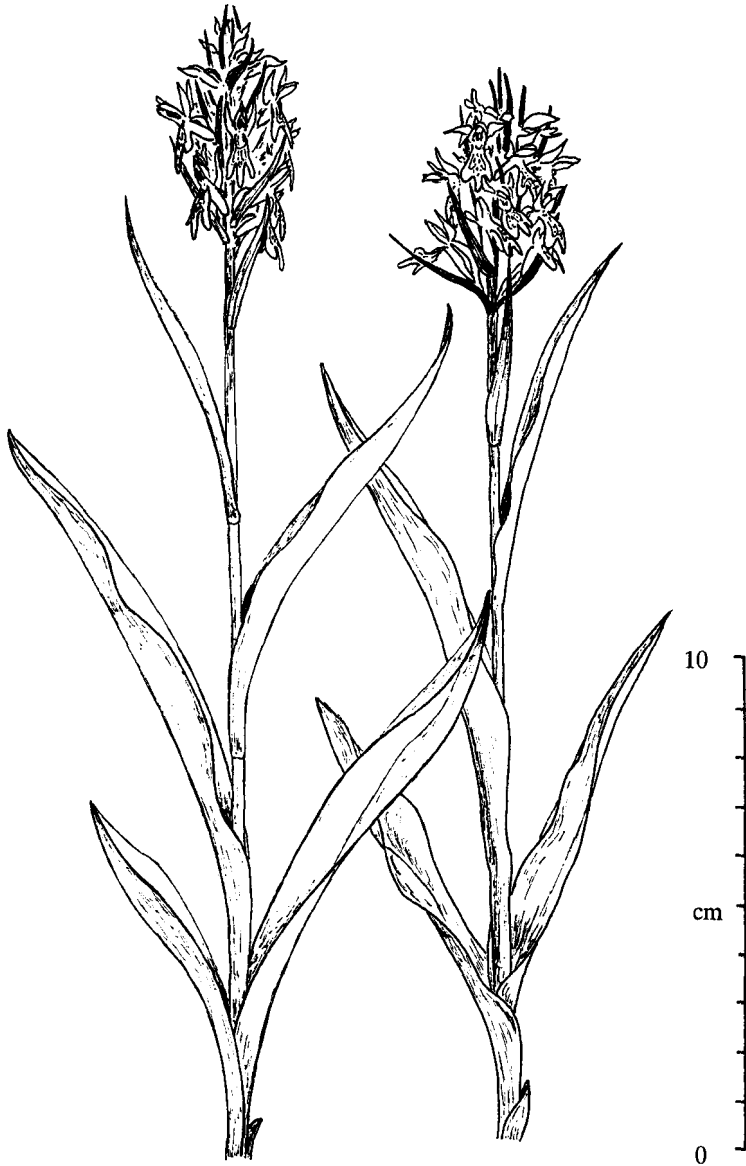


FIGURE 1. *Dactylorhiza majalis* subsp. *traunsteineri* var. *bowmanii* M. N. Jenkinson. Holotype (right hand plant): near Beaulieu, S. Hants. (v.c. 11), 13 June 1989. Paratype (left hand plant): as holotype. Drawn from specimens deposited in **BM**.

A separate sample of ten excised flowers was also obtained, mounted and forwarded to **BM** with the holotype. Drawings of the excised labella of that sample, and of the survey samples from Exbury and Avon Forest Park, are reproduced as Fig. 2.

RESULTS

Table 3 is a summary of population means, for the eight study populations, for those characters (listed in Table 1) regarded as 'diagnostic' for subsp. *traunsteineri*.

TABLE 3. POPULATION MEANS AND STANDARD DEVIATIONS (IN PARENTHESES) FOR SELECTED CHARACTERS OF STUDY POPULATIONS OF *DACTYLORHIZA*

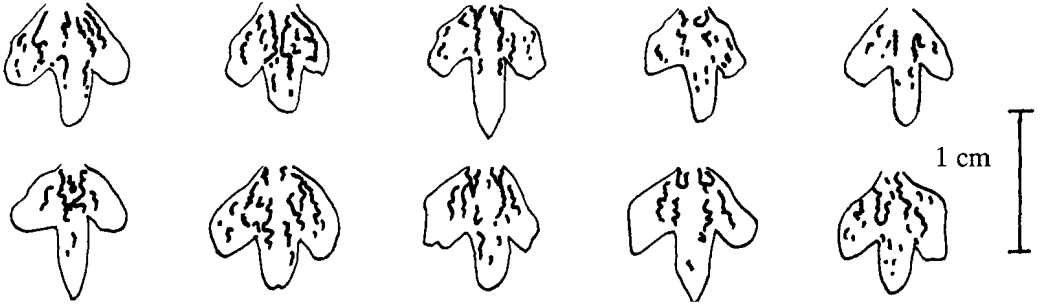
Characters	Populations							
	1. Wharfedale	2. Cothill	3. Parsonage Moor	4. Rhos-y-Gad	5. Cors Erddreiniog	6. Exbury	7. Avon Forest Park	8. Mapledurwell Fen
1. Plant height (cm)	16.16 (3.51)	20.64 (6.14)	17.99 (5.67)	14.68 (3.76)	16.80 (4.15)	27.12 (5.56)	18.30 (4.10)	19.40 (5.89)
2. Stem diameter (mm)	2.30 (0.63)	3.50 (0.87)	2.60 (1.02)	2.65 (0.47)	2.40 (0.39)	4.45 (0.72)	3.90 (1.33)	2.60 (0.74)
3. No. of sheathing leaves	2.60 (0.52)	2.20 (0.45)	2.80 (0.42)	2.70 (0.48)	2.60 (0.52)	3.00 (0.00)	3.50 (0.53)	3.00 (0.67)
4. No. of non-sheathing leaves	0.70 (0.48)	1.00 (0.00)	0.70 (0.48)	0.40 (0.52)	1.00 (0.47)	1.40 (0.52)	1.90 (0.74)	1.00 (0.47)
5. Length of longest leaf (cm)	6.59 (1.61)	10.02 (2.69)	8.25 (1.87)	6.50 (1.92)	7.55 (1.80)	12.81 (2.72)	10.51 (1.63)	9.99 (1.66)
6. Width of widest leaf (cm)	1.26 (0.29)	1.36 (0.32)	1.09 (0.23)	1.07 (0.15)	0.93 (0.11)	2.03 (0.28)	2.25 (0.70)	1.37 (0.22)
7. Leaf markings								
(a) Presence (yes: 1, no: 0)	0.60 (-)	0.00 (-)	0.50 (-)	0.30 (-)	0.20 (-)	0.00 (-)	0.00 (-)	0.70 (-)
(b) Distribution (1 = sparse at leaf tips)	0.60 (-)	0.00 (-)	0.70 (-)	0.30 (-)	0.30 (-)	0.00 (-)	0.00 (-)	0.40 (-)
(c) Type (1 = fine dots)	1.15 (-)	0.00 (-)	0.80 (-)	0.80 (-)	0.40 (-)	0.00 (-)	0.00 (-)	0.70 (-)
8. Inflorescence								
(a) Length (cm)	4.50 (1.39)	3.72 (0.77)	3.82 (0.95)	4.39 (1.30)	3.61 (0.79)	5.20 (1.10)	4.45 (1.37)	3.90 (0.99)
(b) Number of flowers	8.70 (3.74)	12.00 (5.57)	9.40 (3.86)	9.20 (4.34)	8.00 (3.13)	16.80 (4.96)	19.10 (8.97)	9.60 (4.33)
9. Mean length of peripheral bract cells (μm)	74.04 (5.29)	85.66 (9.46)	71.88 (9.64)	94.83 (23.44)	95.55 (13.97)	80.68 (12.92)	73.24 (6.86)	79.30 (10.44)
10. Labellum size and shape:								
(a) Length (mm)	7.83 (0.49)	7.90 (0.84)	8.35 (1.04)	7.90 (1.07)	7.53 (1.03)	8.53 (0.49)	7.93 (0.53)	9.20 (0.83)
(b) Width (mm)	9.85 (1.21)	9.70 (0.78)	9.50 (0.62)	10.60 (1.47)	9.30 (0.95)	9.55 (0.81)	9.60 (1.11)	10.30 (1.01)
(c) Reflexion lateral lobes (Scale 1-5)	3.70 (-)	3.40 (-)	2.80 (-)	4.10 (-)	3.50 (-)	3.90 (-)	3.40 (-)	3.70 (-)
(d) Length central lobe (mm)*	2.25 (0.44)	2.50 (0.79)	1.70 (0.54)	2.18 (0.80)	2.05 (0.86)	3.10 (0.67)	2.18 (0.43)	2.33 (0.82)

TABLE 3. *continued.*

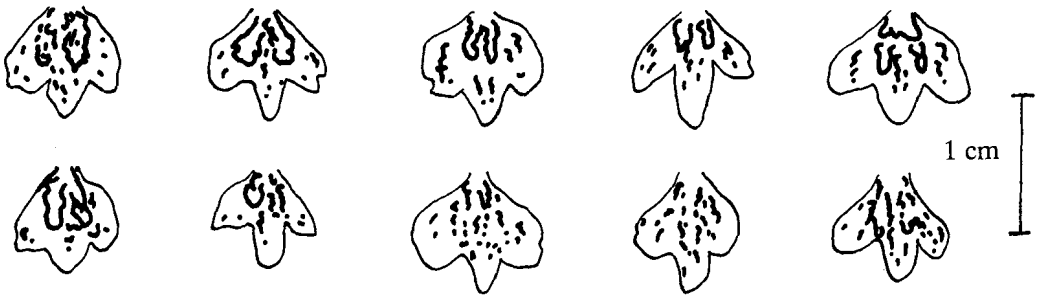
Characters	Populations							
	1. Wharfedale	2. Cothill	3. Parsonage Moor	4. Rhos-y-Gad	5. Cors Erddreiniog	6. Exbury	7. Avon Forest Park	8. Mapledurwell Fen
11. Labellum markings:								
(a) Type (scale 1-5)**	4.50	4.20	4.00	4.90	4.80	4.40	3.50	4.20
	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)
(b) Coverage (scale 1-3)**	2.60	2.60	2.60	3.00	3.00	2.70	3.00	2.60
	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)
12. Labellum colour:								
(a) Base colour (scale 0-3)	2.90	2.20	2.30	3.00	1.70	2.80	3.00	2.40
	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)
(b) Markings (scale 0-3)	3.00	2.00	2.00	3.00	2.30	3.00	3.00	2.40
	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)
13. Lateral outer perianth segments								
(a) Position (scale 1-5)**	4.00	4.80	3.60	3.80	4.10	3.30	2.60	4.20
	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)
(b) Markings (scale 0-3)**	1.00	0.40	1.10	1.20	1.60	1.00	0.80	1.10
	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)
14. Spur: (a) Length (mm)***	7.58	8.75	7.88	8.05	8.30	7.60	6.65	7.98
	(1.48)	(1.10)	(0.94)	(1.01)	(1.25)	(1.17)	(0.77)	(1.23)
(b) Shape:	2.30	2.40	3.00	3.00	2.80	2.90	3.00	2.60
(3= conical/tapered)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)
15. Anthocyanin intensity:								
(a) Upper part of stem (scale 0-3)	2.90	2.40	2.00	3.00	1.50	2.50	2.70	1.30
	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)
(b) Floral bracts: (scale 0-3)	3.00	2.80	2.70	3.00	2.50	2.90	3.00	2.40
	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)

Notes: *Character 10(d) on this table does not equal part of Character 11 on Table 1, which indicates the degree of extension *beyond* the lateral lobes. Character 10(d) is the total length of the central lobe, measured from the base of the right-hand sinus. Nevertheless, in all plants measured, the central lobe extended more than 1 mm beyond the laterals. **See Jenkinson (1992) for more detailed clarification of numerical representation of qualitative character-states. ***See note below Table 4 re spur length: point of excision and method of measurement vary between workers, and are not therefore directly comparable.

Samples from Exbury 13 June 1989 (conserved at BM with holotype)



Survey sample, Exbury 1 June 1988



Survey sample, Avon Forest Park 3 June 1988



FIGURE 2. Drawings of 30 excised and mounted labella of *Dactylorhiza majalis* subsp. *traunsteineri* from Exbury (20) and Avon Forest Park (10).

It will be seen that for the vast majority of character-states, the three Hampshire populations from which data have been obtained fall within the parameters of subsp. *traunsteineri* according to accepted morphological criteria. The only difference from typical subsp. *traunsteineri* noted in the Mapledurwell Fen population was a relatively low mean density of stem anthocyanin. This is not considered significant. At Exbury and Avon Forest Park, however, certain clear distinctions in morphology become apparent. These are listed in Table 4, in which characters are numbered as in Table 1.

TABLE 4. MEAN VALUES (WITH RANGE IN PARENTHESES) FOR MAIN DISTINGUISHING CHARACTERS OF *D. MAJALIS* SUBSP. *TRAUNSTEINERI* VAR. *BOWMANII*

Character	Exbury	Avon Forest Park	Remarks
3. Sheathing leaves	3.0 (3.0)	3.5 (3.0-4.0)	Avon Forest Park more than most
4. Non-sheathing leaves	1.4 (1.0-2.0)	1.9 (1.0-3.0)	More than most
5. Length of longest leaf (cm)	12.81 (8.5-16.7)	10.51 (7.0-12.5)	Longer than most
6. Width of widest leaf (cm)	2.03 (1.6-2.45)	2.25 (1.6-3.4)	Broader than most
8. Number of flowers	16.8 (13-28)	19.1 (8-40)	More than most
11. Length of central lobe (mm)	3.1 (2.25-4.5) (survey sample)	2.18 (1.75-3.0)	Longer than most - to max. 7 mm at Exbury - very marked in the field
14. Lateral outer perianth	Both populations between 45° and vertical.		Lower than most
15. Length of spur (mm)*	7.60 (5.5-9.0)	6.65 (5.5-8.25)	Shorter than most - especially Avon Forest Park

* See Bateman & Denholm (1989) for their remarks re compatibility of measurements for length of spur. All measurements for this study, including those for the 'control sample' populations, are lower than those given by Bateman & Denholm (1983) for this character. It depends on the point of excision of the spur. Those at Avon Forest Park, however, were shorter than those of most plants measured in all populations.

DISCUSSION AND CONCLUSIONS

The absence of significant differences between the morphology of the plants measured at Mapledurwell Fen and that of the 'control' populations measured I consider to be sufficient evidence to support a firm determination of *D. majalis* subsp. *traunsteineri* (i.e. of the type variety, cf. Bateman & Denholm 1983) at this site. Furthermore, Dr Rose now takes the view (pers. comm., 1993) that there are some early-flowering plants at the site which are referable to *D. majalis* subsp. *traunsteineri* var. *traunsteineri*, although the situation is somewhat complicated later in the flowering season by the presence of hybrids and intermediates. There would therefore be no justification in separating these plants from var. *traunsteineri* merely on the basis of a few very minor morphological differences.

The situation at Exbury and Avon Forest Park, however, is somewhat different: the differences from typical subsp. *traunsteineri* var. *traunsteineri* at these sites (and in the few plants found at St Leonards and Studland) I consider to be of some importance. Whilst in the context of their overall morphology it is clear that they are sufficiently close to subsp. *traunsteineri* to warrant inclusion in that taxon, and indeed have been determined as such by both Rose and Bateman, it is my view that the differences identified and described above are comparable in magnitude to those that delimit the other two British named varieties of the subspecies (Roberts & Gilbert 1963; Bateman & Denholm 1983; Lowe, Tennant & Kenneth 1986), viz.:

var. *eborensis* (Godfrey) R. M. Bateman & Denholm: short stem, leaves often marked with annular markings, small labellum, short spur;

var. *francis-drucei* (Wilmott) R. M. Bateman & Denholm: short stem, short unmarked leaves, few-flowered inflorescence, small labellum often longer than broad, elongated central lobe, short spur.

A new variety is therefore proposed to take account of the distinct morphological characteristics of plants at the four locations so far identified. It is named in honour of the finder of the Exbury population, R. Paul Bowman, B.S.B.I. recorder for many years for v.c. 11 (S. Hants.).

DESCRIPTION

Dactylorhiza majalis (Rchb. fil.) P. F. Hunt & Summerh. subsp. **traunsteineri** (Saut. ex Rchb. fil.) H. Sund. var. **bowmanii** M. N. Jenk., var. **nov.**

Caulis plerumque 15 cm (interdum 30 cm) altus superans, raro 5 mm diametro superans. Folia vaginantia 3–4, plerumque secus caulem \pm aequaliter dispersa, folium longissimum plerumque secundum infimum, 8–16 cm longum, latissimum interdum secundum infimum, plerumque infimum, 1.6–3.4 cm latum; folia invaginantia plerumque 2, interdum 1; folia omnia immaculata. Inflorescentia plerumque minus quam 7 cm longa, plerumque 20% longitudinis caulis excedens, plerumque laxa, interdum plus quam 18-flora. Cellulae peripherales bractearum plerumque majores quam 70 μ m longae. Labellum plerumque 7.5–9 \times 8.5–10.5 mm, plerumque \pm circa mediam partem latissimum; color basicus plerumque atrorubens, cum maculis lineatisque fuscioribus, labello incomplete obtecto; sinus semper praesentes atque profundi, lobus medianus plerumque longus (>2.5 mm), lobi laterales raro indentati, plerumque valde reflexi. Sepala lateralia plerumque plus verticalia quam horizontalia (>45°), modice sed non annulatim maculata. Calcar raro minus quam 6.5 mm longum, plerumque 7.5–8.5 mm, plerumque decrescens, raro cylindricum vel sacciforme.

Aestate florens (Junio, primam ad tertiam hebdomadem). Habitat in pascuis asperis udis vel aridis atque \pm acidis; quattuor populationes in Anglia australi, tota distributio ignota; rarissima.

HOLOTYPE: Exbury, near Beaulieu, S. Hants. (v.c. 11), England, very wet neutral flush, 13 June 1989, M. N. Jenkinson (holo. BM) (illustrated in Jenkinson (1991), Plates 62 & 63, p. 112).

Stem usually exceeding 15 cm, only occasionally exceeding 30 cm, rarely exceeding 5 mm in diameter. *Sheathing leaves* 3–4, usually \pm evenly distributed along stem, *longest leaf* usually second lowest on stem, 8–16 cm long, *widest leaf* occasionally second lowest, but usually lowest leaf, 1.6–3.4 cm in width, *non-sheathing leaves* usually 2, occasionally 1; *leaf markings* absent. Inflorescence usually less than 7 cm long, usually more than 20% of stem length, usually lax, occasionally more than 18 flowers. *Mean length of peripheral bract cells* usually exceeding 70 μ m. *Labellum* usually more than 7.5 \times 8.5 mm, but less than 9 \times 10.5 mm, usually broadest \pm at middle; *base colour* usually dark magenta, *markings* usually darker dashes and loops, less than complete coverage of *labellum*; *sinuses* always present, well-developed; *central lobe* usually long (>2.5 mm); *lateral lobes* rarely indented, usually strongly reflexed. Lateral outer perianth segments usually nearer vertical than horizontal (>45°), usually lightly marked with solid, not annular, markings; *spur* rarely less than 6.5 mm long, usually 7.5–8.5 mm, usually tapering, rarely cylindrical or sac-like.

Flowering June (best weeks 1–3). *Habitat:* damp or dry, neutral to slightly acidic rough grassland; only four known populations in southern England, full distribution unknown. Very rare. (N.B. Italics in the English description follow the practice of Bateman & Denholm (1983) in order to emphasise those characters considered to be most diagnostic, but concentrate in this case on those which best distinguish the newly-described variety from the typical subspecies and the other named varieties.)

ACKNOWLEDGMENTS

I gratefully acknowledge the assistance of the following: Drs R. M. Bateman and I. Denholm, for advice and helpful discussion, permission to use the results (published and unpublished) of their own extensive research, and critical appraisal of this paper; R. P. Bowman, for much useful fieldwork, advice and discussion, on *Dactylorhiza* in particular, culminating in the discovery and investigation of the Exbury colony; F. Horsman, for guidance and assistance in the field in Yorkshire; Nicholas Jenkinson, for assistance with the fieldwork in North Hants., Oxfordshire and Yorkshire; Dr F. Rose, for helpful discussion with regard to the Mapledurwell Fen population; Dr R. J. White, for helpful advice and discussion, and invaluable assistance with the multivariate analysis on the computers of Southampton University; and F. A. Woodhead, for assistance with the Avon Forest Park colony, much helpful fieldwork, and the loan of her microscope for the peripheral bract cell measurements. In addition, my thanks go to the following individuals and organisations, who have variously assisted with site information, accompanied visits to sites, and the provision of

permits: Berkshire, Buckinghamshire and Oxfordshire Naturalists' Trust (F. La Forte); Hampshire Wildlife Trust; the former Nature Conservancy Council (Berkshire, Dyfed-Powys and North Wales Regions); and the North Wales Wildlife Trust.

REFERENCES

- BATEMAN, R. M. & DENHOLM, I. (1983). A reappraisal of the British and Irish dactylorchids, 1. The tetraploid marsh-orchids. *Watsonia* **14**: 347–376.
- BATEMAN, R. M. & DENHOLM, I. (1989). Morphometric procedure, taxonomic objectivity, and marsh-orchid systematics. *Watsonia* **17**: 449–455.
- DAVIES, P., DAVIES, J. & HUXLEY, A. (1983). *Wild orchids of Britain and Europe*. Chatto & Windus, London.
- DOHERTY, J. & PILKINGTON, J. (1983). *Hampshire's countryside heritage: 3. Rivers and wetlands*. Hampshire County Council, Winchester.
- FOLEY, M. J. Y. (1990). An assessment of populations of *Dactylorhiza traunsteineri* (Sauter) Soó in the British Isles and a comparison with others from Continental Europe. *Watsonia* **18**: 153–172.
- HESLOP-HARRISON, J. (1953). Studies in *Orchis* L. II. *Orchis traunsteineri* Saut. in the British Isles. *Watsonia* **2**: 371–391.
- JENKINSON, M. N. (1991). *Wild orchids of Dorset*. Orchid Sundries Ltd, Stour Provost, Gillingham, Dorset.
- JENKINSON, M. N. (1992). The marsh orchids in Hampshire and Dorset: some recent research. *Proceedings of the Hampshire Field Club and Archaeological Society* **47**: 225–252.
- KENNETH, A. G., LOWE, M. R. & TENNANT, D. J. (1988). *Dactylorhiza lapponica* (Laest. ex Hartman) Soó in Scotland. *Watsonia* **17**: 37–41.
- KENNETH, A. G. & TENNANT, D. J. (1983). The Scottish records of *Dactylorhiza traunsteineri* (Sauter) Soó. *Watsonia* **14**: 415–417.
- LACEY, W. S. (1955). *Orchis traunsteineri* (Saut.) in Wales. *Proceedings of the Botanical Society of the British Isles* **1**: 297–300.
- LACEY, W. S. & ROBERTS, R. H. (1958). Further notes on *Dactylorhiza traunsteineri* (Saut.) Vermeul. in Wales. *Proceedings of the Botanical Society of the British Isles* **3**: 22–27.
- LOWE, M. R., TENNANT, D. J. & KENNETH, A. G. (1986). The status of *Orchis francis-drucei* Wilmott. *Watsonia* **16**: 178–180.
- PUGSLEY, H. W. (1936). New British marsh orchids. *Proceedings of the Linnean Society of London* **148**: 121–125.
- ROBERTS, R. H. (1988). The occurrence of *Dactylorhiza traunsteineri* (Sauter) Soó in Britain and Ireland. *Watsonia* **17**: 43–47.
- ROBERTS, R. H. & GILBERT, O. L. (1963). The status of *Orchis latifolia* var. *eborensis* Godfery in Yorkshire. *Watsonia* **5**: 287–293.
- SUNDERMANN, H. (1980). *Europäischer und mediterrane Orchideen – eine Bestimmungsflora*, 3rd ed. Brucke-Verlag, Hildesheim.
- TENNANT, D. J. (1979). *Dactylorhiza traunsteineri* in Yorkshire. *Naturalist (Hull)* **104**: 9–13.

(Accepted August 1994)