

# DACTYLORHIZA MAJALIS IN SCOTLAND

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## Samenvatting

Sinds de ontdekking in 1936 van planten die nu bekend zijn als *Dactylorhiza majalis* in North Uist, Schotland, bleken latere rapportages twijfelachtig of onjuist te zijn. De Schotse populatie wordt als morfologisch verschillend gezien en dient als subspecies te worden aangemerkt. De namen *D. majalis* subsp. *scotica* E. NELSON en *D. comosa* subsp. *scotiaca* (E. NELSON) P.D. SELL worden als ongeldig beschouwd en vervangen door de nieuwe samenstelling *D. majalis* subsp. *ebudensis* (WIEF. ex R.M. BATEMAN & DENHOLM) M.R. LOWE. Er worden voorstellen gedaan voor de instandhouding.

## Summary

Since the discovery in 1936 of plants now known as *Dactylorhiza majalis* in North Uist, Scotland, later records have been found to be doubtful or erroneous. The Scottish population is considered to be morphologically distinct and should be accorded the rank of subspecies. The names *D. majalis* subsp. *scotica* E. NELSON and *D. comosa* subsp. *scotica* (E. NELSON) P.D. SELL are considered to be invalid and a new combination *D. majalis* subsp. *ebudensis* (WIEF. ex R.M. BATEMAN & DENHOLM) M.R. LOWE is made. Proposals are made for conservation.

## Zusammenfassung

Seit der Entdeckung 1936 in North Uist, Schottland, von Pflanzen, die jetzt unter dem Namen *Dactylorhiza majalis* bekannt sind, zeigte sich, dass spätere Aufzeichnungen fragwürdig oder unrichtig waren. Die schottische Population wird heute als morphologisch abweichend betrachtet, und sollte als Unterart aufgefasst werden. Die Namen *D. majalis* E. NELSON und *D. comosa* subsp. *scotica* (E. NELSON) P.D. SELL werden als ungültig betrachtet und von der neuen Kombination *D. majalis* subsp. *ebudensis* (WIEF. ex R.M. BATEMAN & DENHOLM) M.R. LOWE ersetzt. Es werden Vorschläge zum Schutz gemacht.

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Foto's pagina 76 (behorend bij het artikel op pag. 49-54): 1                      2  
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1. *Ophrys cretica* subsp. *beloniae*, Katavia, Rhodos, 22 maart 2002
2. *Ophrys episcopalpis*, Lalissos, Rhodos, 22 maart 2002
3. Karakteristiek, orchideeënrijk landschap bij Katavia, Rhodos, 22 maart 2002

Foto's: H. Dekker

## 1. The discovery of *Dactylorhiza majalis* in the British Isles

The continental *Dactylorhiza majalis* (RCHB.) P.F. HUNT & SUMMERH. (*Orchis majalis* RCHB.) was first discovered in the British Isles, in Ireland, by H.W. Pugsley. Based on plants seen in counties Clare and Galway in May, 1933, Pugsley recognised their similarity to the continental plants but, because of some differences, named the Irish plants as *O. majalis* var. *occidentalis* (Pugsley, 1935). The new variety *occidentalis* was said to differ from the typical species in its dwarfer habit, shorter, broader and recurved leaves and short dense spike of dark flowers, with a short central lobe to the lip. From *O. purpurella* T. & T.A. STEPHENSON (*Dactylorhiza purpurella* (T. & T.A. STEPHENSON) SOÓ), the plant was said to be easily separable by its broader, recurved and heavily spotted foliage, its three-lobed labellum, and its longer cylindrical spur and in flowering a month earlier. Pugsley recognised specimens from Orkney and Shetland and West Sutherland which appeared to belong to *O. purpurella*, but commented that if the definition of *O. purpurella* were to be extended to cover forms with fully spotted leaves and a trilobed labellum, then there would be little to separate it from *O. majalis* except its later flowering.

In April, 1936 Pugsley and A.J. Wilmott in turn addressed the Linnean Society on the subject of new British marsh orchids (Pugsley, 1936; Wilmott, 1936). Pugsley changed the rank of his *occidentalis* from variety to subspecies. Wilmott described a new species, *O. kerryensis*, from near Dingle, county Kerry, recognising the similarity to *occidentalis*, but distinguished by unspotted foliage and a broad labellum with a pattern of dots.

In May, 1936 P.M. Hall and N.D. Simpson travelled around the West Coast of Ireland from Cork to West Mayo and found an abundance of *O. majalis* subsp. *occidentalis* in generally damp pastures and meadows. Although with some reservation, *kerryensis* and *occidentalis* were considered to be variants in one range of variation, in which populations contained greater or lesser proportions of both forms. No pure population of *kerryensis* was found and the proportion of these forms was found to decrease northwards from their centre of distribution around West Cork, South Kerry and the Dingle peninsula (Hall, 1937).

In June, 1936 M.S. Campbell visited the Outer Hebrides and sent fresh specimens of marsh orchids to Wilmott. Amongst many specimens attributed to forms of *O. purpurella*, Wilmott described a moderately uniform series collected between Lingay Strand and Newton (North Uist) in damp hollows and dunes, showing the same habit, extremely variable leaf markings and flower characters (except that Pugsley thinks the lip is perhaps slightly narrower) of *occidentalis*. Wilmott received the Hebridean specimens within a few days of receiving fresh specimens of *occidentalis* from Ireland and considered them identical, except that the Hebridean plants (from dry dunes in summer) were smaller. The determination was agreed by Pugsley and Hall (Campbell, 1937). In a second visit with Messrs. Druce and Wilmott in July, 1937, larger and more typical plants were found 'nearly over' when other marsh orchids were in good condition in a marsh at Reumisgarry, close to the original Newton sandhills. Also reported from this site were numerous hybrids including *O. occidentalis* with *O. elodes* and *O. purpurella* (Campbell, 1938).

## 2. The works of Nelson and Landwehr

In December, 1976 E. Nelson published his work on the Genus *Dactylorhiza* (Nelson, 1976), in which *Dactylorhiza majalis* subsp. *scotica* E. NELSON subsp. nov. was named and illustrated, but without the designation of a holotype or a specified type locality. Nelson's concept had regard to Wilmott's description and Campbell's photographic plate of a plant from North Uist (Campbell, 1937), and herbarium material of W. Wiefelspütz from North Uist collected in 1974 (Wiefelspütz, 1977), but included plants of different forms (Nelson, 1976 plate 61c) from the Scottish mainland, which accord with the concept of Heslop-Harrison (1954). In the same work Nelson also named and illustrated *D. purpurella* subsp. *majaliformis* E. NELSON subsp. nov., again without the designation of a holotype or a specified type locality. This plant was described as having leaves usually heavily dull spotted, but otherwise more similar to *D. purpurella* than *D. majalis*. The distribution was stated as Ireland, Wales, the Hebrides, north and north-west Scotland, Jutland, probably Orkney and possibly the Faeroes.

In the next year, J. Landwehr published his work on European orchids in which W. Wiefelspütz named and illustrated *D. majalis* subsp. *occidentalis* var. *ebudensis* WIEF. (Landwehr, 1977), but lacking the designation of a holotype. Wiefelspütz's plant is from the same locality of North Uist and is identical to the plants first described by Wilmott as *O. majalis* subsp. *occidentalis* (in Campbell, 1937) and illustrated from this locality by Nelson as *D. majalis* subsp. *scotica*. Wiefelspütz had searched for the plants described by Wilmott and located fruiting plants in July, 1973 and flowering plants in May, 1974. In a lecture at the Wuppertal conference in 1975, Wiefelspütz presented his findings and proposed to name the Scottish *D. majalis* as var. *ebudensis*, but in the published paper (Wiefelspütz, 1977), after the publication of the work of Nelson, declined to burden unnecessarily the nomenclature.

## 3. Taxonomy and nomenclature

Nelson (1979) sought to validate a number of new names published without the designation of a holotype in his work of 1976. The name *D. purpurella* subsp. *majaliformis* was validated with a holotype from northern Scotland - Scrabster, 20.06.70 in Herb. Nelson, Blatt 2, Nr. 11. The paper published by Løjtnant (1979) designating a holotype from Jutland, Denmark, was superfluous as it was published later. However, Nelson's attempted designation of a holotype for *D. majalis* subsp. *scotica* was ineffective as, although a type locality of North Uist is cited, no specific herbarium specimen or specimens was identified, merely a reference to "Blütenanalyse im Herbarium Wiefelspütz?".

The lack of a valid name for the Scottish *D. majalis* was recognised by R.M. Bateman & I. Denholm (1995), who designated a specimen from Wiefelspütz's collection made on 4th June, 1974 from dunes near the Newton Hotel, Lingay Strand, North Uist as the lectotype, which Wiefelspütz deposited in the herbarium of the Heidelberg Botanical Institute (HEID DM 37). The specimen chosen as the lectotype for the name *D. majalis* subsp. *occidentalis* var. *ebudensis* WIEF. ex R.M. BATEMAN & DENHOLM was that used by Nelson (1976) to illustrate plate 61a and by Landwehr (1977) to illustrate plate 85.3.

At specific rank, Delforge (2000) has made the combination *D. ebudensis* (WIEF. ex R.M. BATEMAN AND DENHOLM) DELFORGE, but at subspecific rank no valid name exists. The appropriate taxonomic treatment of dactylorchids is, and no doubt will remain, controversial.



Research into the genetic basis of the *incarnata/maculata* polyploid complex indicates that all the European allotetraploid marsh-orchids have evolved from more or less the same pair of parents and have the same basic FFII genome composition, although this may have evolved many times (Hedrén, 2002). The proposed, but as yet undefined, 'broad species' taxonomic treatment would create subspecies of the geographic or ecogeographic subdivisions of a single allotetraploid species, seemingly *D. elata*. However, the allotetraploid FFII genomic basis of the marsh-orchids has been widely accepted since Heslop-Harrison (1954) and such a genetic basis does not prevent the processes of evolution and speciation or a taxonomic arrangement of species in a phylogenetic hierarchy. At the other extreme, treatments such as Delforge (2001), which assign the rank of species to the smallest groups of populations constituting morphological units, prevent reflection of different degrees of morphological distinction and phylogenetic relationships; leaves many populations which cannot be identified as species; and makes phytogeographic analysis subject to circular reasoning (Pedersen, 1998). At least until such time as more phylogenetic information is available, I consider the rank of subspecies is appropriate for the Hebridean population of *D. majalis*. This conclusion is based on the assumption that *D. majalis* in Scotland is confined to a single, though extensive, population on North Uist; that other reports of *D. majalis* are erroneous, and that the morphology, ecology and geographical distribution are substantially distinctive. This treatment is similar to that of the Flora of Great Britain and Ireland (Sell & Murrell, 1996), in which three geographical subspecies are distinguished as *scotica* from north-west Scotland, *cambreensis* from Wales and *occidentalis* from south-west and west Ireland. However, the combinations were made under the name *D. comosa* (SCOP.) P.D. SELL., whereby Sell accepted *O. comosa* SCOP. as an earlier name for *O. alpestris* PUGSLEY which, as distinct from *O. majalis* only at subspecific level, gave rise to *D. comosa* subsp. *majalis* (RCHB.) P.D. SELL. This interpretation of *O. comosa* was disputed by Pedersen (2000) who considered *O. comosa* as a synonym of *Dactylorhiza incarnata*, whilst Baumann & al. (2002) indicate affinities to *D. praetermissa*. For present purposes it is sufficient to reject Sell's concept of *D. comosa* although, even if it were to be accepted, the name *D. comosa* subsp. *scotica* (E. NELSON) P.D. SELL is invalid as it is based on Nelson's invalid basionym.

At subspecific rank I have chosen to validate the epithet of Wiefelspütz, against that of Nelson, to avoid the duplication of epithets:

*Dactylorhiza majalis* (RCHB.) P.F. HUNT & SUMMERH. subsp. *ebudensis* (WIEF. EX R.M. BATEMAN & DENHOLM) M.R. LOWE comb. et stat. nov.

Basionym: *Dactylorhiza majalis* var. *ebudensis* WIEF. EX R.M. BATEMAN & DENHOLM in Edinb. J. Bot. 52: 57 (1995).

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Foto's pagina 80:

Boven en onder: *Dactylorhiza majalis*, Newton Dunes, North Uist, Scotland, june 12<sup>th</sup>, 1985

Foto's: M.R. Lowe

#### 4. The records of *Dactylorhiza majalis* subsp. *occidentalis* in Scotland

Between 1935 and 1956 Prof. J.W. Heslop-Harrison led expeditions from King's College, University of Durham to the islands of the Inner and Outer Hebrides. From these expeditions several papers were published which contained records of *majalis/occidentalis* or similar forms. His son, J. Heslop-Harrison, also visited the Hebrides, although there are no reports that he actually found *majalis/occidentalis* on these visits. The reports from the Durham University expeditions are summarised:

Bernary (Barra Isles) (Clark, 1938 & J.W. Heslop-Harrison, 1941).  
Sorisdale, Coll & Carachan, Tiree (J.W. Heslop-Harrison & al., 1941).  
Daliburgh, S. Uist & Clachan, N. Uist (J.W. Heslop-Harrison & al., 1942).  
Kilmory - Kinloch areas of Rhum (J.W. Heslop-Harrison, 1944 & 1951a).  
Coll & Barvas, Lewis (J.W. Heslop-Harrison & J. Heslop-Harrison, 1950).  
Borve to Northton, S. Harris (J.W. Heslop-Harrison, 1951b).  
Suishnish - Rudha na Cloice, Raasay (J.W. Heslop-Harrison & Morton, 1951).  
Luskentyre, S. Harris (J.W. Heslop-Harrison, 1956).

Other records for *majalis/occidentalis* in western and northern Scotland are:

Polin, West Sutherland (McCallum Webster & Marler, 1952)  
Danna, Kintyre (Kenneth & Rodway, 1974)  
Melvick, Sutherland (Kenworthy, 1976)  
Jura, West Ross, West Sutherland & Caithness (Lang, 1980)  
Knapdale, Kintyre (Tennant & Kenneth, 1983)  
Thurso Castle, Caithness (Butler, 1986)

In his review of the British dactylorchids, J. Heslop-Harrison (1954) commented on the existence in northern and western Scotland of populations of *Dactylorchis purpurella* which contain elements of heavily leaf marked plants, through which *D. purpurella* grades into *D. majalis*. Citing Campbell (1938), Hall (1937) and J.W. Heslop-Harrison (1944), populations of western Scotland and the Hebrides were said to be closely similar morphologically to some of those of south-western Ireland referable to *D. majalis* subsp. *occidentalis*, but distinguished by a later flowering period which reaches a peak in July. It is evident that many of the records of *majalis/occidentalis* are referable to such plants, which subsequently became the basis for Nelson's *D. purpurella* subsp. *majaliformis*.

Wiefelspütz (1977) gave an account of visits to Scotland in 1974, 1976 and 1977 in which *majalis* was only found at the one site on North Uist, whilst plants from north and north-west Scotland were described as *Dactylorhiza purpurella* 'north coast form'. From my own visits to the Outer Hebrides, western and northern Scotland in 1983, 1984, 1985, 1988 and 1993 I have only found *D. majalis* at the North Uist station whilst *D. purpurella* subsp. *majaliformis* was found to be infrequent at coastal localities in West Ross, abundant around Portskerra in West Sutherland and frequent about Scrabster and Thurso and on the east coast at Dunbeath in Caithness. In S. Harris, the sites reported by J.W. Heslop-Harrison have been shown to be *D. lapponica* and *D. purpurella* subsp. *majaliformis* and the plants from Knapdale, Kintyre shown to be *D. lapponica* and *D. traunsteineri* (Kenneth & al., 1988). The reports from Bernery (Barra Isles), Coll, Tiree and Rhum refer to marshy habitats or visits in



the summer, which suggest forms of *D. purpurella* and in a recent Flora of Tiree, Gunna and Coll (Pearman & Preston, 2000) the records of *D. majalis* subsp. *occidentalis* were regarded as doubtfully or erroneously recorded. Whilst not all localities of previous reports of *D. majalis* have been revisited, it is evident that there are no verifiable or reliable records, except for the original site on North Uist.

Inevitably, the reports from J.W. Heslop-Harrison & al. became established in British and European floristic accounts and some specialist papers (Clapham, 1962; Perring & Walters, 1976; Soó, 1980 and Bateman & Denholm, 1983). More recent accounts have provided good descriptions and illustrations of *D. majalis* from North Uist and made the distinction from the other marsh-orchids encountered in Scotland (Lang, 1989; Allen & al., 1993 & Turner Eitlinger, 1997 & 1998). Some of these dubious records from northern and western Scotland have been retained in the New Atlas of the British & Irish Flora (Preston & al., 2002).

## 5. Habitat

The North Uist population of *D. majalis* subsp. *ebudensis* occurs in a single extensive machair dune slack between Newton and Clachan over a distance of about 2 kilometres. The habitat is illustrated in photographs in Allen & al. (1993) and Kreutz (1996). Small satellite populations have been found in the near vicinity. The grassland is grazed by sheep in the summer and is likely to be partly flooded in the winter. The soil comprises a sandy peat with



Habitat of *Dactylorhiza majalis*, Newton Dunes, North Uist, Scotland, June 12<sup>th</sup>, 1985 (M.R. Lowe)

a high proportion of shell-sand. The vegetation is broadly consistent with the *Festuca rubra*-*Galium verum* fixed dune grassland, SD8, *Bellis perennis*-*Ranunculus acris* sub-community (Rodwell, 2000) and the *Euphrasio-Festucetum arenariae* Birse (Birse, 1980). However, it can be distinguished from many such machair grasslands by the presence of a perched water table below the surface; a habitat which is infrequent along the west side of the Outer Hebrides. Around Goulaby Burn marsh vegetation becomes dominant and *D. purpurella* and *D. incarnata* subsp. *coccinea* become more frequent, although it should be noted that *D. purpurella* is absent from much of the area in which *D. majalis* subsp. *ebudensis* is frequent.

## 6. Conservation

Any assessment of the conservation status of a plant requires a taxonomic definition, knowledge of the distribution and ecology of the taxon. *Dactylorhiza majalis* subsp. *ebudensis*, as defined above, occurs at a single site, in one 10 km x 10 km grid square with a flowering population of not more than 2,000 individuals. The habitat is dependent upon conservation management, with the continuation of low intensity grazing and sufficient opportunity to enable flowers to set and disperse seed. The habitat is vulnerable to agricultural 'improvement' through the application of fertilisers, herbicides or cultivation. As an endemic subspecies with a highly restricted distribution and the high vulnerability of the habitat to damage, the conservation of the taxon is of the greatest importance. Assessing the population against the IUCN criteria as applied to British vascular plants (Wigginton, 1999), a category of vulnerable (VU) is proposed. The site is already scheduled as a Site of Special Scientific Interest, which affords the habitat legal protection, although protection of the subspecies is proposed under schedule 8 of the Wildlife & Countryside Act, 1981.

## Acknowledgements

I am grateful to Dr. R.K. Brummitt for helpful comments on the nomenclature, to Mr. C.D. Preston and the Biological Records Centre, Dr. R.J. Pankhurst and Messrs. J.K. Butler and D.C. Lang for details of localities, to Messrs. C. Sydes and J. McKinnell of Scottish Natural Heritage for details of the site protection and Mr. D.J. Tennant and the late Messrs. A.G. Kenneth and D.M. Turner Ettlinger for valuable suggestions and companionship on parts of the expeditions.

## Bibliography

- Allen, B., P. Woods & S. Clarke (1993): Wild orchids of Scotland. Edinburgh.  
 Bateman, R.M. & I. Denholm (1983): A reappraisal of the British and Irish dactylorchids, 1. The tetraploid marsh-orchids. *Watsonia* 14: 347-376.  
 Bateman, R.M. & I. Denholm (1995): The 'Hebridean Marsh-Orchid': Nomenclatural and conceptual clarification of a biological enigma. *Edinb. J. Bot.* 52(1): 55-63.  
 Baumann, H., S. Künkele & R. Lorenz (2002): Taxonomische Liste der Orchideen Deutschlands. *Jour. Eur. Orch.* 34: 129-206.  
 Birse, E.L. (1980): Plant communities of Scotland: A preliminary phytocoenonia. Aberdeen.



- Butler, J.K. (1986): Plant records. *Watsonia* 16: 195.
- Campbell, M.S. (1937): Three weeks botanising in the Outer Hebrides. *B.E.C. Report* 11: 304-318.
- Campbell, M.S. (1938): Further botanising in the Outer Hebrides. *B.E.C. Report* 11: 534-560.
- Clapham, A.R. (1962): *Dactylorchis*, in Clapham, A.R., T.G. Tutin, & E.F. Warburg. *Flora of the British Isles*, 2nd ed., pp. 1042-1049. Cambridge.
- Clark, W.A. (1938): The flora of the Islands of Mingulay and Berneray. *Proc. Univ. Durham Phil. Soc.* 10: 56-71.
- Delforge, P. (2001): *Guide des Orchidées d'Europe, d'Afrique du Nord et du Proche-Orient*, ed. 2. Lausanne et Paris.
- Delforge, P. (2000): Nouvelles contributions taxonomiques et nomenclaturales aux Orchidées d'Europe. *Les Nat. belges* 81: 396-398.
- Hall, P.M. (1937): The Irish marsh orchids. *B.E.C. Report* 11: 330-354.
- Hedrén, M. (2002): Speciation patterns in the *Dactylorhiza incarnatalmaculata* polyploid complex (*Orchidaceae*): evidence from molecular markers. *Jour. Eur. Orch.* 34: 707-731.
- Heslop-Harrison, J. (1954): A synopsis of the dactylorchids of the British Isles. *Ber. geobot. Forsh. Inst. Rübel.* 1953: 53-82.
- Heslop-Harrison, J.W. (1941): A Preliminary Flora of the Outer Hebrides. *Proc. Univ. Durham Phil. Soc.* 10: 228-273.
- Heslop-Harrison, J.W. (1944): Records. *Vasculum* 29: 6.
- Heslop-Harrison, J.W. (1951a): Further observations on vascular plants of the Outer and Inner Hebrides. *Trans. Bot. Soc. Edin.* 35: 415-426.
- Heslop-Harrison, J.W. (1951b): Vascular plants in the Outer Hebrides in 1950. *Proc. Univ. Durham Phil. Soc.* 11: 1-11.
- Heslop-Harrison, J.W. (1956): Botanising in the Outer Hebrides in 1955 and 1956. *Proc. Univ. Durham Phil. Soc.* 12: 141-149.
- Heslop-Harrison, J.W., H. Heslop-Harrison, W.A. Clark, & R.B. Cooke (1941): The Flora of the Isles of Coll, Tiree and Gunna (v.-c. 110B). *Proc. Univ. Durham Phil. Soc.* 10: 274-308.
- Heslop-Harrison, J.W., H. Heslop-Harrison, W.A. Clark, & R.B. Cooke (1942): Further observations on the vascular plants of the Outer Hebrides (v.-c. 110). *Proc. Univ. Durham Phil. Soc.* 10: 358-368.
- Heslop-Harrison, J.W. & J. Heslop-Harrison (1950): A contribution to our knowledge of the flora of the Isles of Lewis, Harris, Killegray and Ensay. *Trans. Bot. Soc. Edinb.* 35: 132-156.
- Heslop-Harrison, J.W. & J.K. Morton (1951): Botanical investigations in the Isles of Raasay, Rhum (v.c. 104), Lewis and Harris (v.c. 110) in 1951. *Proc. Univ. Durham Phil. Soc.* 11: 12-23.
- Kenneth, A.G., M.R. Lowe & D.J. Tennant (1988): *Dactylorhiza lapponica* (LAEST. ex HARTMAN) Soó in Scotland. *Watsonia* 17: 37-41.
- Kenneth, A.G. & G. Rodway (1974): Plant records. *Watsonia* 10: 185.
- Kenworthy, J.B. (1976): *John Anthony's Flora of Sutherland*. Edinburgh.
- Kreutz, C.A.J. (1996): *Dactylorhiza majalis* (REICHENBACH) P.F. HUNT & SUMMERHAYES ssp. *scotica* NELSON. *Eurorchis* 8: 58-61.
- Landwehr, J. (1977): *Wilde Orchideeën van Europa*. Amsterdam.

- Lang, D. (1980): Orchids of Britain. Oxford.
- Lang, D. (1989): A guide to the wild orchids of Great Britain and Ireland, 2nd ed. Oxford.
- Løjtnant, B. (1979): *Dactylorhiza purpurella* ssp. *majaliformis* NELSON ex LØJTNANT. Svensk Bot. Tidsskr. 74: 175-176.
- McCallum Webster, M. & P. Marler (1952): A contribution to the Flora of West Sutherland. *Watsonia* 2: 163-179.
- Nelson, E. (1976): Monographie und Ikonographie der orchidaceen-Gattung *Dactylorhiza*. Zürich.
- Nelson, E. (1979): Nachtrag zu E. Nelson 1976. *Taxon* 28: 592-593.
- Pearman, D.A. & C.D. Preston (2000): A flora of Tice, Gunna & Coll. Dorchester.
- Perring, F.H. & S.M. Walters (eds.) (1976): Atlas of the British flora. 2nd ed. London.
- Pedersen, H.Æ. (1998): Species concept and guidelines for infraspecific taxonomic ranking in *Dactylorhiza* (Orchidaceae). *Nord. J. Bot.* 18: 289-310.
- Pedersen, H.Æ. (2000): On the status and synonymy of the names *Dactylorhiza majalis* and *D. incarnata* (Orchidaceae) and their typification. *Taxon* 49: 539-544.
- Preston, C.D., D.A. Pearman & T.C. Dines (2002): New Atlas of the British & Irish Flora. Oxford.
- Pugsley, H.W. (1935): On some marsh orchids. *Bot. J. Linn. Soc.* 49: 553-592.
- Pugsley, H.W. (1936): New British marsh orchids. *Proc. Linn. Soc. Lond.* 148: 121-125.
- Rodwell, J.S. (ed.) (2000): British plant communities. 5, Maritime communities and vegetation of open habitats. Cambridge.
- Sell, P.D. & G. Murrell (1996): Flora of Great Britain and Ireland. 5, *Butomaceae* - *Orchidaceae*. Cambridge.
- Soó, R. de (1980): *Dactylorhiza* in Tutin, T.G. & al. (eds.) *Flora Europaea*, vol. 5, 333-337. Cambridge.
- Tennant D.J. & A.G. Kenneth (1983): The Scottish records of *Dactylorhiza traunsteineri*. *Watsonia* 14: 287-293.
- Turner Ettlinger, D.M. (1997): Notes on British and Irish orchids. Dorking.
- Turner Ettlinger, D.M. (1998): Illustrations of British and Irish orchids. Dorking.
- Wiefelspütz, W. (1977): Über einige *Dactylorhiza*-Sippen in Großbritannien und Irland. *Jber. naturwiss. Ver. Wuppertal* 29: 41-51.
- Wigginton, M.J. (ed.) (1999): British Red Data Books. 1, Vascular Plants. 3rd ed. Peterborough.
- Wilmott, A.J. (1936): New British marsh orchids. *Proc. Linn. Soc. Lond.* 148: 126-130.

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