

Peloria and pseudopeloria in British orchids

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ABSTRACT

Peloric orchids have either (a) the lateral, inner perianth segments replaced by additional labella or (b) the labellum replaced by a third, undifferentiated, inner perianth segment. Type (a) mutants have been reported for several British and Irish orchid species, but type (b) mutants are extremely rare. Aberrant orchids with poorly differentiated labella that resemble their outer perianth segments ('sepaloid') are best described as pseudopeloric. They have often been misidentified as type (b) peloric individuals or as hybrids, and are more frequent than has previously been suggested.

PELORIA

All our native orchid species normally have zygomorphic (bilaterally symmetrical) flowers. However, rare mutants have actinomorphic (radially symmetrical) perianth segments, although the column remains bilaterally symmetrical; actinomorphic mutants of normally zygomorphic flowers are termed peloric. Peloria in orchids occurs when (a) the inner perianth segments are replaced by two additional labella (and spurs if these are normally present in the species), or (b) the labellum is replaced by a third, undifferentiated, inner perianth segment. Type (a) mutants have been reported for *Cephalanthera damasonium* (Mill.) Druce (C. B. Tahourdin, unpublished circular 1926), *Corallorhiza trifida* Chatel. (Webster 1967; Rodway 1972), *Listera ovata* (L.) R. Br. (Summerhayes 1951), *Ophrys insectifera* L. (Tahourdin 1925; Godfery 1933; Webster 1967; Lang 1980; D. M. Turner Ettliger pers. comm. 1983), *O. apifera* Huds. (Godfery 1933; Webster 1967), *O. fuciflora* (F. W. Schmidt) Moench (Godfery 1933), *Orchis morio* L. (Tahourdin 1925; Godfery 1933), *O. purpurea* Huds. (Godfery 1933; Rose 1949; Lang 1980; D. M. Turner Ettliger pers. comm. 1983), *Anacamptis pyramidalis* (L.) L. C. M. Richard (Godfery 1933), and *Gymnadenia conopsea* (L.) R. Br. (I found a single plant on Ivinghoe Beacon, Bucks., v.c.24, in 1982). Genuine type (b) mutant orchids appear to be unrecorded in Britain, although rare individuals with this floral configuration have been found in Europe; e.g. *Orchis purpurea* in France (Godfery 1933) and *Ophrys tenthredinifera* Willd. in Mallorca (J. Robertson pers. comm. 1984).

PSEUDOPELORIA

In a third group of rare mutants the labellum is poorly differentiated and is similar to, but not identical with, the outer perianth segments. These labella are often described as 'sepaloid', and flowers possessing such labella as 'semi-peloric'. However, this term is inappropriate as orchid flowers are either bilaterally or radially symmetrical, i.e. non-peloric or peloric; 'pseudopeloric' is a more apt description. The classic example is the mutant variant of *Ophrys apifera*, illustrated by Tahourdin (1925), Godfery (1933), Summerhayes (1951) and Lang (1980), that has an unusual unmarked labellum similar in colour, size and overall shape to the outer perianth segments. However, the labellum differs from the outer perianth segments in possessing lateral indentations that may represent traces of the deep sinuses which divide normal labella into three lobes.

Reports of possible pseudopeloria in *O. fuciflora* (Smith 1852) and *Epipactis helleborine* (L.) Crantz (Young 1952a) are poorly documented, and the most widespread example of pseudopeloria in British orchids has not previously been recognized as such: *Epipactis phyllanthes* G. E. Smith var. *phyllanthes* has a labellum that lacks the constriction which separates the epichile and

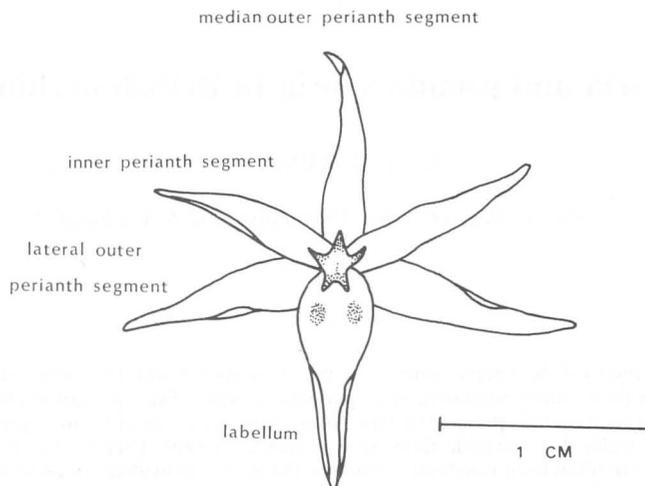


FIGURE 1. Aberrant *Dactylorhiza fuchsii* from Pitstone Fen, Bucks.

hypochile of other *Epipactis* and consequently resembles the outer perianth segments, i.e. it is 'sepaloid' (Young 1952a,b) and the flowers are therefore pseudopeloric.

Lang (1980) illustrated a *Gymnadenia conopsea* flower with three identical outer perianth segments that are abnormally straight, broad and acute. The inner perianth segments and labellum are replaced by three spurless structures that resemble the outer perianth segments but possess two basal protruberances that probably represent traces of the lateral lobes of normal labella. This plant appears to show both type (a) peloria and pseudopeloria; pseudopeloria is not partial peloria, as was suggested by its previous description 'semi-peloria', but is a separate and distinct phenomenon.

In 1982, R. Simms discovered two unusually late-flowering and lax specimens of *Dactylorhiza fuchsii* (Druce) Soó in an eastern Buckinghamshire fen (G. M. Atkins pers. comm. 1982) that I subsequently identified as pseudopeloric (Fig. 1). The labellum resembles that of pseudopeloric *Ophrys apifera*, being reduced to a single, slightly-deflexed, long-acuminate lobe but differentiated from the other perianth segments by a shallow distal constriction. However, unlike *O. apifera*, the other perianth segments are also abnormal, particularly the inner perianth segments which are straight, acute and approximately equal to the outer perianth segments in length. The spur is barely detectable, and the column is sterile and deformed into five almost equal lobes. The flower colour is cream tinged with pink, and the only markings are two crimson spots near the base of the labellum. The overall morphology of the flowers suggests partial regression to the putative ancestors of the orchid family, which are believed to have possessed radially symmetrical lily-like flowers (Dressler 1981; Dahlgren & Clifford 1982). Such plants appear to be very rare, as I have been unable to find any reports of similar aberrant individuals of *Dactylorhiza* in the extensive literature on this genus.

PSEUDOPELORIA AND \times PSEUDANTHERA

Significantly, the six perianth segments of the pseudopeloric *D. fuchsii* resemble those of the supposed intergeneric hybrid \times *Pseudanthera breadalbanensis* McKean (*Platanthera chlorantha* \times *Pseudorchis albida*) in Perthshire, described by McKean (1982); this plant may therefore be a pseudopeloric variant of *P. chlorantha*. This interpretation is supported by four additional observations: (i) Landwehr (1977) illustrated a morphologically similar flower and described it as a mutant form of *P. chlorantha*. (ii) Most characters of the Perthshire plants are much closer to *P. chlorantha* than to *P. albida*. (iii) In 1983 the supposed hybrids occurred with two other mutant variants of *P. chlorantha*. The first mutant, which bore completely green flowers with brown

pollinia, closely resembled *P. algeriensis* Batt. & Trabut (Davies *et al.* 1983: plate 60). Each flower of the second mutant possessed three spurs and a reduced labellum, showing as much morphological divergence from normal *P. chlorantha* as the supposed hybrids. (iv) Similar pseudopeloric individuals have been reported for *P. bifolia* (L.) L. C. M. Richard. A plate in Tahourdin (1925) shows flowers with 'sepaloid' labella and only a trace of a spur, and an apparently pseudopeloric individual of *P. bifolia* was found 25 km south-west of the Scottish locality for \times *Pseudanthera* (Smith 1852).

CAUSE OF PSEUDOPELORIA

The cause of pseudopeloria remains speculative. Plants of *Epipactis phyllanthes* var. *phyllanthes* are not usually associated with those of other more florally-differentiated varieties of *E. phyllanthes*, probably because this species is autogamous so a pseudopeloric founder can generate a large population of similar individuals. Pseudopeloria appears to be an inherited trait. Young (1952b) suggested that 'sepaloid' labella arose in *Epipactis phyllanthes* var. *phyllanthes* either (i) by gradual loss of gene(s) determining labellum shape, or (ii) by the sudden deactivation of these genes, e.g. due to a change in a regulator gene. The absence of morphological intermediates between the pseudopeloric individuals of *Ophrys*, *Platanthera* and *Dactylorhiza* species described in this paper and plants of these species with normal flowers suggests that, for these genera at least, the second hypothesis is more plausible.

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