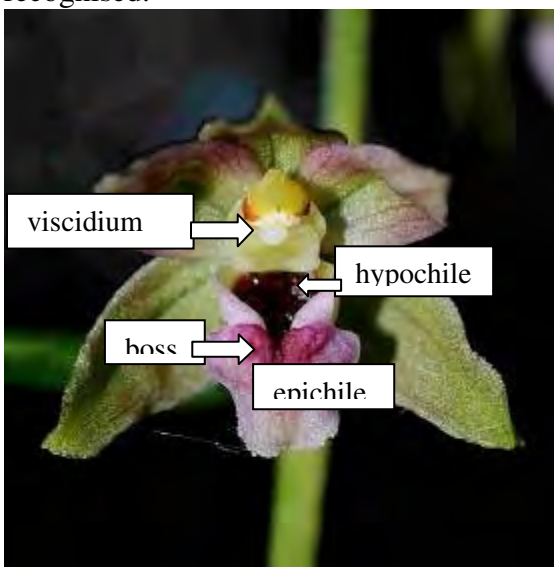
EPIPACTIS

(nb, photos herein were donated by too many photographers to acknowledge!)

The account in the most recent edition of *The Plant Crib* (Rich & Jermy 1998) is now seriously out of date. There is an update in *BSBI News* 112: 8-9 (Richards & Squirrel 2009) on which the following account is based, and in which references to recent molecular advances in the genus are made. In the British Isles, *Epipactis* poses two kinds of taxonomic problem. The first is autogamy (habitual self-fertilization). This causes invariable lines to become genetically fixed which can be recognised as species, albeit of a very narrow scope. Isozyme and chloroplast DNA studies tend to show little if any variation within taxa, and small but consistent differences between them. In the British Isles, these autogamous species are in two complexes which are confirmed by molecular studies, the *E. leptochila* group (*E. leptochila, E. dunensis, E. sancta* and possibly *E. muelleri*), and the *E. phyllanthes* group, in which the taxa are currently treated as varieties, v. *pendula* (probably including v. *confusa*), v. *cambrensis*, v. *vectensis* (including v. *degenera*), and v. *phyllanthes*.

The principal cause of autogamy is the failure of the rostellum (apical point of the stigma) to secrete a sticky viscidium. In the allogamous species, the pollinia adhere to the viscidium, so that they cannot fall further into the stigmatic cavity, and are removed together with the viscidium during a wasp visit. Self-pollination rarely occurs within the flower, although there may be wasp transport between flowers of the same plant. In the autogamous species, the viscidium fails to form or is ineffective, and the pollinia fall directly into the cavity, causing within-flower pollination (automatic selfing). Other features may augment this process, including early release and break-up of the pollinia, and small or partially closed flowers. Nevertheless, autogamous flowers are still visited by wasps, and there may be some transfer of parts of pollinia (massulae) between flowers, so that autogamous x allogamous hybridization may be more frequent than has been recognised.



E. helleborine, showing pollinia resting on the viscidium.

E. leptochila; pollinia falling below the rostellum that has not secreted a viscidium.

The other main problem posed in *Epipactis* is hybridity between allogamous species. The hybrid *E. x schmalhausenii* (*E. atrorubens x helleborine*) does occur but is overdiagnosed. *E. x schulzei* (*E. purpurata x helleborine*) is very difficult to identify with certainty. The following key treats all species and hybrids.

1a Strongly rhizomatous, forming large colonies; epichile orbicular, frilly.....
.....*E. palustris*
1b Stems single, or shortly clumping; epichile not frilly.....2

2a Epichile >1.5 as broad as long; boss >half width of epichile, usually 3-lobed. Stem grey or violet; basal leaf blade acute, erect.....*E. atrorubens*

2b Epichile 1.2 as long as broad; boss half width of epichile, triangular. Stem greenish; basal leaf blade obtuse, patent..... *E. x schmalhuasenii*

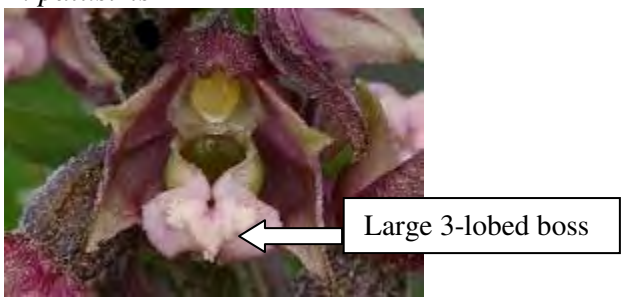
2c Epichile <1.1 as long as broad with two small central bosses. Stem green or violet; basal leaves various.....3

3a Stems often >5 together, grey to violet; leaves stiff, pubescent, blade of lowest acute. Epichile whitish.....*E. purpurata*

E. purpurata

3c Stems green; leaves not stiff or hairy. Epichile not whitish.....4

E. palustris



E. atrorubens

E. x schmalhausenii

3b Stems greenish-pink; leaves stiff but glabrescent and obtuse. Epichile whitish.....*E. x schulzei*

E. x schulzei Stems and leaves.

4a Hypochile usually green; stems glabrous or nearly so; internodes often exceeding leaves.....(*E. phyllanthes* agg.) 5

4b Hypochile purple; stems pubescent above; internodes never exceeding leaves 7

5a Labellum undifferentiated or nearly so (peloric).....*E. phyllanthes v. phyllanthes*

5b Hypochile much smaller than epichile.....*E. phyllanthes v. vectensis* (includes v. *degenera*)

5c Labellum fully differentiated; hypochile about equal to epichile.....6

6a Lower leaves <2.2 x longer than broad; usually shorter than internodes..... .....*E. phyllanthes v. pendula* (includes *v. confusa)*

6b Lower leaves 3-5 x long as broad, exceeding internodes.....*E. phyllanthes v. cambrensis*

E. phyllanthes v. *phyllanthes*

E. phyllanthes v. vectensis

E. phyllanthes v. pendula

E. phyllanthes v. cambrensis

7a Lowermost leaf blade (much smaller than others) wider than long, cucullate; leaves ribbed, harsh in texture, usually dark green. Flowers usually tinged with dirty purple, rarely pink.....(*E. helleborine* agg.) 8

7b Lowermost leaf blade longer than wide; leaves scarcely ribbed, silky in texture, often yellowish green. Flowers yellowish green to clear pink.....9

8a Flowers and leaves crowded; leaves yellow-green, flowers pink. Plants of duneland.....*E. helleborine* subsp. *neerlandica*

8b Leaves usually dark green, flowers tinged dirty purple. Woodland.....*E. helleborine* subsp. *helleborine*

9a Epichile flat, longer than wide.....*E. leptochila*

9b Epichile recurved at tip, no longer than wide.....10

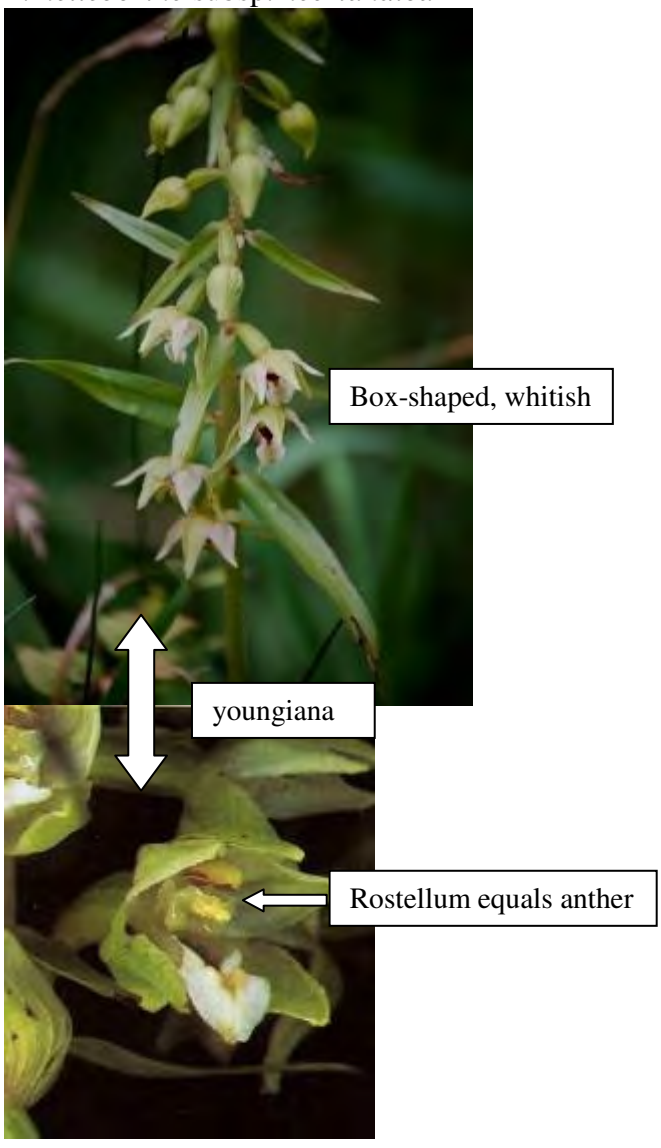
10a Flowers box-shaped, 10-14 mm diameter, whitish-green to clear rose; rostellum long, often nearly equalling anther, with two basal bosses forming a tricornute stigma; ovary nearly glabrous.....*E. helleborine* v. *youngiana*

10b Flowers saucer-shaped, usually <10 mm diameter, yellow-green; rostellum short, stigma not tricornute; ovary pubescent (lens).....11

11a Uppermost leaf inserted in lower third of stem; floral internodes usually exceeding ovary.....*E. sancta*

11b Uppermost leaf inserted about half way up stem; floral internodes usually shorter than ovary.....*E. dunensis* (*E. muelleri* would key out here too).

E. helleborine subsp. *neerlandica*



E. dunensis

E. dunensis

E. sancta

E. sancta

Notes

E. helleborine subsp.*neerlandica* and *E. phyllanthes* v. *cambrensis* are only known from sand-dunes in south Wales.

E. leptochila is found in beechwoods from southern England to the west Midlands. Some inland plants from northern England have a narrow flat epichile and may be indistinguishable from *leptochila*, but have the molecular signature of *E. dunensis.*

Inland *E. dunensis* ('tynensis') differs from west coast plants by one bp substitution, but is clearly derived from dune populations and cannot be differentiated morphologically.

The characters by which *E. dunensis* differs from the continental *E. muelleri* (purple pedicel base, shorter bracts, stalked anther=clinandrium) are dubious and need investigation. They are molecularly distinct, as is *E. sancta*.