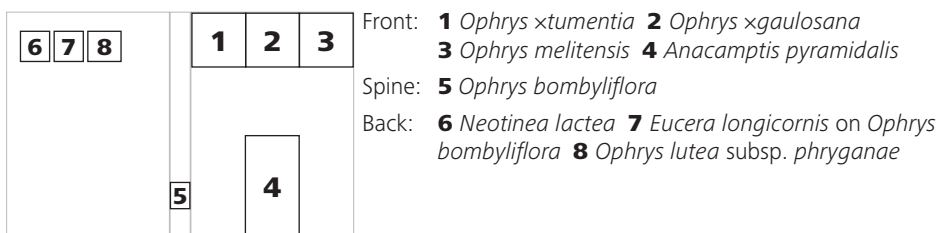


ORCHIDS OF THE MALTESE ISLANDS

a descriptive guide



by Stephen Mifsud



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Ophrys melitensis – Origin and systematics

Ophrys melitensis (Salk.) Devillers-Terschuren & Devillers (FIG. 1) is a Maltese endemic orchid which is closely related to *O. sphegodes* Miller and *O. incubacea* Bianca ex Tod. According to the classification proposed by PEDERSEN & FAURHOLDT (2007), it is included with 12 other taxa into the broader hybrid taxon of *O. xflavicans* Viv. and is cited as such on most plant species databases (e.g. Euro+Med PlantBase, eMonocot, The Plant List and the World Checklist of Selected Plant Families [Royal Botanic Gardens, Kew]). The discussion hereunder provides some possible scenarios about the origin, classification and uniqueness of *O. melitensis* based on long-term observations of many specimens in the field by Stephen Mifsud. The morphological characters and the variability of this species were already mentioned earlier (pg. 134), but some additional data will be provided and discussed here to sustain *O. melitensis* as a distinct endemic hybridogenous species and explain its origin.



FIG. 1. Typical example of *Ophrys melitensis* with green sepals, undulated upper petals, raised lateral wings, horse-shoe-shaped speculum, specular stage that is concolorous with lip with a central white disk and dark bluish pseudoeyes.

As already pointed out by the SALKOWSKI (1994) and his predecessors, the wide variation exhibited in *O. melitensis* can be explained by two hypotheses:

- 1 Allopatric speciation: *O. melitensis* is possibly a relic of a larger population which was present on mainland Europe. Malta became isolated from mainland Europe and this, together with the unique environmental and climatic conditions of these islands, led to its speciation.
- 2 Hybrid speciation: two or more *Ophrys* species can easily cross-fertilise with each other producing a unique hybridogenous orchid species, now defined as *O. melitensis*. In *Ophrys*, hybridisation is dictated by pollinating insects.

A more detailed consideration of these two hypotheses follows hereunder.

Following the geographical separation of the Maltese Islands from mainland Europe in the Holocene Period (about 10,000 years ago), the islands, currently 100 km south of Sicily, became warmer, more arid, prone to stronger winds and gained a more coastal influence relative to the rest of southern Europe. This new environment may have favoured some *Ophrys* species which prefer such conditions. Hybrids formed readily from a few closely related species producing complex hybrid swarms, and it is assumed that these hybrids developed new characteristics better suited to the climatic conditions of the Maltese Islands. Via natural selection, the phenotype of what is now known as *O. melitensis* established itself in the Maltese Islands where it outcompeted and replaced almost all of its putative parents.

While hybridisation between species has not been reported for several orchid genera, the same cannot be said of *Ophrys* which hybridises relatively easily. *Ophrys* is in fact considered amongst one of the most highly evolved genera with its amazing mimicry and pollination tactics not seen in any other plant family, most likely owing to its high rate of successful interspecific hybridisation.

O. melitensis shows great variability and exhibits morphological traits distinctive of several *Ophrys* species, which implies that it is a hybrid of more than two progenitors. It is assumed that these closely related *Ophrys* species co-existed before Malta became isolated from mainland Europe.

The question remains: which species are the progenitors of *O. melitensis*? The following discussion considers two main factors in addressing this question, namely the range of candidate progenitors with respect to the Maltese Islands and the occurrence of morphological traits in *O. melitensis* which are distinctive of candidate progenitors. The candidate progenitors discussed are *O. bertolonii*, *O. incubacea*, *O. lunulata*, *O. sphegodes*, *O. promontorii* and *O. tarentina* (FIG. 2). In addition,

the proposed synonymy of *O. melitensis* with *O. xflavicans* (PEDERSEN & FAURHOLDT, 2007) is considered.

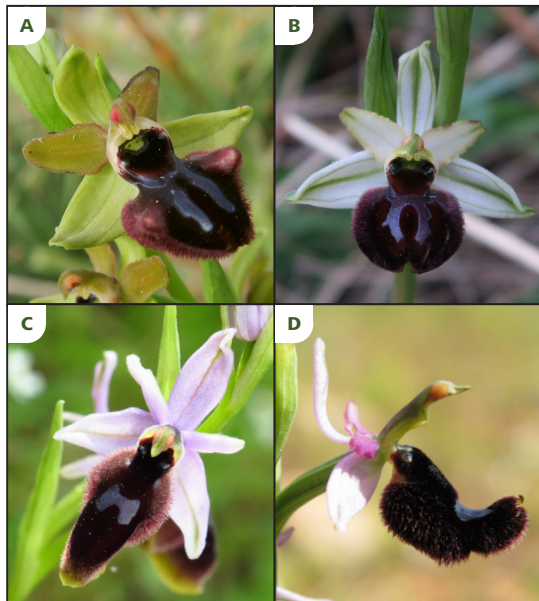


FIG. 2. A. *Ophrys incubacea*; B. *O. sphegodes*; C. *O. lunulata* and D. *O. bertolonii* – species distributed in the central Mediterranean region which are thought to play a role (amongst a few others) in the evolution and hybrid speciation of *O. melitensis*.

While *O. lunulata* Parl. is reported as frequent from Sicily, it is very rare in the Maltese Islands and it possesses a shield-shaped speculum and pink sepals which *O. melitensis* rarely exhibits. *O. lunulata* lacks the knobby wing-like projections at the shoulders of the lip (or sometimes has very weak projections) which are well-developed in many specimens of *O. melitensis*.

The case for *O. bertolonii* Moretti is in several respects similar to that of *O. lunulata*, i.e. it is very rare in the Maltese Islands while frequent in Sicily, it possesses a shield-shaped speculum and pink sepals (both of which *O. melitensis* rarely exhibits) and it lacks the wing-like projections (which are well-developed in *O. melitensis*) as described above. In contrast, *O. bertolonii* has a characteristic saddle-shaped lip (longitudinally concave) and if it was an influential progenitor of *O. melitensis* this character would likely be observed in a few individuals of the latter, but the lip of the endemic orchid is always straight and longitudinally plane. *O. melitensis* predominantly exhibits a green perianth (often with mottled brown petals) and should therefore have much less influence from progenitors with a pink perianth (such as *O. bertolonii*) unless this is controlled by recessive genes. In spite of these differences, some introgression from *O. bertolonii* cannot be excluded completely. At least three characters typical of *O. bertolonii* are exhibited in *O. melitensis*: the appendage situated in a notch at the base of the lip, the pink or purple upper petals (FIG. 3) and a broad shield-shaped speculum (FIG. 4), the last two being rarely present in the Maltese spider orchid.

The knobby wing-like projections mentioned above are characteristic in *O. incubacea* Bianca ex Tod., which is within the geographic range of the Maltese Islands. It is therefore plausible that *O. melitensis* inherited this character (FIG. 5) from this species or one which was ancestral to the *O. incubacea* group. In addition, individuals of *O. melitensis* have been observed with a hint of glabrous speculum-like patches on the surface of the lateral wings, which is typical of *O. incubacea*. This species as

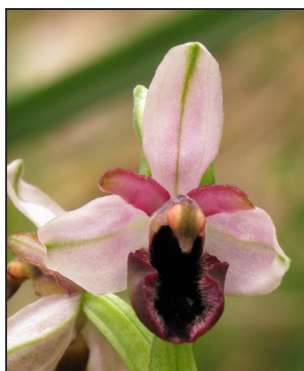


FIG. 3. *Ophrys melitensis* with pink sepals and purplish upper petals.



FIG. 4. *Ophrys melitensis* with a broad speculum.



FIG. 5. *Ophrys melitensis* with characters comparable to *O. incubacea*: upper petals with wavy margins; speculum two broad bands; stigmatic cavity with a white central disc on the floor and pronounced lateral wings.

a candidate progenitor may have contributed many characters to *O. melitensis*: the speculum composed of two parallel bands, the white specular stage at the floor of the stigmatic cavity, the deep notch at the tip of the lip and, more importantly, the green sepals and upper petals with wavy margins which are quite characteristic in most specimens of *O. melitensis*. However, with an average height of 25 cm, *O. melitensis* never reaches the height of *O. incubacea* which is more robust and about 40 cm tall.

While *O. sphegodes* Miller is similarly much taller than *O. melitensis*, the former possesses a green-brown perianth, a speculum collaring around the stigmatic cavity and running down into two parallel stripes (H-shaped or necklace-shaped) and the presence of knobby shoulders, all characters which it may have contributed to *O. melitensis*.

O. tarentina Gözl & H.R.Reinhard is the first species considered here that may explain the reduced or absent (FIG. 6) speculum of *O. melitensis* (as all species considered above have a distinct and usually large speculum) and may also contribute to the reduced or even absent appendage at its apex, as seen in several specimens of *O. melitensis*. Furthermore, both *O. tarentina* and *O. melitensis* have a blackish lip.

O. promontorii O.Danesh & E.Danesh may likewise have contributed its reduced or absent speculum to *O. melitensis*, though the lip of the former is more brownish and often possesses an appendage.

Finally, the proposed synonymy of *O. melitensis* with *O. xflavicans* Viv. (PEDERSEN & FAURHOLDT, 2007) remains to be considered. *O. xflavicans* was described in 1842 from Dalmatia (Croatia) and takes its epithet from the characteristic yellowing of the hairs when the lip becomes old (DELFORGE, 2006; PEDERSEN & FAURHOLDT, 2007; MAST DE MAEGHT, 2017). The range of *O. xflavicans* is rather detached from the Maltese Islands, being distributed from Croatia to Spain. In contrast to the mostly greenish sepals and petals of *O. melitensis*, these structures in *O. xflavicans* are pink. Moreover, the speculum of *O. xflavicans* is almost always shield-shaped (rarely horseshoe) and it has a slightly concave lip resembling *O. bertolonii*, whereas this is longitudinally plane in *O. melitensis*. These characteristics do not align with those of *O. melitensis* and the proposed synonymy of *O. melitensis* with *O. xflavicans* can be rejected.

Based on a consideration of the morphological features of related *Ophrys* species and their occurrence in the Maltese Islands, this discussion suggests that *O. melitensis* constitutes a distinct species evolved through the hybridisation of *O. incubacea*, *O. sphegodes*, *O. lunulata*, and *O. tarentina* (in order from most to least dominant) with possible slight introgression from *O. bertolonii*. TABLE 1 shows some of the characters of *O. melitensis* and which progenitor(s) they are likely inherited from.

Owing to the occurrence of apparently diverse characters in *O. melitensis*, it has in the past been classified inconsistently within the *Ophrys* genus. It was initially grouped with *O. sphegodes* by SALKOWSKI (1992), then transferred into *O. bertolonii* by DEVILLERS-TERSCHUREN & DEVILLERS (1994) and most recently in the

O. lunulata group by DELFORGE (1996, 2006). It is inappropriate and subjective to place a hybridogenous species within a group if it possesses characters typical of two or more groups, but since *O. melitensis* has a great affinity with *O. incubacea*, its placement in the *O. incubacea* group is most suitable. Moreover, this discussion rejects its combination as *Ophrys xmelitensis* (a nothospecies) as seen in a few recent classifications, as well as synonymy of *O. melitensis* with *O. xflavicans* (PEDERSEN & FAURHOLDT, 2007).

TABLE 1. Characters typical of *Ophrys melitensis*, their prevalence within the species' populations and their presence in putative progenitor species.

Character of <i>O. melitensis</i>	Prevalence of character in <i>O. melitensis</i>	Putative progenitor				Possible introgression from <i>O. bertolonii</i> (FIG. 2D)
		x indicates presence of character in putative progenitor (x) indicates it is weak or reduced				
		<i>O. incubacea</i> (FIG. 2A)	<i>O. sphegodes</i> (FIG. 2B)	<i>O. lunulata</i> (FIG. 2C)	<i>O. tarentina</i>	
Green sepals	Common	x	x		x	
Parallel striped speculum reaching the stigmatic cavity	Common	x	x			
Broad petals with wavy margins	Common	x	x			
White specular stage (disc) in stigmatic cavity	Common	x				x
Wing-like projection at shoulder of lip (FIG. 5)	Frequent	x				
Bilobed or horseshoe speculum (FIG. 1)	Frequent			x		
Blackish lip (FIG. 8)	Frequent	x			x	(x)
Long shaggy hair at the margin of the lip	Frequent	x			x	
Pale appendage	Frequent (variable size)	(x)		x	(x)	x
Black specular stage in stigmatic cavity	Scarce (or intermediate)		x			
Slender petals with smooth margin (FIG. 7)	Scarce			x		x
Reduced speculum (FIG. 6)	Scarce				x	
Speculum collaring stigmatic cavity	Scarce	x	x			
Very reflexed margins (FIG. 7)	Scarce			x		
Broad shield speculum	Rare					x
Deep notch at apex	Rare	x				x
Glabrous shiny surface on the lateral wings	Rare	x				
Pink sepals	Rare			x		x
Reddish-brown lip	Rare		x			
White sepals (FIG. 8)	Rare		x			
White stigmatic cavity	Rare	x				



FIG. 6. *Ophrys melitensis* with a flat, reddish-brown lip and slender upper petals with a smooth margin.



FIG. 7. *Ophrys melitensis* with strongly reflexed margins as in *O. lunulata*.



FIG. 8. *Ophrys melitensis* with white sepals and purple upper petals.