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## **Promotion of the Maltese *Ophrys bombyliflora* forma *parviflora* to a variety**

### **Keywords**

Orchids of Malta, Flora Malta, *Ophrys bombyliflora* var. *parviflora*, endemics.

### **Summary**

Mifsud, S. (2014): Promotion of the Maltese *Ophrys bombyliflora* forma *parviflora* to a variety.- J. Eur. Orch. 46 (3/4): 679-685.

A discovery of a second clump of *Ophrys bombyliflora* f. *parviflora* from the Maltese islands was found to be formed of a homogenous population, the same previously found in 2008. These micro-satellite populations show a degree of genetic barrier with the normal form of *O. bombyliflora*, despite they are in sympatric associations. In addition, on evaluating its distinguishing characters, and abiding with the current application of infraspecific ranking in plant taxonomy, this taxon is here combined to a variety level, hence *Ophrys bombyliflora* var. *parviflora*.

### **Zusammenfassung**

Mifsud, S. (2014): Höherstufung der maltesischen *Ophrys bombyliflora* forma *parviflora* zur Varietät.- J. Eur. Orch. 46 (3/4): 679-685.

Eine auf Malta neu entdeckte, zweite Gruppe von *Ophrys bombyliflora* f. *parviflora* zeigte sich ebenso homogen in ihrer morphologischen Ausprägung wie die 2008 angetroffene erste maltesische Gruppe dieser Form. Obwohl sich diese zwei Gruppen in unmittelbarer Nähe von der Nominatform von *O. bombyliflora* befinden, zeigen sie sich über viele Jahre hinweg konstant; dies lässt auf eine deutliche genetische Barriere schließen. Auf Basis weitergehender Untersuchungen der Unterscheidungsmerkmale und in Anlehnung an die aktuelle Anwendung infraspezifischer Rangstufen wird dieses Taxon als *Ophrys bombyliflora* var. *parviflora* hochgestuft.

\* \* \*

## Background

Unlike many other species of *Ophrys*, *Ophrys bombyliflora* Link exhibits minimum plasticity in its morphology. Such differences as there are, are usually insignificant variations in the pattern of the speculum or fluctuations of the size of the lip. *O. bombyliflora* is one of the most abundant orchids in Malta (BARTOLO, LANFRANCO, PULVIRENTI & STEVENS 2001), which makes numerous morphological observations feasible. A clump of *O. bombyliflora* with distinctly smaller lips, and mostly bearing a brighter speculum has been described as a new form called *Ophrys bombyliflora* forma *parviflora* S. Mifsud (MIFSUD 2009). According to this protologue, *O. bombyliflora* forma *parviflora* is best distinguished by the width of the median lobe, which is 4.5mm ( $\pm 0.5$ mm) compared to 7mm ( $\pm 1$ mm) in *O. bombyliflora* f. *bombyliflora* (which from here on will be referred to as *O. bombyliflora*). The infraspecific level of forma was designated in (MIFSUD 2009) with the precaution that studies were early and based on one population only. Further studies on this taxon have been carried out in subsequent years, including long-term observation of individuals within the population, searching for the presence of any intermediate forms, any further morphological distinctness and the occurrence of other populations.

## Current observations

The population present at the type locality at Pembroke, Malta, was visited seven times between 2008 and 2014. The number of orchids remained stable, at more or less 120 specimens in an isolated clump occupying an area of about 1.5 m  $\times$  2.0 m on exposed coastal garigue facing North East (Fig. 1a). Consistent with what was observed earlier (MIFSUD 2009), the flowering specimens were always homogenous and distinct by having much smaller lips. Also, most of the specimens had a rather milky-blue or almost white butterfly-shaped speculum.

Another population of *O. bombyliflora* f. *parviflora* was discovered on the 25<sup>th</sup> March 2011 (Fig. 1b), about 300 m away from the type locality. It was like the previously-discovered clump in that it was an isolated, dense clump of specimens with a homogenous morphology, flowering at same time. During subsequent visits, these populations were always made up of small-lipped flowers only. During some of these visits, attempts to spot a visiting pollinator were futile.

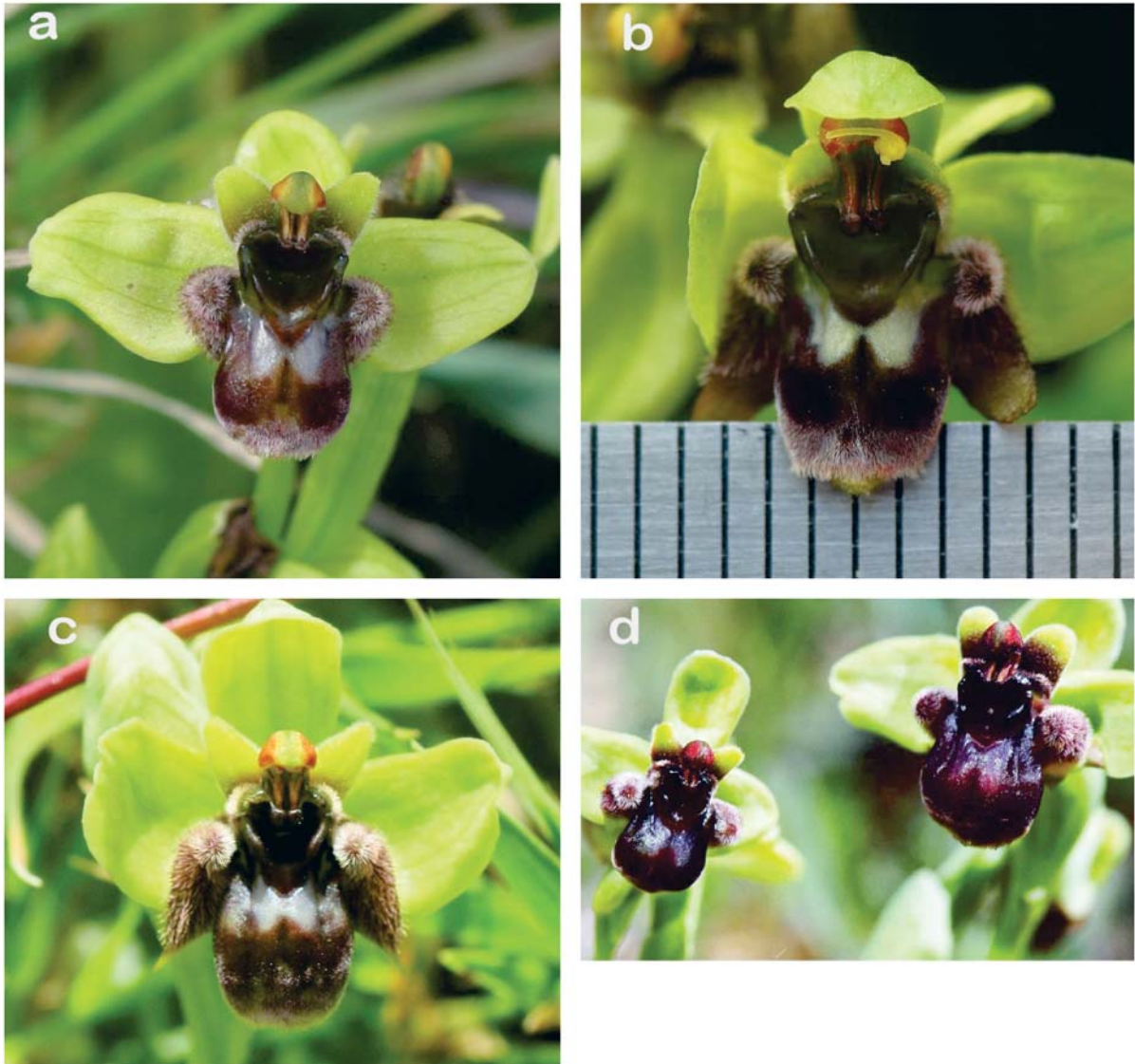


Fig. 1: *Ophrys bombyliflora* var. *parviflora*:

- a. Type locality, Malta, Pembroke, 15 m asl, 25. March 2011 (photo SM).
- b. Specimen from another population in Pembroke, 20 m asl, 25. March 2014 (photo SM).
- c. Malta, Mgarr, Bingemma, ca. 150 m asl, 26. March 2009 (photo SM).
- d. *Ophrys bombyliflora* cf. var. *parviflora* (left) and *O. bombyliflora* var. *bombyliflora*, Tunisia, April 2002 (photo Roland Martin).

In addition no *Ophrys bombyliflora* or intermediate specimens were found intermixed within these small-lipped clumps and thus both populations at Pembroke showed a striking homogenous character. *O. bombyliflora* is extensively scattered throughout the garigue area of Pembroke (ca. 1.0km<sup>2</sup>), and the small-lipped populations are present within and between populations of the larger-lipped variety. These can be defined as microsatellite populations

which exhibit small genetic variation within their own population, but considerable differentiation throughout the entire species population (LOVELESS & HAMRICK 1984). Despite the fact that both forms are sympatric and there is a wide overlap of flowering period, there seems to be a hybridisation barrier between the two forms. This is deduced from the fact that there are no obvious bridging intermediates forming a continuum of lip-sizes with median lobes ranging from 4mm to 7mm wide.



Fig. 2: *Ophrys bombyliflora* var. *parviflora* (right, in-situ) and *O. bombyliflora* var. *bombyliflora* (left; removed from another site) showing main differences, principally in lip size, ratio of lengths of stigmatic cavity to lip and the shape and colour of speculum. Malta, Pembroke, Rifle Ranges, 15 m asl, 25. March 2014 (photo SM).

On taking further measurements and scrutinising the characteristics of several specimens of *O. bombyliflora* f. *parviflora* from these populations during visits between 2008 and 2014, the following main differences were found in comparison with *O. bombyliflora* (Fig.2): median lobe of lip (3.5)4.0–4.7(5.0) mm wide; sepals also smaller and more oblong-lanceolate in shape; shape of lip more elongate-convex (oblong) rather than globular or pear-shaped, and speculum more conspicuous, milky-blue and contrasting with the lip, often butterfly-shaped or dissected. Although the lip is remarkably smaller (ca. 30% less), the stigmatic cavity is relatively large and only slightly smaller than *O. bombyliflora*. The lip of *O. bombyliflora* f. *parviflora* (lower boss to the tip of the lip) is about 1.5-2.0 times the length of the stigmatic cavity while that of

the typical *O. bombyliflora* is at least 2.5 times longer. Other, smaller differences are further listed in table 1 in MIFSUD (2009). From this account, it is deducted that there are more than one conspicuous differences between the two entities, namely the size (and shape) of the lip, the ratio of stigmatic cavity to lip length, and the shape and colour of the speculum.

The population at Bingemma, the other station of *O. bombyliflora* f. *parviflora* in Malta (Fig. 1c), is composed differently and constituted by of a handful of scattered and rather gregarious specimens in close association with normal types. The distribution of *O. bombyliflora* s.l. at Bingemma is less dense than that at Pembroke and the population of *O. bombyliflora* f. *parviflora* has not become established in the same way as those in Pembroke. That is, they did not form their own populations. It is important to mention here that under favourable growth conditions, *O. bombyliflora* s.l. can sometimes reproduce vegetatively, hence by formation of many new tubers instead of one. These tubers are found at the end of long stolons about 5-10cm long and hence away from the mother plant (PEDERSEN & FAURHOLDT 2007). Unfavourable conditions can perhaps explain why the population at Bingemma has not formed established micro-satellite populations like those at Pembroke.

Also interesting is the possible presence of *O. bombyliflora* f. *parviflora* in Tunisia, photographed and communicated to author by Roland Martin in early 2000 (Fig. 1d). Its identity through photographs could not be fully ascertained because discriminating measurements were not taken.

### **Designation of infraspecific ranks**

The application of the three main infra-specific ranks has a history of confusion (HAMILTON & REICHARD 1992) but recommendations for their application in botany have recently been put forward by STUESSY (2009). The current approach is that the ranking form/forma is used for aberrant variants within the main population that usually represent small genetic changes and normally exhibit one conspicuous change only. Accordingly, a more suitable infraspecific ranking from forma has to be designated for this small-lipped orchid. Using the “*recommended infraspecific concepts*” by STUESSY (2009) the variety rank is the most suitable for this Maltese orchid because of the following:

- More than one conspicuous morphological difference;
- The 150 or so specimens within the two established populations at Pembroke exhibited more or less an homogenous morphology;
- The small-lipped specimens are not sporadic and scattered within the vast distribution of *O. bombyliflora* in the Maltese islands but focused as micro-satellite populations;
- There is a lack of obvious intermediates between the small-lipped and the normal form, hence the absence of a uniform diversification between the two; and
- There is no geographic separation between the two entities (hence variety is more suitable than subspecies).

Allopatric and closely related orchids are circumscribed as subspecies while non-allopatric ones are placed in the varietal infraspecific rank. For example, *O. argolica* H.Fleischm, which is divided into six subspecies, each forming populations in different, fairly small geographical areas that hardly overlap (PEDERSEN & FAURHOLDT 2007). Another example is *O. iricolor* subsp. *hospitalis* (DELFORGE) S. Mifsud & L. Lewis from Malta and *O. iricolor* subsp. *mesaritica* H.F.Paulus, C. Alibertis & A. Alibertis from Greece which only differ by one main phenotypic characteristic – a slightly smaller lip (DELFORGE 2012), but are highly allopatric. On the other hand, *O. scopolax* var. *minutula* differs from var. *scopolax* in three characteristics, but the former grows within the geographic range of the latter (PEDERSEN & FAURHOLDT 2007). In some cases even aberrant or monstrous plants, often linked to normal plants by intermediates, are classified as varieties instead of forms, such as the varieties of *Ophrys apifera*, (DELFORGE 2006; PEDERSEN & FAURHOLDT 2007). Given the characteristics of the Maltese population, the promotion of *Ophrys bombyliflora* forma *parviflora* to a variety is justified. Moreover, this gives the population a better conservation status, which often does not apply to ranks below variety. Most orchids in Malta are legally protected, and their collection may require permits from responsible central authorities.

### **New combination for *Ophrys bombyliflora* forma *parviflora***

*Ophrys bombyliflora* forma *parviflora* S. Mifsud is here promoted to the rank of variety as follows:

*Ophrys bombyliflora* Link var. *parviflora* (S. Mifsud) S. Mifsud stat. nov.

Basionym: *Ophrys bombyliflora* Link forma. *parviflora* Mifsud., J. Eur. Orch. 41(3/4): 616-617. 2009.

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