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## Recent Observations on *Ophrys*-species and hybrids of the Maltese Archipelago

### Keywords

*Orchidaceae*; *Ophrys caesiella*, *Ophrys gazella*, *Ophrys mesaritica*, *Ophrys pectus*, *Ophrys vallesiana*, *Ophrys caesiella* × *Ophrys vallesiana*, *Ophrys mesaritica* × *Ophrys vallesiana*. Malta, Gozo.

### Summary

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Detailed field studies carried out between late December 2007 and early April 2011 show that the *Ophrys iricolor* s.l. group on Malta comprises two morphologically distinct forms which flower at different times in two main waves, although some intermediates also occur. The first form flowers from early December to late January and has a medium sized labellum with an underlip which is entirely green or is stained pale red without a clear-cut yellowish-green border. The second form flowers from late February to early April and has a longer labellum with an underlip which is normally stained red with a clear-cut yellowish-green border. It is concluded that the first form is attributable to *O. mesaritica*, consistent with the existing records of this species on the Maltese archipelago, whereas the second form is attributable to *O. vallesiana*. It is also concluded that some intermediate plants, especially those flowering in mid-February between the two main flowering waves, are probably *O. mesaritica* introgressed/hybridised with *O. vallesiana* (that is *O. mesaritica* × *O. vallesiana*).

Field studies of *Ophrys caesiella* at various locations on Malta show that this species is more variable than was originally described by DELFORGE (2000) and support opinions that *O. caesiella* and *O. gazella* are the same species. In addition, an *Ophrys* similar to *O. caesiella* but possessing prominent basal ridges and a geniculated labellum, initially identified as *O. bilunulata* × *O. mesaritica* by DELFORGE (1993) and subsequently incorrectly re-identified

as *O. pectus* (DEVILLERS & DEVILLERS–TERSCHUREN 2000a), has been re-found at its original location as well as elsewhere. It is concluded that it is the result of hybridization and/or introgression of *O. caesiella* with/by *O. vallesiana* (that is *O. caesiella* × *O. vallesiana*). However, the possibility cannot be excluded that the *O. iricolor* s.l. parent of some plants is instead *O. mesaritica*, or that some plants are complex hybrids of *O. caesiella*, *O. vallesiana* and *O. mesaritica*.

Details of four *Ophrys* taxa (namely *O. lojaconoi*, *O. lupercalis*, *O. phryganae* and *O. bombyliflora* forma *parviflora*) recorded on the Maltese archipelago since the publication of a comprehensive list of Maltese orchids by BARTOLO et al. (2001) are also given, as well as new locations for some of the rarer previously listed species.

### **Zusammenfassung**

Mifsud, S. & L. Lewis (2011): Aktuelle Beobachtungen an *Ophrys*-Arten und Hybriden des maltesischen Archipels.- J. Eur. Orch. 43 (3): 609-650.

Gründliche Feldstudien von Dezember 2007 bis Anfang April 2011 zeigen, daß die Gruppe von *Ophrys iricolor* s.l. auf Malta in zwei morphologisch und phänologisch unterscheidbaren Formen auftritt. Die erste Form blüht von Anfang Dezember bis Ende Januar, ihre mittelgroße Lippe ist unterseitig völlig grün oder blaß rot ohne einen scharf abgegrenzten gelbgrünen Rand. Die zweite Form blüht von Ende Februar bis Anfang April, besitzt eine längere Lippe, deren Unterseite normalerweise rot getönt ist und einen scharf abgegrenzten gelbgrünen Rand besitzt. Die erste Form wird in Übereinstimmung mit bisherigen Fundmeldungen von *O. mesaritica* vom maltesischen Archipelag zu dieser gestellt. Die zweite Form kann *O. vallesiana* zugeordnet werden. Daneben können auch Übergangsformen beobachtet werden, die insbesondere um Mitte Februar zum Blühen kommen, die sind vermutlich auf Introgression oder Hybridisierung von *O. mesaritica* mit *O. vallesiana* zurückzuführen (*O. mesaritica* × *O. vallesiana*).

Unsere Geländestudien von *Ophrys caesiella* an verschiedenen Fundorten auf Malta zeigen eine größere Variabilität auf als dies ursprünglich von DELFORGE (2000) beschrieben wurde und unterstützen die Ansicht, daß *O. caesiella* und *O. gazella* dieselbe Art darstellen. Eine weitere *Ophrys*-Sippe, ähnlich zu *O. caesiella*, jedoch mit knieförmig gebogener Lippe und ausgeprägten Höckern an ihrer Basis, von DELFORGE (1993) ursprünglich als *O. bilunulata* × *O. mesaritica* identifiziert und anschließend von DEVILLERS & DEVILLERS–TERSCHUREN (2000a) fälschlicherweise zu *O. pectus* gestellt, konnte an der Erstfundstelle wiederentdeckt und an weiteren Orten nachgewiesen werden. Nach unseren Untersuchungen stellt sie das Ergebnis von Hybridisierung und/oder Introgression von *O. caesiella* mit *O. vallesiana* dar (*O. caesiella* × *O. vallesiana*). Es kann allerdings nicht ausgeschlossen werden, daß der eine

Elter *O. iricolor* s.l. auf *O. mesaritica* zurückgeht, oder daß einige Pflanzen Mehrfachhybriden unter Beteiligung von *O. caesiella*, *O. vallesiana* und *O. mesaritica* entstanden sind.

Abschließend werden detaillierte Fundangaben zu einigen *Ophrys*-Taxa (*O. lojaconoi*, *O. lupercalis*, *O. phryganae* und *O. bombyliflora* forma *parviflora*) mitgeteilt, die erst nach der umfassenden Bearbeitung der maltesischen Orchideen durch BARTOLO et al. (2001) nachgewiesen wurden sowie neue Funddaten einiger a.a.O. als selten eingestuften Taxa.

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## 1. Introduction

The Maltese archipelago consists of the main island of Malta, together with the smaller island of Gozo and the much smaller islands of Comino, Cominotto, Filfla, Selmunett and other smaller islets. It is 45 km long and lies in the central Mediterranean region approximately 95 km due south of Sicily, 350 km due north of Tripoli (Libya), and 290 km east of Tunis (Tunisia). The Maltese flora shows influences from both southern Europe (especially Sicily) and North Africa (especially Tunisia).

The most comprehensive study of Maltese orchids is the paper by BARTOLO, LANFRANCO, PULVIRENTI & STEVENS (2001) which contains detailed lists and commentaries based on literature references, field work, unpublished records of various individuals and herbarium material. As explained in more detail below, there is no consensus on the taxonomy of certain *Ophrys* found on the Maltese archipelago. In order to provide more information to evaluate the different opinions which have been expressed, the present paper reports the results of detailed field studies by SM on the *Ophrys* in question. In addition, the present paper reports the first records (also by SM) of four *Ophrys* taxa on Malta and Gozo published since the date of the BARTOLO et al. paper, as well as new sites for *O. iricolor* s.l., *O. caesiella*, *O. bertolonii*, *O. calliantha* and *O. lutea* subsp. *lutea*, all of which are rare on the Maltese archipelago.

## 2. *Ophrys iricolor* s.l. group

### 2.1 Background

DELFORGE (2006: 365 – 369) lists the following five members of the *Ophrys iricolor* s.l. group (“*Ophrys iricolor* s.l.”):

- Ophrys iricolor* Desfontaines (syn. *O. iricolor* subsp. *iricolor*) which is widely distributed in the south-eastern Mediterranean, including Greece, Turkey, the Aegean islands and Cyprus;
- O. astypalaeica* Delforge (syn. *O. iricolor* subsp. *astypalaeica*) which is endemic to the Aegean island of Astypalea;
- O. mesaritica* Paulus, C. & A. Alibertis (syn. *O. iricolor* subsp. *mesaritica*) described from Crete (PAULUS et al. 1990);
- O. eleonora* J. & P. Devillers–Terschuren, (syn. *O. iricolor* subsp. *maxima*; *O. iricolor* subsp. *eleonora*) described from Sardinia (DELFORGE et al. 1991);
- O. vallesiana* J. & P. Devillers–Terschuren, (syn. *O. iricolor* subsp. *vallesiana*) described from Tunisia (DEVILLERS & DEVILLERS–TERSCHUREN 1994).

These five taxa are each characterised by prominent basal ridges attached to the walls of the basal cavity. As conveniently explained by DEVILLERS & DEVILLERS–TERSCHUREN (2000b) (in English translation): “These five taxa differ from each other in a more or less equal manner. The size of the flowers: there is large-flowered *O. iricolor* and *O. eleonora* group for the one part, and the small-flowered group *O. mesaritica*, *O. vallesiana* and *O. astypalaeica* (PAULUS et al. 1990; DEVILLERS & DEVILLERS–TERSCHUREN 1994; DELFORGE 1997), for the other part. On the contrary, the pattern on the underside of the labellum, which is probably phylogenetically more important, groups together *O. iricolor* and *O. mesaritica* which have [the underside of] the labellum entirely or partially stained red, but without a distinct, sharp concentric zonation (cf. Plates 1, 2A in PAULUS et al. 1990), separately from *O. eleonora*, *O. vallesiana* and *O. astypalaeica* which have a clear cut zonation with a red centre and an abrupt, sharply delimited green or yellowish–green border (DEVILLERS & DEVILLERS–TERSCHUREN 1994; DELFORGE 1997). This pattern on the underside of the lip explains the thin red border along the edge of the labellum of *O. iricolor*, the thin yellow border of *O. eleonora*, *O. vallesiana* and *O. astypalaeica*, and the variably coloured border of *O. mesaritica* which corresponds to the pattern of *O. iricolor* but is less saturated and more irregular (ALBERTIS & ALBERTIS 1989; PAULUS et al. 1990). *O. mesaritica* and *O. eleonora* flower very early or early in the local flowering waves (PAULUS et al. 1990; DEVILLERS & DEVILLERS–TERSCHUREN 1994), *O. astypalaeica* flowers just before *O. iricolor* (DELFORGE 1997), while the latter and *O. vallesiana* flower relatively late in these waves (DEVILLERS & DEVILLERS–TERSCHUREN 1994). Certain of these taxa grow in the same country where they are sometimes separated by flowering time and perhaps by pollinator.”

## 2.2 Distribution of *Ophrys iricolor* s.l. on the Maltese archipelago

*Ophrys iricolor* s.l. occurs at a number of locations on the Maltese archipelago. Thus, BARTOLO et al. (2001) lists a total of 26 sites for *O. mesaritica* on the main island of Malta and one site on Comino. Two further sites have since been located by SM on Malta, namely Mnajdra (l/o Qrendi) and Fawwara (l/o Siggiewi). No sites are listed by BARTOLO et al. (2001) for Gozo and LANFRANCO (2007: 94) also subsequently reported that there are no records of *O. mesaritica* or *O. iricolor* from Gozo but commented “it is highly probable that they will also be found” there. In line with this prediction, SM has now found *O. iricolor* s.l. at the following sites on Gozo:

- il-Qortin ta' Issopu (l/o Nadur) – 20 plants. (15 January 2007)
- il-Qortin tal-Magun (l/o Nadur) – 12 plants (19 January 2007)
- Dahlet Qorrot (Qala) – 5 plants (22 February 2009)
- il-Qortin ta' Ghajn Damma (l/o Xaghra) – 5 plants (31 March 2009)
- Ghajn Abdul (l/o San Lawrenz) – 3 plants (27 March 2011)

## 2.3 Identity of *Ophrys iricolor* s.l. on the Maltese archipelago: background

There is no consensus as to the identity of the *Ophrys iricolor* s.l. plants found on the Maltese archipelago. DELFORGE (1993) concluded that they were probably *O. mesaritica*, stating (in English translation): “It might seem surprising at first sight that a species considered endemic from the Asterousia Mountains in central southern Crete should be recorded from Malta. It is evidently possible that the Maltese taxon is a different isolated species ...” Subsequently, the same author still included Malta in his distribution list for *O. mesaritica* in his latest guide to the orchids of Europe (DELFORGE 2006: 367). BARTOLO et al. (2001) stated that they were maintaining Delforge's interpretation that the plants were *O. mesaritica* pending further more detailed investigations.

However, more recently other views have been expressed. Thus, MAST DE MAEGHT (2011) states “... on Malta, there appear to be three species [of the *O. iricolor* s.l. group], *O. mesaritica*, *O. eleonora* and *O. vallesiana* and that “until further taxonomical developments, always possible, there is no reason to doubt of the presence of this species [*O. mesaritica*] on Malta.” In contrast, PAULUS (pers. comm. 2009) is of the view that *O. mesaritica* does not occur on the Maltese archipelago but is endemic to Crete, Kythera (Kythira) and the Ionian islands (see also BARTOLO et al. 2001; HERTEL & PRESSER 2010) and that the plants on Malta are all *O. eleonora* (syn. *O. iricolor* subsp. *maxima*) (see also RIECHELMANN 2009, 2011). However, LANFRANCO (2007: 94) states

that *O. mesaritica* flowers on Malta in early winter and that a later flowering species on Malta is *O. iricolor* [s.str.]. Surprisingly, BAUMANN et al. (2006: 170 – 172) does not list *O. mesaritica* or any other members of the *O. iricolor* group as present on Malta; also, these authors consider *O. eleonora* and *O. vallesiana* to be the same taxon, listing both as synonyms for *O. iricolor* subsp. *maxima*, although this latter name is considered invalid by KREUTZ (2004) and DELFORGE (2006).

#### **2.4 Variation in flowering time and morphology of *Ophrys iricolor* s.l. on the Maltese archipelago**

In order to provide further data against which the above opinions on the identity of *Ophrys iricolor* s.l. on the Maltese might be assessed, studies were carried out between December 2007 and early April 2011 on populations of flowering plants from the following locations on the Maltese archipelago: tar-Rehba and Dingli Cliffs (Dingli), Mnajdra, Victoria Lines (Bingemma), Pembroke Rifle Ranges (Pembroke), il-Fawwara and il-Girgenti (l/o Siggiewi), ix-Xemxija part of Bajda Ridge (St. Paul's Bay), Wied Babu (Zurrieq), l-Argentier and San Martin (Wardija), and Red Tower (l/o Mellieha) on Malta (main island), and Ghajn Abdul, Dahlet Qorrot and il-Qortin ta Ghajn Damma (Xaghra) on Gozo. These studies included detailed measurements on specimens of *Ophrys iricolor* s.l. at the following three sites:

1. tar-Rehba: 20 plants were measured on 8 January 2010, 10 later-flowering plants on 28 February 2010 and 10 very early flowering plants on 13 December 2010. This site contains a dense population of about 150 *O. iricolor* s.l. growing in an area of about 50 x 30 m. These flower in two main waves, namely (a) a larger wave from early December to late January peaking in the first two weeks of January, and (b) a smaller wave from late February to mid-March peaking in the first week of March. However some plants also flower between these two main waves.
2. Victoria Lines: 20 plants were measured on 16 March 2010. This site contains a large population of *O. iricolor* s.l. growing in an area of 20 x 800 m and all flowering between late February and early April, peaking in the third week of March.
3. il-Fawwara: 20 plants were measured on 10 February 2010 selected at random from a population of *O. iricolor* s.l. plants scattered over a large area of garrigue.

The detailed results from tar–Rehba and Victoria Lines are summarized in Table 1. These results, together with observations from the other sites mentioned above, show that, although intermediate plants do occur, two morphologically distinct forms of *O. iricolor* s.l. are clearly discernable, namely an early flowering form and a later flowering form. With a view to identifying these two forms, Table 2 compares key features of both the early flowering *O. iricolor* s.l. at tar–Rehba and the later flowering *O. iricolor* s.l. at Victoria Lines with *O. mesaritica*, *O. eleonora* and *O. vallesiana*, each as described by DELFORGE (2006: 367–369) supplemented by additional information contained in DEVILLERS & DEVILLERS–TERSCHUREN (2000b); KRETZSCHMAR & KRETZSCHMAR (2004: 96); BOURNÉRIAS & PRAT (2005: 318); BAUMANN et al. (2006: 172) and DELFORGE (2007: 191). Table 3 compares a typical population of plants flowering in mid–February at il–Fawwara, with both early flowering plants at tar–Rehba and later flowering plants at Victoria Lines (see 2.4.3, below).

#### **2.4.1 Early flowering *Ophrys iricolor* s.l. (= *O. mesaritica*)**

As exemplified by the populations at tar–Rehba and San Martin, the early form of *Ophrys iricolor* s.l. (a typical specimen of which is shown in Fig. 26) flowers from early December to late January, with some last flowers persisting into early February. Although variations do occur (see paragraph 2.4.4), typical plants are short (6 –16 cm high) with 2 – 5 flowers and small leaves. The labellum is medium sized (11– 14 (– 15) mm long). The basal ridges are pronounced as is normal for the *O. iricolor* s.l. group. The labellum colour is reddish to dark brown, sometimes with a purple tinge and often with a thin yellow margin. The speculum is milky blue to dull greyish blue, sometimes with darker blobs. The underlip is usually entirely green (Scale value 0 in Scale A, see Figs. 1-4), particularly in the very early flowering plants, but is sometimes stained pale red with a yellowish–green border. In the case of plants flowering in December and early January, this border is always either absent or not clear–cut (Scale value 1). However, a few of the plants flowering in late January have instead a redder underlip with a clear–cut yellowish–green border (Scale value 2 – 3).

As is apparent from the comparison in Table 2, the early flowering plants at tar–Rehba where the underlip is entirely green or is stained pale red without a clear–cut yellowish–green border closely resemble *O. mesaritica* as originally described from Crete but is now known from several Ionian islands (HERTEL & PRESSER 2010) and Tunisia (MARTIN 2008). In view of this close morphological resemblance, and since geographical separation is not *per se* a

sufficient reason to consider the Maltese plants to be a distinct taxon (as, for example, in the case of *O. candica* [DELFORGE 2006: 464]), it would appear appropriate to continue to regard these plants as *O. mesaritica*, consistent with (a) the existing records of this species on the Maltese archipelago (BARTOLO et al. 2001; DELFORGE 2006: 367; LANFRANCO 2007: 94), and (b) for the opinion of MAST DE MAEGHT (2011) that "... until further taxonomical developments, always possible, there is no reason to doubt of the presence of this species on Malta". The early flowering plants where the underlip is stained red with a clear-cut yellowish-green border might be a previously unrecorded colour form of *O. mesaritica* but it would seem more likely that they are *O. mesaritica* introgressed with later flowering *O. iricolor* s.l. (= *O. vallesiana*, see paragraph 2.4.2), most specimens of which possess a similar underlip (see also paragraph 2.4.3, last sentence).

#### **2.4.2 Later flowering *Ophrys iricolor* s.l. (= *O. vallesiana*)**

At Victoria Lines, only the later flowering form of *Ophrys iricolor* s.l. occurs where it flowers from late February to early April. As summarized in Tables 1 and 2 and illustrated by a typical specimen in Fig. 25, these plants are generally taller (12 – 32 cm high) than the early flowering plants at tar-Rehba and have more (4 – 9) flowers; they also have larger leaves. The labellum is larger (typically 15 – 17 mm long) and generally dull brown with a purple tinge and a dull greyish blue speculum. The underlip is normally red with a clear-cut yellowish-green border about 1 – 1.5 mm wide (that is Scale value 2 – 3 in Scale A) but is sometimes either entirely green or green stained pale red centre with no clear-cut border (Scale value 0 – 1).

As is apparent from the comparison in Table 2, the later flowering plants at Victoria Lines show significant differences from *O. mesaritica* but closely resemble the similarly later flowering Tunisian *O. vallesiana*, the underlip of which is normally red with a clear-cut yellowish-green border but sometimes entirely green (DELFORGE 2006: 368). Although some plants at Victoria Lines have more flowers (up to 8) than described for *O. vallesiana* (1 – 5), this difference would not appear taxonomically significant. It is therefore concluded that these later flowering plants at Victoria Lines are *O. vallesiana*.

A further difference occasionally found in a few plants at Victoria Lines is the possession of a slightly longer labellum (17 – 19 mm) than that described for *O. vallesiana* (12 – 16 mm). These plants therefore fall within the lower end of the range (16 – 28 mm) described for *O. eleonora*, This might account for the opinion of MAST DE MAEGHT (2011) that *O. eleonora* occurs on Malta in



addition to *O. mesaritica* and *O. vallesiana*. However, in other respects these occasional plants having a labellum 17 – 19 mm long (one of which is illustrated in Fig. 24) appear otherwise indistinguishable from plants with a slightly shorter labellum (Fig. 25) with which they are growing and which flower at the same time. It therefore seems much more probable that *O. iricolor* s.l. in the Victoria Lines population are all the same species, namely *O. vallesiana*, rather than a mixed population of *O. vallesiana* and *O. eleonora*.

As is apparent from Table 1, the late February flowering *O. iricolor* s.l. at tar-Rehba are morphologically similar to the mid-March flowers at Victoria Lines, although some have less flowers. The later flowering populations of *O. iricolor* s.l. studied in late March by SM at the following locations were closely similar to those at Victoria Lines and are thus also considered to be *O. vallesiana* on Malta (main island) at tar-Rehba, Pembroke Rifle Ranges, ix-Xemxija and Red Tower; and on Gozo at Ghajn Abdul, Dahlet Qorrot, and il-Qortin ta Ghajn Damma.

LANFRANCO (2007: 94) reported the presence on Malta of the later flowering species *O. iricolor* “with the labellum entirely reddish on the underside”, that is presumably *O. iricolor* s.str. However, since none of the plants studied had the reddish-purple underlip characteristic of *O. iricolor* s.str., the authors have not been able to confirm the presence of that species on Malta. Similarly, BARTOLO et al. (2001) and DELFORGE (2006: 366) also do not list this species from Malta.

#### **2.4.3 *Ophrys iricolor* s.l. flowering in mid-February**

As noted above, at tar-Rehba and elsewhere on Malta *Ophrys iricolor* s.l., flowers in two main waves – namely late December to late January and from late February to late March. However, at some sites a smaller number of *Ophrys iricolor* s.l. also flower between these two main waves. As further noted above, Table 3 compares a typical population of plants flowering in mid-February at il-Fawwara, with both early flowering plants at tar-Rehba and later flowering plants at Victoria Lines. As is apparent from this comparison, in addition to having an intermediate flowering time, the mean labellum length and the underlip colour of the il-Fawwara plants are also intermediate those of early flowering and later flowering plants. It seems likely that some of these mid-February flowering plants are specimens of *O. mesaritica* flowering after the first main wave, especially as the flowering period of that species on Crete extends until late February/early March

(KRETZSCHMAR & KRETZSCHMAR 2004). It is also possible that others might be specimens of *O. vallesiana* flowering slightly earlier than the normal period of late February and early April. Nevertheless, in view of their intermediate morphology, it would seem likely that at least some of these plants are the result of hybridization and/or introgression between/of the early flowering *O. iricolor* s.l. (= *O. mesaritica*) and the later flowering *O. iricolor* s.l. (= *O. vallesiana*) described above, that is they are *O. mesaritica* × *O. vallesiana*. This is especially so in the case of plants with intermediate morphologies which grow in association with both early flowering and later flowering populations and the flowering times of some plants in these two populations marginally overlap.

#### 2.4.4 Early flowering *Ophrys iricolor* s.l.: morphological variation

Although most of the early-flowering *Ophrys iricolor* s.l. are typical plants as described above, variations do occur. Thus, specimens of early flowering *O. iricolor* s.l. (= *O. mesaritica*) which were much taller than typical plants were recorded at the following four locations: l–Argentier on 14 January 2009; tar–Rehba on 31 December 2009; il–Girgenti on 18 January 2010; and Pembroke Rifle Ranges on 29 January 2010 (last flower). Two typical specimens are shown in Fig. 20. Table 4 compares the height and other features of these plants with typical early flowering *O. iricolor* s.l. (= *O. mesaritica*) on Malta and with *O. mesaritica* as described by DELFORGE (2006) supplemented by additional information contained in DEVILLERS & DEVILLERS–TERSCHUREN (2000b). As can be seen from that Table, the taller Maltese plants were 20 – 34cm high compared with a typical height of 8 – 16cm for early flowering *O. iricolor* s.l. on Malta (although taller *O. mesaritica* plants are clearly also found on Crete since DELFORGE (2006: 367) specifies a height of 10 – 33cm for that species). The taller Maltese plants also had (5 –) 6 – 9 (– 10) flowers, compared with 2 – 5 flowers for typical plants on Malta and 1 – 5 flowers for *O. mesaritica* as summarised by DELFORGE (2006: 367). Whereas typical early flowering *O. iricolor* s.l. plants on Malta generally grow in fairly short vegetation, all of the taller *O. iricolor* s.l. were growing in pseudo–steppe communities dominated by the much taller *Asphodelus aestivus* Brotero. It therefore seems probable that the increased height of these taller *O. iricolor* s.l. specimens is an adaptation to growing in this taller vegetation (as is often encountered with other plants growing in taller vegetation than normal).

In another variation, the labellum has basal ridges which are much less pronounced than is normal for *O. mesaritica* (and for other members of the

*O. iricolor* s.l. group). For example, at l–Argentier on 2 January 2011, SM found a population about 20 typical specimens of the early flowering form of *O. iricolor* s.l. (= *O. mesaritica*) accompanied by three plants with weak or absent basal ridges; these three plants also had smaller lips (10 – 11.5 cm long) than the typical plants, a pale, milky blue speculum and green underlip. This population was also accompanied by a small population of *O. caesiella*. Although *O. caesiella* at l–Argentier does not start to flower until later in January, since the early flowering *O. iricolor* s.l. (= *O. mesaritica*) is still in flower at that time, it is clearly possible that these three atypical plants were the result of introgression/hybridisation with *O. caesiella* (that is they might be *O. caesiella* × *O. mesaritica*). Also on 2 January 2011, a search by SM at San Martin in an area where *O. iricolor* s.l. (= *O. mesaritica*) and *O. caesiella* again both grow, also revealed several atypical plants which might similarly be the result of such introgression/hybridisation (see also paragraph 4.3).

## 2.4.5 Conclusion

*Ophrys iricolor* s.l. on Malta comprises two morphologically distinct forms flowering at different times, although intermediates also occur. The early flowering form flowers mainly from early December to late January but with some last flowers persisting into early February. The labellum is medium sized (typically 11 – 14 (– 15) mm long) and the underlip is usually entirely green, although in some specimens it is stained red with or without a yellowish–green border. In addition, compared with the later flowering plants, these early flowering plants are shorter (6 – 16 cm high) with less (2 – 5) flowers and smaller leaves. The early flowering plants where the underlip is entirely green or is stained pale red without a clear–cut yellowish–green border appear attributable to *O. mesaritica*, consistent with the description of this species and the existing records of this species on the Maltese archipelago. The early flowering plants where the underlip is stained red with a clear–cut yellowish–green border might be a colour form of *O. mesaritica* but it would seem more likely that they are *O. mesaritica* introgressed with later flowering *O. iricolor* s.l. (= *O. vallesiana*).

It is also possible that atypical early flowering plants, particularly those with weak or absent basal ridges growing in association with *O. caesiella*, are the result of introgression/hybridisation with that species (that is they might be *O. caesiella* × *O. mesaritica*). The later flowering form of *O. iricolor* s.l., attributable to *O. vallesiana*, flowers from late February to early April; it has a longer labellum (typically (14 – 17 mm) and the underlip is normally stained red with a clear–cut yellowish–green border about 1.5 mm wide, although in

some specimens it is either entirely green (as also reported for *O. vallesiana*) or green stained pale red with no clear-cut border. In addition, compared with the early flowering plants, these later flowering plants are taller (12 – 30 cm high) with more (4 – 9) flowers and larger leaves. Plants flowering in mid-February between the two main flowering waves are probably a mixture of (a) *O. mesaritica* introgressed/hybridised with *O. vallesiana* (that is *O. mesaritica* × *O. vallesiana*), (b) later flowering specimens of *O. mesaritica*, and possibly at some locations (c) a few early flowering specimens of *O. vallesiana*.

Unusually tall specimens of *O. mesaritica* are probably an adaptation to growing in this taller vegetation. Specimens with basal ridges much less pronounced than is normal for *O. mesaritica* are probably the result of introgression/hybridisation with *O. caesiella* (that is *O. caesiella* × *O. mesaritica*).

### **3. *Ophrys caesiella* P. Delforge**

#### **3.1 Background**

*Ophrys caesiella* is another member of the taxonomically difficult *Pseudophrys* group. It was first described from Malta by DELFORGE (2000) who also reported its presence at two stations in south-west Sicily. It is a rare orchid – BARTOLO et al. (2001) list only five sites for the species on the island of Malta, one on the island of Comino, but none for Gozo. LANFRANCO (2007: 94) also subsequently reported that there are no records of *O. caesiella* from Gozo but stated “it is highly probable that they will also be found” there. In line with this prediction, *O. caesiella* has subsequently been found by SM at il-Qortin tal-Magun on Gozo (a first record for that island), as well as at two further sites on Malta, namely Manikata (l/o Mellieha) and Wied Babu.

The description by Delforge (2000) of *O. caesiella* (“sensu Delforge”) was based on the measurements of only 22 specimens flowering at three sites during the period of 21 – 27 February 1993 (DELFORGE 1993; 2000) when, as stated, the weather was particularly cold, rainy and windy. Subsequent field studies by the present authors have revealed that specimens falling outside the published description are frequently found on the Maltese archipelago, some of which overlap the descriptions of *O. bilunulata* and *O. gazella*.

## 3.2 Morphological variation

### 3.2.1 Comparison with *Ophrys bilunulata* Risso

As noted above, *Ophrys caesiella* was first described from Malta by DELFORGE (2000). The plants concerned had previously been identified by the same author as *O. bilunulata* (DELFORGE 1993). As recently as the mid–1990s, *O. bilunulata* was considered to be a widely distributed species with a Mediterranean distribution from Portugal to south–western Anatolia (DELFORGE 1995). As a result of taxonomic splitting of *O. bilunulata* into *O. caesiella* and other species, the same author subsequently considered the distribution to be restricted to the western Mediterranean, from the south of the Iberian peninsular to Liguria and the Balearics (DELFORGE 2006: 374).

In order to shown that *O. caesiella* is distinct from *O. bilunulata*, DELFORGE (2000: 234, Tableau 1) tabulated the features distinguishing these two species, as reproduced (in English translation) in the first three columns of Table 5 below. However, there exist on Malta plants with a mottled labellum and an angle between the sides and axis of the labellum of 35° or more which resemble *O. bilunulata* much more closely than was reported by DELFORGE (2000). This similarity is demonstrated by the last column of Table 5 which compares these plants (labelled *Ophrys caesiella* “cf. *bilunulata*”) with *O. bilunulata* and *O. caesiella* as compared by DELFORGE (2000: 234, Tableau 1).

### 3.2.2 Comparison with *Ophrys gazella* (syn. *O. africana*) and *O. caesiella* (sensu Delforge)

Orchids of the *Ophrys fusca* group similar to *O. caesiella* also occur on Tunisia. These were initially described under the provisional name “*Ophrys fusca* forme 1 (VALLÈS & VALLÈS–LOMBARD 1988) before being formally described as *Ophrys gazella* (DEVILLERS & DEVILLERS–TERSCHUREN 2000a) contemporaneously with the description of *Ophrys caesiella* by DELFORGE (2000). Early flowering specimens were then described as a distinct species, *Ophrys africana* (FOELSCHE & FOELSCHE 2001) although the authors subsequently reported that this name was probably superfluous since several experts were of the opinion that *O. gazella* was a synonym of both *O. africana* and *O. caesiella* (FOELSCHE & FOELSCHE 2004). A subsequent multivariate analysis by AMICH et al. (2009) similarly concluded that “Due to extensive overlapping in even the most distinguishing characters, it is not possible to accept *O. africana* as a distinct species from *O. gazella* ...”

CAMPO (2005) also compared *O. gazella* from Tunisia with *O. caesiella* from Sicily. He concluded that they were synonyms for the following reasons (in English translation): “I have carefully observed and photographed *O. gazella* Devillers–Tersch. & Devillers at various locations in Tunisia. In Sicily, I compared the Tunisian “*gazella*” with photographs and dried specimens of *O. caesiella* P. Delforge which I had taken previously on the Iblei Mountains; I also observed the plants mentioned by Galesi [*Ophrys fusca* Link var. *parviflora* Galesi nom. nud. (GALESI & MASCARA 2003) syn. *O. caesiella*] in the places indicated [Bosco di Santo Pietro and Sughereta di Niscemi on the Iblei Mountains]. This examination showed that the two entities in question are perfectly identical: the same habit, the same coloured leaves and flowers, the same average size of flowers and labellum, and the identical general structure and shape of the plant; in other words, the two species have the same morphological characteristics. From this examination, I am convinced that the one should be considered as a synonym of the other.”

Opinions that *O. gazella* and *O. caesiella* are the same species have also been expressed by LANFRANCO (pers. comm. 2008), STEVENS (pers. comm. 2008), VELA (pers. comm. 2008) and PAULUS (pers. comm. 2009), see also RIECHELMANN (2009).

The opinions expressed by FOELSCHE & FOELSCHE (2004) and CAMPO (2005) were based primarily on studies of orchids growing in Tunisia and Sicily while the opinions expressed in personal communications were not supported by detailed argument. In order to facilitate a more comprehensive evaluation of these opinions, a detailed study was carried on Maltese specimens of *O. caesiella* plants at various times in their flowering period (early February to early April) at following locations: Red Tower (*locus classicus*), il–Palma (Wardija), San Martin and ix–Xemxija.

The results of this study are summarised in Table 6 which compares key features of the Maltese plants with those of *O. caesiella* and *O. gazella* as formally described (DELFORGE 2000 and DEVILLERS & DEVILLERS–TERSCHUREN 2000a, respectively), supplemented as necessary by additional information from DELFORGE (2006: 407). As can be seen from this Table, the original description of *O. caesiella* by DELFORGE (2000) does not adequately cover the morphological range of plants found in Malta and that, accordingly, the morphological distinction between *O. gazella* and *O. caesiella* is not as great as presented in the formal descriptions of those species by DELFORGE (2000) and DEVILLERS & DEVILLERS–TERSCHUREN (2000a) respectively, thus supporting the opinions referred to above that they should be considered as a single species.

In particular, the main feature distinguishing *O. caesiella* and *O. gazella* as formally described is the angle of the lateral lobes relative to the longitudinal axis of the labellum, namely 22 – 28° for *O. caesiella* and 35 – 45° for *O. gazella*. However, as indicated in Table 6, plants on Malta were recorded with a lateral angle of up to 43° (Fig. 23). In addition, specimens of *O. caesiella* with one or more of the following further features described for *O. gazella* but not for *O. caesiella* were observed on Malta: pendant flowers; almost straight labellum; swollen basal ridges; labellum often mottled; and green underlip with a reddish centre. The only feature distinguishing the two species as formally described which was not observed in any of plants studied was the narrow petal width (0.7 – 1.3 mm) specified for *O. gazella* – the narrowest petal width in the plants studied was 2mm, consistent with the specified range (1.8 – 2.5 mm) for *O. caesiella*. However, it would seem questionable whether a difference in petal width is *per se* sufficiently taxonomically significant to justify *O. caesiella* and *O. gazella* being considered as two distinct species.

These detailed morphological observations of Maltese specimens of *O. caesiella* therefore strongly support the opinion of CAMPO (2005) based on observations of Sicilian plants, as well as the personal opinions referred to above, that *O. caesiella* and *O. gazella* are the same species. It is to be noted that neither name has priority under the International Code of Botanical Nomenclature since they were published contemporaneously in the same journal (vol. 81(3) of *Natural. belges* (2000)).

### 3.3 Conclusion

As predicted by LANFRANCO (2007: 94), the presence of *Ophrys caesiella* has now been confirmed on Gozo. In addition, the morphology of *O. caesiella* on Malta is more variable than was described by DELFORGE (2000). In particular, as shown by the comparison data in Table 5, plants (labelled *Ophrys caesiella* “cf. *bilunulata*”) exist which closely resemble *O. bilunulata* from which *O. caesiella* was split by DELFORGE (2000). In addition, the results of detailed studies on Maltese plants in Table 6 strongly support the opinion of CAMPO (2005) and others that *O. caesiella* and *O. gazella* are the same species. However, since both of these species were published contemporaneously in the same journal neither name has priority.

## 4. *Ophrys pectus* sensu Devillers & Devillers–Terschuren (2000a) and similar *O. caesiella*–like plants with prominent basal ridges

### 4.1 Background

DELFORGE (1993: 100 – Fig. 6 and 103) reported the discovery at il–Palma on 24 February 1993 of a small population of *Ophrys* which he provisionally identified as *Ophrys bilunulata* [now *O. caesiella*] × *O. mesaritica*. The population was described (in English translation) as follows: “Seven individuals with a morphology clearly intermediate those of *Ophrys bilunulata* and that of *O. mesaritica* were found in an important population of *O. bilunulata* ... The combination of the characters of these parent species produced geniculated labella, slightly globular at the base ...” Since these plants at il–Palma (“il–Palma plants”) possess a labellum which, as illustrated in DELFORGE (1993: 100 – Fig. 6), has prominent basal ridges as well as being geniculated at its base, they are not *O. caesiella* which, as subsequently described by DELFORGE (2000), “is provided with weak basal ridges producing a weak longitudinal curvature.” (A typical *O. caesiella* specimen showing weak basal ridges is shown in Fig. 21.) *O. pectus* was also subsequently reported from Bajda Ridge by HERVOUET & HERVOUET (1998), see also BARTOLO & al. (2001).

The identity of the il–Palma plants was subsequently reconsidered by DEVILLERS & DEVILLERS–TERSCHUREN (2000a) in the context of a discussion of the identity of similar plants from Tunisia. They concluded that the plants from both countries were sufficiently similar to *O. pectus* Mutel from Tunisia to be considered that species for the following reason (in English translation): “The prominence of basal ridges, emphasis by the curvature of the labellum, the similarity of the speculum with that of *O. pallida* and of the habit with that of *O. obaesa* strongly suggest this taxon [*O. pectus*].” In accordance with this opinion, the photograph in DELFORGE (1993: 100 – Fig. 6) was re–published as an illustration of *O. pectus* by DEVILLERS & DEVILLERS–TERSCHUREN (2000a: Planche 19) and DELFORGE (2006: 407, lower photo).

BARTOLO et al. (2001) listed the records of *O. pectus* from il–Palma (DELFORGE 1993) and Bajda Ridge (HERVOUET & HERVOUET 1998) while observing (in English translation); “*O. pectus* shows only weak similarity to *O. pallida*, especially in relation to the basal ridges, the curvature of the labellum and the speculum, while according to DEVILLERS & DEVILLERS–TERSCHUREN (2000[a]) it shows greater affinity to *O. obaesa* and *O. subfusca*.”

However, GÜGEL & WUCHERPFENNIG (2007) subsequently established that



*O. pectus* Mutel was synonym of *O. pallida* and therefore concluded that the taxon which DEVILLERS & DEVILLERS–TERSCHUREN (2000a) had mistaken for *O. pectus* was a species which had not yet been described. To remedy the resulting taxonomic lacuna, the Tunisian plants previously identified as *O. pectus* were then described as *O. carpitana* sp. nova (LOWE, GÜGEL & KREUTZ 2007). However, LOWE (pers. comm. 2008) has confirmed that the il–Palma plants are not *O. carpitana*. It is also clearly apparent that the il–Palma plants are not *O. pallida* which has a much smaller labellum a pale whitish–green perianth and a more strongly geniculated labellum.

As noted by DEVILLERS & DEVILLERS–TERSCHUREN (2000a), the il–Palma plants show some obvious similarities with Sicilian *O. obaesa*, in particular the prominent basal ridges. However, the il–Palma plants differ from that species in having a larger labellum and a distinct yellow border. These differences appear to confirm that they are not *O. obaesa*.

#### **4.2 Re–discovery of *Ophrys pectus* sensu Devillers & Devillers–Terschuren; similar *O. caesiella*–like plants with prominent basal ridges**

A small population of plants similar to *Ophrys caesiella* but possessing a labellum with prominent basal ridges, closely resembling the il–Palma plant illustrated by DELFORGE (1993: 100 – Fig. 6), DEVILLERS & DEVILLERS–TERSCHUREN (2000a: Planche 19) and DELFORGE 2006: 407), was re–discovered by the present authors at il–Palma on 1 March 2008 and further studied in 2009 and 2010. In some of these plants (“*Ophrys* cf. *pectus*”), such as that illustrated in Fig. 13, the degree of basal geniculation was similar to that exhibited by the illustrated il–Palma plant. However, this was a variable feature and in other, otherwise similar, plants such as that illustrated in Fig. 22, this geniculation was less.

Although as noted above, *O. pectus* was also reported from Bajda Ridge by HERVOUET & HERVOUET (1998), the precise location was not published. However, a single *O. cf. pectus* plant similar to those at il–Palma with prominent basal ridges and a variably geniculated labellum was found at ix–Xemxija on Bajda Ridge by SM on 22 February 2011. In addition, several *O. cf. pectus* plants similar to those at il–Palma were also discovered by SM growing in association with *O. caesiella* at two locations at Red Tower and two locations at San Martin both on 15 February 2010. Again, in other respects these plants at each of these locations all closely resembled *O. caesiella*, except that in some cases the underlip was stained red with a clear–cut yellowish–green border, similar to the normal underlip of *O. vallesiana*.

### 4.3 Identity

As noted above, the il–Palma plants previously identified as *Ophrys pectus* are not that species (GÜGEL & WUCHERPFENNIG 2007), nor are they *O. carpitana* (LOWE, pers. comm. 2008), *O. obaesa* or *O. pallida*. This clearly also applies to the similar *Ophrys* with prominent basal ridges and a variably geniculated labellum found at ix–Xemxija, Red Tower and San Martin. So the question is “what are these plants?”

As also noted above, the plants in question closely resemble *O. caesiella*. However, in addition to their more prominent basal ridges, they show a greater range of underlip colour and some possess a labellum which is longer than is normal for *O. caesiella* s.str. These differences are apparent from Table 7 which compares these features in selected specimens of *O. cf. pectus* plants with prominent basal ridges (that is Scale value 2 – 4 in Scale C, see Figs. 9–12, and indicated in bold type) at il–Palma, ix–Xemxija, Red Tower and San Martin with those of a random selection of *O. caesiella* s.str. (indicated in normal type) from the same locations. They are also illustrated in Figs. 17 and 18 which compare the basal ridges of *Ophrys cf. pectus* with those of *O. caesiella* (Fig. 16) and later flowering *O. iricolor* s.l. (= *O. vallesiana*, Fig. 19) showing the gradation of size.

As is apparent from the comparisons in Table 7, most of the *O. cf. pectus* plants also have a coloured underlip (Scale value 2 – 4 in Scale B) similar to that normally possessed by later flowering *O. iricolor* s.l. (= *O. vallesiana*) (see also Scale A and comparison of underlips in Figs. 14 and 15). In addition, many also have a labellum which is longer (more than 13 mm) than is normal for *O. caesiella* s.str. but is within the range (13 –) 15 – 17 (– 19) mm for the later flowering *O. iricolor* s.l. (= *O. vallesiana*). As is also apparent from this comparison, all the selected *O. cf. pectus* specimens in Table 7 with a coloured underlip (Scale value 2 – 4 in Scale B, see Figs. 5–8) have prominent basal ridges (Scale value 2 – 4 in Scale C), although a few plants with a similarly coloured underlip but weak basal ridges have also been observed in the field.

It is thus evident from Table 7 that these *O. cf. pectus* plants are intermediate *O. caesiella* s.str. and the later flowering *O. iricolor* s.l. (= *O. vallesiana*), consistent with the statement by DELFORGE (1993) that the morphology of the il–Palma plants was clearly intermediate that of *O. bilunulata* [now *O. caesiella* on Malta] and *O. mesaritica*.

In addition, at each of their locations at il–Palma, ix–Xemxija, Red Tower and San Martin the *O. cf. pectus* plants grow with or close to *O. caesiella* in flower

at the same time. At il–Palma, ix–Xemxija and Red Tower, the later flowering *O. iricolor* s.l. (= *O. vallesiana*) also grows with these plants, or at least nearby, but the early flowering *O. iricolor* s.l. (= *O. mesaritica*) has not been found. However, both early and later flowering forms of *O. iricolor* s.l. grow at San Martin, as well *O. iricolor* s.l. plants flowering in mid–February.

It is therefore concluded that these *O. cf. pectus* plants with prominent basal ridges at il–Palma, ix–Xemxija and Red Tower are the result of hybridization with —and/or introgression of *O. caesiella* by – the later flowering form of *O. iricolor* s.l. (= *O. vallesiana*) which also has prominent basal ridges. Indeed, specimen no. 21 from Red Tower (illustrated in Fig. 19) would appear to be a clear example of the hybrid *O. caesiella* × *O. vallesiana*.

Such hybridization and introgression would account for the general similarity of the plants concerned to *O. caesiella* and the specific similarity to *O. iricolor* s.l. (= *O. vallesiana*) in the form of the prominent basal ridges (Scale value 2 – 4 in Scale C) and range of underlip colour (see Scale B). It would also account for the longer labellum (up to 15 mm) recorded on some plants. Since, as shown in the two photographs illustrated by MAST DE MAEGHT (2011), the labellum of *O. vallesiana* is sometimes geniculated, such hybridization or introgression would additionally account for the variable basal geniculation observed in *O. cf. pectus*. Fig. 22 illustrates a specimen of *O. c.f. pectus* showing intermediate characters of both *O. vallesiana* and *O. caesiella*; in particular a red underlip with green border characteristic of *O. vallesiana* and weak basal ridges characteristic of *O. caesiella*.

The situation at San Martin is complicated by the presence of both the early and later flowering forms of *O. iricolor* s.l. growing in close proximity to both *O. cf. pectus* and *O. caesiella* (see also paragraph 2.4.1). The 14 – 15mm labellum length suggests that the *O. iricolor* s.l. parents of San Martin *O. cf. pectus* in Table 7 (specimens 1 and 6) are also *O. iricolor* s.l. (= *O. vallesiana*). However, the possibility cannot be excluded that the *O. iricolor* s.l. parent of some *O. cf. pectus* plants at San Martin might instead be the early flowering form (= *O. mesaritica*). This is particularly so in the case of plants (such as specimen 1) which flower before late February and do not have an “*O. vallesiana*–type” underlip stained red with a clear–cut yellowish–green border. This possibility is unlikely to arise at il–Palma, ix–Xemxija and Red Tower where only the later flowering form of *O. iricolor* s.l. (= *O. vallesiana*) has been found.

#### 4.4 Conclusion

The small population of plants similar to *Ophrys caesiella* but with prominent basal ridges and a variably geniculated labellum, which were initially identified as *O. bilunulata* [now = *O. caesiella*] × *O. mesaritica* by DELFORGE (1993), and subsequently as *O. pectus* by DEVILLERS & DEVILLERS–TERSCHUREN (2000a) and DELFORGE 2006: 407), is still extant at il–Palma. Similar plants with prominent basal ridges and a variably geniculated labellum also grow at ix–Xemxija, Red Tower and San Martin. Since the morphology of these plants is intermediate *O. caesiella* and *O. iricolor* s.l. (= *O. vallesiana*), and since at each of these three sites they grow with or close to both these species, it is concluded that they are the result of the hybridization and/or introgression of *O. caesiella* with/by *O. vallesiana*, that is they are *O. caesiella* × *O. vallesiana*. However, in locations where both the early and later flowering forms of *O. iricolor* s.l. grow nearby, the possibility cannot be excluded that the *O. iricolor* s.l. parent of some plants is instead the early flowering form (= *O. mesaritica*), or even that some plants are complex hybrids of *O. caesiella*, *O. vallesiana* and *O. mesaritica*. It is also possible that early flowering *O. iricolor* s.l. plants with weak or absent basal ridges growing in association with *O. caesiella* are in fact similarly *O. caesiella* × *O. mesaritica*.

#### 5. *Ophrys* taxa first recorded on Malta after 2001

The following *Ophrys* taxa which are not listed by BARTOLO et al. (2001) have subsequently been recorded by SM on Malta and/or Gozo.

##### 5.1 *Ophrys lojaconoi* P. Delforge

Two specimens of *Ophrys lojaconoi* were recorded on ta' Kuljat Hill (Zebbug), Gozo on 4 March 2008 (MIFSUD 2008). They were growing in half–shade on damp soil over karstic rock dominated by moss and *Valantia muralis* L. and possessed the following characteristics. Perianth: green. Labellum: horizontal, 12 – 15 mm long. slightly curved longitudinally, relatively narrow with two prominent basal ridges and very short narrow side lobes, wide sinuses; median lobe 8 mm long; thin yellow border, angle between longitudinal axis of labellum and edge of lateral lobes (22 –) 23 – 24 (– 26)°, underlip yellowish–green partly stained reddish–brown. A similar specimen (Fig. 31) was subsequently found by SM at San Martin on 1 January 2011, the first record for Malta (main island).

## 5.2 *Ophrys lupercalis* J. Devillers–Terschuren & P. Devillers

*Ophrys lupercalis* has been recorded at three locations as follows (MIFSUD 2008):

Dingli Cliffs: 15 plants in labiate garrigue, 11 January 2008. Unfortunately, this population is no longer extant following destruction of site by the extension of an adjacent quarry.

Pembroke Rifle Ranges: 4 plants in garrigue, 30 January 2008. Found again in January 2010 (Fig. 28).

San Martin: about 20 plants in garrigue, 23 February 2008. These plants were not re-found in 2010.

These plants possessed the following characteristics. Perianth: green. Labellum: sub-horizontal, 13 – 15 mm long, no longitudinal curvature until beyond sinuses, whitish base, elevated longitudinal ridges, not laterally twisted (as in *O. iricolor* s.l.) forming a central groove ending at the middle of speculum; wide sinuses, long hairs at tip; thin yellow border, pale (almost whitish) speculum marbled with blue, underlip yellowish–green sometimes partly stained reddish–brown.

## 5.3 *Ophrys phryganae* J. Devillers–Terschuren & P. Devillers

In March 2008, a population of about 20 plants at Dwejra previously thought to be *Ophrys sicula* but which possessed a labellum which was 11 – 14 mm long and bent strongly downwards at an angle of 40 – 50°, were subsequently re-identified as *O. phryganae* (MIFSUD 2008) (Fig. 30). A further single specimen of *O. phryganae* was found by SM on 10 March 2009 at Pembroke Rifle Ranges where *O. sicula* (syn. *O. lutea* subsp. *minor*) has not been recorded according to BARTOLO et al. (2001).

## 5.4 *Ophrys bombyliflora* Link forma *parviflora* S. Mifsud

A population of over 100 *Ophrys bombyliflora* all of which had unusually small flowers was found by SM on 1 March 2007 at Pembroke Rifle Ranges where the population is still extant. Two smaller populations of similar plants were found by SM at ix–Xaghra tal–Ghattuqa (Bingemma) on 23 March 2008 and at ix–Xaghra ta–Qallelija (Bingemma) on 27 March 2009. These plants, which have a significantly smaller labellum, were subsequently described under the name *O. bombyliflora* forma *parviflora* (MIFSUD 2009). A second population of 26 plants was also found by SM at Pembroke Rifle Ranges on 29 March 2011).

## **6. Other recent *Ophrys* records**

### **6.1 *Ophrys iricolor* s.l.: first records for Gozo**

As reported above, *Ophrys iricolor* s.l. has now been found (by SM) on Gozo for the first time, as follows:

- (a) early flowering form (= *O. mesaritica*) at il-Qortin ta' Issopu on 12 January 2007 and il-Qortin tal-Magun on 20 January 2007;
- (b) later flowering form (= *O. vallesiana*) at Dahlet Qorret on 19 March 2009; il-Qortin ta' Ghajn Damma a on 31 March 2009 and Ghajn Abdul on 27 March 2011.

### **6.2 *Ophrys caesiella*: first record for Gozo: new location on Malta**

As also reported above, *Ophrys caesiella* has subsequently been found by SM at il-Qortin tal-Magun, on Gozo on 15 March 2010 (a first record for that island) (Fig. 29) and at Manikata on Malta (main island) on 13 March 2010.

### **6.3 *Ophrys bertolonii* Moretti: new locations on Malta**

*Ophrys bertolonii* is very rare on the Maltese archipelago. Thus, although BARTOLO et al. (2001) lists five Maltese locations for this species, four of these relate to old records from sites where the species is no longer extant; the only extant site known in 2001 being Wied Dalam. However, *O. bertolonii* has since been recorded at Clapham Junction (l/o Siggiewi) (WEBER & KENDZIOR 2006) and one specimen by SM at ix-Xaghra tal-Marfa (l/o Mellieha) on 5 April 2008. In addition, RIECHELMANN (2011) reported two plants similar to *O. bertolonii* (labelled "*O. cf. bertolonii*") growing at Victoria Lines on 8 April 2009. However, the specimens illustrated by RIECHELMANN (2011) appear well within the variable range of *O. melitensis*.

### **6.4 *Ophrys calliantha* Bartolo & Pulvirenti: new record on Malta**

A single specimen of *Ophrys calliantha* (Fig. 27) was found in cliff-top garrigue by Luca Pisani at the limits of ix-Xemxija on 30 April 2009 (pers comm., 2010). This does not appear to be the first record of *O. calliantha* for the Maltese archipelago since, although the species is not listed by BARTOLO et al. (2001), it is contained in the "Complete list of orchids recorded from the Maltese Islands" (Lanfranco 2001).

## 6.5 *Ophrys lutea* Cavanilles subsp. *lutea*: first record for Gozo

Although BARTOLO et al. (2001) lists two sites for *Ophrys lutea* [s.l.] on Gozo, a separate list for *O. lutea* subsp. *lutea* lists seven sites for Malta (main island) but none for Gozo. Consistent with this, LANFRANCO (2007: 94) states that *O. lutea* subsp. *lutea* with a larger labellum, has not been recorded with certainty from Gozo. However, a single specimen of this subspecies (labellum 17 mm long) was found by SM on ta' Kuljat Hill on Gozo on 10 April 2009. Two further specimens (also with a labellum of 17mm) were found by SM on 28 March 2011 at Wied Babu, a new site for Malta (main island).

## 7. Orchid site locations (UTM: WGS84)

### 7.1. Malta

Bajda Ridge (ix–Xemxija to l/o Mellieha)	VV 4178, 4278, 4378 4077, 4177, 4277, 4377
Clapham Junction (l/o Siggiewi)	VV4567
Dingli Cliffs (Dingli)	VV 4368, 4468, 4568
Dwejra (Bingemma)	VV 4473
Fawwara (l/o Siggiewi)	VV 4566
il–Girgenti (l/o Siggiewi)	VV 4667
il–Palma (Wardija)	VV 4276, 4376, 4377
ix–Xaghra tal–Ghattuqa (Bingemma)	VV 4274 4374
ix–Xaghra tal–Marfa (l/o Mellieha)	VV 4080
ix–Xaghra ta–Qallelija (Bingemma)	VV 4273 4274 4374
l–Argentier (Wardija)	VV 4477
Manikata (l/o Mellieha)	VV 4177
Mnajdra (l/o Qrendi)	VV 4965
Red Tower (l/o Mellieha)	VV4081
Rifle Ranges (Pembroke)	VV 5276, 5376
San Martin (Wardija)	VV 4376, 4476, 4477
Tar–Rehba (Dingli)	VV 4468
Victoria Lines (Bingemma)	VV 4473
Wied Babu (Zurrieq)	VV 5164
ix–Xemxija, part of Bajda Ridge (Saint Paul's Bay)	VV 4478

### 7.2. Gozo

Dahlet Qorret (l/o Qala)	VV 3889
Ghajn Abdul (l/o San Lawrenz)	VV 2890
il–Qortin ta' Ghajn Damma (Xaghra)	VV 3392, 3492, 3491
il–Qortin ta' Issopu (l/o Nadur)	VV 3790

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Table 1: Comparison of *Ophrys iricolor* s.l. at tar-Rehba (Dingli) and Victoria Lines (Bingemma) at different flowering periods (all measures in mm).

	Mid-December Population of <i>O. iricolor</i> s.l. at tar-Rehba 13-Dec-2010			Early January population of <i>O. iricolor</i> s.l. at tar-Rehba 8 Jan 2010			Late February population of <i>O. iricolor</i> s.l. at tar-Rehba 28 Feb 2009			Mid-March population of <i>O. iricolor</i> s.l. at Victoria Lines 16 Mar 2010		
Plant no.	Lip length	Under- lip colour (see Scale A)		Lip length	Under- lip colour (see Scale A)	No. of flowers	Lip length	Under- lip colour (see Scale A)	No. of flowe rs	Lip length	Under- lip colour (see Scale A)	No. of flower s
1	13	0		13	0	2	17	3	6	17	3	7
2	12	0		13	0	4	15	1	6	15	2	5
3	12	0		14	1	3	14	1	8	17	3	6
4	13	0		14	1	5	16	3	2	16	0	5
5	12	0		13	0	3	15	2	3	14	3	5
6	13	0		12	0	2	14	1	3	16	3	7
7	11	0		15	2	4	15	2	6	16	2	6
8	12	0		13	0	4	15	1	6	15	0	5
9	14	1		14	0	2	15	3	5	16	3	8
10	12	1		15	1	2	16	2	6	13	2	7
11				15	3	3				16	1	5
12				14	0	3				15	1	7
13				14	0	3				15	1	6
14				13	1	4				15	3	7
15				14	1	3				17	3	5
16				14	2	4				17	0	4
17				12	0	5				16	2	6
18				14	1	2				15	1	9
19				13	0	3				16	2	7
20				15	2	4				15	2	6
Mean	12.4			13.7			15.2			15.6		

Table 2: Comparison of early flowering *Ophrys iricolor* s.l. at tar–Rehba (Dingli Cliffs), later flowering *O. iricolor* s.l. at Victoria Lines (Bingemma) with *O. mesaritica*, *O. eleonora* and *O. vallesiana* as described by DELFORGE (2006: 367–369) et al. (all measures in mm).

	<i>O. iricolor</i> s.l.: early flowering plants tar–Rehba	<i>O. mesaritica</i> (sensu DELFORGE 2006 & al.)	<i>O. iricolor</i> s.l.: later flowering plants Victoria Lines	<i>O. vallesiana</i> (sensu DELFORGE 2006 & al.)	<i>O. eleonora</i> (sensu DELFORGE 2006 & al.)
No. of flowers	2 – 5	1 – 5	4 – 9	1 – 5	1 – 7
Plant height	60 – 160	100 – 330	120 – 320	100 – 350	200 – 600
Sepal length	11 – 13	10 – 13	12 – 14	8.5 – 15	11 – 18
Petal length	6 – 8	6 – 9	6 – 8	6 – 10	5.5 – 12
Labellum length	11 – 15	12 – 19	(13) 15 – 17 (19)	12 – 16	16 – 28
Labellum colour	vivid to dark brown with a purple tinge	blackish– or brownish–purple	dull brown with a purple tinge	brownish—purple	blackish purple
Speculum colour	mostly pale greyish blue, sometimes marbled	greyish–blue, often marbled blackish–violet	mostly dull greyish blue, sometimes marbled	light greyish–blue, sometimes marbled violet	generally vivid blue, sometimes marbled blackish–violet
Underlip colour	entirely green or stained pale red with green border usually not clear–cur	green or green stained brown at centre but without clear–cut green border	purple–red with clear–cut yellowish green border; sometimes entirely green	purple with clear–cut yellowish green border; sometimes entirely green	purple, often tinged orange: clear–cut yellowish green border
Flowering period	mid Dec – late Jan	mid – Dec – early Mar.	late Feb – early April	late Feb – early May	late Mar – early May

Table 3: Comparison of early, medium and later flowering populations of *Ophrys iricolor* s.l. at tar-Rehba (Dingli Cliffs), il-Fawwara (l/o Siggiewi) and Victoria Lines (Bingemma), respectively (all measures in mm).

	Early January population (= <i>O. mesaritica</i> ) at tar-Rehba 8 Jan 2010			Mid-February population, at il-Fawwara 10 Feb 2010			Mid-March population (= <i>O. vallesiana</i> ) at Victoria Lines 16 Mar 2010		
Plant no.	Lip length (mm)	Underlip colour (see Scale A)	No. of flowers	Lip length (mm)	Underlip colour (see Scale A)	No. of flowers	Lip length (mm)	Underlip colour (see Scale A)	No. of flowers
1	13	0	2	16	2	3	17	3	7
2	13	0	4	14	3	5	15	2	5
3	14	1	3	11	3	3	17	3	6
4	14	1	5	14	2	3	16	0	5
5	13	0	3	13	0	2	14	3	5
6	12	0	2	15	0	5	16	3	7
7	15	2	4	15	1	2	16	2	6
8	13	0	4	16	0	4	15	0	5
9	14	0	2	15	0	3	16	3	8
10	15	1	2	14	2	3	13	2	7
11	15	3	3	13	0	3	16	1	5
12	14	0	3	15	2	5	15	1	7
13	14	0	3	14	1	4	15	1	6
14	13	1	4	14	3	2	15	3	7
15	14	1	3	14	0	2	17	3	5
16	14	2	4	15	1	3	17	0	4
17	12	0	5	13	0	5	16	2	6
18	14	1	2	14	1	4	15	1	9
19	13	0	3	15	2	5	16	2	7
20	15	2	4	14	1	3	15	2	6
Me an	13.7			14.2			15.6		

Table 4: Comparison of taller form of *Ophrys iricolor* s.l. on Malta with typical earlier flowering *O. iricolor* s.l. (= *O. mesaritica*) on Malta and with *O. mesaritica* sensu DELFORGE et al. (see paragraph 2.4.4).

	<i>O. iricolor</i> s.l. (taller form on Malta)	Early flowering <i>O. iricolor</i> s.l. (= <i>O. mesaritica</i> ) (typical form on Malta)	<i>O. mesaritica</i> (sensu DELFORGE & al.)
No. of flowers	(5) 6 – 9 (10)	2 – 5	1 – 5
Plant height (cm)	>20 – 34	8 – 16	10 – 33
Labellum length (mm)	11 – 13 (14)	(12) 13 – 15	12 – 19
Lateral lobes	small and triangular	variable, but generally large	not specified
Speculum size	large	variable	not specified
Underlip	entirely green or with a pale red centre	entirely green or with a pale red centre	green or green stained brown at centre but without clear-cut green border
Flowering period	mid Dec – Jan	mid Dec – Jan	mid – Dec – early Mar

Table 5: Comparison of *Ophrys caesiella* “cf. *bilunulata*” on Malta with *O. bilunulata* and *O. caesiella* as tabulated by DELFORGE (2000).

	<i>O. bilunulata</i> (DELFORGE (2000))	<i>O. caesiella</i> (sensu DELFORGE)	<i>O. caesiella</i> “cf. <i>bilunulata</i> ” on Malta
Labellum: length (mm)	8.5 – 15 ( $\bar{x}$ = 12.13)	9 – 13 ( $\bar{x}$ = 11.51)	11 – 13 ( $\bar{x}$ = 12)
Labellum: $\bar{x}$ length : width ratio	1.16	1.17	1.12
Labellum: angle side/axis	35 – 39°	26 – 31°	up to 43°
Flower position	sub–horizontal to almost pendant	(sub)horizontal	sub–horizontal
Labellum: general colour	mottled	rather dull	mottled
Labellum: pilosity	fairly ordered	fairly disordered	fairly ordered
Colour of pilosity	dark, uniform, with a clearer area between the speculum lunulae	uniformly dark	uniformly dark
Labellum: border	rather thin, yellow, clearly visible	very thin, yellow, sometimes hardly visible	thin, yellow, clearly visible
Labellum: basal ridges	rarely significant	weak	variable
Labellum: basal groove between speculum lunulae	sometimes present, hairy	often incomplete	present
Underlip: colour	green, sometimes tinted reddish	greenish–white, sometimes tinted brown or purple	yellowish–green
Flowering period	April – May	Feb – Mar	Feb – Mar

Table 6: Comparison of *O. caesiella* studied in 2009/10 with *O. caesiella* sensu DELFORGE (2000) and *Ophrys gazella* sensu DEVILLERS & DEVILLERS–TERSCHUREN (2000a) (all measures in mm).

	<i>O. caesiella</i> : study 2009/10	<i>O. caesiella</i> : sensu Delforge	<i>O. gazella</i> sensu Devillers & Devillers–Terschuren
No. of flowers	(1) 2 – 5 (6)	1 – 6	1 – 5
Plant height (cm)	100 – 200	50 – 220	no information
Lateral sepals: length (mm)	7.5 – 9.(10)	8.5 – 11	8 – 10
Petals shape	oblong	oblong	oblong or oval;
Petal size (L x W) (mm)	5.0 – 6.5 x 2.0 –2.5	5 – 6 x 1.8 – 2.5	4.5 – 5.5 x 0.7 – 1.3
Labellum: size (L x W) (mm)	(9) 10 – 13 x (8) 9 – 11.5	(9) 10–12.5 (13) x (8) 9–11 (12)	9 – 10 x 6.5 – 9
Labellum: horizontal orientation	near horizontal to moderately pendant (c. 30°.)	near horizontal	near horizontal to pendant at 45°.
Labellum: longitudinal curvature	straight to weakly curved	weakly curved	almost straight
Labellum: basal ridges	variable	weak, rarely significant	very important, often separated by a narrow depression
Labellum: angle of lateral lobes	25 – 43°	22 – 28°	35 – 45°
Labellum: colour	dark brown, often mottled against a lighter yellowish–beige areas	dark brownish violet	brown, often mottled with lighter areas
Labellum: border	narrow (up to 1.5 mm wide), yellow; or absent.	thin, yellowish green	narrow yellow
Speculum	greyish blue, mottled with dark blue	greyish blue, sometimes marbled indigo	blue frequently marbled; often light omega
Underlip: colour	green with a white, pink or reddish centre.	greenish–white, sometimes stained brown or purple at centre	green, sometimes stained red at centre
Flowering period	mid–Jan to mid– Mar	Feb – Mar	Jan – early Apr



Table 7: Comparison of selected features of *Ophrys caesiella* s.l. and *O. caesiella*-like plants (including *O. pectus* sensu Devillers & Devillers–Terschuren) at il–Palma (Wardija), Red Tower (l/o Mellieha), San Martin (Wardija) and ix–Xemxija part of Bajda Ridge (St.Paul’s Bay). (Plants with prominent basal ridges shown in bold).













	il–Palma			Red Tower			San–Martin			ix–Xemxija		
Plant no.	Basal ridge size (Scale C)	Underlip colour (Scale B)	Lip length (mm)	Basal ridge size (Scale C)	Underlip colour (Scale B)	Lip length (mm)	Basal ridge size (Scale C)	Underlip colour (Scale B)	Lip length (mm)	Basal ridge size (Scale C)	Underlip colour (Scale B)	Lip length (mm)
1	<b>2</b>	<b>0</b>	<b>12.5</b>	<b>2</b>	<b>0</b>	<b>12.5</b>	<b>2</b>	<b>0</b>	<b>15.0</b>	<b>2</b>	<b>0</b>	<b>12.0</b>
2	1	0	13.0	1	0	13.0	1	0	14.0	1	1	12.0
3	0	1	11.5	0	1	11.5	1	0	13.0	1	1	11.5
4	0	1	12.0	0	1	12.0	1	1	12.5	0	0	10.0
5	<b>2</b>	<b>2</b>	<b>11.0</b>	<b>2</b>	<b>2</b>	<b>12.0</b>	0	0	12.0	0	0	12.0
6	2	1	9.5	<b>2</b>	<b>2</b>	<b>11.0</b>	<b>2</b>	<b>2</b>	<b>14.0</b>	1	1	12.5
7	<b>2</b>	<b>3</b>	<b>12.5</b>	1	1	9.5	0	0	13.0	0	0	11.0
8	<b>3</b>	<b>0</b>	<b>12.0</b>	0	0	12.5	0	0	11.0	0	0	11.5
9	1	1	11.0	<b>2</b>	<b>3</b>	<b>12.0</b>	1	0	12.0	0	1	13.0
10	1	0	13.0	<b>2</b>	<b>2</b>	<b>11.0</b>	0	0	11.0	1	1	12.0
11	<b>3</b>	<b>3</b>	<b>12.5</b>	1	1	13.0				1	0	11.5
12	0	0	12.0	1	0	12.5				1	2	12.0
13	<b>2</b>	<b>0</b>	<b>12.5</b>	0	0	12.0				<b>3</b>	<b>3</b>	<b>12.5</b>
14	1	0	12.0	1	1	12.5				1	0	11.0
15				0	1	12.0				2	0	13.5
16				<b>3</b>	<b>2</b>	<b>13.0</b>				1	0	12.0
17				0	0	11.0				0	1	10.0
18				<b>2</b>	<b>3</b>	<b>15.0</b>				0	0	11.0
19				<b>2</b>	<b>3</b>	<b>14.5</b>				1	0	13.0
20				<b>3</b>	<b>2</b>	<b>15.0</b>						
21				<b>2</b>	<b>3</b>	<b>12.0</b>						
22				<b>3</b>	<b>3</b>	<b>14.0</b>						
23				<b>3</b>	<b>3</b>	<b>13.5</b>						

1	5	9
2	6	10
3	7	11
4	8	12

Fig. 1–4: Scale A – Range of underlip colour of *Ophrys iricolor* s.l. used in Tables 1 and 3, representing Scale values 0 to 3 respectively.

Fig. 5–8: Scale B – Range of underlip colour of *O. caesiella* and *O. caesiella*-like plants (including *O. c.f. pectus*) used in Table 7, representing Scale values 0 to 3 respectively.

Fig. 9–12: Scale C – Range of basal ridge size of *Ophrys caesiella* and *O. caesiella*-like plants (including *O. c.f. pectus*) used in Table 7, representing Scale values 0 to 3 respectively.

		Scale A	Scale B	Scale C
Scale value	0			
	1			
	2			
	3			



13	16
	17
14	18
15	19

Fig. 13: *Ophrys pectus*, il-Palma (Wardija), Malta, 18 February 2010.

Fig. 14 - 15: Comparison of *Ophrys* c.f. *pectus* with *O. vallesiana* showing similar red underlips with a green border.

Fig. 14: *Ophrys* c.f. *pectus*, il-Palma (Wardija), Malta, 18 February 2010.

Fig. 15: *Ophrys vallesiana*, Victoria Lines (Bingemma), Malta, 19 March 2010.

Fig 16 - 19: Comparison of *Ophrys caesiella*, *O.* c.f. *pectus* and *O. vallesiana* showing the gradation in size of basal ridges:

Fig. 16: *Ophrys caesiella*, Red Tower (l/o Mellieha), Malta, 15 February 2010;

Fig. 17-18: *Ophrys* c.f. *pectus*, Red Tower (l/o Mellieha), Malta, 15 February 2010;

Fig. 19: *Ophrys vallesiana*, Dingli Cliffs (Dingli), Malta, 28 February 2009.

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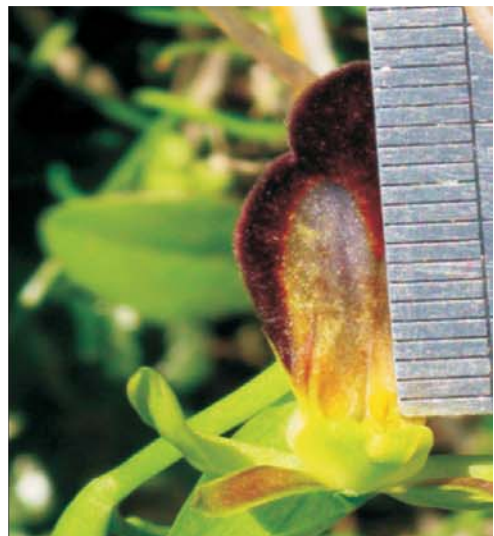
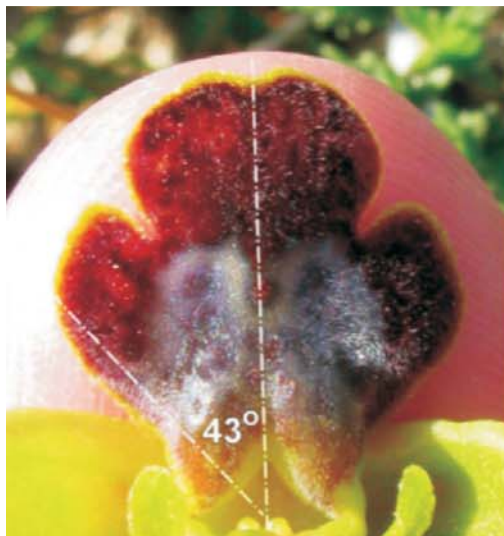
Fig. 20: *Ophrys mesaritica*, tall specimens reaching a height of 32–35 cm with 8–10 flowers,. 1-Argentier (Wardija), Malta, 13 January 2009 (left) and San Martin (Wardija), Malta, 13 January 2009 (right).

Fig. 21: *Ophrys caesiella*, typical specimen, ix-Xemxija, Bajda Ridge (St. Paul's Bay), Malta, 19 February 2011.

Fig. 22: *Ophrys* c.f. *pectus* showing intermediate characters of both *O. vallesiana* and *O. caesiella*; in particular a red underlip with green border characteristic of *O. vallesiana* and weak basal ridges characteristic of *O. caesiella*, Red Tower (Mellieha), Malta, 15 February 2010

Fig.23: *Ophrys caesiella*, specimen with lateral lobes at 43° to longitudinal axis: San Martin (Wardija), Malta, 1 March 2008.

Fig. 24: *Ophrys vallesiana*, specimen with a labellum measuring 18.3 mm long; Victoria Lines (Bingemma) Malta, 19 March 2010.









**Colour plate page 648** (Photos by Stephen Mifsud)

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Fig. 25: *Ophrys iricolor* s.l., late form (= *O. vallesiana*), typical specimen, Victoria Lines (Bingemma), Malta, 19 March 2010.

Fig. 26: *Ophrys iricolor* s.l., early form (= *O. mesaritica*), typical specimen, Dingli Cliffs (Dingli), Malta, 16 March 2008.

**Colour plate page 649** (Photo in Fig. 27 by Luca Pisani, in Figs. 28–31 by Stephen Mifsud)

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Fig. 27: *Ophrys calliantha*: Xemxija, Bajda Ridge (St. Paul's Bay), Malta, 29 April 2009.

Fig. 28: *Ophrys lupercalis*, Pembroke Rifle Ranges (Pembroke), Malta, 27 January 2010.

Fig. 29: *Ophrys caesiella*, il-Qortin tal-Magun (l/o Nadur), Gozo, 15 March 2010 (first record for Gozo).

Fig. 30: *Ophrys phryganae*, Dwejra, Malta, 17 March 2008.

Fig. 31: *Ophrys lojaconoi*, San Martin (Wardija), Malta, 1 January 2011.