

Ophrys albarranii (Orchidaceae): new records and revised taxonomic status, from variety to species

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In memoriam, to/a Antonio Gavira Albarrán

Ophrys bombyliflora var. *albarranii* P. P. Ferrer, E. Laguna & D. C. Gómez-Montblanch was described as a hypochromatic natural variety of the bumblebee orchid (*O. bombyliflora* Link), apparently endemic to the Iberian Peninsula. It was described from Alcalá de Guadaíra (Seville, Andalusia) from a very small population, and some specimens were transferred to CIEF (Centre for Forestry Research and Experimentation, Quart de Poblet, Valencia, Spain) in order to describe the new taxon and prepare the holotype. Recently, a new population has been discovered in Morón de la Frontera (Seville) some 30 km away from Alcalá de Guadaíra.

Data on the number of individuals and habitat description are reported here. All the populations seem to be fertile and maintaining their characteristics. Additionally, hybrid forms with the plants of dark brown labellum (*O. bombyliflora* s. str.) were found at least in Alcalá de Guadaíra. Despite the recessive attributes of hypochromatism, these populations maintain by themselves.

Given the above, a review of its taxonomic status is recommended, so the upgrade to species level is here proposed, as *Ophrys albarranii*, based on *O. bombyliflora* var. *albarranii*, a new combination and a name at new rank.

Keywords: *Ophrys bombyliflora*, Hypochromatism, Andalusian endemics, Taxonomical recombination, *Ophrys bombyliflora* var. *albarranii*.

Ophrys albarranii (Orchidaceae): noves cites i revisió del seu estatus taxonòmic

Ophrys bombyliflora var. *albarranii* P. P. Ferrer, E. Laguna & D. C. Gómez-Montblanch fou descrita com a varietat hipocromàtica de l'orquídia "mosques petites" (*O. bombyliflora* Link), aparentment endèmica de la península Ibèrica. Fou descrita a Alcalá de Guadaíra (Sevilla, Andalusia), a partir d'una població menuda, i alguns exemplars foren transferits al CIEF (Centre per a la Investigació i Experimentació Forestal, Quart de Poblet, València, Espanya) per a descripció del nou tàxon i la preparació de l'holotip. Recentment, una nova població ha estat descoberta a Morón de la Frontera (Sevilla), situada a 30 km de la d'Alcalà de Guadaíra.

S'aporten ací dades del nombre d'individus i descripció de l'hàbitat. Totes les poblacions semblen ser fèrtils, mantenint els seus caràcters. A més a més, almenys a Alcalá de Guadaíra s'han trobat formes híbrides amb les plantes de label obscur (*O. ombyliflora* s. str.). Tot i que l'hipocromatisme té atributs recessius, aquestes poblacions s'automantenen.

Com a resultat d'això, és recomanable una actualització del seu estatus taxonòmic, proposant-se ací l'elevació al grau d'espècie, com a *O. albarranii*, basat en *O. bombyliflora* var. *albarranii*, una nova combinació i un nom en rang nou.

Mots clau: *Ophrys bombyliflora*, hipocromatisme, endemisme andalús, recombinació taxonòmica, *Ophrys bombyliflora* var. *albarranii*.

The Orchidaceae family is considered to have the highest specific plant richness on the planet, reaching up to 35,000 species, distributed in more than 850 genera (Dressler, 1990; Serra, 2019; see also POWO, 2024). Traditionally, their description and study have aroused extraordinary interest as a result of their peculiar biology (Dressler, 1990; Fay & Chase, 2009), their frequent association with mycorrhizae (Dearnaley, 2007) and their complex fertilization mechanisms (Nilsson, 1992; Jersáková *et al.*, 2006; Micheneau *et al.*, 2009). This subject aroused the particular interest of Charles Darwin, among other authors, who found in the pollination systems of orchids one of his most remarkable demonstrations of the theory of biological evolution (Fay & Chase, 2009). For this reason, one of the main groups studied by Charles Darwin was the genus *Ophrys* L. (Darwin, 1877), the most diverse of the European orchidoflora (see Baumann & Künkele, 1982; Buttler, 1991; Devillers & Devillers-Terschuren, 1994; Devey *et al.*, 2008; Delforge, 2016). Delforge (2016), one of the most analytical specialists, indicates the presence of 354 species for the European continent, the Mediterranean and North Africa. These numbers are notably lower for more synthetic authors, such as Pedersen & Faurholdt (2007), who consider that the number of species of this genus worldwide does not exceed 200. Adding the Iberian Peninsula and the Balearic Islands, Delforge (2016) cites up to 40 species of *Ophrys*, while the review carried out by Aldasoro & Sáez (2005), much more synthetic, reduces this to only 12 species –17 taxa up to subspecies grade–.

The interest in orchids has grown since the middle of the last century due, in part, to their frequent inclusion in red lists of threatened species at national and international level (see Bilz *et al.*, 2011), largely due to illegal trafficking for collecting and horticulture, which affects mainly tropical species (Hinsley *et al.*, 2018) and the increasing destruction of their habitat (Stewart, 1992; Hágsater & Dumont, 1996; Bilz *et al.*, 2011). To this situation was added the particular difficulty involved in their *ex situ* propagation and conservation, especially for the case of terrestrial orchids (Swarts & Dixon, 2017; Gale *et al.*, 2018). All this has led to their prioritization in major conservation programs for wild plants (see Stewart, 1992; Hágsater & Dumont, 1996; Smart *et al.*, 2002). Despite this, the Spanish red list of vascular flora includes only 11 species of orchids (Moreno, 2008),

although such numbers are often higher in the autonomous lists of protected species or in the regional or local studies on threatened flora, probably due to the wide distribution of many of the taxa, which hinders an adequate demographic monitoring of their global populations.

One of the most peculiar phenomena in orchids is their frequent tendency to present aberrant forms –*lusus*- or differences in coloration, which usually affect some parts of their flowers. Among the most frequent of these phenomena is the so-called hypochromatism or hypochromaticity (Serra, 2019), consisting of the presence of discolored floral parts. However, this character rarely manifests itself through the presence of absolutely greenish-whitish flowers, and, when they occur in groups dominated by species with strong floral colorations, they have often led to the description of new species. This occurs, for example in *Serapias perezchiscanoi* C. Acedo in SW Iberia. One species showing these characteristics close to albinism is *Ophrys bombyliflora* var. *albarranii* P. P. Ferrer, E. Laguna & D. C. Gómez-Montblanch, a taxon described from specimens located in Alcalá de Guadaíra (Ferrer-Gallego *et al.*, 2015; Gómez Montblanch, 2015), in the province of Seville (Spain). Unlike the usual hypochromatic plants in the genus *Ophrys*, those of this taxon present samples of weak coloration –not exactly white, but light yellowish green, almost ivory– throughout the stem and the totality of the floral parts.

Ophrys bombyliflora Link is one of the most constant-looking and easily identified species within the genus *Ophrys* throughout the Mediterranean, distributed from Turkey and Lebanon to the Iberian Peninsula and the Canary Islands. According to Anthos database (available at www.anthos.es) for the Iberian Peninsula, it is present in the southwestern quadrant, being relatively rare in southern Portugal and in Spanish Extremadura –where it had not been reported by Pérez Chiscano *et al.* (1991), but by Aldasoro & Sáez (2005)– and somewhat more abundant in occasional records in Granada (Aldasoro & Sáez, 2005; Becerra & Robles, 2009). It is absent throughout the rest of the Iberian Peninsula, but exhibits a biogeographic disjunction, appearing again in Balearic Islands (Gil & Llorens, 1999; Bolòs & Vigo, 2001; Fraga, 2004).

Although Delforge (2016) recognizes *O. bombyliflora* as a species, he indicates it heading a group of its own

that, to his knowledge, could consist of at least 5 species throughout the Mediterranean, the type species having been described from Portugal. Not having proposed any subspecies or species of the group for the Andalusian plants, these must be assigned by default to the var. *bombyliflora*.

In the present work, new data and populations initially attributed to *O. bombyliflora* var. *albarranii* are provided and, once its homogeneity of characters is confirmed, it is proposed to recombine it for the species rank.

Material and methods

Field reconnaissance was done by taking the population centroids using conventional GPS and corroboration with commonly used map viewers: REDIAM map viewer of the Junta de Andalucía (<https://portal-rediam.cica.es/VisorRediam/>), SIGPAC (<https://sigpac.mapama.gob.es/feqa/visor/>) and Google Earth

(<https://earth.google.es>). The data were transformed to a 1 × 1 km UTM grid for the 30S zone in ETRS89 datum, equivalent to WGS84, the usual system for citing botanical species in Spain.

Given the relative abundance of plants, some specimens were collected for their maintenance and future propagation at CIEF (Centro para la Investigación y Experimentación Forestal, Quart de Poblet, Valencia, Spain), as an optimal way to obtain specimens that may be required for the preparation of herbarium sheets.

Results

In 2009, a population of this plant was located in the municipality of Alcalá de Guadaíra, which led to the description of the taxon (see Ferrer Gallego *et al.*, 2015). Performing data collection between 2010 and 2015, the number of specimens varied between 70 and 85 (Gómez Montblanch, 2015), distributed in different stands along a distance of approximately 4 m. The soil



FIGURE 1. Aspect of a small part of the new found population in Morón de la Frontera. 19.03.2024. Photo credits: Javier Cano Martín.

Aspecte d'una part menuda de la nova població trobada a Morón de la Frontera. 19.03.2024. Crèdit fotogràfic: Javier Cano Martín.

type was calcareous cambisol with a clay loam to silt loam texture on Quaternary deposits on a Pleistocene terrace, within grasslands rich in annual species and small hemicryptophytes, occupying the hollows of a mosaic of shrublands dominated by *Quercus coccifera* L. and *Chamaerops humilis* L.

In March 2024, a new population attributable to *Ophrys bombyliflora* var. *albarranii* was located by two of us Juan López Martínez and Juan José Roldán Oliva, in Morón de la Frontera (Seville), approximately 30 km from the previously known one of Alcalá de Guadaíra. It consists of several stands arranged across an area of approximately 14 m., containing about 53 blooming specimens and a larger number of unmature specimens. The type of vegetation is again a grassland compound of therophytes, hemicryptophytes and geophytes, placed close to a local roadside and occupying gaps in a tessellate landscape dominated by *Chamaerops humilis* L., *Olea europaea* subsp. *sylvestris*

(Mill.) Hegi, *Pinus halepensis* Mill., etc. The population grows on poor, subsaline soils derived from Triassic gypsum marls –Keuper facies–. Despite some typical plants –brown-blackish flowers– being found around this population, no introgressed ones have been located. On the contrary, in Alcalá de Guadaíra, some intermediate individuals were present. The site data and botanical reference are:

SPAIN: Sevilla, Morón de la Frontera, UTM 30STG8613 (Datum ETRS89), Despeñadero de la Semilla, 300 m., Juan López Martínez & José Rodríguez Díaz, 19/03/2024

On the other hand, several specialists have indicated to us about the findings of plants which could match the same identity in other areas of Andalusia. These populations should be studied in the future, contacting the researchers who found them, particularly if the populations are formed by a high number of individuals, such as those found at Alcalá de Guadaíra and Morón de la Frontera.



FIGURE 2. Flower of *Ophrys albarranii* in Morón de la Frontera. 19.03.2024. Photo credits: Javier Cano Martín.

Flor d'*Ophrys albarranii* a Morón de la Frontera. 19.03.2024. Crèdit fotogràfic: Javier Cano Martín.

Discussion

Following Delforge (2016), the *O. bombyliflora* group could include at least 5 species: *O. bombyliflora* Link s.s., with *typus* from Portugal; *O. hiulca* Mauri, from peninsular Italy; *O. disthoma* Bivona-Bernardi, from Sicily; *O. canaliculata* Vivavi, from Corsica and Sardinia; and *O. tabanifera* Willdenow, from North Africa. *Ophrys bombyliflora* Willd. is clearly a synonym of *O. bombyliflora*, as Karl L. Willdenow himself implied in his description (Linnaeus & Willdenow, 1805). *Ophrys labrofossa* Brot. described from around Montsanto (Portugal) (Brotero, 1835) is also recognized as a synonym of var. *bombyliflora*, but it remains to be determined whether it deserves a varietal or subspecific rank. It should also be clarified in the future whether *O. pulla* Ten. is to be considered a synonym of the Italian continental taxon attributed to this group, *O. hiulca*. There are also some varieties and forms that could have sufficient uniqueness to constitute new subspecies or species in the future, such as *O. bombyliflora* var. *parviflora* (Mifsud) Mifsud, from Malta. In addition, the f. *buccheriana* De Langhe & D'Hose has been described from Sicily (De Langhe & D'Hose, 1985). Delforge (2016) suggests that the group may contain numerous species but has not been analyzed so far, which is reasonable given the high distribution, and, probably, the advantage that may be granted to the species for the fixation of local characters by its ability to propagate vegetatively.

The localization of new populations has made some of us review previous information and reflect on their taxonomic status, since there are different characteristics that allow us to doubt that their rank should be that of a mere variety. On the one hand, what is found in all cases does not seem to be the usual issue of hypochromatism, since there is no simple discoloration of complete floral parts, nor can we speak merely of areas of weak pigmentation, but rather the whole flower and upper parts of the stem are affected by a very light ivory-yellowish-green tone. This type of coloration does not correspond easily to what is often described as genuinely albine or hypochromatic plants, but rather invites us to think of more authentically taxonomic characters, as occurs for example with *Serapias perez-chiscanoi* with respect to the rest of the species of its taxonomic group (see Pérez-Chiscano *et al.*, 1991; Aldasoro & Sáez, 2005). Examples of more common hypochromatism expressions in *O. bombyliflora*, less

notable than here, can be found, for instance, at the illustration of Sánchez Gullón *et al.*, (2012: 318, fig. 2) or webpages such as: https://commons.wikimedia.org/wiki/File:Ophrys_bombyliflora_hipochrome.jpg (Date 19 March 2009; accessed June 2024).

Secondly, these are not single, isolated specimens, as occurs in the usual cases of hypochromatism. On the contrary, they are complete stands that form populations, and which in turn total a sufficient number of specimens. The distances found between the different specimens do not allow us to think of clones, which would have been favored by the presence of underground peduncles carrying new tubers, since such peduncles are usually only 2–3 cm long. A third relevant aspect is the presence of hybrid plants or of intermediate floral characters between the usual dark-flowered forms (*O. bombyliflora* var. *bombyliflora*) and var. *albarranii*, which we could already observe in the first samplings of the population of Alcalá de Guadaíra at the edges of the population, where both varieties coincide.

And a last relevant fact is the extent of territorial dispersion in which the new population is found, which, in addition to having sufficient entity, is located at great distance from the other. These distance and the conservation of characters suggest that it would not easily be a mere mutation perpetuated locally in each case, being easier to think that either it is a taxon with larger old populations, now fragmented, or it corresponds with new seed colonizations at high distances, frequent in orchids due to the small size and weight of their seeds, which can be easily transported by winds (Delforge, 2016; Serra, 2019).

In conclusion, we believe that there is sufficient justification to propose an elevation of the taxonomic rank to that of species, through nomenclatural recombination:

Ophrys albarranii (P.P. Ferrer, E. Laguna & D.C. Gómez Montblanch) P.P. Ferrer, E. Laguna, D.C. Gómez Montblanch & J. Rodríguez Díaz, **comb. & stat. nov.**
 ≡ *O. bombyliflora* var. *albarranii* P.P. Ferrer, E. Laguna & D.C. Gómez Montblanch in *Flora Montiberica* 61: 4 (2015) [basonym]

Holotype: VAL 226151 (see Ferrer-Gallego *et al.*, 2015). This proposal could be worth discussing in the future, in the light of information from other new populations. In the same vein, a plan for the monitoring

of introgression traits should be designed and carried out in the near future, as well as, if possible, molecular research should be performed.

The data available suggests that the known world population does not exceed 250 mature individuals and, as such, meets Criterion D of the Red List of the IUCN Species Survival Commission (2012) placing the species in the EN (Endangered) category. Field observations of the best-known population –Alcalá de Guadaíra– shows fluctuations, although these can probably be discounted as being extreme since, in many cases, the temporary absence of plants between successive years could be due to the effects of tuber dormancy, widely documented in orchids (Serra, 2019). Nevertheless, populations should be subject to detailed interannual monitoring in the future, since in the event that genuine extreme fluctuations were found to exist for a sufficiently significant part of the overall population of the subspecies, it could be re-categorized as CR (Critically Endangered), even without exhibiting widespread population decline, due to criteria B1a+c(iv) and B2a+c(iv).

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