



A NEW VARIETY FROM LEBANON, *Ophrys apifera* var. *libanotica* K. ADDAM AND M. BOU-HAMDAN (ORCHIDACEAE)

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Abstract- Khodr Addam & Mounir Bou-Hamdan (2014): New variety of *Ophrys apifera* (Orchidaceae) from Lebanon. The authors note the recent discovery of new variety of the Bee Orchid, *Ophrys apifera* Hudson var. *libanotica*. K. Addam & M. Bou-Hamdan. The new variety growing near the east of the Mediterranean Sea was observed for the first time in Lebanon. This new variety resembles, *Ophrys apifera* var. *belgarum* Turner Ettl. *Ophrys apifera* subsp. *Trollii*. Hegetschw. K.Richt. and *phrys apifera* f. *friburgensis* (Freyhold) P. Delforge. Naturalistes Belges, but it differs mainly in a lot of morphologic details, and it is described with illustrations.

Keywords- Bee orchid, *Ophrys apifera* var. *libanotica* K.Addam & M.Bou-Hamdan. Orchidaceae, Lebanon, Middle East, taxonomy

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Introduction

An orchid is any plant that belongs to the Orchidaceae family. It is one of the most species-rich families of flowering plants, and it is approximately 25000 species divided among more than 850 genera. It occupies the second place in species richness after the family of composites (Asteraceae) [1].

The word "Ophrys" is a Greek plant name from eye brow, and "apifera" means "bearing bees" [2].

The Bee Orchid, *Ophrys apifera* Huds. (Orchidaceae Lindl.), belongs to the group *apifera* [3] which is a Mediterranean species. It is spread in Asia (Lebanon, Syria, Turkey and Palestine), also widely in Europe, (Spain, France Italy Greece and Cyprus) northward to northern Ireland, eastward to Kavkaz Mt., and southward to North Africa (Algeria Tunisia Egypt Morocco) [4-6].

Ophrys species are distributed from Central to South Europe, North Africa, Asia Minor, up to the Caucasus Mountains, but mostly in the Mediterranean region. Geological upbringing, favorable climate, and topographical diversity of Lebanon contribute greatly to the richness of its flora [7].

The genus, *Ophrys*, of the orchid family, is well known for its special complex floral morphology, the insect-like labellum, in particular, and remarkable pseudocopulatory reproductive strategy [8-13].

It is really an interesting species, because its normal form is quite typical and very constant [4].

It is also notorious for its controversial taxonomy and problematic species delimitation [8,14-16].

In addition, this genus is determined to have evolved primarily through pollinator mimicry. Pollination happens by sexual deception in a process termed pseudocopulation; the flower (the mimic) imitates a female of one or more pollinator species (the model) in order to attract males of the same species (the operator) [8].

Biology and Deviating Forms

It is almost, if not entirely, an autogam [17-24]. (Insect visitors removing excess pollen from already-fertilized flowers occur due to the occasional hybrids with other *Ophrys* species [25-27]. Consequently, any variant tends to be perpetuated since there is no means apart from genetic drift by which mutated genes can be eliminated; that's why different forms can be found varying radically (sometimes) from the typical *O. apifera* Huds [28]. The perpetual self-pollination is the main cause of these deviating forms at different taxonomic levels as they often show ancestral features like sepal-like petals which enlarge the description of *O. apifera* Huds., but it appeared to be mere forms of the bee orchid [4,29,30].

Taxonomic Rank for the Deviating Forms

"In more recent times, there were continuous discussions if these taxa should be considered to be forms, varieties, subspecies or even species. The International Plant Names Index (IPNI updated in 2012) gives the rank subspecies only for the epithet *trollii* (*Ophrys apifera* Huds. subsp. *trollii* (Hegetschw) O.Bolòs), whereas all other known variants are attributed to the ranks of forma (f.) (*Ophrys apifera* Huds. f. *bicolor* (O.Nägeli) P.D.Sell) or variety (var.) (*Ophrys apifera* Huds. var. *saraepontana* (Ruppert) H.Baumgartner bis &

Kreutz). Hassler & Rheinheimer [30], in their updated on line database, (Illustrated World Compendium of Orchids - List of Taxa) treat all variants and forms as varieties (var.) [4].

Various botanists who had worked on the flora Lebanon (localized on the East Mediterranean hosts) had recorded more than 3000 species of plants. Haber & Haber [31] had identified thirty two of them belonging to *Ophrys* genus out of eighty six species and subspecies of the Orchidaceae family all over the country [32].

Both of Dr. Paul Mouterde (1892-1972), the author of "Nouvelle flore du Liban et de la Syrie," and Prof. George Edward Post (1838-1909), the author of "Flora of Syria, Palestine and Sinai," mentioned the presence of *Ophrys apifera* only.

In 2013 & 2014 Two New World Records of Orchids were Added to the Lebanese Flora by Dr Khodr Addam & Mounir Bou-Hamdan

Ophrys omegaifera subsp. *gharifensis* K. Addam & M. Bou-Hamdan and *Neotinea tridentate* var. *libanotica* K. Addam & M. Bou-Hamdan [7,32].

Ricardus M & Myrna Haber, authors of "Orchids of Lebanon" Natural Heritage from Mediterranean Spaces and Species (2009), mentioned 86 types of orchid most of which were not known to exist in Lebanon before [31]. Although continuous field observations from the bottom of the valleys to the tops of the mountains were done over thirty five years [31], they did not discover any variety of *Ophrys apifera*. I think, most probably, the main cause was that very few researchers or even none (in Lebanon) have focused on this variety specifically. Moreover, there were lack of information and findings about the new classification (that was submitted and accepted internationally now) of this rich genus (*O. apifera*) in varieties at that time.

However, great varieties of new species and subspecies of Orchidaceae family are continually being discovered by the authors, one of which is described here.

Morphologic description of *Ophrys apifera* Huds.

The plant is 10-45cm, sometimes to 65cm. The Stem is pale green with two scale leaves at the base. The Basal leaves are up to six, pale green and are clearly veined, keeled and strap-shaped but become narrower, two bract-like non-sheathing leaves towards the flower spike. The Spike is loose, with two to seven flowers, sometimes more (12). The Bract is pale green, lanceolate, pointed at the tip and much longer than the ovary. The ovary is green, body ribbed but not twisted and slightly curved. The Flower: the sepals are oval, concaved and often hooded with a pale rose to a deep pink, and variably obvious green veins. Rarely, the sepals are could be white. The lateral sepals are held horizontally and swept backwards; the upper sepal is held upright but very frequently bends backwards. The Petals are short and are strap-shaped with their margins rolled back to make them appear even narrower; the color varies between greenish, pink to pinkish-brown with fine white hairs. The lip is tongue-shaped with the sides and front strongly molded downwards and two relatively small conical sides lobes at the base that are conspicuously hairy on the outer side. The tip of the lip has two lobes with a pointed nib in the shallow notch between them, appendage is large up to 3 mm long lanceolate or trapiziform and always pointed forwards.

At the base of the lip, there is an elongated, semi-circular, hairless, dull orange area that is bordered by narrow maroon-brown and pale

yellow bands. The speculum radiates from these and is a broader band of dull purple that is, in turn, bounded with a pale yellow band. The markings form a U or H-shape below the basal area, sometimes irregular and asymmetrical. The side-lobes are, also, bounded by dull purple; at the base of the column, the circular stigmatic cavity is yellowish with a horizontal band of orange-brown [33] [Fig-1].

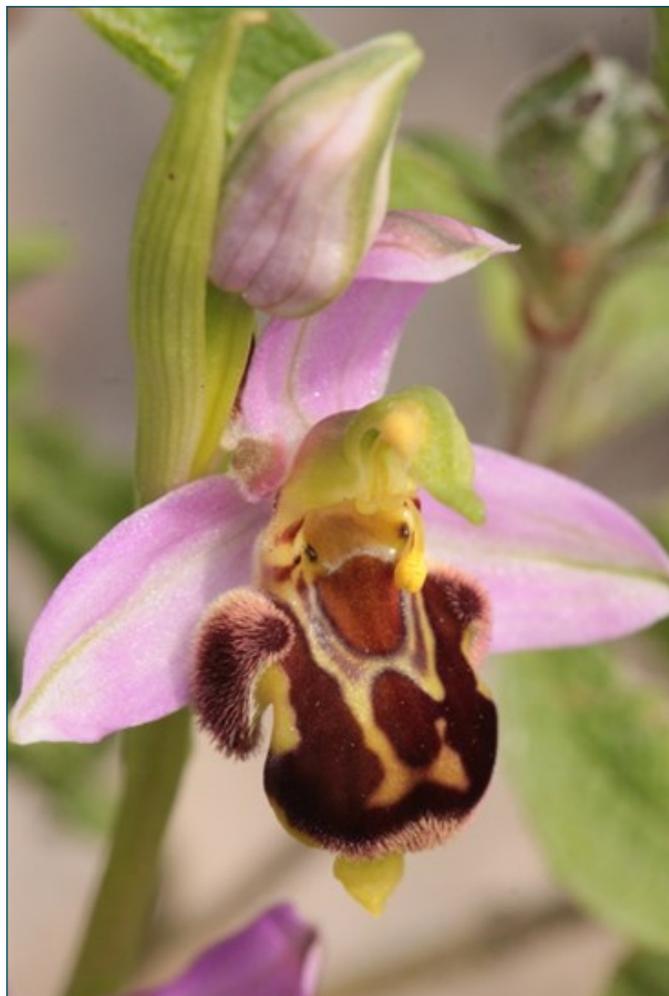


Fig. 1- *Ophrys apifera* Huds. (Photo: Addam K.)

Morphologic description of *Ophrys apifera* var. *libanotica*. K. Addam. & M. Bou-Hamdan

Robust, 20-35 cm tall, 4 to 7 basal glucose green foliage leaves (grouped in a rosette or spaced out on the stem) lanceolate 7- 10 cm long and 2- 2.8 cm wide, and 2 to 4 leaves sheathing the stem higher up and always reaches the first flower, lower Bracts 23-30mm x 7-11mm greyish-green, longer than flowers, 3-12 large flowers in a (relatively lax spike), lateral sepals 16-18.5 mm x 7-10 mm broadly oval-lanceolate, keeled, hooded, pure white, white-rose to dark purple with a marked green central vein, spreading, dorsal sepal 15-20mm x 7-10 mm erect and then strongly turned backwards; the petals directed obliquely forwards, usually very small, 1.5-3.5mm x c. 1mm, bright yellowish rose green to dark pinkish, very villous, triangular, sometimes auriculate, margins strongly rolled up, thus, appearing linear; the lip 13.5-20 mm x 9.5-12.5 mm (when spread), long straight with strongly re-curved margin deeply three-lobed close to the base with velvety, reddish-brown ground color with extensive clear-cut bright yellow band across the middle and small-

er subsidiary bands extending from the sides of the middle band up to the shoulders, an angle of 145 degree exist at the middle of the lip [Fig-2], the column extended into a sharp pointed apex, long narrow lanceolate appendix 2.5mm 3.5 mm long [Fig-3](G), forwarded with a central tooth pattern extended straight forward, a very hairy small rhomboid shape area exist at the tip of the lip above the appendix. Shoulders are very hairy, the lateral lobes are less well developed and not forward pointing, the Ovarium 22mm - 31mm Stigmatic cavity approximately as wide as long and about to be twice as wide as the anther with dark lateral eye-like knobs at the base, basal field 3mm x 3mm [Fig-4], mirror distinct (rarely obscure), consisting of more or less H shaped or often more complicated figure [Fig-3], [Fig-5], [Fig-6], [Fig-7], [Fig-8], [Fig-9].

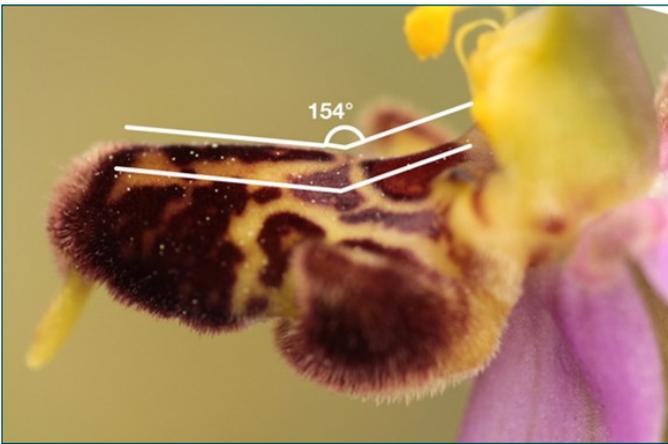


Fig. 2- The angle of 145 degree that exist at the middle of the lip. (Photo: Addam K.)

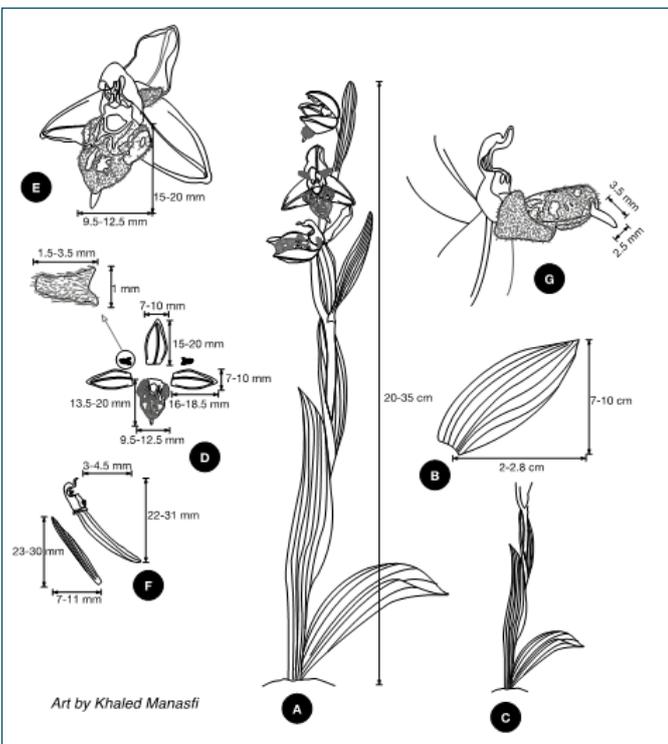


Fig. 3- A: whole plant with inflorescence consists of three flowers; B: Basal leaf description; C: flower leaves form basal rosette at the base and stem leaves; D: floral organs; E: flower viewed from above; F: bract and ovary; G: appendix (from Addam & Bou-Hamdan 1003 (Holotype GU); Drawn By: Khaled Manasfi).

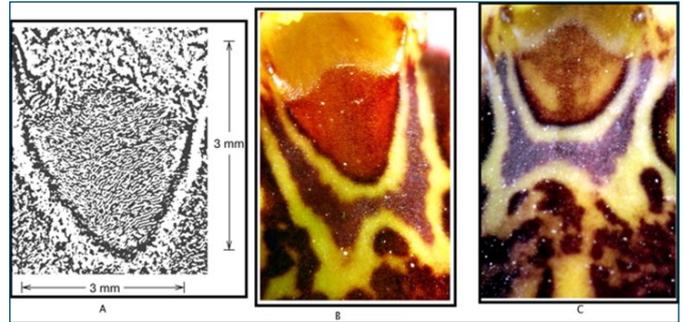


Fig. 4- *Ophrys apifera* var. *libanotica*, basal field.

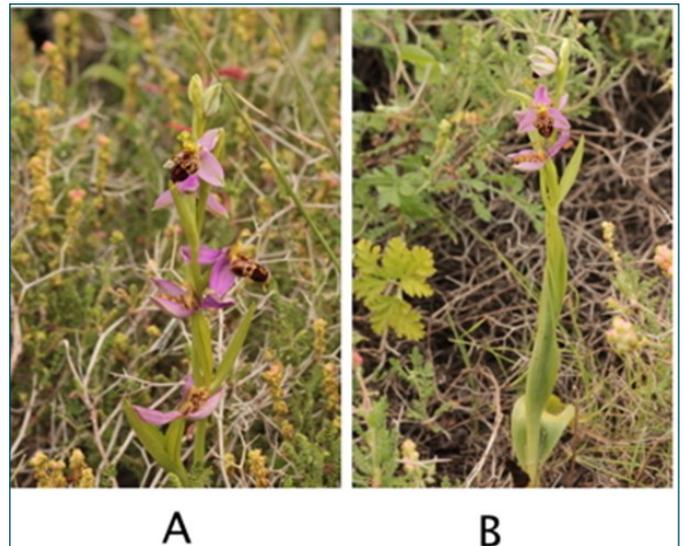


Fig. 5- *Ophrys apifera* var. *libanotica*. A: inflorescence B: whole flower. (Photos: Addam K.)



Fig. 6- *Ophrys apifera* var. *libanotica* flower viewed from above (Photo: Addam K.)

Distribution

South of Lebanon: about 29 flowering plants were found in Kfar Jarra (N 33 32' 402" EO 35 25' 347" alt 305.97 m, N 33 32' 424" EO 35 25' 33" alt 307.74 m, N 33 32' 426" EO 35 25' 018" alt 309.53 m, N 33 32' 419" EO 35 25' 364" alt 310.33 m, located in the Kaza of Jezzine, it is one of the eight mohafazats (governorates) of Lebanon at an Alt from 305 - 311m. Kfar Jarra is 50 km away from Beirut, the capital of Lebanon, 7.7 km of Saida and 22 km from Jezzine [Map-1].

Phenology: Flowering ends of March till the beginning of May depending on the weather.

Etymology: The variety epithet is given in honor of Lebanon.



Map 1- Distribution of *Ophrys apifera* var. *libanotica* in Lebanon

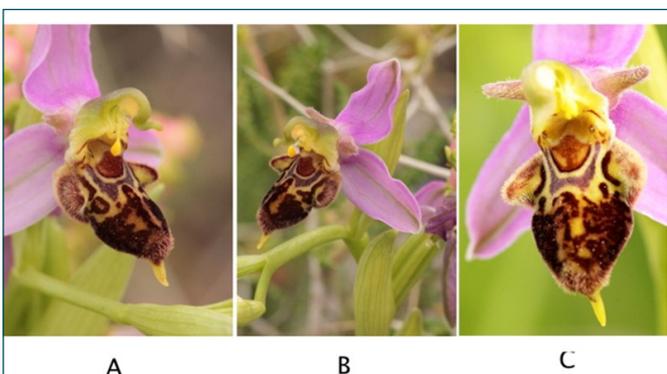


Fig. 7- *Ophrys apifera* var. *libanotica* flower viewed from different sides (Photo: Addam K.)

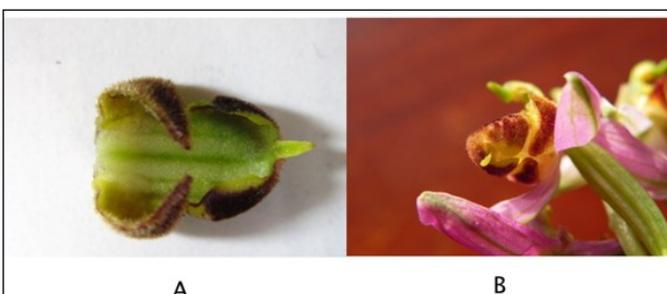


Fig. 8- *Ophrys apifera* var. *libanotica* lip from down. (Photos: Addam K.)

Specimens Examined

The *Ophrys apifera* var. *libanotica* K. Addam & M. Bou-Hamdan was recognized for the first time, at 31-3-2013, in South Lebanon in a small village called Kfar Jarra, located in the Kaza of Jezzine, one of the eight mohafazats (governorates) of Lebanon, 50 km away from Beirut the capital of Lebanon, 7.7 km of Saida and 22 km for Jezzine.

For two years, the place was observed and about 29 flowering plants were found. First, we did not know that this is a new variety of *Ophrys apifera*; we thought after a big search that this was *Ophrys apifera* var. *belgarum* and decided to publish it as var. *belgarum*. We began to search for information about *O. apifera* var. *belgarum*, but it was insufficient, even in the publication of D.M. Turner Ettliger [34], who had published it for the first time, did not write a complete illustrated description about it; moreover, no pic-

tures or drawings at all [35]. We were urged to get academic, taxonomic information about the var. *belgarum*, but the problem was that we did not pick a sample of the flower we found. When we returned after two weeks all the flowers were gone. We did not know that this ophrys is a new variety, and everyone was in a hurry that day. The pictures were the only evidence we got, so we began to compare them to the information that we have about *Ophrys apifera* var. *belgarum* D.M.T. Ettliger [34]. The result was stunning, an unexpected surprise. There were about six differences at least in the morphology of both orchids [Fig-5], [Fig-6], [Fig-7]. Again and again, we searched a lot to find a variety for the *apifera* genus that might have this description, but nothing. The main problem was that we did not have a sample of the flower and a big fire devastated the place in which we found them. We thought that we will never have a sample of the flower, because they will not grow again. After waiting for one year, at 12-4-2014, about nine flowers bloomed at the place of fire, so we got about eight samples [Fig-8], [Fig-9], [Fig-10], [Fig-11]. An illustrated morphologic description was made at once, and the samples were dried; a voucher specimen of the holotype (Addam 1) was deposited in the Post Herbarium at AUB (American University of Beirut) Collected by Dr. Khodr Addam at 12/IV/2014 collection number (Addam 1) [Fig-10].

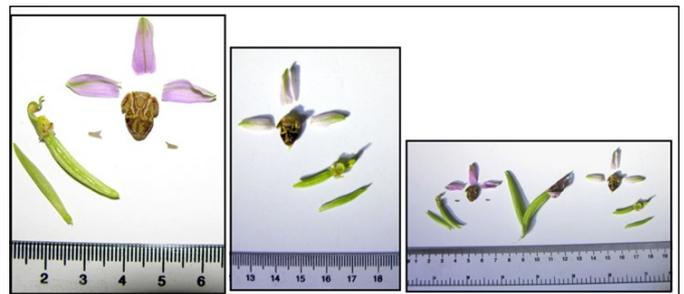


Fig. 9- *Ophrys apifera* var. *libanotica*. flower parts variations (Photo: Addam K.)



Fig. 10- Whole plant length of a dried specimen (Photos: Addam K.)



Fig. 11- Two specimens of the whole plant. (Photos: Addam K.)

The beginning of our search started at 31 of March 2013 until 10 of December 2014 (about two years).

Habitat Characteristics

Ophrys apifera var. *libanotica* K. Addam & M. Bou-Hamdan grows on fresh dry calcareous basic-rich soils, acidic or limestone soils, poor meadows, open rocky place, open woodlands and only in cool full sunny places, but never in the shades of the trees.

Conservation Status and Threat

Orchids in Lebanon are in a big danger although they have a cosmopolitan distribution and great adaptability; orchids are suffering from the severe reduction and, sometimes, total disappearance of their habitats. The role of population, urbanization, industrialization, communications development, and increasing leisure and tourist activities have, within a century, greatly and rapidly increased man's impact on the landscape. The agricultural mechanization increased productivity by using massively huge amounts of fertilizers, and the establishment of productive forestry have caused habitats to become more uniform and reduced diversity.

The culinary use of the orchid's tubers is, in fact, the most critical threat to Mediterranean orchids because of the culinary use of their

tubers. The increase in the human population has increased the demand and the number of harvesters whom, in fruitful years, help to produce tons of salep. Salep is the name of the powder got by grinding the 45 drying tubers of orchids; it is added to cereals, bread, cream desserts and milky drinks to thicken them and add a perfume smell to these mixtures. In Turkey, 1,000 to 4,000 tubers are needed to produce 1 kg of salep, which makes it easy to understand that the pressure put on the orchid populations has become too great. In Lebanon, we are facing the same nightmare, and it is a fact, now, that rare species, such as *Himantoglossum comperianum* *Orhis anatolica*, *Ophrys schulzei*, *Ophrys omegaifera* subsp. *libanotica*. *Neotinea tridentata* var. *libanotica* and many others are on the edge of extinction [33].

Even the big number of species of orchids in the world, the edible (*Vanilla planifolia*) and medical ones, are very little compared to those used for their unique beauty in decoration [36].

Twenty nine specimens of this new variety of *O. apifera* were found to grow in four places in a small village called Kfar Jarra, located in the Kaza of Jezzine, one of the eight governorates of Lebanon, 50 km away from Beirut, the capital of Lebanon, 7.7 km of Saida. The direct observations over 2 year-period indicated no decline in population size. However, we consider that this subspecies should be classified as Critically Endangered (CR B1ac (ii, iv) [35].

Some geographical areas, such as Bekaa Plain, Anti-Lebanon and some North and South Mount Range were not assessed for the presence of this species due to the political dispute in these regions and the war that is taking place at the board with Syria.

Notes and Discussion

The new *Ophrys apifera* var. *libanotica* K. Addam & M. Bou-Hamdan grows on fresh dry base-rich soils and only on calcareous basic, limestone soils and short grass land. Its growth in sunny places (never in the shades and under trees) which makes this new variety different from the *O. apifera* and its varieties that I have seen and read about by its habitat [Table-1].

Each population of *Ophrys apifera* var. *libanotica* K. Addam & M. Bou-Hamdan was normally observed to share its habitat with *Anacamptis morio* subsp. *champagneuxii* (Barnéoud) H.Kretzschmar, Eccarius & H.Dietr. *Anacamptis coriophora* (L.) R.M.Bateman, Pridgeon & M.W.Chase, *Ophrys fusca* subsp. *iricolor* (Desf.) K. Richt. *Ophrys attica* (Boiss. & Orph.) Soó [Table-2].

Table 1- Differences between *Ophrys apifera*, and *Ophrys apifera* var. *libanotica*. wrt Habitat.

<i>Ophrys apifera</i> & its varieties	<i>Ophrys apifera</i> var. <i>libanotica</i>
1 Its growth ranges from the driest chalk grassland and garrigue to wet even swampy conditions.	Only on fresh dry base.
2 It predominantly prefers sunny positions but will tolerate even significant shade.	Only in sunny positions.
3 Appears usually in poor meadows, open rocky place, open woodlands, in the shade of the trees.	Open rocky place, short grassland and never in the shade of the trees.
4 Grows in almost different kinds of soils.	Grows only in calcareous basic-rich and limestone soils.

Morphology

The special characteristics of *O. apifera* var. *libanotica* are: the lip is long straight with strongly re-curved margin deeply three-lobed close to the base, with velvety, reddish-brown ground color with extensive clear-cut bright yellow band across the middle and smaller subsidiary bands extending from the sides of the middle band up to the shoulders, an angle of 145 degree exist at the middle of the lip; the column is extended into a sharp pointed apex; long narrow lanceolate appendix 2.5mm 3.5 mm long, forward with a central tooth pattern extended straight forward, a very hairy small rhomboid shape area exist at the tip of the lip above the appendix; Shoul-

ders are very hairy, lateral lobes are less well developed and not forward pointing and, basal field 3mm x 3mm [Table-3].

Differences and Similarity between *O. apifera* var. *libanotica* and other varieties of *O. apifera* Huds

This new variety, Ophr, *Ophrys apifera* var. *libanotica*. K. Addam & M. Bou-Hamdan, resembles *Ophrys apifera* var. *belgarum* Turner Ettliger, *Ophrys apifera* subsp. *trollii* (Hegetschw.) K.Richt. and *Phrys apifera* f. *friburgensis* (Freyhold) P. Delforge, Naturalistes Belges, but also differs in some of their morphologic details [Table-4].

Table 2- Names of Flora that shares its habitat with *O. apifera* var. *libanotica*.

<i>Anacamptis collina</i> (Banks & Sol. ex Russell) R.M.Bateman, Pridgeon & M.W.Chase	<i>Ophrys lutea</i> subsp. <i>galilaea</i> (H.Fleischm. & Bormm.) Soó
<i>Anacamptis coriophora</i> (L.) R.M.Bateman, Pridgeon & M.W.Chase	<i>Ophrys lutea</i> subsp. <i>numida</i> (Devillers-Tersch. & Devillers) Kreutz
<i>Anacamptis morio</i> subsp. <i>champagneuxii</i> (Barnéoud) Kretzschmar, Eccarius & Dietr.	<i>Ophrys lutea</i> subsp. <i>sicula</i> (Tineo) Soldano
<i>Anacamptis papilionacea</i> (L.) R.M. Bateman, Pridgeon & M.W.Chase	<i>Ophrys omegaifera</i> subsp. <i>israelitica</i> (H.Baumann & Künkele) Morschek & Morschek
<i>Anagallis arvensis</i> var. <i>caerulea</i> (L.) Gouan	<i>Ophrys sphegodes</i> subsp. <i>mammosa</i> (Desf.) Soó ex E.Nelson
<i>Anagallis arvensis</i> var. <i>phoenicea</i> Gouan	<i>Ophrys sphegodes</i> subsp. <i>spruneri</i> (Nyman) E.Nelson
<i>Anemone coronaria</i> var. <i>phoenicea</i> Ardoino	<i>Ophrys transhyrcana</i> Czerniak.
<i>Ceratonia siliqua</i> L.	<i>Ophrys umbilicata</i> Desf. subsp. <i>umbilicata</i>
<i>Cistus creticus</i> L.	<i>Origanum syriacum</i> L.
<i>Dittrichia viscosa</i> (L.) Greuter	<i>Oxalis pes-caprae</i> f. <i>pleniflora</i> (Lowe) Sunding
<i>Moraea sisyrinchium</i> (L.) Ker Gawl.	<i>Ranunculus asiaticus</i> L.
<i>Muscari parviflorum</i> Desf.	<i>Ranunculus asiaticus</i> L.
<i>Neotinea tridentata</i> (Scop.) R.M. Bateman, Pridgeon & M.W.Chase	<i>Salvia fruticosa</i> Mill.
<i>Neotinea tridentata</i> subsp. <i>conica</i> (Willd.) R.M.Bateman, Pridgeon & M.W.Chase	<i>Satureja thymbra</i> L.
<i>Ononis fruticosa</i> L.	<i>Serapias orientalis</i> (Greuter) H. Baumann & Künkele
<i>Ophrys apifera</i> Huds.	<i>Serapias orientalis</i> subsp. <i>levantina</i> (H.Baumann & Künkele) Kreutz
<i>Ophrys apifera</i> var. <i>aurita</i> (Moggr.) Gremli	<i>Serapias vomeracea</i> (Burm.f.) Briq.
<i>Ophrys attica</i> (Boiss. & Orph.) Soó	<i>Thymbra spicata</i> L.
<i>Ophrys fusca</i> subsp. <i>iricolor</i> (Desf.) K.Richt.	<i>Tragopogon porrifolius</i> subsp. <i>longirostris</i> (Sch.Bip.) Greuter
	<i>Vicia sativa</i> L.

Diagnosis

Robust, 20-35 cm tall, 2 to 4 leaves sheathing the stem higher up and always reaches the first flower, lateral sepals 16-18.5 mm x 7-10, dorsal sepal 15-20mm x 7-10 mm erect and then strongly turned backwards; lip 13.5-20 mm x 9.5-12.5 mm (when spread), long straight with strongly re-curved margin, with velvety, reddish-brown ground color with extensive clear-cut bright yellow band across the middle and smaller subsidiary bands extending from the sides of

the middle band up to the shoulders, an angle of 145 degree exist at the middle of the lip, the column extended into a sharp pointed apex, long narrow lanceolate appendix 2.5mm 3.5mm long, forwarded with a central tooth pattern extended straight forward, a very hairy small rhomboid shape area exist at the tip of the lip above the appendix, basal field 3mm x 3mm.

The differences between *Ophrys apifera* var. *libanotica* & *Ophrys apifera* [Table-3]

Table 3- Differences between *Ophrys apifera*, its varieties and *Ophrys apifera* var. *libanotica*. wrt morphology.

Parts	<i>Ophrys apifera</i>	<i>Ophrys apifera</i> var. <i>libanotica</i>	Comments related to <i>Ophrys apifera</i> var. <i>libanotica</i>
1 Stem	10-45cm, sometimes to 65cm.	20-35 cm	It is shorter than <i>O.apifera</i> . 35 cm was the tallest one found. Stem shorter.
2 Sepals	11-17 mm l x 5-9 mm	15-20mm x 7-10 mm	Sepals of <i>O.ap.var. lib</i> are bigger.
3 Petals	2.5 mm x 7 mm	1.5-3.5mm x c. 1mm	Petals of <i>O.ap.var. lib</i> are too small. Smaller than the petals of <i>O.apifera</i>
4 Bracts		23-30mm x 7-11mm	
5a Lip	9 mm x 14 mm	13.5 mm x 20 mm	Lip of <i>O.ap.var. libis</i> is longer than that of <i>O.apifera</i>
5b Lip	The lip is tongue-shaped with the sides and front strongly molded downwards. The tip of the lip has two lobes with a pointed nib in the shallow notch between them, but it appears rounded because the entire tip is curled up underneath. It has a dull purple to brown ground color that is in turn bounded with pale yellow band.	The lip is long straight with strongly re-curved margin deeply three-lobed close to the base, with velvety, reddish-brown ground color with extensive of the middle band up to the shoulders, an angle of 145 degree exist at the middle of the lip, and front strongly molded downwards and two small conical sides lobes at the base that are conspicuously hairy on the outer side. The apex is pointed and sharp.	
6a Appendix	3mm	2.5 mm – 3.5	The appendix of <i>O.ap.var. libanotica</i> is bigger
6b Appendix	The appendix is large up to 3 mm long lanceolate or trapiziform turned downwards with a central tooth.	The appendix is long narrow lanceolate forwarded with a central tooth pattern extended straight forward.	
7 Romboid shape	The small hairy rhomboid shape area does Not exist above the appendix.	A very hairy, small rhomboid shape area exists at the tip of the lip above the appendix.	
8 Basal field	Big basal field 3.5 mm x 3.5 mm	Small basal field 2 mm x 2mm	The basal field of <i>O.ap.var.libanotica</i> is smaller.

Table 4- Morphological differences among *Ophrys apifera* var. *libanotica* and *Ophrys apifera* var. *friburgensis*, *Ophrys apifera* var. *trollii* *O.apifera* var. *friburgensis*

<i>Ophrys apifera</i> var. <i>friburgensis</i>	<i>Ophrys apifera</i> var. <i>libanotica</i>
The Lip is generally reduced and small, middle lobe strongly arched to mostly extended, appendage small directed forwards or downwards, pattern reduced degenerating into irregular yellowish spots. Lateral petals are large (larger than those of <i>O. apifera</i>), linear ovate, shaped and colored like the sepals although they are usually smaller (typically 2/3 as long 3 and 1/2 as wide); sometimes, they are almost as long as the sepals with hairy margins. Bracts are smaller than those of <i>O. apifera</i> var. <i>lib.</i> [12,15]	Petals are usually very small, 1.5-3.5mm x c. 1mm, smaller than the petals of <i>O. apifera</i> and are directed obliquely forwards, bright yellowish rose green to dark pinkish, very villous, triangular, sometimes auriculate, margins strongly rolled up; thus, appearing linear. The lip is large long straight with strongly re-curved margin deeply three-lobed close to the base, with velvety, reddish-brown ground color which becomes extensive at the middle band up to the shoulders, an angle of 145 degree exist at the middle of the lip, and the front strongly molded downwards. The Apex is pointed and sharp with long appendix.
<i>Ophrys. apifera</i> var. <i>trollii</i>	<i>Ophrys. apifera</i> var. <i>libanotica</i>
The Lip is elongated, stretched out, and sharply pointed, near triangular to oblong, middle lobe narrow lanceolate, appendage held straight out or turned up, pattern greatly reduced (to pale spots or patches, barred across with brown and yellow) or absent. The petals are very long (1/2 – 2/3 as long as the sepals), bright yellowish, rose green, auriculate, margins strongly rolled up; thus, appearing linear. The outlook of the whole flower is a thinner longer shape than that of <i>O. apifera</i> var. <i>lib.</i> [11,14,5]	Lip is large straight with strongly recurved margins strongly rolled up thus appearing linear, but not stretched, oblong but does not have a triangular form. Deeply three-lobed close to the base, with velvety, reddish-brown ground color with extensive of the middle band up to the shoulders. Petals are very small, 1.5-3.5mm x c. 1mm, and are directed obliquely forwards, bright yellowish rose green to dark pinkish, triangular, sometimes auriculate, margins strongly rolled up thus appearing linear.
<i>Ophrys apifera</i> var. <i>friburgensis</i>	<i>Ophrys. apifera</i> var. <i>libanotica</i>
In general the flower is small, labellum is more or less ovate, well rounded in shape, upper edges very hairy, absent of the side lobes and the basal field. Side lobes are less well developed and not forward pointing. Apex sharply pointed, usually though not always well reflexed under the lip. Ground color dark chestnut with a clear-cut bright yellow marking extensive band across the middle and smaller subsidiary bands extending from the sides of the middle band up to the shoulders, lip is longer and more pointed at the tip.[4,5]	The lip is long straight with strongly recurved margin deeply three-lobed close to the base, with velvety, reddish-brown ground color with extensive clear-cut bright yellow marking of the middle band up to the shoulders, an angle of 145 degree exist at the middle of the lip, and front strongly moulded downwards and two small conical sides lobes at the base that are conspicuously hairy on the outer side. The apex is pointed and sharp. Small basal field 2 mm x 2mm. very hairy small rhomboid shape area exist at the tip of the lip above the appendix. The appendix is long narrow lanceolate forward with a central tooth pattern extended straight forward.

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