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First survey on Orchids (*Orchidaceae*) of Duhok province in Kurdistan region (N-Iraq)

Keywords

Orchidaceae; Orchids; Flora of N-Iraq, Kurdistan region, Duhok province.

Summary

Vela, E., Youssef, S. & A. Mahmood (2013): First survey on Orchids (*Orchidaceae*) of Duhok province in Kurdistan region (N-Iraq).- J. Eur. Orch. 45 (2-4): 235-254.

In “Flora of Iraq”, 25 taxa of Orchids were described, including 5 for the genus *Ophrys* L., all species limited to the temperate N-Iraq. During botanical surveys in Duhok governorate (west of Kurdistan autonomous region), we have found 10 orchids taxa including 5 *Ophrys*. One of them is considered new for Iraq (*Ophrys cilicica*), nevertheless, a possible historical confusion with *O. reinholdii* subsp. *straussii* is highlighted here. Two others (*Ophrys bornmuelleri* s.l. and *Orchis mascula* subsp. *longicalcarata*) are rediscovered/confirmed in N-Iraq (previously known in central mountains) and considered new for the western mountains of Kurdistan region. Furthermore, the subspecific status of several *Ophrys* and *Orchis* species are debated here. The presence of other taxa is possible but appears still doubtful failing bibliographic sources. The easiness to find new records and to detect misidentification within a small sampling area confirms us that Kurdistan is underexplored and that other discoveries are probable in the future.

Zusammenfassung

Vela, E., Youssef, S. & A. Mahmood (2013): Erste Übersicht über die Orchideen (*Orchidaceae*) der Provinz Duhok in der Region Kurdistan (N-Irak).- J. Eur. Orch. 45 (2-4): 235-254.

In der “Flora of Iraq” werden 25 Orchideentaxa aufgeführt, davon 5 aus der Gattung *Ophrys* L., alle Arten scheinen auf die gemäßigte Klimazone des N-Irak beschränkt zu sein. Während botanischer Exkursionen in der Provinz

Duhok im Westen der autonomen Region Kurdistan konnten wir im April und Mai 2013 zehn Orchideentaxa mit fünf *Ophrys*-Arten nachweisen. *Ophrys cilicica* konnte dabei erstmals für den Irak nachgewiesen werden, könnte früher jedoch, wie unten näher erläutert, mit *O. reinholdii* subsp. *straussii* verwechselt worden sein. Mit *Ophrys bornmuelleri* s.l. und *Orchis mascula* subsp. *longicalcarata*, vormalig bekannt aus den zentralen Gebirgen der Region Kurdistan, konnten zwei weitere Taxa für den N-Irak bestätigt und für die westlichen Gebirge neu gefunden werden. Weiterhin wird der Unterartrang einiger *Ophrys*- und *Orchis*-Taxa diskutiert. Literaturangaben über das Vorkommen weiterer Arten erscheinen unsicher, ihr Vorkommen im Bearbeitungsgebiet zwar durchaus möglich, jedoch bis zum Vorliegen von sicheren Nachweisen zweifelhaft. Da unsere, lediglich ein kleines Gebiet umfassenden Geländearbeiten bereits mehrere neue Nachweise ergaben, erscheint Kurdistan als unterbearbeitet; weitere Neufunde sind durchaus wahrscheinlich.

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1. Introduction

Kurdistan region is a part of the Irano-Anatolian area which is considered as one of the world hotspots for biodiversity (MITTERMEIER et al. 2004). Furthermore, Kurdistan region is narrowly bordering the Mediterranean hotspot in its expanded definition (MITTERMEIER et al. 2004) inducing penetrations of additional biodiversity and source of endemism. In consequence, it is very rich on plant species where there are more than 3000 species according to Flora of Iraq (TOWNSEND & GUEST 1966-1985). However, the geopolitical problems of this region in the last decades prevent the researcher to continue the discovering of its sublime biodiversity which is still partially unnamed.

Our first survey concerns the Orchid family in general and particularly the genus *Ophrys* L., which are both well represented in this area because of its Mediterranean and/or Eurasiatic biogeographical affinities.

2. State of the art

In Flora of Iraq (TOWNSEND & GUEST 1966-1985), 25 taxa of Orchids were described, including 5 for the genus *Ophrys* L. (cf. Table 1). In the World

checklist (GOVAERTS et al. 2013), 27 taxa are cited for Iraq, including 6 for the genus *Ophrys* (cf. Table 2). Unfortunately in this document no bibliographical data is available and cannot justify added or deleted taxa.

Table 1: List of Orchid species in “Flora of Iraq” (Wood 1985).

MAM = Amadiya district (+/- mountains of Duhok governorate); MRO = Rowanduz district (+/- mountains of Erbil governorate); MSU = Sulaimaniya district (+/- mountains of Sulaimania governorate); FNI = Nineveh district (+/- lowlands of Duhok governorate); FAR = Arbil district (+/- lowlands of Erbil governorate); FKI = Kirkuk district (+/- lowlands of Sulaimania governorate); FPF = Persian foothill district (+/- lowlands of Iranian border).

Name used in “Flora of Iraq”	Habitat; Distribution: list of herbarium collections (detailed only when rare or occasional)
<i>Limodorum abortivum</i> (L.) Sw.	Dry oak and pine woods and grassy places in the mountains; alt. 900-2100 m.; fl. & fr. Apr.-Jun.(-July). Occasional in the lower thorn-cushion and the forest zone in Iraq: MAM, Jabal Khair, above Mirsida, c. 40 km. W. by N. of Aqra, Thesiger 577 ! (BM), 598 p.p.! (BM); MRO, Baradost, Id. 901! (BM); MRO, Kan-i Watman, 15 km. west of Rowanduz, Nab. 2241 (SAV); MRO, between Shaikhan and Sakri Sakran, Radac et al. 5429 (PR).
<i>Cephalanthera kurdica</i> Bornm. ex Kraenzl.	Among oak trees and juniper scrub in the mountains, also in pine forest; alt. 800-1350(-2100) m.; fl. & fr. (Mar.-)Apr.-May(-Jun.). Quite common in the lower forest zone of Iraq, occasional in the upper forest and lower thorn-cushion zones: MAM (5 collections...); MRO (3 collections...); MSU (1 collection...); FPF (1 collection...).
<i>Epipactis helleborine</i> (L.) Crantz	In the lower mountains, among oak and pine woods, by a stream; alt. 900-1400 m.; fl. & fr. late Jun.-early Aug. Occasional in the lower forest zone of Iraq: MAM, 'Ain Nuni, Nab. 2243 (SAV); MAM, 15 km. west of Amadiya, Leatherdale 65 ! (BM); MAM, Zawita, Hunting Aerosurveys 201 ! (V.c.R. = Robertson S./1065, Kew No. 20); MAM, Sersang, Haines 1205! (E); MRO, Kuh-i Sefin (Sefin Dagh), Bornm. 183f; MSU, Azmir, F. Karim 39336 !
<i>Epipactis veratrifolia</i> Boiss. et Hoh.	In the mountains by streams under oak shade, in a damp rock cleft by a waterfall; alt. 500-1050(-1900) m.; fl. & fr. (May-)Jun.-Jul.(-Aug.). Quite common in the forest zone of Iraq: MAM (4 collections...); MRO (4 collections...); MSU (1 collection...); FNI (1 collection...).

<i>Ophrys sphegodes</i> Mill. subsp. <i>transhyrcana</i> (Chern.) Soó	Among pine forest in deep soil on a rocky limestone ledge above a gorge, in damp turf among tall asphodel clumps near a stream, also in oak woods; alt. (250-)500-1400 m.; fl. & fr. Mar.-May. Quite common in the middle and lower forest zones of Iraq: MAM (1 collection...); MRO (4 collections...); MSU (3 collections...); FNI (1 collection...); FAR (1 collection...).
<i>Ophrys bornmuelleri</i> M. Schulze ex Bornm.	In a moist grassy cave-mouth under the shade of a bush; alt. 750 m.; fl. & fr. May. Very rare in Iraq – only found once some fifty years ago in the lowest forest zone: MRO, Ser-i Hasan Beg, Cuckney 3836 !.
<i>Ophrys umbilicata</i> Desf. subsp. <i>carmeli</i> (H. Fleischm. et Bornm.) J. J. Wood	In the lower mountains in damp places, under trees, on a rocky slope between vineyards; alt. 500-1200 m.; fl. & fr. Apr.-May. Occasional in the lower forest zone of Iraq: MAM, Sersang, Haines 985 (E); MRO, Shaqlawa, Haines W. 985A!; MSU, 5 km. S.W. of Chamchamal, Rawi & Gillett 7580!; MSU, Shahr-bazar (Chuwarta), Graham 616 !; MSU, Darband-i Khan, Haines s.n. (E).
<i>Ophrys schulzei</i> Bornm. et Fleischm.	In the mountains among oakwoods, in damp grassy places amidst scrub, on limestone; alt. (600-)900-1400 m.; fl. & fr. May. Occasional, locally frequent, in the middle forest zone of Iraq: MAM, c. 7 km. W.S.W. of Amadiya, Salah & Hamad 52646 (BAG); MAM, Sersang, Haines W.977 !; MRO, Kuh-i Sefin, above Shaqlawa, Bornm. 1832, Khayat & Yunis 52748 (BAG); MRO, Shaqlawa, Gillett 8066; MRO, nr. Shaqlawa, Low 235 (BM); MRO, Kan-I Watman, Nab. 2252 (SAV); MSU, between Susa and Surdash, Qaisi & Hamad 49308 !; MSU, 50 km. S.W. of Dukan, Id. 52646 (BAG); MSU, Qopi Qaradagh, Poore 581 1.
<i>Ophrys reinholdii</i> Fleischm. subsp. <i>straussii</i> (Fleischm. et Bornm.) E. Nels.	In the mountains; alt. c. 900 m.; fl. & fr. Apr.-May. Very rare in Iraq – only found once in the lower forest zone: MRO, Shaqlawa, Hadac 1373 (PR).
<i>Anacamptis</i> <i>pyramidalis</i> (L.) L. C. Rich.,	Damp places in a shady oakwood; alt. c. 500 m. (?); fl. & fr. May. Very rare in Iraq – only found once in the lower forest zone: MAM/MRO, Bekme, Gillett 8245 !.
<i>Himantoglossum</i> <i>hircinum</i> (L.) W. D. J. Koch subsp. <i>affine</i> (Boiss.) Sunderm. var. <i>affine</i> (Boiss.) J. J. Wood	In the mountains among oak forest, grassy places among scrub, in a shady place nr. a spring; alt. 900-1500 m.; fl. & fr. May-Jun.(-Jul.). Occasional in the central sector of the middle forest zone of Iraq: MAM, Bakirma (Bakurman), Rawi 8527! (BAG); MRO, Kuh-i Sefin, nr. Shaqlawa, Bornm. 1830; MRO, Kan-i Watman, Nab. 2271 (SAV), Khayat & Yunis 52751 ! (BAG); MRO, Handren, Bornm. 1829; MSU, Pira Magrun, Khayat 52753 ! (BAG).

<i>Himantoglossum hircinum</i> (L.) W. D. J. Koch subsp. <i>affine</i> (Boiss.) Sunderm. var. <i>pseudocaprinum</i> J. J. Wood	Shady places under trees on organic soil; alt. 800 m.; fl. Apr. Very rare in the central sector of the middle forest zone of Iraq: MRO, Kan-i Watman, N.E. of Chinaran, Khayat & Yunis 52744! (BAG); MRO, Kan-i Watman, Khayat & Yunis 52747! (BAG).
<i>Comperia comperiana</i> (Stev.) Asch. et Graebn.	On the mountains, in grassy clearings among oak woods and scrub; all. 1200-1300 m.; fl. & fr. May-Jun. Rare in Iraq – only found in two places in the middle forest zone: MRO, Handren, Bornm. 1828!; MSU, above Penjwin, Hadac 4908 ! (PR).
<i>Orchis anatolica</i> Boiss.	Under moderate shade in a pine forest, amid oak woods and juniper scrub, in deep soil on rocky limestone ledges above a gorge; alt. 700-1400 m.; fl. & fr. Apr.-May. Common in the N.W. sector of the middle and lower forest zones of Iraq: MAM (7 collections...); MRO (4 collections...); MSU (2 collections...).
<i>Orchis mascula</i> L. subsp. <i>pinetorum</i> (Boiss. et Ky.) E. G. Camus	High in the mountains, in moist places in oak forest, damp woods of maple, hawthorns etc.; alt. 1300-1800 m.; fl. & fr. May. Occasional in the central sector of the upper forest zone of Iraq: MRO, Kurek Dag, nr. Rowanduz, Nab. 2267 (SAV); MRO, Handren, Nab. 2268 (SAV); MRO, Gali Warta, c. 30 km. N.W. by N. of Rania-at the southern end of the Qandil range, Rawi, Nuri & Kass 28745 1.
<i>Orchis palustris</i> Jacq.	Damp places on lower mountain slopes and open grassy hills, by a stream in marshes dominated by <i>Bolboschoenus</i> (<i>Scirpus</i>) <i>maritimus</i> ; alt. (?250-)400-1050 m.; fl. & fr. (Apr.-)May-Jun. Common in the lower forest zone of Iraq, rare in the steppe region: MAM (2 collections...); MRO (4 collections...); MSU (8 collections...); FKI (1 collection...).
<i>Orchis collina</i> Banks et Sol.	Habitat : (no data) Rare in Iraq – only found three times in the lower forest and moist steppe zones respectively: MAM, Amadiya, Botany staff43418 !; MSU, nr. Chemchamal, Rogers 0364 !; FUJ/FNI, Mosul, Loftus 101 (cited in Fl. Iran.).
<i>Orchis coriophora</i> L. subsp. <i>fragrans</i> (Poll.) E. G. Camus	Damp meadows and grassy places on open hillsides, among pine trees, moist depressions in pasture on calcareous clay; alt. 450-1000(-1700) m.; fl. & fr. May-Jun. Common in the lower forest zone of Iraq: MAM (6 collections...); MAM/MRO (1 collection...); MRO (3 collections...); MSU (7 collections...); FNI (1 collection...).
<i>Orchis tridentata</i> Scop. var. <i>tridentata</i>	Rocky mountain slopes among pine trees and shrubs, shady meadows and grassy banks, under oak scrub on calcareous soil; alt. c. 800-1200 m.; fl. & fr. Apr.-May.

	Occasional within a relatively small area in the N.W. sector (Amadiya district) of the middle forest zone of Iraq: MAM, Sharifa, nr. Amadiya, O. Polunin 5111 !; MAM, Sersang, Haines W. 1467 !; MAM, Zawita gorge, Guest 2114 !, Emberger, Guest, Long, Schwan & Yusul(Serkahia) 153581.
<i>Orchis tridentata</i> Scop. var. <i>commutata</i> (Tod.) Rchb.f.	Note: Renz (1978) states that specimens having somewhat loose inflorescences and sepals with elongated tips, closely resembling var. <i>commutata</i> (Tod.) Rchb. f. have also been found in Iraq – and he cites a gathering in support of this view, namely: MAM, nr. Zawita, in pine forest, Erdtman & Goedemans in Rech. j 15711 (W).
<i>Orchis simia</i> Lam.	In the lower mountains in deep soil pockets on high rocky limestone ledges above a gorge, under light oak scrub on limestone slopes; alt. 850-1050 m.; fl. & fr. Apr.-May. Occasional within a relatively small area in the Amadiya district of the lower forest zone of Iraq: MAM, Dohuk, Mrs. Bradburne 4007!; MAM, Zawita, Ludlow-Hewitt 1554!, Guest 2180!; MAM, Sersang, Haines W. 978 !; xxx (?MAM), "Kurdish hills", Mrs. A. Low 183 (BM).
<i>Orchis punctulata</i> Stev. ex Lindl.	In marshy places by a small river in a mountain valley; alt. 600 m.; fl. & fr. Mar.-Apr. Very rare in Iraq – only found once (a single plant) about 50 years ago in the south-east sector of the lower forest zone: MSU, Ab-i or Au-i Tanjaro (R. Tangero), nr. Sulaimaniya, Ludlow-Hewitt 1192 !.
<i>Dactylorhiza iberica</i> (M. Bieb. ex Willd.) Sob	Rocky clay soil under trees; alt. 1700 m.; fl. & fr. (May-)Jun.-Jul.(-Aug.). Very rare-only found once in the central sector of the alpine region and thorn-cushion zones of Iraq: MRO, Haji Umran, Qaisi et al. 49765A ! (BAG).
<i>Dactylorhiza umbrosa</i> (Kar. et Kir.) Nevski var. <i>umbrosa</i>	Marshy places nr. streams and springs, damp patches under trees; alt. (1000)1600-2200 m.; fl. and fr. May-Jun.(-Jul.). Quite common in the N.W. and central sectors of the upper forest and thorn-cushion zones of Iraq: MAM (3 collections...); MRO (5 collections...); MSU (1 collection...).
<i>Dactylorhiza umbrosa</i> (Kar. et Kir.) Nevski var. <i>longibracteata</i> Renz	Near mountain summits on rocky limestone; alt. 2000-3000 m.; fl. & fr. Jun.-Jul.(-Aug). Occasional in the central sector of the alpine region and thorn-cushion zones of Iraq: MRO, "on the mountain north of the village of Rost", i.e. Hisar-i Rost, Thesiger 961 (BM); MRO, nr. the village of Sakri Sakran, Hadac et al. 5428 (PR); MRO, Hisar-i Sakran, Id. 5671 (PR).

Table 2: List of Orchid species registered for Iraq by the World Checklist of Monocotyledons (GOVAERTS et al. 2013). After symbol +, species not found in “Flora of Iraq” (WOOD 1985). After symbol -, one species previously listed for Iraq by WOOD (1985) but not by GOVAERTS et al. (2013).

Complete accepted name
<i>Anacamptis collina</i> (Banks & Sol. ex Russell) R.M.Bateman, Pridgeon & M.W.Chase, Lindleyana 12: 120 (1997).
<i>Anacamptis coriophora</i> (L.) R.M.Bateman, Pridgeon & M.W.Chase, Lindleyana 12: 120 (1997).
<i>Anacamptis palustris</i> (Jacq.) R.M.Bateman, Pridgeon & M.W.Chase, Lindleyana 12: 120 (1997) subsp. <i>elegans</i> (Heuff.) R.M.Bateman, Pridgeon & M.W.Chase, Lindleyana 12: 120 (1997).
<i>Anacamptis pyramidalis</i> (L.) Rich., De Orchid. Eur.: 33 (1817).
<i>Cephalanthera kurdica</i> Bornm. ex Kraenzl., Bull. Herb. Boissier 3: 143 (1895).
<i>Dactylorhiza umbrosa</i> (Kar. & Kir.) Nevski, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 4: 332 (1937).
<i>Epipactis helleborine</i> (L.) Crantz, Stirp. Austr. Fasc., ed. 2, 2: 467 (1769) subsp. <i>helleborine</i> .
<i>Epipactis veratrifolia</i> Boiss. & Hohen. in P.E.Boissier, Diagn. Pl. Orient. 13: 11 (1854).
<i>Himantoglossum caprinum</i> (M.Bieb.) Spreng., Syst. Veg. 3: 694 (1826).
<i>Himantoglossum comperianum</i> (Steven) P.Delforge, Naturalistes Belges 80: 401 (1999).
<i>Himantoglossum hircinum</i> (L.) Spreng., Syst. Veg. 3: 694 (1826) var. <i>pseudocaprinum</i> J.J.Wood, Kew Bull. 38: 75 (1983)
<i>Limodorum abortivum</i> (L.) Sw., Nova Acta Regiae Soc. Sci. Upsal. 6: 80 (1799) var. <i>abortivum</i> .
<i>Neotinea tridentata</i> (Scop.) R.M.Bateman, Pridgeon & M.W.Chase, Lindleyana 12: 122 (1997) subsp. <i>tridentata</i> .
<i>Ophrys fuciflora</i> (F.W.Schmidt) Moench, Suppl. Meth.: 311 (1802) subsp. <i>bornmuelleri</i> (M.Schulze) B.Willing & E.Willing, Orchidee (Hamburg) 26: 78 (1975).
<i>Ophrys reinholdii</i> Spruner ex Fleischm., Oesterr. Bot. Z. 57: 5 (1908) subsp. <i>straussii</i> (H.Fleischm.) E.Nelson, Gestaltw. Artb. Orchid. Eur. Mittelmeerl.: 149 (1962).
<i>Ophrys schulzei</i> Bornm. & Fleischm., Mitth. Thüring. Bot. Vereins, n.f., 28: 60 (1911).
<i>Ophrys sphegodes</i> Mill., Gard. Dict. ed. 8: n.º 8 (1768) subsp. <i>mammosa</i> (Desf.) Soó ex E.Nelson, Gestaltw. Artb. Orchid. Eur. Mittelmeerl.: 184 (1962).
<i>Ophrys umbilicata</i> Desf., Ann. Mus. Hist. Nat. 10: 227 (1807) subsp. <i>umbilicata</i> .
<i>Orchis anatolica</i> Boiss., Diagn. Pl. Orient. 5: 56 (1844).
<i>Orchis mascula</i> (L.) L., Fl. Suec., ed. 2: 310 (1755) subsp. <i>mascula</i> .
<i>Orchis punctulata</i> Steven ex Lindl., Gen. Sp. Orchid. Pl.: 273 (1835).
<i>Orchis simia</i> Lam., Fl. Franç. 3: 507 (1779) subsp. <i>simia</i> .
+ <i>Anacamptis laxiflora</i> (Lam.) R.M.Bateman, Pridgeon & M.W.Chase, Lindleyana 12: 120 (1997).
+ <i>Anacamptis morio</i> (L.) R.M.Bateman, Pridgeon & M.W.Chase, Lindleyana 12: 120 (1997) subsp. <i>caucasica</i> (K.Koch) H.Kretzschmar, Eccarius & H.Dietr., Orchid Gen. Anacamptis Orchis

Neotinea, ed. 2: 125 (2007).
+ <i>Ophrys apifera</i> Huds., Fl. Angl.: 340 (1762).
+ <i>Platanthera chlorantha</i> (Custer) Rchb. in J.C.Mössl. & H.G.L.Reichenbach, Handb. Gewächsk. ed. 2, 2: 1565 (1829).
+ <i>Spiranthes sinensis</i> (Pers.) Ames, Orchidaceae 2: 53 (1908).
– <i>Dactylorhiza iberica</i> (M.Bieb. ex Willd.) Soó, Nom. Nov. Gen. Dactylorhiza: 3 (1962).

In the most complete European and Middle-East field guide for orchids (BAUMANN et al. 2006), only the regional endemism are explicitly cited for N-Iraq and/or S-Kurdistan, namely 13 taxa (cf. Table 3). But we should not forget that in this work widely distributed species are not explicitly cited for each country.

Table 3. Partial list of Orchid species explicitly cited for (northern) Iraq and/or (southern) Kurdistan by BAUMANN et al. (2006).

Scientific names used in the guide
<i>Cephalanthera kurdica</i> Bornm.
<i>Comperia comperiana</i> (Steven) Asch. & Graebn.
<i>Dactylorhiza iberica</i> (M. Bieb. Ex Willd.) Soó
<i>Dactylorhiza umbrosa</i> (Karel. & Kir.) Nevski
<i>Himantoglossum affine</i> (Boiss.) Schltr. subsp. <i>affine</i>
<i>Ophrys bornmuelleri</i> M. Schulze subsp. <i>bornmuelleri</i>
<i>Ophrys reinholdii</i> H. Fleischm. subsp. <i>straussii</i> (H. Fleischm. & Bornm.) E. Nelson
<i>Ophrys schulzei</i> Bornm. & H. Fleischm.
<i>Ophrys umbilicata</i> Desf. subsp. <i>khuzestanica</i> Renz & Taubenheim
<i>Orchis mascula</i> (L.) L. subsp. <i>longicalcarata</i> Akhalkatsi, H. Baumann, R. Lorenz, Mosulishvii & Ru. Peter
<i>Orchis palustris</i> Jacq. subsp. <i>pseudolaxiflora</i> (Czerniak.) H. Baumann & R. Lorenz
<i>Orchis tridentata</i> Scop.
<i>Platanthera montana</i> (F. W. Schmidt) Rchb.

3. Study site

The survey was made in connection with another botanical surveys during spring 2013. At this step, we limited the field survey to the Duhok governorate, the most western of the three ones in the Kurdistan autonomous region, northern Iraq. Within the governorate, the main districts explored are those of Duhok, Amadiya and Akré.

Orchids identification follows WOOD (1985) and were systematically verified following KREUTZ (1998), KREUTZ & ÇOLAK (2009) and BAUMANN et al. (2006), especially for complex species/subspecies aggregates. About the genus *Orchis* sensu lato, we have exploited the excellent monograph of KRETZSCHMAR et al. (2007).

4. Results

Our 2013 survey in Duhok province led us to find 10 Orchids taxa including 5 *Ophrys*.

List of 6 localities where orchids were found, coordinates as WGS84 (Fig. 1, 2):

- Chamanke, Gara mountain, Duhok Province: 36°57'42" N, 43°25'04" E, altitude 1100 m ;
- Chamanke 'bis', Gara mountain, Duhok Province: 36°57'12" N, 43°25'24" E, altitude 1080 m.
- Sulav Valley, near Amadiya, Duhok Province: 37°06'56" N, 43°28'26" E, altitude 1420 m.
- Bakrman, Akré, Duhok Province: 36°49'38" N, 43°40'57" E, altitude 910 m;
- Berivka, near Atrush, Duhok Province: 36°49'11" N, 43°13'35" E, altitude 1175m.
- Bedehê, near Ain Nuni, Duhok Province: 37°15'09" N, 43°26'37" E, altitude 1720 m.

List of 10 species found by locality and period of observation (infra-specific identification will be debated later, cf. § 5. Discussion:

- Chamanke, 03-04-2013: *Ophrys bornmuelleri* s.l. (syn. *O. fuciflora* s.l.).
- Chamanke 'bis', 03-04-2013: *Ophrys mammosa* s.l. (syn. *O. sphegodes* s.l.), *Orchis anatolica*.
- Sulav Valley, 11-04-2013: *Ophrys mammosa* s.l. (syn. *O. sphegodes* s.l.).

- Bakrman, 19-04-2013: *Orchis tridentata* s.l., *Ophrys umbilicata* s.l., *Ophrys cilicica*, *Ophrys schulzei*, *Orchis anatolica*, *Ophrys bornmuelleri* s.l., *Orchis collina*.
- Berivka, 01-05-2013: *Cephalanthera kurdica*.
- Bedehê, 09-05-2013: *Orchis mascula* s.l.

5. Discussion

About species we have found, 2 are known to be common in the north of Iraq (*Ophrys mammosa* s.l., *Orchis anatolica*), 1 is given as quite common (*Cephalanthera kurdica*), 4 as occasional (*Ophrys schulzei*, *Ophrys umbilicata* s.l., *Orchis tridentata* s.l., *Orchis mascula* s.l.), 1 as rare (*Orchis collina*), 1 as very rare and only found once (*Ophrys bornmuelleri* s.l.) and another one officially never found (*Ophrys cilicica*) following WOOD (1985). One of them, *Orchis mascula*, was only reported in the central district MRO (mountains of Erbil governorate) and is now known in the MAM district (mountains of Duhok governorate). One another, *Ophrys bornmuelleri*, was only found once in the MRO district (mountains of Erbil governorate) more than half a century ago, and we have found it twice in the MAM district (mountains of Duhok governorate). Finally, *Ophrys cilicica* is officially reported for the first time in Iraq.

Infra-specific identification is not easy because of lack of scientific recent publications concerning Iraq. The only useful works are the monograph of KREUTZ (1998), KREUTZ & ÇOLAK (2009) on Turkey and the field guide of BAUMANN et al. (2006).

About *Ophrys bornmuelleri* s.l., WOOD (1985) just given *O. bornmuelleri* without precision of any subspecies while GOVAERTS et al. (2013) name it *O. fuciflora* subsp. *bornmuelleri* following a very lumpers perspective including in synonymy a lot of neighbouring taxa (cf. PERDERSEN & FAURHOLDT, 2007; FAURHOLDT & PEDERSEN, 2009). BAUMANN et al. (2006) are the only one to give a subspecific precision for Iraq, considering it as *O. bornmuelleri* subsp. *bornmuelleri*, excluding also *O. bornmuelleri* subsp. *carduchorum* Renz & Taubenheim (endemic to SE-Turkey) and *O. levantina* Gözl & H.R.Reinhard (limited to Cyprus and S- and SE-Turkey). Indeed, the labellum of our plants, higher than sepals, led us to exclude subsp. *carduchorum*. The coloration of basal field on the labellum and the complexity of its macula exclude *O. levantina*. The point of view of BAUMANN et al. (*ibid.*) is to consider *O. bornmuelleri* subsp. *bornmuelleri* and subsp. *ziyaretiana* (Kreutz & Ru. Peter) Kreutz as synonyms. Thus, their precision of subsp. *bornmuelleri* is

relative and should be understood as *O. bornmuelleri* “sensu lato”. KREUTZ (2006) himself is excluding subsp. *ziyaretiana* and subsp. *carduchorum* for northern Iraq and gives only subsp. *bornmuelleri*, but without any bibliographical and/or field justification. Unfortunately, even following KREUTZ (1998, 2006) itself and also FAURHOLDT & PEDERSEN (2009) about subsp. *bornmuelleri* and subsp. *zirayetiana* (both respectively named as species or variety rank), we are not able to approve the infraspecific identity of our plants and prefer to follow the BAUMANN et al. (*ibid.*) position.

About *Ophrys cilicica*, WOOD (1985) don't mention its presence in Irak. GOVAERTS et al. (2013) cite only “S- & SE-Turkey to N-Syria and Iran” and BAUMANN et al. (2006) confirm as “S-, SE-Turkey, N-Syria, Iran (Kurdistan)”. But WOOD (*ibid.*) give for Iraq the relative neighbour taxa *O. reinholdii* subsp. *straussii* as “only found once” and curiously the drawing is based on Turkish material (sic) ! But is *O. cilicica* really new for Iraqi Kurdistan and *O. reinholdii* subsp. *straussii* not seen for a long time ? In fact, it is possible that *O. cilicica* was confused with *O. reinholdii* subsp. *straussii*. Nevertheless it is not sure, until we have not seen again the Shaqlawa historical locality (WOOD, *ibid.*), around 50 km south-east-ward from our finding at Bakrman. Herbaria specimen are very difficult to recognise and field observation with living photographs are needed to confirm. As a comparison, KREUTZ (1998) in SE-Turkey has found the two taxa without doubt on their respective identity. Then, the two taxa *O. cilicica* and *O. reinholdii* subsp. *straussii* could be present both in N-Iraq, and numerous field explorations are needed.

About *Ophrys mammosa* s.l. (syn. *O. sphegodes* sensu latissimo), WOOD (1985) given for Iraq *O. sphegodes* subsp. *transhyrcana* while GOVAERTS et al. (2013) name it *O. sphegodes* subsp. *mammosa* following an extreme lumpers perspective including the whole complex in synonymy (cf. PEDERSEN & FAURHOLDT, 2007; FAURHOLDT & PEDERSEN, 2009) ! Unfortunately, BAUMANN et al. (2006) don't cite explicitly for Iraq any species or subspecies from this aggregate. They are giving *O. mammosa* subsp. *mammosa* from Albania to Cyprus, but are writing “eastern border unclear”. They are limiting *O. mammosa* subsp. *cyclocheila* (Aver.) B. Baumann, H. Baumann, R. Lorenz & Ru. Peter to NW-Iran and *O. transhyrcana* Czerniak. (treated as separate species) to N- and NE-Iran and Turkmenistan. Finally, another taxon, named *O. mammosa* subsp. *mouterdeana* B. Baumann & H. Baumann, is proposed replacing subsp. *mammosa* in Mediterranean coasts from S-Turkey to Israel. In Turkey, KREUTZ (1998) was considering *O. mammosa* s.s. limited to Mediterranean coasts and *O. transhyrcana*, considered in a broad sense, present in S- and SE-Turkey. But in the second edition (KREUTZ & ÇOLAK, 2009) he recognises the new taxa under the name *O. transhyrcana* subsp.

mouterdeana (B.Baumann & H.Baumann) Kreutz which is replacing *O. transhyrcana* “sensu auct. turc.”. In our plants, the petals are not very long nor undulate, excluding *O. transhyrcana* sensu stricto. The blunt protuberances on the labellum are excluding the true *O. mammosa* s.s. (subsp. *mammosa*). The broad and crushed stigmatic cavity, rather taller and narrower like *O. exaltata* Ten., is excluding *O. hittitica* Kreutz & Ru. Peter. Finally, only *O. mammosa* subsp. *cyclocheila* and subsp. *mouterdeana* are possible candidates for naming to our plants. The first is described from Azerbaijan in 1994, the second from Lebanon in 2005 (THE PLANT NAMES PROJECT, 2013). At this step, regarding to its labellum with blunt protuberances and lateral lobes deeper down, we are led to consider it as subsp. *mouterdeana*, illustrating an extension of the Mediterranean influences into the southern Zagros area.

About *Ophrys umbilicata* s.l., WOOD (1985) given subsp. *carmeli* for Iraq while GOVAERTS et al. (2013) name it *O. umbilicata* subsp. *umbilicata* following again the same lumpers perspective including inter alia subsp. *carmeli* and subsp. *khuzestanica* in synonymy. BAUMANN et al. (2006) are giving for Iraq subsp. *khuzestanica*, a related taxon described from W-Iran and endemic from Kurdistan area (E-Turkey, N-Iraq, W- and S-Iran), and are considering subsp. *carmeli* as synonymous with *O. umbilicata* subsp. *umbilicata*. The same position is proposed by KREUTZ (1998), but treated as species rank: in Turkey, *O. umbilicata* s.s. is limited to Mediterranean coast while *O. khuzestanica* (Renz & Taubenheim) P. Delforge is limited to Kurdish mountains from SE-Anatolia. Indeed, in our plants, the high number of flowers (8 to 13) with small labellum and green sepals exclude subsp. *umbilicata* and confirm their identity as subsp. *khuzestanica*.

About *Orchis mascula* s.l., WOOD (1985) give for Iraq the subsp. *pinetorum* while GOVAERTS et al. (2013) retain for Iraq only subsp. *mascula*, because inclusion of subsp. *pinetorum* as taxonomic synonym. Nevertheless, BAUMANN et al. (2006) argue very well the distinction between both subspecies *pinetorum* and *mascula* with another subspecies named *longicalcarata*. In our specimens, the length of spur, 1.5 or 2 times as high as the labellum, is characteristic of subsp. *longicalcarata*, given by BAUMANN et al. (*ibid.*) as endemic from Caucasus and Kurdistan area (Georgia, Azerbaijan, Iran, Iraq). KREUTZ (1998) nor BAUMANN et al. (*ibid.*) give this taxon for Turkey, nevertheless in the Kreutz's distribution map, localities from SE-Turkey should be represent confusion with subsp. *longicalcarata* a new taxon described only in 2005. Obviously, identification of *Orchis mascula* s.l. from SE-Turkey has been revised as subsp. *longicalcarata* (KREUTZ & ÇOLAK, 2009). Curiously, KRETZSCHMAR et al. (2007) don't recognize subsp. *longicalcarata*, including it in synonymy with subsp. *mascula*. Of course we don't agree, and this

misinterpretation is probably due to a misunderstanding of this taxa.

About *Orchis tridentata* s.l., infraspecific taxonomy is not clear. WOOD (1985) gives for Iraq var. *tridentata* and var. *commutata*. GOVAERTS et al. (2013), following the new genus taxonomy (i.e. *Neotinea tridentata*) give only subsp. *tridentata* for Iraq, because including *N. t.* var. *commutata* (Tod.) Kreutz in synonymy. Kretzschmar et al. (2007) also follow this scheme. But *Orchis commutata* Tod., the basionym, was described from Sicily as species. What we know is that in Sicily it is a tetraploid element, sometimes considered as variety (KRETZSCHMAR et al. *ibid.*) probably endemic, other times considered as species and possibly widespread at least in the central-eastern Mediterranean (DELFORGE 2005). Morphological variability cannot help us to make a choice for our plants and at this step we prefer consider them as *Orchis tridentata* sensu lato.

The widespread *Ophrys apifera* is missing in our survey. Given for Iraq by GOVAERTS et al. (2013) without detailing the bibliographical source of this information, this species was never given before and nor by BAUMANN et al. (2006). Its known distribution in Near-East seem to be limited to the Pontic area until Caucasus and N-Iran at one hand, and to the Mediterranean coast of Turkey until Lebanon and Israel (KREUTZ 1998, BAUMANN et al. *ibid*, ENCYCLOPEDIA OF LIFE 2013). This autogamous species (the only one for the genus), is generally rare but can reproduce itself. Then, is it possible that on the border of its range it could behave as a casual species. Nevertheless its presence in Kurdistan area (N-Iraq, W-Iran, SE-Turkey) should be considered very doubtful without new and verified information.

Four other species are given for Iraq by GOVAERTS et al. (2013) but unless each information is linked to a precise bibliographical justification: *Anacamptis laxiflora* (syn. *Orchis laxiflora* Lam.), *Anacamptis morio* subsp. *caucasica* (syn. *Orchis morio* var. *caucasica* K.Koch), *Platanthera chlorantha* and *Spiranthes sinensis*, the last one appearing very doubtful in this area.

At this moment, at least 12 species (13 taxa including infraspecificity) formally collected in N-Iraq are missing in our preliminary survey: *Limodorum abortivum*, *Epipactis helleborine*, *E. veratrifolia*, *Anacamptis pyramidalis*, *Himantoglossum hircinum* s.l. (2 var.), *Comperia comperiana*, *Orchis palustris*, *O. coriophora* (subsp.?), *O. simia*, *O. punctulata*, *Dactylorhiza iberica*, *D. umbrosa*. There is no doubt we have chance to find them next years in Duhok governorate and/or elsewhere in Kurdistan region.

6. Conclusion

Therefore during the short period of this first survey about searching on Orchids taxa, most of records are new localities (not previously reported), the most remarkable being *Ophrys bornmuelleri* (subsp. *bornmuelleri*), rediscovered after more than half a century without field collection. One of them, *Ophrys cilicica*, is a new confirmed taxa for Kurdistan autonomous region and for Iraq, instead of *O. reihnoldii* subsp. *straussii* possibly misidentified and then to be confirmed. So the results of this study may stimulate scientific researchers and naturalists to do more field survey in Kurdistan region which in turn will update the Flora of Iraq.

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Bibliography

- BAUMANN, H., KÜNKELE, S. & R. LORENZ (2006): Orchideen Europas, mit angrenzenden Gebieten.- Eugen Ulmer, Stuttgart: 333 p.
- DELFORGE, P. (2005): Guide des Orchidées d'Europe, d'Afrique du Nord et du Proche-Orient.- 3e édition. Delachaux & Niestlé, Paris: 640 p.
- ENCYCLOPEDIA OF LIFE (2013): *Ophrys apifera*.- Available online at <http://eol.org/pages/1136554/maps> [viewed at 6th august 2013].
- FAURHOLDT, N. & H.Æ., PEDERSEN (2009): Flueblomster fra Marokko til Mellemøsten, Orkidéslaegten *Ophrys* i Nordafrika og Levanten.- Dansk Orchide Klub og forfatterne: 122 p.
- GOVAERTS, R., BERNET, P., KRATOCHVIL, K., GERLACH, G., CARR, G., ALRICH, P., PRIDGEON, A.M., PFAHL, J., CAMPACCI, M.A., HOLLAND BAPTISTA, D., TIGGES, H., SHAW, J., CRIBB, P., GEORGE, Alex, KREUTZ, K. & J. WOOD (2013): World Checklist of *Orchidaceae*. Facilitated by the Royal Botanic Gardens, Kew.- Published on the Internet; <http://apps.kew.org/wcsp/> [viewed at 6th august 2013].
- KRETZSCHMAR H., ECCARIUS W. & H. DIETRICH (2007): The Orchid Genera *Anacamptis*, *Orchis*, *Neotinea*.- Echinomedia, Bürgel, DE: 544 p.
- KREUTZ, C.A.J. (1998): Die Orchideen der Türkei.- C.A.J. Kreutz, Landgraaf, NL: 766 p.
- KREUTZ, C.A.J. (2006): Bemerkungen zu den Orchideen von Libanon, Syrien, Israel, Zypern und der Türkei. J. Eur. Orch. 38: 105-160.

- KREUTZ, K. & A.H. ÇOLAK (2009): Türkiye Orkideleri (Botanik Özellikleri, Ekolojik İstekleri, Doğal Yayılış Alanları, Yaşam Tehditleri, Koruma Önlemleri).- Rota Yayınları. İstanbul, TR: 850 p.
- MITTERMEIER, R.A., MYERS, N., THOMSEN, J.B., DA FONSECA, G.A.B. & S. OLIVIERI (1998): Biodiversity hotspots and major tropical wilderness areas: approaches to setting conservation priorities.- *Cons. Biol.*, 12: 516-520.
- MITTERMEIER, R.A., ROBLES GIL, P., HOFFMANN, M., PILGRIM, J., BROOKS, T., MITTERMEIER, C.G., LAMOREUX, J. & G.A.B. DA FONSECA (2004): Hotspots revisited: Earth's biologically richest and most endangered ecoregions.- CEMEX, Mexico City, Mexico.
- PEDERSEN, H.Æ. & N. FAURHOLDT (2007): *Ophrys*: the bee orchids of Europe.- Royal Botanic Gardens. Richmond, UK: 297 p.
- THE PLANT NAMES PROJECT (2013): International Plant Names Index (IPNI).- <http://www.ipni.org/> [viewed at 6th august 2013].
- TOWNSEND, C.C. & E. GUEST (1966-1985): *Flora of Iraq*, Volume 1-9.- Ministry of Agriculture, Republic of Iraq, Baghdad.
- WOOD J.J. (1985): *Orchidaceae*. In: TOWNSEND C.C. & E. GUEST *Flora of Iraq*, Volume 8: Monocotyledones.- Bentham-Moxon Trust : 267-310.

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Fig. 1: Map of the study area (Duhok or ‘Dahuk’, Kurdistan region, N-Iraq).



Fig. 2: Localisation of orchid sites in the study area (Duhok or ‘Dahuk’, Kurdistan region, N-Iraq).



Fig. 3-4: *Ophrys bornmuelleri* (s.l.), Gara & Bakrman, 4th & 19th april 2013 (phot. S.Youssef).



Fig. 5: *Ophrys bornmuelleri* (s.l.), Gara, 4th april 2013 (phot. S.Youssef).



Fig. 6: *Ophrys schulzei*, 19th april 2013, Bakrman (phot. S.Youssef).



Fig. 7-8: *Ophrys mammosa* subsp. *mouterdeana*, Gara & Sulav, 4th & 11th april 2013 (phot. S.Youssef).



Fig. 9: *Ophrys mammosa* subsp. *mouterdeana*, Sulav, 11th april 2013 (phot. S.Youssef).

Fig. 10: *Ophrys cilicica*, 19th april 2013, Bakrman (phot. S.Youssef).



Fig. 11: *Ophrys umbilicata* subsp. *khuzestanica*, Bakrman, 19th april 2013 (phot. S. Youssef).



Fig. 12: *Ophrys umbilicata* subsp. *khuzestanica*, Bakrman, 19th april 2013 (phot. S. Youssef).



Fig. 13: *Cephalanthera kurdica*, 1st may 2013, Bedehê (phot. S. Youssef).



Fig. 14: *Orchis collina*, 19th april 2013, Bakrman (phot. S. Youssef).



Fig. 15-16: *Orchis anatolica*, Gara & Bakrman, 3th & 19th april 2013 (phot. S.Youssef).



Fig. 17: *Orchis mascula* subsp. *longicalcarata*, Bedehê, 9th may 2013 (phot. S.Youssef).



Fig. 18: *Orchis tridentata* 19th april 2013, Bakrman (phot. S.Youssef).