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## RESEARCH ARTICLE

***Hyacinthoides kroumiriensis* sp.nov. (Hyacinthaceae): a new species from North West of Tunisia**\*Ridha El Mokni<sup>1,2,3</sup>, Gianniantonio Domina<sup>4</sup>, Houcine Sebei<sup>2</sup> and Mohamed Hédi El Aouni<sup>3</sup>

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**\*Corresponding Author****Ridha El Mokni****Abstract**

*Hyacinthoides kroumiriensis* El Mokni, Domina, Sebei & El Aouni, a new species in Hyacinthaceae from Kroumiria region, North West of Tunisia, is described and illustrated. Morphological characteristics with illustrations, habitat and description of the new species are provided, in addition to a diagnostic comparison with one phenotypically similar species within the same clade.

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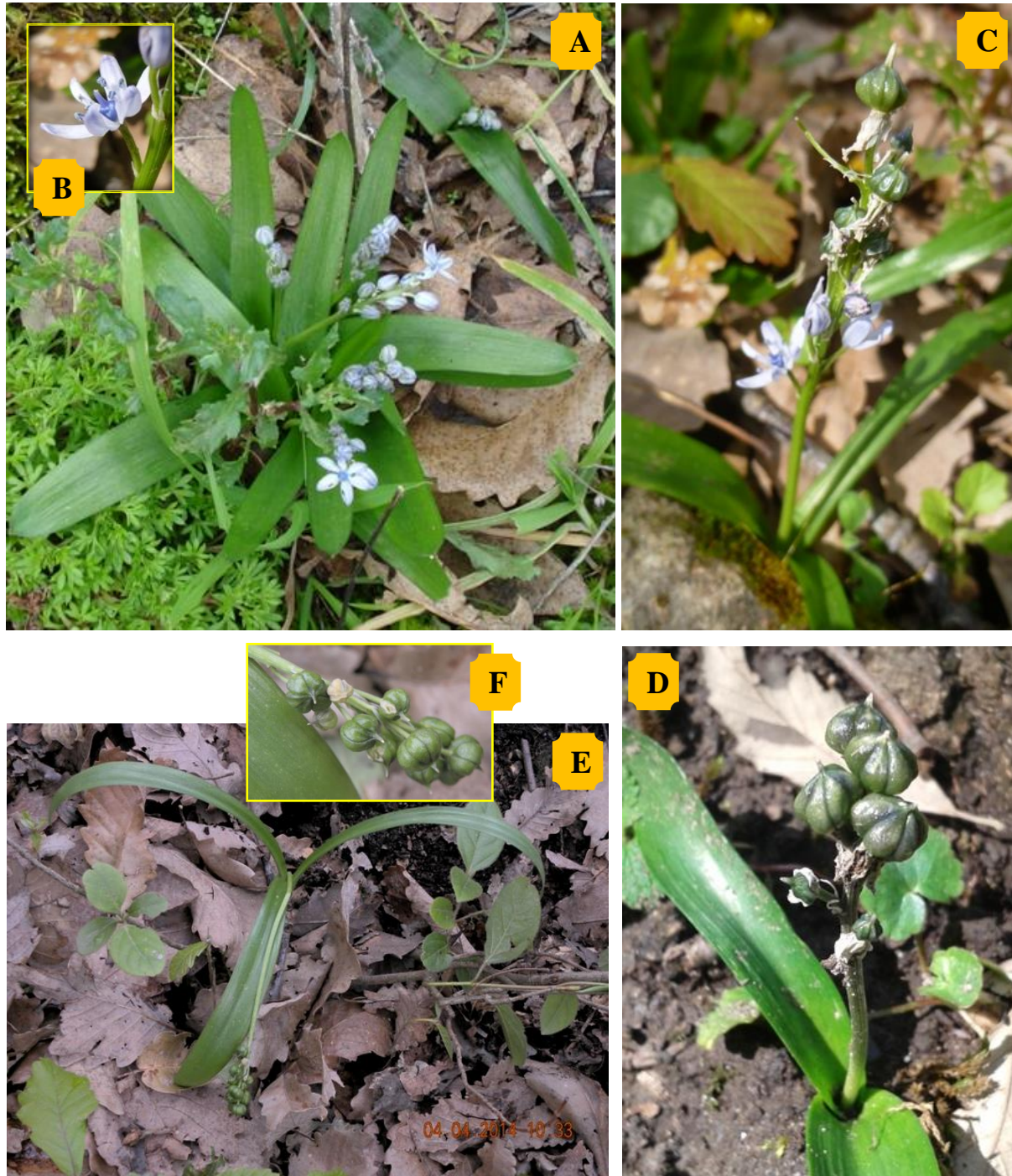
**Introduction**

The genus *Hyacinthoides* Heist. ex Fabr. was recently thoroughly revised with a firmly established phylogeny (Grundmann *et al.*, 2010). It now comprises 11 species, living in the western Mediterranean-Atlantic region and the northern African (Morocco to Tunisia) mountains (cf. Deroin, 2014). In Tunisia, the genus is represented only by 02 (Le Floch *et al.*, 2010; Dobignard & Chatelain, 2010) to 03 species (cf. Grundmann *et al.*, 2010); two endemic Tunisian-Algerian (*Hyacinthoides aristidis* (Coss.) Rothm. and *H. ciliolata* (Pomel) Rumsey) whereas the other (*Hyacinthoides lingulata* (Poir.) Rothm.) is an endemic Tunisian-Algerian-Moroccan (cf. El Oualidi *et al.*, 2012). During botanical studies inside the oak forests of the Kroumiria region in the North West of Tunisia, the authors collected some unfamiliar bulbous specimens similar to an endemic *Hyacinthoides* known in the region.

Description and meticulous measurements compared to those detailed for *Hyacinthoides aristidis* (Coss.) Rothm. (Syn. *Scilla aristidis* Coss. cf. Battandier and Trabut, 1895; Cuénod, 1954; Maire, 1958; Quézel and Santa, 1962) and to recent collections and observations of the *Hyacinthoides* species within the Kroumiria region in its total area (Algeria and Tunisia) has revealed that specimens collected belong to a new species and is described for the first time.

**Diagnosis**

The new species looks more like *Hyacinthoides aristidis* (Coss.) Rothm. (Figure 1.) but differs from this species mainly by its habit; its large number of basal leaves (up to 6 vs. 2-3); long, acute, lanceolate, hairless and smooth, its long and dense inflorescence (up to 20 cm vs. 8) with flowers up to 40 (vs. 20); its glabrous, pyramidal, trilobate, capsule, apiculated by incompletely trilobular atop persistent style and its almost glabrous seeds (table 1). Besides the geographical place, the morphological characters allied the new species to the eastern clade of *Hyacinthoides* defined by Grundmann *et al.*, (2010). The eastern clade includes, in fact, three North African species, *H. aristidis* (Coss.) Rothm., *H. ciliolata* (Pomel) Rumsey, and *H. lingulata* (Poir.) Rothm. occurring from Morocco to Tunisia,



**Figure 1.** *Hyacinthoides aristidis* (Coss.) Rothm. **A.** Plant in its natural habitat, **B.** Blue pale flower with subequal blue stamens, blue anthers and sub-globulous blue ovary, **C.** Short and loose inflorescence on the top of an erecting single flowering spike of three-leaved plant, **D.** Basal leaves in rosette of a two leaved plant; lanceolate, obtuse, hairless and smooth, **E & F.** A three-leaved plant with short inflorescence, glabrous sub-globulous trilobate capsule, and apiculated by incompletely trilobular atop persistent style. (A, B, C & D; Photos of Khellaf Rebbas and Rachid Meddour from Algerian field whereas E & F are from Tunisian field, Ridha El Mokni).

along with *H. italica* (L.) Rothm., endemic to the Maritime Alps of France and Italy. This clade can be enriched by the new species of *Hyacinthoides* (*H. kroumiriensis* El Mokni, Domina, Sebei & El Aouni) described new for science in this present work, with restricted localization (North west of Tunisia).

***Hyacinthoides kroumiriensis* El Mokni, Domina, Sebei & El Aouni. – Figure 2.**

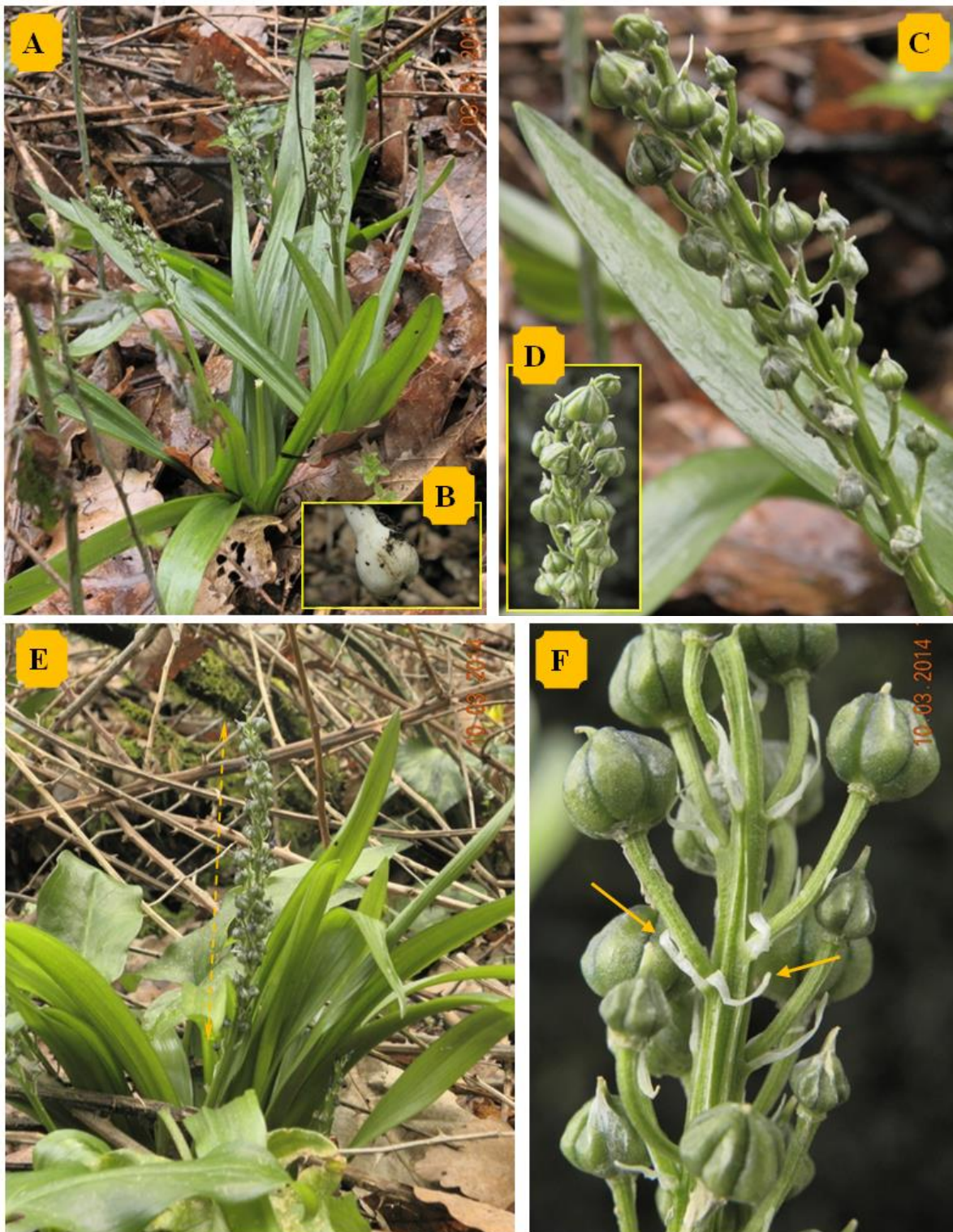
Perennial green grass. White bulb, ovate, 20-23 x 20-25 mm; roots out of the base and sides of the bulb below the middle. Flowering stems erect, 30-42 cm, furrowed-ribbed, serrated even on the spine of the bunch. Leaves all basal, surrounded generally below by 1 to 2 sheaths membranous whitish obtuse. Leaves 4-5(-6), lanceolate, acute and slightly apiculated at the top, with 2-2,6 x 27- 34,5 cm, hairless, smooth, multinerviate in ribs connected by transversal anatomizes, flat, inferiorly canaliculated. Inflorescence in cluster, quite dense, up to 20 cm long., up to 41 flowers. Bracts membranous paired slightly unequal, whitish, linear, somewhat shorter than the peduncle. Peduncle spread-erect, angular, no or hardly serrated, bowed inwardly while fruiting. Flowers bluish to blue sky, 3-4 x 8-9 mm long., starred at anthesis. Tepals briefly connate at their base among themselves and with the stamens, oblong-lanceolate, uninerviate, blue or greenish rib slightly obtuse at the top with an obtuse papillate-pubescent apiculus. Subequal stamens equaling roughly 5-7 mm (almost 2/3 of the Perianth); bluish nets dilated and flattened at the base, nearly matching the anther; blue anthers fixed by the middle, c. 1.5 mm. Bluish ovate sub-globulous ovary, trine sub-trilobate, acuminate in a style as long as it, 3 wells 2-ovulated. Capsule sub-globulous sub-trilobated, 3-5 x 9-10 mm, apiculated by persistent style, papery, trilocular at the base, incompletely trilocular atop, wells with 2-sperms. Seeds ovate, apiculated at the top, blackish, almost glabrous about 2-2,5 mm long.

**Table 1.** Morphological characters useful in separating the new taxon *Hyacinthoides kroumiriensis* from the phenotypically similar species *H. aristidis*, both growing spontaneously in Kroumiria, North-West of Tunisia.

Characters	Taxa	<i>Hyacinthoides kroumiriensis</i>	<i>Hyacinthoides aristidis</i>
Bulbs (mm)		20-23 x 20-25	20 x 25
Habit / Plant length (cm)		erected / 38-47	erected / 16-32
Number / Length of leaves (cm)		4-5(-6) / 2-2,6 x 27- 34,5	2-3 / 1,8 x 22
flowering spike (cm)		30-42	8-28
Inflorescence length (cm)		8-20	6-8
Number of flowers per inflorescence		18-41	4-20
Inflorescence density		quite dense	slightly loose to rather dense
Length of floral pedicel (mm)		9-13	8-10
Bracts / length (mm)		2 / 1-2 x 5-7	2 / 1 x 5
Perianth / Tepals		3-4 x 8-9	6-7
Stamens		5-7	2/3 length of Tepals
Fruit / Length of capsule (mm)		capsule / 3-5 x 9-10	capsule / 5 in diameter
Capsule form		quite pyramidal	ovate to globular
Capsule indumentum		glabrous slightly shagreened	glabrous not shagreened
Seeds / Length (mm)		2, almost glabrous / 3-3,5	2, slightly shagreened / 2,5-3

**Flowering and Fruiting:** — December – Mars

**Distribution and Ecology:** — *Hyacinthoides kroumiriensis* El Mokni, Domina, Sebei & El Aouni grows in shady, well-rained (up to 2200 mm per year) places of Mirbeck's oak (*Quercus canariensis* Willd.) forests at elevations 595-717 m a.s.l. in Kroumiria mountains; Lat. 36°544'14.60" N, Long. 08°42'10.15" E. There is only a single dispersal population, growing on acidic soil (pH is about 5,4), with about 28-32 mature individuals and several seedlings of varying age found within an area of about 2 sq km. The main associated species inside the area are *Athyrium filix-femina* (L.) Roth, *Carex* spp., *Circaea lutetiana* L., *Galium* spp., *Hyacinthoides aristidis* (Coss.) Rothm., *Hypericum afrum* Lam., *Hypericum androsaemum* L., *Ilex aquifolium* L., *Lapsana communis* L. subsp. *macrocarpa* (Coss.) Nyman, *Laurus nobilis* L., *Limodorum abortivum* (L.) Sw., *Luzula forsteri* (Sm.) DC., *Luzula multiflora* (Ehrh. ex Retz.) Lej. subsp. *multiflora*, *Osmunda regalis* L., *Plagius maghrebinus* Vogt & Greuter, *Polystichum setiferum* (Forssk.) T. Moore ex Woynar, *Prunella vulgaris* L., *Rubus incanescens* Bertol., *Sanicula europaea* L., *Sedum cepaea* L., *Teucrium scorodonia* L. *Viola alba* Besser subsp. *dehnhardtii* (Ten.) W. Becker, etc.



**Figure 2.** *Hyacinthoides kroumirensis* El Mokni, Domina, Sebei & El Aouni **sp. nova**. **A.** Plant in its natural habitat **B.** White and ovate bulb, **C & D.** long and dense inflorescences on the top of an erecting single flowering spike, **E.** Plants with many basal leaves in rosette: long, acute, lanceolate, hairless and smooth; long inflorescence with flowers up to 40, **F.** Inflorescence with glabrous, almost pyramidal, trilobate capsule, apiculated by incompletely trilobular atop persistent style; paired membranous bracts, slightly unequal, whitish, linear, shorter than the peduncle (Photos Ridha El Mokni).

**Type:** Tunisia-Kroumiria, shady places of altitude forests of Mirbeck's oak between 595-717 m a.s.l., 03 March 2014, R. El Mokni (**Holo:** BIZ; **Iso:** PAL).

*Perennis viride planta. Nam radix alba, ovatis, 20-25 × 20-23 mm; deorsum radices bulbosae e basi-media parte. Florentem caulibus erectis, 30-42 cm, sulcatis, costata, serratis et in spina de fasciculumque. Folia omnia basalis, plerumque i to etenim infra 2 membranaceis, obtusis, vaginis albidis. Folia 4-5(-6) lanceolatis, acutis, paulo apiculata et in summo, cum 2-2.6 × 27-34.5 cm, glaber, laevibus, multinerviatis in costae nectuntur anatomizans transversum plana canaliculata inferius. Inflorescentia in botro, satis crassa, ad 20 cm. vsque 41 floribus. Bractae membranaceis paribus paulo inaequales, subalbidae, quasi lineares, aliquantulum breviora, pedunculo. Pedunculus straverunt-erecti, angularem, non aurum, vix serratis, adoravit, et intrinsecus fructificatio. Flores caeruleo in caelum caeruleum, 3-4 × 8-9 mm, stellatus sub anthesi. Tetalis ut paucis dicamus, ad apicem connati, se et suos, cum antheris oblongo-lanceolatis, uninerviatis, obtusiusculum caeruleum viridis costa apice anno obtuso papilloso-pubescentibus, apiculo. Subaequalibus, stamina qui adaequavit, asper et 5-7 mm, (fere duas tertias perianthii); Net caeruleo et complanatis basi dilatata, parem fere in alterius; antherae hyacintho ab ipso medio, c. 1.5 mm. Subcaeruleus ovatum infuscatae ovarium, sub-trilobate trina, acuminatis in genere, quoad, 3 puteos 2 ovulata. Capsule infuscatae subtrilobatae, 3-5 × 9-10 mm, apiculatae pertinaci genere, ciliatis, trilobulari basi, perfecte trilobulari genere, 2-spermiis puteis. Seminibus ovatis apice apiculata, nigro, glabris de 2-2.5 mm longis.*

**Eponymy:** — This species is named after Kroumiria region, the type locality of the taxon.

**Specimina visa:**

Tunisia: Kroumiria, shady places of altitude forests of Mirbeck's oak between 595-717 m a.s.l., 03 March 2014, R. El Mokni (BIZ, PAL).

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