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## *Loncomelos koprulense* (Asparagaceae), a new species from southern Turkey

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### Abstract

A new species, *Loncomelos koprulense* (Asparagaceae), is described and illustrated from southern Turkey. It is a very rare endemic species growing on small semi-rocky escarpments within the Köprülü Canyon in the province of Antalya. Morphologically for its hairy leaves, *L. koprulense* shows some relationships with *L. malatyanum* and *L. tardum*, species localized in Anatolia too. The chromosome number of the new species is  $2n = 2x = 22$ . The identification key to *L. koprulense* and its allied species is provided, as well as their geographical distribution map.

### Keywords

Asparagaceae, distribution, karyology, *Loncomelos*, Ornithogaleae, taxonomy

### Introduction

The genus *Ornithogalum* L. for its remarkable morphological and karyological variability has been the object of various taxonomical treatments, which led to the recognition of several subgenera, sections and series or its splitting into different genera (Rafinesque 1837, Salisbury 1866, Speta 1998a, 1998b, 2001, Pfosser and Speta 1999, Manning et al. 2009, Martínez-Azorín et al. 2009). Recently, phylogenetic investigations based on morphological and molecular approach carried out by Martínez-Azorín et al. (2011) emphasized that the hierarchical arrangement partly delineated by Speta (1998a) must be pursued, recognizing within the subfamily Ornithogaloideae Speta 19 monophyletic genera, all of which are morphologically well characterized. This approach was followed by Bogdanović et al. (2020) who widely analysed the taxonomic aspect regarding these groups of Ornithogaleae J.C.Manning and Goldblatt. One of accepted genera of this tribe, quite spread in the Mediterranean territories, is *Loncomelos* Raf. showing in particular close relationships with *Ornithogalum* L. s.str. Morphologically, *Loncomelos* is mainly characterized in having inflorescence arranged in an elongated raceme, with pedicels more or less equal at maturity, capsule ovate-lanceolate, trigonous or trilobate with blunt or slightly retuse edges in cross section, seeds polygonal or irregularly compressed, with tuberculate, papillate or rugose testa, while *Ornithogalum* is differentiated by inflorescence corymbose or racemose-corymbose, capsule obovate or oblong, deeply trilobate with six evident ribs in cross section, seeds globose, with sinuous and prominent reticulate testa (Speta 1998a; Martínez-Azorín et al. 2011).

Currently, *Loncomelos* is represented by ca. 32 taxa, formerly mostly attributed to *Ornithogalum*, which are characterized by a very variable chromosome complement from diploid differing among the species to polyploid and even aneuploid assets with  $2n = 14, 16, 18, 20, 22, 24, 26, 28, 32, 36, 42, 44, 46, 52, 54, 88$  (Cullen and Ratter 1967; Wittman 1985; Speta 1998a, 2006, 2010, 2011; Mutlu and Karakuş 2012; Kypriotakis et al. 2018; Bogdanović et al. 2020). In the frame of taxonomic investigation on the genus *Loncomelos*, it is herein examined a very peculiar population surveyed in the southern Turkey, between Antalya and Manavgat. Based on careful

morphological, anatomical and karyological observations, it is taxonomically quite isolated, only showing some similarities in the hairy leaves with *L. tardum* Speta and *L. malatyanum* (Mutlu) comb. nov., mainly in having hairy leaves, both occurring in Turkey (Speta 2006; Mutlu and Karakuş 2012). Therefore, it is described as a new species for science and named *L. koprulense*.

## Materials and methods

The morphological study on the new species was carried out on living material collected from the locus classicus and cultivated in the Botanical Garden of Catania (Italy). Voucher specimens are deposited in the herbarium CAT (abbreviation follows Thiers 2020). Qualitative and quantitative morphological features were measured and scored on ten fresh plants, using a Zeiss Stemi SV11 Apo stereomicroscope at 6–66× magnification. Morphological comparison with the most related species was carried out using literature data (Speta 2006; Mutlu and Karakuş 2012). Besides the diagnostic trait of the new species and its two allied ones are shown in Table 1.

Leaf anatomy was studied on cross-sections from cultivated plants, using fresh leaf blades of maximum and minimum size in their optimal vegetative phase.

Karyological analyses were performed on root tip cells of cultivated bulbs, pre-treated with a 0.3% (w/v) colchicine water solution for 3h at room temperature, fixed in Farmer's fixative (3:1 v/v, absolute ethanol: glacial acetic acid) for 12 h and stored in 70% ethanol water solution. Then, root tips were hydrolysed in 1 N HCl for 7 min at 60 °C and stained according to the Feulgen technique. Microphotographs of at least 10 good metaphase plates from different individuals were taken using a Zeiss PrimoStar microscope equipped with a Canon PowerShot G9 digital camera. Metaphase chromosomes were measured by the Zeiss Axiovision 4.8 image analysis software, while karyotyping was performed by CROMOLAB 1.1 software (Brullo 2002). The chromosome types were named according to the centromere position based on Levan (1964) and Tzanoudakis (1983). All measured karyomorphometric parameters are provided in Table 2.

## Taxonomy

### *Loncomelos koprulense* Bogdanović, Brullo & Salmeri, sp. nov.

Figs 1, 2, 5

**Type.** TURKEY. Antalya, C3, Köprülü Kanyon Milli Parkı, Province of Antalya, District of Manavgat, Bozyaka Yolu, cultivated 15. June 2010, *Brullo s.n.* (Holotype: CAT!).

**Diagnosis.** *Loncomelo malatyano* affine, sed distinctum statura majore, bulbo subgloboso, latiore, 4-foliato, inflorescentia longiore, 50–55 floribus, bracteis ovato-lanceolatis, non dentatis, tepalis lineari-oblongis, viridibus, albis et undulatis margine, filamentis staminorum oblongis, latioribus, ovario ovoideo, stylo brevior, capsula minore.

**Description.** Plant up to 95 cm tall. Bulbs subglobose, 2.5–3 × 3–3.6 cm, outer tunics whitish, papery, without bulblets. Scape 55–60 cm long, glabrous, green-glaucous. Leaves 4, but often withered at the anthesis, shorter than scape, linear, canaliculate, 18–30 × 0.35–0.8 cm, without white median line, abaxial face densely hairy, margins hairy, hairs 0.5–1.2 mm long, adaxial one glabrous. Raceme cylindrical, 32–40 cm long, 50–55 flowered. Pedicel 12–25 mm long, curved-divaricated, glabrous. Bracts membranous, ovate-lanceolate, 6–13(19) mm long, broadened at the base, long acuminate toward the apex, 5–8 nerved, shorter to subequal than pedicel, smooth at the margin, glabrous. Perigon stellate, 20 mm in diameter, tepals linear-oblong, 10–11 × 2.4–2.6 mm, glabrous, papillate-glandulose at the apex, markedly undulate at the margin, green with white margin. Staminal filaments white, oblong, abruptly apiculate at the apex, 5–5.5 × 1.6–2 mm, thickened at the margin with central greenish midrib, anthers pale-green, 2.5–2.7 mm, dorsifixed. Ovary ovoid, green, 3 × 2.3 mm, with blunt lobes, every provided with one big central nerve, and 2

small lateral nerves. Style 2.2–2.3 mm long, stigma papillose. Capsule ovoid,  $6.5\text{--}7 \times 5$  mm, erect. Seeds not seen. Chromosome number  $2n = 2x = 22$ .

**Phenology.** Flowering in June and fruiting in June-July.

**Etymology.** The species epithet is derived from the name of the Köprülü Kanyon, locality where this geophyte was collected.

**Karyology.** All investigated samples of *Loncomelos koprulense* from the type locality revealed a somatic chromosome complement with  $2n = 22$  (Fig. 3A). The karyotype is rather asymmetrical, arranged into 11 chromosome pairs (Fig. 3B), distinct in two size groups and prevalently of submedian type, as also highlighted by the values of different symmetric indices (Table 2). In particular, there are 3 metacentric pairs, 3 meta-submetacentric pairs (showing arm ratio exceeding 1.30), and 5 submetacentric pairs (3 big-sized and 2 small-sized). Thus, the chromosome formula can be expressed as  $2n = 2x = 22 = 6m + 6msm + 10sm$ . No evident satellites were detected. Absolute chromosome length varied from  $11.1 \pm 1.3 \mu\text{m}$  of the longest chromosome and  $4.26 \pm 0.3 \mu\text{m}$  of the shortest one, with a mean chromosome length of  $6.99 \pm 2.2 \mu\text{m}$ . Relative chromosome length varied from  $7.24\% \pm 0.8$  to  $2.78\% \pm 0.2$ . Arm index varied on average from 1.03 to 2.76, while the centromeric index ranged from 49.3 to 26.6. All karyomorphometric parameters are given in Table 2.

**Leaf anatomy.** The known *Loncomelos* species are usually differentiated by canaliculate leaves, uniformly coloured with adaxial-abaxial polarity, which have a different size in the same individual. In particular, the leaf outline is smooth in adaxial faces and more or less ribbed in the abaxial one, with epidermal cells covered by a thickened cuticle; the palisade tissues is one-layered and distributed along the whole perimeter, while the inner part is occupied by the spongy tissue (Wittmann 1985; Tornadore 1985, 1986; Tornadore and Orza 1987; Lynch et al. 2006; Peruzzi et al. 2007; Öztürk et al. 2014; Bogdanović et al. 2020). The vascular bundles are arranged in two rows all along the mesophyll; larger vascular bundles occur in the central part, which are alternated with other smaller one towards the abaxial side. The large bundles are interspersed with mucilage cells that in the mature leaves are replaced by rhexigenetic lacunae. Most species have fully glabrous leaves, except for *L. tardum*, *L. malatyanum* and the new species, showing a dense hairiness in the abaxial face. On the whole, the leaves of *L. koprulense* maintain the main features of the genus, revealing a marked variability in size; the largest leaves are characterized by 17–18 big vascular bundles, interposed among lacunae; these bundles decrease in number in the progressively narrower leaves up to a minimum of ca. 9, while the number of small vascular bundles coincides with that of the mesophyll lacunae (Fig. 2F), as far as hairs concerns, they are irregularly distributed along the margin and on abaxial face.

**Ecology and distribution.** *Loncomelos koprulense* seems a very rare species currently known only for a single locality of southern Turkey. One small and well circumscribed population was surveyed along the road Bozyaka Yolu within the Köprülü Kanyon at about 150 m of altitude (Fig. 4), where it grows on small semi-rocky escarpments covered by a scarce herbaceous vegetation. The woody vegetation near this habitat is represented by a thermophilous maquis characterized by *Quercus calliprinos* Webb, *Olea europaea* L. subsp. *sylvestris* (Mill.) Rouy ex Hegi, *Pistacia terebinthus* L., *Juniperus oxycedrus* L., *Myrtus communis* L., *Arbutus andrachne* L., *Cupressus sempervirens* L. etc. (Tavşanoğlu and Coşkun 2009). This area, falling within an important National Park is known as Köprülü Kanyon Milli Parkı between Antalya and Manavgat, is floristically highly rich in endemic species as emphasized by Özçelik (2018).

**Additional examined material.** TURKEY. Antalya, C3, Köprülü Kanyon Milli Parkı, Province of Antalya, District of Manavgat, Bozyaka Yolu, cultivated 24. June 2013, *Brullo s.n.* (paratype: CAT!).

**Discussion.** From the literature data (Zahariadi 1977, 1980; Wittmann 1985; Martínez-Azorín 2008; Martínez-Azorín et al. 2009), the circumscription of the genus *Ornithogalum* within the tribe Ornithogaleae has always been problematic, emphasizing that the traditional morphological approach is not sufficient to discriminate the taxa at generic level. Recent phylogenetic studies

carried out by Pfosser and Speta (1999) and Martínez-Azorín et al. (2011), based on cpDNA and nrDNA gene sequences, have provided a relevant support for a taxonomic arrangement of this tribe, validating the treatment previously proposed by Speta (1998a, 1998b). As concern the genus *Loncomelos*, it is morphologically well differentiated from *Ornithogalum* s.str. by numerous and significant characters regarding the inflorescence, pedicel, capsule and seed. From the phytogeographical point of view this genus is mainly distributed in the Mediterranean area with the higher concentration of species in the Balkan Peninsula and Anatolia. The last territory currently hosts 14 species (included the new one), that therefore can be considered the main centre of differentiation of the genus.

A very peculiar and significant morphological character occurring in *L. koprulense* is represented by the densely hairy leaves (Fig. 5D–E). In fact, most species of the genus *Loncomelos* are characterized by glabrous leaves, only other two species show hairs in the leaves, they are *L. tardum* and *L. malatyanum*. According to Speta (2006) and Mutlu and Karakuş (2012), both species occur in Anatolia too, where they are very rare and quite localized (Fig. 4). They differ from *L. koprulense* in some relevant morphological features (Table 1), such as the shape and size of the bulbs, number of leaves, inflorescence size, number of raceme flowers, bracts, tepal shape and colour, tepal margin, stamen filament, size and shape of ovary and capsule. Another difference regards the karyological aspect, since *L. tardum* is characterized by a chromosome complement  $2n = 2x = 20$ , observed by Speta (2006), while according to Mutlu and Karakuş (2012) that one of *L. malatyanum* is  $2n = 2x = 24$ . Otherwise, *L. koprulense*, is also a diploid but its chromosome number is  $2n = 2x = 22$ , which is quite rare in the genus *Loncomelos*, so far only previously counted in *L. fischerianum* (Krasch.) Speta by Agapova (1977).

**Nomenclatural note.** *Loncomelos malatyanum* (Mutlu) Bogdanović, Brullo & Salmeri **comb. nov.**  $\equiv$  *Ornithogalum malatyanum* Mutlu in Mutlu & Karakuş Turkish Journal of Botany 36: 126 (2012), basionym.

Identification key to *Loncomelos koprulense* and its allied species.

1. Bulb subglobose, 3–3.6 cm wide. Inflorescence 32–40 cm long, 50–55-flowered. Tepal margin undulate. Style 2.2–2.3 mm long ..... ***L. koprulense***
- Bulb ovoid to ovoid-globose, 1.5–2.5 cm wide. Inflorescence 12–28 cm long, 18–40-flowered. Tepal margin flat to slightly rolled. Style 3–5.3 mm long ..... **2**
2. Bulb tunic grey-brown. Leaf number 3–4. Inflorescence 23–28 cm long. Bract smooth at the margin, shorter than pedicel. Staminal filament oblong, 1.7–1.9 mm long. Style 3–3.8 mm long. Capsule ellipsoid ..... ***L. tardum***
- Bulb tunic whitish. Leaf number 5–7; Inflorescence 18–20 cm long. Bract 0–1(2) toothed at the margin, equal or longer than pedicel. Staminal filament 1.6 mm long. Style 4–5.3 mm long. Capsule ovoid to globose ..... ***L. malatyanum***

## References

- Agapova ND (1977) Cytosystematic investigation of the European representatives of the genus *Ornithogalum* (Fam. Liliaceae) of the U.S.S.R. flora I. Bot. Zurn. 62: 970–983.
- Bogdanović S, Brullo S, Ljubičić I, Rat M, Salmeri C (2020) Cytotaxonomical remarks on *Loncomelos visianicum* (Hyacinthaceae), a poorly known species endemic to Croatia. Phytotaxa 430: 095–108. <https://doi.org/10.11646/phytotaxa.430.2.2>
- Brullo F (2002) Cromolab. Dipartimento di Botanica Università degli Studi di Catania.
- Cullen I, Ratter JA (1967) Taxonomic and cytological notes on Turkish *Ornithogalum*. Notes Roy Bot Gard Edinburgh 27(3): 293–339.
- Kypriotakis Z, Antaloudaki E, Tzanoudakis D (2018) *Ornithogalum insulare* (Hyacinthaceae): A new species from the Cretan area (S. Aegean, Greece). Botanica Serbica 42: 117–122.

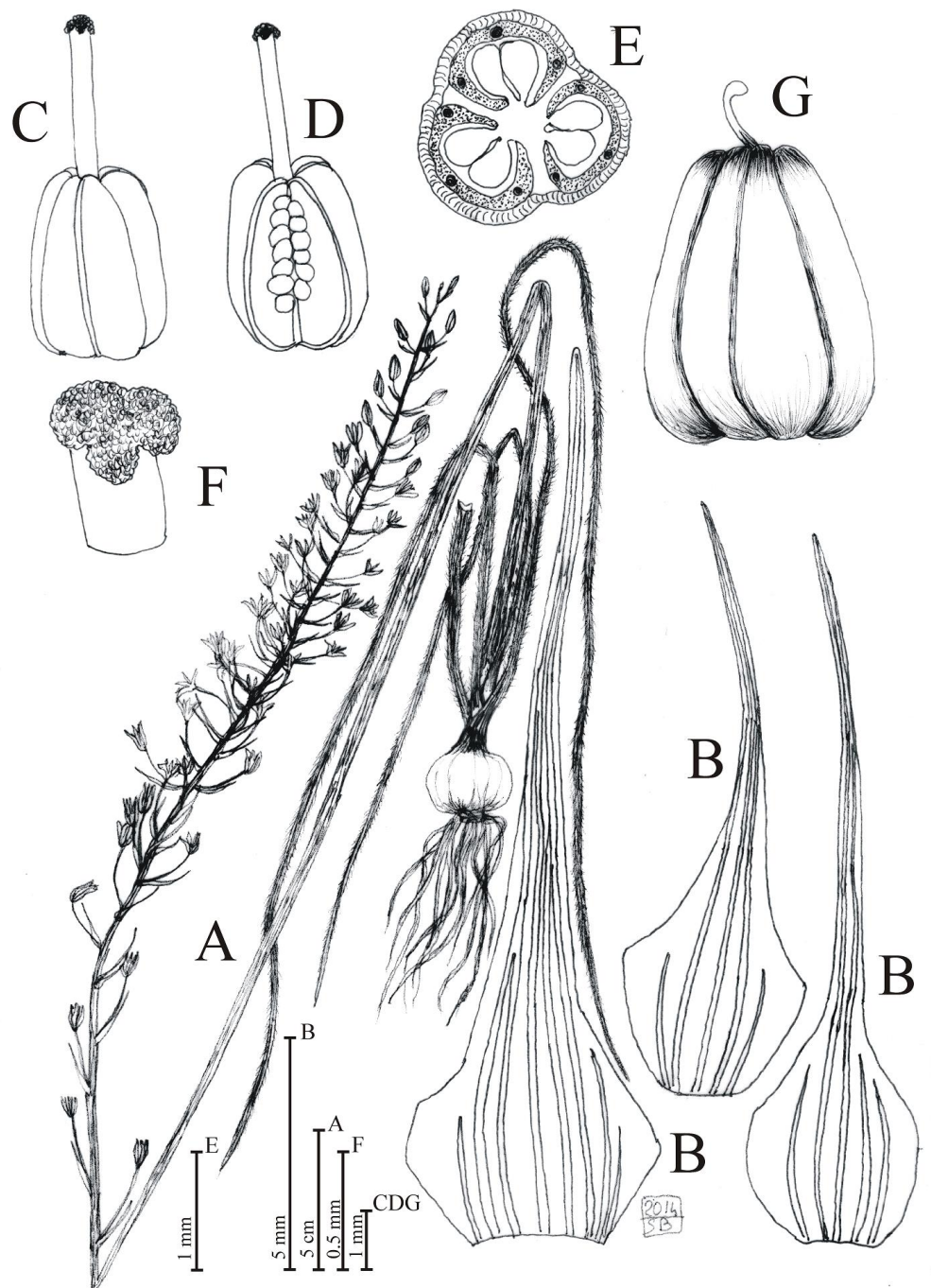


- Levan A, Freda K, Sandberg AA (1964) Nomenclature for centromeric position on chromosomes. *Hereditas* 52: 201–220.
- Lynch A, Rudall PJ, Cutler DF (2006) Leaf anatomy and systematics of Hyacinthaceae. *Kew Bulletin* 61: 145–159.
- Manning JC, Forest F, Devey DS, Fay MF, Goldblatt P (2009) A molecular phylogeny and a revised classification of Ornithogaloideae (Hyacinthaceae) based on an analysis of four plastid DNA regions. *Taxon* 58: 77–107. <https://doi.org/10.1002/tax.581011>
- Martínez-Azorín M, Crespo MB, Juan A, Fay MF (2011) Molecular phylogenetics of subfamily Ornithogaloideae (Hyacinthaceae) based on nuclear and plastid DNA regions, including a new taxonomic arrangement. *Ann Bot.* 107: 1–37. <https://doi.org/10.1093/aob/mcq207>
- Martínez-Azorín M, Crespo MB, Juan A (2009) Taxonomic revision of *Ornithogalum* subg. *Beryllis* (Hyacinthaceae) in the Iberian peninsula and the Balearic islands. *Belg J Bot.* 142: 139–161.
- Martínez-Azorín M (2008) Sistemática del género *Ornithogalum* L. (Hyacinthaceae) en el Mediterráneo occidental: implicaciones taxonómicas, filogenéticas y biogeográficas. Doctoral Thesis, Universidad de Alicante, Spain.
- Mutlu B, Karakuş Ş (2012) A new species of *Ornithogalum* (Hyacinthaceae) from East Anatolia, Turkey. *Turk J Bot.* 36: 125–133.
- Özçelik H (2018) Flora inventory of Köprülü Kanyon National Park (Antalya-Isparta). *Turk J Forst.* 19:40–50.
- Öztürk D, Koyuncu O, Koray Yaylacı Ö, Özgişi K, Sezer O, Tokur S (2014) Comparative anatomical studies on twelve *Ornithogalum* (Asparagaceae) species (eleven nonendemic, one endemic) belonging to subgen. *Ornithogalum* and subgen. *Beryllis*, growing naturally in Eskişehir (Central Anatolia-Turkey). *J Sci Res Rev.* 3: 40–49.
- Peruzzi L, Caparelli KF, Cesca G. (2007) Contribution to the systematic knowledge of the genus *Ornithogalum* L. (Hyacinthaceae): morpho-anatomical variability of the leaves among different taxa. *Boccone* 21: 257–265.
- Pfossor M, Speta F (1999) Phylogenetics of Hyacinthaceae Based on Plastid DNA Sequences. *Ann Miss Bot Gard.* 86: 852–875. <https://doi.org/10.2307/2666172>
- Rafinesque CS (1840) *Autikon Botanikon*, Centuria V. Philadelphia, pp. 55–71.
- Salisbury RA (1866) *The Genera of Plants: a fragment containing part of Liriogamae*. London: John van Voorst.
- Speta F (1998a) Hyacinthaceae. In: Kubitzki K, editor. *The families and genera of vascular plants* 3. Berlin: Springer; p. 261–285. [https://doi.org/10.1007/978-3-662-03533-7\\_35](https://doi.org/10.1007/978-3-662-03533-7_35)
- Speta F (1998b) Systematische analyse der Gattung *Scilla* L. s.l. (Hyacinthaceae). *Phyton (Horn)*. 38: 1–141.
- Speta F (2001) Die Echte und die Falsche Meerzwiebel: *Charybdis* Speta und *Stellarioides* Medicus (Hyacinthaceae), mit Neubeschreibungen und Neukombinationen im Anhang. *Stapfia* 75: 139–176.
- Speta F (2006) Die Gattung *Loncomelos* Raf. (Hyacinthaceae-Ornithogaloideae), vorgestellt anhand dreier neuer Arten. *Phyton (Horn)* 46: 1–25.
- Speta F (2010) Beitrag zur Kenntnis der *Loncomelos narbonensis*-Verwandtschaft (Hyacinthaceae – Ornithogaloideae). *Verh Zool-Bot Ges Österreich.* 147: 125–157.
- Speta F (2011) A remarkable new *Loncomelos* species from NE-Turkey: *L. erichpaschei* Speta spec. nova (Hyacinthaceae-Ornithogaloideae), *Phyton (Horn)* 51: 153–160.
- Tavşanoğlu Ç, Coşkun U (2009) Effect of goat browsing on growth form of maquis species in Köprülü Kanyon National Park (Antalya, Turkey). *Ekoloji* 18: 74–80.
- Thiers B (2020) *Index Herbariorum: A global directory of public herbaria and associated staff*. New York Botanical Garden's Virtual Herbarium. Available from <http://sweetgum.nybg.org/ih/> (accessed 10 February 2020).

- Tornadore N, Orza P (1987) Il gen. *Ornithogalum* L. (Liliaceae) in Italia. VIII. Il subgen. *Beryllis* (Salisb.) Baker con particolare riguardo ad *O. brevistylum* Wolfner. Atti Soc Tosc Sci Nat Mem Ser B. 94: 341–356.
- Tornadore N (1985) Il gen. *Ornithogalum* L. (Liliaceae). V. Osservazioni sulla citosistemica di *O. pyrenaicum* L. Atti Soc Tosc Sci Nat Mem Ser B. 92:247–257.
- Tornadore N. 1986. Il genere *Ornithogalum* L. (Liliaceae). VI. *O. narbonense* L. Atti Soc Tosc Sci Nat Mem Ser B. 93:111–120.
- Tzanoudakis D (1983) Karyotypes of ten taxa of *Allium* section *Scorodon* from Greece. Caryologia 36(3): 259–284. <https://doi.org/10.1080/00087114.1983.10797667>
- Wittmann H (1985) Beitrag zur Systematik der *Ornithogalum* - Arten mit verlängert-traubiger Infloreszenz. Stapfia 13:1–117.
- Zahariadi C (1977) Notes on the intrageneric classification of the genus *Ornithogalum* L. (Liliaceae). Bot Žur 62: 1624–1639. [in Russian]
- Zahariadi C (1980) *Ornithogalum* L. In: Tutin TG, Heywood VH, Burges NA, Moore DM, Valentine DH, Walters SM, editors. Flora Europaea 5. Cambridge: Cambridge University Press; p. 35–40.

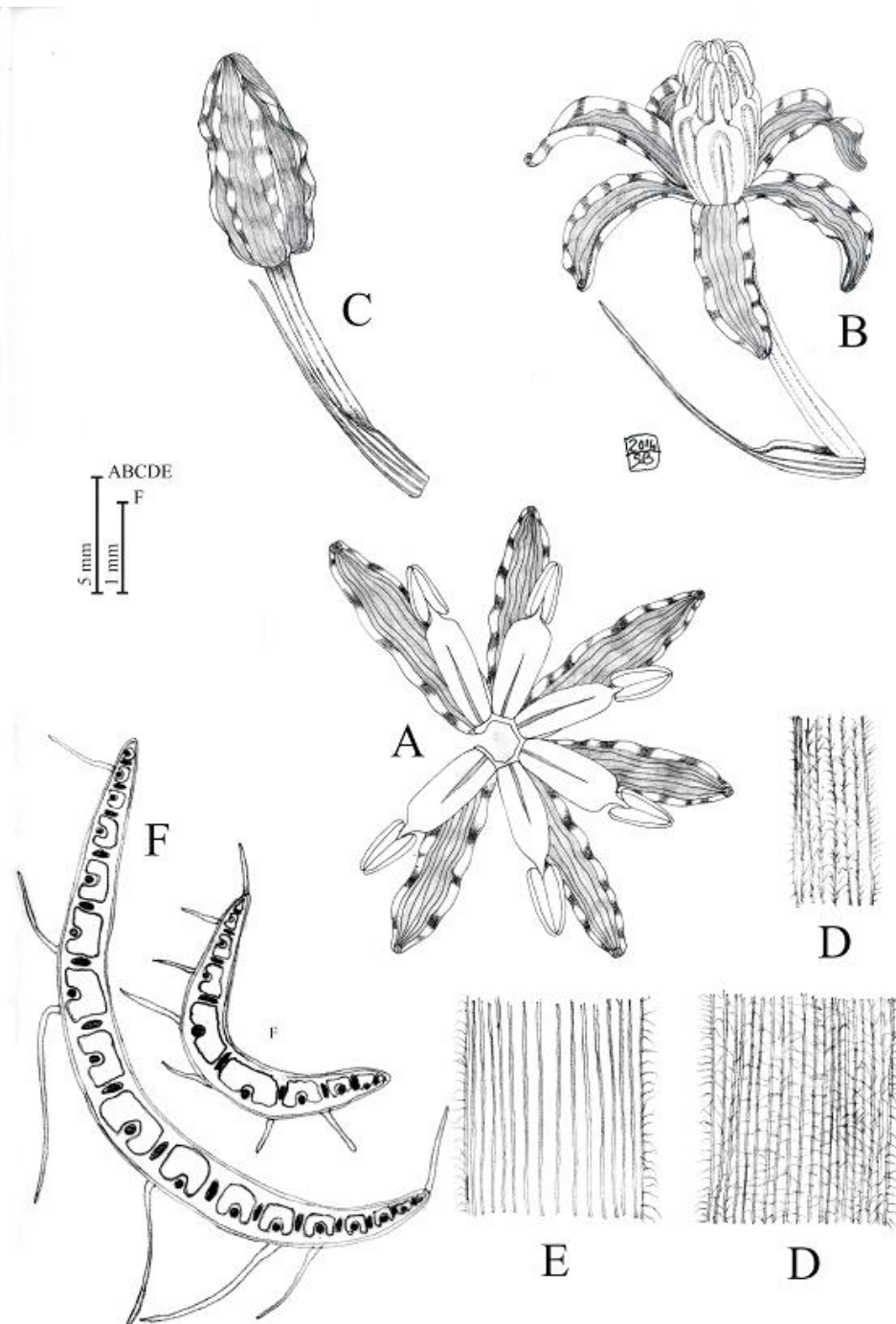
## Figure captions

- Figure 1.** *Loncomelos koprulense* Bogdanović, Brullo & Salmeri sp. nov. **A** Habit **B** Bracts **C** Pistil **D** Open pistil **E** Ovary cross section **F** Stigma **G** Capsule. Drawing by S. Brullo from cultivated material coming from the type locality.
- Figure 2.** *Loncomelos koprulense* Bogdanović, Brullo & Salmeri sp. nov. **A** Tepals and stamens **B** Flower with bract **C** Bud with bract **D** Leaf abaxial face **E** Leaf adaxial face **F** Leaf cross sections. Drawing by S. Brullo from cultivated material coming from the type locality.
- Figure 3.** Chromosome complement ( $2n = 2x = 22$ ) of *Loncomelos koprulense*. **A** Mitotic metaphase plate from the type locality **B** Idiogram.
- Figure 4.** Distribution map of *Loncomelos koprulense* (square), *L. tardum* (circle) and *L. malatyanum* (star).
- Figure 5.** *Loncomelos koprulense*. **A** Inflorescence **B** Flower **C** Leaf abaxial face **D** Leaf adaxial face from cultivated material coming from the type locality.
- Table 1.** Main morphological differences among *Loncomelos koprulense*, *L. tardum* and *L. malatyanum*.
- Table 2.** Karyomorphometric parameters and karyotype symmetry indices of *Loncomelos koprulense*. Values come from 10 good metaphase plates from individuals of the type locality.

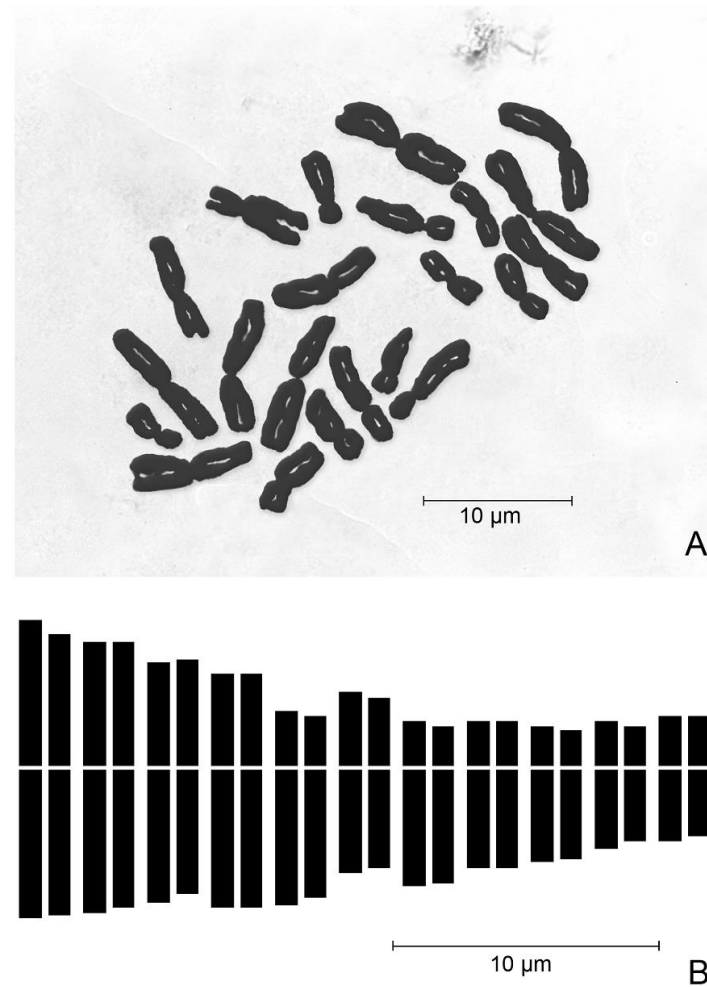


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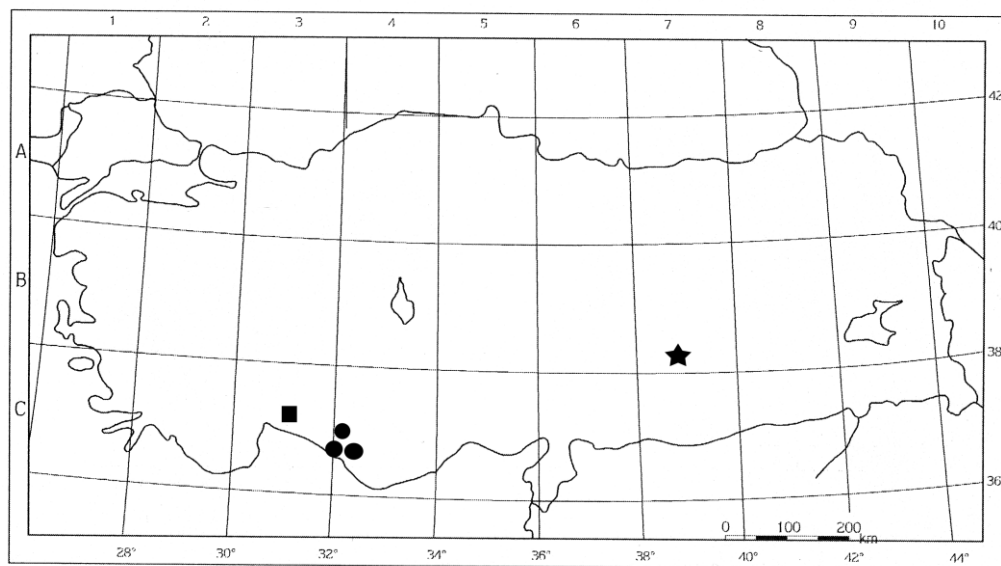




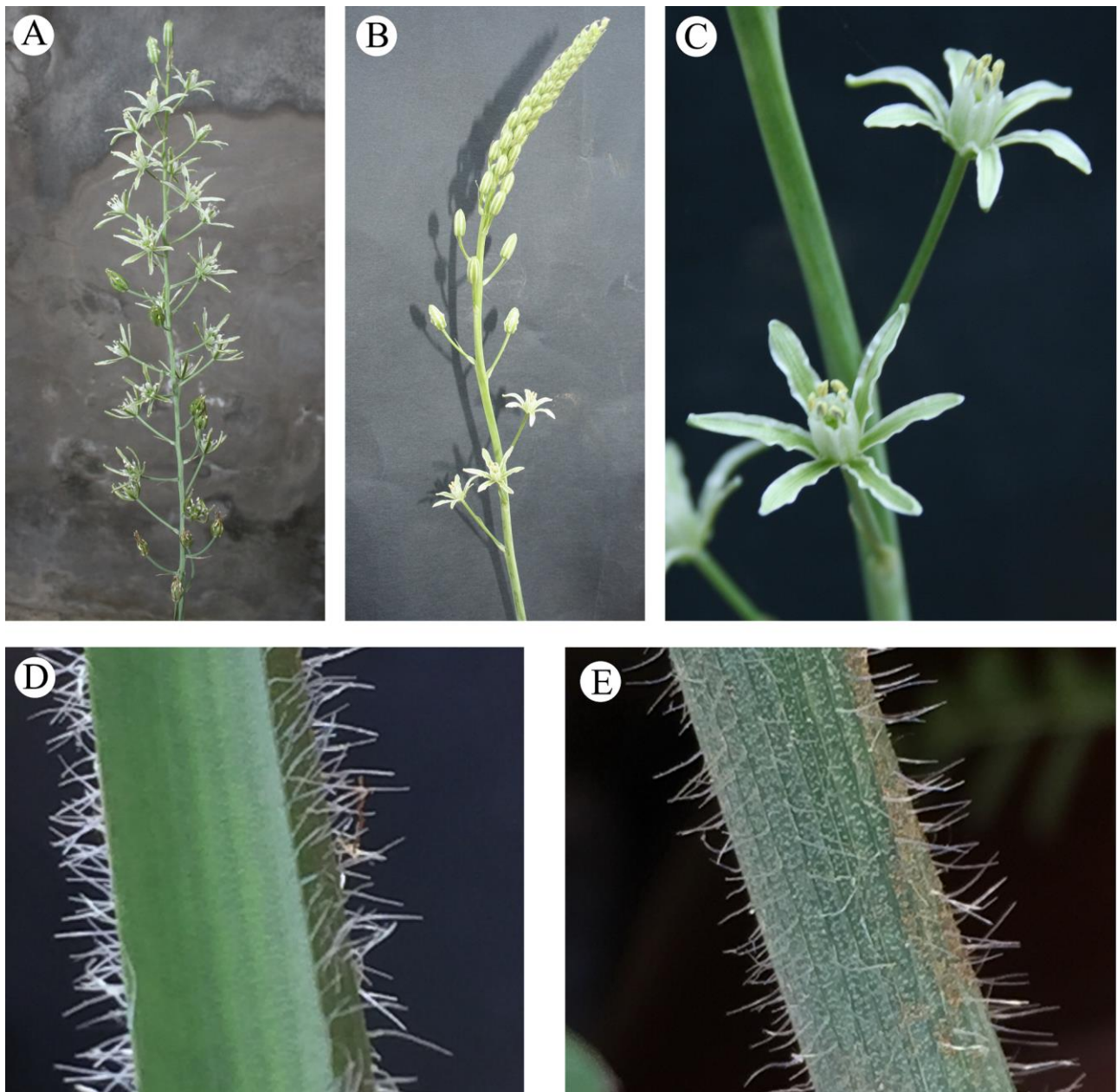
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**Figure 5.** *Loncomelos koprulense*. **A** Inflorescence **B** Flower **C** Leaf abaxial face **D** Leaf adaxial face from cultivated material coming from the type locality.

**Table 1.** Main morphological differences among *Loncomelos koprulense*, *L. tardum* and *L. malatyanum*.

Characters	<i>L. koprulense</i>	<i>L. tardum</i>	<i>L. malatyanum</i>
Plant tall (cm)	up to 95	up to 80	up to 73
Bulb shape	subglobose	ovoid	ovoid-globose
Bulb size (cm)	2.5–3 x 3–3.6	2.5–4 x 2.5	2.5–2.7 x 1.5–2.5
Bulb tunic colour	whitish	grey-brown	whitish
Scape height (cm)	55–60	40–65	34–53
Leaf number	4	3–4	5–7
Leaf length (cm)	18–30	up to 35	(25) 28–40
Leaf width (mm)	3.5–8	4–5	3–10 (11)
Leaf indumentum	densely hairy abaxially	densely hairy abaxially	densely hairy abaxially
Inflorescence length (cm)	32–40	23–28	12–20
Number of flowers	50–55	40	18–30 (55)
Flower pedicel length (mm)	12–25	14–25	5–15
Bract shape	ovate-lanceolate	subulate	subulate
Bract length (mm)	6–13(19)	10–16	7–18
Bract margin	smooth	smooth	0–1 (2) toothed
Bract / pedicel ratio	shorter to subequal	half 9.5–11.3 x	equal or longer
Tepal size (mm)	10–11 x 2.4–2.6	1.7–2.6	9–12 x 2.2–4
Tepal shape	linear-oblong	linear	lanceolate to elliptical
Tepal colour	green, with white margin	greenish, with white margin slightly rolled,	whitish, green in the centre
Tepal margin	undulate	flat	flat
Staminal filament shape	oblong, apiculate at the apex	oblong, apiculate at the apex	lanceolate, acuminate at the apex
Staminal filament size (mm)	5–5.5 x 1.6–2	6 x 1.7–1.9	5.5–6 x 1.6
Anther length (mm)	2.5–2.7	2.8	2.2–3.2
Anther colour	pale–green	greenish	yellowish-light green
Ovary shape	ovoid	ovoid	cylindrical
Ovary size (mm)	3 x 2.3	3–3.5 x 2.2–2.5	2–3.3 x 2.2–2.8
Style length (mm)	2.2–2.3	3–3.8	4–5.3
Capsule shape	ovoid	ellipsoid	ovoid to globose
Capsule size (mm)	6.5–7 x 5	8–9 x 6	(5) 7–11 x (4) 5–7
Chromosome number (2n)	22	20	24

**Table 2.** Karyomorphometric parameters and karyotype symmetry indices of *Loncomelos koprulense*. Values come from 10 good metaphase plates from individuals of the type localities.

Chromosome pairs	TAL (μm)			TRL%			AR	CI	Type
	Mean ± SD	Max	Min	Mean ± SD	Max	Min			
I	10.8 ± 1.3	12.3	9.2	7.0 ± 0.7	7.9	6.1	1.06	48.6	m
II	10.0 ± 1.2	11.8	8.9	6.5 ± 0.3	6.6	6.4	1.13	46.9	m
III	8.8 ± 1.0	10.1	7.4	5.7 ± 0.2	6.8	6.0	1.22	45.1	m
IV	8.8 ± 1.1	10.0	7.4	5.7 ± 0.4	6.4	5.2	1.49	40.2	msm
V	6.9 ± 1.3	9.0	5.1	4.5 ± 0.4	5.1	3.8	2.49	28.6	sm
VI	6.5 ± 1.3	7.8	4.9	4.2 ± 0.6	5.1	3.6	1.39	41.8	msm
VII	5.9 ± 0.6	6.7	5.3	3.9 ± 0.3	4.4	3.5	2.69	27.1	sm
VIII	5.4 ± 0.8	6.7	4.5	3.5 ± 0.1	3.8	3.3	2.17	31.5	sm
IX	4.9 ± 0.6	5.7	4.2	3.2 ± 0.1	3.4	3.1	2.38	29.6	sm
X	4.5 ± 0.3	4.9	4.0	2.9 ± 0.2	3.3	2.6	1.80	35.7	sm
XI	4.5 ± 0.9	5.7	3.4	2.9 ± 0.5	3.4	2.2	1.38	42.0	msm

**TCL:** 153.9 ± 17.1 μm; **MCL:** 7.0 ± 2.2 μm; **d-value:** 32.5; **DRL%:** 4.5; **S%:** 38.3; **MAR:** 1.54;

**MCI:** 38.7; **Cv<sub>CL</sub>:** 32.2; **Cv<sub>CI</sub>:** 21.2; **M<sub>CA</sub>:** 24.2; **Stebbins' category:** 2B

**Abbreviations:** TAL = total absolute length; TRL = total relative length; AR = arm ratio index; CI = centromeric index; Type=chromosome nomenclature; TCL = total chromosome length; MCL = mean chromosome length; d-value = difference between Long arms and Short arms; DRL% = difference of relative length; S% = Relative length of shortest chromosome; MAR = mean arm ratio index; MCI = mean centromeric index; Cv<sub>CL</sub> = coefficient of variation of chromosome length; Cv<sub>CI</sub> = coefficient of variation of centromeric index; MCA = mean centromeric asymmetry.