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Research article

A new record for the flora of Türkiye: *Allium capitellatum* (Amaryllidaceae), and *Allium calyanense* is a synonym of *Allium capitellatum*

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Abstract: *Allium capitellatum* Boiss. (Amaryllidaceae) species is known from Iran. The existence of this species in Turkey was determined by this study. The specimens of the species were collected in Hakkari and Van province, east Anatolia (Türkiye) and Kazvin province (Iran). Detailed morphological description of the species, photographs in its natural distribution area and the updated map of the distribution area are presented in the study. The recently published *Allium calyanense* Balos & Geçit is shown to be a synonym of *Allium capitellatum* Boiss.

Keywords: *Allium capitellatum, Allium calyanense,* Hakkari, Van, new record, synonym

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Introduction

Allium is the largest genus in Amaryllidaceae (Friesen *et al*. 2006), with more than 1000 spe-cies (Friesen *et al*. 2022). In the last decades, many *Allium* taxa were newly described from Türkiye and the number of species known to occur is raised to approximately 225 species, (Kollmann, 1984; Koyuncu, 2012; Fırat, 2015, 2017; Fırat et al., 2018). *Allium* is the largest genera in Türkiye, and 111 of the species are endemic to the country (Koyuncu, 2012, Balos & Geçit, 2023).

When the article *Allium calyanense* Balos & Geçit, published by Dr. Maruf Balos and Mr. Musa Geçit on 31 August 2023, is examined, it is seen that it is not new. And it was deemed appropriate to add it to the new record article.

Materials and Methods

During floristic surveys in Hakkari (Figures 1–2) in July and August 2011, 2018 and 2023, and in Van (Figures 1–2) in July 2012, 2019, in Iran 2012 specimens were collected of one unidentified species from genus *Allium*, therefore decided to analyze the morphological characters of the species. Then some other specimens were examined using a wide range of literature for the identification (e.g. Boissier, 1882; Wendelbo, 1971 and Kollmann, 1984) As a result of this effort, the specimens were identified *Allium capitellatum* Boiss. which is a new record for the Flora of Turkey. Images of the living material were taken with a Sony DSCR1 digital camera. Geographical positions were identified using a Magellan eXplorist 710 GPS, and insert in the Figure 1. A total of 10 herbarium specimens of the new species were collected from many adjacent localities and deposited in the herbaria in the personal herbarium of the author (Herb. Fırat).

Results

Allium capitellatum Boiss. (Figures 3–9) Diagn. Pl. Or. Nov. Ser. 1, 7: 118 (1846). Icon.: Tab. 3, fig. 27.

Type: Aucher-Eloy 5386, G! [regionis alpinse, mons Elamout Persiae borealis (Auch. 5386!), montes Nur, Kellal, Ssebsehuh Persise austrooccidentalis (Haussk!), Affgehaniae vallis Kurrum (Aitoh! ex Baker)].

Description [in Flora of Iranica, vol.76, page 25, in latin, 1971]: Bulbus 1–2 cm diametro, tunicis exterioribus

papyraceis, atrocinereis. Scapus 10–30 cm altus, costatus, usque ad dimidium circiter foliorum vaginis scabridis vel laevibus tectus. Folia (1-)2–3, 0.5–1.5 mm lata, sernitereti-filiformia, canaliculata. Spatha 0.5–1 cm longa, bivalvis, persistens. Umbella sphaerica, multiflora, densa; pedicelli usque ad 8(-12) mm longi, bracteolati. Perigonium campanulatum, viridi-album (in sicco erubescens) vel ± roseum nervis ± sordide violaceis; tepala ca. 3.5 mm longa, elliptico-ovata vel elliptico-oblonga, obtusa. Filamenta ca. 5.5 mm longa, violacea, basi connata et tepalis adnata, e basi anguste triangulari subulata, interiora basi interdum utrinque denticulo obtuso provisa; antherae 1–1.5 mm longae, flavae, demum purpurascenti-brunneae. Stylus ca. 4 mm longus, filiformis. Capsula valvis ca. 3.5 mm longis obcordatis.

Figure 1. Distribution map of; **A**. *Allium capitellatum* and *Allium calyanense* in Türkiye; **B**. *Allium capitellatum* in Iran and Türkiye

Figure 2. Habitat of *Allium capitellatum*: **A**. Hakkari, Berçelan plateau region, **B.** Van Başkale, Mor mountain region, **C.** Van Çatak, Kato mountain region, **D.** Kazvin province, Elbruz mountain region (Iran), **E.** Hakkari, from Berçelan plateau to Nebirnav plateau region

Emended Description Made with the Examined Specimens: Bulb ovoid to spheroidal, 0.8–2 × 0.8–2.2 cm; outer tunics coriaceous, dark brownish to dirty brown; inner tunics dirty white, without bulblets. Scape 7–25 cm

× 0.5–1.0 mm, cylindrical, green to purplish, often purplish above. Leaves 2–4, cylindrical, fistulose, filiform, 0.5–1.5 mm broad, as long as or shorter than scape (rarely longer), lower spirally twisted when dried, uppermost one minute, scabrid, leaf sheath up to lower $^2/_3$ of the stem, few swollen at base of lamina. Spathe 2-valved, valves almost of the same length, straw colored (brown when dry) membranous, reticulate, each valve 3-veined, persistent, shorter than umbel, 3–10 mm × 2–5 mm, ± equal to pedicel, cucullate-apiculate. Umbel globose, spherical to hemispherical, 1.5–2.8 cm diameter, lax, 7–35 flowered; pedicels smooth, ±unequal, white; 2–15 mm long, bracteolate, bracte lanceolate, white, membranous, 1–2 mm × 0.5–0.8 mm. Perigone oblong-campanulate; tepals white (some times purplish towards the ends) with light green and purplish midvein (when dry blushing to pink), smooth, 4.0–5.2 × 5.0–8.0 mm; outer tepals ovoid-oval to elliptic, 3.0–4.0 mm × 1.4–2.1 mm acute at the apex; inner tepals oblong-lanceolate, 3.2–4.2 mm × 1.7–2.0 mm, ±cucullate, acute at the apex, equal or slightly longer than outer tepals. Stamens long-exserted, ±1.5 × perigone, 4–6 mm; all filaments filiform, with or without small teeth at base. Anthers 1.0–1.5 mm × 0.5–0.8 mm, oblong, rounded at apex, yellow (finally purplish-brown). Pistil 3.5–4.0 mm; style 1.5 × 1.9 mm, filiform, included; ovary tetragonal to globose, ±short stipitate at base, green, whitish-green, thiny strigillose, divided into 6 segments and segments in two slices, ±12 equal slices (succession of segments, one green and the other whitish-green). Capsule ovoid-cordate to subcordate, 3.5–4.7 mm × 3.0–4.0 mm; seeds 2.0–2.5 × 1.5–2.0 mm, black.

Habitat: Dry or wet rocky slopes, 3000–3400 m. (in Türkiye) and 2800–4050 m (in Iran)

Phenology: Flowering from July to August and fruiting from August to September.

Distribution in Türkiye: Hakkari and Van province

General distribution: Iran and new to Türkiye

Vernacular name: *Allium* species are known by the local people under many names in Kurdish, e.g. “Bavê sîr”, “Çorîn”, “Giyabizing”, “Gûhbizin”, “Kahar”, “Karûd”, “Kiniwal”, “Lûşa“, “Lûş”, “Lûz”, “Palîmok”, “Sîrik”, “Sîrim” and “Sîrmok” (Fırat, 2013).

New localities: *Allium capitellatum.*: TÜRKİYE. C9 Hakkâri: Berçelan plateau, stony rocky steppes (sometimes grow wet area), 3112 m, 37°41´ N 43°42´ E, 21 August 2011, *M. Fırat 27595*! (Herb. M. Fırat). İbid. 29 July 2018, *M. Fırat 34049*! (Herb. M. Fırat). B9 Van: Başkale district, Mor mountain, stony steppes wet area, 3219 m, 37°45´ N 44°17´ E, 5 August 2012, *M. Fırat 28865*! (Herb. M. Fırat). B9 Van: Çatak district, Kato mountain, stony steppes wet area, 3014 m, 37°54´ N 43°12´ E, 1 August 2019, *M. Fırat 34985*! (Herb. M. Fırat). C9 Hakkâri: from Berçelan plateau to Nebirnav plateau, stony rocky steppes, 3316 m, 37°41´ N 43°41´ E, 6 August 2023, *M. Fırat 40082*! (Herb. M. Fırat). IRAN. Kazvin province: Elbruz mountain 3079 m, stony rocky steppes, 3079 m, 36°04´ N 51°48´ E, 10 August 2012, *M. Fırat 28907*! (Herb. M. Fırat).

Locality in Flora of Iranica: Persia: N: Maz.: M. Alamut, *AUCH. 5386*! Kuh-i Nizwa, in summo occidentale, 3200 m, *WDB. 1281*! Distr. Kojur: M. Uloj, 3200-3400 m, *RECH. 6480*! In valle flavii Chalus: Pol-e Zanguleh, *RECH. 6363-a*!, *MANUCH. 7031*-E!-W: Lur.: Kuh Nur, *HAUSSKN.*! Bakht.: Kuh-e Kukular et Sabzekuh, *HAUSSKN.*! Zard Kuh supra vallem Kuhrang, 4140 m, *ARCHIBALD 2987*! Tang-i Sirdan inter vallis Kuhrang et Bazoft, 4110 m, *ARCHIBALD 3034*!-C: Tehr.: W Emamzadeh Hashem, 2900 m, *WDB. 1410*! M. Damavand supra Reneh, 2950 m:*GILLI* s. n.! Inter pagum Damavand et lacum Tar, 2800 m, *GILLI* s. n.! Prope jugum Kandavan, 2900 m, *GILLI* s. n.! (Wendelbo, 1971).

Taxonomy

Allium capitellatum Boiss. Diagn. Pl. Or. Nov. Ser. 1, 7: 118 (1846). Icon.: Tab. 3, fig. 27.

Type: Aucher-Eloy 5386, G! [regionis alpinse, mons Elamout Persiae borealis (Auch. 5386!), montes Nur, Kellal, Ssebsehuh Persise austrooccidentalis (Haussk!), Affgehaniae vallis Kurrum (Aitoh! ex Baker)].

≡ *Allium calyanense* Balos & Geçit, Ann. Bot. Fennici 60: 203–208 (2023). **Syn. nova**

Type: Turkey. Van Province, Catak District, near Calyan Lake, moist stony slopes with melted snow, 37°46´57.43´´N, 43°23´10.95´´E, 3000–3070 m a.s.l., 28 July 2023 *M. Balos 5515 & M. Geçi*t (holotype and isotype HARRAN). Paratypes: Same locality, 3070 m a.s.l., 27 July 2021 M. Geçit (*M. Balos 5399*) (HARRAN). (Figures 10–11)

Figure 3. *Allium capitellatum*: **A**. habit, **B.** leaf sheaths on stem, **C**. inflorescence, **D.** inflorescence with flowers and buds" (*M. Fırat 27595*-Hakkari, Berçelan plateau).

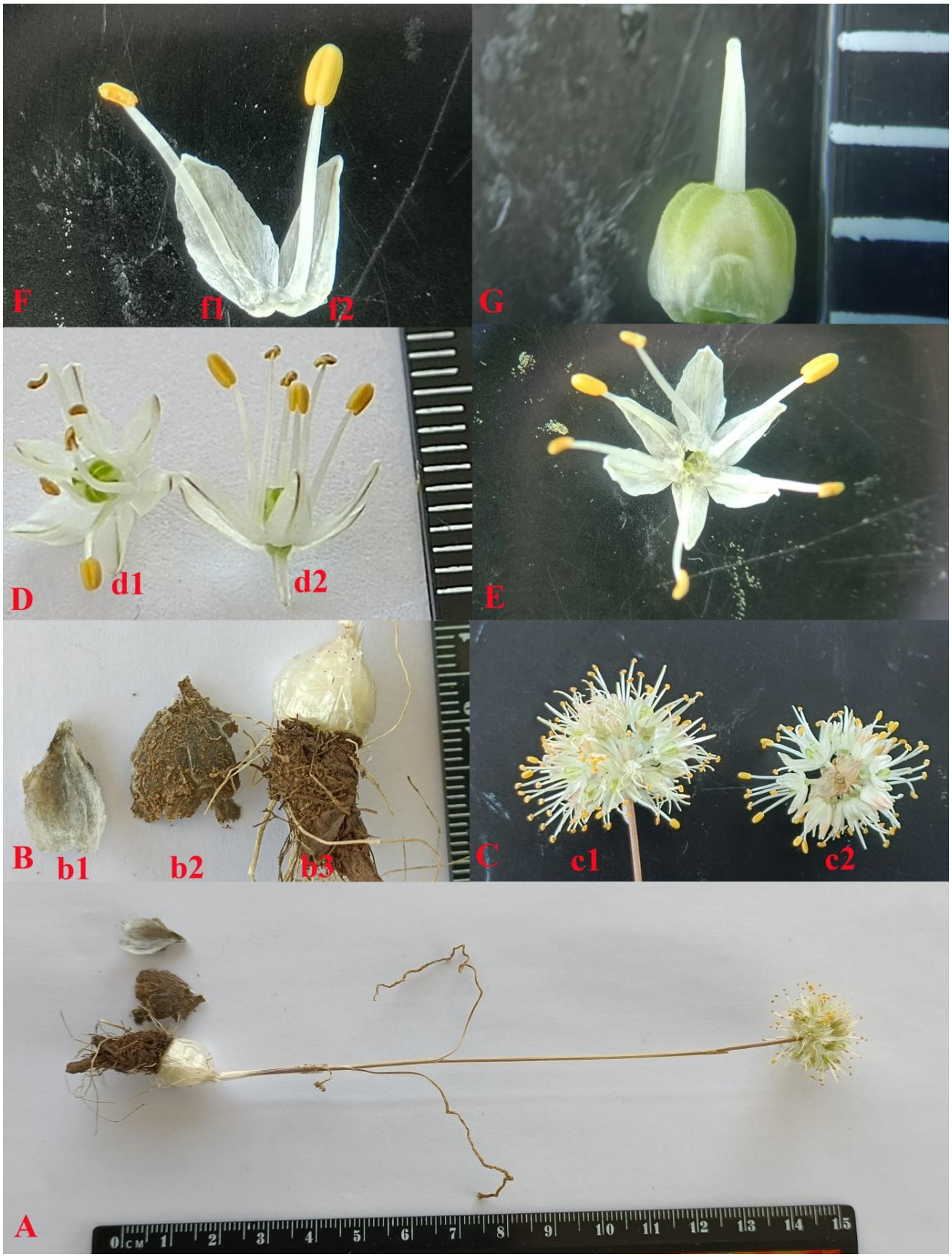

Figure 4. *Allium capitellatum* in fresh material: **A**. habit; **B.** bulb; **b1**. inner tunic, **b2**. outher tunic, **b3**. shape of bulb; **C.** inflorescence; **c1.** inflorescence frontale, **c2.** inflorescence with spatha; **D.** flowers; **d1**. top view of flower, **d2.** horizontal wiev of flower; **E.** inner surface of open perigone; **F.** outer and inner tepal with stamen; **G.** pistil (*M. Fırat 27595*-Hakkari, Berçelan plateau).

Figure 5. *Allium capitellatum* in fresh material: **A.** inner surface of open perigone in under the microscope (stamen with interstaminal teeth at base) (*M. Fırat 27595*-Hakkari, Berçelan plateau). **B.** inner surface of dissected perigone (stamens without interstaminal teeth at base) (*M. Fırat 27595*-Hakkari, Berçelan plateau).

Figure 6. *Allium capitellatum*: **A**. habit, **B.** Bulb, **C**. inflorescence (have 7 flowers and purplish towards the ends) (*M. Fırat 34985*-in Van, Çatak area "nearly area of type samples *Allium calyanense*).

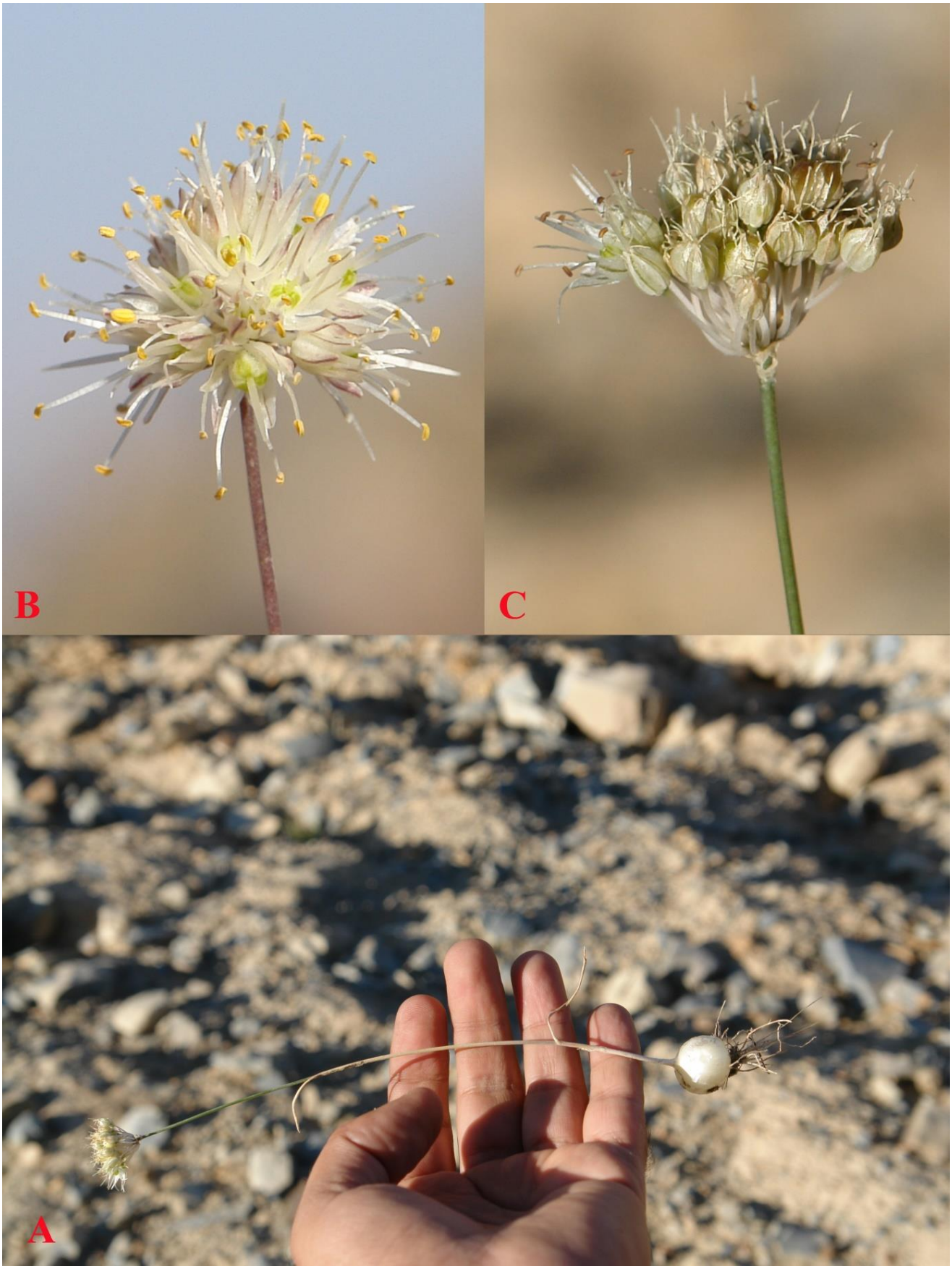

Figure 7. *Allium capitellatum*: **A**. habit, **B.** inflorescence (tepals purplish towards the ends, fresh anthers yellow (anther finally purplish-brown) in flowers, **C**. immature fruit inflorescence (anthers finally purplish-brown) (*M. Fırat 28907*, Kazvin province: Elbruz Mountain-Iran)

Figure 8. *Allium capitellatum*: **A**. habit, **B.** bulb, **C**. inflorescence (Van, Başkale, Mor Mountain, *M. Fırat 28865*)

Figure 9. *Allium capitellatum* in dry material (for herbarium): **A**. habit; **B.** inflorescence, **C.** umbel hemispherical (when dry light blushing), **D.** umbel hemispherical (when dry white), **E.** umbel spherical to hemispherical (when dry blushing to pink), **F.** umbel globose (when dry light blushing) (*M. Fırat 40082*)

Figure 10. *Allium capitellatum* (≡ *Allium calyanense* Balos & Geçit). — A and B: Habitat. — C and D: Habit at the type locality. — E and F: Inflorescences (Balos &Geçit, 2023, Appendix 2. Page. 4).

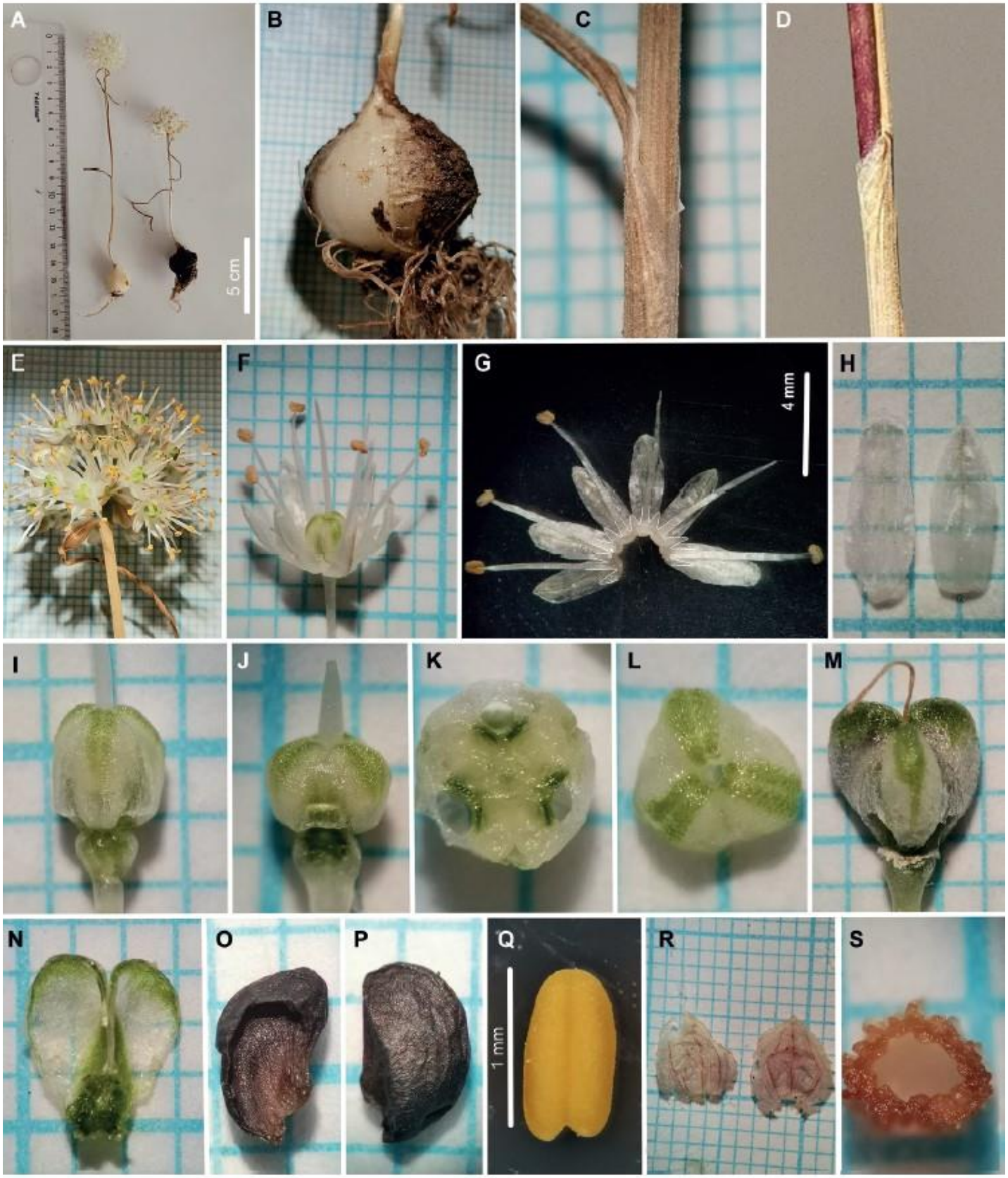

Figure 11. *Allium capitellatum* (≡ *Allium calyanense* Balos & Geçit) (from the holotype). — **A**: Habit. — **B**: Bulb. — **C**: Leaf sheaths on stem. — **D**: Leaf sheaths and scape. — **E**: Inflorescences. — **F**: Flower. — **G**: Inner surface of open perigon. — **H**: Outer and inner tepal. — **I–J**: Ovary. — **K**: Ovary cross-section (lower part). — **L**: Ovary cross-section (upper part). — **M**: Capsule. — **N**: Valve of capsule. — **O–P**: Seed. — **Q**: Anther. — **R**: Valves of spathe. — **S**: Leaf cross-section. (Balos &Geçit, 2023, Appendix 3. Page. 5).

Table 1. Morphological comparison between *Allium calyanense*[*] and *A. capitellatum*[*] with comparison comment.

Charecters	*A. calyanense*	*A. capitellatum*	comparison comment
Bulb diameter (cm)	0.9–1.7	1–2	In other words, this is not a sufficient difference for the species, it can change in these dimensions in a wider area and when the s specimens are examined.
Stem length (cm)	6.5–23	10–30	In other words, this is not a sufficient difference for the species, it can change in these dimensions in a wider area and when the specimens are examined.
Leaf sheath	up to 2/3–4/5 of stem, scabrid, sheaths ± ribbed	up to about 1/2 of leaves covered with scabrous or smooth	The author who first described the specimens would have changed these measures in 1846 had he seen more examples. It is not a sufficient measure to be new.
Leaves	2–3, exceeding inflorescence, semicylindrical, canaliculate, scabrid	(1)2–3, semiterete-filiform, canaliculate	Same thing is stated. The author did not specify some characters in detail under the conditions of that day. And expecialy scabrid
Spathe length (mm)	5.5–7	0.5–1	The author overlooked here, *A. capitellatum* spatha length is given in cm. Whereas *A. calyanense* is given in mm. When turned to cm, it becomes 5–10 mm. There is no difference here.
Umbel shape	spherical	spherical	This is not a difference, contain each other
Umbel diameter (mm)	1.5–3.2	N/A	Unmeasured
Pedicel length (mm)	4–14	up to 8(12)	This is not a difference, contain each other
Perigon shape	campanulate	campanulate	This is not a difference, contain each other
Tepals	dirty white, midrib green, brown or purplish	greenish-white (blushing when dry) or ± pink with veins ± sordid violet	They express the same things in different ways.
Outer tepal length (mm)	2.5–3.75	ca. 3.5	This is not a difference, contain each other
Outer tepal shape	ovate-lanceolate	elliptic-ovate or elliptic-oblong	They express the same things in different ways.
Inner tepal length (mm)	2.5–4	ca. 3.5	This is not a difference, contain each other
Inner tepal shape	ovate-lanceolate	elliptic-ovate or elliptic-oblong	They express the same things in different ways.
Filaments	whitish, 4–5.5 mm long, with interstaminal teeth at base	ca. 5.5 mm long, violet, interior of the base sometimes with a blunt denticle on both sides	The same things. only because the author examined a single locality and a single sample, he stated that there were teeth at base. Whereas there are examples without teeth at base, even on the same plots. Only the color of the stamens is different, I think this is a variation or color illusion. Stamens are not violet in any of the specimens we have collected or examined. Variation is acceptable within limits.
Anther length (mm)	1–1.2	1–1.5	This is not a difference, contain each other
Anther colour	yellow	yellow, finally purplish-brown	This is not a difference, contain each other, When viewed on the author's own photographs, Figure 2 E-F, the anthers become purplish-brown in color as they age.
Style length (mm)	1.25–4.75	ca. 4	This is not a difference, contain each other
Capsule diameter (mm)	2.5–3	ca. 3.5	This is not a difference

*(Balos & Geçit, 2023)

Everything is clear in Table 1. Although the author has prepared this file, I still have difficulty in understanding how he claimed to be a new species. I think the reviewer who reviewed this article did not examine it enough and accepted that it was new. Otherwise, she/he would see that there is no new species.

Conclusion

In the Flora of Turkey volume 8, there is a note below *A. anacoleum*. Specimens from S.E. Anatolia cannot be identified with certainty as *A. capitellatum*. One specimen from Berçelan plateau (C9 Hakkari), cited by Koyuncu in Notes R.B.G. Edinb. 38:419 (1980) and previously determined by me as *A. capitellatum*, is poorly developed

with short, hardly exserted filaments (in *A. capitellatum* they are 1.5–2 × as long as the perianth) (Kollmann, 1984). The region mentioned is where the specimens autor of the article identified as *A. capitellatum* is distributed. *A. anacoleum* species are also distributed in areas close to the same region. In fact, the reason why it is said that the flower color is pink and white in the description of *A. anacoleum* can be described as being confused with this species. autor of the article have been doing land in Eastern Anatolia for years, and have never come across a white *A. anacoleum*. In this case, those who wrote the description must have confused the two plants. Stamens with interstaminal teeth at base may or may not be in different individuals of the same population. And this is not a good character. In some populations, nearly half of the sepals may turn purplish-pink. When it dries, it becomes more visible and creates the impression that the samples have purplish-pink flowers. Sometimes there may be a lot of scabrid on the leaves, sometimes there may be little or none.

Allium capitellatum belongs to *Allium* subgen. *Polyprason* sect. *Scorodon.* With this new record, the number of allium species in Turkiye has increased to 226. *Allium* sect. *Scorodon* species show many variations. Especially *A. anacoleum*, *A. microspathum* and *A. capitellatum* show a lot of variation. When the new species will be published, if possible, it is necessary to visit all localities of these species in the field and make observations while they are in flower. Herbarium specimens is not enough.

In summary, publishing a new species should be focused on solving the problem. A new species should not be published to create new problems.

Ethical Approval

The author does not declare ethical approval.

Conflicts of Interest

The author declares that he has no conflict of interest.

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