

## *Geranium kalenderianum* (Geraniaceae), a new species from Turkey

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*Geranium kalenderianum* A. İlçim & L. Behçet from the city of Kahramanmaraş, Turkey, is described as a new species and illustrated. Diagnostic characters and taxonomic comments on the species are given. It is compared with closely similar *Geranium subacutum* and *G. palmatipartitum*. The geographical distribution of the new species and the similar ones is presented on a map.

Key words: Geraniaceae, *Geranium*, new species, taxonomy

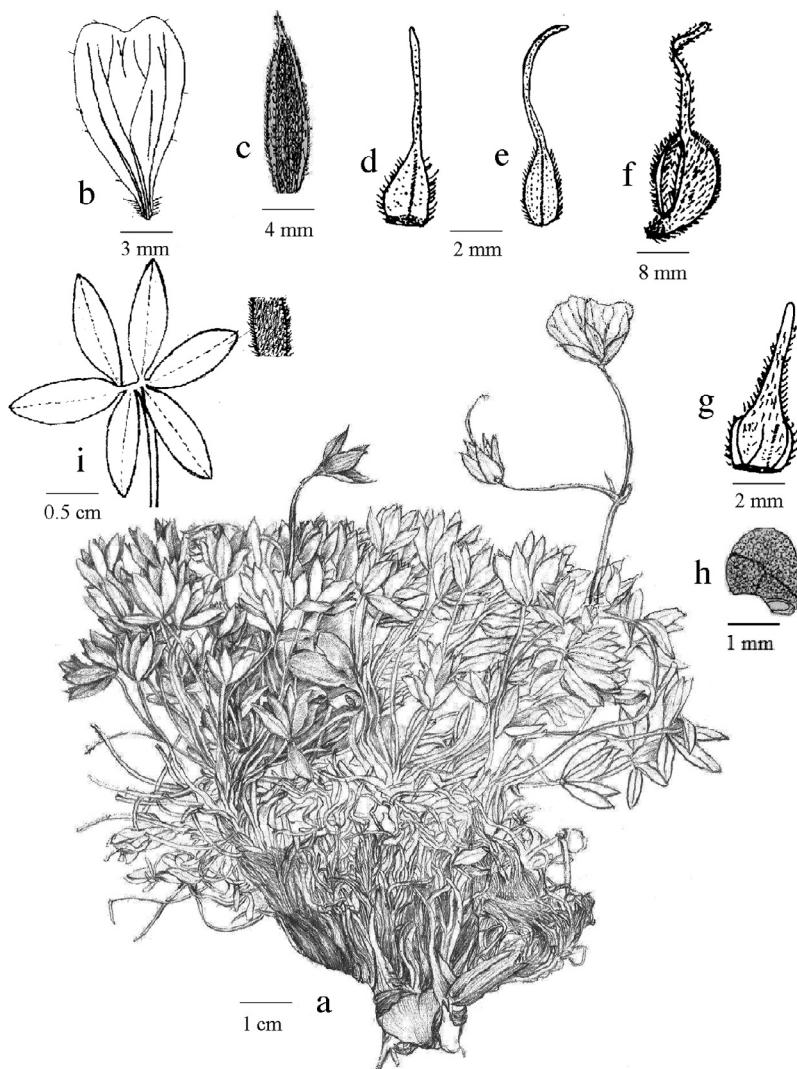
In 2000 and 2001, the senior author collected some *Geranium* (Geraniaceae) specimens with fruit and flowers from Binboğa mountain (1915–1950 m) in the upper part of Armutlu pınar (Afşin–Kahramanmaraş, Turkey). After thorough consultation of the Flora of Turkey (Davis 1967, Davis *et al.* 1988, Güner *et al.* 2000), Flora of Syria, Palaestina and Sinai (Bill 1932), Flora Palaestina (Zohary 1987), Flora Iranica (Schönbeck & Temesvári 1970) and Flora Europea (Webb & Heywood 1968), we concluded that the closest species to our material appeared to be *Geranium palmatipartitum* and *G. subacutum*. After comparisons with specimens in GAZI and ANK it was concluded to describe the material as a new species.

*Geranium* comprises ca. 400 species in temperate areas and tropical mountains throughout most of the world (Aedo *et al.* 2005), being absent only in tropical lowlands, deserts and polar regions. According to the currently accepted clas-

sification (Yeo 1984) *Geranium* is divided into the subgenera *Geranium*, *Erodioidaea* and *Robertium* (Aedo *et al.* 1998, 2002). *Erodioidaea* comprises three sections. The section *Subacaulia* is distributed in the circum-Mediterranean mountains and comprises *G. argenteum* (France, Italy, Slovenia), *G. cazorlense* (Spain) and *G. cinereum*. Of these, the latter has five subspecies: *cinereum* (France & Spain), *dolomiticum* (Spain), *subargenteum* (Spain), *nanum* (Morocco) and *subcaulescens* (plus eight varieties across Italy, Albania, Serbia, Macedonia, Montenegro, Greece, Turkey and Lebanon). A further study and revision by Aedo (1996) elevated the subspecies and the varieties into a total of 15 species.

***Geranium kalenderianum* A. İlçim & L. Behçet, sp. nova** (Figs. 1–2)

*Species G. palmatipartito affinis, sed planta*



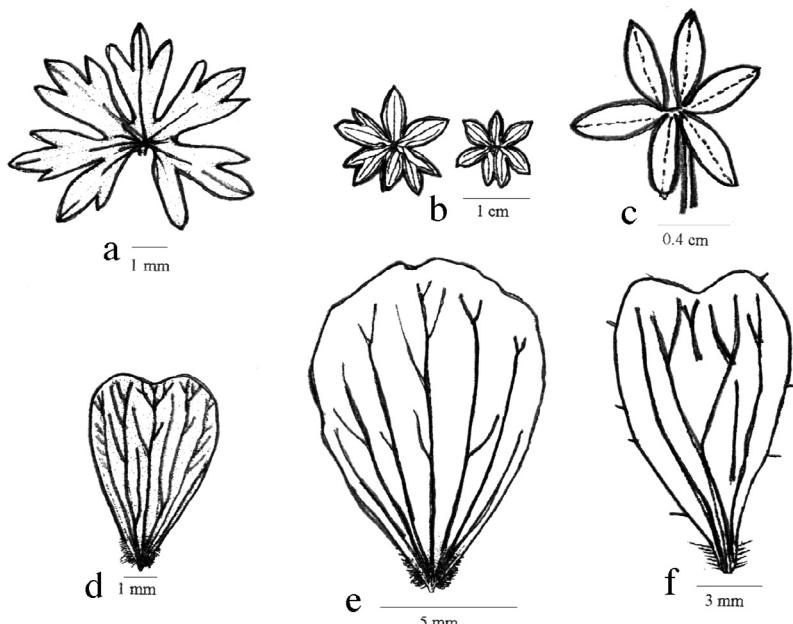
**Fig. 1.** *Geranium kalenderianum* (from holotype). — a: Habit. — b: Petal. — c: Sepal. — d: Outer filament. — e: Inner filament. — f: Mericarp. — g: Pistil. — h: Seed. — i: Leaf.

*densus foliatus, appressus pubescente, interdum sparsus brevis glanduloso pubescente (nec sparsim foliatus et patule eglanduloso pubescente); foliis ad basin usque palmatifidis, divisus ad 100% ex radius, 6–8 fida (nec divisus ad 65%–80% ex radius, 5–7 partita); segmentis liberatus, non continuus, sessilibus vel distincte (1 mm) petiolulatis, apice non divisus (nec connati in inferiora partibus, apice interdum divisus); petiolus ad 6 cm (nec 6–9 cm); petalis 8–18 mm longis, limbus sparsim, unguis densus patule pilosus (nec 16 mm longis et tantum unguis pilosus) differt.*

TYPE: Turkey. South Anatolia, B6 Kahramanmaraş,

Afşin, Tanır kasabası, Güvek Yaylası (high land), Binboğa Dağı (Binboğa Mt.) rocky places, between rock clefts, 1915–1950 m, 20.VI.2001 A. İlçim 1373 (holotype KSUH; isotypes GAZI and VANF). — PARATYPE: Turkey. B6 K. Maraş: Afşin, Tanır kasabası, Güvek Yaylası, Binboğa Dağı 1915–1950 m, rocky places, 27.V.2000 A. İlçim 986 (with fruit, KSUH).

Perennial herb. Woody tap rooted, acaulescent, scapes 2–12 cm, with patent densely, 0.1–0.6 mm long eglandular hairs. Leaves all in basal, persistent rosettes, old petiole remains at base; 1.2–2.5 × 1.5–2.5 cm, pinnatifid (divided 100% of radius), greyish, densely pilose, with adpressed eglandular hairs, leaf segments 6–8, sessile or shortly (up to 1 mm) petiolulate, 7–10 × 1.5–4 mm, entire elliptic; petiole up to



**Fig. 2.** — a–c: Leaves. — a: *Geranium subacutum*. — b: *G. palmatipartitum*. — c: *G. kalenderianum*. — d–f: Petals. — d: *G. subacutum*. — e: *G. palmatipartitum*. — f: *G. kalenderianum*. (a, b, d and e redrawn from Aedo 1996).

6 cm long, densely pilose, with patent, eglandular hairs, stipules 5–9 × 1–1.5 mm, linear to subulate, with 0.5–1 mm long eglandular hairs. Inflorescence cymose, cymules solitary, with 1–2-flowered, arising from tap-roots, bracts reddish, filiform 4, 6–7 mm long, pilose and rarely very short glandular, scapes with eglandular (0.4–0.5 mm long) hairs, pedicels 1–5 cm long, straight or curved, unequal, with eglandular hairs. Sepals 10–14 × 3–4 mm, with an apical mucro (0.8–1 mm) and scarious margin 0.2–0.3 mm wide, covered with eglandular hairs (0.2–0.4 mm long on surface and 0.5–1.4 mm long on the margin). Petals up to 18 mm long, clearly emarginate, white, with purplish veins, the base with 2–3 mm long eglandular hairs, upper parts sparsely short (0.2–0.3 mm long) eglandular hairy. Filaments linear-filiform, at base pilose, 4–8 mm long, base expanded, expanded part 1–1.5 × 0.5–1 mm. Anthers dorsifix, yellow to brown, 2.8–3 mm long, 1 mm wide. Gynoecium pilose, 6–7 mm long; stigma brown to reddish. Fruit reddish, up to 3.5 cm, pilose, mericarps 5–6 × 1.5–2 mm, with 2 transverse ribs at the apex, pilose ( $\pm$  adpressed, eglandular hairs 0.5–1 mm long), rostrum 24 mm long, pilose; stigmatic remains 2–2.5 mm long, with 5 lobes. Flowering and fruiting in May–June.

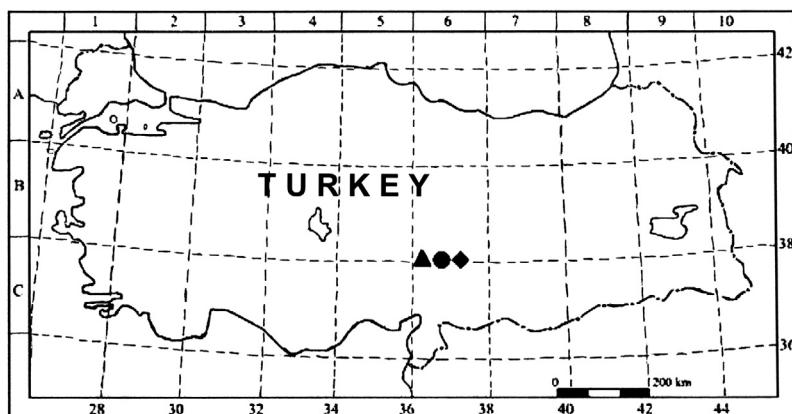
**ETYMOLOGY:** This new species is named in honour of the Kalender family who are currently supporting our Binboga Mountain research.

*Geranium kalenderianum* resembles *G. palmatipartitum* and *G. subacutum* yet clearly differs from them by the characters listed in Table 1. *Geranium subacutum* and *G. palmatipartitum* were first recognized as varieties of *G. cinereum* subsp. *subcaulescens*. Before Aedo's (1996) study, *Geranium cinereum* had five subspecies: *cinereum*, *dolomiticum*, *subargenteum*, *nanum* and *subcaulescens*. Aedo (1996) elevated these to the species rank and also made some other taxonomic changes in this group of taxa.

A comparison of leaf and petal features among *G. kalenderianum*, *G. subacutum* and *G. palmatipartitum* is in Fig. 2. *Geranium subacutum* and *G. palmatipartitum* were growing sympatrically with the new species in the paratype locality (Fig. 3).

### Key to the species

1. Flowers solitary on each 2-bracteate peduncle; leaves mostly cauline ..... *G. sanguineum*
1. Flowers usually 2 on each 4-bracteate peduncle; leaves basal or cauline ..... 2
2. Plant densely leafy; leaves palmately divided into 6–8



**Fig. 3.** Distribution of *Geranium kalenderianum* (▲), *G. palmatipartitum* (●) and *G. subacutum* (◆) in Turkey.

**Table 1.** Comparison of the diagnostic characters of *Geranium kalenderianum*, *G. subacutum* and *G. palmatipartitum*.

	<i>G. subacutum</i>	<i>G. palmatipartitum</i>	<i>G. kalenderianum</i>
Leaves	palmatifid, divided for 0.55–0.75 of its length	palmatifid, divided for 0.65–0.8 of its length	palmately divided to the base, with leaflet
Leaf lobes	5–7, obtiangular, (1–)3 lobed, continuous	5–7, elliptic, usually entire (sometimes 2–3 lobed) in the distal half, continuous	6–8 elliptic, free each other not continuous, sessile or 1 mm petiolulate
Petiole length (cm)	5–12	6–9	up to 6
Plant indumentum	usually patent eglandular	patent eglandular	densely adpressed pubescent and short sparsely glandular
Sepal length (mm)	6–9(–11)	9–12	10–14
Petal length (mm)	13–15	16	8–18
Petal indumentum	only at base densely hairy	only at base densely hairy	at base densely 2–3 mm long, upper parts sparsely 0.2–0.3 mm long hairy

- leaflets, not contiguous; leaflets sessile or 1 mm petiolulate, elliptic, unlobed, entire; petal 8–18 mm, limb sparsely pilose ..... *G. kalenderianum*
2. Plant not densely leafy; leaves palmatifid, 5–7 lobed, segments 2–8 lobed, sometimes entire, contiguous; petal 13–16 mm, limb of petal glabrous ..... 3
3. Leaves with elliptic segment, segments usually entire or 2-lobed at apex; petals 13–15 mm .. *G. palmatipartitum*
3. Leaves with obtiangular segments, segments usually 3–8-lobed; petals 16 mm ..... *G. subacutum*

**HABITAT ECOLOGY:** This species grows on the high mountains, in rocky places with characteristic plants such as *Salvia multicaulis*, *Astragalus nitens*, *Draba bruniifolia* subsp. *olympica*, *Scrophularia cryptophila*, *Fritillaria aurea*, *Astragalus melitensis*, *Tanacetum armenum*, *Astragalus lineatus* var. *lineatus*, *Nepeta transcaucasica*, *Ranunculus fenzlii*, *Eremurus spectabilis*,

*Ajuga salicifolia*, *Morina persica*, *Pelargonium endlicherianum*, *Sedum sempervivoides* and *Pedicularis cadmea*.

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