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Hüseyin EROĞLU

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Asperula fidanii sp. nov. (Rubiaceae, *Asperula* L. sect. *Oppositifoliae* Schischk. ex Schönb.-Tem.): a new species from South Eastern Anatolia, Turkey

Hüseyin EROĞLU
Yüzüncü Yıl University, Faculty of Sciences, Department of Biology,
65090, Tuşba-Van (Turkey)
huseyineroglu_41@hotmail.com

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ABSTRACT
Asperula fidanii sp. nov. (Rubiaceae) is described as a new species in the Beytüşşebap district, Şırnak province in the south-east of Turkey. *Asperula fidanii* sp. nov. is similar to *A. fragillima* Boiss. & Hausskn., *A. friabilis* Schönb.-Tem. and *A. podlechii* Schönb.-Tem. However, it is easily distinguished from *A. fragillima*, with its tubular, white, hairy, and shorter flowers. It differs from *A. friabilis* by the length of the corolla, the corolla lobes shorter than its tube and the hairless ovary. It differs from *A. podlechii* in that it has setulose hairs, corolla tubular and hairy. Morphology, pollen and mericarp surface characteristics of *A. fidanii* sp. nov. were determined. Morphological and palynological data and description of the species were provided. The distribution area of *A. fidanii* sp. nov. and other related *Asperula* L. species was also presented on the map.

KEY WORDS
Rubiaceae,
Turkey,
Şırnak,
endemism,
new species.

RÉSUMÉ
Asperula fidanii *sp. nov. (Rubiaceae,* Asperula *L. sect.* Oppositifoliae *Schischk. ex Schönb.-Tem.) : une espèce nouvelle du sud-est de l'Anatolie, Turquie.*
Asperula fidanii sp. nov. (Rubiaceae) est décrite comme une nouvelle espèce dans le district de Beytüşşebap, province de Şırnak au sud-est de la Turquie. *Asperula fidanii* sp. nov. est similaire à *A. fragillima* Boiss. & Hausskn., *A. friabilis* Schönb.-Tem. et *A. podlechii* Schönb.-Tem. Cependant, il se distingue facilement de *A. fragillima*, avec ses fleurs tubulaires, blanches, velues et plus courtes. Il diffère de *A. friabilis* par la longueur de la corolle, les lobes de la corolle plus courts que son tube et l'ovaire glabre. Il diffère de *A. podlechii* en ce qu'il a des poils sétacés, une corolle tubulaire et velue. La morphologie, les caractéristiques du pollen et de la surface des méricarpes de *A. fidanii* sp. nov. ont été déterminées. Des données morphologiques et palynologiques et une description de l'espèce ont été fournies. Les aires de répartition de *A. fidanii* sp. nov. et d'autres espèces apparentées d'*Asperula* L. ont également été présentées.

MOTS CLÉS
Rubiaceae,
Turquie,
Şırnak,
endémisme,
espèce nouvelle.

INTRODUCTION

The family Rubiaceae Juss. (1789: 196) is represented by three subfamilies, 67 tribes, about 590 genera and about 13 620 species (Christenhusz & Byng 2016; Angiosperm Phylogeny Group 2009). The Rubieae Baill. (Baillon1880: 365) tribe, which includes the genus *Asperula* L. (Linnaeus 1753: 103), is represented by about 900 species (Del Guacchio & Caputo 2020).

The genus *Asperula* is one of the largest genera in the tribe Rubieae of Rubiaceae family and is mainly distributed in temperate regions of both hemispheres (Thompson 2009). Within 10 sections in the world, the genus is represented by a total of 233 taxa, 186 of which are at the species rank. (Latrou & Georgiadis 1984; Ehrendorfer *et al.* 2005; Thompson 2009; Brullo *et al.* 2009; Minareci & Yıldız 2010; Öztürk 2013; Şahin *et al.* 2021). The distribution center of the genus is southwest Asia, but there is also distribution in the western Mediterranean, western Europe and eastern Asia. Apart from above mentioned monoecious sections, a section (Sect. *Dioicae* Airy Shaw & Turrill) consisting of dioecious individuals also spreads in Australia and New Zealand (Ehrendorfer & Schönbeck-Temesy 1982; Schönbeck-Temesy & Ehrendorfer 2005, Thompson 2009). The genus *Asperula* is represented by six sections in Turkey and nine sections in Iran (Ehrendorfer & Schönbeck-Temesy 1982; Schönbeck-Temesy & Ehrendorfer 2005).

Although the taxa of the Rubieae tribe are monophyletic, it has been reported in previous studies that the genus *Galium* L. is paraphyletic and the genus *Asperula* is definitely polyphyletic (Ehrendorfer *et al.* 2005; Gargiulo *et al.* 2015; Del Guacchio & Caputo 2020).

The section *Oppositifoliae* Schischk. ex Schönb.-Tem. (Schönbeck-Temesy 1991: 197) is easily differentiated from other sections of the genus *Asperula* due to its stipules being very reduced or absent. The section is represented by 32 taxa in total, including 26 species and six subspecies worldwide. Distribution area of the section spreads from South and East Anatolia, Iran, Central Asia, Tibet and West Himalaya (Ehrendorfer & Schönbeck-Temesy 1982; Schischkin 1999; Schönbeck-Temesy & Ehrendorfer 2005).

Species in the section *Oppositifoliae* differ from each other by characters such as plant height, leaf aspect ratio, corolla length, corolla lobe length to corolla tube length ratio, corolla hairiness and color, the presence or absence of indumentum on the plant, the presence or absence of hairs on mericarp and, if present, their length on mericarp, shape of bracts, and whether there are reduced stipules on the plant or not. (Ehrendorfer & Schönbeck-Temesy 1982; Schönbeck-Temesy & Ehrendorfer 2005).

Del Guacchio & Caputo (2020) suggested raising the *Cynanchicae* DC. (Boiss.), *Thliphthisa* (Griseb.) Ehrend. and *Hexaphylla* Ehrend. sections belonging to the genus *Asperula*, to the genus rank in their study in 2020. In the same study, Del Guacchio and Caputo, referring to an unpublished molecular work of Ehrendorfer and Barfuss, stated that the *Oppositifoliae* and *Crucianelloides* Boiss. sections represent different evolutionary lineages in *Asperula*, but they believed that it would be premature to change the nomenclature.

In the 7th volume of the Flora of Turkey, the genus *Asperula* is specified as 56 taxa, including 41 species, 14 subspecies and one variety in six sections (Ehrendorfer & Schönbeck-Temesy 1982). Later, one species was added to the genus in the 10th volume of the flora (Davis *et al.* 1988). In the work titled "Türkiye Bitkileri Listesi (Damarlı Bitkiler)" (Minareci 2012), the genus is specified as a total of 50 taxa with 38 species, 10 subspecies and two varieties, 26 of which are endemic. One reason for the decrease in the number of taxa is that some taxon names are synonymous. Another reason is that some taxa in the previous study have been excluded from the list because they are located in the eastern Aegean islands belonging to Greece and do not spread within the political borders of Turkey. After that, two new species were added to the flora of Turkey and the number of taxa in the genus increased to 52 and the number of endemic taxa to 28 (Öztürk 2013; Şahin *et al.* 2021).

In the Flora of Turkey, there are two species; *A. virgata* Hub.-Mor. ex Ehrend. & Schönb.-Tem. and *A. cilicica* Hausskn. ex Ehrend. belonging to the section *Oppositifoliae*. Of these species, *A. virgata* is distributed in the northeast of Turkey, and *A. cilicica*, which is the westernmost member of the section *Oppositifoliae*, distributed in the south and southwest of Turkey (Ehrendorfer & Schönbeck-Temesy 1982).

There are 13 taxa, eight species and six subspecies, in the *Oppositifoliae* section of the Iranian Flora. Only four of these taxa are distributed within the political borders of Iran. The remaining ten taxa are distributed in Afghanistan, Iraq and Pakistan and are included in the flora as they are likely to be distributed in Iran (Schönbeck-Temesy & Ehrendorfer 2005).

Here, the author describes a new species belonging to the genus *Asperula*. It was identified based on morphological data. In addition, the author presents both palynological and mericarp surface characteristics of the new species.

MATERIAL AND METHODS

In 2020, during the field studies of the author of the article, a population belonging to genus *Asperula* representing a possible new species was found in Betüşşebap district, Şırnak province located south east of Turkey. The specimens were first tried to be identified from the Flora of Turkey. Since there is not much similarity between the species of the *Oppositifoliae* section, which is distributed in Turkey and the specimens we collected, in terms of hairiness of plant and flower characteristics, and because the collected samples are closer to Iran and Iraq in terms of distribution, it was tried to be identified from Iran and Iraq floras. It was concluded that the collected specimens were more morphologically similar to some of the specimens found in the flora of Iran and Iraq. The same population was observed again the following year in order to see the population size and to better determine the variation limits of the species. After the literature study on the genus *Asperula* and the section

FIG. 1. — Type specimens of *Asperula fidanii* Eroğlu, sp. nov. and relative species: **A**, *A. fidanii* sp. nov. [VANF165222]; **B**, *A. fragillima* Boiss. & Hausskn. [W0047267]; **C**, *A. friabilis* Schönb.-Tem. [K000770021]; **D**, *A. podlechii* Schönb.-Tem. [MSB, MSB120178].

Oppositifoliae, the type specimens of the species close to collected specimens were examined in E, JE, K, MSB, W, and WU digital herbaria (abbreviations follow Thiers 2016) (Fig. 1). Specimens were collected from field deposited in Van Yüzüncü Yıl University Herbarium (VANF) and Siirt University Herbarium (SUFAF) and the relevant literature were used in the comparisons (Ehrendorfer & Schönbeck-Temesy 1980, 1982; Mouterde 1983; Adylov 1987; Schischkin 1999; Schönbeck-Temesy & Ehrendorfer 2005).

After comparing with morphologically similar taxa, it was determined that the specimens belonged to a new species. Morphological differences between species are presented in Table 1. In addition, a map showing the distribution areas of new species and similar species was made (Fig. 2). While preparing the identification key in the *Oppositifoliae* section of the *A. fidanii* sp. nov., the relevant literature was used (Ehrendorfer & Schönbeck-Temesy 1982; Adylov 1987; Schischkin 1999; Schönbeck-Temesy & Ehrendorfer 2005).

Identification key of *A. fidanii* Eroğlu, sp. nov. in the section Oppositifoliae

1. Ovary and mericarps scabrid or entirely glabrous 2
— Ovary and mericarps hairy ..... *A. albiflora* M. Pop., *A. badachschanica* Pachom., *A. botschantzevii* Pachom., *A. brachyantha* Boiss., *A. congesta* Czern., *A. czukavinae* Pachom. & Karim., *A. fedtschenkoi* Ovcz. & Czern., *A. fragillima*, *A. friabilis*, *A. glabrata* Czern., *A. insolita* Pachom., *A. karategini* Pachom. & Karim., *A. kovalevskiana* Pachom., *A. nuratensis* Pachom., *A. oppositifolia*, *A. pauciflora* Czern., *A. popovii* Schischk., *A. pugionifolia* Czern., *A. pulchella* (Podlech) Ehrend. & Schönb.-Tem., *A. rechingeri*, *A. scabrella* Czern., *A. strishovae* Pachom. & Karim.

2. Leaves 2-6 times longer than width 3
— Leaves 7-20 times longer than width 8

3. Corolla white, white with outwardly rose color, up to 2.7 mm long 4
— Corolla rose color or reddish, 2.5-5 mm long 7

4. Plant hairy or hairy at the base, glabrous on top 5
— Plant entirely glabrous or scabrid 6

5. Plant hairy at the base glabrous on top, corolla shortly infundibular, tube somewhat shorter than lobes ..... *A. cilicica* Hausskn. ex Ehrend.
— Plant hairy both at base and top, corolla tubular, tube longer than lobes ..... *A. fidanii* Eroğlu, sp. nov.

6. Corolla white, infundibular, 2-2.7 mm long, ovary elongate-ellipsoid ..... *A. podlechii* Schönb.-Tem.
— Corolla white, outwardly rose color, subcampanulate, 1.5-1.7 mm long, ovary oblong ellipsoid ..... *A. rezaiyensis* Schiönb.-Tem

7. Plant entirely glabrous, corolla reddish, 2.5-3.5 mm long ..... *A. virgata* Hub.-Mor. ex Ehrend. & Schönb.-Tem.
— Plant dense velutinose, corolla rose color, 3.5-5 mm long ..... *A. fragillima* Boiss. & Hausskn.

8. Corolla 2.5-5.3 mm long, stems lax, bracts lanceolate, broadly elliptic to ovate ..... *A. oppositifolia* Regel & Schmalh.
— Corolla 1.25-2 mm long, stems strict, bracts broadly ovate to conchiform ..... *A. rechingeri* Ehrend. & Schönb.-Tem.

Morphological investigations

The specimens collected and photographed in their natural habitat during the field study were morphologically examined and measured. Flowers of the specimens were photographed under HD camera attached Leica EZ4 stereo microscope (Figs 3; 4).

Palynological and mericarp surface investigations

Pollen grains and mericarps from specimens collected from the field were examined using both a light microscope (LM) and a scanning electron microscope (SEM). For the pollen LM studies Wodehouse technique was used (Wodehouse 1935). Pollen grains were extracted from anthers and kept in 70% ethanol for softening. Then, 1% safranin powder and jelly glycerin were mixed to prepare slides. The pollen grains were photographed from different angles using a Leica ICC50HD camera attached to a Leica DM500 microscope. Then pollens were measured by using LAS EZ program. In order to more accurately determine the characteristics of the pollen grains, 60 pollen grains belonging to 3 different individuals were measured. The pollens were fixed on an aluminum rod and coated with molten gold in a sputter-coater to examine and photograph the pollens under Zeiss Leo 440 SEM. Relevant literature were used in the pollen description (Erdtman 1969; Walker 1974a, b; Faegri & Iversen 1975; Punt *et al.* 2007). To investigate the mericarp characteristics photos were taken using a Leica EZ4 stereo microscope with a HD camera. Thirty mature mericarps from different individuals were measured to determine mericarp sizes. The SEM analysis has followed the same way as for pollen and photos were also taken with a Zeiss Leo 440. Relevant literature was used to describe the mericarp surface morphology with correct terms (Stearn 1983; Bojňanský & Fargašová 2007) (Fig. 5).

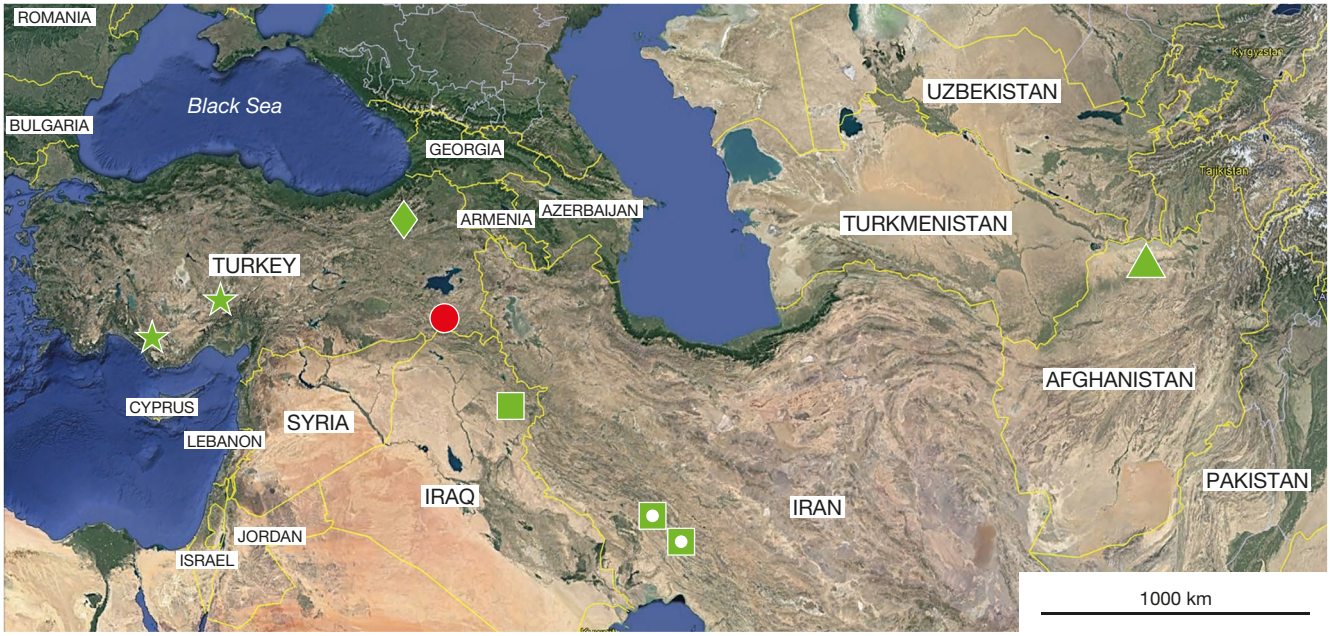

Fig. 2. — Distribution map of *Asperula fidanii* Eroğlu, sp. nov. and its relatives: ●, *A. fidanii* sp. nov.; ■, *Asperula friabilis* Schönb.-Tem.; ▲, *Asperula podlechii* Schönb.-Tem.; ♦, *Asperula virgata* Hub.-Mor. ex Ehrend. & Schönb.-Tem.; ◘, *Asperula fragillima* Boiss. & Hausskn.; ★, *Asperula cilicica* Hausskn. ex Ehrend. Map taken from Google Earth.

RESULTS

Family Rubiaceae Juss.
Genus *Asperula* L.

Asperula fidanii Eroğlu, sp. nov.
(Figs 3; 4)

Asperula fidanii sp. nov.resembles *A. fragillima* Boiss. & Hausskn., but is easily differentiated from it by its setulose hairiness (not velutinose, partially pubescent or glabrous), by having ovate-lanceolate to elliptical-lanceolate leaves (not oblong, rarely elliptical or ovate), having semi-revolute margins of leaves (not flat), having white, tubular, hairy corolla (not pink, infundibular and glabrous or velutinose), corolla length of 2-2.5 mm (not 3.5-5 mm). *Asperula fidanii* sp. nov. is similar to *A. friabilis*, but mainly differs from it by its setulose hairiness (not subvillous), ovate-orbicular basal leaf shape (not broadly obovate-spathulate), longer and wider middle and upper leaves of 3-21 × (2)4-7(9) mm (not 5-10 × 1.5-2.5 mm), corolla length of 2-2.5 mm (not 1.5 mm), corolla tube longer than lobes (not somewhat shorter than lobes) and glabrous ovarium (not velutinose). *Asperula fidanii* sp. nov. is also similar to *A. podlechii,* but is basically different from it by its setulose hairiness (not short scabrid to glabrous), hairy leaves (not glabrous), ovate-orbicular basal leaf shape (not obovate to suborbicular), longer and wider middle and upper leaves of 3-21 × (2)4-7(9) mm (not 4-8 × 1.5-2.5 mm), tubular corolla shape (not infundibular), pubescent corolla (not scabrid) and oblong ovarium shape (not elongated ellipsoid) (Table 1).

Type. — **Turkey**. C9 Şırnak: Beytüşşebap, southeast of Ilıcak Village, around of thermal spring, 37°34'58"N, 43°08'02"E, limestone rock crevices, 1350 m, 27.VII.2020, *H. Eroğlu 1616,* (holo-, VANF!; iso-, SUFAF!).

Phenology. — The flowering period of *Asperula fidanii* sp. nov. is between July and September, the fruiting time is August and September.

Distribution and ecology. — *Asperula fidanii* sp. nov. is endemic to Şırnak-Turkey. It spreads on cracks in limestone cliffs habitats at elevation of 1300-1500 m. It is a native species of the Irano-Turanian floristic region (Fig. 6).

Etymology. — This new species was named *Asperula fidanii* sp. nov. in order to honor Yusuf Fidan, who participated in the fieldwork with the author at the time the species was first collected.

Palynological properties. — The pollen grains of *Asperula fidanii* sp. nov. are monads, isopolar (5-)6-7 zonocolpate, suboblate [Polar length: 15.43 (± 1.93), Equatorial length: 17.60 (± 1.05), Polar length/Equatorial length: 0.88, Exine thickness: 1.20 (± 0.16), Intine thickness: 0.77 (± 0.06), Colpus length: 9.82 (± 1.08), Colpus width: 1.48 (± 0.40)], ornamentation is sparse-heterogeneous microperforate and scabrate. The average number of scabrae at 1 μm²: 13.5 in polar area, 16.8 in equatorial area (Fig. 5A-D).

Mericarp surface properties. — The mericarp surface has reticulate ornamentation type. Surface cells are polygonal, between 35 and 45 μm in diameter. They have secondary structures like, line-shaped or ruminate cuticular spurs. While the types of anticlinal cell walls in *Asperula fidanii* sp. nov. are sunken, periclinal cell walls are convex or concave (Fig. 5E, F).

Description

Caespitose and suffruticose perennial. Stems numerous, 8-18 cm, ascending, fragile, quadrangular, setulose. Petioles minute or absent. Leaves 2, opposite, obtuse or acute, with a prominent nerve in lower surface, with semi-revolute margins, stipules absent. Basal leaves ovate-orbicular 1-4 × 1-3 mm. Middle and upper leaves ovate-lanceolate to elliptical-lanceolate, 3-21 × (2)4-7(9) mm. Inflorescence lax, dichasial, flowers 1-6, bracts linear-lanceolate to elliptical-lanceolate, setulose, 1-2 × 0.5-1 mm, bracteoles similar, smaller. Peduncle 2-5 mm. Pedicels minute to 3 mm, with short hairs.

Fig. 3. — *Asperula fidanii* Eroğlu, sp. nov.: **A**, habit; **B**, inflorescence and flowers; **C**, fruit and ovaries; **D**, basal leaves; **E**, middle and upper leaves; **F**, 4- and 5-lobed flowers on same plant.

Fig. 4. — Flowers of *Asperula fidanii* Eroğlu, sp. nov.; **A**, **B**, general wiew; **A**, 5-lobed flower; **B**, 4-lobed flower; **C**, **D**, dissected flowers; **E**, ovarium. Scale bars: 1 mm.

Corolla white when fresh, creamy when dry, pubescent, 4- or 5- lobed, tubular, 2-2.5 mm with lobes, tube longer than lobes, stamens epipetalous, 0.5-0.75 mm, 4 or 5. Ovarium *c.* 1 mm, oblong, glabrous, styles 2, *c.* 0.5 mm, not permanent on fruit, stigma globose. Mericarp broadly ovate-orbicular to orbicular, glabrous, 1.5-2 mm.

Additional material examined

Asperula fidanii sp. nov.: **Turkey**. C9 Şırnak: Beytüşşebap, south-east of Ilıcak Village, around of thermal spring, 37°34'58"N, 43°08'02"E, limestone rock crevices, 1350 m, 4.IX.2020, *H. Eroğlu 1823* (in fruit).

A. fragillima: **SW Iran**. Iter Syriaco-Armeniacum. Kuh [Eschker] Luristan, 3352 m, 06.VIII.1868, *Haussknecht s.n.* (K[K000770020]; JE[JE00005220, JE00005270, JE00005302]; W[W0047266, W0047267] photos!). — **Iran**. Persica austro-occidentalis, in fiss. rup. calc. Teng Machmud diti. Bachtiar., 3352 m, VII.1868, *Haussknecht s.n.* (JE[JE00005287] photo!).

A. friabilis: **Iraq**. Kopi Quradagh, 1524 m, *W-1548* (E[E00265857]; K[K000770021] photos!).

A. podlechii: **Afghanistan**. Ali Kuh, 5 km SE Sultan Baba Ali Sher, S Mazar-i Sharif, 1250 m, in saxosis calc., 36°34'N, 67°09'E, 8.VI.l978, *Podlech 31564* (MSB[MSB120178] photo!).

A. cilicica: **Turkey**. C5 Niğde: Cilicia, Bulghar Maaden (Bolkar Maden), 1600 m, 1896, *Siehe 501* (JE[JE00005263, JE00005264, JE00005265, JE00005266]; LE[LE00017577] photos!).

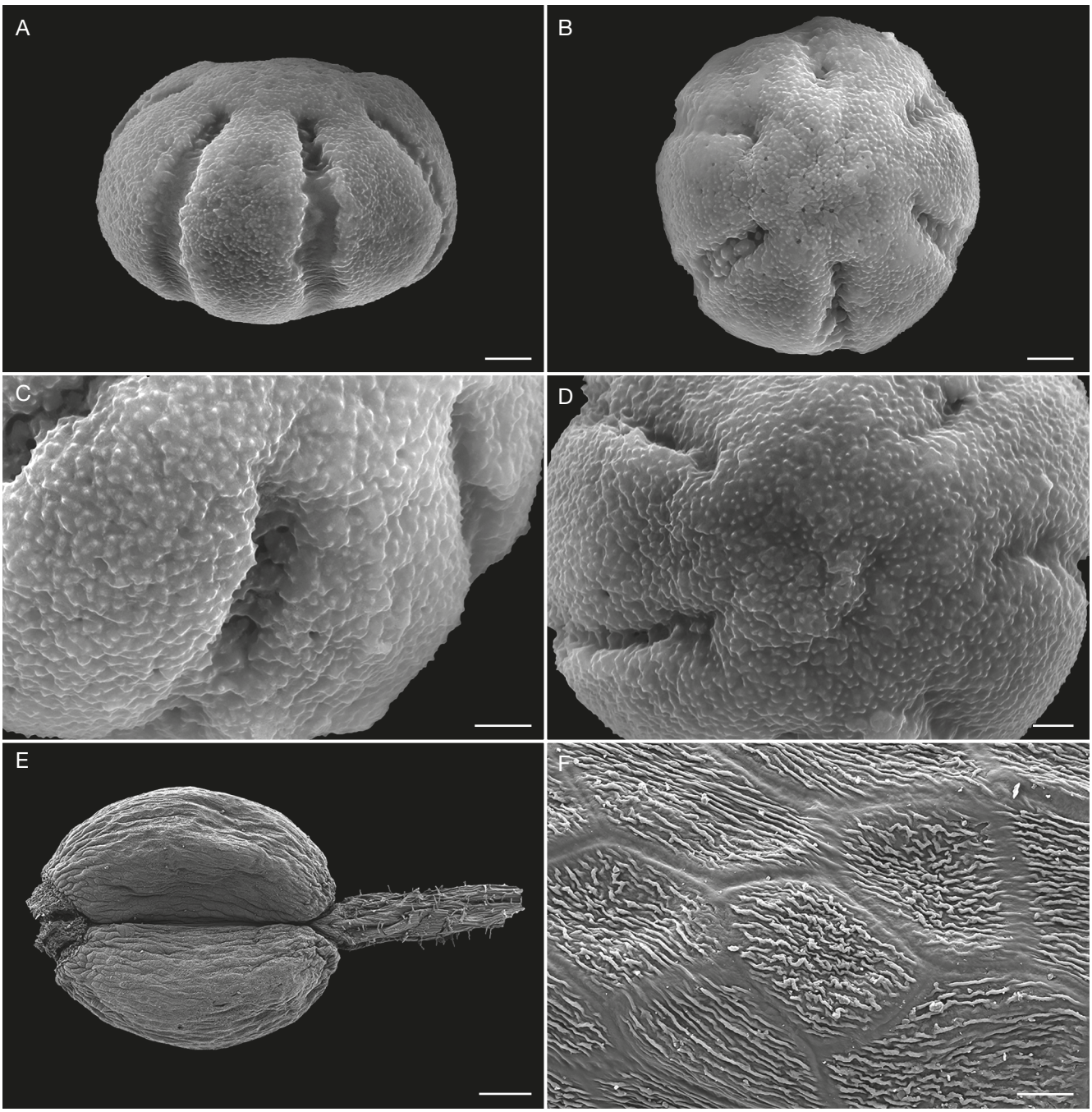

Fig. 5. — SEM micrographs of pollen grains and mericarp of *Asperula fidanii* Eroğlu, sp. nov.; **A**, equatorial view; **B**, polar view; **C**, **D**, close ornamentation and colpus views of pollen grains; **E**, general view of mericarp; **F**, close view of mericarp. Scale bars: A, B, 2 µm; C, D, 1 µm; E, 300 µm; F, 20 µm.

A. virgata: **Turkey**. A8 Erzurum: Tortum, Kalkgeröll Westl. ob dem Tortum-See, 1070 m, 16.VII.1958, *Huber-Morath 14885* (WU[WU0065866, WU0065867] photos!).

DISCUSSION

In Şırnak Province, the area where the new species was discovered is the transition zone between the two main geographic areas in Turkey distinguished by important features such as altitude, climate, land structure and vegetation, reflecting the rich biodiversity of the province (Erdoğan & Kalay 2016). There are 1141 plant taxa within the borders of Şırnak province, 86 of them are endemic to Turkey, new taxa are constantly being added to these taxa (Çelik *et al.* 2018).

Asperula taxa are distributed throughout Turkey, however, two species belonging to the *Oppositifoliae* section are distributed northeast (*A. virgata* Hub.-Mor. ex Ehrend. &

Fig. 6. — Habitat of *Asperula fidanii* Eroğlu, sp. nov.: **A**, general view; **B**, close view. Note: the white arrows in the photo **A** show the spots on the rock where the species was present.

Table 1. — Diagnostic morphological characters of *Asperula fidanii* Eroğlu, sp. nov. and its close relatives.

Characters	*Asperula fidanii* sp. nov.	*A. friabilis* Schönb.-Tem. (Ehrendorfer & Schönbeck-Temesy 1980)	*A. podlechii* Schönb.-Tem. (Schönbeck-Temesy & Ehrendorfer 2005)	*A. fragillima* Boiss. & Hausskn. (Schönbeck-Temesy & Ehrendorfer 2005)
Stem, hairiness	setulose	subvillous	short scabrid to glabrous	dense velutinose, partially pubescent or glabrous
Basal leaves, shape	ovate-orbicular to ovate-lanceolate	broadly obovate-spathulate	obovate to suborbicular	–
Middle and upper leaves				
shape	ovate-lanceolate to elliptical-lanceolate	oblanceolate to elliptic	elliptical, oblong-elliptical or lanceolate	oblog to broadly elliptic or ovate
size (mm)	3-21 × (2)4-7(9)	5-10 × 1.5-2.5	4-8 × 1.5-2.5	4-17 × 1.5-4
Leaf margin	semi revolute	flat	flat	flat
Corolla				
shape	tubular	nearly campanulate	infundibular	infundibular
color	white when fresh creamy when drying	purplish outside on drying	white on drying	pink
length (mm)	2-2.5	1.5	2-2.7	3.5-5
lobe number	4 or 5	4	4	–
tube/lobe ratio	longer than lobes	somewhat shorter than lobes	longer than lobes	longer than lobes
hairiness	pubescent	pubescent	scabrid	glabrous or velutinose
Ovarium				
shape	oblong	–	elongated ellipsoid	–
length (mm)	1	–	1.75-2	*c.* 1.75
hairiness	glabrous	velutinose	sparse scabrid to glabrescent	glabrous or velutinose (hairs 0.1-0.175 mm)

Schonb.-Tem.) and in the south (*A. cilicica* Hausskn. ex Ehrend.) and both of them endemic; whereas *A. fidanii* sp. nov. is distributed in south-eastern Turkey. *Asperula fidanii* sp. nov. mainly differs from *A. virgata* by its setoluse hairiness (entirely glabrous in A. *virgata*), by having wider leaves, middle and upper leaves (2)4-7(9) mm in *A. fidanii* sp. nov. (0.4-0.8 mm in *A. virgata*), having white, tubular and hairy corolla (reddish, infundibular and glabrous in *A. virgata*), broadly ovate-orbicular to orbicular mericarp (subglobose in *A. virgata*). *Asperula fidanii* sp. nov. differs from *A. cilicica* by its setoluse hairiness in whole plant (hairy in basal, entirely glabrous in upper part of plant in *A. cilicica*), its wider leaves, middle and upper leaves (2)4-7(9) mm in *A. fidanii* sp. nov. (1.8-3 mm in *A. cilicica*), by its ovate-lanceolate to elliptical-lanceolate median leaves (oblong to oblong-elliptic in *A. cilicica*), having tubular, hairy and longer (2-2.5 mm) corolla (shortly infundibular, glabrous and 1.5-2 mm in *A. cilicica*), its corolla tube longer than lobes (somewhat shorter than lobes in *A. cilicica*).

Since the *A. fidanii* sp. nov. is not much morphologically similar to *A. cilicica* and *A. virgata* which are endemic to Turkey, it was compared with the species in *A. fragillima* (endemic to Iran), *A. friabilis* (endemic to Iraq) and *A. podlechii* (endemic to Afghanistan) in *Oppositifoliae* section.

Especially when the identification key in the Iranian flora was used, it was determined that the *A. fidanii* sp. nov. were much similar to *A. fragillima* Boiss. & Hausskn. (endemic to Iran), *A. friabilis* Schönb.-Tem. (endemic to Iraq) and *A. podlechii* Schönb.-Tem. (endemic to Afghanistan) in terms of some morphological characters, but morphologically distinct from all of these species (Table 1).

It is stated that the flowers of the section *Oppositifoliae* are 4-lobed in the Flora Iranica and Flora of Turkey (Ehrendorfer & Schönbeck-Temesy 1982; Schönbeck-Temesy & Ehrendorfer 2005). *Asperula fidanii* sp. nov. has both 4-lobed and 5-lobed flowers on the same individual, it was concluded that 5-lobed flowers can also be found in this section.

Although the description of the *A. cilicica* in the Flora of Turkey is said to be entirely glabrous, the digital herbarium specimen examinations show that the species is hairy at the base and glabrous on the upper part (LE00017577; JE00005263; JE00005264; JE00005265; JE00005266 photos!).

Together with *A. fidanii* sp. nov., the total number of *Asperula* species known from Turkey increases to 53 and 29 of those are endemic (endemism level is 54.71%). Taxa number of the section *Oppositifoliae* arise 33 in Worldwide.

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