

An emended description for *Rosularia haussknechtii*
(Boiss. & Reuter) A.Berger (Crassulaceae)
from Southeastern Anatolia

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Adansonia est une revue en flux continu publiée par les Publications scientifiques du Muséum, Paris
Adansonia is a fast track journal published by the Museum Science Press, Paris

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diff.pub@mnhn.fr / <http://sciencepress.mnhn.fr>

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ISSN (imprimé / print): 1280-8571/ ISSN (électronique / electronic): 1639-4798

An emended description for *Rosularia haussknechtii* (Boiss. & Reuter) A.Berger (Crassulaceae) from Southeastern Anatolia

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Submitted on 22 December 2024 | accepted on 22 March 2025 | published on 3 November 2025

Kaya Ö. F. & Ertekin A. S. 2025. — An emended description for *Rosularia haussknechtii* (Boiss. & Reuter) A.Berger (Crassulaceae) from Southeastern Anatolia. *Adansonia*, sér. 3, 47 (18): 319-326. <https://doi.org/10.5252/adansonia2025v47a18>.
<http://adansonia.com/47/18>

ABSTRACT

Rosularia haussknechtii s.str. is an enigmatic endemic taxon only spread in Southeastern Anatolia. Since the description of this species has been made only on herbarium specimens and from herbarium and live samples of *R. pseudohaussknechtii* Niederle incorrectly, unfortunately, it contains many deficiencies and mistakes. With this study, the only known type locality of *R. haussknechtii* s.str. was collected for the first time since 1865, and a new different locality was also found. Based on the live specimens from these different populations, the description of the species was emended. Considering these new data., habitat and ecological characteristics of *R. haussknechtii* s.str. were determined and distribution map in Türkiye was given.

KEY WORDS

Crassulaceae,
Türkiye,
Anatolia,
ecology,
endemic species.

RÉSUMÉ

Une description amendée pour Rosularia haussknechtii (Boiss. & Reuter) A.Berger (Crassulaceae) du sud-est de l'Anatolie.

Rosularia haussknechtii s.str. est un taxon énigmatique endémique du sud-est de l'Anatolie. La description de cette espèce n'ayant été établie que sur des spécimens d'herbiers et à partir d'échantillons secs et vivants de *R. pseudohaussknechtii* Niederle de manière incorrecte, elle comporte malheureusement de nombreuses lacunes et erreurs. Avec cette étude, la seule localité type connue de *R. haussknechtii* s.str. a été recollectée pour la première fois depuis 1865, et une nouvelle localité distincte a également été reconnue. Sur la base des spécimens vivants de ces différentes populations, la description de l'espèce a été amendée. Compte tenu de ces nouvelles informations, l'habitat et les caractéristiques écologiques de *R. haussknechtii* s.str. ont été précisés et une carte de répartition en Türkiye a été établie.

MOTS CLÉS

Crassulaceae,
Turquie,
Anatolie,
écologie,
espèces endémiques.

INTRODUCTION

Crassulaceae members are perennial, succulent herbaceous, small shrubs, or rarely trees and contain about 34 genera and 1400 species. Generally, they grow in arid habitats, and also in mesic or moist habitats outside of Australia and the Pacific islands (Cronquist 1981; Takhtajan 2009; Simpson 2019).

Rosularia (DC.) Stapf is a small genus usually grown as chas-mophytes and distributed in arid and semi-arid regions from the Eastern Mediterranean to Central Asia and Himalaya (Kelaidis 2006). Especially the region from Southern and Eastern Anatolia to Iran is an important diversification center where high endemism is seen in *Rosularia* and its related genera.

The taxonomy of the *Rosularia* is problematic due to differences between classifications and disputes over the boundaries of generic groups (Sarwar & Qaiser 2012). In taxonomic arrangements done in recent years by some researchers, *Prometheum* (A. Berger) H. Ohba and *Chaloupkaea* Niederle, are suggested as different genera from *Rosularia*. (Ohba 1978; Niederle 2016). The genus *Rosularia* has 33 taxa (11 endemic taxa) in the world and is represented by 16 taxa (seven endemic taxa) in Türkiye. (Karaer 2012; Yıldırım 2014; Niederle 2015; Kılıç & Yıldırım 2019; POWO 2024).

Rosularia haussknechtii (Boiss. & Reut.) A. Berger is endemic to the Southeastern Anatolia Region and was collected for the first time and only once in 1865 by Haussknecht from Urfa (now Şanlıurfa) and it was published as a new species by Boissier (1872). However, in the following years, Chamberlain & Muirhead (1972) erroneously considered different *Rosularia* specimens collected from the Munzur Mountains in Tunceli province as the same species and the characteristics of these specimens were added to the description of the species. Again, the same mistake was made by Eggli (1988) in his monography of the genus *Rosularia*. He made the description of the species by taking into account of the different *Rosularia* samples, collected from Tunceli, in the same way. Unfortunately, unfinished and deficient evaluations were made in both studies mentioned above.

This situation was clearly determined when the *R. haussknechtii* specimens, collected from Diyarbakır and Şanlıurfa provinces during the floristic trips in the Southeastern Anatolia Region between 2018-2020, could not be evaluated with the help of the literature (Chamberlain & Muirhead 1972; Eggli 1988, 2003).

As a result of this study, specimens were collected from the type locality of *R. haussknechtii* for the first time in 150 years, and a new locality other than the only known locality was identified. In addition, its description was reorganized in detail on live and herbarium specimens, its habitat and ecological characteristics and distribution were clearly determined.

MATERIAL AND METHODS

The samples collected from the ruins of the Mar Jacob monastery in Şanlıurfa and its surroundings are the first to be collected since Haussknecht's collection in 1865. The samples collected from Eğil district of Diyarbakır, belong to a population, de-

termined for the first time with this study. The specimens are deposited in Dicle University Herbarium (DUF). Diagnosis and evaluations were made according to relevant literatures (Boissier 1872; Chamberlain & Muirhead 1972; Niederle 2015; Eggli 1988). In addition, the examined virtual herbarium samples of *R. haussknechtii* s.str. and *R. pseudohaussknechtii* are shown in Table 1.

ABBREVIATIONS

B	ZE Botanischer Garten und Botanisches Museum, Freie Universität Berlin;
BM	Natural History Museum, London;
E	Royal Botanic Garden, Living Plant Collections, Edinburgh;
CJBG (G)	Conservatoire et Jardin botaniques de la Ville de Genève;
JE	Friedrich Schiller University Jena;
K	Royal Botanic Gardens, Kew;
MW	Moscow State University, Moscow;
P	Muséum national d'Histoire naturelle, Paris;
W	Naturhistorisches Museum, Wien.

RESULTS

Family CRASSULACEAE J.St.-Hil.
Genus *Rosularia* (DC.) Stapf

Rosularia haussknechtii s.str.
(Figs 1, 2, 3; Tables 1, 2, 3)

Rosularia haussknechtii (Boiss. & Reut.) A. Berger, *sensu stricto* Die natürlichen Pflanzenfamilien (ed. 2) 18a: 466 (Berger 1930). — Basionym: *Umbilicus haussknechtii* Boiss. & Reut. in Boiss., *Flora Orientalis* 2: 774 (Boissier 1872).

TYPE MATERIAL. — **Türkiye** • [C7 Urfa] in fissuris rupium calcar-eaum regionis calidae ad Mar Jacob supra Orfa (Urfa) Mesopotamiae; 15.V.1865; *Haussknecht s.n.*; lectotype: JE[JE00003786] image!; isotypes: B[B100241949] image!, BM[BM000632423] image!, G-BOIS[G00330685] image!, G[G00418089] image!, JE[JE00003785] image!, K[K000838527] image!, LE[LE00013283] image!, MW[MW0592720] image!, P[P04022552, P04022553] images!, W[W0005250, W1889-0223437] images!

OTHER MATERIAL EXAMINED. — **Türkiye** • B8 Diyarbakır, Eğil to Dicle 4 km, oak openings, rock crevices; 1042 m alt.; 23.V.2018; Ertekin 2018-085; DUF • C7 Şanlıurfa, North of Kızılkuyu Wildlife Development Area, near beltway, rock crevices; 729 m alt.; 27.V.2020; Ö.F.Kaya 6471 • Nemrut mountain, surroundings of Mar Jacob monastery ruins, rock crevices; 712 m alt.; 27.V.2020; Ö.F.Kaya 6479.

DISTRIBUTION AND ECOLOGY. — *R. haussknechtii* s.str. is an endemic species native to the Southeastern Anatolia Region and an Irano-Turanian element. Bare crevices or rockies on open areas of oak forest form the plant habitat. *R. haussknechtii* s.str. grows in rockies or in rock areas at oak glades at 700-1050 meters altitudes in the Mesopotamian steppes and, three populations of *R. haussknechtii* s.str. were identified in Şanlıurfa and Diyarbakır provinces.

The distribution area of the species for Şanlıurfa is approximately 4 km² with an average of 350-400 individuals, while it is approximately 2 km² for Diyarbakır with an average of 150-200 individuals. The main factors such as road construction, land use change, grazing and urbanization threaten the plant environment/habitat. Therefore, it has been suggested that the plant should be evaluated in Vulnerable-VU B1b (iii) category according to IUCN Standards & Petitions Committee (2024) Red List categories.



FIG. 1. — *Rosularia haussknechtii* (Boiss. & Reuter) A.Berger in Şanlıurfa: **A**, habitat; **B**, habit; **C**, inflorescence; **D**, stem; **E**, basal leaves; **F**, flowering twig; **G**, corolla; **H**, median cauline leaf; **I**, rosette leaf. Scale bars: F, 11 cm; G, 12 mm; H, 2 cm, I, 2 cm. Photographs by Ö. F. Kaya.

REMARKS

The holotype was not specified, in the protologue of *Rosularia haussknechtii* by Boissier (1872). This was ignored by Chamberlain & Muirhead (1972) when a lectotype should

have been determined. On the other hand, according to ICN (Turland *et al.* 2018), Eggli (1988) used the term holotype instead of lectotype in his original choice of lectotype for *Rosularia haussknechtii*. This is an error (see point 9.10).



FIG. 2. — *Rosularia haussknechtii* (Boiss. & Reuter) A.Berger in Diyarbakır: **A**, **B**, habitat; **C**, habit. Photographs by A.S.Ertekin.

However, since this erroneous typing was before January 1, 2001 (see Article 9.23), the original selection by Eggli (1988) is valid.

Unnumbered samples first collected by Haussknecht in 1865 from a single locality in Urfa (now Şanlıurfa) were named as *Umbilicus haussknechtii* by Boissier and Reuter (Boissier 1872). There are 13 sheets collected by Haussknecht only from this type locality and only found in B, BM, G, JE, K, LE, MW, P, W herbaria. Although “typus” was written on the sheets found in B, G, P and W herbaria, taxonomists, who examined these samples, stated them as “isotypus”. The sheet (MW0592720) only found in MW was labelled as “isolectotypus”.

DESCRIPTION

Caudex well developed, 4-8 mm diam. Rosettes persistent after flowering, semiglobular, 2-5 cm diam.; offsets many; scapes lateral, 5-10 cm long, green or pink. Rosette leaves obovate-spathulate to narrowly spathulate, 18-30 × 3-6 mm, uninerved, attenuate at base, densely pectinate-ciliate with scattered glandular hairs on both surfaces, apex subacute. Lower cauline leaves linear, oblong-linear, 8-12 × 1.5-2 mm; median leaves linear or oblong-linear, 16-24 × 2-3 mm, dull green or deep pink, hirsute, densely ciliate, apex obtuse; floral leaves smaller and densely glandular pilose 7-12 × 2 mm. Inflorescence a lax thyrs, densely hairy, 8-17 flowered, al-

TABLE 1. — Examined specimens of *R. haussknechtii* (Boiss. & Reuter) A. Berger and *R. pseudohaussknechtii* Niederle.

Herbarium Code	Barcode / Catalog number	Collector	Number	Date	Text on label Locality
<i>R. haussknechtii</i> s.str.					
B	B100241949	Haussknecht	s.n.	15.05.1865	In fissur. rup. calc. m. Mar Jacob supra Orfa, 4000 ped.
BM	BM000632423	Haussknecht	s.n.	15.05.1865	In rup. Mar Jacob supra Orfa, 3000 ped.
G-BOIS	G00330685	Haussknecht	s.n.	—	—
G	G00418089	Haussknecht	s.n.	1865	Monte Orfa
JE	JE00003785	Haussknecht	893	15.05.1865	In fissur. rup. calc. montis Mar Jacob pr. Orfa
JE	JE00003786	Haussknecht	s.n.	1865	Monte Orfa
K	K000838527	Haussknecht	s.n.	15.05.1865	In rup. supra Orfa, 3000 ped.
LE	LE 00013283	Haussknecht	s.n.	1865	Monte Orfa
P	P04022552	Haussknecht	s.n.	15.05.1865	In rup. Mar Jacob supra Orfa, 3000 ped.
P	P04022553	Haussknecht	s.n.	15.05.1865	In rup. Mar Jacob supra Orfa, 3000 ped.
W	W0005250	Haussknecht	s.n.	15.05.1865	In fissur. rup. calc. m. Mar Jacob supra Orfa, 3000 ped.
W	W1889-0295631	Haussknecht	s.n.	15.05.1865	In fissur. rup. calc. m. Mar Jacob supra Orfa, 4000 ped.
MW	MW0592720	Haussknecht	s.n.	1865	In fissur. rup. s. Orfa Mesopot., 3000 ped.
<i>R. pseudohaussknechtii</i> Niederle					
E	E00361529	Davis & Hedge	D.31242	17.7.1957	Turkey Prov. Tunceli: Munzur Dağ above Ovacik, 2800 m, limestone rocks
RSA	RSA0267476	Davis & Hedge	D.31242	17.7.1957	Tunceli: Munzur Dağ above Ovacik, 2800 m, limestone rocks
G	G00446746	Aucher-Eloy	2652	s.d.	Armenia
G	G00446744	Aucher-Eloy	2653	s.d.	Armenia

ways lateral, 1–3 per rosette, axis glandular-hairy in upper $\frac{2}{3}$ imbricate leafy. Flowers 5-merous, narrowly campanulate. Pedicel 1–4 mm. Bracts 2–4 mm, bracteoles lanceolate, hairy. Calyx 4–5 mm, densely hairy, tube 1–1.5 mm, teeth lanceolate, 3–4 mm. Corolla 10–12 mm, pale yellow, back of petals densely pilose, petals connate $\frac{2}{3}$ to $\frac{3}{4}$, corolla lobes spreading, 3–4 mm, ovate, yellow, with purple or pinkish veined, margins denticulate, mucronate, *c.* 0.5 mm, corolla tubes greenish, 7–8 mm, densely pilose, longer than the calyx. Stamens 10, biseriate, longer stamen 7–8 mm, shorter stamens 5–6 mm long. Follicles 5–6 mm, finely hairy, styles 1 mm, stigmas capitate. Flowering in May. Rocky places, open areas of oak forest.

Rosularia pseudohaussknechtii Niederle
(Fig. 3)

Skalnickářův rok 72: 38 (Niederle 2015).

TYPE MATERIAL. — **Türkiye** • Tunceli, Munzur dağı, above Ovacık, limestone rocks; 2800 m alt.; 17.VII.1957; *P.H. Davis & I.C. Hedge* (D. 31242); E!

OTHER MATERIAL EXAMINED. — **Türkiye** • East Anatolia, in Armenia petrosis; s.d.; *Aucher-Éloy* 2652; G! • Same data; *Aucher-Éloy* 2653; G! • Erzincan, N.W. side of Tayran dağı; 1500–1800 m alt.; *Watson et al.* 32981.

DISTRIBUTION AND ECOLOGY. — *R. pseudohaussknechtii* is an endemic species native to Eastern Anatolia, identified from the Munzur Mountains and the nearby Tayran Mountains. The distribution area of the species is limited and it grows on calcareous rocks at elevations between 1500 and 2800 meters. The distribution area and population status of *R. pseudohaussknechtii* could not be evaluated due to insufficient data. While *R. haussknechtii* s.str. is distributed in Southeastern Anatolia, *R. pseudohaussknechtii* is distributed in

Eastern Anatolia. Some morphological characteristics of both species are shown in detail in Table 2.

DESCRIPTION

Caudex slender, 2–3 mm diam. Rosettes depressed 1–1.5 cm diam; scapes lateral, 6–12 cm, densely hairy. Rosette leaves oblong to oblong-spathulate, 8–12 × 2–3 mm, ciliate. Cauline leaves sparsely; lower narrowly obovate-spathulate, 7–12 × 2–3 mm, obtuse; median and upper leaves shorter and narrower, oblong to linear-spathulate, 6–9 × 1–1.5 mm, densely hairy. Inflorescence a lax thyse, densely hairy, 7–13 flowered, lateral, 1–3 per rosette. Flowers 5-merous, narrowly campanulate. Pedicel 3–6 mm. Bracts minute, *c.* 2 mm, hairy. Calyx 4–5 mm, densely hairy, teeth lanceolate, connate at base. Corolla 9–11 mm, pale pink, back of petals pilose; petals connate $\frac{2}{3}$ to $\frac{1}{2}$, corolla lobes 5–6 mm, ovate, apiculate, as long as or slightly longer than corolla tube. Flowering in July. Limestone rocks 1700–2800 m.

DISCUSSION

Due to evaluation of *R. haussknechtii* s.str. together with different *Rosularia* samples collected from Eastern Anatolia, the information given in the literature (Chamberlain & Muirhead 1972; Eggli 1988) about the species is incomplete and erroneous, therefore the description, distribution and ecology of the species were actually identified very differently. For this reason, the description of *R. haussknechtii* s.str. has been reorganized according to the samples collected from the type locality, its surroundings and the newly determined location.

Although the flower color of the species was clearly stated as “ochroleucous” in the first description by Boissier (1872); Chamberlain & Muirhead (1972) and Eggli



FIG. 3. — Distribution map of *Rosularia haussknechtii* s.str. (●) and *R. pseudohaussknechtii* (▼) in Türkiye.

(1988) erroneously stated it as pink, based on only the live and herbarium samples collected from Tunceli and also belonging to a different taxon. It seems that this is due to the fact that no live samples from *R. haussknechtii* s.str. were collected and examined in both literatures caused this situation. Chamberlain & Muirhead (1972) made a note stating that the flower color as “ochroleucous” in the description of the sample was a mistake of Boissier (1872) because the flowers were dried. However, this is not correct. It can be said that Chamberlain & Muirhead (1972) misled at this point by the sheet in the E herbarium (E00361529). Because it can be seen the flower color of this sample collected from Tunceli by P.H. Davis (*D. 31242*) is pink. This is also clearly stated by the collector on the herbarium label. Similarly, Eggli (1988) reported (stated) that he could not collect samples from the type locality of the species in 1985. He made the same mistake because he only used the samples of a different taxon with pink flowers collected from Tunceli.

The location of the type locality was another mistake of Eggli (1988) and he stated this as a footnote. He stated that he could not collect samples during his trip to Şanlıurfa in 1985, where the type locality of the species is located. Considering the population status of the species in the type locality today, it is understood that the location of the type locality has never been able to be determined. As a result of this, he questioned the location of “Mar Jacob” in Urfa, which was stated as the type locality by Haussknecht, and stated that the type locality could be “Mar Jakub”, which Nábělek (1923) stated in his itinerary. He also stated that this place should be located outside of Türkiye, between Mosul and Zaho (Iraq). He made a completely erroneous

interpretation. Interestingly, despite this erroneous interpretation, Eggli (1988) still stated the type locality of the species same as given by Haussknecht. However, on the other hand, he continued this misconception by making information about the distribution area, habitat and ecology of the species without taking into account the characteristics of the type locality. This has led to misinformation about the species.

Eggli (1988) stated that he examined 12 collections (B7, C7, B9) containing live material from three populations of *R. haussknechtii* from Türkiye. He did not provide any clear locality information for the live materials he claimed that he collected. He stated that he only collected samples from Munzur Mountain (Tunceli) at the lower elevation limit of 1700-1800 m, which already corresponds the B7. It was stated in the previous paragraph that he could not collect samples from C7, where the type of the species was located. He did not provide any clear locality information on the live materials, that he said he examined from the B9. In this case, it seems that the author did not collect any live samples except from B7. There is no information on the herbarium labels indicating that *Rosularia* samples were collected from B9 square where the author stated. Presumably, the author may have referred to *Aucher-Éloy 2617*, registered in the W (W 1889-0223437) herbarium. Because, there is Eggli’s determinavit on this sample’s herbarium label. Niederle (2015) used the expression for *Aucher-Éloy 2617* “Neither *haussknechtii* nor *pseudohaussknechtii*, but perhaps a small form of *Rosularia blepharophylla*”. The sheets *Aucher-Éloy 2652* and *2653* registered in the G herbarium (G00446746 / G00446744) examined by Chamberlain & Muirhead (1972) must also be from the

TABLE 2. — Comparison of morphological features of *R. haussknechtii* s.str. and *R. pseudohaussknechtii* Niederle.

Characters	<i>R. haussknechtii</i> s.str.	<i>R. pseudohaussknechtii</i> Niederle
Caudex	Robust, 4–8 mm diam.	Slender, 2–3 mm diam.
Rosette leaves	Obovate-spathulate to narrowly spathulate, ciliate, 18–30 × 3–6 mm	Oblong to spathulate, ciliate, 8–12 × 2–3 mm
Median cauline leaves	16–24 mm long, densely, imbricate	6–8 mm long, sparsely, not imbricate
Calyx	Shorter than corolla tube	Longer than corolla tube
Corolla	Pale yellow	Pale pink
Petals	Connate 2/3 to 3/4	Connate 2/5 to 1/2

TABLE 3. — Comparison of the morphological features of *R. haussknechtii* s.str.

Characters	Chamberlain & Muirhead (1972)	Eggli (1988)	This study
Caudex	Present	Absent or well developed	Well developed
Rosette (diam)	1–2 cm	(0.5–)1.5–2.0(–3.0) cm	2–5 cm
Rosette leaves	Unknown	Unknown	18–30 × 3–6 mm
Stem leaves	Linear-spathulate, 8–18 mm	Oblong-spathulate to linear spathulate, 8–18 × 1.5–2.5 mm	Linear or oblong-linear, 7–24 × 1.5–3 mm
Calyx length	4 mm	2.5–4 mm	4–5 mm
Corolla	Pink, 6–12 mm	Pale pink, 7–8.3 mm	Pale yellow, 10–12 mm,
Petals	Connate 2/5 to 1/2	Connate 2/5 to 3/4	Connate 2/3 to 3/4

same locality. Because, only “Armenia” is written on all three samples as the locality. There is no label on *Aucher-Éloy* 2652, but Eggli (1988) quotes that he examined it. *Aucher-Éloy* 2617 is dated 1834, while *Aucher-Éloy* 2652 and 2653 does not bear a date.

Aucher-Éloy made six trips to Türkiye between 1832 and 1837. It is known that he visited Munzur (Tunceli) and Keşiş (Erzincan) Mountains in the region called Upper Euphrates during his trip with Gustave Coquebert de Montbret in 1834 (Jaubert 1843; Baytop 2005). Aucher-Éloy’s itinerary in 1834 does not pass through square B9 in any way. In this case, it seems that Aucher-Éloy’s samples 2617 and 2652 and the plant samples collected by Davis (*D. 31242* from Tunceli) and Watson and his colleagues (*Watson et al. 3298* from Erzincan) have been collected from the same region. Aucher-Éloy’s itinerary confirms this situation. Accordingly, the plant samples mentioned above, collected and examined as *R. haussknechtii*, are not actually samples of this species. The above-mentioned species was distinguished from *R. haussknechtii* samples by Niederle (2015) and described as a new species with the name *R. pseudohaussknechtii*. This is another proof that the information about the description, distribution, habitat and ecology of *R. haussknechtii* s.str. is inaccurate and incomplete.

In this study, living samples collected from three different populations of *R. haussknechtii* s.str., including the type locality, were examined and some morphological characteristics of the species were compared with those reported by Chamberlain & Muirhead (1972) and Eggli (1988) (Table 3). Also, the distribution map of the species is given (Fig. 3).

The natural range of *R. haussknechtii* is limited to the Mesopotamian steppes including Southeastern Anatolia, not the Munzur Mountains and neighboring mountains as Eggli (1988) erroneously stated. In addition, *R. haussknechtii* grows in the same geographical region as the morphologically well-defined *R. blepharophylla* Eggli, which has a limited

distribution in the northwestern part of Diyarbakır, but has a distinct isolation due to its more southerly distribution.

In terms of morphological (habit and floral) characteristics, *R. pseudohaussknechtii* (Niederle 2015) and *R. paluensis* (Kılıç & Yıldırım 2019) are closely related to *R. sempervivum* A. Berger. It is also possible that they are the same taxa. Both species were described only in comparison with *R. haussknechtii*. *R. sempervivum* was therefore overlooked and consequently under-evaluated.

R. sempervivum is a rather complex taxon represented by seven subspecies with different views on their boundaries (Eggli 1988). The infraspecific classification of this taxon by Eggli (1988) emphasized the importance of geographical delimitation as well as morphological features. In addition, considering the studies of Eggli (1988) and Kılıç & Yıldırım (2019), it is seen that *R. paluensis* and *R. sempervivum* subsp. *libanotica* (Labill.) Eggli are taxa that grow in the same geographical area and have very similar morphological characteristics (leaf, calyx, corolla and hairiness). Due to these characteristics, *R. paluensis* is considered to be a synonym of *R. sempervivum* subsp. *libanotica*.

As a result, *R. haussknechtii* s.str., is not morphologically, geographically and ecologically related to other *Rosularia* taxa and is an endemic species that grows in rocky areas of 700–1050 meters altitude in Southeastern Anatolia Region and has three populations in Şanlıurfa and Diyarbakır provinces. It has distinct characteristics different from those reported by other authors. It is distinctly different from other taxa, especially with its long, linear-striped, prominent, white-ciliate and closely arranged stem leaves, and light yellow petals 10–12 mm long.

Acknowledgements

Thierry Deroin (Muséum national d’Histoire naturelle, Paris) and an anonymous referee are thanked for their remarks on a previous version of the manuscript.

REFERENCES

- BAYTOP A. 2005. — XIX. yüzyılın ilk yarısında Anadolu'da bir bitki toplayıcısı: Rémi Aucher-Éloy (1793-1838). *Osmanlı Bilimi Araştırmaları* 6: 71-78 (in Turkish). <https://dergipark.org.tr/tr/pub/iuoba/issue/1210/14237>
- BERGER A. 1930. — Crassulaceae, in ENGLER A. & PRANTL K. (eds), *Die natürlichen Pflanzenfamilien*. 2nd edition, 18a. Verlag von Wilhelm Engelmann, Leipzig: 466.
- BOISSIER P. E. 1872. — *Flora Orientalis*. Vol. 2. Genevae et Basileae, H. Georg: 774. <https://doi.org/10.5962/bhl.title.20323>
- CHAMBERLAIN D. F. & MUIRHEAD C. W. 1972. — *Rosularia* (DC.) Stapf., in DAVIS P. H. (ed.), *Flora of Turkey and the East Aegean Islands*. Vol. 4. Edinburgh University Press, Edinburgh: 214-224.
- CRONQUIST A. 1981. — *An Integrated System of Classification of Flowering Plants*. Columbia University Press, New York, 1262 p.
- EGGLI U. 1988. — *A Monographic Study of the Genus Rosularia (Crassulaceae)*. Supplement to Bradleya 6. British Cactus & Succulent Society, United Kingdom, 119 p.
- EGGLI U. (ed.). 2003. — *Illustrated Handbook of Succulent Plants "Crassulaceae"*. Springer-Verlag Berlin Heidelberg, 458 p.
- GÜNER A., ASLAN S., EKİM T., VURAL M. & BABAC M. T. (eds) 2012. — *Türkiye Bitkileri Listesi (Damarlı Bitkiler)*. Nezahat Gökyiğit Botanik Bahçesi ve Flora Araştırmaları Derneği Yayını, İstanbul (in Turkish), 1290 p.
- IUCN STANDARDS & PETITIONS COMMITTEE 2024. — *Guidelines for Using the IUCN Red List Categories and Criteria*. Version 16. Prepared by the Standards and Petitions Committee, 122 p. <https://www.iucnredlist.org/documents/RedListGuidelines.pdf>
- JAUBERT H. J. 1843. — *Relations de Voyages en Orient de 1830 à 1838, par Aucher Éloy*. Librairie encyclopédique de Roret, Paris.
- KARAER F. 2012. — *Rosularia* [date accessed: 11.02.2021, retrieved from <https://bizimbitkiler.org.tr/yeni/demos/technical/>].
- KELAIDIS P. 2006. — *Rosularia*. *Cactus and Succulent Journal* 78 (5): 231-236. [https://doi.org/10.2985/0007-9367\(2006\)78\[231:RTUHS\]2.0.CO;2](https://doi.org/10.2985/0007-9367(2006)78[231:RTUHS]2.0.CO;2)
- KILIÇ Ö. & YILDIRIMLI Ş. 2019. — A new species of *Rosularia* (DC.) Stapf (Crassulaceae), *R. paluensis* from Elazığ, Turkey. *Or Sistematiik Botanik Dergisi* 26 (2): 97-104.
- NABELEK F. 1923. — Iter Turcico-Persicum, Pars I, Plantarum Collectarum Enumeratio (Ranulaceae-Dipsacaceae). *Spisy Vydávané Přírodovědeckou Fakultou Masarykovy University* 35: 1-144. <https://doi.org/10.5962/bhl.title.124870>
- NIEDERLE J. 2015. — *Rosularia haussknechtii* versus *Rosularia pseudohaussknechtii*. *Skalnickářův rok* 72: 37-39 [retrieved from https://www.crassulaceae.ch/docs/6c1624c342f490770cf0513fd621b85f_72skalnickaruv_rok33-40.pdf].
- NIEDERLE J. 2016. — *Chaloupkaea pisidica* (Niederle) Niederle. *Skalnickářův rok* 73: 16-19.
- OHBA H. 1978. — Generic and infrageneric classification of the Old World Sedoideae (Crassulaceae). *Journal of the Faculty of Science University of Tokyo* 12 (4): 139-198.
- POWO 2024. — *Plants of the World Online*. Royal Botanic Gardens, Kew. <http://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:12234-1> (accessed 16 August 2024)
- SARWAR G. R. & QAISER M. 2012. — A numerical taxonomy of the genus *Rosularia* (DC.) Stapf from Pakistan and Kashmir. *Pakistan Journal of Botany* 44 (1): 349-354. http://pakbs.org/pjbot/paper_details.php?id=3123
- SIMPSON M. G. 2019. — *Plant Systematics*. Third edition. Elsevier Academic Press, 761 p.
- TAKHTAJAN A. (ed.) 2009. — *Flowering Plants* (Second edition). Springer, Netherlands, 871 p.
- TURLAND N. J., WIERSEMA J. H., BARRIE F. R., GREUTER W., HAWKSWORTH D. L., HERENDEEN P. S., KNAPP S., KUSBER W. H., LI D. Z., MAROLD K., MAY T. W., MCNEILL J., MONRO A. M., PRADO J., PRICE M. J. & SMITH G. F. (eds). 2018. — International Code of Nomenclature for algae, fungi, and plants (Shenzhen Code) adopted by the Nineteenth International Botanical Congress, Shenzhen, China, July 2017. *Regnum Vegetabile* 159. Glashütten: Koeltz Botanical Books. <https://doi.org/10.12705/Code.2018>
- YILDIRIMLI Ş. 2014. — *Rosularia globulariifolia* A. Berger subsp. *pallidiflora* (Holmboe) Yıldırımli, stat. nov., A new status of *Rosularia* Stapf, in YILDIRIMLI Ş. (ed.), Miscellaneous nomenclatural and taxonomic corrections on Turkish plants. *OT Sistematiik Botanik Dergisi* 21 (1): 29-42.

Submitted on 22 December 2024;
accepted on 22 March 2025;
published on 3 November 2025.