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## **A new chasmophytic species of *Potentilla* (*Rosaceae*) from S Anatolia, including some taxonomic remarks on *P.* subg. *Fragariastrum* in the E Mediterranean**

### **Abstract**

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*Potentilla ulrichii* is described as a species new to science and illustrated. Its taxonomic position close to *P. nerimaniae* and *P. davisii* of SW Turkey is discussed and SEM micrographs of the nutlets and the indumentum of these three species are presented. Their ranges, plus those of the more distantly allied *P. isaurica*, *P. libanotica* and *P. arcadiensis*, are mapped. The description of the nutlets of *P. nerimaniae* is corrected from smooth to reticulate-scrobiculate. *P. ulrichii* is a Mediterranean cushion-forming perennial of overhanging limestone rocks known from a single locality in foothills of the S Anatolian Taurus above Manavgat. The chasmophytic habit, its relationship and its stenochory suggest it to be a Tertiary relic endemic.

### **Introduction**

The plant described here is another addition to the *Potentilla* flora of Turkey. Since the first revision of the genus for Turkey by Peşmen (1972), six species and two subspecies have been described from this area (Davis & al. 1988, Duman & Mill 1999, Soják 1991; cf. Erik & Güner 2000).

It was in 1993 that the German pharmacist Robert Ulrich found an uncommon *Potentilla* west of the narrow distributional range of *P. isaurica* (P. H. Davis) B. Pawł. on rock-walls in the foothills of the Isaurian Taurus close to Ahmetler near Manavgat in the province of Antalya. The gathering consists only of two non-flowering specimens, displaying *Fragaria*-like leaves and a strikingly discoloured leaf indumentum. The first flowering plant to be collected, in 1998, confirmed the impression that the plant was not an aberrant variant of *P. isaurica*, but a putative new taxon. The description of two similar *Potentillae* from SW Anatolia, *P. nerimaniae* H. Duman and *P. davisii* R. R. Mill & H. Duman (Duman & Mill 1999), gave the stimulus for Ulrich to re-visit the original collecting place, to do more field-work and to communicate the material to the first author.

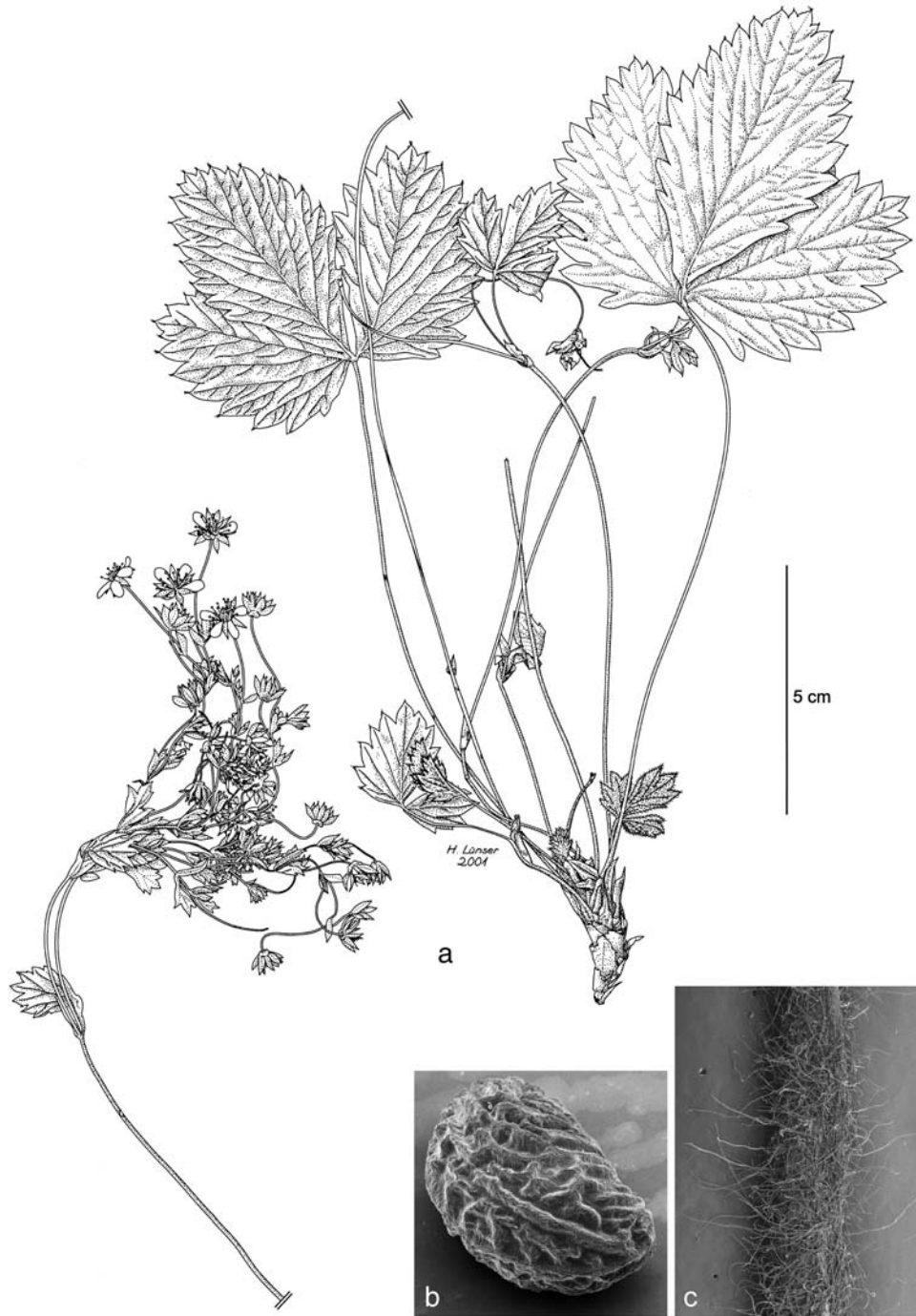


Fig. 1. *Potentilla ulrichii* – a: habit; b: SEM micrograph of the nutlet; c: SEM micrograph of the pedicel indumentum. – Specimens: a: *Ulrich 0/121* (holotype at B); b-c: *Ulrich 0/120* (herb. Parolly).

Indeed, the *Potentilla* of the Ahmetler population comes close to the two taxa named above, but also clearly differs in a number of important features (Table 1). Hence, it is described here as a new species, bringing the total number of species known from Turkey to 60 (Erik & Güner 2000). – The colours in the following description are indicated with the help of the index of Kornerup & Wanscher (1981).

***Potentilla ulrichii* Parolly & Nordt, sp. nova**

Holotype: Turkey: C3 Antalya, Abzweig der Straße Manavgat - Akseki, nahe Ahmetler SW Muratçı, 500 m, überhängende, schattige Kalkwand, Exp. E, 15.10.2000, *Ulrich 121* (B). – Fig. 1, 2, 3c.

Affinis *P. nerimaniae* H. Duman sed foliis majoribus, marginibus 8-9-dentatis (non (3-)4(-)5-dentatis) et petalorum apice ovali (haud truncati) differt. A *P. davisii* R. R. Mill & H. Duman ovario et nucula glabro (non pubescenti) recedit. A his speciebus proximis foliis distincte discoloribus et inflorescentia multiflora differt.

Densely tufted to cushion-forming perennial with brownish woody caudex covered with scarios, persistent stipules and occasionally petiolar remains. *Flowering stems* decumbent-ascending (rarely erect) or pendent, (5-)10-35 cm, rather slender (up to 1 mm diam.), often somewhat flexuous, shorter to considerably longer than basal leaves, olive yellow, sparsely or densely clothed with short eglandular (< 0.5 mm) and glandular (0.1 mm) pubescence interspersed with many 1-2 mm long, soft, white, patent, eglandular hairs. *Leaves* chiefly in rosettes, normally distinctly bicoloured, surface thinly pilose, glabrescent, (in sicco) deep green to greyish green or olive yellow (lime green), lower face densely silvery sericeous with appressed long hairs, paler (within the same range of colours), with very small (0.05 mm) scattered yellowish sessile glands on both faces. *Basal leaves* long-petiolate, trifoliolate; *leaflets* obovate, cuneate at base, lateral leaflets (2-)2.5-5 × (1.5-)2-2.5(-3) cm, terminal leaflet (3-)3.5-6(-7) × (1.5-)2.5-3.5(-4.5) cm; apex of leaflets blunt or shortly acute, margins deeply and coarsely incised-serrate to 2/3 or nearly down to base, with (7-)8-9(-10) sharp, ± triangular teeth on either side; teeth 3-6 mm, larger teeth sometimes with an additional lateral tooth; *petiole* 5-10(-12) cm long (or sometimes, in pendent forms, longer), slender (0.6-0.8 mm diam.), canaliculate above, thinly to densely spreading-villous with a mixture of soft, 0.5-2 mm long eglandular and much smaller, subsessile to shortly stalked glandular hairs; *stipules* broadly lanceolate-acuminate to narrowly ovate, c. 6-14 × 3-5(-6) mm, light brown to brownish orange, long pilose along margins and on midrib, adnate basally to the lower part of the petiole. *Cauline leaves* similar but smaller and with green stipules, diminishing upwards, shortly petiolate or subsessile, leaflets with fewer teeth, the uppermost sometimes 1-foliolate and functioning as a bract of a partial inflorescence. *Inflorescence* a rather dense, ± corymbose cyme, with flexuously ascending branches, many-flowered (c. [10-]15-30 flowers); in all parts densely to moderately villous with the same type of indumentum as on stems and petioles. *Bracts* foliaceous, usually less than 12 × 4 mm and variously lobed or toothed, uppermost c. 6-7 × 2 mm. *Pedicels* (10-)12-20(-35) mm, very slender (0.3-0.4 mm in diam.). *Flowers* relatively small. *Epicalyx segments* 5, narrowly ovate-lanceolate, acute and sometimes denticulate, about 4-5 × 1-1.5(-2) mm. *Calyx* shallowly cup-shaped, densely sericeous-villous, (5-)6-7(-9) mm diam., moderately accrescent in fruit; divided into 5 sepals of nearly the same shape, size (or slightly larger) and indumentum as the epicalyx segments. *Petals* white, obovate, distinctly clawed, longer than the sepals, c. 4.5-6(-7) × 2.5-3 mm, apex rounded (to broadly obtuse). *Stamens* c. 30; filaments 2.5-4 mm long, pilose in lower 5/6, more loosely so in upper 1/2, anthers pale yellowish-brown, oblong, c. 0.6-0.8 × 0.3 mm. *Receptacle* conical, up to 2(-3) mm in fruit, densely white-pilose. *Ovary* pale, glabrous, minute, c. 0.6-0.8 mm long; style subapical, glabrous, filiform (nematostylous), at least 4 × as long as carpel, caducous, stigma truncate. *Nutlets* ivory, kidney-shaped, distinctly compressed, c. 1.6-1.8 × 0.9 mm, glabrous, surface conspicuously ornamented with anastomosing ridges and thus appearing scrobiculate-reticulate, margin narrowly winged.

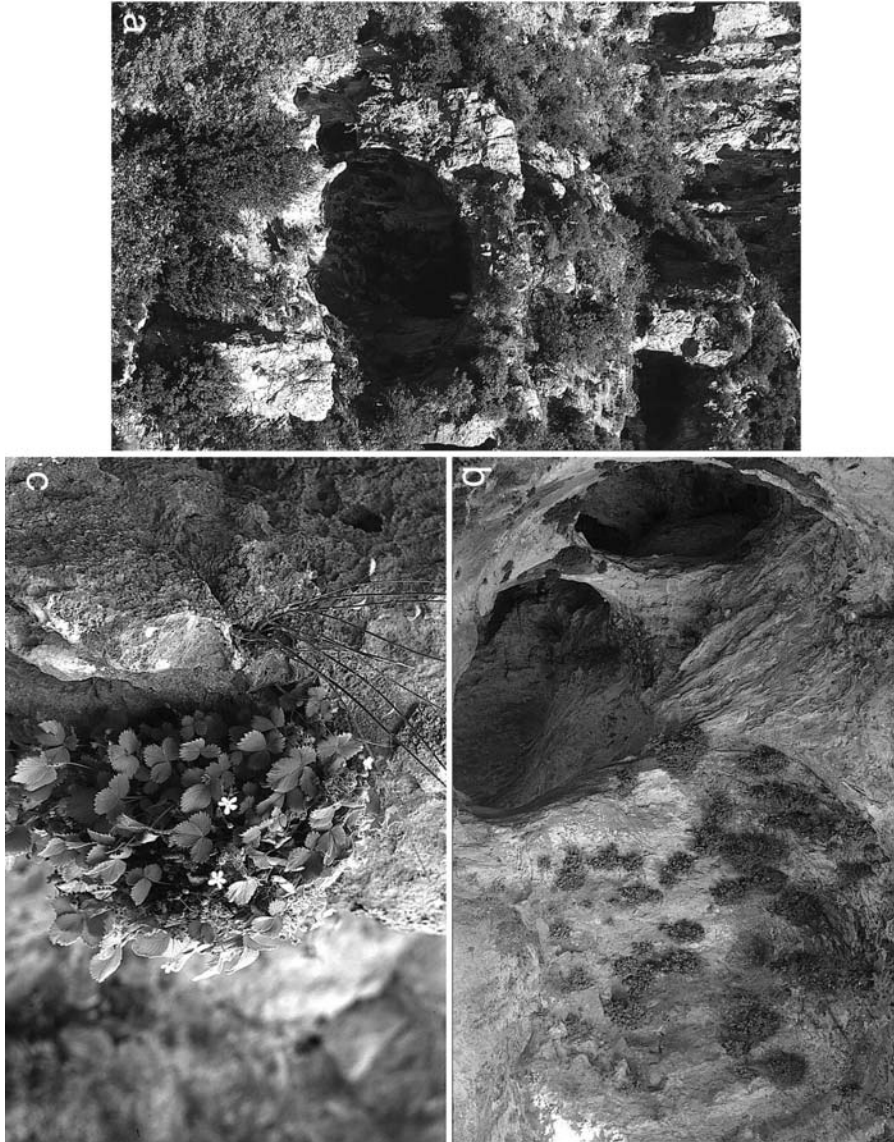


Fig. 2. *Potentilla ulrichii* in its natural habitat [Turkey, C3 Antalya, Manavgat - Akseki, Ahmetler SW Muratçı, 15.10.2000; all photographs by R. Ulrich] – a: big shallow cave (Balme) at 500 m; b: the right-hand portion of the same grotto, showing a healthy population of *P. ulrichii*; c: habit, in the left *Stachys aleutica*.



*Eponymy.* – It gives us much pleasure to dedicate this species to its discoverer, Mr Robert Ulrich (Tübingen, Germany), pharmacist and plant enthusiast with a profound knowledge of the Turkish flora.

*Site conditions and synecology.* – *Potentilla ulrichii* is a typical limestone chasmophyte of the Mediterranean belt (*Pinus brutia* zone). It appears to be a thermophytic element of wind-sheltered sites and to require an enhanced humidity; all collections and observations come from sheltered places at altitudes ranging between c. 300 and 550 m. The sites with E-, SE-, W-, NW- and N-exposures are chiefly semi-shady to shady, rarely moderately sunny. *P. ulrichii* colonises exclusively high vertical to overhanging rock faces, shallow caves (“Balmen” in German) and grotto entrances and covers both the outside rock walls and the ceilings of the grotto mouths (Fig. 2a-b). A preference of rain-sheltered rocks is assumed. In the large shallow cave at 460 m the otherwise cushion-forming *Potentilla* “hängt bis zu 1 m frei von der Decke und bildet eine dickzopfige Girlande aus. Die Blütenstände sind extrem verlängert” [hangs down the ceiling to 1 m, forming a thick, plait-like garland with extremely prolonged inflorescences] (R. Ulrich in litt., 16.12.2000).

*Potentilla ulrichii* occurs often as the only spermatophyte in its habitats, or dominates a particular rock community. The few recorded associates are rare to very rare, such as *Adiantum capillus-veneris* L. (one stand at 500 m at the foot of a damp, overhanging rock). *P. ulrichii* has mostly been found associated with *Stachys aleurites* Boiss. & Heldr. (Fig. 2c), *Ballota inaequidens* Hub.-Mor. & Patzak and *Calamintha tauricola* P. H. Davis. *Hypericum pamphylicum* Robson & P. H. Davis grows mainly outside the *Potentilla* covered rock faces as does *Ballota saxatilis* subsp. *saxatilis*, which prefers much sunnier and drier habitats. *Stachelina lobelii* DC. dwells in the vertical rocks above the grottoes in eye-catching, large clumps.

The herbarium specimens of *Potentilla ulrichii* (and *P. nerimaniae*) reveal that the plants have a blastochorous mechanism of dispersal. The flexuous stems spread over the rock and the slender pedicels bend downwards geotropically to place their diaspores in rock fissures and soil pockets of the rooting-place or very close to the mother plant. This has already been reported for *P. pulvinaris* Fenzl, another Anatolian lithophyte (Parolly 1995).

The vegetation formed by *Potentilla ulrichii* and its associates cannot yet be classified phytosociologically as the only more comprehensive accounts of the rock vegetation of the Taurus, by Quézel (1973) and Hein & al. (1998), deal with the cover of the high mountain rock vegetation (*Silenetalia odontopetalae* Quézel 1973). The latter work gives a short sketch of the saxatile vegetation of the East Mediterranean Subregion. *Ballota saxatilis* subsp. *saxatilis* is a very characteristic element in sun-drenched, submontane to montane rock fissure communities of the western half of the Central Taurus (pers. obs. Parolly; cf. Davis 1951 and Quézel 1973; for the phytogeographical subdivision of the Taurus range see Parolly 1995, 1998). According to Ayaşlıgil (1987), who provides valuable floristic notes of the lowland rock vegetation of the Köprülü Kanyon Nationalpark (also C3 Antalya), *Stachys aleurites*, *Calamintha tauricola* and *Stachelina lobelii* are locally important elements of the Mediterranean chasmophytic vegetation. Robson (1988) reports *Hypericum pamphylicum* from rock crevices between Manavgat and Alanya at altitudes of c. 100 m.

*Phenology.* – *Potentilla ulrichii* flowers chiefly from (mid June) July to September. In early October most of the plants are found after anthesis. Late flowering is a feature of all the related species groups discussed below (Duman & Mill 1999, Iatroú 1985, Pawłowski 1965, Wolf 1908).

*Affinities and taxonomic position.* – *Potentilla* is a taxonomically difficult genus because of infraspecific hybridisation and apomixis, especially in *P.* subg. *Potentilla*. As a result of this and the conflicting concepts adopted at sectional level (Ball & al. 1968, Juzepčuk 1941, Pawłowski 1965, Schiman-Czeika 1969, Soják 1987, Wolf 1908), which often tend to work well regionally but break down at a larger geographical scale, some standard floras restrict themselves to group the species into subgenera only (Ball & al. 1968 [except the use of very broadly defined sections in *P.* subg. *Fragariastrum*], Guillén & Rico 1998, Mouterde 1970; cf. Meikle 1966). Also owing

Table 1. Differential features of *Potentilla ulrichii* and related species. Measurements and features taken from the references and specimens cited. Diagnostic features of *P. sect. Plumosistylae* B. Pawl. are emphasised in grey. Unique features discriminating one species are in bold.

Character	<i>Potentilla</i> sect. <i>Crassinerviae</i> p.p. ( <i>P. nerimaniae</i> group)			<i>Potentilla</i> sect. <i>Plumosistylae</i>	
	<i>P. ulrichii</i>	<i>P. nerimaniae</i>	<i>P. davisii</i>	<i>P. arcadiensis</i>	<i>P. isaurica</i>
<b>Petioles [length in cm]</b>	5-12, thin	1-7, thin	≤ 10, stout	3-5, thin	<i>P. libanoica</i> 3-5, stout
<b>Indumentum</b>	Simple hairs dominant ± hiding the much shorter glandular hairs			glandular hairs dominant, glutinous	
<b>Leaves</b>	ternate, (distinctly) bicoloured	ternate, (weakly) bicoloured	ternate, bicoloured	ternate (rarely digitate), bicoloured ?	ternate, green, not bicoloured
<b>Leaflet size [mm]</b>	(20-)25-60(-70) × (15-)20-35(-45)	(7-)10-25 × (6)10-20	15-30 × 12-20	15-25 × 10-18	15-25 × 10-20
<b>Leaflet margin</b>	dentate	dentate	crenulate-serrate	crenate-serrate	crenulate-serrate, rarely dentate
<b>Lateral teeth of leaflets</b>	(6-)8-9(-10)	(3-)4(-5)	(4-)5-7(-10)	5-6(-7)	6-9
<b>Tip of teeth</b>	acute			blunt	
<b>Pedicels [length in mm]</b>	(10-)12-35, thin	10-30, thin	10-30, thin	15-35, ±thin	≤ 10, stout
<b>Epicalyx segments [mm]</b>	4-5	2-4	6-10	3.5-5.5	4-6.5
<b>Petals length [mm] shape</b>	4.5-6(-7) obovate	5-5.5 obovate	6-10 obovate-orbicular	4.5-6 elliptic oblong to obovate oblong	5-7.5 obovate to ovate
<b>apex</b>	rounded to broadly obtuse, glabrous	obtuse or shallowly retuse, glabrous	obtuse, glabrous	± truncate, <b>pubescent</b>	obtuse, glabrous
<b>Filaments</b>	pilose, base dilated			glabrous, base dilated	glabrous, base not dilated
<b>Anthers</b>	oblong, yellowish			globose, <b>reddish</b>	
<b>Style</b>	glabrous			plumose, persistent	
<b>Ovary / Nutlet</b>	glabrous			apex loosely pilose	
<b>Nutlet ornamentation</b>	scrobiculate-reticulate			smooth	
<b>Altitudinal range [m]</b>	Mediterranean (300-550)	montane-oral (1350-1950)	montane (-oral) (1370-1630)	Medierranean (550)	montane-oral (1100-1700) montane-subalpine (1450-2100)

to some uncertainty of status, sections are not interpolated in the “Flora of Turkey”, but are listed as a guide with indication of the species contained (Peşmen 1972).

There is no doubt about the placement of *Potentilla ulrichii* in *P.* subg. *Fragariastrum* (Heist. ex Fabr.) Rchb. and close to *P. nerimaniae* H. Duman and *P. davisii* R. R. Mill & H. Duman. The interpretation of its taxonomic position becomes more complicated as soon as attention is drawn to additional or more distantly allied species and an attempt is made to classify this group of species subgenerically. Duman & Mill (1999) relate *P. davisii* to *P. libanotica* Boiss. and *P. isaurica* (P. H. Davis) B. Pawł., and include all together, as outlined by Peşmen (1972), in *P.* sect. *Crassinerviae* (Th. Wolf) Juz.

This sectional classification is followed here with some hesitation (caused by the different circumscriptions of the section by Juzepčuk 1941, Pawłowski 1965, Soják 1987 and Wolf 1908 and the lack of any better classification) as far as *Potentilla ulrichii*, *P. nerimaniae* and *P. davisii* are concerned. Pawłowski (1965) suggested to narrow down the “grex *Crassinerviae*” in the broad sense of Wolf (1908) to include *P. crassinervia* Viv. only, but this treatment has found less acceptance. Much more convincingly, he established *P.* sect. *Plumosistylae* B. Pawł. on account of having globose anthers and styles persistent in fruit with at least the lower half plumose. *P.* sect. *Plumosistylae* comprises two subsections classifying three species only: *P.* subsect. *Libanoticae* B. Pawł. (with *P. libanotica* and *P. isaurica*) and subsect. *Alpinimaritimae* B. Pawł. (with *P. saxifraga* Ardoino ex De Not.). *P. saxifraga*, a plant of the French and Italian Maritime Alps, bears a superficial resemblance to *P. ulrichii* owing to its discoloured, ternately to quinately digitate leaves, but it clearly differs in many distinctive characters.

We preliminarily group five Anatolian species in *Potentilla* sect. *Crassinerviae*: the complex of *P. ulrichii*, *P. nerimaniae* and *P. davisii* (as the *P. nerimaniae* group) and the Euxine *P. doddsii* P. H. Davis and *P. savvalensis* B. Pawł. The two N Anatolian taxa are placed in accordance with Pawłowski (1965, see iconography, below) and Soják (1987) into the *P. valderia* group (*P.* ser. *Valderiae* B. Pawł.) with petals shorter than sepals, epicalyx segments much narrower than sepals, subcampanulate flowers and digitate leaves.

The *Potentilla nerimaniae* group has an allied species in *P. arcadiensis* Iatroú of the Greek Peloponnese; this inhabits similar habitats of the same belt as *P. ulrichii*. *P. arcadiensis* is easily recognised by its pilose petal apex, the long pilose apex of the nutlets, a mixed indumentum with long glandular hairs up to 1 mm and only slightly longer simple hairs, and the tendency to develop one or two digitate radical leaves within the predominantly trifoliate rosettes (Table 1, Fig. 4). However, the number of leaflets is not a reliable character for a subgeneric classification, as first stressed by Wolf (1908). For details and a discussion of the taxonomic position of *P. arcadiensis*, see Iatroú (1985) and Tan & Iatroú (2001).

Within the *Potentilla nerimaniae* group, *P. ulrichii* comes in total closer to *P. nerimaniae* than to *P. davisii* in sharing the small flowers, the glabrous nutlets of nearly the same size (1.6-1.8 mm), sharply serrate leaflets, the delicate habit owing to the slender petioles and pedicels and the loose inflorescences, and the blastochorous dispersal type. By contrast, *P. davisii* has a much stouter appearance (with thick petioles, stems 1-2.5 mm in diam. and more rigid inflorescences), crenulate-serrate leaf margins (in general, its leaves are very similar to those of *P. speciosa* Willd.), flowers often twice as large as in their relatives and larger (2.3-2.4 mm), pilose nutlets (Fig. 3a). *P. ulrichii* and *P. davisii* have in common a dense indumentum with distinctly discoloured leaves (often indistinctly so in *P. nerimaniae*). However, *P. ulrichii* is easily distinguished from *P. nerimaniae* by the greater number of teeth along the leaflet margins and the many-flowered inflorescences. There is not so much difference in the ornamentation between the nutlets of *P. nerimaniae* (Fig. 3b) and *P. ulrichii* (Fig. 3c), since Duman’s protologue of *P. nerimaniae* erroneously describes and figures them to be smooth (Duman & Mill 1999). The examined nutlets present on the isotype kept at E are not fully mature, but the reticulation is already clearly developed and may be seen with the help of a hand lens.

The petal shape seems to provide in general only characters of minor value within the *Potentilla nerimaniae* group as there is a rather large range of variation.

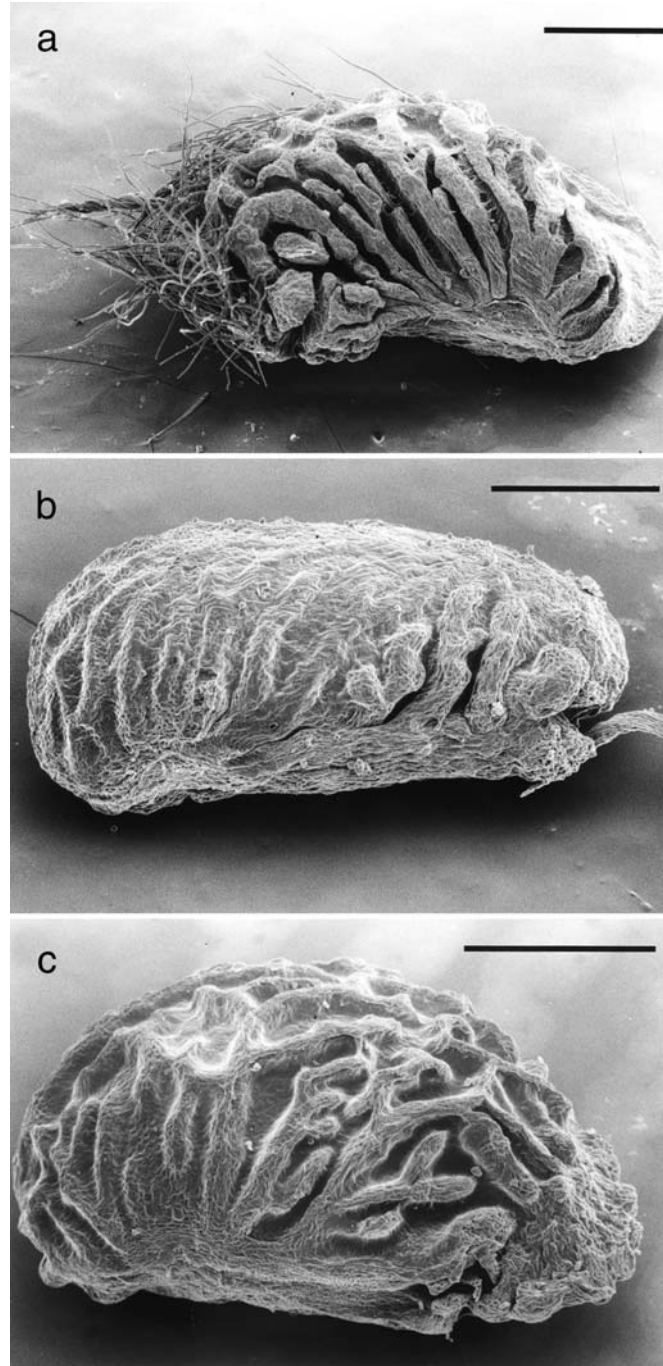


Fig. 3. SEM micrographs of nutlets (overview) of *Potentilla davisii* (a), *P. nerimaniae* (b) and *P. ulrichii* (c). – Scale bar: a-c = 0.5 mm. – Specimens: a: *Aytaç 7648* (isotype E); b: *Duman, Ekici & Duran [Duman 5978]* (isotype E); c: *Ulrich 0/120* (herb. Parolly).



Although placed in a different section, *P. isaurica* and *P. libanotica* seem to be the only other relatives of the *P. nerimaniae* group in the East Mediterranean Subregion. The differences between the sections and the six species compared are summarised in Table 1. In addition to the diagnostic characters of *P. sect. Plumosistylae*, the two taxa of *P. subsect. Libanoticae* are distinct in their uniformly green leaf faces with a prominent, chiefly glandular and often somewhat glutinous indumentum and the relatively short (and stout) pedicels.

All species discussed are chasmophytes restricted to small or extremely narrow ranges (Fig. 4) in S Greece and the biogeographically well-defined Taurus system (Parolly 1995), also known as the Taurus-Amanos district (Davis 1971). Their rarity, restricted occurrences in never glaciated altitudes, the particular taxonomic position and the accompanying flora displaying an enhanced number of paleoendemics, indicate that all these species may represent Tertiary relic endemics (cf. Davis 1951, Snogerup 1971). According to Wolf (1908), their ancestors should be suffrutescent plants ("*Trichocarpeae fruticulosae*"), which migrated during the Tertiary from the North (primitive centre of the genus *Potentilla*) to the Mediterranean mountains where they have been differentiated (cf. Iatrou 1985). This view is supported by karyological data since all studied species of *P. sect. "Crassinerviae s. l."* are diploid ( $2n = 14$ , Contandriopoulos 1962) with chromosome counts of the members of the *P. nerimaniae* group still pending.

*Distribution.* – *Potentilla ulrichii* is presently known from only one large rocky mountain slope in the Manavgat district close to the village of Ahmetler SW of Muratiçi (Fig. 4). The records and observations come from an altitudinal gradient of c. 250 m. The area is not easily accessible and more field work may surely extend the extremely narrow range in the Karpuz Çayı valley.

*Additional specimens seen.* – TURKEY: C3 ANTALYA: Abzweig der Straße Manavgat - Akseki, nahe Ahmetler SW Muratiçi, 360 m, Kalkfelsen mit Balme, Exp. NW, 23.4.1997, Ulrich (E, herb. Parolly); 330 m, Exp. N, 26.9.1998, Ulrich (E, photo in herb. Parolly); *ibid.*, 460 m, Balme, an der Außenwand, Exp. SE, 15.10.2000, Ulrich 0/119 (herb. Parolly); *ibid.*, 460 m, Balme, von der Decke herabhängend, Exp. SE, 15.10.2000, Ulrich 0/120 (herb. Parolly); *ibid.*, 540 m, überhängende Kalkfelsen, Exp. E, 15.10.2000, Ulrich 0/122 (B) *ibid.*, 460 m, Balme, Exp. SE, 21.6.2001, Ulrich 1/65 (herb. Parolly); *ibid.*, 330 m, überkragender Kalkfels, Exp. N, 21.6.2001, Ulrich 1/66 (B).

*Recommended IUCN threat category.* – For such a steno-endemic species, occupying a site which is not directly threatened by human activities in the near future, the listing as "Vulnerable" seems to be appropriate.

## Conclusions

The reticulate distribution of the relevant characters among *Potentilla ulrichii* and the complex of the related species (Table 1) makes the classification very difficult, while the species seem to be clear-cut. To adopt a fully convincing concept for *P. sect. Crassinerviae* seems presently impracticable. A certain number of the diagnostic features (stems stout, firm, longer than leaves; leaflets green beneath, thick, usually broadly obovate, with strongly prominent network of veins and numerous remote teeth; inflorescence congested; fruitlets hairy) used to delimit the section (cf. Juzepčuk 1941) are not suitable to cover the entire group. Within the *P. nerimaniae* group they apply much better to *P. davisii* and keep *P. ulrichii* and *P. nerimaniae* distinct.

Following the formal emendation of Soják (1987: *P. sect. Crassinerviae* (Th. Wolf) Juz. emend. Soják), it has to be pointed out that the *P. nerimaniae* group has aequicrassate styles and not "styli dimidio inferiore paulum dilatate, ad apicem sensim attenuati", as indicated for the section.

An evaluation of all the characters put together in Table 1 reflects three subgroups (*P. ulrichii* / *P. nerimaniae*; *P. davisii*; *P. arcadiensis*) within one complex (*P. sect. Crassinerviae*) and outlines clearly a second, more distant group (*P. sect. Plumosistylae* subsect. *Libanoticae*: *P. isaurica* / *P. libanotica*). As we do not want to contribute to the inflation of the patchwork in *P. subg. Fragariastrum*, the taxonomically somewhat isolated S Anatolian *Crassinerviae* may better be

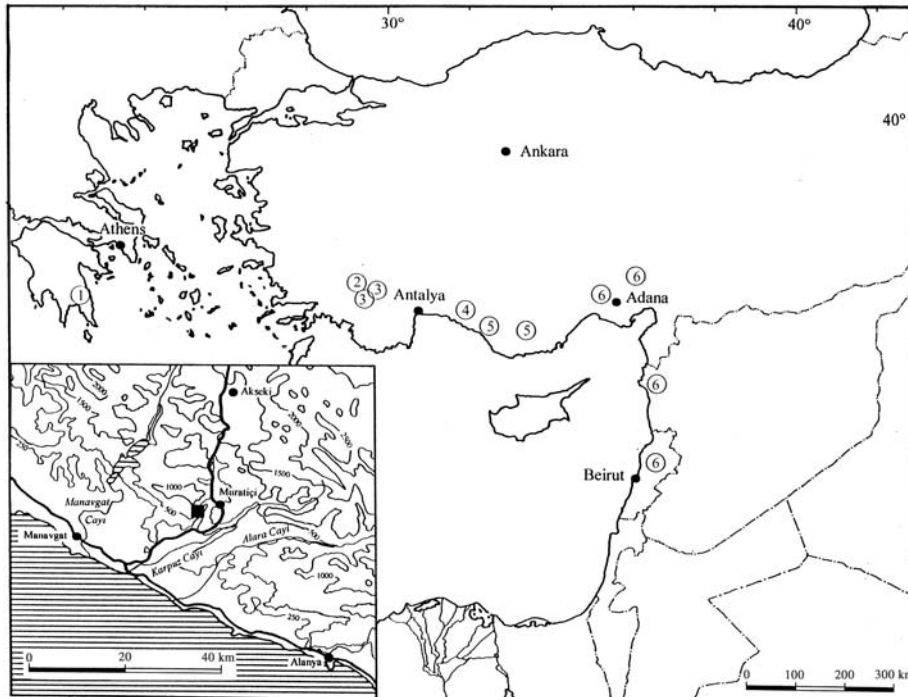


Fig. 4. Distribution of *Potentilla ulrichii* and related species – 1: *P. arcadiensis* [based on Iatrou 1985]; 2: *P. davisii* [based on Duman & Mill 1999]; 3: *P. nerimaniae* [based on Duman & Mill 1999]; 4: *P. ulrichii* [this paper]; 5: *P. isaurica* [based on Ekim 1999, Pawłowski 1965, Peşmen 1972 and specimens cited]; 6: *P. libanotica* [based on Iatrou 1985, Mouterde 1970, Pawłowski 1965, Peşmen 1972]. – Inset map: the square indicates the locality of *P. ulrichii* close to Ahmetler.

treated as an informal *P. nerimaniae* group (rather than a conceivable new *P. ser. Nerimaniae*) so long as there is no biosystematic study at hand. Note in this context that according to first molecular studies *Potentilla* s.l. is probably paraphyletic (Eriksson & al. 1998, Vretblad & al. 1996).

Be what it may, *P. ulrichii* obviously belongs to a group of ancient species with a very restricted or disjunct distribution area and may reveal a Tertiary origin. Its occurrence in the mountains above Manavgat confirms the special importance of the rocky foothills of the Taurus in total for the preservation and conservation of ancient types. Its discovery in the western Central Taurus (Pisidian-Isaurian Sector sensu Parolly 1995, 1998), together with many recent discoveries in this area reveals that it was unjustly put in the shade for a long time by focussing only on the endemic-rich slopes of the Lycian and Cilician Taurus (cf. Davis 1971, Quézel 1973).

#### Specimens of the related *Potentilla* species seen and a short iconography to the taxa

*Potentilla arcadiensis*. – GREECE: Peloponnesus, Arkadhia, bei Moni Elona, W Leonidion, 530 m, Kalkfelswand, Exp. NE, 21.4.2002, Ulrich (herb. Parolly).

*Iconography & map*. – Iatrou (1985), Tan & Iatrou (2001).

*P. davisii*. – TURKEY: C2 DENIZLI: Acıpayam, Bozdağ, Olukbaşı, above Geyran Yayla, 1450 m, rocks, 4.8.1997, Aytaç 7648 (isotype E); Bozdağ, above Geyran Yayla, 4500 ft, rocks, 16.7.1947, Davis 13334 (paratype E); ibid., 5000-5500 ft, Davis 13435 (paratype E).

*Iconography & map*. – Duman & Mill (1999).

***P. isaurica***. – TURKEY: C4 ANTALYA: Alanya, Kargı Çayı between Durbanas and Derince Dere, in cliffs, 25.8.1947, *Davis & Bilger 14464* (holotype E); Alanya, Dimçayı vadisi, 1200 m, 10.10.1992, *Duman 4677 & Karavelioğulları* (E); Alanya, Gökdere (Gevne) Çayı canyon, 1-2 km SE of the vilayet border, between Çamiçi and Çayarası, 1170-1180 m, E-exp., partly water-trickled cliff-bases and step crevices, limestone, 12.7.2000, *Eren & Parolly [Parolly 7917]* (B, herb. Eren, herb. Parolly); Alanya, in Paßnähe zwischen Demirtaş und Söğüt Yaylası, 1540 m, überhängende Kalkfelsen, Exp. N, 18.9.1999, *Ulrich* (B); *ibid.*, in Paßnähe NE Demirtaş, 1560 m, senkrechte Kalkfelsen, Exp. N, 9.10.2000, *Ulrich 0/117* (herb. Parolly).

*Iconography*. – Ekim (1999), Pawłowski (1965).

*Maps*. – Iatroú (1985), Pawłowski (1965).

***P. libanotica***. – LEBANON: In declivita Libani borealis occidentalibus, prope pagum Ehden, 1450-1700 m, 30.6.-2.7.1910, *Bornmüller 11766* (E); Bocherre to Cedar, 5000-6000 ft, on hard vertical rocks with *Staezelina*, 18.8.1945, *Davis 10113* (E). — TURKEY: C5 İçel, Kapudschı Dere, an Felsen, *Siehe 1896: 643* (E).

*Iconography*. – Iatroú (1985), Mouterde (1970), Pawłowski (1965), Wolf (1908).

*Maps*. – Iatroú (1985), Pawłowski (1965).

***P. nerimaniae***. – TURKEY: C2 Antalya, Elmalı, Çığlıkara, 1900-1950 m, on calcareous rocks, 1.8.1995, *Duman, Ekici & Duran [Duman 5978]* (isotype E); C2 Burdur, N Ören (NE Fethiye), 1350 m, Kalkfelsen, Exp. NW, 9.5.2001, *Ulrich 1/64* (herb. Parolly).

*Iconography & map*. – Duman & Mill (1999).

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### References

- Ayaşlıgil, Y. 1987: Der Köprülü Kanyon Nationalpark. Seine Vegetation und ihre Beeinflussung durch den Menschen. – Doctoral thesis (Landschaftsökologie) Weihenstephan.
- Ball, P. W., Pawłowski, B. & Walters, S. M. 1968: *Potentilla* L. – Pp. 36-47 in: Tutin, T. G., Heywood, V. H., Burges, N. A., Moore, D. M., Valentine, D. H., Walters, S. M. & Webb, D. A. (ed.), *Flora europaea* 2. – Cambridge, etc.
- Contandriopoulos, J. 1962: Recherches sur la flore endémique de la Corse et sur ses origines. – *Ann. Fac. Sci. Marseille* 23.
- Davis, P. H. 1951: Cliff vegetation of the Eastern Mediterranean. – *J. Ecol.* 39: 63-93.
- 1971: Distribution patterns in Anatolia with particular reference to endemism. – Pp. 15-27 in: Davis, P. H., Harper, P. C. & Hedge, I. C. (ed.), *Plant life of South-West Asia*. – Edinburgh.
- , Mill, R. R. & Tan, K. 1988: *Potentilla* L. – Pp. 132-134 in: Davis, P. H., Mill, R. R. & Tan, K. (ed.), *Flora of Turkey and the East Aegean Islands* 10. – Edinburgh.
- Duman, H. & Mill, R. R. 1999: Two new species of *Potentilla* L. (*Rosaceae*) from SW Turkey. – *Edinburgh J. Bot.* 56: 349-354.
- Ekim, T. 1999: A botanical field trip to Geyik Dağı. – *Karaca Arbor. Mag.* 5: 1-26.

- Erik, S. & Güner, A. 2000: *Potentilla* L. – Pp. 101-103 in: Güner, A., Özhatay, N., Ekim, T. & Baëer, K. H. C. (ed.), Flora of Turkey and the East Aegean Islands **11**. – Edinburgh.
- Eriksson, T., Donoghue, M. J. & Hibbs, M. S. 1998: Phylogenetic analysis of *Potentilla* using DNA sequences of nuclear ribosomal internal transcribed spacers (ITS), and implications for the classification of *Rosoideae* (*Rosaceae*). – Pl. Syst. Evol. **211**: 155-179.
- Guillén, A. & Rico, E. 1998: *Potentilla* L. – Pp. 96-140 in: Muñoz Garmendia, F. & Navarro, C. (ed.), Flora iberica **6**. – Madrid.
- Hein, P., Kürschner, H. & Parolly, G. 1998: Phytosociological studies on high mountain plant communities of the Taurus mountains (Turkey) 2. – Phytocoenologia **28**: 465-563.
- Iatrou, G. 1985: A new species of *Potentilla* (*Rosaceae*) from Peloponnesus, Greece. – Candollea **40**: 121-128.
- IUCN 2001: IUCN Red List categories and criteria, version 3.1. – Gland & Cambridge.
- Juzepčuk, S. V. 1941: *Potentilla* L. – Pp. 78-223 in: Komarov, V. L., Šiškin, B. K. & Juzepčuk, S. V. (ed.), Flora SSSR **10**. – Moskva & Leningrad.
- Kornerup, A. & Wanscher, J. H. 1981: Taschenlexikon der Farben, ed. 3. – Zürich & Göttingen.
- Meikle, R. D. 1966: *Rosaceae*. – Pp. 102-171 in: Townsend, C. C. & Guest, E. (ed.), Flora of Iraq **2**. – Baghdad.
- Mouterde, P. 1970: Nouvelle flore du Liban et de la Syrie **2**. – Beyrouth.
- Parolly, G. 1995: Die Steinschuttfluren (Heldreichietea) des Westlichen und Mittleren Taurus (Türkei). Pflanzensoziologische, floristische und ökologische Untersuchungen. – Diss. Bot. **247**.
- 1998: Phytosociological studies on high mountain plant communities of the South Anatolian Taurus mountains 1. Scree plant communities (Heldreichietea): A synopsis. – Phytocoenologia **28**: 233-284.
- Pawłowski, B. 1965: De generis *Potentilla* L. serie *Crassinerviae* (Th. Wolf) B. Pawł. – Fragm. Florist. Geobot. **11**: 53-91.
- Peşmen, H. 1972: *Potentilla* L. – Pp. 41-68 in: Davis, P. H. (ed.), Flora of Turkey and the East Aegean Islands **4**. – Edinburgh.
- Quézel, P. 1973: Contribution à l'étude phytosociologique du massif du Taurus. – Phytocoenologia **1**: 131-222.
- Robson N. K. B. 1988: *Hypericum* L. – Pp. 96-103 in: Davis, P. H., Mill, R. R. & Tan, K. (ed.), Flora of Turkey and the East Aegean Islands **10**. – Edinburgh.
- Schiman-Czeika, H. 1969: *Potentilla* L. – Pp. 78-114 in: Rechinger, K. H. (ed.), Flora iranica **66**. – Graz.
- Snogerup, S. 1971: Evolutionary and plant geographical aspects of chasmophytic communities. – Pp. 157-170 in: Davis, P. H., Harper, P. C. & Hedge, I. C. (ed.), Plant life of South-West Asia. – Edinburgh.
- Soják, J. 1987: Notes on *Potentilla*. IV. Classification of Wolf's group "*Potentillae trichocarpae*". – Candollea **42**: 491-500.
- 1991: Notes on *Potentilla* L. (*Rosaceae*) IX. New species from Turkey, the Caucasus, Iran and Turkmeniya. – Willdenowia **20**: 117-124.
- Tan, K. & Iatrou, G. 2001: Endemic plants of Greece. The Peleponnese. – Copenhagen.
- Vretblad, M., Eriksson, T. & Donoghue, M. J. 1996: A molecular and morphological phylogenetic analysis of the subfamily *Rosoideae* (*Rosaceae*), with emphasis on the monophyly of the genus *Potentilla*. – Abstracts from the Phylogeny of Life Symposium, Oct. 10-13. 1996. – Published on the internet: <http://eebweb.arizona.edu/rtg/abstrax2.htm#vretblad>.
- Wolf, Th. 1908: Monographie der Gattung *Potentilla*. – Bibl. Bot. **16** (71): 1-715.

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