

## *Sedum ursi* (Crassulaceae), a new species from Sandras Dağı (Turkey)

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### SUMMARY

*Sedum ursi* from Mt Sandras (Turkey) is described. Most probably it is related to the species of *Sedum* series *Alpestris* Berger of *Sedum* sect. *Sedum*. The position of *Sedum ursi* ( $2n = 12$ ) within *Sedum* series *Alpestris* is briefly discussed, especially with respect to the three paleodiploid species ( $x = 8$ ) of this group.

*Key-words:* *Sedum ursi*, Crassulaceae, chromosome numbers.

### INTRODUCTION

In 1985 during field work in SW Turkey Urs Eggli (Zürich) collected a small *Sedum* with yellow flowers on Sandras Dağı. It was provisionally identified as *S. laconicum* Boiss. & Heldr., which had been reported before from Mt Sandras (Chamberlain 1972). Part of the collection was cultivated in the botanical gardens of Zürich and Utrecht. However, the cultivated plants differed substantially from *S. laconicum*, and in fact from all other Eurasiatic species of *Sedum* with yellow flowers (Webb 1964; Chamberlain 1972; 't Hart 1978; Runemark & Greuter 1981). The habit of the plant, the size, shape and arrangement of its leaves, the structure of the inflorescence, the shape of the sepals and its karyotype are especially distinct. The plant from Mt Sandras combines a unique set of cytological and morphological characters and is described here as a new species. It is named after the collector.

### *SEDUM URSI* SP. NOV.

Plantae perennes totae glabrae, surculis sterilibus repentibus radicanibus ramosissimis apicibus dense foliosis. Folia viridia, alterna, dense imbricata, plerumque in 7 spiris dispositis, oblonga, 8 mm longa, 2 mm lata, semiteretia, apicibus rotundatis aliquantum mammillatis, marginibus obtusis laevibus, calcaribus basalibus virido-albis truncatis circa 0.7 mm longis. Folia mortua badia, interdum persistentia. Caules floriferi simplices erecti. Inflorescentiae cincinnos terminales formantes, ramis 2, floribus 3 ad 7 vel ultra. Flores 5-meri, pedicellis brevibus erectis circa 0.5 mm longis, bracteis binis apicibus rotundatis calcaribus basalibus brevibus. Sepala viridia, inaequalia, oblonga, ad 2.5 mm longa, apicibus rotundatis, basibus receptaculo adnatis. Petala flava, aestivatione quincunciali, stellatim patentia anthesi, elliptica, 4–5 mm longa, 1.5–2 mm lata, acuta, mucronibus dorsalibus parvulis, basibus liberis vel connatis per circa 0.1 mm. Stamina 10, filamentis flavis circa 3 mm longis, antheris flavis. Carpella flavo-viridia, suberecta, circa 4 mm longa, stylis apicalibus distinctis erectis circa 1 mm longis, squamis basalibus cuneatis,

0.1 mm longis, emarginatis vel bilobatis. Folliculi fusci, stellato-patentes, labiis angustis secus suturas. Semina brunnea ovoidea, circa 0.8 mm longa, testis reticulato-papillois. Chromosomatum numerus  $2n = 12$ . Hab. in regionibus alpinis montis Sandras.

Plants completely glabrous, with prostrate, creeping and rooting, branched non-flowering shoots. Leaves green, densely imbricate, alternate, usually arranged in seven parastichies, oblong, 8 mm long and 2 mm wide, with a rounded, somewhat mamillate tip, smooth obtuse margin, and greenish-white, truncate spur of 0.7 mm at the base. Dead leaves reddish-brown, sometimes persistent. Flowering shoots erect. Inflorescences terminal cincinni with one or two branches, and three to seven or more flowers. Flowers five-merous, with erect pedicels of 0.5 mm, and two bracts with a rounded tip and a short basal spur. Sepals green, unequal, oblong, up to 2.5 mm long, with a rounded tip, and the base fused with the receptacle. Petals yellow, quincuncial in bud, stellate patent during anthesis, elliptic, 4–5 mm long, 1.5–2 mm wide, acute with a short dorsal mucro, basally free or slightly connate (c. 0.1 mm). Stamens 10, about 3 mm long, filaments and anthers yellow. Carpels yellowish-green, erect, about 4 mm long with a distinct erect style of about 1 mm at the tip, and a yellowish, cuneate emarginate or bilobate, scale of 0.1 mm at the base. Follicles stellate-patent, brown, with narrow lips along the ventral suture. Seeds brown, ovoid, about 0.8 mm long, with a reticulo-papillose testa. Chromosome number  $2n = 12$ .

Typus: Turkey (prov. Muğla), Sandras Dağı, above Ağla, Gök Gedik Tepesi, on limestone and serpentine gravel, 1650 m, Egli 729a, cult. in Hort. Bot. Zürich, May 1986, Z (holotype), and in Hort. Bot. Utrecht, June 1987, U (paratype).

## DISCUSSION

The systematic position of *S. ursi* within the group of Eurasiatic species of *Sedum* sect. *Sedum* ('t Hart 1982) seems to be quite clear. Its habit as well as the semiterete, obtuse leaves, unequal sepals, yellow petals, and stellate-patent ripe follicles indicate a close affinity with the species of the so-called *S. acre* group (Webb 1964). The hybridization pattern of the species of *Sedum* sect. *Sedum* (including the *S. acre* group) are strictly correlated with the character states of four morphological characters ('t Hart 1983, 1987), and 't Hart (1987) emphasized the significance of these four characters in the infrageneric classification of *Sedum*. With respect to the states of these characters *S. ursi* fully agrees with the species of *Sedum* series *Alpestris* Berger. Like the 11 species of this series *S. ursi* has seeds with a reticulate testa and an acute apex, sepals which are basally fused with the receptacle, and it is completely glabrous. The other species of the *S. acre* group differ from *S. ursi* and *Sedum* series *Alpestris* in one of the four characters which are correlated with the hybridization pattern, namely, *S. acre* L. has basally free and spurred sepals, *S. litoreum* Guss. (= *S. praesidis* Runemark & Greuter) and *S. nanum* Boiss. have bipapillate or costate seeds ('t Hart & Berendsen 1980), and *S. samium* Runemark & Greuter has glandular pubescent petals.

Cytologically, *S. ursi* is quite distinct. It has the chromosome number  $2n = 12$  and its chromosomes are rather long (Fig. 1). Within *Sedum* series *Alpestris* it resembles the three paleodiploid species of this group ('t Hart 1983) most closely, namely, *S. alpestre* Vill., *S. grisebachii* Boiss. & Heldr., and *S. laconicum* Boiss. & Heldr. However, these three species have the basic chromosome number  $x = 8$ . The karyotypes of *S. alpestre* (Fig. 1c) and *S. grisebachii* (Fig. 1d) differ considerably from the karyotype of *S. ursi*. The chromosomes of *S. alpestre* are much smaller and those of *S. grisebachii* almost twice as large. The size and

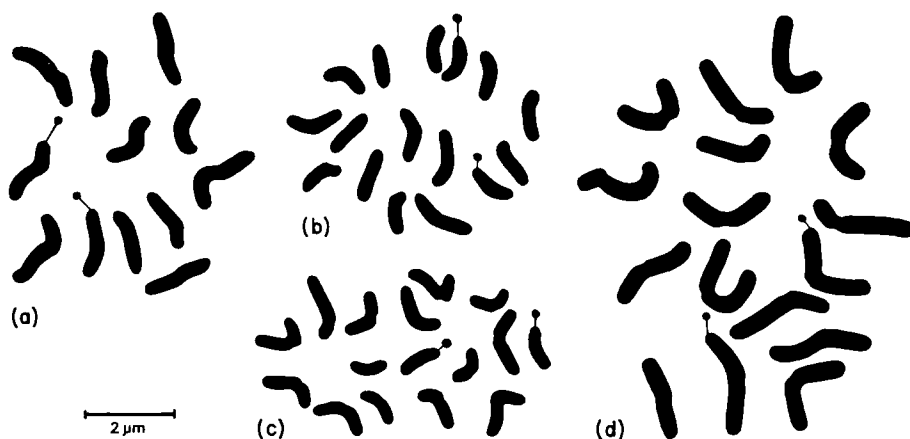


Fig. 1. Chromosome complements of the four paleodiploid species of *Sedum* series *Alpestris* Berger. (a) *Sedum ursi* 't Hart,  $2n=12$  (Sandras Dağı, type). (b) *S. laconicum* Boiss. & Heldr.,  $2n=16$  (Greece: Parnon Mts, 't Hart 28750). (c) *S. alpestre* Vill.,  $2n=16$  (Greece: Varnous Mts, 't Hart 28847). (d) *S. grisebachii* Boiss. & Heldr.,  $2n=16$  (Greece: Timfi Mts, 't Hart 28823). The karyograms were drawn from root-tip sections stained with haematoxylin ('t Hart & Eggli 1989).

shape of the chromosomes of *S. laconicum*, on the other hand, show much more affinity with the karyotype of *S. ursi*, and the latter might well have been derived from the former through dysploidy. The total length of the chromosomes of *S. laconicum* and *S. ursi* is almost equal, but *S. laconicum* (Fig. 1b) has one pair of long chromosomes (c.  $1.5\ \mu\text{m}$ ) and seven pairs of somewhat smaller, almost equally long, chromosomes ( $1.1\text{--}1.3\ \mu\text{m}$ ), whereas *S. ursi* has two pairs of long chromosomes (approximately  $2\ \mu\text{m}$ ) and four pairs of distinctly smaller chromosomes ( $1.4\text{--}1.6\ \mu\text{m}$ ). Although descending dysploid changes of the basic chromosome number are a quite common phenomenon in the Sedoideae ('t Hart 1985; 't Hart & Eggli 1989) there is, as yet, no direct cytological evidence to suppose that *S. ursi* evolved from *S. laconicum* through the fusion of two pairs of chromosomes.

So far *S. ursi* is only known from Mt Sandras, but it may be much more widely distributed. Herbarium specimens of *S. laconicum* and *S. ursi* are difficult to differentiate, the main difference between the two species being the shape of the leaf apex and the presence or absence of papillae. Boissier (1846) described *S. laconicum* after specimens from the Peloponnisos (near Tripolizza and on Mt Taigetos above Anavriti) and it has also been reported from central Greece, Crete, Anatolia, Lebanon, Syria, Israel, and Cyrenaica (Boissier 1872; Pampanini 1931; Rechinger 1943; Mouterde 1969; Chamberlain 1972; Zohary 1972; Hagemann & 't Hart 1986). Plants of *S. laconicum* from Greece and Crete are diploid ( $2n=16$ ) and have acute leaves with hyaline papillae at the tip (Hagemann & 't Hart 1986). Tetraploid plants ( $2n=32$ ) of *S. laconicum* occur in Israel (C.H. Uhl, Ithaca, U.S.A., unpublished; 't Hart unpublished). Like the plants of *S. laconicum* from the Greek mainland and Crete the plants from Israel also have apically papillate, acute leaves. Chamberlain (1972) referred to 12 collections of *S. laconicum*, most of which originated from central and southern Anatolia. Specimens of four of these collections have been examined, i.e. from Hatay (Kusliji Dağı, 1750–2000 m, Haradijan 2539, 1908, W), Kayseri (Erciyas Dağı, 2700–2900 m, Zederbauer 328, 1902, W) and Maras (Berit Dağı, 2000 m, Haussknecht s.n., 1865, W; Hobek Dağı, 1800 m, Davis c.s.

20175, 1952, K). The leaves of these specimens, however, are rounded or obtuse and have glabrous or only slightly mamillate tips. Most probably they are identical with *S. ursi*.

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## REFERENCES

- Boissier, E. (1846): *Diagnoses Plantarum Orientalium Novarum*. 1, 6. Leipzig.
- (1872): *Flora Orientalis*. 2. Geneva.
- Chamberlain, D.F. (1972): *Sedum*. In: Davis, P.H. (ed.): *Flora of Turkey*. 4. Churchill Livingstone, Edinburgh.
- Hagemann, I. & 't Hart, H. (1986): *Sedum*. In: Strid, A. (ed): *Mountain Flora of Greece*. 1. Cambridge University Press, Cambridge.
- Hart, H. 't (1978): *Biosystematic Studies in the Acre-Group and the Series Rupestris Berger of the Genus Sedum L. (Crassulaceae)*. Thesis, University of Utrecht.
- (1982): The white-flowered European *Sedum* species. 1. Principles of a phylogenetic classification of the Sedoideae (Crassulaceae) and the position of the white-flowered *Sedum* species. *Proc. Kon. Akad. Wet., Ser. C*, 85: 663–675.
- (1983): *Sedum apoleipon*, a new species of the *Sedum acre* group (Crassulaceae) from Central Greece. *Willdenowia* 13: 309–319.
- (1985): Chromosome numbers in *Sedum* (Crassulaceae) from Greece. *Willdenowia* 15: 115–135.
- (1987): Evolution of the Eurasiatic *Sedum* flora. *IOS Bulletin* 4: 209–210.
- & Berendsen, W. (1980): Ornamentation of the testa in *Sedum* (Crassulaceae). *Plant Syst. Evol.* 135: 107–117.
- & Egli, U. (1989): Cytotaxonomic studies in *Rosularia* (Crassulaceae). *Bot. Helv.* 98: 223–234.
- Mouterde, P. (1969): *Nouvelle Flore du Liban et de la Syrie*. 2. Dar El-Machreq, Beyrouth.
- Pampanini, R. (1931): *Prodromo della Flora Cirenaica*.
- Rechinger, K.H. (1943): Neue Beiträge zur Flora von Kreta. *Denkschr. Akad. Wiss. Wien.* 105: 1–184.
- Runemark, H. & Greuter, W. (1981): Notes on Cardagean plants. 1. The *Sedum litoreum* group. *Willdenowia* 11: 13–21.
- Webb, D.A. (1964): Crassulaceae. In: Tutin, T.G. *et al.* (eds): *Flora Europaea*. 1. Cambridge University Press, Cambridge.
- Zohary, M. (1972): *Flora Palestina*. 2. Israel Acad. Sci. Human., Jerusalem.