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LORENZO GALLO[1]

Sedum ochroleucum subsp. *mediterraneum* (*Crassulaceae*), a new Italian endemic

Abstract

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A new subspecies of *Sedum ochroleucum* Chaix (*S.* ser. *Rupestria* Berger, *Crassulaceae*), endemic to the Italian Peninsula, is described. It differs from the typical subspecies mainly by the glabrous sepals and the semi-erect to spreading petals at anthesis.

Additional key words: Mediterranean basin, phytogeography, taxonomy, *Sedum* ser. *Rupestria*

Introduction

Since the 1970s, many papers have improved the taxonomic, distributional and evolutionary knowledge of the genus *Sedum* L., especially of *S.* ser. *Rupestria* Berger. Many new taxa (species and hybrids) have been described, and our knowledge of this series is now much closer to being complete (Hart 1974, 1978, 1979; Hebert 1983; Hart 1987; Hart & al. 1993; Hart & Jarvis 1993; Hart & Bleij 2003; Gallo 2008, 2009; Gallo & Jarvis 2009; Gallo 2012). Grulich (1984) even proposed raising *S.* ser. *Rupestria* to the rank of genus, as *Petrosedum* (Thiede & Eggli 2007).

Sedum ochroleucum Chaix is a N Mediterranean orophile taxon, morphologically and cytologically rather variable, with a distribution area extending from France to the Balkan Peninsula (Jalas & al. 1999; Hart 2003). The countries where this species is found are (from west to east): France, Switzerland, Italy (incl. Sicily), Croatia, Bosnia-Herzegovina, Serbia and Montenegro, Albania, Macedonia, Romania, Bulgaria, Greece and European Turkey.

The name *Sedum ochroleucum* has been recently accepted by Webb (1993), Jalas & al. (1999), Hart & Bleij (2003), Gallo (2005 and in press) and Euro+Med (2006+), whereas Greuter & al. (1986) treated it as a misapplied name in the synonymy of *S. anopetalum* DC. The species was discovered by the French monk D. Chaix (1730–1799) in the neighbourhood of Gap (Hautes-Alpes, France). Chaix (1785, 1786) published the name *S. ochroleucum* in a separate paper in 1785, and reprinted it the next year as part of D. Villars's Histoire des plantes de Dauphiné (Gallo 2013).

Sedum ochroleucum is cytologically variable, with reported chromosome numbers of $2n = 34$, 51, 68, 85 and 102 (see Chromosome numbers, below). The diploid and tetraploid cytotypes are sympatric, but often occur at different altitudes in the same area and are not correlated with any morphological variation (Hart 1978). The only significant differences noted from field and herbaria studies concern plant and flower sizes, which steadily increase from west to east (Hart 1978).

Recently, Gallo (2005 and in press) reported *Sedum ochroleucum* in the Apennines of Italy and confirmed its

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occurrence in Sicily. However, the presence in the central and eastern parts of the Alps shown by Jalas & al. (1999) must be excluded.

The S Italian populations of *Sedum ochroleucum* were first reported by Gussone from Apulia in 1824 (Amico 1958) as *S. altissimum* Poir. (= *S. sediforme* (Jacq.) Pau). Subsequently, Gussone (1827) reported the Sicilian populations as *S. reflexum* L. from "Girgenti [Agrigento], Alicata [Licata] and Palma [Palma di Montechiaro]". Later, Gussone (1842) reported *S. rufescens* Ten. (= *S. sediforme*) and *S. albescens* Haw., the latter replacing *S. reflexum*, the name he had previously used (1827; see also Troìa & al. 1998). The name *S. albescens* sensu auct. ital. is in fact referable to the taxon described in the present study, *S. ochroleucum* subsp. *mediterraneum* Gallo. The morphology of the two taxa is very close, but the name *S. albescens* is perhaps a misapplication because the taxon described in Haworth's protologue (1821) is not recognizable and without source. Tenore (1830) treated the S Italian taxon as *S. anopetalum*, even though the descriptive statement "Fiori citrini [flowers lemon-yellow]" is not applicable to *S. anopetalum*. Campo & al. (1995) reported the occurrence of *S. ochroleucum* in Sicily and some morphological differences between the Sicilian and the alpine populations.

The present study aims to compare the morphological characters, biology and ecology of *Sedum ochroleucum* in its S Italian populations with those in the rest of its distributional area. The author's field and herbaria research confirms and completes the morphological differences of the alpine populations previously reported (Campo & al. 1995) and leads to a broadening of the distribution. As a main result of this study, the S Italian populations of *S. ochroleucum* have been separated at subspecific rank.

Material and methods

Extensive field research was undertaken in the Italian Peninsula and in France, to collect and study living specimens of *Sedum ochroleucum*. Some of the plants gathered have been grown in the author's private collection with the aim of studying their growth and some biological features. Research was also done in the herbaria of APP, CAT, FI, G, G-BU, GAP, GDOR, PAD, PAL, PAV, PESA, PI, RO, TN, TO, TSB and VER, to study the geographical range of the new subspecies and the boundaries of the typical subspecies. Cytological data come from a literature search. Altogether 292 herbarium specimens and 201 living collections were studied.

Results

The research confirmed the morphological, ecological and distributional peculiarities of the S Italian populations of *Sedum ochroleucum*, and lead the author to distinguish them at the taxonomic rank of subspecies.

Sedum ochroleucum subsp. ***mediterraneum*** Gallo, **subsp. nov.** – Fig. 1–3.
Holotypus: Italy, Campania, Monte Alburno, Polla Vallescura, pascolo roccioso al passo [rocky pasture at the pass], 7 Jun 1948, *A. De Philippis s.n.* (FI 001711).
– *Sedum reflexum* sensu Guss., Fl. Sicul. Prodr.: 520. 1827, non L. 1755.
– *Sedum albescens* sensu Guss., Fl. Sicul. Syn.: 520. 1842, non Haw. 1821.
– *Sedum anopetalum* sensu Ten., Fl. Napol. 4: 247. 1830, non DC. 1807.

Diagnosis — A subspecie typica sepalis glabris (non glandulosis), petalis sub anthesi semierectis vel patentibus (non erectis), perraro filamentis ad basim papillosis differt.

Description — *Herbs* perennial, succulent, with decumbent sterile shoots 4–10 cm long. *Leaves* green or glaucous sometimes reddish, linear, (5–)7–13(–15) × 1–2 mm, distinctly spurred at base. *Inflorescence* erect, sometimes reddish, (12–)15–22(–23) cm tall, usually with 4 bracteate branches, glabrous. *Flowers* subsessile, 5–6 mm long, usually 6-merous with 12 filaments, some flowers 5- or 7-merous. *Sepals* sometimes reddish at apex, triangular, 4–5 × 1–1.5 mm, glabrous, rarely with 1 or few glandular hairs. *Petals* semi-erect or spreading at anthesis (Fig. 3), never erect as in subsp. *ochroleucum* (Fig. 4), with a green or red central stripe, lanceolate, pointed. *Nectaries* green-transparent, rectangular. *Filaments* light green, glabrous or very rarely papillose at base. *Anthers* basifixed, yellow, cylindrical. *Carpels* smooth or very thinly papillose, with styles spreading outwards.

Chromosome numbers — $2n$ = 34 and 51, noted on Sicilian specimens collected at Ciminna and Montallegro (Hart in Campo & al. 1995). Conversely, the following numbers are known for *Sedum ochroleucum* subsp. *ochroleucum*: $2n$ = 34, 51, 68, 85 and 102 (Hebert 1983; Ham & Hart 1994).

Distribution and ecology — The distribution area of *Sedum ochroleucum* subsp. *mediterraneum* falls within the Italian Peninsula and Sicily, but in the herbarium at G the author observed two specimens from Zakynthos (Zante), Ionian Islands, Greece, which possibly belong to this subspecies. Field research will be necessary to clarify this matter. The distribution area is otherwise straightforward: Basilicata, Calabria, Campania (where both subspecies occur), Molise, Apulia and E Sicily. The new subspecies prevails in xeric grazing lands with calcareous rocks, but is also not rare on the edges of roads and walls. It occurs from sea level to almost 2000 m on the Pollino Massif

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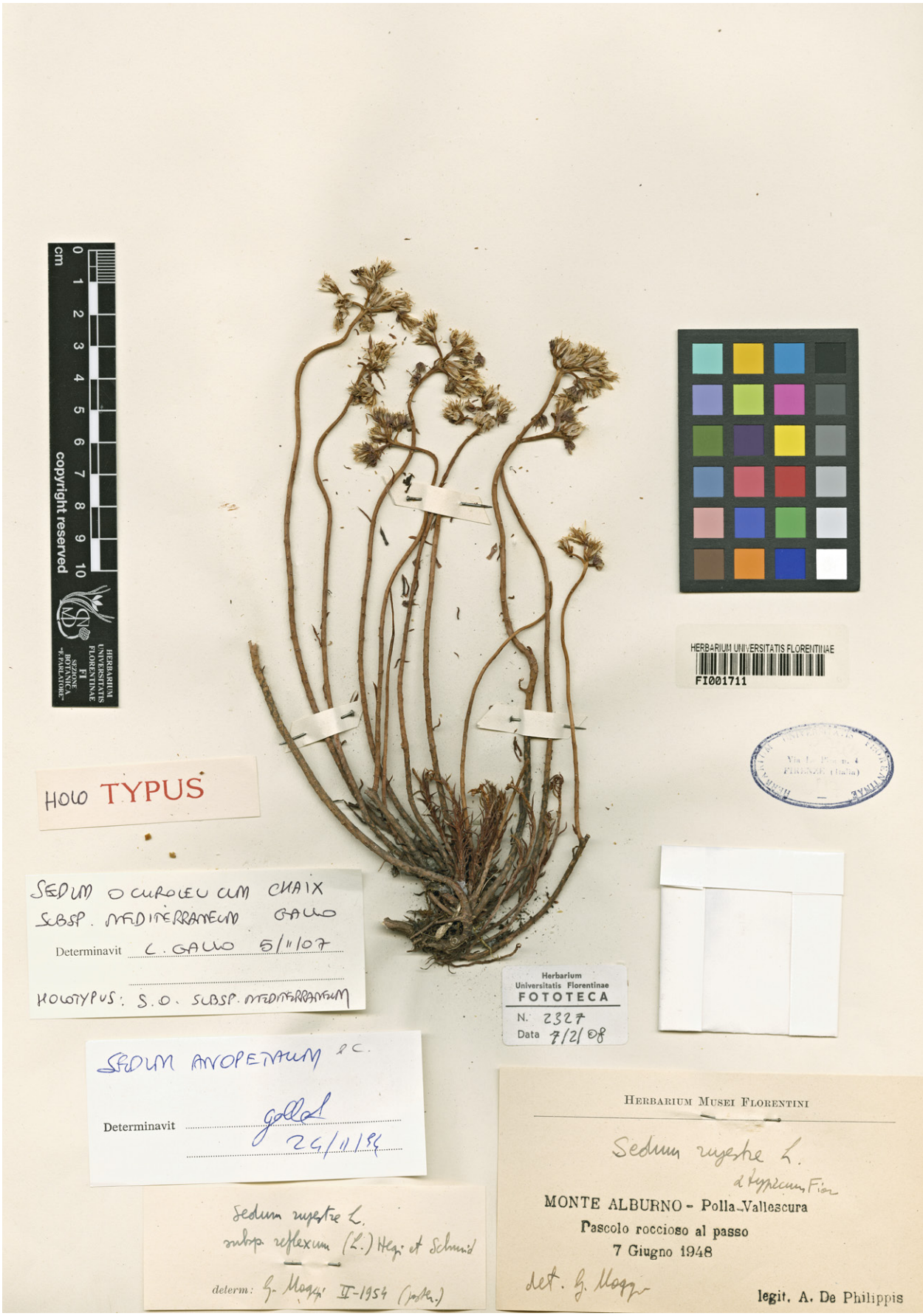


Fig. 1. Holotype of *Sedum ochroleucum* subsp. *mediterraneum* – *A. De Philippis s.n.* (FI 001711).

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(Calabria), and has been found up to 2300 m (*Guadagno s.n.*, PI). *Sedum ochroleucum* subsp. *ochroleucum* has been observed by the author from sea level up to 1500(–1650) m (Montagne de Céüse, Hautes-Alpes, France).

Remarks — There is some degree of morphological variability in the S Italian populations of *Sedum ochroleucum* subsp. *mediterraneum*, especially regarding sepal length and the filaments sometimes being papillose at the base. This last character, unknown in subsp. *ochroleucum*, was observed in Campania (M. Alburni, Cilento), Basilicata (between Grassano and Tricarico and between Pignola and Abriola), Apulia (Gargano) and Calabria (Pollino Massif).



Fig. 2. Close-up of an inflorescence on the holotype of *Sedum ochroleucum* subsp. *mediterraneum*. – Scale: lines are 1 mm apart.

Key to the subspecies of *Sedum ochroleucum*

1. Petals semi-erect or spreading at anthesis; sepals glabrous; filaments glabrous or very rarely papillose at base . . . . . subsp. ***mediterraneum***
– Petals erect at anthesis; sepals ± glandular; filaments always glabrous . . . . . subsp. ***ochroleucum***



Fig. 3. Close-up of an inflorescence of *Sedum ochroleucum* subsp. *mediterraneum* showing petals semi-erect or spreading at anthesis. – Photograph by V. Buono, from Acta Plantarum (http://www.actaplantarum.org).

Discussion

Examination of living plants and herbarium specimens of *Sedum ochroleucum* from its whole distribution area has revealed interesting morphological differences. In particular, the S Italian populations show distinctive markers versus the type. These populations are here separated at subspecific rank as *S. ochroleucum* subsp. *mediterraneum*. The two subspecies are allopatric, although they present a very restricted contact zone in Campania, where their distributions are adjacent but not overlapping.

Hart (1978, 1991) suggested a western origin for *Sedum ochroleucum*, phylogenetically very close to the diploid *S. montanum* Songeon & E. P. Perrier. In agreement with this view, the species maybe spread eastward, reaching Sicily and the Balkans. As a consequence of the description of *S. ochroleucum* subsp. *mediterraneum*, today subsp. *ochroleucum* has a distribution area divided into two parts, a western part: the French-Italian Alps and the N Apennines, and an eastern part: the Balkans (Fig. 5). Up until now, no discontinuities in morphological variation have been found that would allow a distinction between the eastern and western parts.

The suggested route taken by *Sedum ochroleucum* to the Balkans is not traceable today with any certainty. No populations of this taxon have been located in historical times in the C or E Alps, and it cannot be excluded that the taxon crossed the Adriatic Sea in the past between Gargano and Salento (Apulia) following a terrestrial bridge, as postulated by Trotter (1912), Gridelli (1950), Audisio & De Biase (1992) and Pezzetta (2010). Other species of *S.* ser. *Rupestria* have probably been involved with this path, such as *S. sediforme* (Jacq.) Pau and *S. tenuifolium* (Sm.) Strobl, the last being the vicariant of *S. amplexicaule* DC.

Despite the separation of *Sedum ochroleucum* subsp. *mediterraneum*, the species as a whole remains morphologically and cytologically rather variable (Gallo 2013), especially in France, and it still requires proper evaluation, taking into account that many French botanists noted this variability and described several taxa, such as *S. aristatum* Vill. (Villars 1789), *S. anopetalum* DC. (Candolle 1807), *S. verlotii* Jord. (Jordan 1862) and the not

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Fig. 4. Individual plant of *Sedum ochroleucum* subsp. *ochroleucum* showing petals erect at anthesis. – France, Vercors, 30 May 2013. – Photograph by L. Gallo.

validly published *S. orthopetalum* Thur. & Bornet (see Burnat 1906: 33) now under study.

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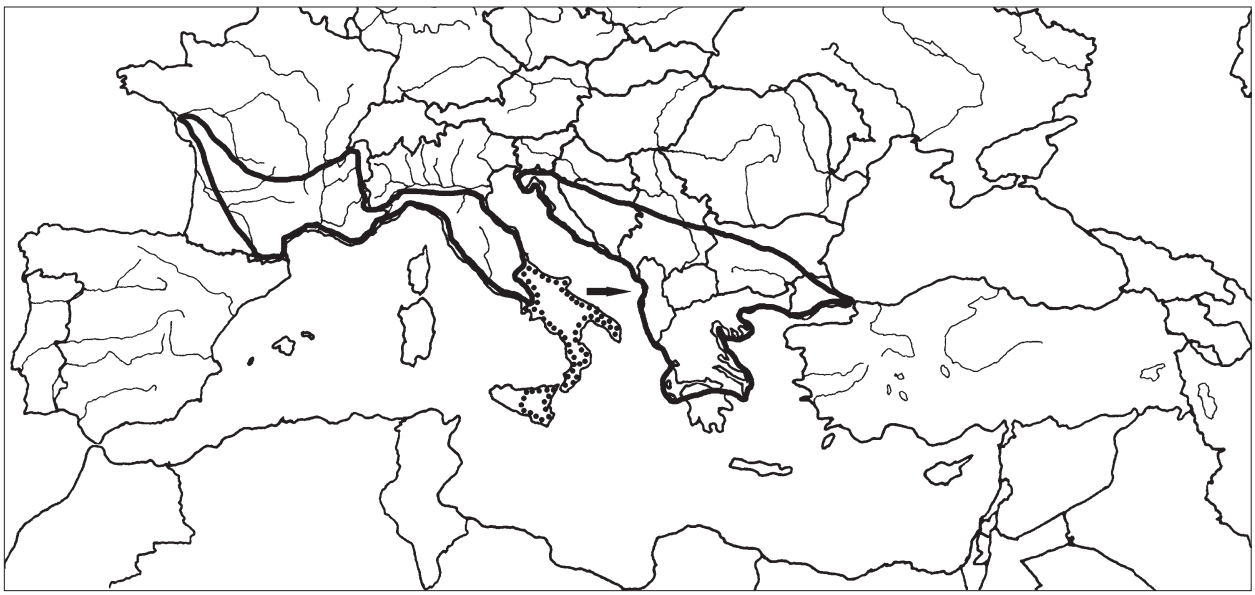


Fig. 5. Distribution of *Sedum ochroleucum* subsp. *ochroleucum* (solid line) and *S. ochroleucum* subsp. *mediterraneum* (dotted line). The arrow indicates a possible migration route via a former land bridge between Italy and the Balkan Peninsula.

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