Forum Geobotanicum (2012) 6:1-13
DOI 10.3264/FG.2012.0710

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Natural hybrids in *Sedum* series *Rupestria* Berger (Crassulaceae): a review of taxonomy and nomenclature

Published online: 10. July 2012

Abstract. The nothotaxa of the genus *Sedum* series *Rupestria* Berger (Crassulaceae) are reviewed, three new hybrids (*S.* ×*affomarcoi, S.* ×*henkii* and *S.* ×*pascalianum*) are described and *Sedum brevierei* Chass. is typified. The identity of the western (French) populations of *S. rupestre* L. subsp. *erectum* 't Hart is also clarified, and a table with all known combinations is given.

Keywords Nothotaxa, typification, *Sedum rupestre* L. subsp. *erectum* 't Hart

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Introduction

The *Sedum* series *Rupestria* Berger is a natural and well-delimited Euro-Mediterranean taxon of the Crassulaceae family, grouping together nine species and subspecies, plus several natural and experimental hybrids. Grulich (1984) raised the series *Rupestria* to the genus level (*Petrosedum*) and recent molecular studies (Mort *et al.* 2001) confirm the soundness of splitting the polyphyletic genus *Sedum* into many small new genera, *Petrosedum* included. However, this split is not yet recognised formally (cf. Thiede & Eggli 2007).
Interspecific hybrids are common and can easily be obtained experimentally ('t Hart 1978, Gallo 2009), due to the almost complete lack of reproductive barriers among the species; this is also the main cause of reticulate speciation, involving at least two taxa (*S. rupestre* L. and *S. thartii* Hebert) that can propagate by seed. The result is a series of natural populations, similar to the taxa obtained by natural selection. Interspecific hybridization in *Sedum* ser. *Rupestria* Berger (Crassulaceae) has been studied in depth ('t Hart 1978, 1979, 1987 and 1991) and involves many of the taxa currently known (Gallo 2009). It can be attributed to the proven high crossability and interfertility as well as to overlapping distributions ('t Hart *et al*. 1993, van Ham & 't Hart 1994). The first hybrid recognized was *S.* ×*luteolum,* reported by Chaboissier in 1863, then *S.* ×*brevierei,* by Chassagne in 1956. However, the most important contribution was made by Henk 't Hart after his botanical travels, especially in southern France, in the 1970s. He described S. ×*hegnaueri, S.* ×*hommelsii* and *S.* ×*lorenzoi* ('t Hart 1979, 1987). Other contributions were made by Hebert (1983), with a cytological approach, and more recently by Gallo (1999, 2008), who continued the studies and proposed a preliminary checklist of the taxa, hybrids included, presenting provisional geographical distributions (Gallo 2009).
The present contribution offers a revised checklist of hybrids of the series *Rupestria* Berger, including three new nothotaxa, and the typification of *S.* ×*brevierei;* the identity of the western (French) populations of *S. rupestre* L. subsp. *erectum* 't Hart, alleged yellow-petalled parent of *S.* ×*hegnaueri* 't Hart and *S.* ×*hommelsii* 't Hart, is also clarified.

Organs	Characters	States
Leaf	Shape	linear / lanceolate
Inflorescence	Position	erect / reflexed
	Indumentum (glands)	yes / no
	Bracteate	yes / no
	Shape	erect / scorpioid
Floral bud	Shape	cylindrical / ovate
Sepal	Shape	lanceolate / intermediate / triangular
	Indumentum (glands)	yes / no
Petal	Position	erect / intermediate / spreading
	Colour	yellow / intermediate / white
Filament	Colour	yellow / white
	Indumentum (glands)	yes / no
Style	Position	erect / outwards

Tab. 1: Morphological characters useful to discriminate the hybrid taxa of the *Sedum* ser. *Rupestria*

Materials and methods

The taxonomic literature, from Linnaeus to the present, regarding the Mediterranean taxa of *Sedum* series *Rupestria* and corresponding cytological findings was reviewed. The specimina (*exsiccata*) pertaining to these nothotaxa, especially the original material used for describing them, was also examined in the following herbaria: CLF, FI, G, GAP, TO, U and ZSS. Several hybrids and their relatives were discovered in field research carried out in France and Italy (*loci classici* included); many of these were then cultivated in the author's private collection under uniform conditions, reducing their phenotypical variation and studied from the morphological and biological standpoint. Table 1 shows the morphological characteristics useful in the taxonomic study of hybrids of *Sedum* series *Rupestria*. The holotypes of the three new nothotaxa described have been deposited at TO.

Results and discussion

The results reported here, given in the "Checklist of nothotaxa", are quite significant: three of the seven nothotaxa listed are new to science. *S. rupestre* L. and *S. montanum* Songeon & E.P. Perrier subsp. *orientale* 't Hart (= *S. thartii* Hebert), clearly of hybrid origin ('t Hart *et al*. 1993; van Ham & 't Hart 1994) were excluded from the list as being able to propagate from seed. They should be treated similarly to taxa obtained by natural selection. Table 2 reports the hybrids known to date, including those obtained experimentally but unknown in nature (cf. 't Hart 1978) together with doubtful entities.

The only specimen of *S.* ×*brevierei,* collected by Chassagne and located at CLF where the Chassagne *herbarium* is preserved, was recognised here as holotype.

The field study in France did not confirm the presence of *S. rupestre* subsp. *erectum* in the localities cited by 't Hart (1979, 1987, 1994), where *S. montanum* was found instead. It is here suggested that this taxon is the yellow-petalled parent of *S.* ×*hegnaueri* and *S.* ×*hommelsii*. Indeed, 't Hart himself recognised the close relationship between *S. rupestre* subsp. *erectum* and *S. montanum* (cf. van Ham & 't Hart 1994). The hypothetical evolutionary history of the series is thus simplified, eliminating the unnecessary unknown taxon with the doubtful chromosome number =15 (Ham & 't Hart 1994). Finally, the name *S.* ×*hommelsii* has been discarded as being superfluous (cf. Eggli & Taylor 1994).

Taxa	*amplexicaule*	*forsterianum*	*montanum*	*ochroleucum*	*pruinatum*	*rupestre*	*sediforme*
amplexicaule							
forsterianum	s						
montanum	-	-					
ochroleucum	-	-	×***pascalianum***				
pruinatum	s	-	-	-			
rupestre	s	×*brevierei*	×***affomarcoi***	×*lorenzoi*	-		
sediforme	? s	s	×*hegnaueri*	×***henkii***	-	×*nicaeense* (= ×*luteolum*)	
thartii	-	-	?	-	-	-	-

Tab. 2: Nothotaxa of the *Sedum* series *Rupestria* Berger. Taxa new to science are in bold; s = experimental hybrids (cf. 't Hart 1978). ? = doubtful hybrids.

Checklist of the nothotaxa

Sedum* ×*affomarcoi Gallo & Afferni ***hybr. nov.*** [= *S. montanum* Songeon & E.P. Perrier × *S. rupestre* L.]

Holotype: Italy: Piedmont, Susa valley, above Chianocco, along the road to Combetta. Rocks, 590 m. 15/06/2011, *legit* L. Gallo [GL-7288] (TO) (Fig. 1).

Diagnosis: *Planta hybrida, differt a Sedo montano Songeon & E.P. Perrier ob filamenta basi papillosa, inflorescentiam ante anthesin reflexam, caulium sterilium et inflorescentiae folia lanceolata et non teretia. Differt a S. rupestri L. ob sepala triangulata-lanceolata et glandulosa*.

Description: Perennial herb with erect stem (20 cm or more). Leaves of the sterile sprouts linear and glaucous (11 × 2 mm). Inflorescence bracteate, large and reflexed before anthesis; floral bud cylindrical. Sepal triangular-lanceolate more or less glandular. Petal yellow, half erected at the anthesis. Carpel green and papillatus, style erect at anthesis. Filament white-green glabrous or rarely papillose at the base. Anther cylindrical yellow.

Distribution: Fairly widespread in Italy, *S.* ×*affomarcoi* is found in the regions of Piedmont, Liguria, Tuscany and Abruzzo (Fig. 7), the southern limit of its distribution, where it is very frequent. Also found in France (Pyrénées-Atlantiques and Alpes-Maritimes).

Discussion: The finding of the hybrid around 1400 m a.s.l. demonstrates the former presence of *S. rupestre* at altitudes, that are currently no longer reached due to its ecological requirements. Hebert (1983) provides the 2n = 90 number for this hybrid, obtained at various European localities.

Etymology: Dedicated to Marco Afferni (1985-2009) known familiarly as "Affo", son of one of the authors, tragically killed in a road accident.

Representative specimens/observations

FRANCE. Pyrénées-Atlantiques. Vallée des Aldudes – Banca. 2009, *legit* Thomas J.-F. [GL-6975]. Alpes-Maritimes. Vallée de la Tinée. Isola 2000 toward Isola. Rocks along the road. 8/8/2011, *legit* Gallo L. [GL-7373].

ITALY. Piedmont. Prov. Torino. Susa valley, between Condove and Pralesio. Rocks, 717 m S, *legit* L. Gallo GL-3974. Prov. Cuneo. Tanaro valley, Rif. Mongioie. Arid grassland, 1547 m, SE, *legit* L. Gallo [GL-5811]. Tanaro valley, Valdellarmella. Sunny rocks, 1124 m, SE, *legit* L. Gallo [GL-4774]. Liguria. Prov. Imperia. Towards

Fig. 1 = Holotype of *S. xaffomarcoi* Gallo & Afferni (GL7288 - TO)

Fig. 2 = Holotype of *S.* ×*brevierei* Chass. (CLF)

Colle della Melosa. Rocks along the road, 1288 m E, *legit* L. Gallo [GL-4761]. Diego, between Passo di Teglia and Andagna. Grassland with rocks. 1080 m, *legit* L. Gallo [GL-4745]. Tuscany. Prov. Arezzo. Passo della Collina. 920 m. M. Afferni *obs*. June 2007. Prov. Firenze. Montemignaio. Pratomagno (Mt. Secchieta). 1417 m. M. Afferni *obs*. June 2007. Abruzzo. Prov. Chieti, Tornareccio. Stone wall, 285 m. 15/08-26/08 1994, *legerunt* L. Gallo and M. Gai [GL-2547]. Maiella, road to Rava del Ferro (M. Amaro). Rocks in a beech forest, 1382 m. 1997, *legit* L. Gallo [GL-4645]. Prov. L'Aquila, Rocca di Cambio, Campo Felice. Grassland, 1400 m. 29/06/2011, *legerunt* L. Gallo and F. Conti [GL-7300]. Prov. L'Aquila, Barisciano, M. della Selva, Costa Sambuco sopra F.te Verdice. Pascolo arido, 1120-1390 m. 13-7-2003, *legit* S. Torcoletti (APP) (*sub S. rubens*). Prov. L'Aquila, Barisciano, M. della Selva, cresta est. Pascolo arido, 1300-1570 m. 16-6-2003, *legit* S. Torcoletti (APP) (*sub S. rubens*). Prov. Teramo, Fano Adriatico, Colle S. Marcello presso l'Eremo della Annunziata. Pascoli e cespuglieti su arenaria (Flysch della Laga), 900-980 m.17-6-2010, *legerunt* F. Conti, F. Bartolucci e N. Ranalli (APP) (*sub S. rupestre*). Prov. L'Aquila, Barisciano, Valle Cupa. Pascoli aridi su pendii W, 1200-1275 m. 15-07-2003, *legit* I. Londrillo (APP) (*sub S. rupestre*). Prov. L'Aquila, Caporciano, fraz. Bominaco, presso il Castello di Bominaco. Rupi, 1070 m. 04/04/2007, *legerunt* Di Santo e F. Conti (APP) (*sub S. rupestre*). Prov. L'Aquila, Scoppito, Monte Calvo. Pascolo 1400-1600 m. 8-7-2007, *legerunt* S. Torcoletti e G. Santoni (APP) (*sub S. rupestre*).

Sedum ×brevierei Chass.

Hybrid formula: *S. forsterianum* Sm. in Sowerby × *S. rupestre* L.
Synonyms: -
Protologue: *Fl. Auvergne*, 1: 443 (1956).
Type (Holotype): 29 juin 1892, *legit* Brevière, *det.* Chassagne, *herb*. M. Chassagne (CLF) (Fig. 2).
Locus classicus: France: Puy-de-Dôme (Pelleyrol près Ambert).
Etymology: dedicated to P. Brevière, who discovered this hybrid.
Distribution: France: Puy-de-Dôme and Vienne. Apparently very rare, localised in very few localities of Central Western France.
Chromosome numbers: 2n = 104 (‘t Hart 1978).
Discussion: This hybrid was confirmed by ‘t Hart (1978) and ‘t Hart & Bleij (2003), who reported 2n = 104 as the most probable chromosome number. *S. ×brevierei* is very similar to *S. forsterianum*. It has sterile sprouts with a terminal tuft of leaves and lacks papillae at the base of the filaments; on the other hand, the presence of bracts in the inflorescence is reminiscent of *S. rupestre.*
Literature: ‘t Hart 1978, 1987, 1994, ‘t Hart *et al*. 1993, ‘t Hart & Bleij 2003.

Sedum ×hegnaueri ‘t Hart

Hybrid formula: *S. rupestre* L. subsp. *erectum* ‘t Hart × *S. sediforme* (Jacq.) Pau
Synonyms: *S. luteolum* Chaboiss. nothosubsp. *hegnaueri* (‘t Hart) ‘t Hart (Sedum Soc. Newsl., 28: 19, 1994)
Protologue: Danseria, 16: 32, 1979.
Type (Holotype): 1977, *legit* C.H. Hommels and H. ‘t Hart, HRT-22581 (L) (Fig. 3).
Locus classicus: Het type is een hexaploide plant (2n = 96) afkomstig uit een grote, uitsluitend uit hybriden bestaande populatie op een kleine heuvel ten westen van de weg van l’Argentière-la-Bessée naar Serre-de-la-Bâtie ten noorden van, en gedeeltelijk boven de tunnel van de spoorlijn naar Briançon, ongeveer 1 Km ten noorden van l’Argentière, altitude ca. 1050 m, verzameld door C. Hommels en H. ‘t Hart ijn 1977 en verder gekweekt in de proeftuin te Utrecht, no. 22581, juli 1979 (U).
Etymology: dedicated to R. Hegnauer (1919-living), biochemist at Leiden University in Holland (Eggli & Newton 2004).
Distribution: France: Hautes-Alpes and Alpes-Maritimes. Italy: Piedmont (prov. of Cuneo) and along the Apennine Mountains in Liguria, Tuscany and Latium.
Chromosome numbers: 2n = 96, (‘t Hart 1979); 2n = 80,96 (‘t Hart & Bleij 2003) The 2n = 64 count, obtained experimentally (‘t Hart 1978) has not since been confirmed. These counts refer to *S. rupestre* subsp. *erectum* × *S. sediforme.*
Discussion: Henk ‘t Hart (1979) postulates *S. rupestre* L. subsp. *erectum* as one of the parents of S. ×*hegnaueri*. It represents a doubtful and enigmatic taxon which has never yet been found in France and is now included in *Sedum thartii* (cf. Gallo & Bracchi 2005a). From the protologue, it is quite clear that the two parents have white and true yellow (lemon) petals, respectively; in the *locus classicus* or in its neighbourhood, *S. ochroleucum* and *S. sediforme* (white petals) and *S. montanum* Songeon & E.P. Perrier (yellow petals) can be found. The habit of the plant, the scorpioid cyme with very few bracts and the highly papillose filaments, tends to indicate *S. montanum* and *S. sediforme* as the parents, which also closely agrees with the holotype; the scorpioid and very tall inflorescence is reminiscent of *S. sediforme*, although the linear leaves and the bracts lean towards *S. montanum*; lastly, the sepals are intermediate between the parents. At the *locus classicus* in 2011 the author collected a specimen [GL-7297] with morphological characters compatible with both protologue and holotype. Because of these results, a change of parentage is proposed for the name *S. ×hegnaueri* ‘t Hart, which, according to the Art. H.10 of the I.C.B.N. (McNeill *et al.* 2006), becomes the correct name for all hybrids between *S. montanum* and *S. sediforme*.
Literature: ‘t Hart 1994, ‘t Hart & Bleij 2003.

Sedum ×henkii Gallo ***hybr. nov***. [= *S. ochroleucum* Chaix × *S. sediforme* (Jacq.) Pau]

Holotype: France, Provence-Alpes-Côte d'Azur, Hautes-Alpes (05), Saint-Martin-de-Queyrières, Prelles, along the road to Les Vigneaux. Road bank, 1199 m. E. 20/06/2011, *legit* L. Gallo [GL-7320] (TO) (Fig. 4).
Diagnosis: *Planta hybrida, media inter parentes putatos, differt a Sedo ochroleuco Chaix ob inflorescentias petala-que glandulis fere carentia, sepala triangulata-lanceolata, petala erecta- patentia vel patentia et filamenta basi papillosa. Differt a S. sediformi (Jacq.) Pau ob caulium sterilium folia linearia et non lanceolata, inflorescentiam bracteatam, sepala triangulata-lanceolata et genuinas cylindricas neque globosas.*
Description: Plants tall (up to 35 cm) with glaucous, linear, spreading leaves (10 × 2 mm) on the sterile sprouts; leaves of the inflorescence linear or linear-lanceolate. Inflorescence glabrous with bracts somewhat scorpioid. Floral bud lengthened (7 mm) and flowers subsessile (pedicel < 1 mm). Sepal triangular-lanceolate glabrous or rarely glandular; petal half-erect white with central green

Fig. 3 = Holotype of *S. ×hegnaueri* 't Hart (HRT22581 - L)

Fig. 4 = Holotype of *S. ×henkii* Gallo (GL7320 - TO)

line, keeled, pale yellow in bud. Filament white-green, papillose; anther cylindrical yellow, carpel green and papillose, style slightly outwards.

Distribution: Quite rare, found only in two French localities (Prelles and Argentiere-la Bessée) in the Hautes-Alpes (Provence-Alpes-Côte d'Azur) and in Greece (Hebert 1983).

Discussion: Henk 't Hart (1978) did not obtain this hybrid, possibly because very few flowers were involved in his experiments. The hybrid appears to be very rare in nature,

although its parents frequently occur together, especially in southern France. Hebert (1983) reports this hybrid also for Greece, with chromosome numbers 2n = ca. 64, ca. 98.
Etymology: Dedicated to Henk 't Hart (1944-2000), Dutch botanist, who discovered many species and hybrids in the genus *Sedum* and set up a modern taxonomic arrangement for the Crassulaceae family.

Representative specimens/observations
France. Hautes-Alpes. Argentière-la-Bessée, near the rail-road, wall and gravel bank. 1000-1050 m. 20/06/2011, *legerunt* L. Gallo e M. Gai [GL-7300]. Saint-Martin-de-Queyrières, district of Prelles, along the road to Les Vigneaux. Road bank, 1199 m. E. 20/06/2011, *legerunt* L. Gallo e M. Gai [GL-7319].

Sedum ×lorenzoi 't Hart

Hybrid formula: *S. ochroleucum* Chaix × *S. rupestre* L. subsp. *rupestre*
Synonyms: *S.×lorenzoi nothosubsp. lorenzoi* (Sedum Soc. Newsl., 28: 20, 1994).
Protologue: *Bot. Jahrb. Syst.,* 109 (1): 10 (1987).
Type (Holotype): 26.6.1982, *legit* H. 't Hart, HRT-28539 (L) (Fig. 5).
Locus classicus: France: Charente (Soubérac, 6 km east of Cognac, fields on limestone rock (chaumes) north of R.N. 141).
Etymology: Dedicated to Lorenzo, son of B.R. Dotson-Smith (Eggli & Newton, 2004).
Distribution: France: Charente. Italy: Piedmont (Cuneo) and Liguria (Imperia).
Chromosome numbers: Experimentally, this hybrid should have 2n = 61, 73 and 90 ('t Hart 1978) but the field collected plants showed other counts: 2n = 124, 126 and 146 ('t Hart 1987, 't Hart & Bleij 2003).
Discussion: After Eggli & Taylor (1994), *S. ×lorenzoi* is retained as the correct name for hybrids between *S. ochroleucum* and *S. rupestre s.l.,* disregarding the name *S. ×hommelsii* (cf. *S. ×pascalianum).*
Literature: 't Hart 1978, 1987, 1994, 't Hart & Bleij 2003.

Sedum ×nicaeense All. *pro sp.*

Hybrid formula: *S. rupestre* L. × *S. sediforme* (Jacq.) Pau
Synonyms: *S. ×luteolum* Chaboiss. Bull. Soc. Bot. Fr., 10: 296 (1863).
Protologue: *Flora Pedemontana*, 2: 122, n. 1752, 1785.
Type (Lectotype): *s.d.*, *legit* L. Bellardi, *Herb.* Bellardi (TO) (Gallo 2008).
Locus classicus: […] *nascitur in scopulosis prope Savorgio* [Saorge, Val Roya, France].
Etymology: From the old name of the place of provenance, named "Comté de Nice" (France).
Distribution: France. Alpes-Maritimes (Roya), Hautes-Alpes (Prelles) and Pyrénées-Atlantiques (Banca). Italy. Piedmont, Liguria, Tuscany and Latium.
Chromosome numbers: 2n = 80, 96, 120 and 144-160 ('t Hart 1978, Hebert 1983, 't Hart & Bleij 2003).
Discussion: The plant discovered by Chaboisseau (*S. ×luteolum*) had already been described by Allioni (1785) as *S. nicaeense* from a plant collected by L. Bellardi in the neighbourhood of Saorge (Val Roya, France); this name therefore has priority over S. *×luteolum* (cf. Gallo 2008).
Literature: Bouvet 1882; Rouy & Camus 1901, Hebert 1983, 't Hart 1978, 1994, 't Hart & Bleij 2003, Gallo 1999, 2005, 2008, in press.

Sedum ×pascalianum Gallo ***hybr. nov.*** [= *S. ochroleucum* Chaix × *S. montanum* Songeon & E.P. Perrier]

Holotype: France, Provence-Alpes-Côte d'Azur, Alpes-Maritimes Val Roya, Vallon de Caramagne, on gravel bank below a limestone cliff, 1100 m. 6/07/2011, *legit* L. Gallo [GL-7363] (TO) (Fig. 6).
Diagnosis: *Planta hybrida, petalis luteolis et non albis, cum viridi linea mediana ut in Sedo ochroleuco Chaix, vel citrina ut in S. montano Songeon & E.P. Perrier; petala per anthesin cum 45° inclinatione ad axim inflorescentiae et non erecta ut in S. ochroleuco.*
Synonyms: *Sedum ×hommelsii* 't Hart *Bot. Jahrb. Syst.,* 109 (1): 8 (1987). Illeg. (Art. 11.1, 11.5 and H.4 I.C.B.N., McNeill *et al.* 2006).
Description: Plants tall (15-50 cm) with green linear leaves, appressed at the axis. Inflorescence reddish, with leaves persistent at anthesis, glandular with many bracts. The flower is cylindrical with glandular sepals often reddish at the apex. Petals triangular with acute apex, erect at anthesis and pale yellow. Carpel green and papillose. Style green and outwards. Stamen with a green filament without papillae at the basis. Anther yellow and cylindrical.
Distribution: Observed only on the French side of the Maritime Alps (Fig. 8) and in the Hautes-Alpes (as *S. ×hommelsii*); its presence in Italy e.g. Piedmont and Liguria, is to be confirmed.
Discussion: The name *S. ×pascalianum* is here proposed for the hybrid discovered by 't Hart and illegitimately named *S. ×hommelsii*. *S. rupestre* L. subsp. *erectum* 't Hart and *S. ochroleucum* Chaix are proposed as parents. However, no populations of *S. rupestre* subsp. *erectum* 't Hart, today included in *S. thartii* (Gallo in press), have been located in France (see also *S. ×hegnaueri*). At the type locality and in its neighbourhood, *S. ochroleucum*, *S. montanum and S. sediforme* were found. The protologue report "[...] *petala eburnea, carinata* [...]",is somewhat ambiguous since "eburnea" could mean ivory or very pale yellow in colour (cf. Stearn 1987); in agreement with subsequent treatments ('t Hart 1994, 't Hart & Bleij 2003) we believe that "pale yellow" is the true colour of the fresh petals of this hybrid. The holotype of *S. ×hommelsii* agrees closely with the author's field observations, especially for the triangular sepals and the long buds; this would rule out any introgressive hybridization of other taxa, e.g. *S. rupestre.*
The morphologically distinctive characters of *S. ×pascalianum* (petal colour and position) are not easy to assess in living specimens and nearly impossible in *exsiccata*. The presence of this hybrid was reported by Hebert (1983) from some French and Italian localities, namely "Col de Tende", "Col des Salines", "St.-Martin-Vésubie" and Robilante, with two different chromosome numbers: 2n= 68 and 85.
Etymology: Dedicated to Roberto "Roby" Pascal (1968-2010), great friend and companion of botanical travels, who died before his time. His death has left an immense gap in all of us who knew him.

Representative specimens/observations
France. Alpes-Maritimes. Val Roya, along the road to Colle di Tenda. Stone wall, 1250 m. 6/07/2011, *legit* L. Gallo [GL-7357]. Val Roya, along the road to Colle di Tenda. Arid grassland, 1300 m. 6/07/2011, *legit* L. Gallo [GL-7359]. Val Roya, between Tenda and Vievola. Gravel alongside the road, 1100 m. 6/07/2011, *legit* L. Gallo [GL-7366].

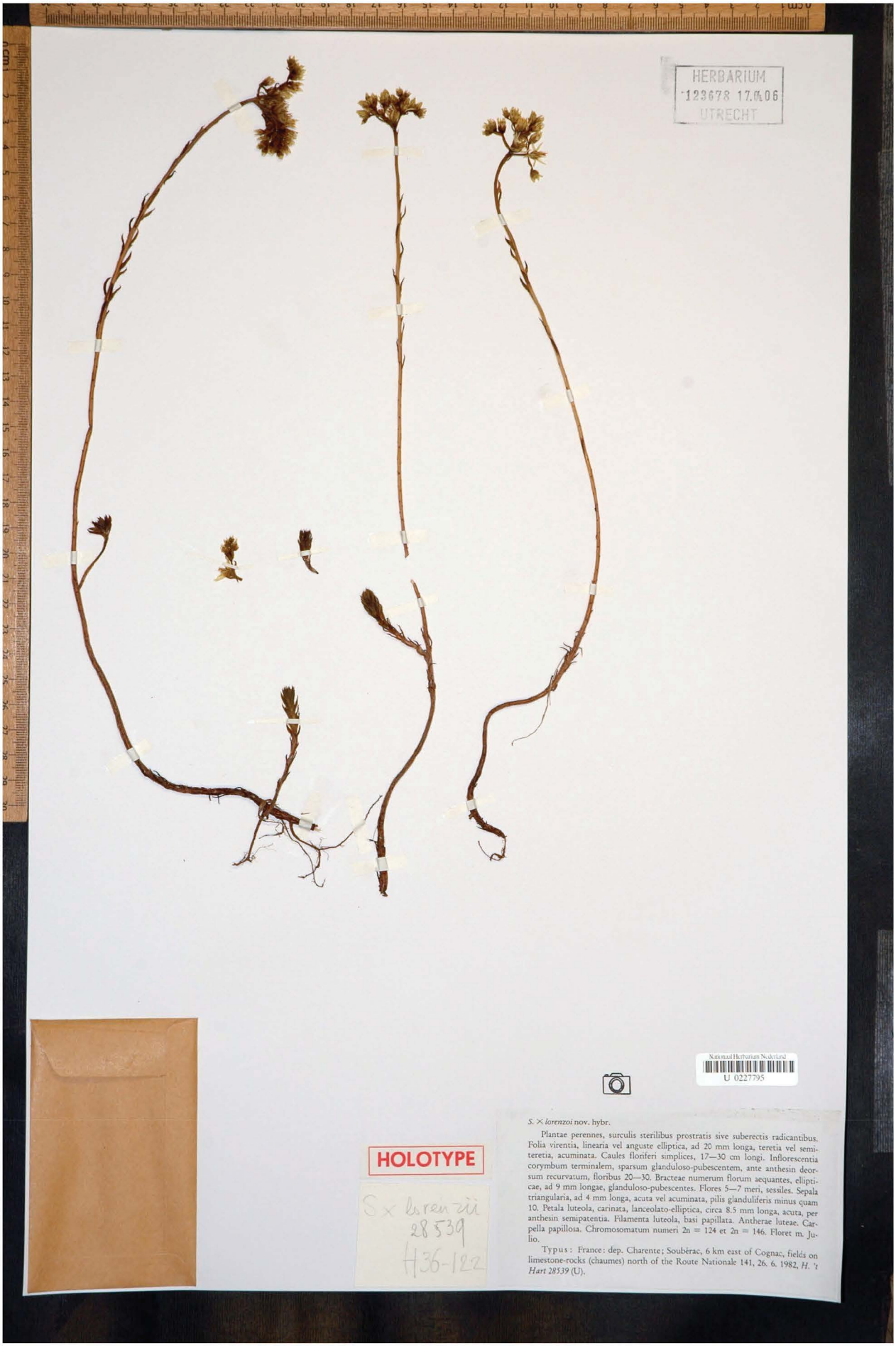

Fig. 5 = Holotype of *S. ×lorenzoi* 't Hart (HRT28539 - L)

Fig. 6 = Holotype of *S. xpascalianum* Gallo (GL7363 - TO)

Fig. 7 = *Sedum* ×*affomarcoi* Gallo & Afferni: Campo Felice, 1400 m (L'Aquila, Abruzzo, Italy), 29/06/2011 (photo Gallo)

Fig. 8 = *Sedum* ×*pascalianum* Gallo: Vallon de Caramagne, 1100 m (Val Roya, Provence-Alpes-Côte d'Azur, France), 6/07/2011 (photo Gallo, type locality)

Conclusions

Some years ago a preliminary checklist of the *Sedum* ser. *Rupestria* Berger, hybrids included, was proposed (Gallo 2009); the list is now updated, with the description of three new taxa. Seven hybrids are presently known and have been given binomials according to I.C.B.N. (McNeill *et al.* 2006). But the checklist may perhaps not be final and conclusive since further hybrids, for example those obtained through experimental hybridisation by 't Hart (1978), have not yet been located in the field, and still others remain to be studied (see Table 1). In the future, special care should be paid to *S. amplexicaule s.l.*, sympatric with *S. sediforme* in Spain, southern Italy and Greece, and to *S. montanum* and *S. thartii* in the Apennine Mountains (Italy).

Acknowledgements

The author is grateful to U. Eggli (ZSS) for the care with which he reviewed the original manuscript and for valuable conversation on this matter. Thanks also to E. Smets, N. Sol (NHN, Leiden), C. Roux (CLF) and L. Guglielmone (TO), for providing digital photographs of the types and G. Pandolfo (Turin, Italy) for the Latin diagnoses.

Literature

Bouvet G (1882) Revision des *Sedum* (groupe *reflexum*) de l'Herbier Boreau. Revue generale de Botanique 1:156-160.

Chaboisseau T (1863) Notes sur plusieurs especes observees ou soumises a la culture. 3. sur le *Sedum* a fleurs jaunes. Bulletin de la Société Botanique de France 10:289-301.

Chassagne M (1956). Fl. Auvergne, 1:443.

Eggli U, Newton LE (2004) Etymological Dictionary of Succulent Plant Names. Springer, Heidelberg.

Eggli U, Taylor N (Eds) (1994) List of names of succulent plants (other than cacti) from *Repertorium plantarum succulentarum* (1950-1992). R.B.G. Kew & SSZ. Whitstable Litho, Whitstable.

Gallo L (1999) Note scientifiche: Crassulaceae. In: Pistarino A.L. *et al*. Le collezioni di Giacinto Abbà. Catalogo e note critiche delle raccolte botaniche in Piemonte. Museo regionale Scienze naturali, Torino. Cataloghi XII. 2:196-197.

Gallo L, Bracchi G (2005a) *Sedum pseudorupestre* Gallo, *nomen novum* per *S. montanum* Songeon & Perr. subsp. *orientale* 't Hart (Crassulaceae). Atti Società italiana Scienze naturali 146(1):49-51.

Gallo L, Bracchi G (2005b) Aggiornamento alla conoscenza delle Crassulaceae dell'Emilia-Romagna, con segnalazioni per la Liguria orientale e la Toscana settentrionale. Atti Soc. italiana Scienze naturali 146(2):135-148.

Gallo L (2008) Taxonomic notes on some species of *Sedum* ser. *Rupestria* Berger (Crassulaceae) and typify-cation of their names. Webbia 63(2):169-173.

Gallo L (2009) *Sedum* ser. *Rupestria* Berger (Crassulaceae): work in progress toward a checklist of taxa and their distribution. Bocconea 23:203-205.

Gallo L (in press) Crassulaceae. In: Pignatti *et al*. Flora d'Italia. Edagricole. Bologna.

Grulich V (1984) Generic division of Sedoideae in Europe and the adjacent regions. Preslia 56:29-45.

van Ham RCHJ, 't Hart H (1994) Evolution of *Sedum* series *Rupestria* (Crassulaceae): evidence from chloroplast DNA and biosystematic data in: phylo-genetic implications of chloroplast DNA variation in the Crassulaceae. Cip-Gegevens Koninklijke Bibliotheek, den Haag, pp. 41-62.

't Hart H (1978) Biosystematic studies in the *Acre*-group and the series *Rupestria* Berger of the genus *Sedum* L. (Crassulaceae). PhD Thesis, Utrecht, Nederland.

't Hart H (1979) *Sedum x hegnaueri* Nov. Hybr. Danseria, 16:28-33.

't Hart H (1987) Natural hybrids in *Sedum* (Crassulaceae). 1. Two new hybrids of *S.* series *Rupestria* and a new locality of *S. brevierei*. Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzen-geographie 109(1):1-16.

't Hart H (1991) Evolution and classification of the European *Sedum* species (Crassulaceae). Flora Mediterranea, 1:31-61.

't Hart H (1994) The *Sedum Rupestre* group. Sedum Society Newsletter 28:8-22.

't Hart H, Bleij B (2003) *Sedum* in: Eggli (Ed) Illustrated Handbook of Succulent Plants: Crassulaceae, Springer, Heidelberg, pp. 235-332.

't Hart H, Sandbrink JM, Csikos I, Ooyen A van, Brederode J van (1993) The allopolyploid origin of *Sedum rupestre* subsp. *rupestre* (Crassulaceae). Plant Systematic Evolution 184:195-206.

Hebert L-P (1983) Analyse d'un complexe chromosomique en Mediterranee: *Sedum* ser. *Rupestria* Berger emend. Revue de Cytologie et de Biologie Vegetales - le Botaniste 6:179-224.

McNeill J *et al* (2006) International Code of Botanical Nomenclature (Vienna Code). Regnum Vegetabile 146. A.R.G. Gantner Verlag KG.

Mort ME, Soltis DE, Soltis PS, Francisco-Ortega J, Santos-Guerra A (2001) Phylogenetic relationships and evolution of Crassulaceae inferred from matK sequence data. American Journal of Botany 88(1):76-91.

Rouy G, Camus EG (1901) Flore de France ou description des plantes qui croissent spontanément en France, en Corse et en Alsace-Lorraine. Tome VII. Soc. sc. nat. Charente-Inférieure. 106-112.

Stearn WT (1987) Botanical Latin. Third ed. David & Charles. Newton Abbot.

Thiede J, Eggli U (2007) Crassulaceae. In: Kubitzki (Ed.). The Families and genera of Vascular Plants. Vol. IX. Flowering Plants – Eudicots. Springer, Berlin, Heidelberg, 83-118.