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NEW CONTRIBUTION TO THE KNOWLEDGE OF ITALIAN CRASSULACEAE. MISCELLANEOUS NOTES ON DISTRIBUTION, NOMENCLATURE, AND TAXONOMY

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Abstract - LORENZO GALLO - New contributions to the knowledge of Italian Crassulaceae. Miscellaneous notes on distribution, nomenclature, and taxonomy.

In this second contribution (cfr. GALLO, 2019) the author provides new data on distribution, taxonomy, and nomenclature of Crassulaceae in Italy, in accordance with MARTELLOS & NIMIS (2023). This study extends the distribution of *Petrosedum* hybrids (*×affomarcoi*, *×bellardii*, and *×hegnaueri*) and list a new *Sempervivum* species (*S. alpinum* and *S. ×barbulatum*) in Liguria. Furthermore, two species previously recorded in Piemonte (*Sempervivum glaucum* and *Umbilicus horizontalis*) are removed, while a new subspecies (*Sedum dasyphyllum* subsp. *glanduliferum*) is added to Piedmont, Tuscany ad Abruzzo; the presence of *Petrosedum thartii* is also reported for Tuscany and a new variety of *Sedum annuum* (*S. annuum* var. *albidum* L.Gallo) is added for Liguria. Finally, this study proposes the acceptance of non-Caucasian species previously classified as *Phedimus* into *Aizopsis*.

Keywords: Italy, taxonomy, nomenclature, Crassulaceae.

Riassunto - LORENZO GALLO - Nuova contribuzione alla conoscenza delle Crassulaceae italiane. Note miscellanee su distribuzione, nomenclatura e tassonomia.

Seconda contribuzione alla conoscenza della distribuzione, degli aspetti tassonomici e nomeclaturali delle Crassulaceae del territorio italiano, in accordo con MARTELLOS & NIMIS (2023). In questo lavoro, che fa seguito a quello già pubblicato (GALLO, 2019), vengono segnalati alcuni *Petrosedum* (*×affomarcoi*, *×bellardii*, *×hegnaueri*) e nuovi *Sempervivum* (*S. alpinum* e *S. ×barbulatum*) per la Liguria, vengono eliminate due specie dal Piemonte (*Sempervivum glaucum* e *Umbilicus horizontalis*), viene aggiunta la subspecie *Sedum dasyphyllum* subsp. *glanduliferum* a Piemonte, Toscana e Abruzzo; si segnala inoltre la presenza di *Petrosedum thartii* per la Toscana e una nuova varietà di *Sedum annuum* (*S. annuum* var. *albidum* L.Gallo) rinvenuta in Liguria. Infine, si accetta la ricombinazione in *Aizopsis* delle specie non caucasiche precedentemente trattate come *Phedimus*.

Parole chiave: Italia, tassonomia, nomenclatura, Crassulaceae.

INTRODUCTION

Following a previous update on Italy (GALLO, 2019), it seemed appropriate to publish a second contribution because of the substantial amount of information accumulated in recent years in floristics, nomenclature, and taxonomy obtained through field research and the study of specimens conducted in various herbaria (FI, PI, ALB, Erb. C. Bicknell, Bordighera). This mainly concerns the addition of hybrids, the acceptance or exclusion of species, as well as a change in taxonomic rank to adhere to the proposals of previous authors, and the description of a new entity, new to science. This second contribution update the work of MARTELOS & NIMIS (2023). Taxon names were reported according to IPNI (2023). Unlike what is reported on the MARTELOS & NIMIS (2023), this work includes hybrids as they are an essential component in the description of the territory's flora and an additional contribution to understanding the dynamics of the parental species involved. This note was written with the information obtained by the author in the last years until 31 December 2023. The acronym GL- indicates an observation of the author.

Aizopsis

LINNAEUS in *Species Plantarum* (1753: 430, 431) describes the first two taxa belonging to the genus *Aizopsis*: *Sedum aizoon* (Fig. 1) and *S. hybridum*, coming, respectively, from “Siberia” and from “Tataria ad amministrationes montium uralensium”. The plants, however, have already been described by LINNAEUS in *Hortus Upsaliensis* (1748: 116), which in turn was inspired by AMMAN's work (1739) sub “*Anacampseros flore flavo*”; Amman publish the b/w drawing (Tab. XI) of the flowering plant, which it is definitely an *A. aizoon*. Subsequently many other taxa were described: HART 'T & BLEIJ (2003: 196) provide a list of 13 species (treated as *Phedimus* subgen. *Aizoon*) with a “Far East” distribution, i.e. having a primary range between China, Japan, Korea to C Siberia; this distribution is clearly separated from that of the entities belonging to *Phedimus* subgen. *Phedimus* (Fig. 2) localized instead: “C and E Mediterranean region, Anatolia, Caucasus, and N Iran”. In the Euro-Mediterranean region, four taxa of *Aizopsis* (Table 1) are now known to have gone wild at random or naturalized, which now do not seem capable of becoming invasive and therefore problematic for the indigenous flora. Owing to the wide geographical separation and clear morphological separation already found by

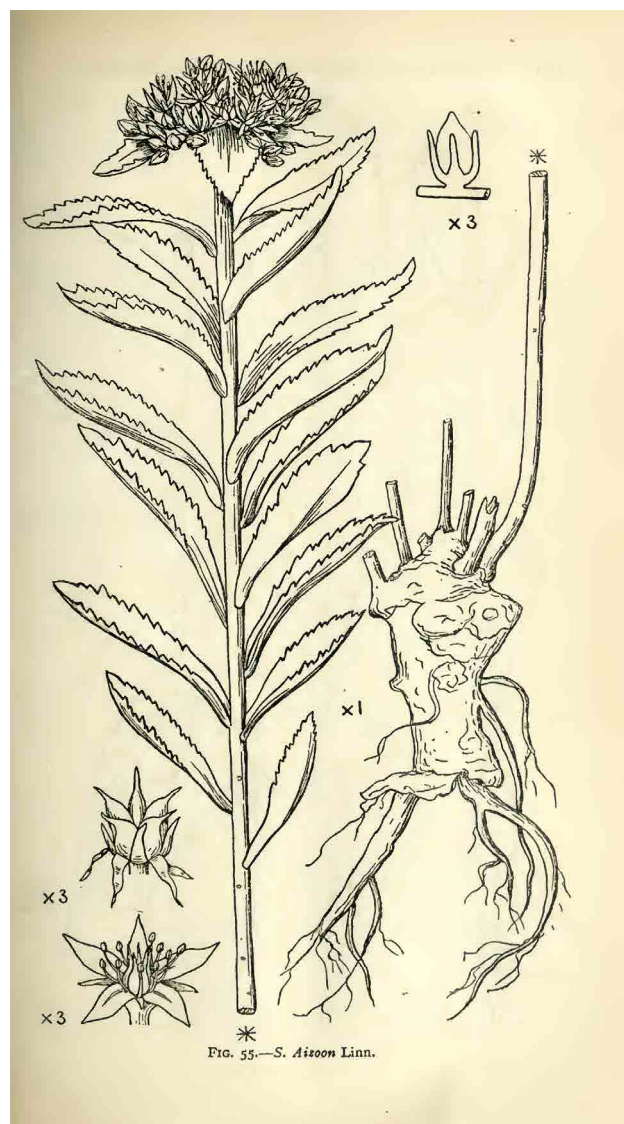


Fig. 1 - Table of *S. aizoon* L. (Taken by Praeger R., 1921. An account of the genus *Sedum* as found in cultivation) (Photo L. Gallo).

several Russian authors (GONTCHAROVA, 1999; BYALT, 2001; BYALT, 2007; BYALT, 2012), the recognition of *Aizopsis* GRÜLICH (1984) of these species is accepted, highlights the clear separation from the genus *Phedimus* RAFINESQUE (1817), which has also been confirmed at the evolutionary level (HAM & HART 'T, 1988; MORT *et al.*, 2001; GONTCHAROVA *et al.* 2006; MESSERSCHMID *et al.*, 2020; KIM *et al.*, 2023). In recent floras *Aizopsis* is treated as a subgenus of *Phedimus* (HART 'T & BLEIJ, 2003: 197), attributing to it an unverified evolutionary closeness (cf. HART 'T, 1995: 168-169).

	<i>Phedimus</i> Raf. (Fig. 3)	<i>Aizopsis</i> Grulich (Fig. 4)
Life span	Perennial plants (rr.) annuals (<i>P. stellatus</i>)	Perennial plants
Habitus	Decumbent o rr. erect (<i>P. stellatus</i>)	Erect or decumbents
Leaves shape	Rounded Leaves or ovate ecc. with lobed margins	Lanceolate leaves with toothed margin
Petals color	Purple, pink or white petals	Yellow petals and sometimes red carpels
Distribution	Caucasus, Mediterran (GRÜLICH, 1984: Fig.3 <i>sub Aizopsis</i>)	East Asia (Russia, China, Korea, Japan, Mongolia (GRÜLICH, 1984: Fig.4 <i>sub Asterosedum</i>)
Species	<i>Phedimus obtusifolius</i> (C.A.Mey.) 't Hart in 't Hart & Eggli <i>Phedimus spurius</i> (M.Bieb.) 't Hart in 't Hart & Eggli subsp. <i>oppositifolius</i> (Sims) L.Gallo <i>Phedimus spurius</i> (M.Bieb.) 't Hart in 't Hart & Eggli subsp. <i>spurius</i> <i>Phedimus stevenianus</i> (Rouy & E.G.Camus) 't Hart in 't Hart & Eggli <i>Phedimus stellatus</i> (L.) Raf. <i>Phedimus stoloniferus</i> (S.G.Gmel.) 't Hart in 't Hart & Eggli	<i>Aizopsis aizoon</i> (L.) Grulich <i>Aizopsis ellacombeana</i> (Praeger) P.V. Heath <i>Aizopsis florifera</i> (Praeger) P.V.Heath <i>Aizopsis kamtschatica</i> (Fisch. in Fisch., C.A.Mey. & Avé-Lall.) Grulich ¹

1 = Only the species currently present in the wild in the Euro-Mediterranean territory are listed.

Tab. 1 - Distinctive features between *Aizopsis* and *Phedimus*.

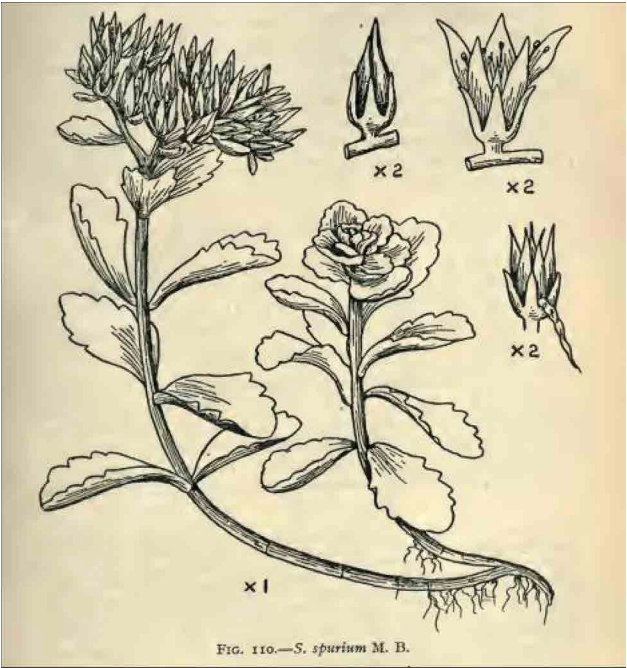


Fig. 2 - Table of *S. spurium* M. B. (Taken by Praeger R., 1921. An account of the genus *Sedum* as found in cultivation) (Photo L. Gallo).

Fig. 3 - *Phedimus spurius* (M.Bieb.) 't Hart in 't Hart & Eggli subsp. *spurius*. Francia, Massiccio Centrale (Photo L. Gallo).

Fig. 4 - *Aizoon kamtschaticum*. Monte Brione (Trentino, Italy) (Photo G. Perazza).





Fig. 5 - *Petrosedum thartii* (L.P. Hébert) Niederle. Appennino Piacentino (Emilia-Romagna, Italy) (with Giacomo Bracchi). (Photo L. Gallo).



Fig. 6 - *Petrosedum* $\times$ *affomarcoi*. Colle di Nava al Forte centrale (Liguria, Italy) 7/06/2022 (Photo L. Gallo).

Petrosedum thartii (Fig. 5)

+TOS

MARTELLOS & NIMIS (2023) did not quote the presence of this species in the northern Apennines. In some cases, it has been found alongside other members of the same genus, such as Castello di Montignoso, where it was collected, along with *P. rupestre* L. The existence of plants with intermediate characteristics raises questions regarding the possible introgression or hybridization with *P. rupestre* and *P. montanum*. These findings warrant further research to properly interpret the intermediates.

Toscana. Tra Pieve S. Stefano e La Verna, 711 m, muro a secco, 7/1996, Gallo obs. (GL-4034), Paterno (tra Val-lombrosa e Pontassieve), 443 m, muro a secco, 7/1996, Gallo obs. (GL-4050). Castello di Montignoso, es. sxp., 4-6-1991, Pellegrini (PI) (*Sub Sedum rupestre*). Rupi calcaree a Massa vecchia 18-6-1946, Pellegrini (PI) (*Sub Sedum rupestre*). Vecchi muri e rupi calcaree in loc. Porta Quaranta a Massa vecchia, 21-6-48, Pellegrini (PI) (*Sub Sedum rupestre*). Nei boschi alla Marina di Massa a SS Ronchi. 6-1928 Pellegrini (PI) (*Sub Sedum rupestre*).

tre). Rupi calcaree e vecchi muri al Castello di Massa. 7-1915, Pellegrini (PI) (*Sub Sedum rupestre*). Rupi calcaree al castello di Montignoso, 8-1891, Pellegrini (PI) (*sub Sedum rupestre*).

Casalguidi Pistoia, 6-1894, Costa-Reghini PI) (*Sub Sedum rupestre*).

Petrosedum $\times$ *affomarcoi* (L.Gallo & Afferni in L. GALLO) Afferni

+LIG

The hybrid between *P. montanum* (Sondeur & E.P. Perrier) Grulich and *P. rupestre* L. (Fig. 6) is often found in close proximity to the first of the two parents; the second parent, *P. rupestre*, remains unconfirmed in the mountainous areas of the province, where it appears to be replaced by the hybrid. This suggests that *P. rupestre* was once present in the Apennine areas of the region but subsequently disappeared due to progressive introgression or changes in ecological conditions towards colder climates, which favored the survival of *P. montanum* and the hybrid.

Liguria, Imperia. Colle di Nava al Forte centrale, 7/06/2022 (Photo L. Gallo). M. Ceppo, 7-13/06/2022, *Gallo obs.* (GL-9201). Carmo Langan, 7-13/06/2022, *Gallo obs.* (GL-9202). Tra Rif. Muratone e M. Toraggio, 7-13/06/2022, *Gallo obs.* (GL-9225).

***Petrosedum* × *bellardii* L.Gallo**

+LIG

This hybrid, with a complicated taxonomic and nomenclatural history (GALLO, 2017), was initially collected by Ludovico Bellardi in Val Roya in the 18th century. It is widely distributed in the western Alps and has been discovered on several occasions in the Imperia province.

Liguria, Imperia. Luoghi sassosi muri a secco Diano Cervo. Giugno-luglio (1866?) *Ricca* (FI) (*sub S. altissimum*). Diano Marina a M.te Torre, 31 luglio 1888, *Belli e Ferrari* (TO). Bordighera, 14-6-1901, *Pollini* (G-BU) (*sub Sedum*). Pieve di Teco (Imperia) ai margini della strada. 17/7/1963. *Fiussello* (TO) (*sub S. rupestre*). Dolcedo nelle macerie. giugno 1850, *Berti* (FI) (*sub S. altissimum*). Lavina (Rezzo) (GL-9194) (7-13/06/2022) *Gallo obs.* Tra Diano Marina e Diano Roncagli (GL-9203, 9238) Oss. /Racc. (7-13/06/2022) *Gallo obs.*

***Petrosedum* × *hegnaueri* (t Hart) Afferni ex Niederle**

+LIG

This particular hybrid taxon, which is infrequently observed between Italy and France, is a product of a cross between *P. montanum* and *P. sediforme* (Jacq.) Grulich, and belongs to the *Petrosedum* group with “pale yellow” petals (GALLO, 2012).

Liguria, Imperia. Pornassio secus rivulum Nava in pas-cuis. 1863-9-Aug., *Vignolo-Lutati* (TO) (*sub Sedum*). Tra Rezzo e Molini di Triora, 7-13/06/2022, *Gallo obs.* (GL-9195).

***Petrosedum* × *pascalianum* (L.Gallo) Afferni**

+LIG

Liguria, Imperia. Mendatica - Le Salse - Alpi Marit-time. 1600 m, 15 Luglio 2000, *Traverso*. (MRSN) (*sub S. montanum*).

***Sedum annuum* L.**

+LIG

A rare species in Liguria, which is known to occur in

the Apennine region along the border with Piedmont. In Imperia province, it is very rare and known for the surroundings of M. Ceppo, where it was collected by C. Bicknell in 1894 as a preserved herbarium specimen at the Clarence Bicknell Library Museum in Bordighera. The Bicknell herbarium (<http://www.museobicknell.com/le-collezioni/botanico>) is preserved in the Clarence Bicknell Library Museum in Bordighera, where it was already studied by (MARTINI, 1981) which carried out a critical review of some samples. In 2022, I rediscovered the population of Monte Ceppo, and a second, even smaller (few specimens), population was observed near Tegli Pass. The populations of the Imperia province present some morphological and biological characteristics that are currently under study, which increases the interest of these populations, which could be considered as glacial relicts in a situation of complete isolation from the main range; they exist in an environment with peculiar ecological conditions, which have contributed to the appearance of morphobiological characteristics with significant taxonomic value. In fact, the population has white-yellow flowers and the typical sterile plants are missing; therefore, the populations are annual, and the absolute protection of this population is particularly desirable, considering the very low number of specimens known to date. In the herbarium Bicknell, there is an exsiccatum of *Sedum annuum* L., corresponding to the collection list on p. 109 of his flora “Flora of Bordighera and San Remo” (BICKNELL, 1896): “Rare on the high mountains. Between Monte Ceppo and S. Giovanni dei prati...” chosen here as the type of the new variety. This herbarium specimen was also observed by BURNAT (1906: 17). From the examination of the (few) specimens collected between Liguria and Piedmont and France in the immediate vicinity, no specimens were found with flowers with white or whitish petals or with sterile sprouts: in particular, the samples coming from France (Tenda, FI), Carnino Alps (FI), and San Martin Vesubie (FI), Liguria, Savona province: Roccavignale on the rock under the Castle (ALB), Cliffs between Calizzano and Colle di Melogno (TO-HP) Varazze (FI).

***Sedum annuum* L var. *albidum* L.Gallo var. nov.**

(Figg. 7 e 8)

Holotype: *Sedum annuum* L. Presso Monte Ceppo dove il sentiero entra nel bosco di faggi. 10.VII.1894, *Bicknell* (Erb. C. Bicknell (!), 15a.13-1) (Fig. 9).

Dignoses: Differs from var. *annuum* for the colour



Fig. 7 - *S. annuum* var. *albidum*, photo taken at the site of M. Ceppo (Liguria, Italy) (Photo L. Gallo).



Fig. 8 - *S. annuum* var. *albidum*, Detail of flowers, a plant grown at the collection of L. Gallo (Photo L. Gallo).

white or white-yellow of the petals, rather than lemon yellow, and for the total absence of sterile plantlets, indicating a one-year biological cycle.

Description: Slightly lanceolate leaves measuring 3-5 x 1 mm with a blunt tip. Inflorescence typical, with alternate flowers on a branch that starts more or less from the 1/2 of the inflorescence, which is bracted with flowers in the axils of bracts that are similar to the leaves. Unequal digit-shaped sepals long 3/4 of petals. Flowers pentamerous (rr. tetramerous), sessile flowers, with five sepals, five erect petals, and five carpels. Petals white or pale yellow (especially when aged), linear, mucronate with small dimensions of 3 x 1 mm (rr. with purplish central line). Greenish carpels with very short erect styles and smooth yellow filaments. Transparent, digit-shaped hypogynous scales.

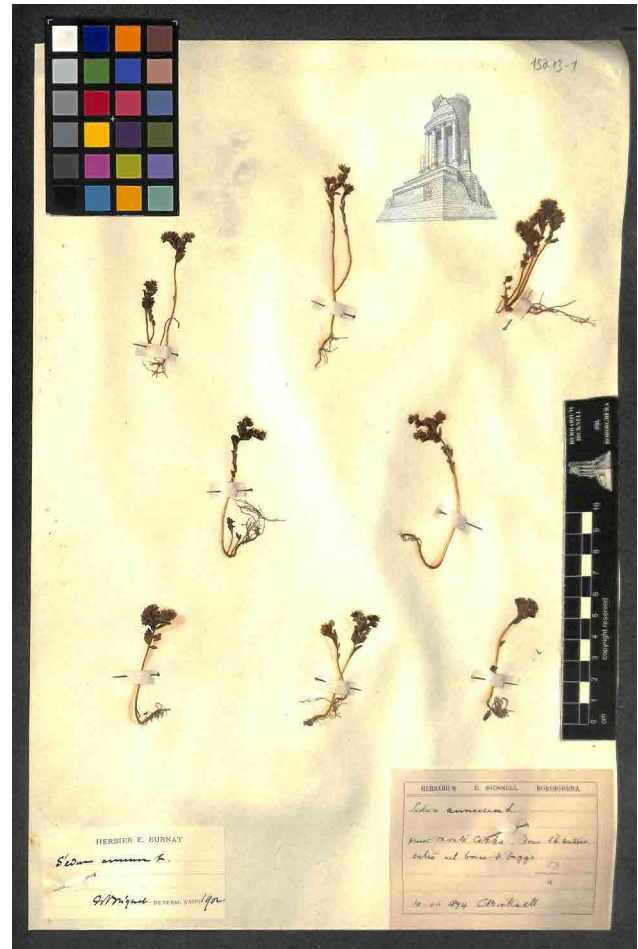


Fig. 9 - Lectotype of *S. annuum* var. *albidum* Presso Monte Ceppo dove il sentiero entra nel bosco di faggi. 10.VII.1894, C. Bicknell (Erb. C. Bicknell (!), 15a.13-1) (Photo: Biblioteca Museo Clarence Bicknell - Istituto Internazionale di Studi Liguri (Bordighera)).

Etymology: Due to the color of the petals.

Liguria, Imperia. M. Ceppo in piano, 1515 m 4394265, 776863, grassland with rocks, rare about 30 plants in anthesis, 7-10/06/2022, L. Gallo (Erb. L. Gallo). Passo di Tegli, above the road on the left going down towards Molini, 1385 m, SW, rocky outcrop on the limestone ridge in the sun, 7-10/06/2022, L. Gallo (Erb. L. Gallo).

Sedum dasyphyllum subsp. *glanduliferum* (Guss.) Nyman

+PIE

The distribution of this subspecies appears to be highly localized and has not been reported by MARTELOS & NIMIS (2023). A review of the author's information on

herbarium materials and collections/observations suggests that this subspecies is also present in Piedmont, with the caveat that the specimens or populations in northern Italy, particularly in the Insubric area, may have been unintentionally introduced by humans. Overall, their presence, which is limited to the southern sector, appears rare.

Piemonte. Bonvicino sui muri presso il centro abitato. 11/06/1981 *Abbà* (ALB). Entrando in Mombarcaro da San Pietro - Oss.: A Castiglione Falletto, mura del Castello ecc. Muri a secco, 29/VI/1928 *Vignolo-Lutati F* (VER) (*typicum e glandulosum*). Lago Maggiore, Stresa, muri, 28/06/1887, *Boggiani* (FI). Aisone verso la località S. Giuseppe, pendio lungo la strada, 2/9/90 *Abbà* (Erb. L. Gallo). Perno, su un muro del paese, 21/6/77, *Abbà G.* (MRSN).

***Sedum dasyphyllum subsp. glanduliferum* (Guss.) Nyman**

+TOS

The origin of herbarium specimens with sparsely glandular leaves from the Islands of Montecristo (GL-8240, GL-8241, and GL-15433) and Elba (GL-8236) is unclear, and their classification as subsp. *glanduliferum* is tentative and requires further research. Actual samples of subsp. *glanduliferum* came from the northern Apennines, including the Garfagnana, Vallombrosa, and Monte Granaio, as well as the specimen from “Florentia in aridis”.

Toscana. Nell’Appennino di Garfagnana sotto le Radici sulla via presso Castelnuovo. *Bottini*, 22-7-1878 (PI, Erb. Bottini) (*sub S. glanduliferum*). Vallombrosa-Secchiato (Secchiola?). *Grilli*, 30 luglio 1854 (FI) (*sub Sedum villosum*). Preappennino Pistoiese-Lucchese. Monte Granaio vetta, 1043 m, *Nardi*, 2 giugno 64 (FI). Florentia in aridis. *De Heldreich*, Aestate 1842 (G-Herb. Reuter-Barbey) (*sub S. glanduliferum*). Sentiero sopra Vallombrosa. *No legit*, 30 luglio 1854 (FI-Erb Grilli) (*sub Sedum villosum*).

***Sedum dasyphyllum subsp. glanduliferum* (Guss.) Nyman**

+ABR

It is likely that this subspecies is more widespread, particularly in mountainous regions.

Abruzzo. Stiffa, presso la cascata tra Aquila e Sulmona, 800 m 10/05/06 *Vaccari* (FI). Aquila presso le mura della città 800 m, 10/06/06, *Vaccari* (FI). In subalpinis



Fig. 10 - *Sempervivum alpinum*. Valle Argentina (Liguria, Italy). (Photo L. Gallo).

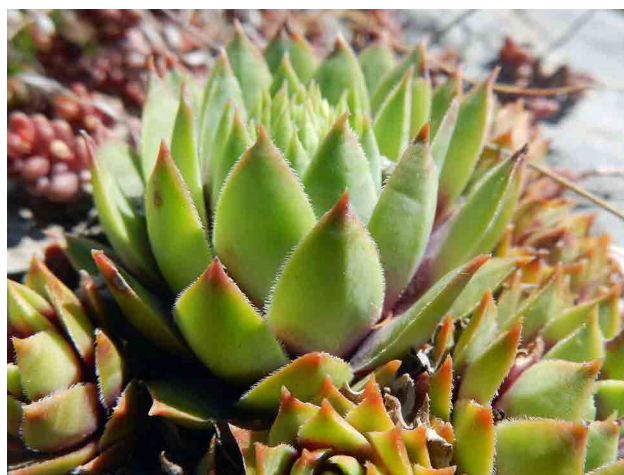


Fig. 11 - *Sempervivum* hybrid between *S. alpinum* and *S. tectorum*. (Liguria, Italy) Valle Argentina. (Photo L. Gallo).

montis Majella Valle d’Orfente presso la cascata grande ai piedi del M. Macchia [?], 6/74 *Levier* (FI).

***Sempervivum alpinum* Griseb. & Schenk**
+LIG

A new species in the Liguria region (cfr. MARTELLOS & NIMIS, 2023) (Fig. 10) above all in the alpine environment of the Imperia province. Often, this species can be found jointly with *S. tectorum* L., which frequently hybridizes with it (Fig. 11). This species is not particularly rare and does not require special protection. Its populations are linked to those from nearby Val Tanaro in the provinces of Cuneo, Piedmont, and P.A.C.A. in France.



Fig. 12 - *Sempervivum* hybrid between *S. arachnoideum* and *S. montanum* Strada carrozzabile per il Rif. Grai (Liguria, Italy) (Photo L. Gallo).

Liguria, Imperia. Valle Argentina 9-6-2022. (Photo L. Gallo). Da Col di Nava a Cosio Arroscia (7-13/06/2022) L. Gallo *obs.* Da Rif. Allavena a Monte Pietravecchia (7-13/06/2022) L. Gallo *obs.* (GL-9204).

Sempervivum glaucum Ten.

-PIE

On July 31, 2003, the author found a population of *S. glaucum* Ten. in the Canavese (Locana Valley in Piedmont, Italy), on granite rocks approximately 800 meters above sea level. This finding was later included on the Portal to the Flora of Italy (MARTELOS & NIMIS, 2023). However, a recent inspection of the same location in 2022 did not confirm the presence of the population, and the report was not considered entirely reliable due to the possibility of confusion with another taxon. Therefore, it is recommended to eliminate this population from the Piedmont region as a precaution. Aosta Valley remains the only Italian region where this species is known to occur.

Sempervivum × *barbulatum* Schott

+LIG

The hybrid species between *S. arachnoideum* L. and *S. montanum* L. is commonly found in the mountain ranges of the Alps, Apennines, and Pyrenees. However, it is quite rare in Liguria, where it has only been found in a single population (Fig. 12). Interestingly, this species exhibits atypical characteristics in terms of its consistency and form of sterile rosette leaves.

Liguria, Imperia. Da Rif. Allavena a Rif. Grai,

10/06/2022 (photo L. Gallo), Gallo *obs.* (GL-9215, GL-9216).

Umbilicus horizontalis (Guss.) DC.

-PIE

Recently, the presence of *U. horizontalis* (Guss.) DC. in the Langhe region of Piedmont was reported (CAVALLO, 2021). This species has not been previously reported in Piedmont and only one specimen has been observed. The herbarium sample (ALB) was unavailable at the time of the request; therefore, the author relied on photographs taken by Franco Rota to correctly identify the plant. However, the photographs show that the plant in question was *U. rupestris*, despite its size resembling other entities. The shape of the laciniae of the petals and their large overlap are decisive factors in plant identification. The length and robustness of the pedicels, which allow the flower to remain horizontal even during anthesis, suggest that the plant belongs to the Tyrrhenian population of this species. These populations are well represented in the Tuscan Archipelago as well as in Eastern Liguria (Colle del Melogno, Genova, Rossiglione, and Sarzana), the Alessandria Apennines in Piedmont, and in recent decades. Although these characteristics are not constant, it is interesting to note that these individuals are linked to Mediterranean environments and are expanding northwards.

Piemonte, Cuneo. *Umbilicus horizontalis*. Langhe, Valle Belbo, comune di San Benedetto Belbo (CN), muretto a secco presso un'abitazione, 620 m, 23 maggio 2020. Cavallo (ALB) (= *Umbilicus rupestris*, det L. Gallo).

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