A new species of the *Sempervivum marmoreum* group in Central Europe

Nový druh z okruhu *Sempervivum marmoreum* v strednej Európe

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A comparative study of material of *Sempervivum marmoreum* Griseb. from the type locality (Mt Athos, Greece) and the northern part of its distribution revealed a distinct morphotype occurring in an isolated enclave along the Slovak–Hungarian border. As its karyotype differs it is formally described here as a new species – *Sempervivum matricum* Letz. The name *Sempervivum assimile* Schott, formerly considered as a possible name for this species is here critically examined. A morphological characterization of the new species, photographs of the plant and a distribution map based on revised herbarium specimens are provided.

**Keywords**: *Sempervivum marmoreum*, *Sempervivum assimile*, *Crassulaceae*, new species, Hungary, Slovakia, Central Europe, taxonomy

**Introduction**

*Sempervivum marmoreum* Griseb. (*Crassulaceae*) was described by Grisebach (1843) from Mount Athos, the highest peak on the Chalkidiki Peninsula in Greece. This name is applied to populations of this species throughout its distribution extending from the Balkan Peninsula to the Carpathians. It is cited in most current floras (Soó 1966, Vále 1970, Gajić 1972, Zahradníková 1985, Hagemann 1986, Paparisto 1988, Dostál 1989, Simon 1992, Parnell & Favarger 1993, Assyov et al. 2002, Hart 2002). Earlier authors used the name *S. schlehanii* Schott for this species. However, Turrill (1936) pointed out that the taxa *S. schlehanii* Schott and *S. marmoreum* Griseb. are conspecific and *S. marmoreum* has priority over *S. schlehanii*. *Sempervivum marmoreum* has not been taxonomically revised over its whole distribution area. The publication of Domokos (1936) indicates considerable variability in the region of Banatus (Romania) and Hungary, and that of Nyárády (1939), although an inadequate taxonomic treatment, variability of the plants in Transylvania (Romania).

*Sempervivum marmoreum* is extremely variable (Hagemann 1986, Parnell 1988), with a reticular type of variability and there is no possibility of geographically delimiting its morphotypes. The name *S. marmoreum* is used for all indumentum variants, with or without pubescence on the rosette leaves. The second edition of the Flora Europaea (Parnell & Favarger 1993) also treats the taxon *S. marmoreum* with broad circumscription. Even the densely pubescent variant with very short, velvety hairs on the leaves, *S. erythraeum* Velen., recognized in the first edition (Favarger & Zésiger 1964), is there considered to be conspecific with *S. marmoreum*. These plants from the Rila Mts in Bulgaria were previously considered to be *S. montanum* L. (Velenovský 1891: 188). Later they were described...

*Sempervivum erythraeum* is not the only variant of the *S. marmoreum* group in which the rosette leaves have a hairy surface. In Central Europe the name *S. assimile* Schott (1852) assigned to plants from Transylvania (Romania) was used by several authors to indicate plants with hairy rosette leaves (e.g., Porcius 1878: 21–22, Prodan 1923: 530, Jávorka 1924: 456, Ungar 1925: 240). Later it was used only to indicate a variety (Domin 1933: 34) or stated to be a synonym (Berger 1930: 422). More recently it was included only as a synonym of the names *S. schlehanii* Schott or *S. marmoreum* Griseb. (Dostál 1950: 536, Soó & Jávorka 1951: 305, Răvăruț 1956: 79, Soó 1966: 264, Zahradníková 1985: 195).

Some subspecies were recognized recently (Hart et al. 2003 following Zonneveld 1999): *S. marmoreum* Griseb. subsp. *marmoreum* (plants with glabrous rosette leaves), *S. marmoreum* subsp. *balisii* (Wale) Zonneveld (small glabrous plants), *S. marmoreum* subsp. *erythraeum* (Velen.) Zonneveld (velvety-pubescent plants) and *S. marmoreum* subsp. *reginae-amaliciae* (Heldr. & Sartori ex Boiss.) Zonneveld (strongly pubescent forms). However, these taxa are more appropriate for the cultivated forms of *Sempervivum* fanciers’ collections than a comparative study of populations in the field. Nevertheless, this concept reopened the problem of how to taxonomically distinguish the morphotypes of *S. marmoreum* that have rosette leaves with a hairy surface.

Our taxonomic revision of *S. marmoreum* reflects the finding that this species consists of two cytotypes, a diploid (2n = 34) and tetraploid (2n = 68) (Letz et al. 1999). The tetraploids are restricted to isolated populations in the northern part of the distribution of *S. marmoreum*. The aim of the present study is to determine if the tetraploids are a separate species and to search for a previously published name for the taxon.

**Material and methods**

The results of this study are based on material from herbaria and living specimens of the *S. marmoreum* group. All the material in the following herbaria was examined: BP, BRA, BRNU, CL, KRA, KRAM, LW, LWS, PR, PRC, SAV, SIB, SLO, TAU, W, WU (acronyms of Holmgren et al. 1990). The herbarium specimens are cited as follows: year when collected, name of collector and herbarium acronym; information mostly derived from the labels on the specimens. In order to eliminate environmentally induced phenotypic variation the living material collected from selected localities was cultivated for at least one year in an experimental field at the Institute of Botany in Bratislava (Slovakia). The collection of living specimens is maintained at the Institute and voucher specimens of the material studied are deposited in herbarium SAV.

The material recognized as tetraploid and found only in the northern part of the distribution area of the *S. marmoreum* group was morphologically evaluated and compared with herbarium and living material from the type locality of *S. marmoreum* Griseb. and from selected additional localities covering the whole distribution area. During a preliminary investigation of the material significant differences in the indumentum of the rosette leaves were noted, therefore the comparison concentrated on the presence/absence and type of the indumentum on the surfaces of the rosette leaves. The hairs were measured
with the precision of 50 μm and their density evaluated by counting them along a 1 mm section of the same part of each leaf.

The morphotypes were analysed also geographically. Revised specimens (see Appendix 1) were arranged according to their localities in accordance with phytogeographical division of the relevant countries (Soó 1964, Futák 1984). A dot distribution map was produced based on the herbarium material.

The question of the proper name for the revealed taxon was solved initially by a nomenclatural analysis of the available names. This is included as taxonomic synonyms (=) and misidentifications (−) in the diagnosis of the new species. Partial misidentifications are designated “p. p.” following the word “auct.” Under the heading “Ind. loc.” information from the protologue on the distribution and locality of the original material is cited. When a name has not been typified, the reason why it is included in the synonymy of the taxon is presented: “Ex descr.” – according to original description, “Ex loc.” – according to stated locality.

**Results and discussion**

**Material of Sempervivum marmoreum from the type locality**

Although the name *S. marmoreum* Griseb. was not typified it is clear that Grisebach (1843) based this name exclusively on material collected by Friedrichsthal from Mt Athos (Chalkidiki, Greece). A lectotype should be selected from the original material based on the diagnosis “foliis glabris”, which means the rosette leaves have a glabrous surface and ciliate margins. Rechinger (1943: 290) also indicates that the plants from Mt Athos have “folia rosularia in lamina glabra” and uses the name *S. schlehanii var. blandum* (Schott) Hayek.

There is material of *S. marmoreum* collected from Mt Athos in herbaria CL, GOET, TAU and W. It consists of specimens with glabrous rosette leaves (In regione superiori montis Athos, cca 1800–2000 m, 1862 Orphanides CL. – Athos, Kerasia – Panagia, 1996 Babalonas TAU, no. 968. – Nordseite des Athos gegen den Nadelwald, s. a. Friedrichsthal GOET, no. 1161) and one specimen with dense and very short hairs on the surface of the rosette leaves (M. Athos, s. a. Friedrichsthal W). The sample “M. Athos, s. a. Friedrichsthal W, Herb. Maced. n. 1294” consists of one glabrous and two hairy specimens. The presence of two morphotypes at the type locality was confirmed by my visit to the locality in 1997.

*Sempervivum marmoreum* is common there, especially at altitudes above 1700 m a.s.l. and up to the top of the mountain (2030 m). Only the “glabrous morphotype” occurs at the higher altitudes. The “hairy morphotype” was detected only up to 1600 m. These two morphotypes meet in the vicinity of Panaghia (1500 m). Although no intermediate forms were detected, hybridization is very probable. On Mt Antiathonas (1042 m), which is lower and opposite Mt Athos, only the “hairy morphotype” is recorded (based on herbarium specimens: Athos, Antiathonas, 1996 Babalonas TAU). This fact indicates the morphotypes are associated with particular altitudes at least in the region of Athos. The “hairy morphotype” grows at a lower altitude than the “glabrous morphotype”.

The taxonomic identity of the two morphotypes needs to be resolved. In the case of the “glabrous morphotype” growing at high altitudes it is clear the name *S. marmoreum* Griseb. s. str. accords with Grisebach’s protologue. The taxonomic identity of the “hairy
morphotype” has to be solved in the context of the whole S. marmoreum group. The “hairy
morphotype” is characterized by a greyish appearance caused by the presence of dense and very short indumentum on the surface of the rosette leaves. Our study of herbarium and living material of the S. marmoreum group revealed that this morphotype occurs at other places in the Balkan Peninsula and northwards to the Romanian Southern and Eastern Carpathians. As the “hairy morphotype” has a different chorology and ecology it is proposed to treat it as at least a subspecies. Based on the original material with the name S. erythraeum Velen., deposited in PRC, this name is applicable to the “hairy morphotype” of the S. marmoreum group.

Material from the northern part of the distribution area

Taxonomic revision of samples of the S. marmoreum group collected from the whole of its distribution area revealed that the northern populations are morphologically and karyologically different from the others. Unlike S. marmoreum Griseb. s. str. that has glabrous rosette leaves (Fig. 1), their rosette leaves are always sparsely pubescent, never glabrous, with hairs 151±55 μm long (mean±S.D.). The hairs (cilia) on the margins of the rosette leaves are 438±177 μm long and protruding (Rezešová 2005, n = 10 from eight localities). They differ from the above mentioned “hairy morphotype” (S. erythraeum Velen.) in the Balkans and Southern Carpathians, which have 86±14 μm long hairs on the surface of the rosette leaves and 297±151 μm long and ± oblique hairs (cilia) on the margins of the rosette leaves (Rezešová 2005, n = 2 from two localities). These measurements are similar to those of the hairs on the herbarium and living material I measured. The rosettes of the plants in populations from the northern part of the distribution area of the S. marmoreum group (Fig. 2) never have a greyish velvety appearance due to the high density of short hairs, typical of S. erythraeum Velen (Fig. 3).

The number of chromosomes is also different. The only number recorded for the S. marmoreum group is 2n = 34 (Uhl 1961, Favarger & Zésiger 1964, Hart & Loon 1982, Zésiger 1982). An analysis of material from the northern part of the distribution area revealed 2n = 68 (Letz & Boșcaiu in Letz et al. 1999). Material from other localities in Slovakia and Hungary also have 2n = 68.

As in the whole S. marmoreum group, the rosettes of the plants in the populations in the northern part of their distribution are extremely variable in size, and in the number, colour, shape and size of the rosette leaves. Even clones from same locality show special and unique combinations of these characters. Therefore, these characters have little taxonomic value and only justify taxonomic treatment at the level of a form. Some of these forms with narrow and long rosette leaves from the Zemplén Mts (Tokajense, NE Hungary) are described as varieties, e.g. S. schlehanii var. dimorphum Domokos (1936), S. schlehanii var. tokajense Domokos (1936) and S. marmoreum var. angustissimum Priszt (in Soó 1980). Although such forms may be locally abundant they form part of a continuum with other forms in the population (Dumont 2008). Unlike the variability in shape, colour and size, the indumentum on the rosette leaves is an important taxonomic character for differentiating taxa within the S. marmoreum group, related to geographic distribution.

The morphotype with pubescent rosette leaves and chromosome number 2n = 68 occurs along the Slovak-Hungarian border. Its distribution area extends from the Hungarian Middle Mountains in the phytogeographic district Pilisiense (Buda and Pilis Mts) in the
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Fig. 1 – Rosettes of *Sempervivum marmoreum* s. str. Montenegro, Durmitor Mts, Crno jezero. Photo: M. Miklánek. Scale bar = 1 cm.

Fig. 2. – Rosettes of *Sempervivum matricum*. Slovakia, Muránska planina Mts, Martinova dolina. Photo: M. Miklánek. Scale bar = 1 cm.
Fig. 3 – Rosettes of *Sempervivum erythraeum*. Romania, Danube Valley, near Portile de Fier. Photo: R. Letz. Scale bar = 1 cm.

Fig. 4 – Flowers of *Sempervivum matricarium*. Slovakia, Slovenský kras Karst, Kečovo. Photo: R. Šuvada. Scale bar = 1 cm.
west, in a north-easterly direction into the phytogeographic districts Burda, Ipeľsko-rimavská brážda and Slovenský kras on the Slovak side and districts Visegradense (Visegrád Mts), Neogradense (Börzsöny and Naszály Mts), Borsodense (Bükk Mts), Tornense (Torna Karst) and Tokajense (Zemplén Mts) on the Hungarian side. All these districts are in the phytogeographical region Matricum (hilly northern part of Pannonicum). Recently this species was found in Slovakia in the district of Muránska Planina in the Praecarpaticum region (Blanár & Letz 2005). Other specimens from this region (from the Štiavnické vrchy Mts; Zahradníková 1985: 195) were misidentified and belong to *S. carpathicum* subsp. *heterophyllum* (Hazsl.) Letz of the *S. montanum* group.

The localities in Slovakia and Hungary are isolated on the northern border by the Hungarian Plain from the main part of the distribution area of the *S. marmoreum* group (Fig. 5). This particular area is ca 240 × 110 km in extent and ca 230 km from the nearest population of plants of the *S. marmoreum* group in the Apuseni Mts (Romania), where, however, only the morphotype with glabrous leaves (*S. marmoreum* s. str.) occurs. Another close by enclave of *S. marmoreum* s.l. is situated in the western foothills of the Eastern Carpathians in Ukraine (1933 Deyl PR and Kobiv et al. 2007) and Romania (in the Rodna and Maramureş Mts). The taxonomic identity of the populations there with hairy rosette leaves has to be karyologically and morphologically investigated.
The different number of chromosomes (2n = 68), and unique morphology and chorology of the northern populations of the *S. marmoreum* group is a serious argument for treating them as a separate disjunct species.

**Nomenclatural analysis**

Of the available names only *Sempervivum assimile* Schott can be considered as a possible name for this new species.

*Sempervivum assimile* Schott is one of the three Schott’s species in the *S. marmoreum* group (Schott 1852). Like *S. blandum* Schott this species was also described by Schott based on plants collected in 1850 by Kotschy during a field trip in Transylvania. Schott’s note on the origin of *S. assimile* is only “Vorkommen in Siebenbürgen [occurring in Transylvania] (Kotschy)”. Although the locality is not specified in Kotschy’s detailed itinerary (Kotschy 1853), information on the localities of the new species from Transylvania collected by Kotschy are provided by Fuss (1857). For *S. assimile* there is note: “bei Hermannstadt [Sibiu] und Törzburg [Bran]”. Schott’s original description of *S. assimile* is in both Latin and German. The descriptions differ slightly but complement one another. According to both the Latin and German descriptions the most important differential character is the indumentum on the rosette leaves. According to the Latin description the young rosette leaves are hairy and become semiglabrous: “foliis rosularum ... juventute ubique puberulis, demum subcalvescentibus”, according to the German description the rosette leaves are densely and shortly hairy: “Die Blätter der Rose graugrün, dicht-kurzbehaart, sehr kurzgewimpert.” (Schott 1853: 19). The original description is not of a morphotype with glabrous rosette leaves but rather a morphotype with more or less permanently hairy leaves. Therefore, *S. assimile* Schott is not clearly conspecific with *S. marmoreum* Griseb. s. str., unlike the other two Schott’s species (*S. schlehanii* Schott and *S. blandum* Schott), which have glabrous rosette leaves: “glabris” or “demum glabris” (Schott 1853: 12, 29).

This name was lectotypified by Parnell (1988: 216, BP). Based on the characteristic branching of the inflorescence, its bigger size and the glabrous rosette leaves, this specimen belongs to *S. tectorum* L. s. str. and not the *S. marmoreum* group. According to the herbarium label “Plantae Transylvaniae Herbarii Schott, 306. *Sempervivum assimile* Schott, prope Hermannstadt, 1850, legit Th. Kotschy” this lectotype is representative of the original material. The stated locality “prope Hermannstadt” [near Sibiu], corresponds to the datum in Fuss (1857: 171), could be that of the species *S. tectorum* L. s. str., which has been cultivated for a long time and frequently escapes and becomes naturalized. Furthermore, the young leaves of the daughter rosettes on the stolons of *S. tectorum* are very often sparsely hairy (ciliate) and become glabrous when fully grown. This character could correspond with the Latin description of *S. assimile* Schott “foliis rosularum juventute puberulis”, although the mature rosette leaves of *S. tectorum* L. are not “subcalvescens”, but totally glabrous. There are no specimens of *S. marmoreum* s.l. known from the vicinity of Sibiu.

On the same herbarium sheet (BP, no. 77392) there is also another specimen labelled “*Sempervivum*, Transylvania prope Bânffihunyad [Huedin] ad pagum Magyaro Kereke [Alunişu] in monte porphryaceo, Wolff”. This specimen has glabrous rosette leaves like *S. marmoreum* Griseb. s. str. However, it does not represent the original material. Although both the labels are attached to the sheet, it is not possible to exclude the possibility of a mix-up in the past.
The second locality with which the name *S. assimile* is associated is Törzburg [Bran] (Fuss 1857). The specimen of *S. marmoreum* from the vicinity of this town (Törcsvár [Bran], in saxosis calcareis montis Maguricea – 1916 Benedek BP ut *S. assimile* Schott) is of the “Balkan hairy morphotype” – *S. erythraeum* Velen. (see above) and is as described in the German part of Schott’s original description of *S. assimile*. However, in the absence of such original material this name cannot be used in this sense.

Parnell’s lectotype must be accepted in accordance with the article 9.17 of the Code (McNeill et al. 2006) as there is no other original material and the discrepancy between the designated lectotype and the original description is slight and explainable (see above). Based on this lectotype the name *S. assimile* Schott should be attached to the synonymy of *S. tectorum* L. subsp. *tectorum* and cannot be used for the new species. Furthermore, a morphotype corresponding to the tetraploid populations of *S. marmoreum* s.l. does not occur in the South Carpathian region, the original localities of *S. assimile* Schott (the regions of Sibiu and Bran in Romania).

Hart et al. (2003) have used the name based on *S. reginae-amaliae* Heldreich & Sartori ex Boissier (1872) for all hairy morphotypes of *S. marmoreum*, except *S. erythraeum*, but including populations from Hungary (with incorrect note “S Hungary”). However, the name *S. reginae-amaliae* from a manuscript of Heldreich and Sartori was cited by Boissier only in the synonymy of *S. tectorum* L. (cf. Boissier 1872: 796) as he could not distinguish *S. reginae-amaliae* from *S. tectorum* (cf. Boissier 1888: 248). The name *S. reginae-amaliae* Heldr. & Sartori ex Boiss. and all the combinations based on it are therefore invalid according to Art. 34.1(c) of the Code (McNeill et al. 2006). Moreover, the hairy morphotypes from Greece, to which this invalid name was referred, are not the same as those in the populations in Hungary and Slovakia.

### Sempervivum matricum Letz, spec. nova

**Holotypus:** “Flora Slovaciae, Kováčovské kopce – medzi Kováčovom a Kamendínom [Kamenínom], leg. Dr. J. Futák, 22. 8. 1948.” (SLO) – Fig. 6.

**Diagnosis:** Differet a specie *Sempervivum marmoreum* Griseb. s. str. foliis rosularum supra et subtus pubescentibus, a specie *Sempervivum erythraeum* Velen. pilis in facie foliorum rosularum longioribus (0.1–0.25 mm) et sparsioribus (5–8 pili / 1 mm). Chromosomatum numerus somaticus 2n=68.

**Synonymy:**
  Ind. loc.: “in Hungaria in montibus Tokaj–Hegyalja in ripibus andesyticis arcis Regéci vár. Legit dr. E. Goszleth. 1933”. Not found (Ex loc.)
  Ind. loc.: “in Hungaria in montibus Tokaj–Hegyalja, in ripibus andesyticis arcis Regéci vár. Legit dr. E. Goszleth, 1933”. Not found (Ex loc.)
  Ind. loc.: “Tokajense: Regéc”. Holotypus: “1976, HHBp”, not found (Ex loc. et desc.)
  Ind. loc.: “Borsodense, ad praed. Szarvaskő.” Holotypus: “1977, HHBp”, not found (Ex loc.)
- = *Sempervivum assimile* auct. non Schott: Feichtinger, Esztergom fl.: 294. 1899; Jáv., Magyar Fl. 2: 456. 1924 (p. p.).
Fig. 6. – Holotype of *Sempervivum matricum* Letz, spec. nova, deposited in SLO. Scale bar = 5 cm.
Description: Root long, corded, 3–8 mm thick. Sterile rosettes of leaves open, flattish, (3–) 5–10 (–13) cm across. Rosette leaves (15–) 25–80 mm long, 5–15 (–20) mm broad, (1.5–) 2–4 (–5) mm thick, obovate-spathulate to oblong, mostly broader above, abruptly mucronate, often rounded below apex, adaxial surface flat to concave, abaxial surface convex, green, often with red-purple tip or flushed red over whole upper part, to the naked eye ± not conspicuously pubescent, never glabrous, hairs on surface 0.10–0.25 mm long and relatively sparse (5–8 hairs per 1 mm), and bearing a small terminal gland; marginal hairs like cilia, mostly ± projecting, 0.3–0.7 long. Offsets horizontal, 5–8 cm long, 2–3 mm thick, fine hairy, with sparse ovate hairy leaves. Flowering plants with (12–) 18–25 (–35) cm stems, terete, finely glandular-hairy, in upper part branched at ± one place. Cauline leaves oblong lanceolate, acuminate, 2–5 cm long, 3.5–15.0 mm broad, at least partly flushed red, surface glandular hairy, margins ciliate. Inflorescence (12–) 30–60 (–65)-flowered, composed of (2–) 3 main branches usually divided into two terminal coils, flowers with small linear lanceolate bracts. Peduncles 1.5–2.0 mm long, green to red-purple, glandular hairy. Flowers with 12-parts, 1.5–2.5 cm across. Calyx bowl-shaped, sepals linear lanceolate, sessile broadest at the base, with merging bases 6–8 mm long. Petals 8–12 mm long, 1–2 mm broad, linear to linear-lanceolate, with glandular hairs on the underside and margins, whitish to pale pink, with a broad darker median band formed by minute longitudinal purple lines. Stamens 5–7 mm long, purple-violet; filaments dilated and sparsely glandular hairy at the base; anthers ovate, purple, later dark violet, with deep yellow pollen. Nectary scales minute, rounded, greenish. Carpels 6–7 mm long, 1–2 mm broad, curved, with narrow outward bent stylodium, green to red-purplish, glandular hairy. Follicles brown; seeds minute, pear-shaped, brown. – Fig. 2, 4.

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Súhrn
Štúdium materiálu druhu Sempervivum marmoreum Griseb. z jeho typovej lokality (vrch Athos, Grécko) a jeho porovnanie s materiálom zo severnej časti jeho areálu odhalilo odlišný morfotyp, ktorý sa vyskytuje v izolovanej arele pozdĺž slovensko-maďarskej hranice. Po zohľadnení karyologickej odlišnosti je tu tento morfotyp opísaný ako nový druh – Sempervivum matricum Letz. Uvedené je tiež kritické preverenie mena Sempervivum assimile Schott, ktoré bolo pôvodne zvažované ako možné meno pre tento druh. Práca prináša tiež morfologickú charakteristiku nového druhu, ako aj jeho fotografie a mapu rozšírenia vypracovanú na základe revidovaných herbarových položiek.
References


Appendix 1. – Material studied (see Material and methods for details).

**Herbarium specimens of Sempervivum matricum**

**Slovakia.** **Matricum: Burda**

*Sempervivum matricum* Herbarium specimens of Preslia 81: 293–308, 2009

Living material of *Sempervivum marmoreum* s. str.


**Herbarium specimens of *Sempervivum marmoreum* s. str.**

Living material of *Sempervivum marmoreum* s. str.


**Herbarium specimens of *Sempervivum erythraeum***


**Bosnia and Herzegovina:** Vlašić plateau (bei Travnik), 1700 m (1890 Brandis BRA, 1893 Brandis PRC, 1907 Brandis CL, PR, PRC).


**Greece:** In regione superiori montis Athos, cca 1800–2000 m (1862 Orphanides CL). – Athos, Kerasia – Panagia (1996 Babalonas TAU, no. 968). – Mt. Lailia (Serres), on granite rocks, 1500–1850 m, summit Ali Baba (1850 m), Katiga (1520 m) (1964 Voliotis TAU).

**Living material of *Sempervivum erythraeum***
