

The moss *Schistidium chalubinskii* spec. nov. in Slovakia

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In 1936 when I collected in the Malá Fatra Mts in Slovakia a tiny, slim moss belonging to the *Grimmia* - *Schistidium* Genera I couldn't deal with it, but I knew it must have been some little known or even new species. Over my further research and during a long time I paid particular attention to this species. More discoveries came and I found that it is a strongly calcifilous species, occupying mountainous or high - altitude levels. I have never found it on granite bedrock. Over my long life I have collected it in 33 locations and I have gathered 74 specimens. It is unusual that this species has been collected only by myself. It is not reported by Limpricht, Györfy, Boros, Czerkawski, Greschik, Haszlinzski, Juratzka, Kruppa, Rehmann, Šmarda, Suza, or in the monograph of Czechoslovak species of *Schistidium* Genera Vilhelm, Zmuda. None of the recent bryologists have collected it. No specimen in their collections is found. Searching in the European and North-American literature has led to perception that these plants really belong to *Grimmia* - *Schistidium* Genera and obscurely the names *tenerum* or *tenerrimum* are used.

I have found the first information on the occurrence of this species in Europe in the work of Nees, Hornschuch and Sturm (1827). They describe the variation of the species *Grimmia apocarpa* B.S.G. and introduced 19 varieties in an old-fashioned description, restricted to macroscopical features and only rarely described signs observed by magnifying glass. Except for previous known varieties all the others are new. These morphological variants have not been later accepted, because they were merely forms or modifications. My attention was caught by the variety of *tenerrima* Nees, Hornsch. et Sturm, widely described as follows:

Die Stämchen 6-8''' (13-14.5 mm) hoch, sehr schlank ästig, unten nackt, nach oben dicht beblättert. Die Blätter gedrängt, aufrecht abstehend, ei-lanzettförmig, hohl, ganzrandig, der Rand eingeschlagen, häufig mit einer sehr kurzen haarförmigen Spitze, gewöhnlich rostbraun: der Nerv auslaufend, stark. Die Hüllblätter noch einmal so gross als die Stengelblätter, länglich, fast scheidenförmig länger behaart. Die Frucht ursprünglich gipfelständig, aber später durch sehr kurze Schösslinge seitlich gestellt, oft mehrere über einander. Das Scheidchen sehr kurz, stumpf, mit vielen vertrockneten Griffeln besetzt und deshalb sehr rauch. Der Fruchtsiel kaum so lang als die Kapsel, aufrecht, gelb. Die Kapsel fast walzenförmig. Das Deckelchen fast flach mit einer kurzen pfriemenförmigen, sehr schiefen Spitze.

Beide Formen wachsen auf Felsblöcken der höchsten Alpen, um Heiligenblut (Hornsch.) auf den Wilkrachkogel in der Gastein (Funck).

The majority of bryologists later didn't take this variety into consideration, neither did Müller (1849), Bruch, Schimper and Gumbel (1836-55), nor Schimper in the both editions of his book (1860, 1876). Only Hübener (1833) described a new variety var. *alpina* and brought a list of synonyms: var. *nigro-viridis* Nees et al., var. *nana* Nees et al., var. *robusta* Nees et al., and var. *tenerrima* Nees et al. All the varieties are characterized by description relating mostly to sporophyte, the other signs are left. With respect to detail description it is deduced that the author has seen the plants. Well known locations are Heiligenblut and Wilkrachkogel.

With respect to the fact that I had only sterile plants and the description of other organs was different, I didn't include my plants with this variety.

In 1876, Zetterstedt described a new species *Grimmia tenera* Zett. from the northeast part of Norway. The species is described as follows:

Caules dense caespitiosi, parum cohaerentes, pollicares et ultra tenerrimi, fastigiato-ramosi nonnumquam subsimplices. Folia sicca appressa, madida patentia, brevia, triangulari - ovata, acuta 1. acuminata, margine revoluta praesertim superiora, inferiora mutica, superiora brevipila. Omnia minutissime reticulata.

In fissuris rupium prope mare, sat raro ut videtur: Alten, Talvig.

In the description, the species is compared with *Grimmia funalis* and *Grimmia conferta* and apparent slightness is stressed. The bedrock is not reported, but it is known to me that it is the question of crystalline bedrock. Formerly Lindberg (1865) described var. *filiformis* Lindb. from Spitsbergen.

Limpricht (1890) both the taxons characterises: Sehr formenreich. Auf die fadenförmigen, kleinsten Formen var. *filiformis* Lindb., var. *tenerrima* (Br. germ.) Chalub. ist *Grimmia tenera* Zett. gegründet.

Limpricht joined both varieties together without seeing the originals. His authority caused both the varieties to be considered the same. Roth (1904) collected near Laubach on sunny basalt rocks a strange variety of *Schistidium apocarpum* that in his opinion coincides with the description in Bryol. germ. as well as with the description of Chalubinski (1882) and upgraded it to "species" despite the fact that this lowland form couldn't be identical with the mountainous variety published in Bryol. germ. or that described by Chalubinski (1882). Only Mönkemeyer (1927) described this form reported as *Grimmia apocarpa* f. *tenerrima* Chalub. from higher sunny habitats. The species *Grimmia tenera* doesn't report from Europa on the whole. In the meantime, the species *Grimmia tenera* was found in North America together with *Grimmia tenuicaulis* Will. Kindberg (1903) pointed at apparent similarity of American species. This fact has been later confirmed by Persson and

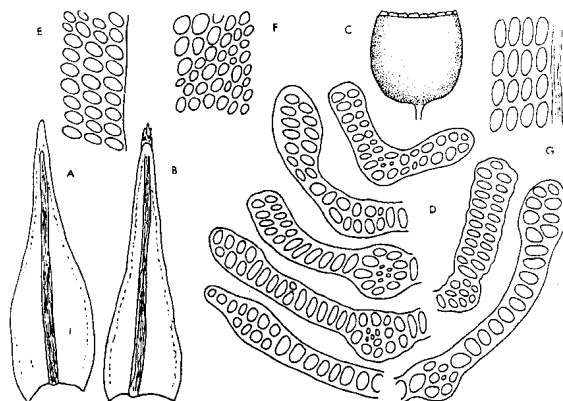


Fig. 1. *Schistidium chalubinski*, spec. nov. A - stem leaf; B - upper stem leaf; C - capsule; D - sections of leaf; E - basal marginal cells; F - mid-leaf cells; G - basal cells near nerve.

Gjaervoll (1957). The number of locations in America have been increasing, while in Europe none have been reported found.

Jones (1934) reported all the varieties involved in the species *Grimmia apocarpa* var. *tenerrima*. Currently they are known in many states in the USA.

Loeske (1913) in his monography of the family Grimmiaceae reported *Schistidium apocarpum* var. *tenerrimum* Br. germ. f. *tenerrima* Chalub. from the Tatras and The Alps and compared it with the other forms, but only on the basis of description, he couldn't have seen the originals. The synonyms are reported obscure, in his next monography (Loeske 1930). The reason is that he hadn't seen the original and the plants hadn't been rediscovered. The situation was complicated but solved by Chalubinski (1882). At that time the detailed monography of the Tatra species of the family Grimmiaceae was published. This talented bryologist has written his monography with subtitle "Ex autopsyia descripsit et adumbravit". Essentially he followed Schimper (1876), but all his descriptions are based on his own collections. The species *Grimmia apocarpa* has taken three pages. On the page 21 is variation discussed. He admitted only 6 forms (varieties):

Form (I) *vulgaris*. This form is in detail described in Latin, microscopical and anatomical features are shown.

Form (II) *gracilis* (*Grimmia gracilis* Schw.).

Form (IV) *rivularis* (*Grimmia alpicola* var. *rivularis* Whlbg. ex parte).

Form (V) *alpicola* (ex parte form *latifolia* Zett. et *Grimmia conferta* Zett. var. *rivularis* Whlbg.).

Form (VI) *conferta* (*Grimmia conferta* Zett., *Grimmia pulvinata* Sw, ex parte *Grimmia conferta* Fk.).

The most interesting for us is the form (III) *tenerrima*. This is described as follows: "Humilis, caespites densi facillime secedentes, fusco nigricantes. Caulis 1.5 - 2.5 ctm longus, erectus vel arcuatim ascendens, gracilis, basi subnudus, inferne parce, ascendendo dense, subfasciculatim ramosus. Ramis gracilibus et gracillimis, plerumque aliis sat longe sterilibus, aliis vero plures thacas vel flores male ex uno latere gerentibus. Quoties enim sterilis ille ramulus nonnisi ex apice innovatur, toties alter apice florem male vel female fert, ex cujus basi innovatio orta ramum continuat, flores autem vel fructus laterati fiunt, ac superpositi pro more numerosi. Folia saepe (non tamen semper) apice nigrescentia inferne fusca; madore erectopatula, sicca laxe imbricata, sat angusta maxime latit. ad longit 1:2.5 - 1:3, mutica vel

superiora pilo brevissimo stipata. Margine superne valde incrassato (saepius uno latere 3-4 seriatim, altero biseriatis bistratoso); lamina caeterum rarissime aliquot cellulis duplicata. Cellulae minutae, valde incrassatae. Folia perichaetia interna minora, angustiora, plerumque sublineari - oblonga. Theca brevis subglobosa, evacuata ore dilatato; operculo rostrato, rostro vix obliquato. Dentes purpureo - rufi, irregulariter et parce rimosi.

Giewont nad szczybą aż do szczytów, nad Mala Laka pod Malym Giewontem (Chalubinski 1882).

Remarkable is the footnote "Conseruo nomen Bryol. Germanicae, siquidem planta paucis notis exceptis (theca subglobosa nec subcylindrica) proxime ad var. *tenerrima* H. et H. accedit. He might not have been convinced that his plants are coincided with those of Nees's.

Roth (1904) upgraded this variety to species, as the author of basionym is introduced Chalubinsky, despite the fact that Chalubinski (1882) as authors introduced Nees et Hornsch. (Nees et al. 1827). In the case when variety is upgraded, this procedure should be accepted. He hadn't seen Chalubinski's plants, his new species was defined by extensive description, based not on typus, but on plants collected in Hessen near town of Laubach and following synonyma are added: *Grimmia apocarpa* var. Chalub. 1882; *Schistidium basalticum* Rth. in litt. 1902; vielleicht auch identisch mit *Grimmia apocarpa* var. *filiformis* Lindb. und *Grimmia tenera* Zett. 1979. In this way two species have been mixed together, limestone bedrock of Chalubinski's plants have been underestimated and their occurrence in high altitude level. His description is similar to earlier plants described by Warnstorf (1906) as *Grimmia apocarpa* var. *pumila* (Schimper) Warnstorf 1906.

This Roth's species has been forgotten without any response. Mönkemeyer (1927) this species ignores and introduces only *Grimmia apocarpa* fo. *tenerrima* Chalub.

There is no mention about Chalubinski's plants in Hungarian literature despite the fact that there is a lot of Hungarian work. There is only one notice in Czech literature reported by Podpěra (1905) on *Schistidium apocarpum* var. *subalpinum* Podp., that is described and there is a supplement: "Mönkemeyer, who has seen these plants, has come to the opinion that this species might have been identical with *Schistidium tenerrimum* (Chalub.) Roth. I can't deny close the relation of these forms, but I can't firmly decide to coincide them." Podpěra (1906) in page 57 introduces *Schistidium tenerrimum* (Chalub.) Roth as follows: "The Carpathian Mountains, on sunny sandstone rocks in Czernava near Rajnochovice in Czech Republic, abundant". I have made a revision and found that they are tidy, slim forms of *Schistidium apocarpum* var. *pumilum* (Schimp.) Warnst.

Vilhelm (1923) elaborated in his monography all the species of the family Grimmiaceae but there is no information on the taxon *Schistidium* (*Grimmia*) *tenera* or *tenerrima*. Only Vilhelm (1923) reports *Schistidium apocarpum* subsp. *tenerrimum* and continues: "According to Podpěra (1905) this subspecies is the finest form of the polymorphic species *Schistidium apocarpum* growing on sunny sandstone rocks and creating easy crumbling tufts, xerophyte." So, no one belongs to Chalubinski's plants but to species *Schistidium tenerrimum* (Chalub.) Roth.

Šmarda (1948) reported *Grimmia apocarpa* var. *tenerrima* from the East Carpathian Mts. (Ukraine), from Pietros, leg. Hiltzer.

Podpěra (1954) admitted *Schistidium apocarpum* var. *tenerimum* Limpr. (*Grimmia apocarpa* var. *tenerima* Chalub., *Schistidium apocarpum* subsp. *tenerimum* Amann) and *Schistidium apocarpum* var. *tenera* (Zett.) Conard et Hagen (*Grimmia conferta* var. *tenera* Kindb., *Grimmia apocarpa* var. *tenera* Müller).

It's no use to name all the bryologists dealing with the names *tenerum* or *tenerimum*. In the USA this species is considered as well defined [Ireland (1964)], but there is a call for revision of Central European or Carpathian plants respectively that coincide only with Chalubinski's (1882) plants and that are reported by Roth as *Schistidium tenerimum* (Chalub.) Roth nom. nec descr. This Roth's species is dubious. Here is a notice from page 395: "Gez. und beschrieben nach dahier bei Laubach gesammelten Expl. Lässt sich beim Sammeln von an derselben wachsenden ähnlich Formen des *Schistidium apocarpum* durch das blutrope Peristom und die dunkleren, fast schwarzen, dicht polsterförmigen Rasen leicht unterscheiden, zumal letzteres ein mehr gelbrotes Peristom besitzt." There is no mention about apparently thickened leaf margin, only in diagnosis is told: "Lamina aufwärts am Rand in 1 - 3 Zellreihen doppelschichtig", while the Chalubinski's plants are in several rows from base two stratose at margin, the cells are more pellucid and more thickened. The cells of the Chalubinski's plants are not apparently sinuose, only strongly thickened. From twelve currently legitimated species of the *Schistidium* Genera bistratose leaf margin is known only for *Schistidium rivulare* (Brid.) Podp.

Bremer (1980) made a thorough revision of *Schistidium* Genera. *Schistidium tenerum* (Zett.) Nyh. considered as a well defined species and published its geographical distribution in North America, Europe and north Asia, while *Grimmia apocarpa* var. *tenerima* Nees et al. 1827 with synonyma *Grimmia apocarpa* var. *alpina* Hüb. nom. superfl. 1833, *Schistidium tenerimum* (Nees et al.) Roth

1904, *Schistidium basalticum* Roth, as regards to the types Heiligenblut (collected by Hornschuch) and Wildkrachkogel (collected by Funck) he hasn't seen.

On the basis of the world literature studied about the species with the above mentioned epitheta and on the basis of the specimens collected and compared with the only herbarium specimen I have recognized *Schistidium tenerum* Zett. and *Schistidium chalubinski* sp. nov. as well defined species from a taxonomical point of view with their own areal and bedrock.

Schistidium chalubinski spec. nov.

Original diagnosis on page 53.

Basionym *Grimmia apocarpa* var. *tenerima* Chalub. non Nees et al.

Holotype: Poland, The Polish Tatras, Giewont Mt., leg. Chalubinski. Unfortunately the original was burnt by the fire in Zakopane.

Neotype: Poland, The Polish Tatras, Giewont Mt, top rocks, e loco clasico, leg. Z. Pilous, 1961.

Description: Small tufted plants, tufts in area of 1 cm², rarely larger. Plants to 5 - 10 mm, rarely higher, dark brown to black, sometimes greenish above, shoots 0.3 mm wide when dry, leaves regularly, loosely appressed when dry, erecto - patent when moist, slightly deccurent, 0.8 (0.7 - 0.9) mm long, widest in the middle (0.29 - 0.35 mm), from ovate base lanceolate, cucullate above, margin plane, apex obtuse. Upper and perichaetial leaves with short, about 0.11 mm denticulate hair - point. Below 2 marginal rows of cells, above up to 8 rows and more incrassate and pellucid. Lamina below unistratose, above bistratose, dark and opaque, rarely with 1 - 2 bistratose belts running down nearly to base. Cells below small, pellucid, regularly quadrate, mixed with transversal, incrassate, basal cells shorter, marginal transversal. Upper cells more incrassate, smaller, quadrate (0.11 mm),

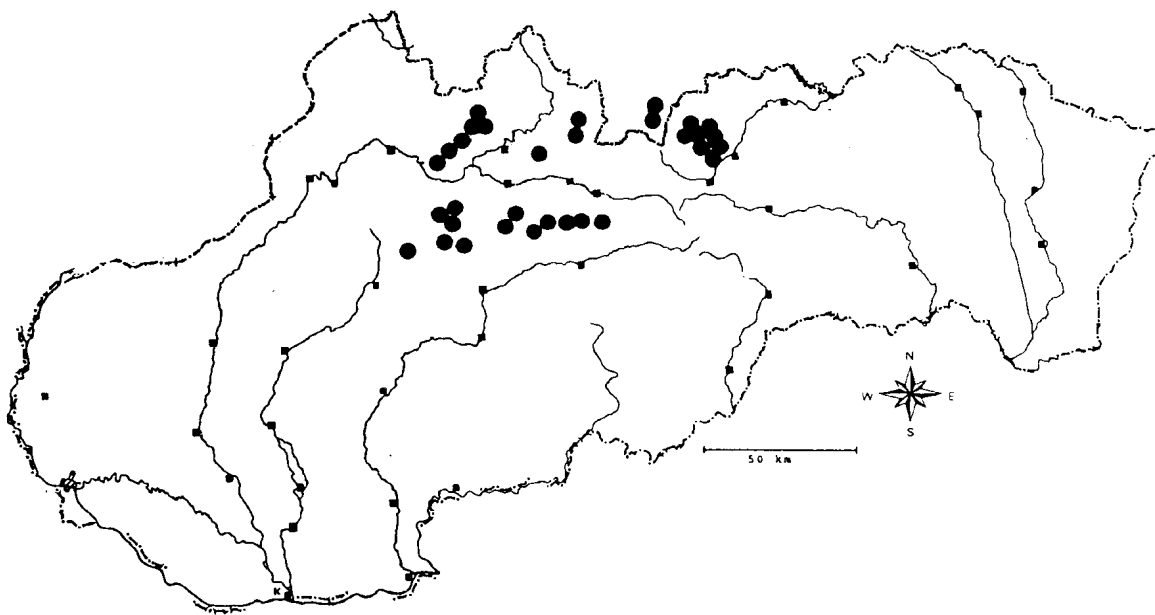


Fig. 2. Distribution of *Schistidium chalubinski* in the Carpathians.

irregularly mixed with ovoid or triangular. Nerve ending in apex, brown, faint below, stronger above, 0.35 - 0.41 mm wide in the leaf middle, on dorsal side slightly prominent. Autoecious. (Internal perichaetial leaves smaller, external linear - oblong. Capsule nearly globose, mouth widen after dehiscence, lid with slightly curved beak, peristome brownish red, irregularly partly devided - according to Chalubinski, I have never seen fertile plants).

Exsiccati: Pilous, Musci čechoslovenici exsiccati (sub *Schistidium teretinervis* Limpr.) 1341, 1349.

Survey of all locations known

Poland:

Polish Tatra Mts: Giewont, Mala Laka, leg. Chalubinski; Giewont, loco classico, 1961, leg. Pilous.

Slovakia:

Západné Tatry Mts.: Osobitá, 1947, leg. Pilous;

Chočské pohorie Mts.: Choč, 1950, leg. Pilous (2 spec.);

Malá Fatra Mts.: Klak, 1954, leg. Pilous (4 spec.);

Rozsutec, 1972, leg. Pilous (7 spec.); Suchá, 1951,

1954, leg. Pilous (3 spec.); Fatranský Kriváň, 1980, leg.

Pilous (2 spec.); Chleb, 1978, 1980, leg. Pilous (6 spec.);

Malý Rozsutec, 1972, leg. Pilous (2 spec.); Poludňové

skaly, 1970, leg. Pilous;

Veľká Fatra Mts.: Križná, 1963, leg. Pilous (2 spec.);

Čierny kameň, 1952, leg. Pilous (4 spec.); Ostrá, 1976,

leg. Pilous; Kráľova studňa, 1975, leg. Pilous;

Smrekovica, 1976, leg. Pilous;

Nízke Tatry Mts.: Demänovská dolina, 1958, leg. Pilous;

Sinná, 1958, leg. Pilous (3 spec.); Poludnica, 1981, leg.

Pilous; Krakova hola, 1954, 1958, leg. Pilous (6 spec.);

Prednie, 1979, leg. Pilous; Ohnište, 1954, 1970, leg.

Pilous (2 spec.); Salatin, 1948, leg. Pilous (2 spec.);

Ďumbier, 1949, leg. Pilous;

Belianske Tatry Mts.: Skalné vráta, 1950, 1981, leg.

Pilous (4 spec.); Úplazky, 1961, leg. Pilous; Muráň,

1961, leg. Pilous; Nový, 1947, leg. Pilous; Dolina

Nového, 1946, 1961, leg. Pilous (2 spec.); Muráň, top,

1946, 1961, leg. Pilous (2 spec.); Ždiarska Vidla, 1948,

1964, leg. Pilous (2 spec.); Predné Jatky, 1961, leg.

Pilous; Bujačí vrch, 1938, 1954, 1961, leg. Pilous (5

spec.); Hlúpy, 1947, leg. Pilous;

Havran, 1964, leg. Pilous;

Ukraine:

Poloniny Mts.: Pietroš, 1936, leg. Hiltzer.

The bedrock is always created by limestone or dolomites. Plants prefer rock crevices, rock cracks or the surface of vertical karst walls, usually west facing and inaccessible, accompanied by *Grimmia anodon* and *Grimmia tergestina*.

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