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The *Cerastium alpinum* Group *(Caryophyllaceae)* in the High Mountains of Poland and Slovakia

By

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Summary

BOŞCAIU M., MARHOLD K. & EHRENDORFER F. 1997. The *Cerastium alpinum* group (*Caryophyllaceae*) in the high mountains of Poland and Slovakia. – Phyton (Horn, Austria) 37 (1): 1–17. – English with German summary.

The *Cerastium alpinum* group is represented in the Polish and Slovakian West Carpathians by the two closely related species, i.e., *Cerastium alpinum* L. (2n = 72) and *C. eriophorum* KIT. (2n = 36). While *C. alpinum* is confined to a local area on the

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Slovakian and Polish side of Mt. Babia hora (= Mt. Babia góra) in the Západné Beskydy Mts (Beskid Żywiecki Mts in Poland), *C. eriophorum* is wide-spread on mylonitized granite, limestone and dolomite thorough the whole Tatry Mts (including Západné Tatry, Vysoké Tatry and Belianske Tatry Mts in Slovakia and Polish Tatry Mts). *C. alpinum* and *C. eriophorum* differ in chromosome number, pollen and stomata size, micromorphology of trichomes and seeds. Detailed data are given on the synonymy, the coenological affinities, and the distribution of the two taxa in Slovakia and in Poland.

Zusammenfassung

BOŞCAIU M., MARHOLD K. & EHRENDORFER F. 1997. Die *Cerastium alpinum*-Gruppe (*Caryophyllaceae*) in den Gebirgen Polens und der Slowakei. – Phyton (Horn, Austria) 37(1): 1–17. – English mit deutscher Zusammenfassung.

Die *Cerastium alpinum*-Gruppe ist in den polnischen und slowakischen Westkarpaten durch 2 Arten vertreten, nämlich *Cerastium alpinum* L. (2n = 72) und *C. eriophorum* KIT. (2n = 36). Während *C. alpinum* auf ein lokales Areal im slowakisch-polnischen Grenzbereich der Babia hora (= Babia Góra) in den Westlichen Beskiden (Beskid Żywiecki in Polen) beschränkt ist, erscheint *C. eriophorum* auf mylonitisiertem Granit, Kalk und Dolomit weit verbreitet durch die gesamte Tatra (einschließlich West-Tatra, Hohe Tatra und Weiße Tatra in der Slowakei sowie die polnische Tatra). *C. alpinum* und *C. eriophorum* unterscheiden sich in ihrer Chromosomenzahl, in der Größe ihrer Pollenkörner und Stomata sowie in der Mikromorphologie ihrer Trichome und Samen. Synonymie, die zönologischen Affinitäten sowie die Verbreitung der beiden Taxa in der Slowakei und in Polen werden detailliert dargestellt.

1. Introduction

The *Cerastium alpinum* group includes several perennial species from the northern hemisphere. HULTÉN 1956, in one of the most important studies on this group, considered "*C. alpinum* complex" as a chain of nine northern circumpolar species connected not only by hybrids, but also by hybrid swarms: *C. alpinum* L., *C. glabratum* HARTM., *C. arcticum* LANGE, *C. edmondstonii* (WATSON) MURB. & OSTENF., *C. regelii* OSTENF., *C. jenisejense* HULTÉN, *C. beeringianum* CHAM. & SCHLECHT., *C. aleuticum* HULTÉN, *C. fischerianum* SER.

JALAS & al. 1964: 140–141 recognized within *C. alpinum* L., apart from subsp. *glabratum* (HARTM.) Á. LÖVE & D. LÖVE (distributed in northern Europe) and subsp. *squalidum* (LAM.) HULTÉN (confined to the Pyrenees), two other subspecies distributed throughout the area of the species, namely subsp. *alpinum* and subsp. *lanatum* (LAM.) GRAEBN. & CORRENS. Later JALAS & SUOMINEN 1983: 97–98 classified the first of them (subsp. *glabratum*) on the species level, leaving the other three as subspecies. However, JALAS & al. 1993: 170, considered variation within *C. alpinum* even less taxonomically important leaving "plants with dense, lanate, eglandular indumentum" only on the level of variety as var. *lanatum* (LAM.)

HEGETSCHW. HEGI's Illustrierte Flora von Mitteleuropa (FRIEDRICH 1969: 916–917) reported for the Central European area *C. alpinum* subsp. *alpinum* and subsp. *lanatum* (LAM.) GRAEBN. & CORRENS, both distributed throughout the area of the species and with the same chromosome number, 2n = 72.

The distribution area of the *C. alpinum* group in Poland and Slovakia is mostly confined to the Tatry Mts and to Mt. Babia hora (Mt. Babia Góra in Poland), in the Západné Beskydy Mts (Beskid Żywiecki Mts in Poland) both on the Polish-Slovak (former Polish-Czechoslovak) border. Most authors of the Czechoslovak and Polish Floras and identification keys classified populations of the *C. alpinum* group from the Tatry Mts and Mt. Babia hora as two separate taxa on various levels. Plants from the Tatry Mts are reported either as C. *lanatum* LAM. (DOSTÁL 1958, 1989, DOSTÁL & ČERVENKA 1991, KULCZIŃSKI 1921, PAWŁOWSKI 1956) or *C. alpinum* subsp. *lanatum* (LAM.) GRAEBN. & CORRENS. (ZAJĄC 1992), while plants from Mt. Babia hora are either *C. alpinum* L. (DOSTÁL 1958, PAWŁOWSKI 1956) or *C. alpinum* L. subsp. *alpinum* (ZAJĄC 1992), or *C. alpinum* subsp. *babiogorense* ZAPAŁ. (DOSTÁL 1989, DOSTÁL & ČERVENKA 1991), or *C. alpinum* var. *glanduliferum* KOCH (KULCZIŃSKI 1921).

Until recently the *C. alpinum* group have been thought to be represented only by tetraploids in the Alps and the Carpathians (cf. MURÍN & MÁJOVSKÝ 1979: 127, UHRÍKOVÁ & PACLOVÁ 1986: 69, and POGAN & al. 1986: 68). The first diploid chromosome counts from this area were reported by ZELTNER (in FAVARGER 1991) and by STARLINGER & al. 1994. ZELTNER counted 2n = 36 chromosomes in one individual plant from Bucegi Mts (Romania) identifiying it as *C. alpinum* subsp. *lanatum* (LAM.) GRAEBN. & CORRENS and STARLINGER & al. 1994 reported the same diploid number for several individuals from Hăşmaş Mts (Romania) which they identified as *C. laniferum* SCHUR.

The aim of the present paper is a taxonomic reconsideration of the populations of the *C. alpinum* group in Poland and Slovakia in the light of the recent results of BOŞCAIU 1996 and BOŞCAIU & al. (1997). These studies have shown that diploid and tetraploid populations should be treated as separate taxa and after typification of several names published for this group we have coined correct names for them.

2. Materials and Methods

The present study is based on living material collected in the field as well as on the herbarium specimens from the following herbaria (abbreviations according to HOLMGREN & al. 1990): BRA, KRA, KRAM, PR, PRC, SAV, SLO, W, WU.

Several populations of the *C. alpinum* group from the area studied were examined for chromosome numbers, on average 4–5 individuals from each population. For each individual, mitotic chromosomes were obtained from root tip squashes and counted in 4-5 metaphase plates. Roots were obtained either from seedlings,

germinated in Petri dishes from seeds collected in the field, or from transplanted plants grown in the experimental garden of the Institute of Botany, University of Vienna.

The root tips were fixed in glacial acetic acid : ethanol (1:3) after a pretreatment of 2–4 hours in 0.002 M 8-hydroxyquinoline. For staining, the Giemsa standard method was used as recommended by GUERRA 1983. After a 5–10 min wash in distilled water, the root tips were hydrolysed for 20 min in 5 N HCl at room temperature, then transferred to distilled water and squashed in 45% acetic acid on a slide. Coverslips were detached over a cold plate and the slides air dried and stained for 2–7 min with a 4% Giemsa solution. After a short wash in running tap water, the slides were air-dried and finally mounted in Euparal.

Voucher specimens are deposited in the herbarium WU.

Names of vegetation units follow MUCINA & MAGLOCKÝ 1985, GRABHERR & MUCINA 1993, and VALACHOVIČ & al. 1995.

3. Results and Discussion

3.1. Differences Between Diploid *C. eriophorum* and Tetraploid *C. alpinum*

Until recently no diploids were known from the Carpathian and Eastern Alpine area of the *C. alpinum* group, and the decisive morphological differences between those two ploidy levels remained unnoticed. Populations of this species (or group of species) were classified almost entirely according to the indument, attributing "lanate" plants to C. *lanatum* (or subsp. or var. *lanatum*) and "plants not lanate, but with long, soft hairs and sometimes also glandular hairs" to *C. alpinum* (or subsp. or var. *alpinum*). However, BOŞCAIU 1996 showed that diploid (2n = 36) and tetraploid (2n = 72) populations of this group can be identified by a few morphological characters, namely the size of stomata and pollen grains, the length of hairs and the number of their cells on the fertile and sterile branches. Indument characters, namely presence of "lanate" hairs, seem to have much lower taxonomical value. This is described in a more detailed way in the following paragraphs.

3.1.1. Chromosome Numbers

The chromosome numbers counted during the present study are shown in Tab. 1. All our counts from the Tatry Mts (including Vysoké Tatry, Západné Tatry and Belianske Tatry Mts) belong to diploids with 2n = 36. We tried to confirm the only tetraploid report from this area, published by UHRÍKOVÁ & PACLOVÁ 1986: 69 (as C. *lanatum* Lam., from the Vysoké Tatry Mts, "scree below Vyšné Kôprové sedlo"), but repeated analyses of plants from the very the same locality revealed only diploids and we believe that this data should be considered as erroneous.

The population from the Polish and Slovak side of Mt. Babia hora (Babia Góra on the Polish side of the border) have not been karyologically examined during the present study. However, there are two published

reports for this locality, namely 2n = 72 by KUTA (in POGAN & al. 1986: 68, as *C. alpinum* L.) and the same number by MURÍN & MÁJOVSKÝ 1979: 127 (as *C. alpinum* subsp. *babiogorense* ZAPAŁ.).

Table 1

Chromosome numbers of *Cerastium eriophorum* KIT. counted during thepresent study.

Acc. No.	2n	Provenance
93090767	36	Slovakia, Belianske Tatry Mts, Zadné Med'odoly
93090768	36	Slovakia, Belianske Tatry Mts, Mt. Hlúpy
	36	Slovakia, Belianske Tatry Mts (leg. F. Starlinger)
93090769	36	Slovakia, Belianske Tatry Mts, Mt. Zadné Jatky
94090677	36	Slovakia, Západné Tatry Mts, Mt. Osobitá
94090878	36	Slovakia, Vysoké Tatry Mts, Bystré sedlo Saddle
95082080	36	Slovakia, Vysoké Tatry Mts, Vyšné Kôprovské sedlo
95082081	36	Slovakia, Vysoké Tatry Mts, below Vyšné Kôprovské sedlo

3.1.2. Pollen Size

BOŞCAIU 1996 examined the correlation between pollen size and ploidy level in three diploid populations of *C. eriophorum*, and six tetraploid populations of *C. alpinum* from Austria and Romania. From each population an average of 5 individuals was examined, and from each plant the diameters of a minimum of 50 mature pollen grains from different anthers were measured. The arithmetical means of the diploid pollen grains for the individual plants ranged from 31.77 to 38.59 µm and those of tetraploid ones ranged from 39.54 to 46.61 µm.

3.1.3. Stomata Size

The dimension of stomata was studied (BOŞCAIU 1996) on samples of two to five plants from two populations of *C. eriophorum* and five populations of C. *alpinum*, again from Romania and Austria. 30 stomata were measured on each plant on the leaves situated one internode below the inflorescence. The stomata lengths of the 2x individuals ranged from 29.47 to 33.11 µm and those of 4x individuals from 34.09 to 42.43 µm.

3.1.4. Trichomes

Two types of eglandular hairs were found (BOŞCAIU 1996) on specimens of *C. eriophorum* and *C. alpinum*, long hairs with a large variability in size, and short ones, which were more constant in length, 0.05–0.3 mm long and with 2–4 cells. The density and length of longer eglandular hairs and the number of cells per hair are important characters for the delimitation of *C. eriophorum* from the "lanate" populations of C. *alpinum*. In *C. eriophorum* the hair length varies from 1.9 to 3.9 mm on the flowering

stems and from 2.6 to 5.8 mm on the vegetative shoots, while in *C. alpinum* the variation is from 0.4 to 2.8 mm on the flowering stems and 1.2 to 4.2 mm on vegetative shoots. The number of hair cells is also different in the two taxa: 6–14 on the flowering stems and 9–18 on the vegetative shoots for *C. eriophorum* and 5–10 and 5–14, respectively, for *C. alpinum*.

3.1.5. Seeds

There is a difference in the size of tubercles on the seeds of diploids and tetraploids. In *C. eriophorum* marginal tubercles are conical, prickly, 60–80 μm high and 80–100 μm wide at the base; the lateral tubercles are stelliform, except the central ones which are elliptic, up to 40–50 μm high and 90–100 mm in diameter, forming ridges 40–60 μm long and 10–25 μm wide (Fig. 1A, C, E). In *C. alpinum* marginal tubercles are rounded with the apex blunted, 60–70 μm high and 40–70 μm wide at the base; the lateral ones are elliptic, 20–35 μm high and 60–90 μm in diameter, forming ridges 10–35 μm long and 8–14 μm wide (Fig. 1B, D, F).

3.2. Ecological Differentiations

Diploid *C. eriophorum* and tetraploid *C. alpinum* occur in the West Carpathians under slightly different ecological conditions.

C. eriophorum in the Tatry Mts occurs generally in communities of the Juncetea trifidi (on mylonitised granite) and the Elyno-Seslerietea (on limestone and dolomite).

Table 2

A list of vegetation units with recorded occurrence of *Cerastium eriophorumon* the mylonitised granite in the West Carpathians. (1) KRAJINA 1933a: 14–15, 54–55, 62–63, 70–71, 818–819; (2) HADAČ 1956: 29; (3) KOMÁRKOVÁ 1964: tab. 15; (4) PAWŁOWSKI & al. 1928: tab 5; (5) DOMIN 1930: 189; (6) HRABOVCOVÁ 1976: tab. 8; (7) KRAJINA 1933b: 183–184.

Juncetea trifidi HADAČ in KLIKA & HADAČ 1944
- Caricetalia curvulae BR.-BL. in BR.-BL. & JENNY 1926
  - Festucion versicoloris KRAJ. 1933
    - Pediculari oederi-Festucetum versicoloris (KRAJ. 1933) DÚBRAVCOVÁ in MUCINA & MAGLOCKÝ 1985 (= "Festucetum versicoloris graniticum") (1, 2, 3)
    - Agrostidetum alpinae KRAJ. 1933 (1)
    - Silenetum noricae KRAJ. 1933 (1)
    - "Versicoloreto-Agrostidetum alpinae" PAWŁOWSKI & al. 1928 (4)
  - Juncion trifidi KRAJ. 1933
    - Seslerietum distichae KRAJ. 1933 (1)

Thlaspietea rotundifolii BR.-BL. 1948
- Androsacetalia alpinae BR.-BL. in BR.-BL. & JENNY 1926
  - Androsacion alpinae BR.-BL. in BR.-BL. & JENNY 1926
    - Oxyrio digynae-Saxifragetum carpaticae PAWŁOWSKI & al. 1928 (1, 5, 6, 7)

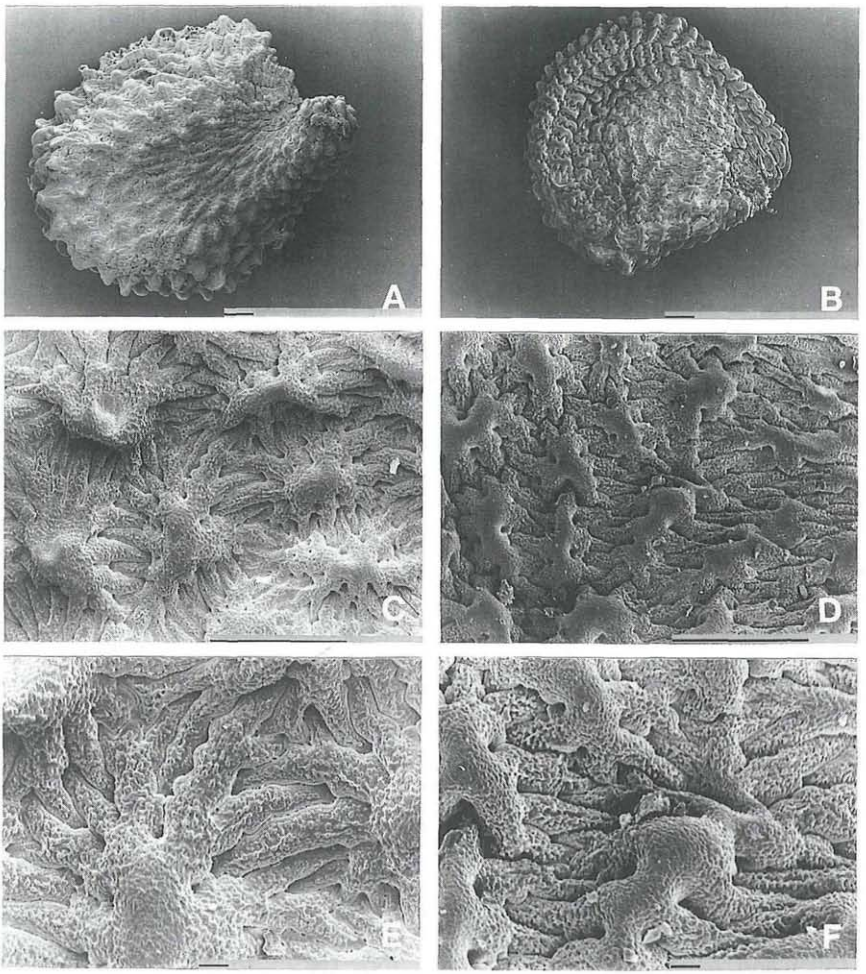

Fig. 1. Seeds of *Cerastium eriophorum* (A, C, E) and *C. alpinum* (B, D, F). Bars A–D= 100 µm, E–F = 10 µm.

A list of the vegetation units with recorded occurrence of *C. eriophorum* on mylonitised granite is presented in Tab. 2. The most typical communities for *C. eriophorum* on this substrate are those of the Festucion versicoloris, and among them probably the Pediculari oederi-Festucetum versicoloris. The later is the community occupying stabilized soils, while the Agrostidetum alpinae is a community of steep rock faces, and the Silenetum noricae occurs on the mylonite screes. The Oxyrio digynae-Saxifragetum carpaticae (Thlaspietea rotundifolii) is a pioneer community of the wet mylonite screes, slightly chionophile, and very rich in species.

A list of the vegetation units with recorded occurrence of *C. eriophorum* on limestone and dolomite is presented in Tab. 3. On such substrate this species most typically occurs in the Dryado-Caricetum firmae and the communities of the Seslerion tatrae. The Dryado-Caricetum firmae is a unit characterized by a mosaic of patches of *Carex firma, Dryas octopetala* or *Festuca versicolor*. It is a community of steep slopes. The Seslerion tatrae, represented for instance by the Seslerio tatrae-Festucetum versicoloris forms stands in open places, except for screes. The Salicetum reticulatae is a vicarious community to the Oxyrio digynae-Saxifragetum carpaticae on limestones and dolomites. It is a pioneer community occupying rather wet and snow rich habitats. On the other hand, the Drabo tomentosae-Artemisietum petrosae is a community of shallow rock fissures filled with a very limited amount of humus.

The coenological affinities of *C. alpinum* on Mt. Babia hora can be illustrated by four relevés of the community of *Festuca supina* and *Juncus trifidus* ["Trifidi-Supinetum", at present classified as the Juncetum trifidi SZAFER & al. 1923 em. KRAJ. 1933 festucetosum supinae (SILL. 1933) DÚBRAVCOVÁ 1985], published by WALAS 1933: tab. 4, belonging to the Juncion trifidi. WALAS classified *C. alpinum* as a character-species of this community, together with *Festuca supina*, *Juncus trifidus*, *Hieracium alpinum*, and *Pulsatilla alba*. The "Trifidi-Supinetum" occurs in bouldery habitats in the uppermost part of Mt. Babia hora (further data about this locality are provided by PARUSEL 1993).

C. alpinum grows in the alpine belt on the summit of Mt. Babia hora on mostly fine to medium granulated grey sandstones with a certain amount of Ca^{2+}. On the other hand *C. eriophorum* occurs in the subalpine and alpine belts (only rarely at lower altitudes), either on limestone and dolomite (Polish Tatry, Belianske Tatry, and Západné Tatry Mts), or on quartzite ("Rendy" in the Belianske Tatry Mts), or on weathered, mylonitised granite, showing a considerably high concentration of calcium ions (Vysoké Tatry, and Západné Tatry Mts). It is supported by soils covering at least slightly basiphilous rocks and does not grow on compact granite.

3.3. Taxonomical Conclusions

As diploids and tetraploids not only differ in their morphology, but also occupy at least partially different areas and have slightly different ecology, it is logicalto keep them as separate species. BOŞCAIU & al. (in press) typified several names published for this group. These typifications show that (1) the correct name for the diploid populations of the *C. alpinum* group is *C. eriophorum* KIT.; (2) the name *C. lanatum* LAM. has to be applied only to strongly hairy forms of the tetraploid *C. alpinum* L. and not the diploid *C. eriophorum* KIT. JONSELL & JARVIS 1994 lectotypified the name *C. alpinum* L. by a plant originating from Lapland, where only tetraploids are known, and thus *C. alpinum* is the correct name for the tetraploids on the level of species.

Table 3

A list of vegetation units with recorded occurrence of *Cerastium eriophorum* on the limestone and dolomite in the West Carpathians. (5) DOMIN 1930: 14–15; (8) BĚLOHLÁVKOVÁ & FIŠEROVÁ 1978: 110–111; (9) DOMIN 1926: 169; (10) PAWŁOWSKI & STECKI 1927: tab. 2, 4; (11) PAWŁOWSKI 1935: tab. 1; (12) MARHOLD & VALACHOVIČ 1990: 437; VALACHOVIČ 1992: tab. 2.

Elyno-Seslerietea BR.-BL. 1948
Seslerietalia calcariae BR.-BL. & JENNY 1926
Caricion firmae GAMS 1936
Dryado-Caricetum firmae SILL. 1933 ("Dryadeto-Firmetum") (8)
Saxifrago caesiae-Caricetum firmae (SZAFER & al. 1923) HADAČ in MUCINA & MAGLOCKÝ 1985 ("Caricetum firmae") (9, 10)
Mulgedio-Aconitetea HADAČ & KLIKA in KLIKA & HADAČ 1944
Seslerietalia tatrae HADAČ 1962
Seslerion tatrae HADAČ 1962
Seslerio tatrae-Festucetum versicoloris (SZAFER & al. 1923) MUCINA & PETRÍK in MUCINA & MAGLOCKÝ 1985 ("Varietum tatricum"; "Versicoloretum tatricum") (10, 11)
Juncetea trifidi HADAČ in KLIKA & HADAČ 1944
Caricetalia curvulae BR.-BL. in BR.-BL. & JENNY 1926
Juncion trifidi KRAJ. 1933
Juncetum trifidi SZAFER & al. 1923 em. KRAJ. 1933 ("Trifido-Distichetum") (11)
Asplenietea trichomanis (BR.-BL. in MEIER & BR.-BL. 1934) OBERD. in OBERD. & al. 1977
Potentilletalia caulescentis BR.-BL. in BR.-BL. & JENNY 1926
Potentillion caulescentis BR.-BL. in BR.-BL. & JENNY 1926
Drabo tomentosae-Artemisietum petrosae BR.-BL. ex ŠMARDA & al. 1971 (12)
Thlaspietea rotundifolii BR.-BL. 1948
Thlaspietalia rotundifolii BR.-BL. in BR.-BL. & JENNY 1926
Thlaspion rotundifolii BR.-BL. in BR.-BL. & JENNY 1926
Cerastietum tatrae HADAČ & al. ex HADAČ 1985 (13)
Arabidetalia coeruleae Rübel ex BR.-BL. & JENNY 1926
Arabidion coeruleae BR.-BL. in BR.-BL. & JENNY 1926
Salicetum reticulatae SZAFER & al. 1927 ("Salicetum reticulata emuscosum") (5)

Several infraspecific taxa of the *C. alpinum* group were described according to the presence or absence of glandular hairs. We share the opinion of MÖSCHL 1973 that this character is highly variable (as in other *Cerastia* or *Alsinoideae*) and can not offer a reliable basis for the differentiation of subspecies or varieties. Intensively glandular populations from Mt. Babia Góra in Poland were described as *C. alpinum* subsp. *babiogorense* ZAPAŁ. and this name was maintaned by many, especially Czech, Slovak and Polish authors (e. g. CHRTEK 1966, MÁJOVSKÝ & al. 1987). There are also other taxa based on the presence of glandular hairs from

other parts of the distribution area of the *C. alpinum* group, e.g. *C. squalidum* RAMOND [= *C. alpinum* subsp. *squalidum* (RAMOND) HULTÉN], *C. alpinum* var. *glanduliferum* KOCH, and *C. alpinum* var. *nevadense* PAU. As in the case of subsp. *babiogorense* they refer to the tetraploids and we believe that they should be considered as synonyms of *C. alpinum* s. str.

These conclusions can be presented in a formal way as follows:

3.3.1. *C. eriophorum* KIT. in SCHULT., Österr. Fl. 1, ed. 2: 694 (1814)

Ind. loc.: "Auf den Alpen der Tatra".

Neotype (designated by BOŞCAIU & al. 1997): In summis alpibus Scepusii [leg. KITAIBEL] Augusto (BP, Herbarium Kitaibelianum, Fasc. XIII., no. 365).

= *C. villosum* BAUMG., Enum. Stirp. Transsilvaniae: 424 (1816).

Ind. loc.: "In summis alpium jugis Butschetsch et Dscheameanie".

Neotype (designated by BOŞCAIU & al. 1997): In alpibus rupestribus Burzenßibus, vel Schuler Gebirge, 8–1827 [leg. BAUMGARTEN] (CL, Herbarium Baumgartenianum, no. 6128).

≡ *C. alpinum* subsp. *lanatum* var. *villosum* (BAUMG.) GRAEBN. & CORRENS in ASCH. & GRAEBN., Syn. Mitteleur. Fl. 5 (1): 619 (1917).

= *C. tatrense* ZAPAŁ., Consp. Fl. Galic. Crit. 3: 97–98 (1911) (pro hybr.).

Ind. loc.: "In Tatris: Czerwony Wierch-Giewont (JABŁOŃSKI)".

Holotype: Tatry – Czerwony Wierch Giewont, [W.] JABŁOŃSKI, 23. 7. 1862 (KRAM, no. 105907; 97.1440).

– *Cerastium lanatum* auct. non LAM.: POLÍVKA, DOMIN & PODPĚRA 1928, KULCZYŃSKI 1921, DOSTÁL 1958, 1989, & ČERVENKA 1991, PAWŁOWSKI 1956.

– *Cerastium alpinum* subsp. *lanatum* auct. non (LAM.) GRAEBN. & CORRENS: ZAJĄC 1992.

– *Cerastium alpinum* var. *lanatum* auct. non (LAM.) HEGETSCHW.: DOSTÁL 1954.

– *Cerastium alpinum* subsp. kochii auct. non WETTST.: DOSTÁL 1948.

Description: Perennial plants forming loose caespitose cushions, with ascendent or erect floral stems, usually branched, 5–20 cm high, with the upper internode of 10–40(–50) mm. Stems at base with short sterile shoots with rosulate, woolly leaves. Whole plant, including sepals, densely felted with a compact, lanate indumentum of simple, long and entangled hairs; shorter glandular trichomes also frequent; general aspect of plant white-silverish, sometimes yellowish-glutinous.

Leaves on the floral stems (5–)7–15 × 3–5 mm, ovate or oblong lanceolate, with acute or obtuse apex, covered by curly, entangled simple hairs (2.2–4.5 mm long), sometimes also by shorter (0.1–0.2 mm) glandular hairs; simple hairs longer at the apex and on the margin of the leaves (3.8–

4.5 mm). Leaves on vegetative shoots shorter (4–11 × 3-5 mm), compact imbricated and all (also the mature ones) covered by a persistent indumentum of long (3.8–5.8 mm), curly and entangled hairs; hairs thin-walled, air-filled and therefore, shiny, lanate, multicellular (up to 18 cells).

Flowers (1) 3–8 grouped in dichasia. Lower bracts 5–11 × 3–6 mm, mostly herbaceous; upper bracts 4–8 × 3–6 mm, with a scarious apex. Pedicels (7–)10–25 mm long, covered by simple hairs (0.5–1.2 mm) and often also by glandular ones (0.2–0.6 mm). Sepals (3–)5–8 × 2–3 mm long, ovate-lanceolate, acute, square based, with scarious margins of 0.6–0.7 mm and covered by simple (0.7–1.7 mm) and sometimes glandular hairs (0.2–0.7 mm). Petals 12–14 mm, twice as long as the sepals, deeply bifid.

Capsules (10–)12–14 mm long, cylindrical, sometimes narrowed in the upper part, with 10 revolute teeth of 1.2–1.4 mm. Seeds 1.3–1.5 mm in diameter, round shaped, covered by scattered acute, 60–80 μm high tubercles.

A diploid species with 2n = 2x = 36 chromosomes.

General distribution: *C. eriophorum* is a mountain species, distributed in the SE. and C. Europe. The western limit of its distribution area is found in the Eastern Alps, in the Niedere Tauern and Gurktaler Alpen. Further it occurs in the West Carpathians. It is frequent in Romania, in the Eastern and South Carpathians. This species is also spread throughout the Balkan Peninsula, namely in Bulgaria, Serbia, Bosnia-Hercegovina, Macedonia and Albania.

Distribution in Poland and Slovakia: It is widely distributed in the Belianske Tatry, Západné Tatry, and Vysoké Tatry Mts in Slovakia and the Tatry Mts in Poland on the limestone, dolomite, quartzite, and mylonite. Two localities are also documented from the Polish Wzniesienie Gubałowskie Mts, a mountain range close to the Tatry Mts, from rather low altitudes (approximately 650–800 m a.s.l.) where the plants were reported from gravel terraces of the rivers Czarny Dunajec and Białka. This strongly suggests that propagules of the plants were washed down by rivers from their original localities at higher altitudes of the neighbouring Tatry Mts. There are several data in the literature concerning the occurrence of "*C. alpinum*" or "*C. lanatum*" on Mt. Choč in the Chočské vrchy Mts in Slovakia [e.g. SZONTAGH 1863: 1089, WETSCHKY 1872: 321, PAX 1908: 151, BORZA 1913: 52 (cites SCHÖBEL's specimen), DOMIN 1922: 199 (repeats data of PAX only), NOVÁK 1954: 375], but no herbarium specimens from this area have been seen by the present authors.

Altitudinal distribution: Minimal altitude: 1140 m a.s.l., Belianske Tatry Mts, Mt. Ždiarska Vidla (1925 KRAJINA, PRC); in the Wzniesienie Gubałowskie Mts also at 650–800 m, but these localities have apparently secondary character. Maximal altitude: 2530 m a.s.l., Vysoké Tatry Mts, Mt. L'adový štít, PACLOVÁ 1977: 204.

Specimina visa selecta:

Slovakia: Západné Tatry Mts: Mt. Osobitá (1925 J. DOSTÁL PRC, 1941 J. FUTÁK SLO, 1978 D. BERNÁTOVÁ BRA). – Between Mts Volovec and Predný úplaz (1926 J. DOSTÁL PRC). – Below Mt. Ostrý Roháč (1938 M. DEYL PR). – Near the Horné Roháčske pleso Lake (1931 J. DOSTÁL PRC). – Above the Dolné Roháčske pleso Lake (1928 J. DOSTÁL PRC). – Smutná dolina Valley, below Mt. Plačlivô (1926 J. DOSTÁL PRC). – Mt. Hrubý vrch (1928 J. DOSTÁL PRC). – Račková dolina Valley, Mt. Jakubina (1931 J. DOSTÁL PRC). – Červené vrchy Mts, Mt. Kopa Kondračka (1930 J. DOSTÁL PRC). – Červené vrchy Mts, between Mt Kopa Kondračka and Mt. Małołaczniak (1957 K. KOSTRAKIEWICZ KRAM), Červené vrchy Mts, Javorové skalky (1930 J. DOSTÁL PRC). Vysoké Tatry Mts: Between Mts Kriváň and Krátka (1938 J. DOSTÁL PR). – Mt. Kriváň, near the Zelené pleso Lake (1925 F. WEBER PR). – Hlinská dolina Valley (1925 F. WEBER BRA). – Nefcerka Valley (1925 F. WEBER BRA). – Furkotská dolina Valley, above the Vyšné Wahlenbergovo pleso Lake (1925 F. WEBER BRA). – Furkotská dolina Valley, below Mts Vel'ké Solisko and Štrbské Solisko (1991 Z. DÚBRAVCOVÁ SLO). – Bystré sedlo Saddle (1935 J. DOSTÁL & F. A. Novák PRC). – Mt. Solisko (1932 J. DOSTÁL PRC). – Mlynická dolina Valley (1926 V. KRAJINA PRC). – Mt. Kôprovský štít (1936 J. DOSTÁL PRC). – Dolina Hincových plies Valley, below the Vyšné Kôprovské sedlo Saddle (1991 Z. DÚBRAVCOVÁ SLO). – Mt. Satan (1925 F. WEBER PR). – Mt. Predná Bašta (1925 F. WEBER BRA). – Mengusovská dolina Valley, near the Žabie plesá Lakes (1901 K. Brancsik PRC). – Mt. Český štít (1925 F. WEBER PR). – Mt. Tupá (1925 F. WEBER BRA). – Mt. Gerlachovský štít (s.a. SCHÜTZ KRAM, 1925 F. WEBER BRA). – Velická dolina Valley, Kvetnica (1919 K. DOMIN PRC). – Vel'ká Studená dolina Valley, near the Zbojnícka chata chalet (1925 F. WEBER PR). – Mt. Vel'ká Svišťovka (1925 F. WEBER BRA). – Javorová dolina Valley (1962 F. Dočolomanský BRA). – Between Mts L'adový štít and Baranie Rohy (1936 J. DOSTÁL PRC). Belianske Tatry Mts: Mt. Muráň (1878 A. Rogalski KRAM, 1940 F. NÁBĚLEK SLO). – Mt. Nový (1919 K. DOMIN PRC). – Mt. Havran (1925 K. DOMIN & V. KRAJINA PRC). – Tristarská dolina Valley (1943 J. FUTÁK & T. OPLUŠTILOVÁ SLO). – Mt. Ždiarska Vidla (1951 V. KNEBLOVÁ PR). – Kopské sedlo Saddle (1940 K. PTAČOVSKÝ SAV). – Mt. Hlúpy (1938 M. DEYL PR). – Mt. Javorinka (1926 K. DOMIN & V. KRAJINA PRC). – Mt. Belianska Kopa (1949 V. KNEBLOVÁ PRC). – Mt. Zadné Jatky (1984 A. PETRÍK BRA). – Mt. Predné Jatky (1934 K. PREIS PRC). – Near the former Kežmarská chata chalet (1943 J. FUTÁK SLO). – Mt. Bujačí (1889 V. GRESCHIK SLO, 1936 V. NÁBĚLEK BRA). – Skalné vráta (1911 T. WILCZYŃSKI KRAM, 1948 ŠOUREK PR). – Faixova lúka (1925 K. DOMIN PRC). – Kotlina Siedmich prameňov Cirque (1932 J. OTRUBA PRC).

Poland: Wzniesienie Gubałowskie Mts: Witow Górny, gravel terrace above the river Czarny Dunajec (1956 E. PANCER KRA). – Czarna Góra, gravel terrace nearby the river Białka (1956 E. PANCER KRA). Tatry Mts: Mt. Czerwony Wierch (1855 F. BERDAU KRA, 1875 W. KULCZYŃSKI KRAM). – Mt. Kominy Tylkowe (1954 T. TACIK KRAM). – Dolina Kościeliska Valley, slopes of Mt. Raptawicka Turnia (s. a. H. CZECZOTT KRAM). – Wawóz Kraków Valley (1875 W. KULCZYŃSKI KRAM). – Mt. Pyszna (1875 W. KULCZYŃSKI KRAM). – Hala Upłaz (1972 R. OCHYRA KRAM). – Dolina Miętusia Valley (1880 B. KOTULA KRAM). – Mt. Wielka Świstówka (1932 K. STARMACH KRAM). – Mt. Rzędy (1977 M. PAWLUS KRAM). – Mt. Ciemniak (1967 A. JASIEWICZ KRAM). – Dolina Mułowa Valley (1913 J. KRÓL KRAM). – Dolina Litworowa Valley, slopes of Mt. Krzesanica (1885 B. KOTULA KRAM). – Mt. Wielka Turnia (1882

B. KOTULA KRAM). – Dolina Małej Łąki (1937 M. LAŃCUCKA KRA). – Mt. Mały Giewont (1912 T. WILCZYŃSKI KRAM). – Mt. Giewont (1921 K. MICZYŃSKI KRAM). – Mt. Sarnia Skała (1906 I. KRÓL KRAM). – Dolina Pańszczycy Valley (1961 H. PIĘKOŚ KRAM). – Orla Perć (1952 K. KOSTRAKIEWICZ KRAM). – Mt. Granaty (1925 K. Miczyński KRAM). – Mt. Cubryna (1954 A. JASIEWICZ KRAM). – Hińczowa Przełęcz (1954 A. JASIEWICZ KRAM).

3.3.2. Cerasium *alpinum* L. Sp. Pl. : 438 (1753)

Ind. loc.: "in alpibus Europaeae".

Lectotype (JONSELL & JARVIS 1994: 156): Linnaeus's Lappland herbarium, Paris, no. 192.

= *C. lanatum* LAM., Encycl. Meth. Bot.: 680 (1885).

Ind. loc.: "Cette plante croît dans les Alpes, & est cultivée au Jardin du Roi".

Lectotype (designated by BOȘCAIU & al. 1997): *Cerastium lanatum* enc. Caryophyllus holostius tomentosus latifolius. bau. pin. 210. prodr. 104. no. 9 (P, Herbier DE LAMARCK).

≡ *C. alpinum* subsp. *lanatum* (LAM.) GRAEBN. & CORRENS in ASCH. & GRAEBN., Syn. Mitteleur. Fl. 5 (1): 619 (1917).

≡ *C. alpinum* var. *lanatum* (LAM.) HEGETSCHW. Reisen: 154 (1825).

= *C. alpinum* subsp. *babiogorense* ZAPAŁ., Consp. Fl. Galic. Crit. 3: 90 (1911).

Ind. loc.: "Babia Góra".

Lectotype (BOȘCAIU & al., 1997): *Cerastium alpinum* L. var. *glanduliferum* KOCH, z Babiej Góry, w Lipcu [August] 1858, BERDAU; subsp. *babiagorense* [sic!], [rev.] ZAPAŁowicz, 18. 5. 1910 (KRAM, no. 105341; 87.2563).

Nomenclatural note: Some authors (e.g. CZEREPANOV 1995) attribute the combination *C. alpinum* subsp. *lanatum* to SIMONKAI 1886 and not to GRAEBNER & CORRENS 1917. SIMONKAI 1886, however, did not indicate unambiguously the subspecific rank of "341. *C. alpinum* L. 341/c. *C. lanatum* Lam.". In the introduction to his book he noted that he recognized "A subspeciesek, vagy én szerintem subtilis-speciesek ... [Subspecies, or according to me subtile species ...]; Subspecies Auctorum – a me potius species-subtiles apellatae ...".

Description: Perennial plants forming loose caespitose cushions; with floral shoots ascendent or erect, simple or branched, 4–14 (–20) cm high, with the upper internode of 10–35 mm. Stems at base with short sterile shoots with rosulate leaves. Whole plant covered by soft, simple hairs; shorter glandular hairs present sometimes. Pilosity highly variable, from glabrescent to lanate.

Leaves on the floral stems 7–14 (–17) × 3–5 (–7) mm, obovate or oblong lanceolate, whith acute or obtuse apex, covered with simple hairs,

1–1.2 mm long, sometimes also by shorter (0.2–0.4 mm) glandular ones. Hairs usually longer at the margin of the leaves and along the midrib, building compact bundles at the apex of the leaves.

Leaves on the vegetative shoots shorter, 4–7 (–10) × 2–4 (–7) mm, ovate or suborbiculate, with obtuse apex, often imbricated, covered by simple, erect or curly hairs, 1.2–3.2 mm long, more dense than on the leaves of the floral stems; short glandular hairs (0.1-0.2 mm) sometimes present.

Flowers grouped 1–3 (–5) in dichasia. Lower bracts herbaceous 6–9 × 3.5–6 mm, suborbiculate, with obtuse apex; upper bracts 4–7 × 1–2 mm, acute lanceolate, with narrow scarious margin (0.5–0.7 mm) or only scarious apex. Pedicels 10–20 (–30) mm long, covered by simple hairs (0.7–1.2 mm) and sometimes also by glandular ones (0.2–0.6 mm). Sepals 6–8 × 2–3 mm, ovate lanceolate, acute, square based, with a narrow scarious margin (0.5–0.7 mm), covered by simple hairs (0.6–1.7 mm) and sometimes also by glandular ones (0.2–0.6 mm). Petals 12–14 mm, twice as long as sepals, deeply bifid.

Capsules 11–12 mm long, cylindrical, sometimes narrowed and curved in the upper part, with 10 teeth of 1–1.2 mm, bent backwards. Seeds 1–1.4 mm in diameter, round shaped, with prominent rounded tubercles (up to 60–70 μm), in a concentric arrangement.

A tetraploid species with $2n = 4x = 72$ chromosomes.

General distribution: In temperate Europe it occurs in the high mountains from the Balkans through the Carpathians and Alps to the Pyrenees and Sierra Nevada. Further, it can be found in the arctic and subarctic regions from arctic NE. America, Greenland, Iceland, Spitsbergen, and Scandinavia to arctic NW. Russia and Novaja Zemlja.

Distribution in Poland and Slovakia: It is confined to a sole macrolocality on Mt. Babia hora [Babia Góra] in the Západné Beskydy Mts [Beskid Żywiecki Mts in Poland] in the West Carpathians.

Altitudinal distribution: 1490–1725 m a.s.l. (PARUSEL 1993: 52, ZAJĄC 1992: 288).

Specimina visa selecta:

Slovakia: Západné Beskydy Mts: Mt. Babia hora (1919 DOMIN PRC, 1964 KOSINOVÁ PRC, 1974 MIGRA SLO).

Poland: Beskid Żywiecki Mts: Mt. Babia Góra, below summit (1911 H. ZAPAŁOWICZ KRAM, 1964 BŁASZCZYK KRA). – Mt. Babia Góra, Główniak (1977 A. JASIEWICZ KRAM). – Mt. Babia Góra, Djablak (1876 K. BOBER, KRAM, 1928 J. WALAS KRA).

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