

CHROMOSOME NUMBERS IN SELECTED SPECIES OF *HIERACIUM* SECT. *ALPINA* (ASTERACEAE) FROM CENTRAL AND EASTERN EUROPE

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Abstract: Chromosome numbers are reported for 15 taxa of *Hieracium* sect. *Alpina* (GRISEB.) GREMLI from Central and eastern Europe (Austria, the Czech Republic, Poland, Romania, Slovakia, Ukraine). The mode of reproduction was also studied for some of the taxa. For the first time the chromosome counts of 5 taxa from the *Hieracium rohacsense* group are given: *H. rohacsense* KIT. (the West Carpathians), *H. ratezaticum* (NYÁR. et ZAHN) MRÁZ (the South Carpathians) and a still unnamed taxon of the *H. rohacsense* group from Mt. Pop Ivan (the East Carpathians) are tetraploid ($2n=36$); *H. rauzense* MURR (the Eastern Alps) and *H. borsanum* MRÁZ (the East Carpathians) are triploid ($2n=27$). *H. krivanense* (WOL. et ZAHN) SCHLJAKOV (the West Carpathians) is tetraploid, *H. brevopiliferum* MRÁZ (the South Carpathians) is triploid; these are the first karyological reports of both taxa belonging to the *H. fritzei* group. The tetraploid chromosome number was revealed for the first time in an unnamed taxon of the *H. nigrescens* group from the West Carpathians, and in *H. nigrescens* subsp. *koprovanum* RECH. f. et ZAHN. In *H. alpinum* L. s.str. triploid ($2n=27$) populations from the West Carpathians and diploid populations ($2n=18$) from the East Carpathians were confirmed. For *H. halleri* VILL. (the *H. alpinum* group, the West Carpathians) and *H. nigrescens* WILLD. (the West Sudeten), the numbers $2n=27$ and $2n=36$, respectively were found, which is in accordance with previous data. The triploid level ($2n=27$) for *H. pinetophilum* (the *H. fritzei* group) and the tetraploid level ($2n=36$) for *H. stygium* UECHTR. (the *H. chlorocephalum* group) both from the West Carpathians were confirmed. One new species, one *nomen novum* and one new combination at the level of species are published in this paper.

INTRODUCTION

Without any doubt the genus *Hieracium* L. s.str., even without *Pilosella* HILL, is among the richest and at the same time the most intricate genera of the plant kingdom. Two main approaches concerning the taxonomic concept of species versus subspecies (or lower ranks) in *Hieracium* s.str. evolved in European hieraciology during the last two centuries. The so-called German school (based on the classical works of Nägeli and Peter, later developed by Zahn), working with a wide species concept, recognized many infraspecific ranks such as subspecies, variety and forma below the rank of species, but also grex or subgrex (ranks between the species and subspecies not explicitly mentioned in the present International code of botanical nomenclature (ICBN, GREUTER et al. 2000)). On the other hand, Scandinavian and British botanists accepted a narrow species concept; under species level no or few taxonomic ranks are recognized.

Unlike *Pilosella*, where the hybridization still plays a great role in evolution, *Hieracium* in the narrow sense represents an immense agamic group with only sporadic occurrence of

gametic fusion (syngamy). Diploid sexuals ($2n=18$; basic chromosome number $x=9$) are very rare, but a little more common among the south European species (MERXMÜLLER 1975, SCHUHWERK 1996). The studies on karyology and reproductive mode showed that the triploid and tetraploid level ($2n=27$ and 36 , respectively), the most frequent in *Hieracium*, are connected with (obligate and possibly also facultative) apomixis of the diplosporous type (e.g. SKAWIŃSKA 1963, NOGLER 1984). Pentaploids are very rare (see below). The geographic distribution of ploidy levels in the genus is noteworthy. Most representatives of *Hieracium* s.str. in the Balkan Peninsula are triploids and tetraploids (about 35–40% for each ploidy level among the investigated taxa); the diploid level is very rare (about 5%). In contrast, in the Iberian Peninsula only triploids and diploids occur (about 80% and 20%, respectively); tetraploids are lacking (SCHUHWERK 1996, SCHUHWERK & LIPPERT 1998). Various factors, such as mode of reproduction, wide geographical distribution and ecological range cause the morphological and genetic variability of *Hieracium*, and thus, difficulties with identification (CHRTEK 1996); moreover, the chromosome numbers of most of the taxa are unknown. Knowledge of ploidy level is one of the most important sources of information indicating the mode of reproduction and forms the basis for taxonomic evaluation. *Hieracium* sect. *Alpina* in Central and eastern Europe (the Sudeten Mts., West and East Carpathians, Eastern Alps) was investigated from the karyological point of view mainly by CHRTEK (1994, 1996, 1997a,b) and CHRTEK & MARHOLD (1998). Scattered data were reported by SKALIŃSKA (1959), Májovský's team (UHRÍKOVÁ & MURÍN 1970, MURÍN 1992), MĚSÍČEK (1992), and HUBER & BALTISBERGER (1992). For references to the chromosome counts from other regions (Arctic Russia, British Iceland, Greenland, Iceland and Fennoscandia) see CHRTEK (1994, 1996).

MATERIALS AND METHODS

Plant material was collected in 1996–1999 from natural habitats, then transferred to experimental fields in Bratislava (Institute of Botany) and Košice (Botanical Garden of the P.J. Šafárik University). Chromosome counts were made mostly on the pot-grown plants. Root tip cuttings were pre-treated with a 0.1% solution of colchicine for 1.5 hours at room temperature (the usually-used concentration of colchicine, 0.05%, did not provide good results for this material). Subsequently the colchicine was replaced by a mixture of absolute ethanol and acetic acid (3 : 1). Roots were stored in 70% ethanol and hydrolyzed for 10 minutes in 1N HCl at 60 °C. The squash and smear method with cellophane replacing the glass covers followed MURÍN (1960) with slight modifications. Giemsa solution in phosphate buffer was used as a stain. In a few cases the roots from germinated seeds were used (in such cases the seeds were collected from cultivated plants and kept at 4 °C before allowing to germinate on filter paper in Petri dishes at room temperature; the length of time between collection and sowing of the seeds was about 6–9 months).

The mode of reproduction for several polyploid taxa was determined by emasculation experiments. The “decapitulation” was carried out by cutting off the whole upper half of the capitulum (including the styles) with a razor blade. Those flower heads (from 1 to 5 heads per species) producing apparently “normal” seeds after emasculation were evaluated as apomictic. Decapitulation in many cases, however, caused the abortion of the entire flower head. Voucher specimens (from natural habitats or from cultivated plants) are deposited in the herbarium SAV (Institute of Botany, Slovak Academy of Sciences, Bratislava). Permanent slides are

stored in the Department of Experimental Botany and Genetics, Faculty of Sciences, P.J. Šafárik University, Košice.

RESULTS AND DISCUSSION

Taxonomic concept

The ZAHN's (1930–1939) concept of sections is adopted here. The morphologically intermediate species (“Zwischenarten” or species intermediae) between the main taxon (“Hauptart” – or species principalis) *Hieracium alpinum* and other main taxa in the sense of ZAHN are included in the sect. *Alpina*.

The analyzed taxa are arranged in the species groups of SELL & WEST (1976), generally corresponding to “species principales” and “species intermediae” in ZAHN's classification (1930–1939). For polyploid taxa (tri- and tetraploids), diplosporous agamosperms with narrow morphological variation, I have adopted a narrow concept of species. These taxa represent discrete and recognizable units and prevail in this paper. However, in a few cases no corresponding name at species level (or no name at all) was available. For these reasons one new combination, one *nomen novum* and one new name are published in this paper.

List of plants

The number of quadrates of grid mapping project of Central Europe (for Austria, the Czech Republic, Poland and Slovakia, NIKLFELD 1971) is given in parentheses after geographical co-ordinates. Numbers in parentheses after the date of collection mean the reference numbers of plants in cultivation used for chromosome analyses. The following abbreviations are used: “ca.” – precise chromosome number was not possible to ascertain; “ps” – chromosome number was obtained from a pot-cultivated plant as well as from its germinating seeds obtained from heads isolated in nylon mesh bags or from the emasculated heads of cultivated plants (F₁ generation).

The *Hieracium alpinum* group

Hieracium alpinum L. – 2n=18

(Fig. 1)

Ukraine: 1. Svidovets Mts., Mt. Ungaryas'ka, northern slopes, 1750 m a.s.l., 48°18' N, 24°06' E. Coll. P. MRÁZ & V. JURKOVIČOVÁ, 7.VIII.1999 (no. 636, 639). 2. Svidovets Mts., Tatulska polonina ridge, saddle below Mt. Tatul, 1760 m a.s.l., 48°16'30" N, 24°12' E. Coll. P. MRÁZ & V. JURKOVIČOVÁ, 10.VIII.1999 (no. 663).

Hieracium alpinum L. – 2n=27

(Fig. 2)

Poland: 1. Tatry Zachodnie Mts., Mt. Zadni Ornak, 1800 m a.s.l., 49°13' N, 19°50'16" E (6785/c). Coll. P. MRÁZ & V. JURKOVIČOVÁ, 26.VII.1999 (no. 582, 583, 587, 589, 590, 592, 593, 598, 599, 600).

Slovakia: 2. Nízke Tatry Mts., Mt. Kráľova hoľa, ca. 0.3 km E of the summit, 1900 m a.s.l., 48°53'46" N, 20°08'48" E (7186/b). Coll. P. MRÁZ & V. JURKOVIČOVÁ, 1.VIII.1999 (no. 628). 3. Nízke Tatry Mts., Mt. Kráľova skala, ca. 1 km SE of Mt. Kráľova hoľa, 1680 m a.s.l., 48°53'08" N, 20°09'37" E (7186/b). Coll. P. MRÁZ & V. JURKOVIČOVÁ, 1.VIII.1999 (no. 631).

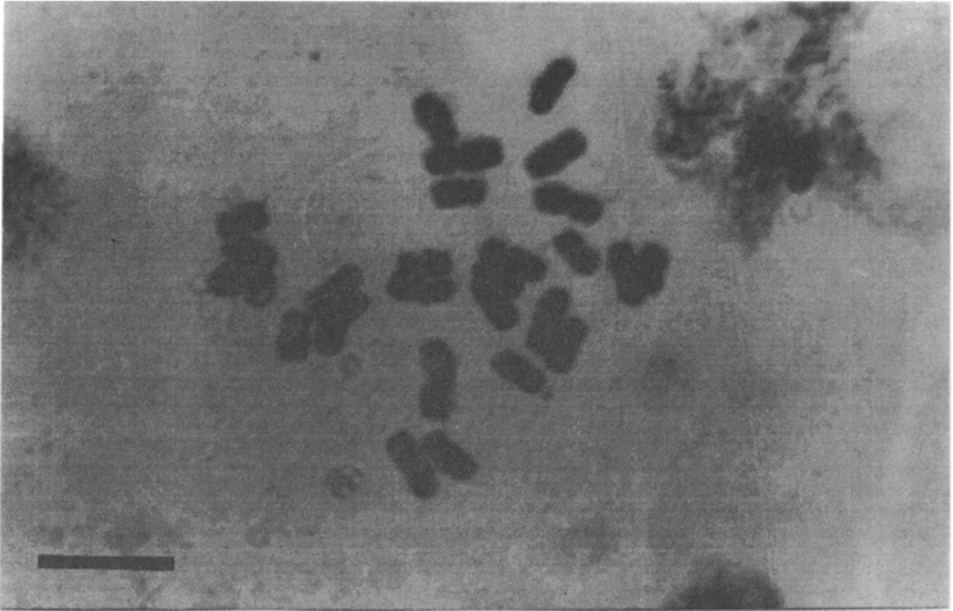


Fig. 1. Photomicrographs of metaphases of *Hieracium alpinum*, $2n=18$ (cultivation number of the plant: 639). Scale bar = 10 μm .

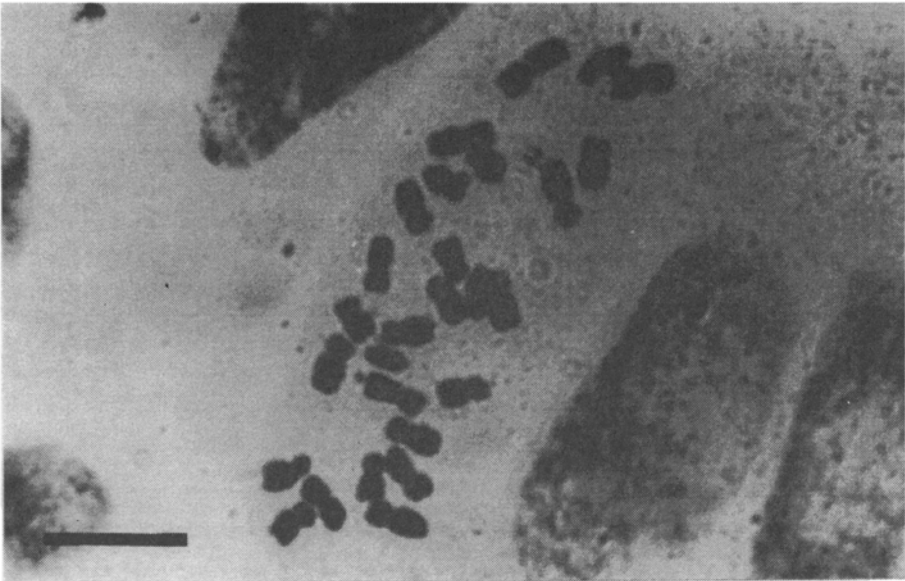


Fig. 2. Photomicrographs of metaphases of *Hieracium alpinum*, $2n=27$ (cultivation number of the plant: 583). Scale bar = 10 μm .

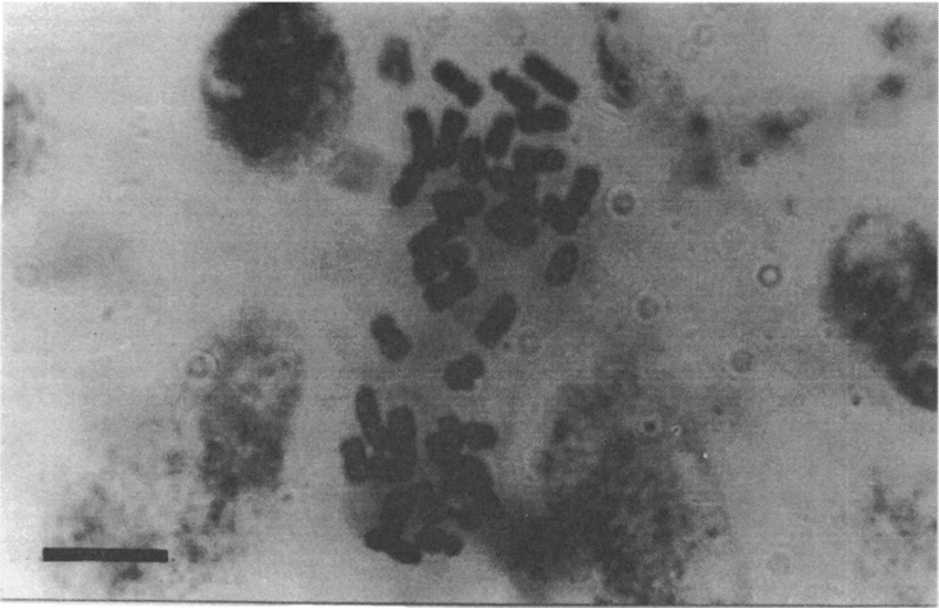


Fig. 3. Photomicrographs of metaphases of *Hieracium rohacsense*, $2n=36$ (cultivation number of the plant: 613). Scale bar = 10 μm .

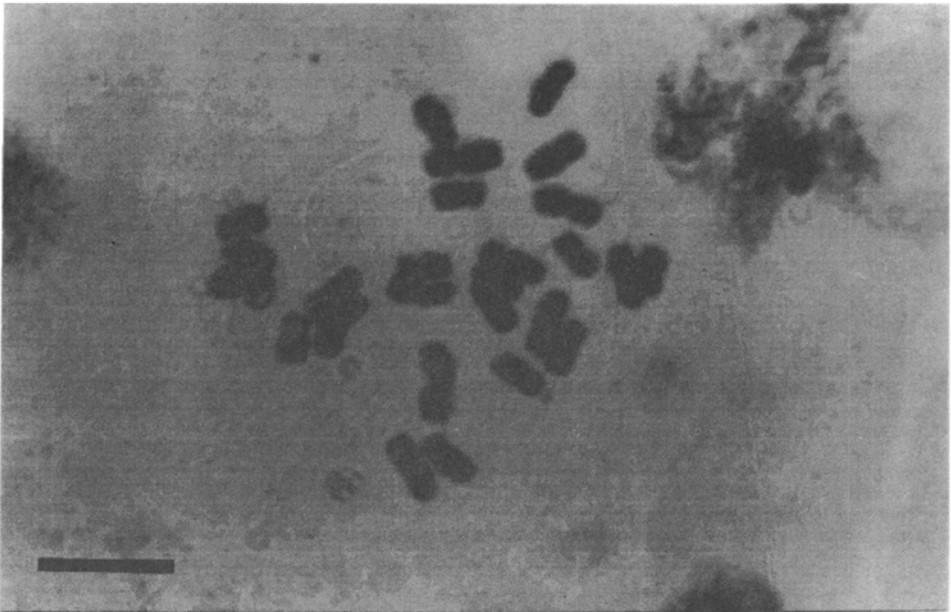


Fig. 4. Photomicrographs of metaphases of *Hieracium rauzense*, $2n=27$ (cultivation number of the plant: 272). Scale bar = 10 μm .

***Hieracium halleri* VILL. – 2n=27**

Poland: 1. Tatry Zachodnie Mts., Mt. Zadni Ornak, 1800 m a.s.l., 49°13' N, 19°50'16" E (6785/c). Coll. P. MRÁZ & V. JURKOVIČOVÁ, 26.VII.1999 (no. 583/1).

Slovakia: 2. Západné Tatry Mts., Jamnická dolina valley, below the Jamnické sedlo saddle, 1850 m a.s.l., 49°12'13" N, 19°46' E (6784/d). Coll. P. MRÁZ & V. JURKOVIČOVÁ, 28.VII.1999 (no. 618, 619, 620, 621).

For most of the distribution area, *H. alpinum* has been found to be a triploid species; from Central Europe there are data from the Krkonoše Mts. (MĚSÍČEK 1992, CHRTEK 1994), Vysoké Tatry Mts. (SKALIŇSKA 1959, CHRTEK 1997b), Západné Tatry Mts. (UHRÍKOVÁ & MURÍN 1970) and the Západné Beskydy Mts. (Mt. Babia hora) (MURÍN 1992). The present results agree with previous ones; new records are based on populations from the Západné Tatry Mts. and the Nízke Tatry Mts. SZELAG & JANKUN (1997) published the first and the only tetraploid count on plants from Mt. Ornak (Tatry Zachodnie Mts.). The repeated search of the present author for a tetraploid population on Mt. Zadni Ornak in 1999 was unsuccessful, all 10 analyzed plants from this location were triploids. Voucher specimens of tetraploid plants from which the chromosome number was counted were not preserved (SZELAG, pers. comm.).

Recently CHRTEK (1997b) found sexual diploid populations from the Ukrainian East Carpathians; our counts from the same region confirm the presence of the 2n=18 cytotype. Diploids in Ukraine have large within- and among-population morphological variation. Smaller morphological types without the clothing hairs on the leaves, peduncles and involucre are treated as *Hieracium alpinum* subsp. *augusti-bayeri* ZLATNÍK. They are known only from the Ukrainian and Romanian East Carpathians (cf. CHRTEK & MARHOLD 1996, CHRTEK 1997b; MRÁZ 1999). An aneuploid chromosome number, a hypotriploid – 2n=26, was reported in *H. alpinum* from NW Russia (SOKOLOVSKAYA & STRELKOVA 1960).

In *H. halleri* the number 2n=27 was found in plants from the Vysoké Tatry Mts. (CHRTEK 1997b).

The *Hieracium nigrescens* group***Hieracium nigrescens* WILLD. – 2n=36**

Czech Republic: 1. Krkonoše Mts., Mt. Sněžka, SW slopes to the Obří důl valley, by a path, ca. 1400 m a.s.l., 50°44'10" N, 15°43'50" E (5260/c). Coll. P. MRÁZ, 16.VII.1997 (no. 507).

***Hieracium nigrescens* subsp. *koprovanum* RECH. f. et ZAHN – 2n=36**

Poland: 1. Tatry Vschodnie Mts., Ubocz Opalone, SE slopes to the Swistowka Roztocka valley, 1840 m a.s.l., 23.VIII.1997, 49°12'50" N, 20°03'44" E (6786/c). Coll. P. MRÁZ (no. 460, 464).

Slovakia: 2. Nízke Tatry Mts., Demänovské sedlo saddle, 1750 m a.s.l., 48°56'25" N, 19°37'21" E (7083/d). Coll. P. MRÁZ, 15.VII.1996 (no. 13, 19). 3. Nízke Tatry Mts., saddle between Mt. Králička and Mt. Lajštroch, 1500–1600 m a.s.l., 48°55'11" N, 19°42'25" E (7084/c). Coll. P. MRÁZ, 16. VII. 1996 (no. 41). 4. Západné Tatry Mts., Račkova dolina valley, ca. 400 m above the crossroads with the Gáborova dolina valley, 1500 m a.s.l., 49°11'12" N, 19°49'03" E (6884/b). Coll. P. MRÁZ, 12.VIII.1996 (no. 178). 5. Vysoké Tatry Mts., Veľká Studená dolina valley, 1550 m a.s.l., 49°10'32" N, 20°11'50" E (6887/a). Coll. P. MRÁZ, 13.VIII.1996 (no. 214 (ca.), 225). 6. Vysoké Tatry Mts., Dolina Zeleného plesa (Zahandel)

valley, 1 km SE of Mt. Kriváň, 1720 m a.s.l., 49°08'43" N, 20°00'29" E (6886/c). Coll. P. MRÁZ & V. JURKOVIČOVÁ, 16.VII.1998 (no. 517).

***Hieracium nigrescens* s. l. – 2n=36, apomictic**

Poland-Slovakia (state boundary, both sides): 1. Západné Tatry Mts., Sedlo pod Hrubým vrchom saddle, ca. 1.5 km NW of Mt. Hrubý vrch (= Mt. Jarząbczy Wierch), 1935 m a.s.l., 49°11'55" N, 19°47'10" E (6884/b). Coll. P. MRÁZ & V. JURKOVIČOVÁ, 26.VII.1998 (no. 528, 529).

The same chromosome number was found by CHRTEK (1994) for typical *Hieracium nigrescens* s.str., from the Krkonoše Mts., from where it was described by Willdenow. *H. nigrescens* subsp. *koprovanum* represents some intermediate form between *H. rohacsense* group and *H. nigrescens* group. The stellate trichomes on the peduncles are dense, on the involucre bracts scattered (mainly on the margin). ZAHN added in the description of this taxon a note: "verosimiliter *bifidum-alpinum*" (ZAHN 1927: 369–370). *H. nigrescens* subsp. *koprovanum* differs from *H. rohacsense* s.str. by shape and indumentum of the leaves and by the character of the indumentum on the involucre (cf. MRÁZ 2001). The population of *H. nigrescens* s.l. from the Západné Tatry Mts. has longer and denser clothing trichomes on the peduncles and involucres than *H. nigrescens* WILLD. The correct name for this taxon has not yet been found.

Only the tetraploid (*H. decipiens* TAUSCH, *H. decipientiforme* (WOŁ. et ZAHN) SCHLJAKOV) or very rarely pentaploid level (2n=45 in *H. chrysostyloides* (ZAHN) CHRTEK jun.) have been reported in this group in the Central European mountains (CHRTEK 1994, 1996, 1997a). It seems that only two pentaploid counts have been ascertained in the genus *Hieracium* s.str., and both come from the *H. nigrescens* group. Apart from the Krkonoše Mts. (*H. chrysostyloides* in CHRTEK 1996), there is a still unnamed pentaploid taxon from Scotland (STACE et al. 1995). *H. macrocarpum* PUGSLEY from the British Isles is tetra- or hypertetraploid, 2n=36 or 37 (STACE et al. 1995).

The *Hieracium fritzei* group

***Hieracium krivanense* (WOŁ. et ZAHN) SCHLJAKOV – 2n=36, apomictic**

Poland: 1. Tatry Zachodnie, Mt. Zadni Ornak, 1800 m a.s.l., 49°13'00" N, 19°50'16" E (6785/c). Coll. P. MRÁZ & V. JURKOVIČOVÁ, 26.VII.1999 (no. 603, 604 (ca.)).

Slovakia: 2. Západné Tatry Mts., be

low the Zábrad' saddle to the Látná dolina valley, 1550–1600 m a.s.l., 49°13'32" N, 19°45'05" E (6784/d). Coll. P. MRÁZ, 9.VIII.1996 (no. 133). 3. Západné Tatry Mts., Zadná Tichá dolina valley, 1634 m a.s.l., 49°12'27" N, 19°59'39" E (6785/d). Coll. P. MRÁZ, 24.VIII.1997 (no. 485, 486). 4. Západné Tatry Mts., Červené vrchy Mts., Červený úplaz to the Tichá dolina valley, southern slopes, 1650–1800 m a.s.l., 49°13'48" N, 19°57'11" E (6785/d). Coll. P. MRÁZ & R. LETZ, 15.VII.1998 (no. 516).

***Hieracium brevopiliferum* MRÁZ, nom. nov. – 2n=27, apomictic**

= *Hieracium fritzei* subsp. *fritzei* f. *brevipillum* NYÁR. et ZAHN in ZAHN K.H. Bull. Grad. Bot. Univ. Cluj 8 (1928): 60–61, 1929

Note: A nomen novum is proposed here as the usage of the epiteton *brevipillum* on the level of species would result in an illegitimate combination *Hieracium brevipillum*, because of the

existence of earlier name *Hieracium brevopilum* GREENE, Bull. Torrey Bot. Club 9: 64, 1882 (Art. 53.3 of the ICBN, GREUTER et al. 2000).

Romania: 1. Munții Retezatului Mts., below the Bucura lake, on the ridge in the krumholz, 1800–1900 m a.s.l., 45°21' N, 22°23' E. Coll. P. MRÁZ & M. SEVERA, 3.VIII.1998 (no. 572).

***H. pinetophilum* (DEGEN et ZAHN) CHRTEK jun. – 2n=27**

Slovakia: 1. Západné Tatry Mts., Zadná Tichá dolina valley, below the Závory saddle, W exp., 1786 m a.s.l., 49°12'27" N, 20°00'03" E (6786/c). Coll. P. MRÁZ, 24.VIII.1997 (480).

There are the first reports for *H. krivanense* and *H. brevopiliferum*. As reported by CHRTEK (1994) and CHRTEK & MARHOLD (1998), the other representatives of the *H. fritzei* group from the Sudeten Mts. and West Carpathians. are triploids (*H. fritzei* F. SCHULTZ, *H. rohlenae* ZLATNÍK, *H. schneiderianum* ZLATNÍK) and tetraploids (*H. crassipedipilum* (PAWL. & ZAHN) CHRTEK jun., *H. slovacum* CHRTEK jun.). The present count for *H. pinetophilum* confirms the triploid level (CHRTEK & MARHOLD 1998). In stylose flowers analyzed plant shows some affinity to *H. crassipedipilum*, although in character of the indumentum of peduncles and involucral bracts (not dense, simple trichomes up to 1.5 mm long), the plant fits very well into *H. pinetophilum*. *H. krivanense* is a more common species in the Západné Tatry Mts., as was reported by CHRTEK & MARHOLD (1998).

The Romanian plant collection was identified with the description in the protologue (ZAHN 1929) and with herbarium specimens (BP 0493622) collected by Nyárády in the Retezat Mts. and determined by Zahn as *Hieracium fritzei* subsp. *fritzei* f. *brevipillum* NYÁR. et ZAHN, which, however, do not belong to the original material. This taxon has oblong-spathulate basal leaves, oblanceolate, slightly denticulate later leaves; oblong subentire stem-leaves; peduncles and involucre with scattered to subnumerous (on involucre) clothing trichomes, which are very short up to 1(–1.3) mm (see the name of taxon); stellate trichomes dense on peduncles and scattered on the border of involucrum bracts; and the glandular hairs usually short, scattered on peduncles to subnumerous on involucre. The taxon is morphologically well differentiated from the other representatives of the group, taxa described from the Retezat Mts., including e.g. *H. fritzei* subsp. *stanisoare* JÁV. et ZAHN. Since the breeding system was ascertained as asexual by emasculation experiments I consider the rank of species to be most appropriate.

The *Hieracium rohacsense* group (*H. alpinum* < *bifidum*)

***Hieracium rohacsense* KIT. – 2n=36, apomictic**

(Fig. 3)

Poland: 1. Tatry Zachodnie Mts., Mt. Grzes (= Mt. Lúčna), by Polish-Slovak border, 1640 m a.s.l., 49°14'15" N, 19°46'08" E (6784/d). Coll. P. MRÁZ & V. JURKOVIČOVÁ, 28.VII.1999 (no. 612, 613, 615).

Slovakia: 2. Západné Tatry Mts., Roháčska dolina valley, near the former Ťatliakova chata chalet, 1350 m a.s.l., 49°12'53" N, 19°44'58" E (6784/c). Coll. P. MRÁZ, 9.VIII.1996 (no. 100, 114, 120). 3. Západné Tatry Mts., below the Zábraď saddle to the Látaná dolina valley, 1550–1600 m a.s.l., 49°13'32" N, 19°45'05" E (6784/d). Coll. P. MRÁZ, 9.VIII.1996 (no. 122, 129, 137, 144). 4. Západné Tatry Mts., Račkova dolina valley, ca. 400 m above the crossroads with the Gáborova dolina valley, 1500 m a.s.l., 49°11'12" N, 19°49'03" E (6884/b). Coll. P. MRÁZ, 12.VIII.1996 (no. 184, 186, 191 (ca.), 197, 208, 210). 5. Západné Tatry Mts., Zadná Tichá dolina valley, by the path in the krumholz, 1550 m a.s.l., 49°12'30" N, 19°59'10" E (6785/c). Coll. P. MRÁZ, 24.VIII.1997 (no. 488, 489, 492). 6. Vysoké Tatry Mts., Kobyliá

dolina valley, by the path from the Kôprovská dolina valley, 1650 m a.s.l., 49°11'49" N, 20°00'50" E (6886/a). Coll. P. MRÁZ, 24. VIII. 1997 (no. 481). 7. Vysoké Tatry Mts., by the paths from Mt. Kriváň to Tri studničky, 1600–1655 m a.s.l., 49°09'17" N, 19°58'48" E (6885/b). Coll. P. MRÁZ & V. JURKOVIČOVÁ, 16.VII.1998 (no. 520, 521). 8. Nízke Tatry Mts., saddle between Mt. Králička and Mt. Lajštroch, 1500–1600 m a.s.l., 48°55'11" N, 19°42'25" E (7084/c). Coll. P. MRÁZ 16.VII.1996 (no. 38). 9. Veľká Fatra Mts., Malá Ramžiná valley, southern slope below the elevation 1497 m a.s.l., ca. 1 km WSW of Mt. Krížna (1574), 1420 m a.s.l., 48°52'34" N, 19°04'02" E (7180/a). Coll. P. MRÁZ, 12.VII.1997 (no. 365, 367).

***Hieracium rohacsense* s.l. – 2n=36, apomictic**

Ukraine: 1. Marmarosh, Mt. Pop Ivan, slopes of the main glacial cirque, E exposition, 1850–1900 m a.s.l., 47°56' N, 24°20'. Coll. P. MRÁZ et al., 30.VII.1996 (no. 49 (ps), 51 (ca.), 53 (ca.), 60 (ca.), 66, 67 (ca.)).

***Hieracium borsanum* MRÁZ, spec. nov. – 2n=27, apomictic**

Diagnosis: *H. pietroszense* DEGEN et ZAHN affine, sed folia basalia interiora lanceolata, in petiolum attenuata, ad basin profunde dentata, saepe cum dentibus liberis; involucria minora, 9–11(–12) mm longa differt.

Typus: Romania septentrionalis, montes Rodnenses, situ meridionali a pago Borșa, 0.4 km situ septentr.-occidentali ad lacum glaciale "La Iezer", in declivio septentr.-orientali montis Pietrosul Mare, ca. 1780 m s. m., 47°39' N, 24°39' E, coll. P. MRÁZ & P. TURIS, 25.VII.1997 (Holotypus: SAV; isotypus: BRA Herbarium P. MRÁZ).

– *Hieracium rohacsense* subsp. *borsanum* ZAHN, nom. inval. (Art. 36.1., diagnosis germanica (ut *borsánum*) in ZAHN K.H. in GRAEBNER P. f. (ed.), Syn. Mitteleurop. Fl., Band XII(3), Liefer. 2., p. 218, 1936.

Romania: 1. Munții Rodnei Mts., Mt. Pietrosul Mare, northern slope, by the path Borșa – Stația Meteo, 1560 m a.s.l., 47°39' N, 24°39' E. Coll. P. MRÁZ & P. TURIS, 24.VII.1997 (no. 380). 2. Munții Rodnei Mts., Mt. Pietrosul Mare, rocky slopes by the path Borșa – Stația Meteo, 0.3 km NW of Stația Meteo, 1780–1800 m a.s.l., 47°39' N, 24°39' E. Coll. P. MRÁZ & P. TURIS, 25.VII.1997 (no. 386, 388, 390 (ps)).

***Hieracium ratezaticum* (NYÁR. et ZAHN) MRÁZ, comb. & stat. nov. – 2n=36, apomictic**

= *H. rauzense* var. *ratezaticum* NYÁR. & ZAHN (ut *ratezaticum*) in ZAHN K.H. Bull. Grad. Bot. Univ. Cluj 8 (1928): 53, 1929

Romania: 1. Munții Retezatului Mts., the slopes 0.2 km SW of the Zănoaga lake, 1850–1980 m a.s.l., exp. S–SE, 45°20'30" N, 22°20' E. Coll. P. MRÁZ & M. SEVERA, 1.VIII.1998 (no. 533, 535). 2. Munții Retezatului Mts., below the Bucura lake, on the ridge in the krumholz 1800–1900 m a.s.l., 45°21' N, 22°23'. Coll. P. MRÁZ & M. SEVERA, 3.VIII.1998 (no. 566, 567).

***Hieracium rauzense* MURR – 2n=27, apomictic**

(Fig. 4)

Austria: 1. Vorarlberg, St. Christoph, Arlberg pass, southern slopes in the saddle, 1790–1820 m a.s.l., 47°07'57" N, 10°12'38" E (8827/c). Coll. P. MRÁZ, 19.VIII.1996 (no. 272). 2. Vorarlberg, Mt. Arlen Satel, southern slopes, 1790–1800 m a.s.l., 47°08'15" N,

10°12'38" E (8827/c). Coll. P. MRÁZ et al., 6.VIII.1997 (no. 414 (ca.)). 3. Vorarlberg, Klösterle, Nenzigast Tal valley, Nenzigast Alpe chalet, 1600 m a.s.l., 47°05'30" N, 10°05'20" E (8926/c). Coll. P. MRÁZ et al., 8.VIII.1997 (no. 436, 440).

These are the first chromosome numbers ascertained for the whole species group. This group, involving species in the morphological position *H. alpinum* < *H. bifidum* (in the sense of SELL & WEST 1976: 394) is, however, to a large extent, artificial and includes taxa with more – or – less stellate trichomes on peduncles and involucre, a character which might be a result of convergent evolution rather than close phylogenetic relationships.

Hieracium rohacsense is an endemic of high mountain ranges of the West Carpathians (both Slovak and Polish). Because this name was also incorrectly used for the South and East Carpathian, Sudeten and Alpine populations, a choice of lectotype was made, which restricts the usage of the name for the West Carpathian populations (MRÁZ & MARHOLD 1999). All 25 studied plants from 9 populations had $2n=36$.

The tetraploid population from the glacial cirque of Mt. Pop Ivan probably represents a new species similar to *H. rohacsense*; it differs from the latter by the character of the indumentum and allozyme pattern (MRÁZ et al. 2001).

ZAHN (1936) described a new subspecies from the Rodna Mts. (locality: "Siebenbürgen: Vurfu Pietroszu, 1750 m, bei Borsa [Glimmerschiefer] ! Stiolu 1500 m [Kalk]!") and named it *Hieracium rohacsense* subsp. *borsanum* ZAHN, but the description is in German and according to the ICBN, the name is invalidly published (Art. 36.1., GREUTER et al. 2000). It is an easily recognizable taxon at the rank of species (the basal part of the lamina of rosette leaves is deeply dentate to the central vein). German description and specimens labelled "Rodnaer Alpen, felsige stellen am Vurfu Pietrosu bei Borsa, Glimsschifer, 1750 m, F. PAX, 7.VIII.1906; ut *H. rauzense* subsp. *borsanum*, det. ZAHN 1929 [BP 195852]" fit very well to our plants collected at the same locality. The holotype was selected from our own material because the specimen deposited in BP lacks the upper part of the stem, the flowers including. A detailed description with figures will be published elsewhere (MRÁZ, in prep.).

Hieracium ratezaticum is a tetraploid apomictic taxon known only from the Retezat Mts. and is raised to species rank in the present paper. By its morphological characters it is quite different from *H. rohacsense* s.str. and other taxa of the group.

The situation in the region of Vorarlberg (Eastern Alps) is more complicated, because of presence of several taxa from the *H. rohacsense* group. The plants from the first locality belong to *H. rauzense* MURR; from the other two localities they differ slightly in the higher density of glandular hairs on the peduncles and involucre. Not all type materials are at disposal because of the reconstruction of the herbarium in Innsbruck (IB), where the Murr's collection is stored. Because the taxonomic revision of the Alpine populations has not yet finished, all analyzed plants have been provisionally placed in *H. rauzense* MURR. No herbarium specimens corresponding to the *H. rohacsense* s.str. from the Alps were found by the present author in any of the Central European herbaria studied (MRÁZ, unpubl.).

The *Hieracium chlorocephalum* group (*H. alpinum* – *lachenalii* – *prenanthoides*)

***Hieracium stygium* UECHTR. – $2n=36$**

Slovakia: 1. Nízke Tatry Mts., Demänovské sedlo saddle, 1750 m a.s.l., 48°56'25" N, 19°37'21" E (7083/d). Coll. P. MRÁZ, 15.VII.1996 (no. 16, 25). 2. Nízke Tatry Mts., saddle between Mt. Králička and Mt. Lajštroch, 1500–1600 m a.s.l., 48°55'11" N, 19°42'25" E

(7084/c). Coll. P. MRÁZ, 16.VII.1996 (no. 43). 3. Nízke Tatry Mts., Zubrovica valley, 0.5 km SE of Mt. Kráľova hoľa, 1590–1620 m a.s.l., 48°53'21" N, 20°09'44" E (7186/b). Coll. P. MRÁZ, 29.VIII.1996 (no. 326). 4. Západné Tatry Mts., Roháčska dolina valley, near the former Ťatliakova chata chalet, 1350 m a.s.l., 49°12'53" N, 19°44'58" E (6784/c). Coll. P. MRÁZ, 9.VIII.1996 (no. 108, 116). 5. Vysoké Tatry Mts., Veľká Studená dolina valley, 1550 m a.s.l., 49°10'32" N, 20°11'50" E (6887/a). Coll. P. MRÁZ, 13.VIII.1996 (no. 220). 6. Západné Beskydy Mts., Mt. Pilsko, 0.2 km SE of the summit, 1532 m a.s.l., 49°31'41" N, 19°19'30" E (6481/c). Coll. P. MRÁZ et al., 20.VIII.1997 (no. 456, 457).

This confirms counts published by CHRTEK (1996) from two Czech localities (the Hrubý Jeseník Mts.) and one Slovak locality (the Západné Tatry Mts.). *H. chlorocephalum* UECHTR., which probably occurs only in the Sudeten Mts., is also a tetraploid (CHRTEK 1996).

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