Polish Botanical Journal 50(2): 139–143, 2005

CHROMOSOME NUMBERS OF POLISH *HIERACIA* (ASTERACEAE)

ZBIGNIEW SZELĄG & VLADIMIR VLADIMIROV

Abstract. Chromosome numbers are given for the following species of *Hieracium* L. from Poland: subgenus *Hieracium* – *H. barbatum* Tausch (2n = 27), *H. bupleuroides* C. C. Gmelin (2n = 36), *H. laevigatum* Willd. (2n = 27), *H. laurinum* Arvet-Touvet (2n = 18), *H. sabaudum* L. (2n = 27, 36), *H. umbellatum* L. (2n = 18), *H. villosum* Jacq. (2n = 36); subgenus *Pilosella* (Hill.) Gray – *H. lactucella* Wallr. (2n = 18), *H. schultesii* F. W. Schultz (2n = 36). The chromosome number of *H. barbatum* is published for the first time. The diploid number is reported for the first time for *H. laurinum*. Except for *H. umbellatum* and *H. villosum*, the chromosome counts are reported for the first time from Poland.

Key words: Asteraceae, *Hieracium*, chromosome numbers, karyotypes, Poland

Zbigniew Szeląg, Institute of Botany, Polish Academy of Sciences, Lubicz 46, PL-31-512 Kraków, Poland; e-mail: azszelag@wp.pl
Vladimir Vladimirov, Institute of Botany, Bulgarian Academy of Sciences, 23, Acad. G. Bonchev St., Sofia 1113, Bulgaria; e-mail: vdvlad@iph.bio.bas.bg

INTRODUCTION

Publications dealing with karyology of Polish vascular plants give only sparse data on representatives of the genus *Hieracium* L. (Skalińska *et al*. 1959, 1968, 1974; Skalińska 1967, 1970; Skawińska 1963; Szeląg & Jankun 1997). Basic karyological data on Polish *Hieracia* are much needed, especially now, when work on a new comprehensive flora of the country is in progress. The present paper reports an initial attempt to fill this gap. It gives chromosome numbers for nine species, seven of which had no chromosome counts published from Polish territory so far, and one of which (*H. barbatum*) had no count published at all to date.

MATERIAL AND METHODS

Living plants were collected during field trips in southern Poland in summer 2001 and cultivated in the greenhouse of the Institute of Botany, Bulgarian Academy of Sciences (BAS). Chromosome counts were made in the Karyosystematic Laboratory of the Institute of Botany, BAS, on permanent slides. Two or three individuals of each species from each locality were investigated. Root tips were pretreated with colchicin solution (0.01%) for *ca* 90 min, then fixed in acetic alcohol (1:3) for at least 2 h at room temperature, hydrolyzed in 1 M HCl for 20 min at 60°C, stained in Gomori's hematoxylin (Melander & Wingstrand 1953) for 30 min at 60°C, and finally squashed in 45% acetic acid. Voucher specimens are deposited in the herbarium of the Institute of Botany, Bulgarian Academy of Sciences, Sofia (SOM).

RESULTS AND DISCUSSION

Hieracium barbatum Tausch

H. racemosum subsp. *barbatum* (Tausch) Zahn

2n = 3x = 27 (Fig. 1)

SPECIMENS EXAMINED. POLAND. Osieczany village near Myślenice, margin of *Tilio-Carpinetum* forest, 49°50′N/19°58′E, alt. 305 m. 29 Aug. 2001. *Z. Szeląg & V. Vladimirov.*

This is the first chromosome number report for this species, which belongs to the *H. racemosum* agg. (Sell & West 1976). In this group the diploid chromosome number was previously given for *H. pojoritense* Woł. from Romania (Ştefureac & Tăcină 1979) and for *H. racemosum* subsp. *leiopsis* Murr & Zahn from Austria (Schuhwerk & Lippert 1999). The triploid level has been

reported for *H. racemosum* Waldst. & Kit. *ex* Willd. *s.l.* from the Balkan Peninsula (Christoff & Popoff 1933) and Slovakia (Uhríková in Májovský 1976, 1978; Hindáková & Májovský 1977; Chrtek *et al*. 2004), for *H. crinitum* Sibth. & Sm. [*H. racemosum* subsp. *crinitum* (Sibth. & Sm.) Zahn] from Greece (Schuhwerk & Lippert 1998), and for *H. racemosum* subsp. *leiopsis* from Austria in a mixed population with diploid plants (Schuhwerk & Lippert 1999). The tetraploid count was reported for *H. crinitum* from Greece (Schuhwerk & Lippert 1998).

Hieracium barbatum is very rare in Poland, occurring at a few localities in Lower Silesia and the West Carpathians (Zahn 1935; Szeląg, in prep.). Polish localities of *H. barbatum* are among the northernmost for the whole *H. racemosum* agg. (cf. Bräutigam 1992).

Hieracium bupleuroides C. C. Gmelin

2n = 4x = 36 (Fig. 2)

SPECIMENS EXAMINED. POLAND. Pieniny Mts: Wąwóz Sobczański gorge, *Dendranthemo-Seslerietum* on limestone rocks, 49°24′N/20°24′E, alt. 596 m, 27 Aug. 2001, *Z. Szeląg & V. Vladimirov*; Smolegowa Skała Mt., *Festucetum pallentis* on limestone rocks, 49°24′N/20°34′E, alt. 630 m, 27 Aug. 2001, *Z. Szeląg & V. Vladimirov*.

This is the first chromosome number report for the species from Poland. Triploid counts have been given from the Western Carpathians (Murín & Uhríková in Májovský 1970) and from the Alps (Polatschek 1966; Schuhwerk & Lippert 1999). Recently the tetraploid chromosome number was reported from the Slovak Western Carpathians (Chrtek *et al*. 2004).

Hieracium laevigatum Willd.

2n = 3x = 27 (Fig. 3)

SPECIMENS EXAMINED. POLAND. Ząbkowice, pine forest with *Corynephorus canescens* and *Koeleria glauca*, 50°22′N/19°15′E, alt. 260 m, 29 Aug. 2001, *Z. Szeląg.*

This is the first chromosome number report from Poland for this species. The triploid chromosome number has been reported for *H. laevigatum s.l.* (Rosenberg 1917, 1926; Christoff & Popoff 1933; Gadella & Kliphuis 1966; Belaeva & Siplivinnsky 1981; Dmitrieva 1987; Lavrenko *et al.* 1989; Lavrenko *et al.* 1990; Schuhwerk & Lippert 1999) and for *H. laevigatum* subsp. *perangustum* (Dahlst.) Zahn (Schuhwerk & Lippert 1999). The diploid count has been reported from Finland by Jalas and Pellinen (1985).

Hieracium laurinum Arvet-Touvet

2n = 2x = 18 (Fig. 4)

SPECIMENS EXAMINED. POLAND. Buków village near Kraków, on roadside together with *Hieracium umbellatum*, 49°57′N/19°50′E, alt. 250 m, 29 Aug. 2001, *Z. Szeląg & V. Vladimirov.*

This is the first diploid count for this species. Morphologically, *H. laurinum* is intermediate between *H. umbellatum* and *H. sabaudum* (cf. Zahn 1935); it grows mostly together with the first of them or, rarely, with both species.

Hieracium sabaudum L.

2n = 3x = 27, 2n = 4x = 36 (Fig. 5)

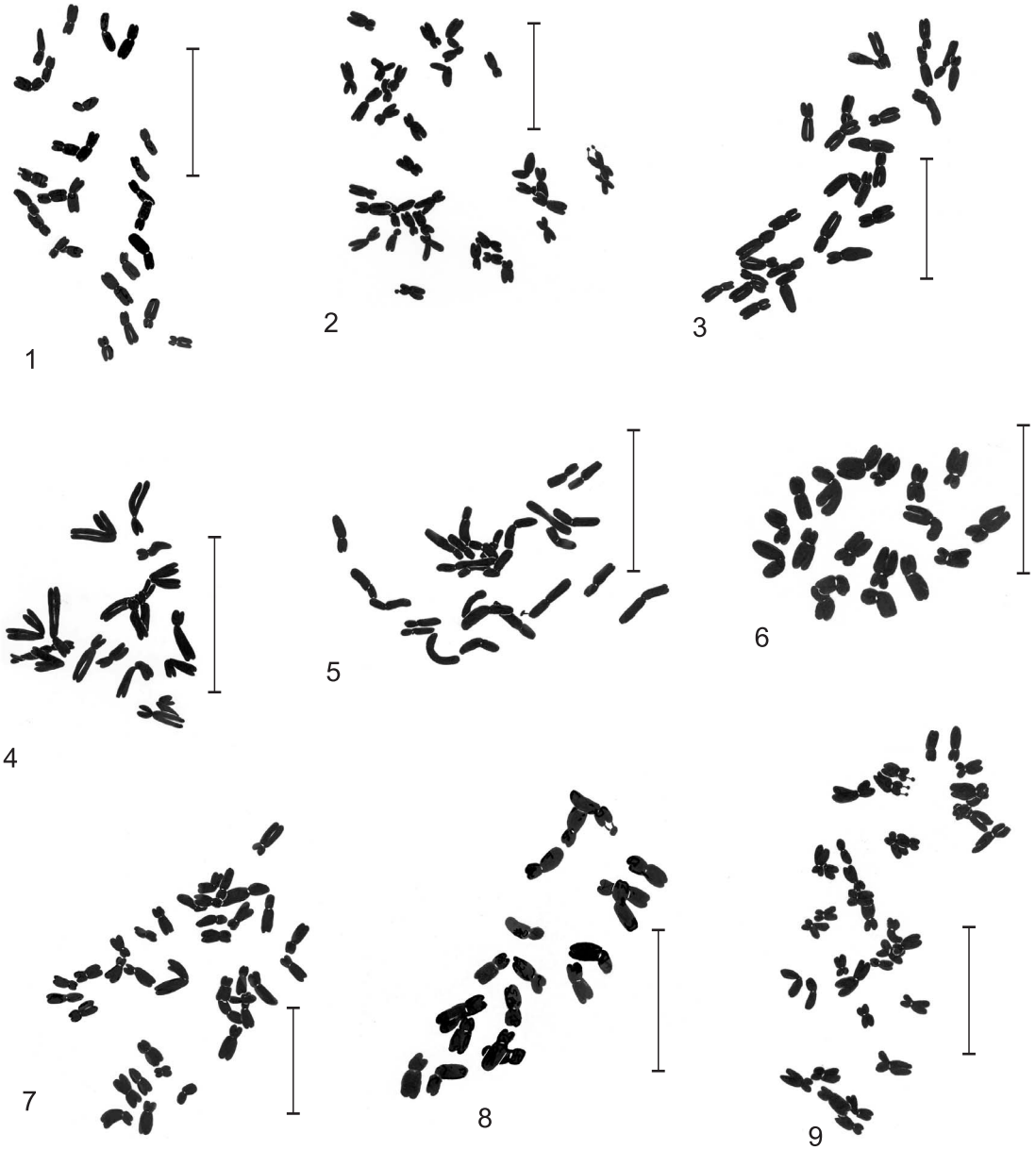
SPECIMENS EXAMINED. POLAND. Zielona Góra Nature Reserve near Częstochowa, margin of *Tilio-Carpinetum* forest, 50°46′N/19°14′E, alt. 285 m, 2 Sep. 2001, *Z. Szeląg.*

Diploid (Chouksanova *et al.* 1968; Uhríková & Feráková 1977) and triploid (Rosenberg 1926; Fedorov 1969; Murín & Váchová in Májovský 1970; Mesíček & Javůrková-Jarolímová 1992) counts have been published for the species. Also, the diploid number has been reported for the *H. sabaudum* agg. (Hrušovská-Osuská 1988), and triploid for *H. sabaudum* subsp. *sublactucaceum* Zahn and *H. sabaudum* subsp. *vagum* (Jord.) Zahn (Schuhwerk & Lippert 1999). The tetraploid chromosome count has been reported by Chrtek *et al*. (2004).

Hieracium umbellatum L.

2n = 2x = 18 (Fig. 6)

SPECIMENS EXAMINED. POLAND. Mogilany near Kraków, by road, 49°56′N/19°52′E, alt. 400 m, 29 Aug. 2001, *Z. Szeląg & V. Vladimirov.*



Figs 1–9. Mitotic metaphase plates of: 1 – *Hieracium barbatum* Tausch, 2n = 27; 2 – *H. bupleuroides* C. C. Gmelin, 2n = 36; 3 – *H. laevigatum* Willd., 2n = 27; 4 – *H. laurinum* Arvet-Touvet, 2n = 18; 5 – *H. sabaudum* L., 2n = 27; 6 – *H. umbellatum* L., 2n = 18; 7 – *H. villosum* Jacq., 2n = 36; 8 – *H. lactucella* Wallr., 2n = 18; 9 – *H. schultesii* F. W. Schultz., 2n = 36. Scale bars = 10 μm.

Several chromosome counts (2n = 17, 18, 27, 54) have been published for the species (e.g., Juel 1905; Nisioka 1956). Recently published is 2n = 18 + 0 – 1B (Lövkvist & Hultgard 1999). Diploid numbers were given for *H. umbellatum* subsp. *brevifolioides* Zahn (Strid & Franzén 1981; Schuhwerk & Lippert 1999) and *H. umbellatum* subsp. *umbellatum* (Schuhwerk

& Lippert 1999). The triploid number was published for *H. umbellatum* subsp. *scabriusculum* (Schwein.) Löve & Löve (Parfitt 1981; Löve & Löve 1982).

Hieracium villosum Jacq.

2n = 4x = 36 (Fig. 7)

SPECIMENS EXAMINED. POLAND. Tatry Zachodnie Mts, Wąwóz Kraków gorge, 49°14′N/19°53′E, alt. 1670 m, 28 Aug. 2001, *Z. Szeląg & V. Vladimirov.*

Triploid and tetraploid chromosome numbers have been published for the Western Carpathians (Skalińska *et al*. 1959; Murín & Paclová 1979; Murín & Májovský 1987; Chrtek *et al*. 2004) and from other European mountains (Christoff & Popoff 1933; Larsen 1954; Polatschek 1966).

Hieracium lactucella Wallr.

2n = 2x = 18 (Fig. 8)

SPECIMENS EXAMINED. POLAND. Tatry Zachodnie Mts, Wysoka Turnia Mt., 49°14′N/19°54′E, alt. 1750 m, grassy clearings in *Pinus mugo* community, 28 Aug. 2001, *Z. Szeląg & V. Vladimirov.*

Diploid chromosome counts have been reported in a number of publications. Recently the diploid number has been published by Gadella (1992), Schuhwerk & Lippert (1997), Krahulcová & Krahulec (1999) and Krahulcová *et al.* (2001).

Hieracium schultesii F. W. Schultz

2n = 4x = 36 (Fig. 9)

SPECIMENS EXAMINED. POLAND. Tatry Zachodnie Mts, Wysoka Turnia Mt., 49°14′N/19°54′E, alt. 1750 m, grassy clearings in *Pinus mugo* community, together with *H. lactucella*, 28 Aug. 2001, *Z. Szeląg & V. Vladimirov.*

A tetraploid chromosome number has been published for the species (Krahulcová & Krahulec 1999; Krahulcová *et al.* 2001). Triploid (2n = 27) by Schuhwerk & Lippert (1997) and pentaploid (2n = 45) by Krahulcová & Krahulec (1999) numbers have also been given. Recently, Rotreklová *et al*. (2005) published 2n ~ 5x on the basis of one plant from Lower Silesia in southern Poland.

ACKNOWLEDGMENTS. We thank the anonymous reviewer for helpful comments and suggestions, and Velichka Ilieva for technical assistance in the preparation of slides. We are grateful to the Polish and Bulgarian Academies of Sciences and to the Polish State Committee for Scientific Research (KBN grant no. 2 P04G 042 28) for their financial support.

REFERENCES

BELAEVA V. A. & SIPLIVINNSKY V. 1981. Chromosome number reports LXXIII. *Taxon* **30**: 857–860.

BRÄUTIGAM S. 1992. *Hieracium* L. In: H. MEUSEL & E. J. JÄGER (eds), *Vergleichende Chorologie der zentraleuropäischen Flora*, **3**: 325–333. Gustav Fischer, Jena.

CHOUKSANOVA N. A., SVESHNIKOVA L. I. & ALEXANDROVA T. V. 1968. Data on karyology of the family Compositae Giseke. *Citologija* **10**: 198–206.

CHRISTOFF M. & POPOFF A. 1933. Cytologische Studien über die Gattung *Hieracium*. *Planta* **20**: 440–447.

CHRTEK J. JUN., MRÁZ P. & SEVERA M. 2004. Chromosome numbers in selected species of *Hieracium* s.str. (*Hieracium* subgen. *Hieracium*, Compositae) in the Western Carpathians. *Preslia* **76:** 119–139.

DMITRIEVA S. A. 1987. Kariologicheskaja kharakteristika nekotorykh predstaviteley sem. slozhnocvetnykh (Asteraceae Dumort.) flory Belorussii. *Botanika* (*Minsk*) **28**: 23–33.

FEDOROV A. A. (ed.) 1969. Chromosome numbers of flowering plants. Nauka, Leningrad.

GADELLA T. W. J. 1992. Notes on some triple and inter-sectional hybrids in *Hieracium* L. subgenus *Pilosella* (Hill) S. F. Gray. *Proc. Kon. Ned. Akad. Wetensch. Biol.* **95**: 51–63.

GADELLA T. W. J. & KLIPHUIS E. 1966. Chromosome numbers of flowering plants in the Netherlands II. *Proc. Kon. Nederl. Akad. Wetenschapen, Ser. C* **69**: 541–556.

HINDÁKOVÁ M. & MÁJOVSKÝ J. 1977. IOPB Chromosome number reports LVI. *Taxon* **26**: 257–274.

HRUŠOVSKÁ-OSUSKÁ Ľ. 1988. Karyological study of some taxa of the flora of the northern part of Považský Inovec. Part I. *Acta Fac. Rer. Natur. Univ. Comen*., *Bot*. **35**: 69–79.

JALAS J. & PELLINEN K. 1985. Chromosome counts on *Erigeron*, *Hieracium*, *Pilosella* and *Sonchus* (Compositae), mainly from Finland. *Ann. Bot. Fenn.* **22**: 45–47.

JUEL H. O. 1905: Die Tetradenteilungen bei *Taraxacum* und anderen Cichorien. *Sv. Vet. Akad. Handl.* **39**(4): 1–22.

KRAHULCOVÁ A. & KRAHULEC F. 1999. Chromosome numbers and reproductive systems in selected representatives of *Hieracium* subgen. *Pilosella* in the Krkonoše Mts (the Sudeten Mts). *Preslia* **71**: 217–234.

KRAHULCOVÁ A., KRAHULEC F. & CHRTEK J. JUN. 2001. Chro-

mosome numbers and reproductive systems in selected representatives of *Hieracium* subgen. *Pilosella* in the Krkonoše Mts (the Sudeten Mts) – 2. *Preslia* **73**: 193–211.

LARSEN K. 1954. Chromosome numbers of some European flowering plants. *Bot. Tidsskr.* **50**: 163–174.

LAVRENKO A. N., SERDITOV N. P. & ULLE G. 1989. Chromosome numbers in some species of flowering plants of the Urals (the Komi Autonomous Soviet Socialist Republic). *Bot. Zhurn.* **74**: 1059–1061. (In Russian with English summary).

LAVRENKO A. N., SERDITOV N. P. & ULLE G. 1990. Chromosome numbers in some species of flowering plants of the Urals (the Komi Autonomous Soviet Socialist Republic). *Bot. Zhurn.* **75**: 1622–1624. (In Russian with English summary).

LÖVE Á. & LÖVE D. 1982. IOPB chromosome number reports LXXV. *Taxon* **31**: 344–360.

LÖVKVIST B. & HULTGARD U.-M. 1999. Chromosome numbers in South Swedish vascular plants. *Opera Bot.* **137**: 1–42.

MÁJOVSKÝ J. (ed.) 1970. Index of chromosome numbers of Slovakian flora Part 1. *Acta Fac. Rer. Natur. Univ. Comen. Bot.* **16**: 1–26.

MÁJOVSKÝ J. 1976 (ed.). Index of chromosome numbers of Slovakian flora. Part 5. *Acta Fac. Rer. Natur. Univ. Comen. Bot.* **25**: 1–18.

MÁJOVSKÝ J. 1978 (ed.). Index of chromosome numbers of Slovakian flora. Part 6. *Acta Fac. Rer. Natur. Univ. Comen. Bot.* **27**: 1–42.

MELANDER Y. & WINGSTRAND K. G. 1953. Gomori's haematoxylin as a chromosome stain. *Stain Technol.* **28:** 217.

MESÍČEK J. & JAROLÍMOVÁ V. 1992. List of chromosome numbers of the Czech vascular plants. Academia, Praha.

MURÍN A. & MÁJOVSKÝ J. 1987. Karyological study of the Slovak flora XIX. *Acta Fac. Rerum Nat. Univ. Comenianae*, *Bot*. **34**: 3–20.

MURÍN A. & PACLOVÁ L. 1979. IOPB Chromosome number reports LXIV. *Taxon* **28**: 403–405.

NISIOKA T. 1956: Karyotype analysis in Japanese Cichorieae. *Bot. Mag. Tokyo* **69**: 586–591.

PARFITT B. D. 1981. Chromosome number reports LXXI. *Taxon* **30**: 515–516.

POLATSCHEK A. 1966. Cytotaxonomische Beiträge zur Flora der Ostalpenländer. *Österr. Bot. Zeitschr.* **113**(1): 1–46 & (2): 101–147.

ROTREKLOVÁ O., KRAHULCOVÁ A., MRÁZ P., MRÁZOVÁV., MÁRTONFIOVÁ L., PECKERT T. & ŠINGLIAROVÁ B. 2005. Chromosome numbers and breeding systems of some European species of *Hieracium* subgen. *Pilosella. Preslia* **77**: 177–195.

ROSENBERG O. 1917. Die Reduktionsteilung und ihre Degeneration in *Hieracium*. *Svensk. Bot. Tidskr.* **11**: 145–206.

ROSENBERG O. 1926. Die semiheterotypische Teilung und ihre Bedeutung für die Entstehung verdoppelter Chromosomenzahlen. *Hereditas* **8**: 305–338.

SCHUHWERK F. & LIPPERT W. 1997. Chromosomenzahlen von *Hieracium* L. (Compositae, Lactuceae). Teil 1. *Sendtnera* **4**: 181–206.

SCHUHWERK F. & LIPPERT W. 1998. Chromosomenzahlen von *Hieracium* L. (Compositae, Lactuceae). Teil 2. *Sendtnera* **5**: 269–286.

SCHUHWERK F. & LIPPERT W. 1999. Chromosomenzahlen von *Hieracium* L. (Compositae, Lactuceae). Teil 3. *Sendtnera* **6**: 197–214.

SELL P. D. & WEST C. 1976. *Hieracium* L. In: T. G. TUTIN, V. H. HEYWOOD, N. A. BURGES, D. M. MOORE, D. H. VALENTINE, S. M. WALTERS & D. A. WEBB (eds), *Flora Europaea* **4**: 358–410. Cambridge University Press, Cambridge.

SKALIŃSKA M. 1967. Cytological analysis of some *Hieracium* species, subgen. *Pilosella* from mountains of southern Poland. *Acta Biol. Cracov., Ser. Bot*. **10**: 127–141.

SKALIŃSKA M. 1970. Further cytological studies in natural populations of *Hieracium aurantiacum* L. *Acta Biol. Cracov., Ser. Bot*. **13**: 111–117.

SKALIŃSKA M., CZAPIK R., & PIOTROWICZ M. *et al*. 1959. Further studies in chromosome numbers of Polish angiosperms (*Dicotyledons*). *Acta Soc. Bot. Polon.* **28**: 487–529.

SKALIŃSKA M., MAŁECKA J. & IZMAIŁOW R. *et al*. 1974. Further studies in chromosome numbers of Polish Angiosperms. Tenth contribution. *Acta Biol. Cracov., Ser. Bot*. **17**: 133–163.

SKALIŃSKA M., POGAN E. & JANKUN A. *et al*. 1968. Further studies in chromosome numbers of Polish Angiosperms. Seventh contribution. *Acta Biol. Cracov., Ser. Bot*. **11**: 199–224.

SKAWIŃSKA R. 1963. Apomixis in *Hieracium alpinum*. *Acta Biol. Cracov., Ser. Bot*. **5**: 7–14.

ŞTEFUREAC T. & TĂCINĂ A. 1979. Cytotaxonomical and chorological investigations of the endemic taxon *Hieracium pojoritense* Woł. *Rev. Roumaine Biol*. **24**: 109–120.

STRID A. & FRANZÉN R. 1981. Chromosome number reports LXIX. *Taxon* **29**: 709–710.

SZELĄG Z. & JANKUN A. 1997. Tetraploid *Hieracium alpinum* in the Polish Tatra Mts. *Fragm. Flor. Geobot*. **41**: 190–192.

UHRÍKOVÁ A. & FERÁKOVÁ V. 1977. [Report on *Hieracium sabaudum* and *H. umbellatum*]. In: Á. LÖVE (ed.), *IOPB Chromosome number reports LVI. Taxon* **26**: 263.

ZAHN K. H. 1935. *Hieracium* L. In: P. GRAEBNER FIL. (ed.), *Synopsis der mitteleuropäischen Flora*. **12**(2): 1–790. Borntraeger, Berlin.

Received 19 September 2005