

CHROMOSOME NUMBERS IN SELECTED SPECIES OF *HIERACIUM* SUBGENUS *PILOSELLA* (ASTERACEAE) FROM BULGARIA

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Abstract: Chromosome numbers are given for the following species of *Hieracium* subgen. *Pilosella* (Hill.) Gray from Bulgaria: *H. alpicola* Schleich. ex Gaudin ($2n = 27$), *H. brachiatum* Bertol. ex DC. ($2n = 45$), *H. cymosum* L. ($2n = 36, 54$), *H. echioides* Lumn. ($2n = 27$), *H. guthnickianum* Hegetschw. & Heer ($2n = 54$), and *H. pseudopilosella* Ten. ($2n = 18$). With the exception of *H. pseudopilosella*, the chromosome numbers of these species are reported for the first time from Bulgaria. A triploid number is reported for the first time for *H. alpicola*.

Key words: *Hieracium* subgen. *Pilosella*, Asteraceae, chromosome numbers, Bulgaria

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INTRODUCTION

The genus *Hieracium* L. is one of the most taxonomically intricate vascular plant genera of the temperate flora. The taxonomic difficulties are due mainly to the coexistence of normal sexual, hybridogenous, optional apomictic and obligatory apomictic genotypes, resulting in very complicated patterns of morphological variation. In a monograph of the genus (Zahn 1921–1923) two types of species are recognized: basic and intermediate, the latter often morphologically connecting the basic species almost continuously. All European species are grouped into two subgenera, *Hieracium* and *Pilosella* (Hill) Gray, which some authors (e.g., Sell 1987) believe are best considered as separate genera.

The subgenus *Pilosella* is characterized by the occurrence of several ploidy levels, based on $x = 9$, possible hybridization between most species, aposporic type of apomixis and the occurrence of clonal growth (Krahulcová & Krahulec 1999).

In Bulgaria *Hieracium* is one of the largest genera. Because of difficulties in distinguishing the taxa, the genus has been deliberately avoided in biosystematic studies in the country, so it is among the least-investigated vascular plant groups.

Christoff and Popoff (1933) and Gentscheff (1937) were the first Bulgarian authors to investigate *Hieracium* species cytologically. They used plant material from different botanical gardens, often of unknown origin and doubtful identification. Only a few recent publications are available on the chromosome numbers of taxa from native Bulgarian populations. These deficiencies encouraged us to start collecting living plants of different *Hieracium* species and to investigate their chromosome numbers.

MATERIAL AND METHODS

Living plants were collected in different floristic regions of Bulgaria in 1999 and cultivated in the greenhouse of the Institute of Botany, Bulgarian Academy of Sciences. Chromosomes were counted in the Karyosystematic Laboratory of the Institute of Botany on permanent slides. Two or three individuals of each species from each locality were investigated. Root tips were cut and pretreated with colchicine solution (0.01%) for ca 90 min., then fixed in acetic alcohol (1:3) for at least 2 h at room temperature, hydrolyzed in 1M HCl for 20 min. at 60°C, stained in hematoxylin after Gomori (Melander

& Wingstrand 1953) for 30 min. at 60°C and finally squashed. Voucher specimens are deposited in SOM.

RESULTS AND DISCUSSION

Hieracium alpicola Schleicher ex Gaudin

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

The species is distributed in Central Europe and the Balkan Peninsula (Zahn 1921–1923). A tetraploid chromosome number ($2n = 36$) has been

reported (Favarger 1959) from accessions in the Alps, whereas our count is the first record of a triploid number ($2n = 27$) for the species.

SPECIMENS EXAMINED. BULGARIA. Pirin Mt., Bez-bog peak, 41°43' N, 23°30' E, grassy places on granite in openings of *Pinus mugo* communities, alt. ca 2400 m, 01 Aug. 1999, *Vladimirov VV 5644*; – Pirin Mt., Razlozhki Suhodol valley, 41°48' N, 23°22' E, grassy places in openings of *Pinus mugo* communities on silicious bedrock, alt. ca 2300 m, 03 Aug. 1999, *Vladimirov VV 5353* (Fig. 1).

Hieracium brachiatum Bertol ex DCA.

$2n = 5x = 45$ (Fig. 2)

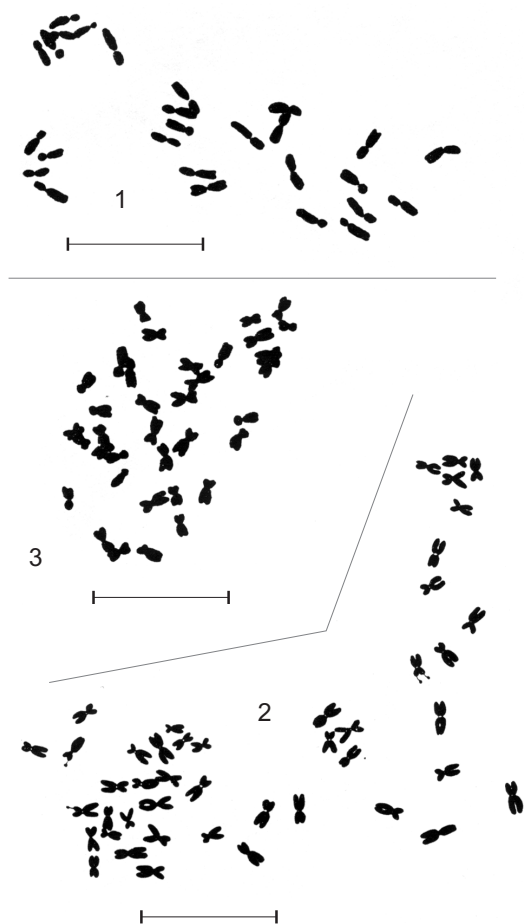
The distribution range of the species in Europe covers Central Europe, extending eastward to central Russia, Crimea and Bulgaria (Zahn 1921–1923). The chromosome number $2n = 45$ is published for the first time from a Bulgarian locality. It confirms an earlier count of Schuhwerk and Lippert (1997) for plants from Germany. Also, tetraploid ($2n = 36$) (Bräutigam & Bräutigam 1996; Schuhwerk & Lippert 1997) and hexaploid ($2n = 54$) (Bräutigam & Bräutigam 1996) chromosome numbers have been published from accessions in Germany.

SPECIMENS EXAMINED. BULGARIA. Pirin Mt., Demjanitsa valley, above Demjanishka poljana, 41°45' N, 23°27' E, rocky slope at edge of *Picea abies* forest on siliceous bedrock, alt. ca 1800 m, 02 Aug. 1999, *Vladimirov VV 5510* (Fig. 2).

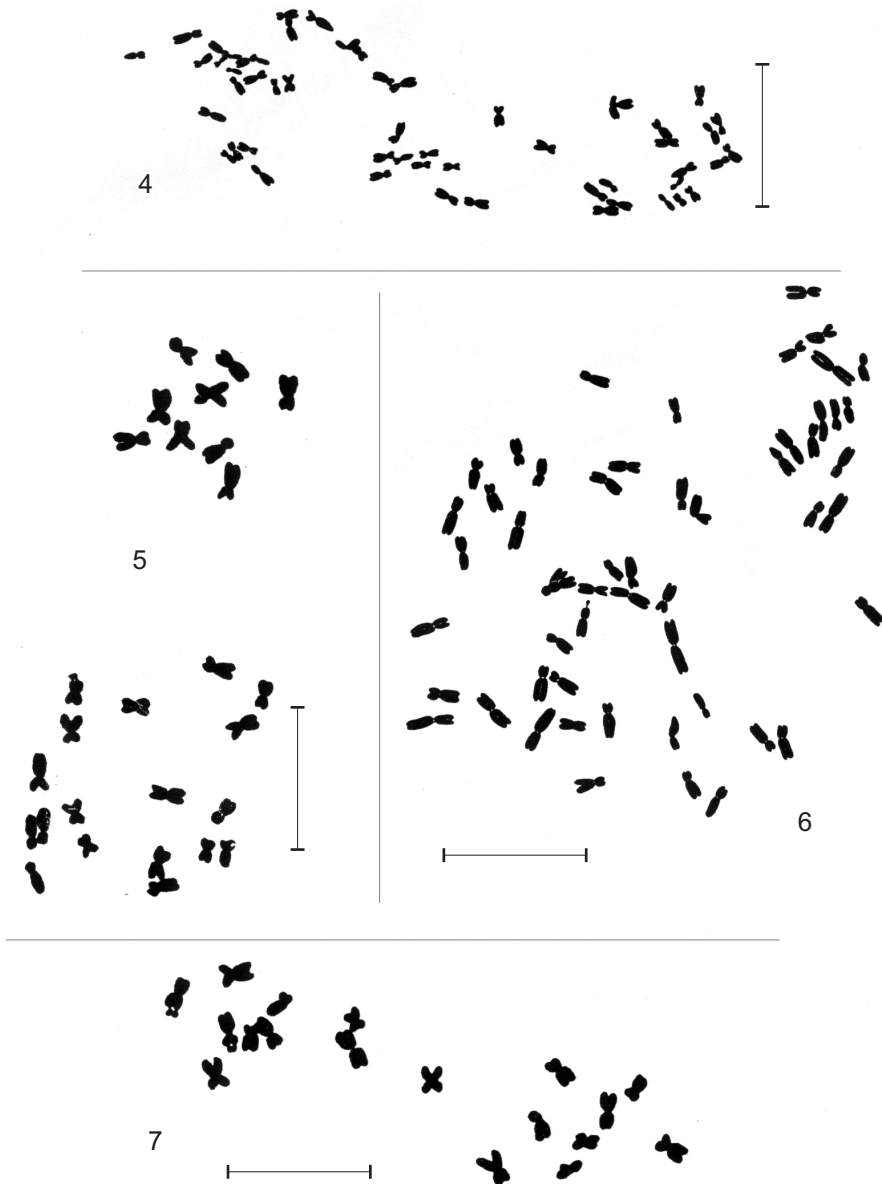
Hieracium cymosum L.

$2n = 4x = 36$, $2n = 6x = 54$ (Fig. 3 & 4)

The distribution area of the species covers much of Europe except for the westernmost parts, extending eastward to western Siberia and Asia Minor (Zahn 1921–1923). These are the first chromosome counts from Bulgarian accessions. So far, diploid chromosome number ($2n = 18$) has been published for *H. cymosum* from the Czech Republic (Mesíček & Jarolímová 1992; Šimek 2000), Germany (Schuhwerk & Lippert 1997) and Greece (Schuhwerk & Lippert 1998); triploid ($2n = 27$) from Austria (Schuhwerk & Lippert 1997); tetraploid ($2n = 36$) from the Caucasus,



Figs. 1–3. Mitotic metaphase plates of: 1 – *Hieracium alpicola* Schleich. ex Gaudin, $2n = 27$; 2 – *H. brachiatum* Bertol. ex DC., $2n = 45$; 3 – *H. cymosum* L., $2n = 36$; Scale bars = 10 μm .



Figs. 4–7. Mitotic metaphase plates of: 4 – *Hieracium cymosum* L., $2n = 54$; 5 – *H. echioides* Lumn., $2n = 27$; 6 – *H. guthnickianum* Hagetschw. & Heer, $2n = 54$; 7 – *H. pseudopilosella* Ten., $2n = 18$; Scale bars = 10 μm .

Armenia (Nazarova 1984), Austria (Schuhwerk & Lippert 1997), Italy (Gadella & Cliphuis 1970a) and the Netherlands (Gadella 1984); pentaploid ($2n = 45$) from Germany (Schuhwerk & Lippert 1997) and Macedonia (Schuhwerk & Lippert

1998); hexaploid ($2n = 54$) from the French Alps (Gadella & Kliphuis 1970b) and Greece (Strid & Anderson 1985); and heptaploid ($2n = 63$) from the French Alps (Gadella & Kliphuis 1970b).

A tetraploid number has been reported for

H. cymosum subsp. *heldreichianum* Nägeli & Peter from Greece (Grau & Erben 1988).

SPECIMENS EXAMINED. BULGARIA. Osogovska Mt., ca 3 km NE of Ruen peak, 42°10' N, 22°32' E, subalpine grassland on silicious bedrock, alt. ca 2000 m, 23 July 1999, *Vladimirov VV 5981* (2n = 36) (Fig. 3); – Pirin Mt., Razlozhki Suhodol valley, 41°49' N, 23°22' E, grassy places on granite in openings of coniferous forest above Javorov hut, alt. ca 1900 m, 03 Aug. 1999, *Vladimirov VV 5183* (2n = 54) (Fig. 4).

***Hieracium echioides* Lumn.**

2n = 2x = 27

(Fig. 5)

The species has a distribution area covering Central and Southern Europe, Central Asia, southern Siberia, eastward to Manchuria (Zahn 1921–1923). It occurs mainly in dry grasslands or sandy places. The chromosome number 2n = 27 is reported for the first time from a Bulgarian locality and coincides with already published data (Stepanov & Muratova 1995; Schuhwerk & Lippert 1997). Also, a diploid number (2n = 18) has been reported from Austria (Schuhwerk & Lippert 1997), Poland (Skalińska *et al.* 1976) and Russia (Stepanov & Muratova 1995); a tetraploid number (2n = 36) from Austria (Schuhwerk & Lippert 1997), Slovakia (Uhríková & Murín 1970), and with unknown origin from the Botanical garden in Belgrade (Gentscheff 1937).

SPECIMENS EXAMINED. BULGARIA. Strouma valley, Skinski gorge, 42°11' N, 22°54' E, roadside on andesite rocks, alt. ca 500 m, 26 July 1999, *Vladimirov VV 5813* (Fig. 5).

***Hieracium guthnickianum* Hegetschw. & Heer**

2n = 6x = 54

(Fig. 6)

The species is distributed in the Alps, the Carpathians and the mountains of the Balkan peninsula (Zahn 1921–1923). This is the first chromosome count for the species from a Bulgarian locality. It coincides with an earlier report for *H. guthnickianum* subsp. *erythrodes* (Nägeli & Peter) Zahn from Germany (Schuhwerk & Lippert 1997).

SPECIMENS EXAMINED. BULGARIA. Pirin Mt., Razlozhki Suhodol valley, 41°48' N, 23°22' E, grassy places on granite in openings of *Pinus mugo* communities,

alt. 2100–2200 m, 03 Aug. 1999, *Vladimirov VV 5245* (Fig. 6).

***Hieracium pseudopilosella* Ten.**

2n = 2x = 18

(Fig. 7)

The distribution range of this Mediterranean species covers Southern Europe and North Africa (Zahn 1921–1923). A diploid number (2n = 18) has been reported from Rila Mt. in Bulgaria (Pavlova 1999), Italy and Spain (Merxmüller 1975) and Morocco (Vogt & Oberprieler 1993), and tetraploids (2n = 36) from Morocco (Galland 1988; Schuhwerk & Lippert 1998; Vogt & Oberprieler 1993, 1994).

SPECIMENS EXAMINED. BULGARIA. Pirin Mt., Razlozhki Suhodol valley, 41°48' N, 23°22' E, grassy places on granite in openings of *Pinus mugo* – communities, alt. ca 2250 m, 03 Aug. 1999, *Vladimirov VV 5286* (Fig. 7).

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