



DIPLOID CHROMOSOME NUMBERS IN *HIERACIUM* AND *PILOSELLA* (ASTERACEAE) FROM MACEDONIA AND MONTENEGRO

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The authors report the first discovery of diploid populations of *Hieracium naegelianum* Panč. subsp. *naegelianum* and *H. naegelianum* subsp. *lyubotenticum* Behr & Zahn., and give the first chromosome counts for *H. cernuum* Friv., *H. gymnocephalum* Griseb. ex Pant., *H. sparsum* Friv., *Pilosella pavichii* (Heuff.) Holub and *P. serbica* (F. W. Schultz & Schultz-Bip.) Szlag from Macedonia and/or Montenegro. A diploid chromosome count for *Hieracium renatae* Szlag is confirmed based on material from the whole distribution range of the species. An emasculation experiment showed that all the analyzed diploid *Hieracium* taxa reproduce sexually.

Key words: Asteraceae, Balkan Peninsula, chromosome number, *Hieracium*, karyotype, mode of reproduction, *Pilosella*.

In Europe the genera *Hieracium* L. and *Pilosella* Vaill. (*Hieracium* sensu Zahn 1921–1923) are dominated by polyploids (triploids to pentaploids in *Hieracium* and triploids to octoploids in *Pilosella*) with a basic chromosome number of $x = 9$. Sexual diploids are very rare and restricted mainly to refugial areas of Southern Europe such as the Balkan Peninsula and Iberian Peninsula (Merxmüller, 1975; Schuhwerk and Lippert, 1998; Vladimirov, 2003; Vladimirov and Szlag, 2006; Chrtek et al., 2007, 2009). Looking for diploids, the first author carried out field research in the region of the former Yugoslavia, visiting sites including the highest massifs of Montenegro and Macedonia, the most refugial areas of mountain flora on the Balkan Peninsula (Horvat et al., 1974). During these studies many living plants of both genera were collected and analyzed karyologically. This paper presents the most significant results of this work focused on Balkan endemics.

Living plants were transplanted to an experimental garden of the first author, their chromosomes were counted at mitotic metaphase, and the mode of reproduction was tested with an emasculation experiment. Detailed information on the karyological procedure and experimental methods fol-

lowed here is given in Joachimiak et al. (1999) and Szlag (2006).

Vouchers are stored in the herbarium of the first author (Herb. Hierac. Z. Szlag) and the plants analyzed karyologically remain in cultivation in his garden.

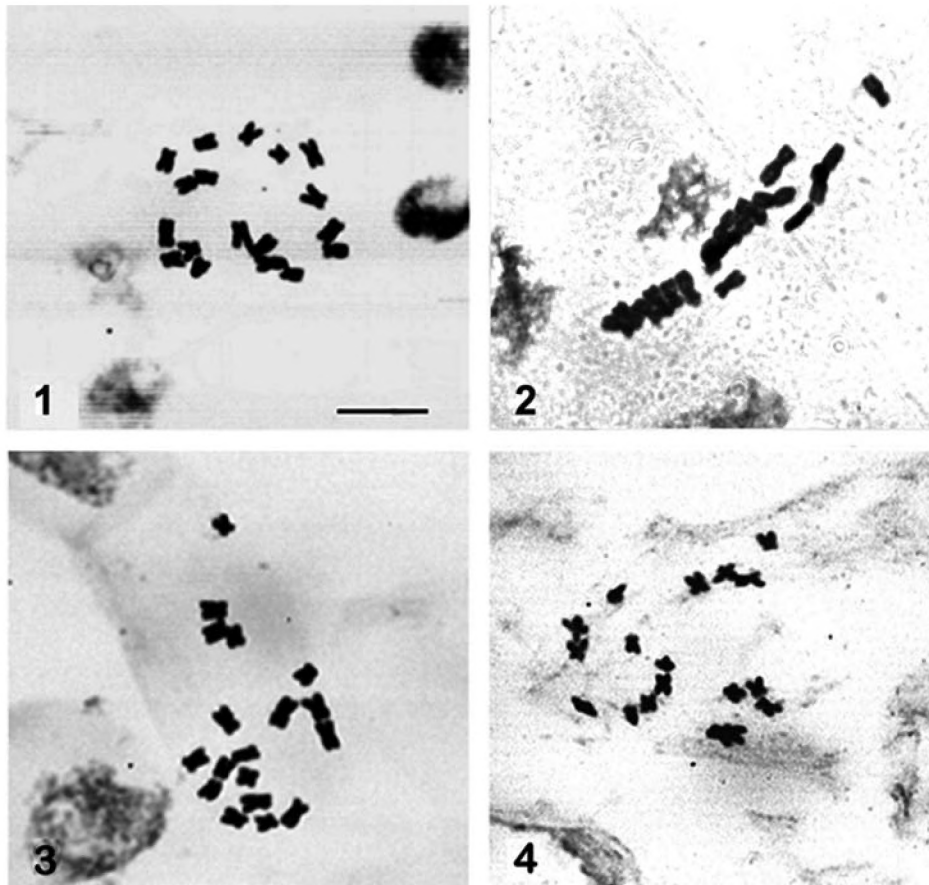
Hieracium cernuum Friv. $2n = 2x = 18$, sexual
Macedonia, Nidže Mts., along road to summit of Mt. Kajmakčalan, 2300 m a.s.l., alpine grassland on siliceous bedrock.

This is the first chromosome number for this species from Macedonia; it confirms the count recently published from Bulgaria (Ilnicki and Szlag, 2011).

Hieracium gymnocephalum Griseb. ex Pant. $2n = 2x = 18$, sexual
Montenegro, Prokletije Mts., Mt. Maja Rosave, 1650 m a.s.l., calcareous grassland on western slope above Zastan Koliba military checkpoint.

This is the first diploid chromosome number for the species from Montenegro; it confirms the recently published count from Albania (Chrtek et al., 2009). A triploid chromosome number was reported from the Durmitor Mts. in Montenegro (Niketić et al., 2006).

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Figs. 1–4. Metaphase plates of: **Fig. 1.** *Hieracium naegelianum* Panč. subsp. *naegelianum*, $2n = 18$. **Fig. 2.** *Hieracium naegelianum* subsp. *ljuboticum* Behr & Zahn, $2n = 18$. **Fig. 3.** *Hieracium renatae* Szelag, $2n = 18$. **Fig. 4.** *Pilosella serbica* (F. W. Schultz & Schultz-Bip.) Szelag, $2n = 18$. Bar = 10 μ m.

Hieracium naegelianum Panč. subsp. *naegelianum*
 $2n = 2x = 18$, sexual (Fig. 1)

1. Macedonia: Šarplanina Mts., Mt. Ljuboten, 2350 m a.s.l., calcareous rock crevices.
2. Macedonia, Korab Mts., between Mt. Šila Vort and Mt. Ništovski Korab, 2050 m a.s.l., calcareous scree.

This is the first diploid chromosome number for this species, previously known only from triploid populations on the Balkan Peninsula (Merxmüller, 1975; Grau and Erben, 1988; Buttler, 1991; Vladimirov and Szelag, 2001a; Niketić et al., 2003, 2006; Chrtek et al., 2007), including plants from the *locus classicus* on Mt. Kom Vasojevički in Montenegro (Ilnicki and Szelag, 2011). Until now the only known diploid in *Hieracium* sect. *Naegeltiana* Zahn ex Szelag was *H. renatae* Szelag described from Macedonia (see below).

Hieracium naegelianum subsp. *ljuboticum* Behr & Zahn $2n = 2x = 18$, sexual (Fig. 2)
 Macedonia, Šarplanina Mts., Mt. Ljuboten 2300 m a.s.l., calcareous rock crevices.

This is the first chromosome number for this taxon known only from Mt. Ljuboten.

Hieracium renatae Szelag $2n = 2x = 18$, sexual (Fig. 3)
 Macedonia, Jakupica Mts.: 1. Mt. Solunska Glava NW slope, 2400 m a.s.l. (*locus classicus*); 2. above Gorno Begovo plateau, rocky slope along road to summit of Mt. Solunska Glava, 2200 m a.s.l.; 3. on ridge between Mt. Solunska Glava and Grob pass, 2250 m a.s.l.; 4. on ridge between Mt. Solunska Glava and Mt. Pržal, 2370 m a.s.l.; 5. summit region of Mt. Solunska Glava above Nežilovska Stena cliff, 2520 m a.s.l.

The present count is based on abundant material from the whole known range of *H. renatae* and confirms the diploid chromosome number published in the protologue of the species (Szelag, 2010).

Hieracium sparsum Friv. $2n = 2x = 18$, sexual
 Macedonia, Nidže Mts., Redir ridge along road to summit of Mt. Kajmakčalan, 1650 m a.s.l., *Picea abies* forest margin on siliceous bedrock.

This is the first karyological data for this species from Macedonia; it confirms the chromosome number for the species previously published from Bulgaria (Vladimirov and Szeląg, 2001) and Serbia (Szeląg et al., 2007).

Pilosella pavichtii (Heuff.) Holub $2n = 2x = 18$

1. Macedonia, Jakupica Mts., siliceous rocks along road from Karadžica chalet to Mt. Krivil, 1720 m a.s.l.
2. Montenegro, Prokletije Mts., Čakor pass, 1840 m a.s.l., secondary rocky grassland.

This is the first karyological data for this species from Macedonia and Montenegro. Diploids were reported earlier from Bulgaria, Greece, Romania and Serbia (Christov and Popov, 1933; Strid and Frazén, 1981; Vladimirov, 2000; Mráz and Szeląg, 2004; Szeląg et al., 2007).

Pilosella serbica (F. W. Schultz & Schultz-Bip.) Szeląg $2n = 2x = 18$ (Fig. 4)

1. Macedonia, Korab Mts., Mt. Šila Vort, 2040 m a.s.l., rocky places on granite.
2. Montenegro, Prokletije Mts., Mt. Starac, 2100 m a.s.l., grassland with *Juncus trifidus* on granite.

This is the first chromosome number report for the species from Macedonia and Montenegro; it confirms the previously published count from Serbia (Szeląg et al., 2007; Szeląg, 2008).

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