

Recent findings of epiphytic mosses from *Orthotrichaceae* family in Poloniny National Park (Slovakia)

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Abstract: A survey focused on epiphytic mosses was carried out during serial biological excursions in Poloniny National park in 1998-2006. Total 14 species from *Orthotrichaceae* family were recorded there by author. As the most interesting taxa e.g. *Zygodon dentatus*, *Zygodon rupestris* and *Orthotrichum patens* can be considered. Historical and literature data are briefly discussed.

Keywords: Bryophytes, epiphytic mosses, *Orthotrichum*, *Ulota*, *Zygodon*, Poloniny National Park, Bukovské vrchy Mts., Slovakia, threatened species

Introduction

The Poloniny National Park is situated in the north-eastern part of Slovakia, in the Bukovské vrchy mountain range, along the border with Poland and Ukraine. Area of the park is almost 300 km² and a buffer zone about 100 km². From a geomorphological point of view, Poloniny belongs into Outer Eastern Carpathians and Bukovské vrchy unit. Forests, mainly beech and fir-beech, covering 80% of the total area, are typical of the region of Poloniny. There is the largest concentration of primeval forests in Slovakia. Mountain meadows, called 'poloniny', are situated on the main ridges of the Bukovské vrchy Mts. and are a special feature of this park. In respect of exiguous anthropogenic pressure on the region in the last a lot of native ecosystems remained still well-established there.

Methods

A survey focused on epiphytic mosses was carried out as a part of serial biological excursions in Poloniny National park in years 1998-2006. All of the recorded epiphytic species were collected and localization together with their ecological data were noted. The specimens are housed in herbarium of Silesian museum in Opava (OP) and in herbarium of Univesidat Autonoma de Barcelona (BCB). Presented localities are listed according to collecting date. The species names follow 'Annotated checklist of the mosses of Europe and Macaronesia' (Hill et al. 2006). Categories of threatened mosses (given in parentheses after the species names) correspond to Kubinská, Janovicová & Šoltés (2001).

List of the recorded species

Zygodon dentatus (Limpr.) Kartt. -[CR]

- Ruský potok village, 441 m a.s.l., 16.VI.2004 leg. Plášek (herb. OP); ecology: bark of *Malus domestica*, 200-250 cm high above ground, inclined on branch, NNW exposition.

Zygodon rupestris Schimp. ex Lorentz -[CR – evaluated as *Z. viridissimus*]

- Ruský potok village, 441 m a.s.l., 16.VI.2004 leg. Plášek (herb. OP); ecology: bark of *Malus domestica*, 200-250 cm high above ground, inclined on branch, NNW exposition.

***Orthotrichum affine* Brid.**

- Between Runina and Ruský potok villages, in valley of a stream, 600 m a.s.l., 21.VI.2000 leg. Plášek (herb. OP).
- Runina village, 573 m a.s.l., 21.VI.2003 leg. Plášek (herb. OP); ecology: bark of *Malus domestica*, 180-240 cm high above ground, vertically, NW exposition.
- Runina village, 577 m a.s.l., 21.VI.2003 leg. Plášek (herb. OP); ecology: bark of *Malus domestica*, 140-160 cm high above ground, vertically, WNW exposition.
- Kolbasov village, 309 m a.s.l., 16.VI.2004 leg. Plášek (herb. OP); ecology: bark of *Salix fragilis*, 60-180 cm high above ground, vertically, ENE exposition.
- Ruský potok village, 456 m a.s.l., 16.VI.2004 leg. Plášek (herb. OP); ecology: bark of *Juglans regia*, 190-200 cm high above ground, vertically, S exposition & bark of *Malus domestica*, 150-300 cm high above ground, vertically, W exposition.
- Ruský potok village, 482 m a.s.l., 16.VI.2004 leg. Plášek (herb. OP); ecology: bark of *Tilia cordata*, 180 cm high above ground, vertically, NNW exposition.
- 1.6 km NE edge of Ulič village, valley of Rožok stream, Rožok reserve, 408 m a.s.l., 21.VI.2006 leg. Plášek (herb. OP); ecology: bark of *Salix caprea*, 150 cm high above ground, vertically, W exposition.
- Runina village, near a church, 544 m a.s.l., 23.VI.2006 leg. Plášek (herb. OP, BCB); ecology: bark of *Malus domestica*, 40-180 cm high above ground, vertically, W exposition.
- N edge of Topoľa village, 388 m a.s.l., 23.VI.2006 leg. Plášek (herb. OP); ecology: bark of *Fraxinus excelsior*, 60-180 cm high above ground, inclined to vertically, SE exposition.

***Orthotrichum diaphanum* Brid.**

- Ulič village, 254 m a.s.l., 21.VI.2006 leg. Plášek (herb. OP, BCB); ecology: bark of *Malus domestica*, 190 cm high above ground, vertically, W exposition.

***Orthotrichum lyellii* Hook. & Taylor -[NT]**

- Nová Sedlica village, 445 m a.s.l., 20.VI.2003 leg. Plášek (herb. OP); ecology: bark of *Tilia cordata*, 40-120 cm high above ground, vertically, NE exposition.
- Between Runina and Ruský potok villages, 535 m a.s.l., 21.VI.2003 leg. Plášek (herb. OP); ecology: bark of *Malus domestica*, 160 cm high above ground, vertically, N exposition.
- Runina village, 568 m a.s.l., 21.VI.2003 leg. Plášek (herb. OP); ecology: bark of *Fraxinus excelsior*, 50-300 cm high above ground, vertically, E exposition.
- Kolbasov village, 309 m a.s.l., 16.VI.2004 leg. Plášek (herb. OP); ecology: bark of *Salix fragilis*, 60-180 cm high above ground, vertically, ENE exposition.
- Ruský potok village, 456 m a.s.l., 16.VI.2004 leg. Plášek (herb. OP); ecology: bark of *Fraxinus excelsior*, 180-230 cm high above ground, vertically, SSE exposition & bark of *Malus domestica*, 150-300 cm high above ground, vertically, W exposition.
- Ruský potok village, 441 m a.s.l., 16.VI.2004 leg. Plášek (herb. OP); ecology: bark of *Malus domestica*, 180 cm high above ground, vertically, E and W exposition.
- Between Runina and Ruský potok villages, in valley of a stream, 600 m a.s.l., 19.VI.2004 leg. Plášek (herb. OP, BCB); ecology: bark of *Malus domestica*, 200 cm high above ground, vertically, E exposition.
- SW slope of Kremenec Mt., touristic path along Slovakia/Ukraine border line, 1115 m a.s.l., 24.VI.2005 leg. Plášek (herb. OP); ecology: bark of *Fagus sylvatica*, 100-120 cm high above ground, vertically, E exposition.
- 1.6 km NE edge of Ulič village, valley of Rožok stream, Rožok reserve, 408 m a.s.l., 21.VI.2006 leg. Plášek (herb. OP); ecology: bark of *Salix caprea*, 150 cm high above ground, vertically, W exposition.
- NW edge of Ulič village, 253 m a.s.l., 21.VI.2006 leg. Plášek (herb. OP, BCB); ecology: bark of *Acer pseudoplatanus*, 250-300 cm high above ground, vertically, N exposition.

***Orthotrichum obtusifolium* Brid.**

- Between Runina and Ruský potok villages, 535 m a.s.l., 21.VI.2003 leg. Plášek (herb. OP); ecology: bark of *Malus domestica*, 160 cm high above ground, vertically, N exposition.
- Runina village, 577 m a.s.l., 21.VI.2003 leg. Plášek (herb. OP); ecology: bark of *Malus domestica*, 140-160 cm high above ground, vertically, WNW exposition.
- Ruský potok village, 482 m a.s.l., 16.VI.2004 leg. Plášek (herb. OP); ecology: bark of *Acer platanoides*, 160-180 cm high above ground, vertically, NW exposition.
- E edge of Ulič village, valley of Rožok stream, 254 m a.s.l., 21.VI.2006 leg. Plášek (herb. OP); ecology: bark of *Salix fragilis*, 60-130 cm high above ground, vertically/inclined, E exposition.

- Runina village, near a church, 544 m a.s.l., 23.VI.2006 leg. Plášek (herb. OP, BCB); ecology: bark of *Malus domestica*, 40-180 cm high above ground, vertically, W exposition.
- N edge of Topoľa village, 388 m a.s.l., 23.VI.2006 leg. Plášek (herb. OP); ecology: bark of *Fraxinus excelsior*, 60-180 cm high above ground, inclined/vertically, SE exposition.

***Orthotrichum pallens* Bruch ex Brid. -[NT]**

- Between Runina and Ruský potok villages, 535 m a.s.l., 21.VI.2003 leg. Plášek (herb. OP); ecology: bark of *Malus domestica*, 160 cm high above ground, vertically, N exposition.
- Runina vilage, 573 m a.s.l., 21.VI.2003 leg. Plášek (herb. OP); ecology: bark of *Malus domestica*, 180-240 cm high above ground, vertically, NW exposition.
- Between Runina village and summit of Ďurkovec Mt., 1083 m a.s.l., 15.VI.2004 leg. Plášek (herb. OP); ecology: bark of *Fagus sylvatica*, 150 cm high above ground, vertically, ENE exposition.
- Ruský potok village, 456 m a.s.l., 16.VI.2004 leg. Plášek (herb. OP); ecology: bark of *Juglans regia*, 190-200 cm high above ground, vertically, S exposition.
- SW slope of Kremenec Mt., touristic path along Slovakia/Ukraine border line, 1115 m a.s.l., 24.VI.2005 leg. Plášek (herb. OP); ecology: bark of *Fagus sylvatica*, 100-120 cm high above ground, vertically, E exposition.
- 1.5 km NE edge of Ulič village, valley of Rožok stream, Rožok reserve, 408 m a.s.l., 21.VI.2006 leg. Plášek (herb. OP); ecology: bark of *Fagus sylvatica*, 170 cm high above ground, vertically, N exposition.
- E edge of Ulič village, valley of Rožok stream, 254 m a.s.l., 21.VI.2006 leg. Plášek (herb. OP); ecology: bark of *Salix fragilis*, 60-130 cm high above ground, vertically/inclined, E exposition.

***Orthotrichum patens* Bruch ex Brid. -[CR]**

- Ruský potok village, 482 m a.s.l., 16.VI.2004 leg. Plášek (herb. OP); ecology: bark of *Tilia cordata*, 180 cm high above ground, vertically, NNW exposition.

***Orthotrichum pumilum* Sw.**

- Between Runina and Topoľa villages, mixed forest, 650 m a.s.l., 25.VI.1999 leg. Plášek (herb. OP).
- Between Runina and Ruský potok villages, in valley of a stream, 600 m a.s.l., 21.VI.2000 leg. Plášek (herb. OP).
- Runina vilage, 573 m a.s.l., 21.VI.2003 leg. Plášek (herb. OP); ecology: bark of *Malus domestica*, 180-240 cm high above ground, vertically, NW exposition.
- Ruský potok village, 456 m a.s.l., 16.VI.2004 leg. Plášek (herb. OP); ecology: bark of *Malus domestica*, 150-300 cm high above ground, vertically, W exposition.
- Nová Sedlica village, 445 m a.s.l., 17.VI.2004 leg. Plášek (herb. OP); ecology: bark of *Juglans regia*, 180 cm high above ground, vertically, E exposition.
- 890 m NE edge of Runina village, 666 m a.s.l., 20.VI.2006 leg. Plášek (herb. OP); ecology: bark of *Salix caprea* 60-250 cm high above ground, vertically, E exposition.
- NE edge of Runina village, 551 m a.s.l., 20.VI.2006 leg. Plášek (herb. OP); ecology: bark of *Malus domestica*, 160-200 cm high above ground, vertically, E exposition.
- Ulič vilage, 254 m a.s.l., 21.VI.2006 leg. Plášek (herb. OP, BCB); ecology: bark of *Malus domestica*, 190 cm high above ground, vertically, W exposition.
- Runina vilage, near a church, 544 m a.s.l., 23.VI.2006 leg. Plášek (herb. OP, BCB); ecology: bark of *Malus domestica*, 40-180 cm high above ground, vertically, W exposition.
- N edge of Topoľa vilage, 388 m a.s.l., 23.VI.2006 leg. Plášek (herb. OP); ecology: bark of *Fraxinus excelsior*, 60-180 cm high above ground, inclined/vertically, SE exposition.

***Orthotrichum speciosum* Nees**

- Between Runina and Topoľa vilages, mixed forest, 650 m a.s.l., 25.VI.1999 leg. Plášek (herb. OP).
- Runina vilage, 573 m a.s.l., 21.VI.2003 leg. Plášek (herb. OP); ecology: bark of *Malus domestica*, 180-240 cm high above ground, vertically, NW exposition.
- Runina vilage, 568 m a.s.l., 21.VI.2003, leg. Plášek (herb. OP); ecology: bark of *Fraxinus excelsior*, 50-300 cm high above ground, vertically, E exposition.
- Kolbasov vilage, 309 m a.s.l., 16.VI.2004 leg. Plášek (herb. OP); ecology: bark of *Salix fragilis*, 60-180 cm high above ground, vertically, ENE exposition.
- Ruský potok vilage, 482 m a.s.l., 16.VI.2004 leg. Plášek (herb. OP); ecology: bark of *Acer platanoides*, 160-180 cm high above ground, vertically, NW exposition.
- Ruský potok vilage, 456 m a.s.l., 16.VI.2004 leg. Plášek (herb. OP); ecology: bark of *Fraxinus excelsior*,

180-230 cm high above ground, vertically, SSE exposition & bark of *Malus domestica*, 150-300 cm high above ground, vertically, W exposition.

- NE edge of Runina village, 551 m a.s.l., 20.VI.2006 leg. Plášek (herb. OP); ecology: bark of *Malus domestica*, 160-200 cm high above ground, vertically, E exposition.
- 1.6 km NE edge of Ulič village, valley of Rožok stream, Rožok reserve, 408 m a.s.l., 21.VI.2006 leg. Plášek (herb. OP); ecology: bark of *Salix caprea*, 150 cm high above ground, vertically, W exposition.

***Orthotrichum stramineum* Hornsch. ex Brid. -[DD]**

- Between Runina and Ruský potok villages, in valley of a stream, 600 m a.s.l., 21.VI.2000 leg. Plášek (herb. OP).
- Runina village, 568 m a.s.l., 21.VI.2003 leg. Plášek (herb. OP); ecology: bark of *Fraxinus excelsior*, 50-300 cm high above ground, vertically, E exposition.
- Between Runina village and summit of Ďurkovec Mt., 960 m a.s.l., 15.VI.2004 leg. Plášek (herb. OP); ecology: bark of *Fagus sylvatica*, 50-80 cm high above ground, vertically, SE exposition.
- Ruský potok village, 441 m a.s.l., 16.VI.2004 leg. Plášek (herb. OP); ecology: bark of *Malus domestica*, 200-250 cm high above ground, inclined, NNW exposition.
- Nová Sedlica village, 445 m a.s.l., 17.VI.2004 leg. Plášek (herb. OP); ecology: bark of *Juglans regia*, 180 cm high above ground, vertically, E exposition.
- Between Runina and Ruský potok villages, in valley of a stream, 600 m a.s.l., 19.VI.2004 leg. Plášek (herb. OP, BCB); ecology: bark of *Malus domestica*, 200 cm high above ground, vertically, E exposition.
- Nová Sedlica village, Stučica primeval forest, 695 m a.s.l., 24.VI.2005 leg. Plášek (herb. OP); ecology: bark of *Acer pseudoplatanus*, 60 cm high above ground, vertically, ENE exposition.
- 890 m NE edge of Runina village, 666 m a.s.l., 20.VI.2006 leg. Plášek (herb. OP); ecology: bark of *Salix caprea*, 60-250 cm high above ground, vertically, E exposition.
- E edge of Ulič village, valley of Rožok stream, 254 m a.s.l., 21.VI.2006 leg. Plášek (herb. OP); ecology: bark of *Salix fragilis*, 60-130 cm high above ground, vertically/inclined, E exposition.

***Orthotrichum striatum* Hedw. -[VU]**

- 890 m NE edge of Runina village, 666 m a.s.l., 20.VI.2006 leg. Plášek (herb. OP); ecology: bark of *Salix caprea*, 60-250 cm high above ground, vertically, E exposition.

***Ulota bruchii* Hornsch. ex Brid. -[VU]**

- Nová Sedlica village, Stučica primeval forest, 695 m a.s.l., 24.VI.2005 leg. Plášek (herb. OP); ecology: bark of *Acer pseudoplatanus*, 60 cm high above ground, vertically, ENE exposition.

***Ulota crispa* (Hedw.) Brid. -[NT]**

- 1.5 km SW of Runina village towards Stakčín village, 750 m a.s.l., 15.V.1998 leg. Plášek, teste Vondráček (herb. OP, BCB); ecology: bark of *Fagus sylvatica*.
- SW edge of Runina village, valley of a stream, 546 m a.s.l., 21.VI.2003 leg. Plášek (herb. OP, BCB); ecology: bark of *Populus tremula*, 250 cm high above ground, vertically, NE exposition.
- Between Runina and Ruský potok villages, in valley of a stream, 600 m a.s.l., 19.VI.2004 leg. Plášek (herb. OP); ecology: bark of *Malus domestica*, 200 cm high above ground, vertically, E exposition.
- 890 m NE edge of Runina village, 666 m a.s.l., 20.VI.2006 leg. Plášek (herb. OP); ecology: bark of *Salix caprea*, 60-250 cm high above ground, vertically, E exposition.
- E edge of Ulič village, valley of Rožok stream, 254 m a.s.l., 21.VI.2006 leg. Plášek (herb. OP); ecology: bark of *Salix fragilis*, 60-130 cm high above ground, vertically/inclined, E exposition.
- Nová Sedlica village, Stučica primeval forest, 695 m a.s.l., 24.VI.2005 leg. Plášek (herb. OP); ecology: bark of *Acer pseudoplatanus*, 60 cm high above ground, vertically, ENE exposition.

Discussion

In the past, bryophytes of the Poloniny were not studied in detail. Several contributions to the bryoflora are possible to find in articles of Bauer (1941), Peciar (1960, 1965, 1969, 1970), Stuchlý (in Kučerová & Jeník 1963) or Herben, Soldán & Váňa (1980). All these literature data were summarized by Peciar (1987) together with his own results of survey. Historical findings of mosses from *Orthotrichaceae* family were revised and assembled by Vondráček (1993, 1994).

Data excerpted from literature sources mentioned above showed that 16 species within

Orthotrichaceae family were recorded in the Poloniny National Park and its vicinity in former times (see table 1). But at least 4 of the published records are problematical. Among others an occurrence of *Orthotrichum gymnostomum*, *O. stellatum* and *O. tenellum* seems to be disputable in relation to lacking of herbarium specimens. In the case of *Zygodon viridissimus*, the only specimen from the area (collected by Bauer in 1923; herb. in PRC, BRNM) was later recognized by Düll as *Z. rupestris*. Literature data about finding of *Zygodon dentatus* is presumably reliable although herbarium material collected by Sedlmayr in 1925 was not recently found. However, the specimen was studied and confirmed by Vondráček before (cf. Vondráček 1994).

The recent survey in the area confirmed an occurrence of 12 species (see table 1) and helped to find 2 new species (*Orthotrichum diaphanum* and *Ulota bruchii*). Both of the newly recorded species were collected only ones. It reflects the fact, the species probably occur very rarely in the area and they were not be just overlooked by bryologists before. It is surprising especially in case of *O. diaphanum* which belongs to common epiphytic mosses in Central Europe.

According to updated Red-List of bryophytes in Slovakia (Kubinská, Janovicová & Šoltés 2001), among the recently found species are 3 taxa considered as 'critically endangered' [CR], 2 considered as 'vulnerable species' [VU], 3 taxa from category 'near threatened' [NT] a 1 taxon evaluated as [DD] category (data deficient).

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Recentní nálezy epifytických mechů z čeledi *Orthotrichaceae* v národním parku Poloniny (Slovensko)

V rámci pravidelných botanických exkurzí do národního parku Poloniny bylo v letech 1998-2006 studováno druhové spektrum epifytických mechů z čeledi *Orthotrichaceae* a zaznamenávány jejich ekologické nároky. Celkem bylo nalezeno 14 druhů. Jde v mnoha případech o vzácné či ohrožené druhy uvedené na červeném seznamu mechorostů Slovenska. Práce přináší také srovnání historických a recentních dat.

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Tab. 1: Comparison of historical and recent data regarding an occurrence of epiphytic mosses in Poloniny National Park and its vicinity

species	historical data					recent data		comments
	Bauer (1941)	Peciar (1960)	Peciar (1965)	Herben, Soldán & Váňa (1980)	Peciar (1987)	Vondráček (1993, 1994)	Plášek (1998-2006)	
<i>Zygodon dentatus</i>						1*	1	* the mentioned specimen was not found in herbarium BRNM by author of the article
<i>Zygodon rupestris</i>						1	1	
<i>Zygodon viridissimus</i>	1*							* the mentioned specimens collected by Bauer in 1923 is <i>Z. rupestris</i> - rev. Düll 1985 (PRC), Soldán 1989 (BRNM) & Plášek 2007 (BRNM, PRC)
<i>Orthotrichum affine</i>			1		1	1	1	
<i>Orthotrichum diaphanum</i>							1	
<i>Orthotrichum gymnostomum</i>	1*							* doubtful literature data; there was no herbarium specimen found during revision of the genus <i>Orthotrichum</i> neither by Vondráček (1993) or author of the article
<i>Orthotrichum lyellii</i>			1			1	1	
<i>Orthotrichum obtusifolium</i>	1		1			1	1	
<i>Orthotrichum pallens</i>						1	1	
<i>Orthotrichum patens</i>						1	1	
<i>Orthotrichum pumilum</i>						1	1	
<i>Orthotrichum speciosum</i>			1			1	1	
<i>Orthotrichum stellatum</i>						1*		* doubtful literature data; all Slovakian herbarium specimens signed as <i>O. stellatum</i> were identified wrong. Only herbarium material of <i>O. stellatum</i> from Slovakia was collected in Mlýnská valley in Low Tatras Mts. (cf. Vondráček 1993)
<i>Orthotrichum stramineum</i>			1			1	1	
<i>Orthotrichum striatum</i>		1	1			1	1	
<i>Orthotrichum tenellum</i>						1*		* doubtful literature data; all Slovakian herbarium specimens signed as <i>O. tenellum</i> were identified wrong. Only herbarium material from Slovakia conformable to <i>O. tenellum</i> was collected in Jánská valley in Low Tatras Mts. (cf. Vondráček 1993)
<i>Ulota bruchii</i>							1	
<i>Ulota crispata</i>		1	1	1	1	1	1	



Fig. 1: 1 - *Orthotrichum striatum* (with detail view of peristome); 2 - *O. patens*; 3 - *O. lyellii* (with detail view of gemmae); 4 - *Zygodon rupestris* (with detail view of gemmae /4a/); 4b - leaf apex of *Zygodon dentatus*; 4c - gemmae of *Zygodon dentatus*. Photos made by V. Plášek