

***Polypodium vulgare* L. in the communities of acidophilous and thermophilous oak forests in the Sudety Mts and their foreland**

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Abstract: In the Sudety Mts and their foreland, *Polypodium vulgare* is the main component of the rocky plant communities classified within the class *Asplenieta trichomanis*. In the forest communities, this fern occurs most frequently in the patches of forests of the alliance *Tilio platyphyllis-Acerion pseudoplatani*. Phytosociological and floristic research, conducted from 2008 to 2011 in acidophilous and thermophilous oak forests of the Sudety Mts and their foreland, revealed that *P. vulgare* was an element of different importance in the herb layer in these communities. *P. vulgare* was mostly observed in the stands of oak forests at the altitude above 300 m a.s.l., in west, south-west or south-facing slopes. *P. vulgare* was recorded mainly in the herb layer of thermophilous oak forests (ass. *Sorbo torminalis-Quercetum* and oak forests with the occurrence of *Silene vulgaris* and *Galium verum*) and acidophilous oak forests with the occurrence of *Festuca pallens* and *Cotoneaster integerrimus* developed in extremely xerothermic sites. For the latter community, *P. vulgare* is a differential species.

Abstrakt: W Sudetach oraz na przedgórzu sudeckim *Polypodium vulgare* jest przede wszystkim komponentem zbiorowisk naskalnych, zaliczanych do klasy *Asplenieta trichomanis*. W zbiorowiskach leśnych z większą częstością pojawia się w płatach lasów klonowo-lipowo-jaworowych ze związku *Tilio platyphyllis-Acerion pseudoplatani*. Badania florystyczno-fitosocjologiczne, przeprowadzone w latach 2008-2011 w lasach dębowych Sudetów i ich Przedgórza, wykazały, że paprotka zwyczajna jest składnikiem o różnym znaczeniu w warstwie runa w dąbrowach. *P. vulgare* została odnotowana głównie w płatach lasów dębowych występujących na wysokości powyżej 300 m n.p.m., na stokach o wystawie zachodniej, południowej bądź południowo-zachodniej. Paprotka była najczęściej komponentem runa w zbiorowiskach dąbrów świetlistych (ass. *Sorbo torminalis-Quercetum*, dąbrowy z udziałem *Silene vulgaris* i *Galium verum*) oraz dąbrów kwaśnych, rozwijających się na wybitnie kserotermicznych siedliskach (dąbrowy z udziałem *Festuca pallens* i *Cotoneaster integerrimus*). Dla tych ostatnich *P. vulgare* pełni rolę gatunku wyróżniającego.

KEY WORDS: *Polypodium vulgare*, *Quercetea robori-petraeae*, *Quercetalia pubescenti-petraeae*, Sudety Mts, SW Poland

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Introduction

In the Sudety Mts and their foreland, *Polypodium vulgare* L. is one of the main components of the rocky communities of the class *Asplenieta trichomanis* (Br.-Bl. in Meier & Br.-Bl. 1934) Oberd. 1977 (Anioł-Kwiatkowska, Świerkosz 1992; Świerkosz 2004; Nowak et al. 2008; Świerkosz 2012; Świerkosz, Reczyńska 2012), in which it reaches the highest values of frequency and cover. In these communities *P. vulgare* prefers non-calcareous rocks in shady sites (Świerkosz 2012).

In oak forests, *P. vulgare* is much less abundant and reaches a lower cover comparing to the previous communities. Despite that, the research on syntaxonomical diversity and distribution of acidophilous and thermophilous oak forests in the Sudety Mts and their foreland revealed a diagnostic value of *P. vulgare* for this type of communities. Presented article focuses on phytosociological variation of the Sudeten oak forest communities, in which *P. vulgare* was noted.

Materials and methods

Research focused on the oak forests of the Sudety Mts and their foreland was conducted between 2008 and 2011. 343 relevés were collected according to the Braun-Blanquet approach (Westhoff, van der Maarel 1978; Mueller-Dombois, Ellenberg 2003) and stored in a TURBOVEG database (Hennekens, Schaminée 2001). Values of slopes were estimated using Digital Terrain Model prepared in Arc Gis Desktop Arc View 10.

From all data collected, 312 relevés were analyzed using a modified TWINSpan method (Roleček et al. 2009), available in the JUICE program (Tichý 2002). Cluster heterogeneity was measured by Total Inertia software (Tichý et al. 2007). As a measure of fidelity, phi coefficient was used (Chytrý et al. 2002). Only species with both significant concentration in particular vegetation unit (using the Fisher's exact test at the significance level $p = 0.05$) and phi coefficient = 0.20 were considered to be diagnostic species.

In this paper, only relevés in which *P. vulgare* occurs are presented. The syntaxonomy is based on the following publications: Chytrý (1997), Moravec (1998), Matuszkiewicz J. M. (2007) and Matuszkiewicz W. (2007). The nomenclature of vascular plants is in accordance with Mirek et al. (2002). Bryophytes nomenclature follows Ochyra et al. (2003). The information on habitat conditions such as a bedrock and soil type were taken from the Detailed Geological Map of the Sudety Mts and provided by the Bureau for Forest Management and Geodesy in Brzeg.

Results

Polypodium vulgare was observed in four types of oak forest communities and documented in 28 relevés, what makes 9% of all data analyzed. It was found in 30% of relevés representing the oak forests with a participation of *Festuca pallens* and *Cotoneaster integerrimus* and in 22% with *Silene vulgaris* and *Galium verum*; furthermore it occurred in 13% of relevés representing oak forests classified as the *Sorbo torminalis-Quercetum* Svoboda ex Blažková 1962 association and in 7% relevés belonging to the *Luzulo luzuloidis-Quercetum* Hilitzer 1932 association (Tab. 1-4). Figure 1 shows the distribution of the plots of the oak forest communities with occurrence of *P. vulgare*.



Fig. 1. Distribution of the oak forest communities with *Polypodium vulgare* L.
Ryc. 1. Rozmieszczenie płatów lasów dębowych z udziałem *Polypodium vulgare* L.

Oak forests with *Festuca pallens* and *Cotoneaster integerrimus* (Tab. 1)

This community belongs to the class *Quercetea robori-petraeae* Br.-Bl. et R.Tx. 1943 and represents xerothermic acidophilous oak forests. The species composition strongly resembles the ass. *Viscario-Quercetum* Stöcker 1965 known from the Czech Republic. In the Sudety Mts it occurs mainly in rocky river valleys, in south-west and west-facing slopes with an inclination between 10 and 60°, usually covered by brown soils, regosols and brown acid soils developed on greywacke, siltstones or claystones and basalts. *P. vulgare* was observed at three sites of this community (Nysa Kłodzka gorge near Bardo and near Morzyszów, and the hill of Ostrzyca Proboszczowicka). At these locations, the tree layer was opened with the cover between 30% and 50%, dominated by *Quercus petraea*; the shrub layer was usually well developed and the herb layer cover ranged from 20% to 80%. Also, the medium-developed moss layer was regularly present. The cover of *P. vulgare* in this community varied from 0.1% to 0.5%. The fern was accompanied by both acidophytes, such as *Deschampsia flexuosa*, *Luzula luzuloides*, *Calluna vulgaris*, *Hieracium pilosella*, *Agrostis capillaris*, and by thermophilous, drought-tolerant species, which prefer rocky habitats, e.g. *Festuca pallens*, *Cotoneaster integerrimus*, *Cardaminopsis arenosa*, *Vincetoxicum hirundinaria* and *Silene nutans*.

Oak forests with *Silene vulgaris* and *Galium verum* (Tab. 2)

This community belongs to the class *Querco-Fagetea* and, at the moment, is classified within the order *Quercetalia pubescenti-petraeae* Klika 1933 corr. Moravec in Beg. et Theurill 1984. Its syntaxonomical position is however still unclear and requires further analyses. Most likely it represents a transitional form between thermophilous oak forests of the ass. *Potentillo albae-Quercetum petraeae* Libb. 1933 occurring in Polish lowlands and thermophilous oak forests of a submontane part of the Sudety Mts. It grows exclusively on brown rankers rich in Mg²⁺ developed on serpentine rocks, and is known only from the Sudety Foreland. *P. vulgare* has been observed at three sites of this community (the hill of Radunia, the Oleszeńskie Hills and the Kiełczyńskie Hills). At these locations, the community was formed by an open tree layer usually dominated by *Quercus petraea* with an admixture of *Pinus sylvestris*. However, some of the stands, e.g. in the Kiełczyńskie Hills, have been converted into *Pinus sylvestris* plantations. The shrub layer was absent or scarcely developed, the herb layer cover varied from 60% to 100% and in the most relevés, the cover of moss layer was low. *P. vulgare* occurred in this community with a cover value ranging from 0.1% to 5%. The fern grew together with species, which are typical of xerothermic swards from the *Festuco-Brometea* Br.-Bl. et R.Tx. 1943 class and are considered differential species of this oak

Table 1. Occurrence of *Polypodium vulgare* L. in the oak forest communities with a participation of *Festuca pallens* and *Cotoneaster integerrimus*.

Tabela 1. Występowanie *Polypodium vulgare* L. w zbiorowiskach lasów dębowych z udziałem *Festuca pallens* i *Cotoneaster integerrimus*.

Relevé no. (Numer zdjęcia) Relevé field no. (Numer zdjęcia w terenie)		1	2	3	4	5	6	7	8	9			
Date: y/m/d (Data: r/m/d)		2010	2010	2010	2010	2009	2009	2009	2009	2009			
Relevé area (Powierzchnia zdjęcia) m ²		200	200	200	200	200	100	100	100	100			
Altitude m a.s.l. (Wysokość n.p.m.)		333.4	319.9	326.1	344.8	289.7	293.0	296.6	465.1	465			
Aspect (Wystawa)		SW	SW	SW	SW	W	W	W	SW	S			
Slope in degrees (Nachylenie w stopniach)		50	15	45	50	40	40	10	18.3	30			
Cover tree layer a2 (Zwarcie warstwy drzew) %	Layer	.	50	.	.	40	30	30	30	30	Constancy in %		
Cover tree layer a3 (Zwarcie warstwy drzew) %		30	.	30	30	10	.	.	.	+			
Cover shrub layer b (Zwarcie warstwy krzewów) %		30	20	20	20	5	30	30	5	5			
Cover herb layer c (Pokrycie warstwy runa) %		20	25	30	30	50	70	60	80	80			
Cover moss layer d (Pokrycie warstwy mszystej) %		10	10	10	15	+	5	30	10	+			
Bedrock type (Podłoże geologiczne)		SL/CL	SL/CL	SL/CL	SL/CL	GR	GR	GR	BS	BS			
Soil type (Typ gleby)		R	R	R	R	B	B	B	BA	BA			
No. of species (Liczba gatunków)			39	31	27	27	18	25	36	32		23	
<i>Polypodium vulgare</i>			+	+	r	+	+	+	+	r		+	100
D. <i>Festuca pallens</i>-<i>Cotoneaster integerrimus</i> group													
<i>Festuca pallens</i>		1	+	2	1	2	+	1	2	3	100		
<i>Cotoneaster integerrimus</i>	b	1	.	.	.	1	2	.	+	+	78		
<i>Cotoneaster integerrimus</i>	c	+	+	.	.	+	+	+	+	.	.		
<i>Galium pumilum</i>		+	+	+	+	.	.	.	.	.	44

<i>Polytrichum piliferum</i>	d	+	.	+	+	+	.	.	.	.	44
<i>Cardaminopsis arenosa</i>		r	r	.	+	.	.	.	.	.	33
<i>Galeopsis ladanum</i>		+	+	.	.	.	+	.	.	.	33
Ch. et D*. O. Quercetalia pubescenti-petraeae											
<i>Silene nutans*</i>		1	+	+	+	2	.	1	2	2	89
<i>Vincetoxicum hirundinaria*</i>		1	1	1	+	.	.	+	2	1	78
<i>Campanula persicifolia</i>		.	r	+	.	.	+	+	+	+	67
<i>Polygonatum odoratum*</i>		+	+	+	+	44
<i>Campanula rapunculoides*</i>		+	+	.	.	+	33
<i>Digitalis grandiflora*</i>		+	+	22
Sporadic (sporadycznie): <i>Coronilla varia*</i> 301 +; <i>Lathyrus niger</i> 302 r; <i>Trifolium alpestre*</i> 301 +.											
Ch. Cl. Querco-Fagetea											
<i>Poa nemoralis</i>		+	+	+	.	.	+	+	1	.	67
<i>Carpinus betulus</i>	a2	.	.	.	.	.	1	.	.	.	67
<i>Carpinus betulus</i>	a3	1	.	.	1	1	.	.	.	.	.
<i>Carpinus betulus</i>	b	.	+	.	2	+	2	1	.	.	.
<i>Carpinus betulus</i>	c	+	+	.	1	+	+	+	.	.	.
<i>Tilia cordata</i>	a2	.	.	.	.	.	1	.	1	.	55
<i>Tilia cordata</i>	a3	.	.	2	.	.	.	.	.	.	.
<i>Tilia cordata</i>	b	.	1	2	.	.	.	1	+	.	.
<i>Tilia cordata</i>	c	.	r	+	.	.	+	.	+	.	.
<i>Acer pseudoplatanus</i>	c	.	r	.	.	.	r	.	r	.	33
<i>Cerasus avium</i>	b	+	.	.	.	.	.	.	.	.	33
<i>Cerasus avium</i>	c	+	.	r	r	.	.	.	.	.	.
<i>Corylus avellana</i>	b	+	+	1	.	.	.	.	.	.	33
<i>Fraxinus excelsior</i>	b	.	.	.	.	.	.	.	+	.	22
<i>Fraxinus excelsior</i>	c	.	.	.	r	.	.	.	.	.	.
<i>Melampyrum nemorosum</i>		.	.	.	.	.	+	+	.	.	22

<i>Stellaria holostea</i>	c	.	.	.	.	.	r	r	.	.	22
Sporadic (sporadycznie): <i>Acer platanoides</i> c 144 r; <i>Fagus sylvatica</i> c 147 +; <i>Dryopteris filix-mas</i> c 154 r; <i>Stellaria nemorum</i> c 147 +; <i>Hedera helix</i> c 154 +.											
Ch. Cl. Quercetea robori-petraeae et Vaccinio-Piceetea											
<i>Hieracium murorum</i>		+	1	r	+	+	1	+	+	.	89
<i>Luzula luzuloides</i>		+	1	+	+	1	2	1	.	.	78
<i>Hieracium lachenalii</i>		.	+	r	+	.	+	.	+	+	67
<i>Deschampsia flexuosa</i>		.	1	1	2	.	.	2	+	.	55
<i>Hieracium sabaudum</i>		.	+	.	r	+	+	.	.	+	55
<i>Hypnum cupressiforme</i>	d	1	2	.	1	.	.	2	1	.	55
<i>Pinus sylvestris</i>	b	.	.	.	+	.	.	.	.	.	33
<i>Pinus sylvestris</i>	c	.	r	+	.	.	.	.	.	.	.
<i>Vaccinium myrtillus</i>		.	.	+	.	.	.	r	+	.	33
<i>Dicranum scoparium</i>	d	+	.	.	2	.	.	.	.	.	22
<i>Genista tinctoria</i>		.	.	.	r	.	.	1	.	.	22
<i>Hieracium laevigatum</i>		+	+	.	.	.	.	.	.	.	22
<i>Melampyrum pratense</i>		.	.	.	.	.	+	r	.	.	22
Ch. Cl. Nardo-Callunetea											
<i>Agrostis capillaris</i>		.	.	.	.	.	+	1	+	+	44
<i>Hieracium pilosella</i>		+	+	.	.	.	.	1	.	.	33
<i>Pohlia nutans</i>		.	.	.	.	+	.	2	+	.	33
<i>Calluna vulgaris</i>		.	.	+	1	.	.	.	.	.	22
Accompanying species (Gatunki towarzyszące):											
<i>Quercus petraea</i>	a2	.	4	.	.	3	2	3	2	3	100
<i>Quercus petraea</i>	a3	2	.	2	2	1	.	.	.	+	.
<i>Quercus petraea</i>	b	+	2	1	2	+	1	2	1	+	.
<i>Quercus petraea</i>	c	.	1	r	+	+	1	1	+	+	.

<i>Sedum maximum</i>		+	+	r	+	+	+	+	1	2	100
<i>Sorbus aucuparia</i>	b	+	+	.	+	+	+	+	+	.	78
<i>Sorbus aucuparia</i>	c	r	r	.	r	+	+	+	+	.	.
<i>Rosa canina</i>	b	2	.	+	+	.	.	+	+	.	67
<i>Rosa canina</i>	c	+	.	r	.	.	.	.	.	+	.
<i>Ceratodon purpureus</i>	d	1	.	2	.	.	1	.	1	+	55
<i>Viscaria vulgaris</i>		+	.	+	.	1	3	+	.	.	55
<i>Calamagrostis arundinacea</i>		+	.	+	+	.	.	.	1	.	44
<i>Dicranella heteromalla</i>	d	.	+	.	.	+	+	2	.	.	44
<i>Asplenium septentrionale</i>		1	.	.	r	.	.	r	.	.	33
<i>Convallaria majalis</i>		+	.	.	.	.	.	.	1	+	33
<i>Galeopsis tetrahit</i>		.	.	.	.	.	r	.	+	+	33
<i>Hypericum perforatum</i>		.	.	+	.	.	.	+	r	.	33
<i>Asplenium trichomanes</i>		+	.	.	r	.	.	.	.	.	22
<i>Campanula rotundifolia</i>		.	.	.	.	.	.	+	+	.	22
<i>Juniperus communis</i>	b	1	.	.	.	.	.	.	.	.	22
<i>Juniperus communis</i>	c	.	.	+	.	.	.	.	.	.	.
<i>Rubus idaeus</i>	c	+	.	.	.	.	+	.	.	.	22
<i>Silene vulgaris</i>		.	.	.	.	.	.	.	+	+	22
Sporadic (sporadycznie): <i>Achillea millefolium</i> 144 +; <i>Betula pendula</i> c 302 r; <i>Cerastium arvense</i> 151 r; <i>Crataegus laevigata</i> b 151 1; <i>Crataegus laevigata</i> c 151 r; <i>Galium mollugo</i> 151 +; <i>Orthodicranum montanum</i> d 154 +; <i>Polytrichastrum formosum</i> d 144 +; <i>Potentilla neumanniana</i> 144 1; <i>Quercus rubra</i> c 144 +; <i>Ribes uva-crispa</i> b 301 +; <i>Rosa sherardii</i> b 301 1; <i>Rosa villosa</i> c 301 r; <i>Rubus</i> sp. c 301 r; <i>Rumex acetosella</i> 151 +; <i>Vicia hirsuta</i> 144 r.											

Explanations (Objaśnienia):

Bedrock type (podłoże geologiczne): GR – greywacke (szarogłaz), SL/CL – siltstones/claystones (mułowce/iłowce), BS – basalt (bazalt).

Soil subtype (podtyp gleby): BA – brown acid soil (gleba brunatna kwaśna), B – brown soil (gleba brunatna), R – regosol (gleba inicjalna).

Table 2. Occurrence of *Polypodium vulgare* L. in the oak forest communities with a participation of *Silene vulgaris* and *Galium verum* group.
Tabela 2. Występowanie *Polypodium vulgare* L. w zbiorowiskach lasów dębowych z udziałem *Silene vulgaris* i *Galium verum*.

Relevé no. (Numer zdjęcia)		1	2	3	4	5	6	7	8	
Relevé field no. (Numer zdjęcia w terenie)		148	150	206	205	138	104	101	210	
Date: y/m/d (Data: r/m/d)		2009	2009	2009	2009	2009	2009	2009	2010	
Relevé area (Powierzchnia zdjęcia) m ²		100	200	200	200	200	100	100	200	
Altitude m a.s.l. (Wysokość n.p.m.)		323.8	323.2	526.2	512.4	367.6	502.3	558.9	449.6	
Aspect (Wystawa)		S	S	S	SW	S	SW	NE	S	
Slope in degrees (Nachylenie w stopniach)		20	20	23.4	23.5	9.7	24.6	14.9	10	
Cover tree layer a1 (Zwarcie warstwy drzew) %	Layer	20	.	+	10	.	.	.	.	Constancy in %
Cover tree layer a2 (Zwarcie warstwy drzew) %		.	30	50	40	50	60	50	50	
Cover tree layer a3 (Zwarcie warstwy drzew) %		.	5	.	.	.	.	.	.
Cover shrub layer b (Zwarcie warstwy krzewów) %		5	.	.	.	.	.	20	5	
Cover herb layer c (Pokrycie warstwy runa) %		70	90	60	80	70	60	100	70	
Cover moss layer d (Pokrycie warstwy mszystej) %		5	+	20	5	20	0	0	0	
Bedrock type (Podłoże geologiczne)		SR	SR	SR	SR	SR	SR	SR	SR	
Soil type (Typ gleby)		BR	BR	BR	BR	BR	BR	BR	BR	
No. of species (Liczba gatunków)		37	44	23	27	31	25	30	34	
<i>Polypodium vulgare</i>			+	+	r	r	+	+	1		r	100
D. <i>Silene vulgaris</i>-<i>Galium verum</i> group										
<i>Galium verum</i>		1	2	.	.	+	1	1	+	75
<i>Silene vulgaris</i>		2	2	+	+	+	.	.	.	62

<i>Asplenium cuneifolium</i>		1	.	+	+	.	.	.	.	37
<i>Centaurea scabiosa</i>		+	+	.	.	.	.	.	.	25
<i>Centaurea stoebe</i>		1	+	.	.	.	.	.	.	25
<i>Dianthus carthusianorum</i>		+	1	.	.	.	.	.	.	25
<i>Phleum phleoides</i>		+	+	.	.	.	.	.	.	25
<i>Potentilla arenaria</i>		1	+	.	.	.	.	.	.	25
<i>Galium valdepilosum</i>		.	.	+	1	.	.	.	.	25
<i>Potentilla heptaphylla</i>		.	.	.	.	.	r	+	.	25
Ch. et D*. O. Quercetalia pubescenti-petraeae										
<i>Polygonatum odoratum*</i>		.	.	.	+	+	.	r	.	37
<i>Vincetoxicum hirundinaria*</i>		.	.	1	.	.	2	.	+	37
<i>Potentilla alba</i>		.	.	.	.	.	r	2	.	25
Sporadic (sporadycnie): <i>Campanula persicifolia</i> 138 +; <i>Geranium sanguineum*</i> 101 r; <i>Hypericum montanum</i> 206 r; <i>Lathyrus niger</i> 210 +.										
Ch. Cl. Querco-Fagetea										
<i>Dryopteris filix-mas</i>		.	.	.	+	+	r	2	1	62
<i>Moehringia trinervia</i>		.	.	.	+	+	+	r	r	62
<i>Poa nemoralis</i>		.	.	+	3	2	2	+	.	62
<i>Galium schultesii</i>		.	.	.	.	1	.	1	+	37
<i>Brachypodium sylvaticum</i>		+	+	.	.	.	.	.	.	25
<i>Cerasus avium</i>	b	+	.	.	.	.	.	.	.	25
<i>Cerasus avium</i>	c	r	+	.	.	.	.	.	.	.
<i>Corylus avellana</i>	b	+	.	.	.	.	.	.	+	25
<i>Corylus avellana</i>	c	.	.	.	.	.	.	.	r	.
<i>Lathyrus vernus</i>		.	.	.	.	.	.	+	+	25
<i>Melica nutans</i>		.	.	.	.	.	.	+	+	25
Sporadic (sporadycnie): <i>Anemone nemorosa</i> 101 1; <i>Festuca altissima</i> 138 +; <i>Festuca heterophylla</i> 138 +; <i>Galeobdolon luteum</i> 210 +; <i>Lilium martagon</i> 101 +; <i>Mercurialis perennis</i> 210 1; <i>Viola reichenbachiana</i> 210 +.										

Ch. Cl. <i>Quercetea robori-petraeae</i> et <i>Vaccinio-Piceetea</i>										
<i>Deschampsia flexuosa</i>		.	+	1	.	+	1	2	.	62
<i>Hypnum cupressiforme</i>	d	1	+	2	1	2	.	.	.	62
<i>Pinus sylvestris</i>	a1	2	.	+	.	.	.	.	.	62
<i>Pinus sylvestris</i>	a2	.	3	.	1	.	+	.	.	.
<i>Pinus sylvestris</i>	a3	.	1	.	.	.	.	.	.	.
<i>Genista tinctoria</i>		.	.	+	+	+	+	.	.	50
<i>Vaccinium myrtillus</i>		.	.	.	+	2	.	r	+	50
<i>Luzula luzuloides</i>		.	.	.	+	+	.	.	.	25
Sporadic (sporadycznie): <i>Hieracium sabaudum</i> 150 +; <i>Pteridium aquilinum</i> 210 +.										
Accompanying species (Gatunki towarzyszące):										
<i>Quercus petraea</i>	a2	.	.	4	3	4	4	4	4	100
<i>Quercus petraea</i>	b	.	.	.	.	.	.	.	1	.
<i>Quercus petraea</i>	c	+	+	+	+	+	+	.	+	.
<i>Calamagrostis arundinacea</i>		.	.	3	2	2	r	+	r	75
<i>Euphorbia cyparissias</i>		+	1	1	.	+	1	.	+	75
<i>Hypericum perforatum</i>		+	+	.	.	+	r	.	+	62
<i>Rubus idaeus</i>	b	.	.	.	.	.	.	2	.	62
<i>Rubus idaeus</i>	c	r	.	+	+	.	.	2	1	.
<i>Sorbus aucuparia</i>	a2	.	.	.	.	.	.	.	+	62
<i>Sorbus aucuparia</i>	b	.	.	.	.	.	.	.	+	.
<i>Sorbus aucuparia</i>	c	.	+	.	+	+	r	.	+	.
<i>Achillea millefolium</i>		+	1	.	.	+	+	.	.	50
<i>Campanula rotundifolia</i>		+	.	+	+	+	.	.	.	50
<i>Convallaria majalis</i>		.	.	.	+	+	.	1	1	50
<i>Dryopteris carthusiana</i>		.	.	r	+	+	.	r	.	50
<i>Fallopia convolvulus</i>		.	.	+	.	+	+	.	r	50
<i>Sedum maximum</i>		.	.	.	+	+	.	+	r	50

<i>Stellaria media</i>		.	.	+	+	+	.	.	r	50
<i>Taraxacum officinale</i>		r	.	+	+	.	.	r	.	50
<i>Agropyron repens</i>		1	.	.	.	.	.	r	3	37
<i>Festuca ovina</i>		2	2	.	.	+	.	.	.	37
<i>Pyrus pyraaster</i>	c	+	+	.	.	.	.	r	.	37
<i>Viscaria vulgaris</i>		+	+	.	.	+	.	.	.	37
<i>Asplenium septentrionale</i>		.	.	r	.	.	r	.	.	25
<i>Cerastium arvense</i>		1	r	.	.	.	.	.	.	25
<i>Festuca pallens</i>		.	.	1	.	.	2	.	.	25
<i>Geranium robertianum</i>		.	.	.	.	.	.	r	+	25
<i>Polytrichastrum formosum</i>	d	.	.	+	+	.	.	.	.	25
<i>Robinia pseudoacacia</i>	b	1	.	.	.	.	.	.	.	25
<i>Robinia pseudoacacia</i>	c	r	+	.	.	.	.	.	.	.
<i>Rosa canina</i>	b	+	.	.	.	.	.	.	.	25
<i>Rosa canina</i>	c	r	+	.	.	.	.	.	.	.
<i>Rubus sec. Corylifolii</i>	c	+	+	.	.	.	.	.	.	25
<i>Rubus ser. glandulosi</i>	c	.	+	.	.	.	r	.	.	25
<i>Rumex acetosella</i>		+	+	.	.	.	.	.	.	25
<i>Thymus pulegioides</i>		2	1	.	.	.	.	.	.	25
<i>Viola sp.</i>		r	+	.	.	.	.	.	.	25

Sporadic (sporadycznie): *Agrostis capillaris* 150 +; *Ajuga genevensis* 104 +; *Allium montanum* 104 +; *Arrhenatherum elatius* 150 +; *Asplenium trichomanes* 206 r; *Calamagrostis epigeios* 150 r; *Carex sp.* 150 1; *Ceratodon purpureus* d 150 +; *Danthonia decumbens* 150 +; *Festuca tenuifolia* 210 +; *Fragaria vesca* 210 +; *Galeopsis pubescens* 210 +; *Galeopsis tetrahit* 150 r; *Galium aparine* 101 r; *Galium boreale* 101 2; *Galium pumilum* 104 +; *Geum urbanum* 210 r; *Hypochoeris radicata* 150 r; *Impatiens parviflora* 210 1; *Koeleria macrantha* 150 +; *Larix decidua* a2 205 +; *Linum catharticum* 148 +; *Lotus corniculatus* 150 r; *Malus sp.* c 101 r; *Molinia caerulea* agg. 205 1; *Mycelis muralis* 104 +; *Pimpinella saxifraga* 150 1; *Pohlia nutans* d 150 +; *Pseudotsuga menziesii* a1 205 2; *Pseudotsuga menziesii* c 205 +; *Rhamnus catharticus* b 210 +; *Quercus rubra* a1 148 1; *Quercus rubra* c 148 +; *Rubus caesius* c 150 r; *Rubus sp.* c 210 +; *Sambucus nigra* c 101 r; *Senecio viscosus* 150 +; *Thesium alpinum* 148 r; *Trifolium campestre* 148 r; *Veronica chamaedrys* 138 +.

Explanations (Objaśnienia):

Bedrock type (podłoże geologiczne): SR – serpentine (serpentyinit); Soil subtype (podtyp gleby): BR – brown ranker (ranker brunatny).

forest: *Galium verum*, *Centaurea stoebe*, *Centaurea scabiosa*, *Dianthus carthusianorum*, *Phleum phleoides* or *Potentilla heptaphylla*. Other accompanying plants were thermophilous species: *Potentilla alba*, *Vincetoxicum hirundinaria*, mesophilous species: *Poa nemoralis*, *Dryopteris filix-mas*, *Moehringia trinervia*, *Galium schultesii*, and acidophilous species: *Deschampsia flexuosa*, *Vaccinium myrtillus*.

Ass. *Sorbo torminalis-Quercetum petraeae* (Tab. 3)

This community belongs to the class *Querco-Fagetea* and the order *Quercetalia pubescenti-petraeae*. In the Sudety Mts, it was first recorded at the Kaczawskie Foothills (Kwiatkowski 2003), but according to recent studies its range is wider. *Sorbo torminalis-Quercetum* occurs mostly in basalts and greenstones but some of its stands are also present in sandstones and spilite. *P. vulgare* was observed at six sites of this community: the Grobla Nature Reserve, Siedmica, Paszowice, Żerkowice – the Kaczawskie Foothills, Wleń – the Izerskie Foothills and Dobromierz – the Wałbrzyskie Foothills. At these locations, the community occurred in slopes with varied expositions (S, SW, SE, W, NW, NE) and inclination of 10–30°, in a quite shallow brown acid soil. The maximum density of the tree layer was 75%, but at the majority of locations was lower. *Quercus petraea* dominated in this layer, with an admixture of *Carpinus betulus* and *Pinus sylvestris*. The shrub layer was developed with the medium density. The cover of the herb layer varied from 50% to 95%, and the moss layer was usually present and sometimes reached a high coverage. *P. vulgare* occurred in this community with a cover ranging from 0.1% to 5% and was accompanied by a wide group of thermophilous species, e.g. *Digitalis grandiflora*, *Clinopodium vulgare*, *Brachypodium pinnatum*, *Lathyrus niger*, *Silene nutans*, *Vincetoxicum hirundinaria*, *Campanula persicifolia*, *Polygonatum odoratum* and mesophilous species, e.g. *Poa nemoralis*, *Lathyrus vernus*, *Melampyrum nemorosum*.

Ass. *Luzulo luzuloidis-Quercetum petraeae* (Tab. 4)

This community belongs to the class *Quercetea robori-petraeae* and is widely spread in the Sudety Mts. *P. vulgare* has been observed at two sites of this community - in the Bardzkie Mts and the Opawskie Mts. At these locations, the community occurs mostly in steep slopes with an inclination around 20–30° and varying expositions (SW, S, NW), in brown acid soils developed on sedimentary rocks – greywacke or siltstone, and claystone. The stands are formed by the open tree layer with the density from 30% to 60%, dominated by *Quercus petraea* with an admixture of *Pinus sylvestris*, *Tilia platyphyllos* and *Fagus sylvatica*. The latter species distinguishes a submontane type of acidophilous oak forests. The shrub layer is well developed, and the herb layer

Table 3. Occurrence of *Polypodium vulgare* L. in the ass. *Sorbo torminalis-Quercetum petraeae* Svoboda ex Blažková 1962.
 Tabela 3. Występowanie *Polypodium vulgare* L. w fitocenozach zespołu *Sorbo torminalis-Quercetum petraeae* Svoboda ex Blažková 1962.

Relevé no. (Numer zdjęcia) Relevé field no. (Numer zdjęcia w terenie)		1	2	3	4	5	6	7	
Date: y/m/d (Data: r/m/d)		2010	2009	2008	2008	2010	2009	2010	
Relevé area (Powierzchnia zdjęcia) m ²		200	200	200	200	150	200	200	
Altitude m a.s.l. (Wysokość n.p.m.)		356.7	304.9	322.9	311.1	242.2	340.7	326.7	
Aspect (Wystawa)		SW	W	SW	SW	S	S	NE	
Slope in degrees (Nachylenie w stopniach)		12.6	25	12.9	18.3	25	16.6	6.9	
Cover tree layer a1 (Zwarcie warstwy drzew) %	Layer	.	60	60	40	.	.	.	Constancy in %
Cover tree layer a2 (Zwarcie warstwy drzew) %		60	.	.	5	40	40	50	
Cover tree layer a3 (Zwarcie warstwy drzew) %		15	.	.	.	.	+	.
Cover shrub layer b (Zwarcie warstwy krzewów) %		10	15	5	5	10	.	.	
Cover herb layer c (Pokrycie warstwy runa) %		70	70	95	70	80	70	50	
Cover moss layer d (Pokrycie warstwy mszystej) %		10	r	0	5	5	40	30	
Bedrock type (Podłoże geologiczne)		BS	SP	GS	GS	SS	GS	GS	
Soil type (Typ gleby)		BR	BA	BA	BA	N.D.	BA	BA	
No. of species (Liczba gatunków)		47	37	40	48	33	43	34	
<i>Polypodium vulgare</i>			+	+	+	r	1	r		+	100
D. (loc.) Ass. <i>Sorbo torminalis-Quercetum</i>									
<i>Digitalis grandiflora</i>		+	1	+	1	.	1	+	86

<i>Brachypodium pinnatum</i>		+	.	1	1	2	2	.	71
<i>Clinopodium vulgare</i>		.	.	+	+	+	1	.	57
<i>Lathyrus niger</i>		.	1	1	.	.	+	+	57
<i>Coronilla varia</i>		.	+	+	1	.	.	.	43
<i>Galium album</i>		.	+	+	.	+	.	.	43
<i>Galium mollugo</i>		+	.	.	+	.	.	.	29
Ch. et D*. O. Quercetalia pubescenti-petraeae									
<i>Silene nutans*</i>		+	+	.	1	2	+	.	71
<i>Vincetoxicum hirundinaria*</i>		1	+	.	+	.	1	.	57
<i>Campanula persicifolia</i>		2	.	+	.	1	.	.	43
<i>Polygonatum odoratum*</i>		.	+	+	+	.	.	.	43
<i>Astragalus glycyphyllos*</i>		1	.	.	+	.	.	.	29
<i>Campanula rapunculoides*</i>		.	1	.	1	.	.	.	29
<i>Trifolium alpestre*</i>		+	+	.	29
<i>Vicia pisiformis*</i>		+	+	29
Sporadic (sporadycznie): <i>Fragaria moschata</i> * 114 +; <i>Sorbus torminalis</i> c 30 +; <i>Vicia cassubica</i> * 278 +.									
Ch. Cl. Querco-Fagetea									
<i>Carpinus betulus</i>	a1	.	.	.	1	.	.	.	86
<i>Carpinus betulus</i>	a3	2	.	.	.	.	.	.	.
<i>Carpinus betulus</i>	b	1	1	.	.	.	.	.	.
<i>Carpinus betulus</i>	c	+	+	.	.	r	+	+	.
<i>Galium schultesii</i>		1	+	+	+	.	+	+	86
<i>Poa nemoralis</i>		1	3	2	2	2	+	.	86
<i>Acer pseudoplatanus</i>	a3	+	.	.	.	.	.	.	57
<i>Acer pseudoplatanus</i>	c	.	.	.	.	r	r	+	.
<i>Lathyrus vernus</i>		+	+	+	.	.	.	r	57
<i>Acer platanoides</i>	c	+	+	+	.	.	.	.	43
<i>Fraxinus excelsior</i>	b	.	+	.	.	.	.	.	43

<i>Fraxinus excelsior</i>	c	+	.	+	.	.	.	.	.
<i>Hedera helix</i>		.	.	+	+	.	.	+	43
<i>Melampyrum nemorosum</i>		.	.	1	.	1	.	+	43
<i>Tilia cordata</i>	b	1	1	.	.	.	.	.	43
<i>Tilia cordata</i>	c	+	r	+	.	.	.	.	.
<i>Fagus sylvatica</i>	b	+	.	.	.	.	.	.	29
<i>Fagus sylvatica</i>	c	+	.	.	.	.	.	+	.
<i>Corylus avellana</i>	b	.	.	.	.	1	.	.	29
<i>Corylus avellana</i>	c	.	r	.	.	+	.	.	.
<i>Melica nutans</i>		.	.	+	+	.	.	.	29
<i>Festuca heterophylla</i>		.	.	+	.	.	.	r	29
Sporadic (sporadycznie): <i>Asarum europaeum</i> 30 +; <i>Atrichum undulatum</i> d 30 +; <i>Cerasus avium</i> c 278 +; <i>Dryopteris filix-mas</i> 45 +; <i>Galeobdolon luteum</i> 278 +; <i>Galium odoratum</i> 278 +; <i>Hepatica nobilis</i> 45 +.									
Ch. Cl. Quercetea robori-petraeae et Vaccinio-Piceetea									
<i>Hieracium murorum</i>		1	+	.	+	r	+	+	86
<i>Hieracium sabaudum</i>		+	+	.	.	+	+	+	71
<i>Hypnum cupressiforme</i>	d	1	.	.	.	1	2	+	57
<i>Deschampsia flexuosa</i>		+	+	.	.	.	.	1	43
<i>Dicranum scoparium</i>	d	+	.	.	.	.	1	+	43
<i>Hieracium lachenalii</i>		.	.	.	.	+	+	+	43
<i>Melampyrum pratense</i>		+	.	2	.	.	.	2	43
<i>Vaccinium myrtillus</i>		1	.	+	.	.	.	1	43
<i>Hieracium laevigatum</i>		.	.	.	.	+	+	.	29
<i>Luzula luzuloides</i>		1	.	.	.	2	.	.	29
<i>Luzula pilosa</i>		.	.	.	+	.	.	r	29
<i>Picea abies</i>	c	.	.	.	.	.	.	r	.
<i>Pinus sylvestris</i>	a2	.	.	.	.	1	.	.	29
<i>Pinus sylvestris</i>	c	r	.	.	.	.	.	.	.

<i>Pleurozium schreberi</i>	d	.	.	.	.	.	+	+	29
<i>Solidago virgaurea</i>		.	.	.	+	.	.	+	29
Sporadic (sporadycznie): <i>Dicranum polysetum</i> d 124 +; <i>Galium rotundifolium</i> 30 +; <i>Genista tinctoria</i> 124 +; <i>Holcus mollis</i> 30 +; <i>Lathyrus montanus</i> 278 1; <i>Leucobryum glaucum</i> d 283 +; <i>Picea abies</i> c 283 r.									
Accompanying species (Gatunki towarzyszące):									
<i>Quercus petraea</i>	a1	.	4	4	3	.	.	.	100
<i>Quercus petraea</i>	a2	4	.	.	.	3	3	4	.
<i>Quercus petraea</i>	a3	.	.	.	.	.	+	.	.
<i>Quercus petraea</i>	b	1	1	1	.	1	.	.	.
<i>Quercus petraea</i>	c	+	+	1	+	+	+	1	.
<i>Festuca ovina</i>		2	+	+	1	.	2	+	86
<i>Sedum maximum</i>		1	+	+	+	+	1	.	86
<i>Calamagrostis arundinacea</i>		1	.	+	+	.	+	+	71
<i>Convallaria majalis</i>		1	1	2	.	.	r	2	71
<i>Polytrichastrum formosum</i>	d	+	r	.	1	.	2	2	71
<i>Rosa canina</i>	b	.	r	.	.	.	.	.	71
<i>Rosa canina</i>	c	+	+	+	+	.	+	.	.
<i>Hypericum perforatum</i>		.	r	.	+	1	+	.	57
<i>Sorbus aucuparia</i>	b	.	.	.	.	+	.	.	57
<i>Sorbus aucuparia</i>	c	+	r	.	.	+	.	+	.
<i>Veronica chamaedrys</i>		.	.	+	1	1	+	.	57
<i>Viscaria vulgaris</i>		.	+	.	+	1	+	.	57
<i>Campanula rotundifolia</i>		+	.	.	.	+	+	.	43
<i>Crataegus monogyna</i>	c	.	r	+	.	.	+	.	43
<i>Euphorbia cyparissias</i>		.	r	.	1	.	+	.	43
<i>Plagiomnium affine</i>	d	+	.	.	.	.	+	1	43
<i>Prunus spinosa</i>	c	.	r	+	.	.	+	.	43
<i>Dicranella heteromalla</i>	d	.	.	.	+	.	.	+	29

<i>Carex muricata</i>				+	+				29
<i>Crataegus laevigata</i>	a2	.	.	.	1	.	.	.	29
<i>Crataegus laevigata</i>	b	.	.	+	1	.	.	.	.
<i>Crataegus laevigata</i>	c	.	.	+	+	.	.	.	.
<i>Fallopia dumetorum</i>		+				+			29
<i>Fragaria vesca</i>		.	.	1	+	.	.	.	29
<i>Linaria vulgaris</i>				+	+				29
<i>Poa pratensis</i>				+	+				29
<i>Rhamnus catharticus</i>	b	+	+	.	.	.	.	.	29
<i>Rhamnus catharticus</i>	c	.	+	.	.	.	.	.	.
<i>Viola riviniana</i>		.	+	.	1	.	.	.	29

Sporadic (sporadycznie): *Achillea millefolium* 30 +; *Agropyron repens* 307 +; *Amelanchier spicata* b 307 +; c 307 +; *Antennaria dioica* 124 r; *Arabis glabra* 30 +; *Asplenium septentrionale* 124 +; *Betonica officinalis* 45 1; *Conyza canadensis* 307 r; *Cornus sanguinea* b 307 +; c 307 r; *Fallopia convolvulus* 30 +; *Festuca rubra* 307 1; *Frangula alnus* b 45 +; c 45 +; *Galeopsis pubescens* 278 +; *Geranium robertianum* 30 +; *Hieracium pilosella* 124 +; *Luzula multiflora* 124 r; *Mycelis muralis* 30 +; *Plagiothecium laetum* d 278 1; *Pohlia nutans* d 124 +; *Polygala vulgaris* 124 r; *Prunus serotina* c 307 r; *Rubus saxatilis* c 114 r; *Rubus* sp. c 307 r; *Selinum carvifolia* 30 r; *Senecio jacobaea* 30 +; *Sorbus intermedia* c 283 +; *Thymus pulegioides* 124 1.

Explanations (Objaśnienia):

Bedrock type (podłoże geologiczne): BS – basalt (bazalt), GS – greenstone (zieleniec), SP – spilite (spilit), SS – sandstone (piaskowiec).

Soil subtype (podtyp gleby): BA – brown acid soil (gleba brunatna kwaśna), BR – brown ranker (ranker brunatny), N.D. – no data (brak danych).

Table 4. Occurrence of *Polypodium vulgare* L. in the ass. *Luzulo luzuloidis-Quercetum petraeae* Hiltzer 1932.

Tabela 4. Występowanie *Polypodium vulgare* L. w fitocenozach zespołu *Luzulo luzuloidis-Quercetum petraeae* Hiltzer 1932.

Relevé no. (Numer zdjęcia)		1	2	3	4	
Relevé field no. (Numer zdjęcia w terenie)		338	314	340	320	
Date: y/m/d (Data: r/m/d)		2010	2010	2010	2010	
Date: y/m/d (Data: r/m/d)		09.01	08.19	09.01	08.20	
Relevé area (Powierzchnia zdjęcia) m ²		200	200	200	200	
Altitude m a.s.l. (Wysokość n.p.m.)		332.1	533.8	377.3	496.6	
Aspect (Wystawa)		NW	NW	N	SW	
Slope in degrees (Nachylenie w stopniach)		13.7	17.8	7.4	23.0	
Cover tree layer a1 (Zwarcie warstwy drzew) %	Layer	.	.	60	40	
Cover tree layer a2 (Zwarcie warstwy drzew) %		50	50	.	.	
Cover tree layer a3 (Zwarcie warstwy drzew) %		.	5	+	.	
Cover shrub layer b (Zwarcie warstwy krzewów) %		5	+	10	30	
Cover herb layer c (Pokrycie warstwy runa) %		70	40	50	20	
Cover moss layer d (Pokrycie warstwy mszystej) %		5	40	20	30	
Bedrock type (Podłoże geologiczne)		GR	SL/CL	GR	SL/CL	
Soil type (Typ gleby)		BA	BA	N.D.	BA	
No. of species (Liczba gatunków)			16	23	21	20
<i>Polypodium vulgare</i>			1	r	+	r
D. (loc.) Ass. <i>Luzulo luzuloidis-Quercetum petraeae</i>						
<i>Fagus sylvatica</i>		a2	2	.	.	.
<i>Fagus sylvatica</i>		b	1	+	+	1
<i>Fagus sylvatica</i>		c	+	+	+	+
Ch. Cl. <i>Quercu-Fagetea</i>						
<i>Poa nemoralis</i>			.	+	+	r
<i>Acer pseudoplatanus</i>	a3	.	1	.	.	
<i>Acer pseudoplatanus</i>	c	.	+	.	r	
<i>Corylus avellana</i>	c	.	.	r	r	
<i>Carpinus betulus</i>	c	.	.	r	.	
<i>Cephalanthera longifolia</i>		.	.	r	.	
<i>Daphne mezereum</i>	c	.	r	.	.	
<i>Fraxinus excelsior</i>	c	.	r	.	.	
<i>Melampyrum nemorosum</i>		.	.	+	.	
<i>Tilia cordata</i>	b	.	.	1	.	

<i>Tilia cordata</i>	c	.	.	+	.
<i>Tilia platyphyllos</i>	a2	.	2	.	.
<i>Tilia platyphyllos</i>	c	.	r	.	.
Ch. Cl. <i>Quercetea robori-petraeae</i> et <i>Vaccinio-Piceetea</i>					
<i>Deschampsia flexuosa</i>		3	2	2	2
<i>Hypnum cupressiforme</i>	d	1	2	2	1
<i>Luzula luzuloides</i>		1	+	+	+
<i>Dicranum scoparium</i>	d	+	2	.	2
<i>Hieracium murorum</i>		.	1	+	1
<i>Vaccinium myrtillus</i>		2	1	2	.
<i>Hieracium sabaudum</i>		.	.	r	+
<i>Hieracium lachenalii</i>		.	.	+	+
<i>Picea abies</i>	b	.	.	.	+
<i>Picea abies</i>	c	.	.	+	.
<i>Melampyrum pratense</i>		.	.	r	.
<i>Pinus sylvestris</i>	a1	.	.	.	+
<i>Pinus sylvestris</i>	c	.	.	.	+
<i>Solidago virgaurea</i>		.	.	+	.
Accompanying species (Gatunki towarzyszące):					
<i>Quercus petraea</i>	a1	.	.	4	3
<i>Quercus petraea</i>	a2	3	3	.	.
<i>Quercus petraea</i>	a3	.	.	+	.
<i>Quercus petraea</i>	b	.	+	1	2
<i>Quercus petraea</i>	c	+	1	1	1
<i>Sorbus aucuparia</i>	b	+	.	.	.
<i>Sorbus aucuparia</i>	c	+	+	+	r
<i>Polytrichastrum formosum</i>	d	+	.	1	1
<i>Abies alba</i>	b	+	.	.	.
<i>Abies alba</i>	c	.	.	.	r
<i>Ceratodon purpureus</i>	d	.	2	.	+
<i>Dicranella heteromalla</i>	d	+	+	.	.
Sporadic (sporadycznie): <i>Calamagrostis arundinacea</i> 338 +; <i>Calluna vulgaris</i> 338 +; <i>Plagiothecium laetum</i> d 338 +; <i>Silene nutans</i> 320 +; <i>Convallaria majalis</i> 314 r; <i>Lophocolea bidentata</i> d 338 r; <i>Pohlia nutans</i> d 314 +; <i>Rubus idaeus</i> c 314 r; <i>Sedum maximum</i> 314 r; <i>Stellaria media</i> 314 r; <i>Viola riviniana</i> 314 r.					

Explanations (Objaśnienia):

Bedrock type (podłoże geologiczne): GR – greywacke (szarogłaz), SL/CL – siltstones/claystones (mułowce/iłowce).

Soil subtype (podtyp gleby): BA – brown acid soil (gleba brunatna kwaśna), N.D. – no data (brak danych).

cover varies from 20% to 70%. The moss layer is usually presented. *P. vulgare* reaches from 0.1% to 5% cover and is accompanied by species typical of acidophilous oak forests, such as *Deschampsia flexuosa*, *Luzula luzuloides*, *Vaccinium myrtillus* and *Hieracium murorum*.

Discussion and conclusions

In the Sudety Mts and their foreland, *Polypodium vulgare* was recorded in acidophilous and thermophilous oak forest communities, developed on different types of the geological substrate, which were generally poor or moderately rich in nutrients: sedimentary rocks (sandstone, siltstone, claystone, greywacke), effusive rocks (basalt, spilite) and metamorphic rocks (serpentine, greenstone). Their stands most frequently occurred in sunny slopes with inclination of about 20° and western, south-western or southern exposition. Soils were acidic or moderately acidic, shallow, often initial and therefore in many places rock outcrops and small cliffs were present.

The species was observed in very similar conditions in the oak forests in the Czech Republic and Austria, where it had a diagnostic value for some syntaxa. In the Czech Republic, *P. vulgare* was recorded in six types of associations belonging to either thermophilous or acidophilous oak forests. In thermophilous oak forests, it was recorded in patches of the ass. *Genisto pilosae-Quercetum* Zólyomi et al. ex Soó 1963, the ass. *Sorbo torminalis-Quercetum* and occasionally in the ass. *Asplenio-Quercetum* Chytrý et Horák 1997. All of these syntaxa belong to the alliance *Quercion petraeae* Zólyomi et Jakucs ex Jakucs 1960 (within the class *Querco-Fagetea*), which mainly includes thermophilous oak forests in sunny slopes and shallow soils developed on various types of mainly siliceous rocks (Chytrý 1997). In these associations, *P. vulgare* occurred in the steep south-facing slopes, in usually acidic soils, well drained rankers over granitoids, gneisses or granulites (Chytrý 1991, 1997; Chytrý, Horák 1997; Zelený 2008). Within acidophilous oak forests belonging to the class *Quercetea robori-petraeae* and the alliance *Genisto germanicae-Quercion* Neuhausl et Neuhauslová-Novotná 1967, *P. vulgare* was observed in patches of the ass. *Viscario-Quercetum*, the ass. *Luzulo albidae-Quercetum* and occasionally in the ass. *Vaccinio vitis-idaeae-Quercetum* Oberdorfer 1957. The species was present in steep slopes, in acidic, poor in nutrient, shallow rankers developed on andesites and rhyolites or in sandy soils above conglomerates and sandstones (Kolbek 2003; Zelený 2008). In all above mentioned associations, *P. vulgare* usually reached the cover between 0.1 and 5%, occasionally up to 15% and more in ass. *Luzulo albidae-Quercetum*.

In Austria, *P. vulgare* was observed in three types of associations of oak forests, belonging to the alliance *Quercion pubescenti-petraeae* Br.-Bl. 1932 within the class *Quercio-Fagetea*. First of all it occurred in patches of the ass. *Luzulo niveae-Quercetum petraeae* Frey 1995 (*Digitali grandiflorae-Quercetum petraeae* prov.), occasionally in the ass. *Sileno nutantis-Quercetum petraeae* (Br.-Bl. 1959) Ellenb. & Klötzli 1974 and *Sorbo torminalis-Quercetum*. *P. vulgare* was observed in the patches covering steep, mostly southern exposed slopes. Soils were shallow, dry and moderately acidic (neutral to base-rich brown soils, brown ranker) over siliceous bedrock, sporadically rendzinas developed on limestone (Willner, Grabherr 2007a,b; Walnöfer, Hotter 2008). The species cover in these associations ranged from 0.1% to 25%.

With regard to the diagnostic value of *P. vulgare*, in the Czech Republic it is sometimes treated as a differential species of the alliance *Quercion petraeae* (Chytrý, Horák 1997) or more generally, within the mentioned alliance, as a differential for oak forests in steep slopes and shallow initial soils against those in more gentle slopes and nutrient-rich mature substratum (Chytrý 1997). In Austria, *P. vulgare* is a differential species of the association *Luzulo niveae-Quercetum* (Willner, Grabherr 2007a,b). Its diagnostic value is also noticeable in the Sudety Mts, in the communities formed in extremely xerophilous rocky habitats, where it reaches the highest frequency.

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***Polypodium vulgare* L. w zbiorowiskach dabrow acidofilnych i ciepłolubnych w Sudetach i na ich Przedgorzu**

W latach 2008–2011 badaniami objeto acidofilne i ciepłolubne dabrowy Sudetow i ich Przedgorza. W czasie badanı wykonano 342 zdjecia fitosocjologiczne, z czego 312 zdjec zostało poddanych analizie numerycznej przy użyciu algorytmu TWINSpan. Przeprowadzone analizy materiału fitosocjologicznego wskazuja, że *Polypodium vulgare* jest składnikiem warstwy runa o roznym znaczeniu w dabrowach acidofilnych oraz ciepłolubnych. Gatunek wystapil w 28 zdjeciach fitosocjologicznych (9% całosci analizowanego materiału) zaklasyfikowanych do 4 typow zbiorowisk lasow debowych. Paprotke zwyczajna stwierdzono w 30% zdjec reprezentujacych dabrowy z udziałem *Festuca pallens* i *Cotoneaster integerrimus* oraz w 22% zdjec reprezentujacych dabrowy z udziałem *Silene vulgaris* i *Galium verum*, w 13% zdjec reprezentujacych zespól *Sorbo torminalis-Quercetum* i w 7% zdjec zespolu *Luzulo luzuloidis-Quercetum petraeae*.

Na przewazajacej liczbie stanowisk gatunek wystepował w zbiorowiskach lasow debowych porastajacych nasłonecznione stoki o ekspozycji zachodniej, południowej lub południowo-zachodniej i nachyleniu co najmniej 20°. W podłozu wystepowały skały bezwapienne. Gleby były kwaśne lub umiarkowanie kwaśne, płytkie, czesto o charakterze inicjalnym - stad w wielu płatach obecne były niewielkie wychodnie skalne.

Warto podkreślić, że *Polypodium vulgare* było odnotowane w bardzo zbliżonych warunkach siedliskowych w płatach dabrow na terenie Czech i Austrii. Pozwala to wnioskować, że głównymi czynnikami warunkujacymi jego wystepowanie w tych zbiorowiskach jest rodzaj podłozu geologicznego, warunki świetlne oraz nachylenie stoku, wplywajace na charakter gleby. W lasach debowych *Polypodium vulgare* wyraźnie preferuje stanowiska na podłozu krzemianowym, nasłonecznione, na stromych stokach oraz płytkich, kwaśnych glebach. Ponadto, w wielu wypadkach paprotka zwyczajna traktowana jest jako gatunek wyrozniajacy dla zbiorowisk w obrebie dabrow, wystepujacych wlasnie w takich warunkach siedliskowych. Na terenie objętym badaniami pełni ona rolę gatunku wyrozniajacego dla zbiorowiska z udziałem *Festuca pallens* i *Cotoneaster integerrimus*.