

THE ASSOCIATION *GERANIO PHAEI-URTICETUM DIOICAE* IN SOUTHWEST POLAND

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Abstract: *Geranio phaei-Urticetum dioicae*, a poorly known association of nitrophilous saum communities occurring in the mountains of Central Europe was characterized based on 39 phytosociological relevés. Its ecological requirements and distribution in Poland and Central Europe are presented and discussed. Five new subassociations of the *Geranio phaei-Urticetum dioicae* (*G.-U. arrhenatheretosum elatioris*, *G.-U. typicum*, *G.-U. festucetosum giganteae*, *G.-U. senecionetosum fuchsii* and *G.-U. rumicetosum alpestris*) have been distinguished on the basis of differing species composition.

Key words: Nitrophilous saum communities, new syntaxa, *Geranium phaeum*, *Convolvuletalia sepium*, *Artemisietea vulgaris*, Poland

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INTRODUCTION

Most nitrophilous saum communities in Poland have been the subject of numerous and detailed studies. Work on determining their variability intensified after Brzeg (1989) discussed the taxonomic division of the order *Galio-Calystegietaalia sepium* (R. Tx. 1950) Oberd. in Oberd. *et al.* 1967. Brzeg's paper was a compilation and was introductory in nature, but many of his suggestions have been confirmed, particularly in regard to the ecological and geographical variability of saum communities in Poland. Brzeg did not provide information on the distribution of some communities whose occurrence in southwest Poland he believed to be nearly certain.

For many reasons the mountain and piedmont communities of the suballiance *Melandrio-Aegopodienion* (R. Tx. 1967) Siss. 1973 are especially interesting. Their floristic composition is dominated by indigenous non-synanthropic spontaneous phytes, often of montane character; some of them transgress from plant communities of the class *Betulo-Adenostyletea* Br.-Bl. 1948. Unlike the majority of nitrophilous saum communities, the associations comprising this suballiance are limited to

areas of low anthropopressure, occurring along streams, river banks and forest roads, or in clearings. One of these associations is *Geranio phaei-Urticetum dioicae* Hadač *et al.* 1969, whose distribution, basic habitat conditions and differentiation is presented in this paper.

MATERIAL AND METHODS

Phytosociological studies were conducted in the entire area of the Sudety Mts and their foreland, the Nizina Śląska Lowland, Równina Opolska plain and Wzgórza Trzebnickie hills. The distribution of the 15 recorded localities of the association *Geranio phaei-Urticetum dioicae* is presented in Figure 1, and their descriptions are given in Table 1. Areas ranging in size from 3 to 25 m², depending on the degree of development and homogeneity of patches, were studied using the Braun-Blanquet method (1964). The obtained material is grouped in subassociations in Tables 3–5. The nomenclature of forest communities follows Matuszkiewicz (2001), that of vascular plants follows Mirek *et al.* (1995), and that of bryophytes is after Ochyra and Szmajda (1978).

Phytocoenoses included in the association *Geranio*

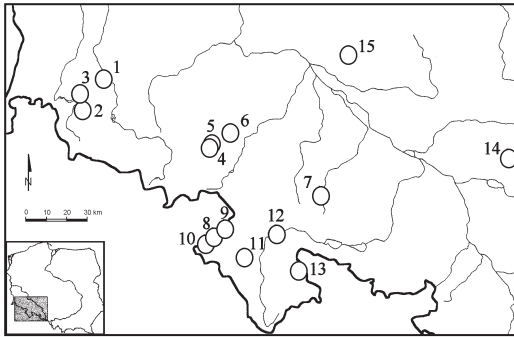


Fig. 1. Distribution of studied localities of *Geranio phaei-Urticetum dioicae*; list of localities: 1 – Lwówek Śląski (Pogórze Izerskie foothills), 2 – Młyńsko (Pogórze Izerskie foothills), 3 – Ubocze (Pogórze Izerskie foothills), 4 – Świebodzice – Pełcznica (Pogórze Wałbrzyskie foothills), 5 – Szczawnik river valley (Pogórze Wałbrzyskie foothills), 6 – Nowy Jaworów (Równina Świdnicka plain), 7 – Brukalice (Wzgórze Niemczańsko-Strzelińskie hills), 8 – Pasterka (Góry Stołowe Mts), 9 – Radków (Góry Stołowe Mts), 10 – Jakubowice (Góry Stołowe Mts), 11 – Bystrzyca river valley (Góry Bystrzyckie Mts), 12 – Bardo Śląskie (Góry Bardzkie Mts), 13 – Łądek Zdrój (Góry Złote Mts), 14 – Szumirad (Równina Opolska plain), 15 – Skarszyn (Wzgórze Trzebnickie hills).

phaei-Urticetum dioicae often accompany stands of *Urtico-Aegopodietum auct.* s.l. Both associations occupy similar habitats on banks of watercourses and at the edges of fertile broadleaf forests. Thirty-nine relevés of phytocoenoses with *Geranium phaeum* and 106 relevés of *Urtico-Aegopodietum* s.l. (from valleys with watercourses in the Wzgórze Lipowe hills microregion, a part of the Wzgórze Niemczańsko-Strzelińskie hills in the Przedgórze Sudeckie foreland; Dajdok 1998) were pooled and analyzed together by detrended correspondence analysis (DCA, Canoco package, Braak & Šmilauer 1998). A preliminary division of all relevés of the association was made using TWINSpan hierarchical classification (Hill 1979). The relevés were numerically classified using the average linkage procedure, both with presence/absence data and with cover-abundance values on Braun-Blanquet's scale. In the latter case the symbol '+' was replaced by 0.5 and the symbol 'r' was replaced by 0.1.

The principles of synanthropodynamic analysis defined by Chmiel (1993) were followed, with a minor modification concerning the division of mezohemeric habitats (Świerkosz 1998). The names of the distinguished subassociations are consistent with the *Code of Phytosociological Nomenclature* (Barkman *et al.* 1995).

RESULTS

The DCA results indicate that most relevés of *Geranio phaei-Urticetum dioicae* are well separated from the *Urtico-Aegopodietum* s.l. relevés (Fig. 1). Like Hadač *et al.* (1969), Brzeg (1989) and Mucina (1993) are of the opinion that *Geranio phaei-Urticetum dioicae* is a good separable association. Its regional diagnostic species are *Geranium phaeum* (Ch. Ass.), *Anthriscus nitida* and *Chaerophyllum hirsutum* [D. Ass. **toward ?? versus ??** other syntaxa of the alliance *Petasition officinalis* Silinger 1933 *emend.* R. Tx. 1967 (syn. *Aegopodion podagrariae* R. Tx. 1967) occurring in the investigated area].

The phytosociological documentation of *Geranio phaei-Urticetum dioicae* phytocoenoses found in the 15 recorded localities consists of 39 relevés; 31 of them were made on river or stream banks, indicating that the association prefers the environs of running waters. Its phytocoenoses are encountered both on inundation terraces of mountain rivers and along streams no wider than 1 m. We found the phytocoenoses of this association at altitudes between 170 and 700 m. The preferred topographic forms include shallow valleys of water-

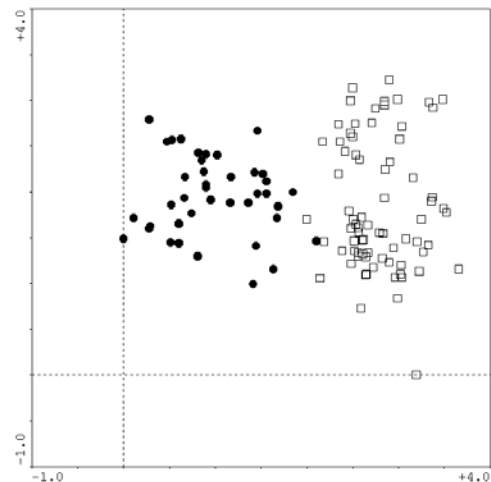


Fig. 2. Ordination relevés of *Geranio phaei-Urticetum dioicae* (●) and *Urtico-Aegopodietum podagrariae* s.l. (□) along the first two DCA axes.

Table 1. Basic habitat conditions of the studied localities of *Geranio phaei-Urticetum dioicae* Hadač *et al.* 1969 (localities as in Fig. 1).

No. of locality	Locality	Presence of the running water	Form of the land	Altitude a.s.l. [m]	Level of hemeroby of habitat	Number of relevés (mean number of species)
1	Lwówek Śląski	absent	flat	240–270	a-euhemeroby	2 (13.0)
2	Młyńsko	stream	depression	390	b-mezohemeroby	1 (13.0)
3	Ubocze	absent	flat	350	a-euhemeroby	2 (7.5)
4	Dolina Pełcznicy	river	ravine	290–320	a-mezohemeroby	9 (16.3)
5	Szczawnik	river	depression	280	a-mezohemeroby	3 (16.7)
6	Jawornik	river	depression	250	b-mezohemeroby	2 (10.5)
7	Brukalice	stream	slope	190–200	a-euhemeroby	2 (13.5)
8	Pasterka	stream	depression	700	b-mezohemeroby	1 (21.0)
9	Dolina Pośny valley	stream	ravine	650–690	oligohemeroby	4 (14.0)
10	Jakubowice	stream	ravine	540	a-euhemeroby	1 (15.0)
11	Dolina Bystrzycy	river	depression	410	oligohemeroby	1 (24.0)
12	Bardo	absent	slope	310	a-euhemeroby	1 (14.0)
13	Łądek Zdrój	river	depression	450	oligohemeroby	2 (15.5)
14	Szumirad	absent	flat	200	a-euhemeroby	3 (13.7)
15	Skarszyn	stream	flat	170	a-mezohemeroby	5 (20.6)

courses and the terraces and slopes of mountain rivers (Table 1).

Alluvial soils are the main type of substratum on which phytocoenoses of *Geranio phaei-Urticetum dioicae* develop. They are recorded on proper or acid brown soils only within large forest complexes. Synanthropodynamic analysis indicates a wide distribution range of the association, from á-euhemerobic to oligohemerobic habitats (Table 1).

DIVERSIFICATION OF THE ASSOCIATION

The floristic composition of *Geranio phaei-Urticetum dioicae* phytocoenoses varies depending

on the surrounding plant communities. Five main subassociations can be distinguished within the studied association – four are recognized within the authors' material, and the fifth from Hadač *et al.* (1969) and Balcerkiewicz (1978) (Table 6).

Geranio phaei-Urticetum dioicae arrhenatheretosum elatioris Dajdok 2002 *subass. nova hoc loco* (Table 3, rel. 1–7; Table 6, col. 7)

NOMENCLATRURAL TYPE: Table 3, rel. 2 (orig.) holotypus hoc loco.

Subassociation *G.ph.-U.d. arrhenatheretosum elatioris*, covers the sides of streams running across rural areas or has no contact with water-

Table 2. Systematic value of the main phytosociological groups in the distinguished subassociations of the *Geranio phaei-Urticetum dioicae* Hadač *et al.* 1969 (**Ch. and D. Ass. — podać pełne brzmienie**).

Main phytosociological groups	Systematic value D for selected subassociations			
	<i>senecionetum</i>	<i>festucetosum</i>	<i>arrhenatheretosum</i>	<i>typicum</i>
Ch. and D. Ass.	5.8	3.5	7.3	9.2
Cl. <i>Artemisietea</i>	7.5	14.5	16.5	17.4
Cl. <i>Querc-Fagetea</i>	6.1	10.2	0.7	3.9
Cl. <i>Molinio-Arrhenatheretea</i>	1.8	0.7	9.6	1.5

Table 3. *Geranio phaei-Urticetum dioicae arrhenatheretosum* Dajdok 2002 (rel. 1–7) and *Geranio phaei-Urticetum dioicae typicum* Dajdok 2002 (rel. 8–12).

No. of releve	1	2	4	3	5	6	7	8	9	10	11	12	13	C	C		
Year	2000	1999	1995	1998	1998	1998	1998	1997	1997	1994	1999	1994	2000	Constancy % (1–7)	Constancy % (8–13)		
Month	7	5	6	5	7	7	7	9	9	6	5	6	7				
Day	31	19	8	12	12	12	12	20	20	14	22	14	20				
Releve area (m ²)	10	10	15	10	12	6	20	8	10	10	4	10	15				
Altitude (m a.s.l.)	190	270	540	310	200	200	200	290	270	350	270	350	170				
Aspect (degrees)	10	.	7	35	.	.	.	.	.	.	.	.	.
Slope	S	.	W	NE	.	.	.	.	.	.	.	.	.
Cover herb layer (%)	100	100	100	100	100	100	80	80	70	100	100	100	100				
Locality	7	1	10	12	14	14	14	4	6	3	1	3	15				
Number of species	10	15	15	15	19	12	11	7	13	8	13	8	17				
Ch. et D.* ass. <i>Geranio phaei-Urticetum dioicae</i>																	
<i>Geranium phaeum</i>	3	4	3	4	3	4	4	2	2	5	4	5	4			100	100
<i>Anthriscus nitida</i>	.	.	.	+			14	.
<i>Chaerophyllum hirsutum</i>	.	.	.	+			14	.
D. subass. <i>Geranio phaei-Urticetum dioicae arrhenatheretosum</i>																	
<i>Dactylis glomerata</i>	.	1	2	+	1	+	+	.	.	.	r	.	.	86	17		
<i>Arrhenatherum elatius</i>	2	+	.	r	.	.	.	.	.	.	.	.	.	42	.
<i>Galium mollugo</i>	+	+	.	.	+	.	.	.	.	.	.	.	.	42	.
<i>Alopecurus pratensis</i>	.	+	+	.	.	.	.	.	.	.	.	.	.	29	.
<i>Rumex acetosa</i>	.	+	+	.	.	.	.	.	.	.	.	.	.	29	.
Ch. All. <i>Aegopodium podagrariae</i>																	
<i>Aegopodium podagraria</i>	2	.	1	1	3	2	1	2	1	+	1	+	1	86	100		
<i>Chaerophyllum aromaticum</i>	+	1	2	+	.	.	.	.	.	.	.	.	2	67	17
<i>Lamium maculatum</i>	.	.	.	.	.	.	.	1	1	.	.	.	1	.	50
<i>Anthriscus sylvestris</i>	.	1	.	.	.	.	.	.	.	.	r	.	.	14	14
<i>Heracleum sphondylium</i>	+	+	.	.	.	.	.	.	.	.	.	.	.	29	.
<i>Geranium pratense</i>	+	.	.	+	.	.	.	.	.	.	.	.	.	29	.
<i>Melandrium rubrum</i>	.	.	.	.	.	.	.	+	.	.	.	.	.	.	14
Ch. Or. <i>Galio-Calystegietalia sepium</i>																	
<i>Galium aparine</i>	+	+	.	.	+	.	.	.	+	+	r	.	+	42	67		
<i>Geum urbanum</i>	.	.	.	.	+	+	+	.	+	.	+	.	.	42	34
<i>Chelidonium majus</i>	.	.	.	.	+	+	+	.	.	.	.	.	.	42	.
<i>Glechoma hederacea</i>	.	.	.	.	.	.	.	.	.	+	.	1	1	.	50
<i>Lapsana communis</i>	.	.	.	.	r	+	.	.	.	.	.	.	.	29	.
Sporadic species: <i>Geranium robertianum</i> 13 (+); <i>Impatiens noli-tangere</i> 13 (+); <i>Impatiens parviflora</i> 2 (+); 11 (+); <i>Rubus caesius</i> 13 (+);																	
<i>Solidago gigantea</i> 9 (+);																	
Ch. Cl. Artemisietea																	
<i>Urtica dioica</i>	2	2	2	+	+	1	1	3	3	1	+	.	2	100	83		
<i>Artemisia vulgaris</i>	.	.	.	+	1	+	.	.	.	.	r	.	.	42	17
<i>Agropyron repens</i>	.	.	+	.	.	+	.	.	+	.	.	.	.	29	17
Sporadic species: <i>Arctium minus</i> 5 (+); <i>Calystegia sepium</i> 8 r; <i>Equisetum arvense</i> 9 (+); <i>Rumex obtusifolius</i> 4 (+); 9 (+)																	

Table 3. Continued.

No. of releve	1	2	4	3	5	6	7	8	9	10	11	12	13	C	C
Ch. Cl. <i>Molinio-Arrhenatheretea</i>															
<i>Poa trivialis</i>	+	.	.	+	+	.	.	.	+	42	17
<i>Taraxacum officinale</i> coll.	+	+	r	.	.	r	.	.	.	42	17
<i>Ranunculus repens</i>	.	+	+	+	42	.
<i>Veronica chamaedrys</i>	.	+	.	.	+	29	.
<i>Plantago maior</i>	r	.	.	.	.	.	r	.	.	14	14
Sporadic species: <i>Alchemilla monticola</i> 3 (+); <i>Campanula patula</i> 4 (+); <i>Cirsium oleraceum</i> 13 r; <i>Deschampsia cespitosa</i> 13 r; <i>Lysimachia nummularia</i> 13 (+); <i>Poa pratensis</i> 4 (+); <i>Stellaria graminea</i> 2 (+)															
Ch. Cl. <i>Quercu-Fagetea</i>															
<i>Viola reichenbachiana</i>	+	.	+	+	.	29	17
<i>Poa nemoralis</i>	1	+	.	.	34
<i>Acer platanoides</i> c	+	.	+	.	.	34
Sporadic species: <i>Anemone nemorosa</i> 10 (+); <i>Chrysosplenium alternifolium</i> 13 (+); <i>Ficaria verna</i> 3 (+); 9 (+); <i>Fraxinus excelsior</i> c 12 (+); <i>Hepatica nobilis</i> 7 (+); <i>Pulmonaria obscura</i> 13 (+); <i>Tilia platyphyllos</i> 7c (+)															
Others															
<i>Peridium aquilinum</i>	+	1	+	.	.	.	.	.	.	42	.

Sporadic species: *Ajuga reptans* 13 (+); *Alchemilla monticola* 3 (+); *Athyrium filix femina* 4 (+); *Hypericum perforatum* 5 r; *Lysimachia nummularia* 13 (+); *Poa annua* 3 (+); 11 (+); *Plantago major* 5 r, 11 r; *Quercus robur* 8c (+); *Sambucus nigra* 6c (+); 12 (+); *Stellaria media* 3 (+); 13 (+); *Verbascum nigrum* 5 r; *Vicia dumetorum* 9 (+); *Vicia sepium* 3 (+).

courses at all. It is characterized by a small percentage of forest species. The dominant species are nitrophilous perennial plants of the class *Artemisietea vulgaris* Lohm., Prsg. & R. Tx. in R. Tx. 1950; the share of meadow species is clearly increasing. The differential species are *Dactylis glomerata*, *Arrhenatherum elatius*, *Alopecurus pratensis*, *Galium mollugo* and *Rumex acetosa*. This kind of patch was recorded from altitude 200 to 540 m (mean alt. 300 m) only in á-euhemerobic habitats. The mean level of hemeroby (according to Chmiel 1993) is high ($H_m = 50$).

Geranio phaei-Urticetum dioicae typicum Dajdok 2002 *subass. nova hoc loco* (Table 3, rel. 8–13; Table 6, col. 8)

NOMENCLATURE TYPE: Table 3, rel. 8 (orig.) holotypus hoc loco.

Some phytocoenoses lacking differential species of the other distinguished subassociations represent *G.ph.-U.d. typicum*. They may constitute an initial phase of the characterized associ-

ation or may represent floristically poor, terminal forms transitional to other communities of the order *Convolvuletalia sepium* R. Tx. 1950 em. Oberd. in Oberd. *et al.* 1967 [syn. *Galio-Calystegietales sepium* (R. Tx. 1950) Oberd. 1967] sharing *Geranium phaeum* (Pender & Rybałowska 1995).

Geranio phaei-Urticetum dioicae festucetosum giganteae Świerkosz 2002 *subass. nova hoc loco* (Table 4; Tab 6. col. 5–6)

NOMENCLATURE TYPE: Table 4, rel. 7 (orig.) holotypus hoc loco.

This subassociation occupies terraces and slopes of piedmont rivers within the habitats of forests of the *Carpinion betuli* Issler 1931 em. Oberd. 1957 and *Alnion incanae* Pawłowski in Pawłowski *et al.* 1928 alliances. It is characterized by a species composition in which woodland species and apophytes grow together in a relative balance (Table 2). The differential species are *Festuca gigantea* and *Stellaria holostea*. Some

Table 4. *Geranio phaei-Urticetum dioicae festucetosum giganteae* Świerkosz 2002.

No. of relevé	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	C	
Year	1994	1993	1993	2000	2000	2000	2000	2000	1993	1993	1993	1993	1993	1993	1994	1994		
Month	6	6	6	7	7	7	7	7	6	6	6	6	6	6	5	5	Constancy %	
Day	26	5	5	31	20	20	20	20	26	26	26	26	26	26	28	28		
Releve area (m ²)	5	12	5	6	10	12	15	15	20	10	20	15	6	10	12	6		
Altitude (m a.s.l.)	290	450	450	200	170	170	170	170	290	290	290	300	300	290	310	310		
Aspect (degrees)	.	.	.	50	.	.	.	.	.	.	.	.	.	.	.	.
Slope	.	.	.	N	.	.	.	.	.	.	.	.	.	.	.	.
Cover shrub layer (%)	10	.	.	.	.	.	10	.	10	10	.	5	5	5	5	10	
Cover herb layer (%)	100	100	100	80	90	100	95	100	100	100	100	100	100	100	100	100		
Cover moss layer (%)	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.
Locality	4	13	13	7	15	15	15	15	4	4	4	4	4	4	4	4		
Number of species	13	13	19	17	21	26	22	18	26	16	16	17	13	18	18	11		
Ch. et D.* ass. <i>Geranio phaei-Urticetum dioicae</i>																		
<i>Geranium phaeum</i>	4	4	3	3	3	3	3	3	3	3	3	4	4	4	3	4		100
<i>Chaerophyllum hirsutum</i>	.	+	+	.		13
D. subass. <i>Geranio phaei-Urticetum dioicae festucetosum giganteae</i>																		
<i>Festuca gigantea</i>	+	1	1	.	r	+	+	1	+	+	.	+	+	1	1	1		88
<i>Stellaria holostea</i>	+	.	.	1	+	+	1	.	+	1	1	1	+	.	2	2	75	
D. var. with <i>Chaerophyllum temulum</i>																		
<i>Chaerophyllum temulum</i>	.	.	.	.	.	.	.	.	+	+	+	+	+	.	+	+	44
<i>Euphorbia dulcis</i>	.	.	.	.	.	.	.	.	+	+	.	.	.	.	+	+	25
<i>Rumex sanguineus</i>	.	.	.	.	.	.	.	.	+	.	.	.	.	+	r	+	25
Ch. All. <i>Aegopodium podagrariae</i>																		
<i>Aegopodium podagraria</i>	2	+	2	2	1	2	2	2	2	3	1	1	2	+	.	.	88	
<i>Chaerophyllum aromaticum</i>	1	+	2	.	2	1	2	2	1	+	+	2	1	.	.	.	75	
<i>Lamium maculatum</i>	.	.	.	+	.	1	1	2	.	.	.	.	.	.	.	.	25
<i>Geranium pratense</i>	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	7
Ch. Or. <i>Galio-Calystegietalia sepium</i>																		
<i>Geum urbanum</i>	1	+	1	+	+	+	+	+	+	+	+	+	+	+	+	+	100	
<i>Glechoma hederacea</i>	.	.	.	.	+	1	+	1	+	+	+	.	+	+	+	.	63
<i>Galium aparine</i>	+	+	.	+	1	1	.	1	.	.	1	.	.	1	.	.	50	
<i>Alliaria petiolata</i>	+	1	.	.	.	.	.	.	+	+	+	+	.	.	+	.	44
<i>Geranium robertianum</i>	.	.	.	.	.	.	+	1	+	.	+	+	.	.	+	.	38
<i>Impatiens parviflora</i>	.	.	+	.	.	.	+	1	+	1	.	.	.	+	.	.	38	
<i>Symphytum officinale</i>	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	13
<i>Rubus caesius</i>	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	13
Sporadic species: <i>Calystegia sepium</i> 4 (1); <i>Chelidonium majus</i> 10 (+); <i>Epilobium montanum</i> 3 r; <i>Lapsana communis</i> 6 (+)																		
Ch. Cl. <i>Artemisietea</i>																		
<i>Urtica dioica</i>	.	2	2	2	1	+	1	1	2	.	3	1	1	2	2	1	88	
<i>Agropyron repens</i>	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	13
<i>Rumex obtusifolius</i>	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	13
<i>Cirsium arvense</i>	.	.	.	.	r	+	.	.	.	.	.	.	.	.	.	.	13
<i>Galeopsis tetrahit</i>	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	7
Ch. Cl. <i>Quercu-Fagetea</i>																		
<i>Poa nemoralis</i>	.	.	+	.	.	.	+	.	+	.	1	+	1	+	2	+	56	

Table 4. Continued.

No. of relevé	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	C
<i>Galeobdolon luteum</i>	1	.	.	.	.	.	.	.	+	+	1	.	+	+	1	1	50
<i>Stachys sylvatica</i>	.	.	1	.	1	1	.	+	+	.	.	.	.	.	r	.	38
<i>Ulmus glabra</i> b	1	1	.	+	+	.	+	1	38
<i>Acer pseudoplatanus</i> b	1	.	r	.	.	.	.	.	.	.	.	.	.	+	.	.	31
<i>Acer pseudoplatanus</i> c	+	+	.	.	.	+	.	.	
<i>Pulmonaria obscura</i>	+	+	2	.	+	.	.	.	.	.	.	.	25
<i>Acer platanoides</i> c	+	.	.	.	+	+	.	.	19
<i>Mercurialis perennis</i>	+	1	.	.	.	+	.	.	19
<i>Fraxinus excelsior</i> b	1	.	.	.	.	.	.	.	.	.	13
<i>Fraxinus excelsior</i> c	.	.	+	.	.	.	+	
<i>Stellaria nemorum</i>	.	1	1	.	.	.	.	.	.	.	.	.	.	1	.	.	19
<i>Equisetum pratense</i>	.	.	.	+	+	+	19
<i>Tilia cordata</i> c	r	+	.	.	.	.	.	.	.	13
<i>Scrophularia nodosa</i>	r	+	.	.	.	.	.	.	.	.	.	.	13
<i>Euonymus europaeus</i> b	+	13
<i>Euonymus europaeus</i> c	.	.	.	r	.	.	.	.	.	.	.	.	.	.	.	.
<i>Quercus robur</i> c	.	.	.	r	.	.	+	.	+	.	.	.	.	.	.	.	19
Sporadic species: <i>Brachypodium sylvaticum</i> 7 r; <i>Carex sylvatica</i> 9 (+); <i>Hedera helix</i> 15 r; <i>Primula elatior</i> 3 r																	
Ch. Cl. <i>Molinio-Arrhenatheretea</i>																	
<i>Dactylis glomerata</i>	r	+	.	.	.	+	.	.	+	.	25
<i>Poa trivialis</i>	.	.	.	+	.	2	.	+	.	.	.	.	.	.	.	.	19
<i>Cirsium oleraceum</i>	.	.	+	.	+	1	.	.	.	.	.	.	.	.	.	.	19
<i>Filipendula ulmaria</i>	.	+	.	+	13
<i>Ranunculus repens</i>	+	+	.	.	13
<i>Lysimachia nummularia</i>	.	+	.	2	.	.	.	.	.	.	.	.	.	.	.	.	13
<i>Veronica chamaedrys</i>	r	.	.	.	r	.	13
<i>Deschampsia cespitosa</i>	1	+	.	.	.	.	.	.	.	.	.	.	13
<i>Bromus racemosus</i>	+	+	.	.	.	13
Sporadic species: <i>Galium mollugo</i> 4 (+); <i>Geranium palustre</i> 6 (+); <i>Holcus lanatus</i> 6 (+); <i>Lysimachia vulgaris</i> 3 (+); <i>Poa pratensis</i> 12 (1); <i>Potentilla reptans</i> 6 (+).																	
Others																	
<i>Ajuga reptans</i>	+	1	+	.	.	.	.	.	.	.	.	.	19
<i>Vicia sepium</i>	.	.	.	+	+	+	.	.	.	19
<i>Hypericum perforatum</i>	+	+	13
<i>Rubus idaeus</i>	.	1	+	.	.	.	.	.	.	.	.	.	.	.	.	.	13

Sporadic species: *Fragaria vesca* 5 (+); *Mnium hornum* 9 (+); *Oxalis acetosella* 1 (+); *Poa annua* 3 (+); *Rubus* sp. 9 (+); *Phragmites australis* 5 (+); *Sambucus nigra* b 7 (1); *Taraxacum* sp. 3 r.

relevés with *Chaerophyllum temulum*, *Euphorbia dulcis* and *Rumex sanguineus* were distinguished as representing a variant with *Chaerophyllum temulum* (Table 4, rel. 6–16), but it was recorded

only in Pełcznica river valley (Pogórze Wałbrzyskie foothills) so it may be of only local significance. This subassociation was recorded at 170–450 m (mean alt. 280 m) in various types of

Table 5. Continued.

No. of relevé	1	2	3	4	5	6	7	8	9	10	C
<i>Dryopteris filix-mas</i>	+	+	+	.	30
<i>Stachys sylvatica</i>	.	.	.	+	.	.	+	.	.	+	30
<i>Ficaria verna</i>	+	+	+	30
<i>Acer pseudoplatanus</i> c	.	.	+	1	+	30
<i>Stellaria nemorum</i>	.	.	.	1	.	+	+	.	.	.	30
<i>Poa nemoralis</i>	+	+	.	.	.	20
<i>Brachypodium sylvaticum</i>	1	.	.	+	20
<i>Milium effusum</i>	.	.	.	+	1	.	20
Sporadic species: <i>Anemone ranunculoides</i> 6 r; <i>Allium ursinum</i> 7 (+); <i>Asarum europaeum</i> 8 (+); <i>Carex sylvatica</i> 8 (+); <i>Corylus avellana</i> 10c (+); <i>Euonymus verrucosus</i> 8c (+); <i>Fraxinus excelsior</i> 9c (+); <i>Galium odoratum</i> 9 (+); <i>Lathraea squamaria</i> 9 (+); <i>Pulmonaria obscura</i> 10 (+); <i>Ranunculus auricomus</i> 7 (+); <i>Stellaria holostea</i> 7 (1); <i>Ulmus glabra</i> 3 b (+).											
Others											
<i>Ranunculus repens</i>	1	+	1	30
<i>Dactylis glomerata</i>	+	r	.	.	.	.	20
<i>Cirsium oleraceum</i>	+	.	+	.	.	.	20
<i>Deschampsia cespitosa</i>	.	.	+	.	.	+	20
<i>Poa annua</i>	+	.	.	r	.	.	.	.	.	.	20
<i>Geum rivale</i>	.	.	+	.	.	.	+	.	.	.	20
<i>Alchemilla monticola</i>	+	+	20

Sporadic species: *Brachythecium velutinum* 6 (+); *Crepis paludosa* 7 (+); *Filipendula ulmaria* 7 (+); *Luzula pilosa* 8 r; *Mnium hornum* 6 (+); *Myosoton aquaticum* 9 (+); *Petasites albus* 10 (1); *Quercus robur* c5 (+); *Ribes uva crispa* 10 (+); *Rubus* sp. 7 (+); *Sorbus aucuparia* 9c (+); *Taraxacum* sect. *Vulgaria* 6 (+); *Valeriana officinalis* 7 (+); *Valeriana sambucifolia* 3 (+); *Veronica chamaedrys* 5 (+);

habitats, but the mean hemeroby level ($H_m = 32$) shows that mezo- and oligohemerobic habitats are preferred.

One relevé characterized as a “community with *Geranium phaeum*” (Table 6, col. 6) is known from the Wzgórza Trzebnickie hills (Pender & Rybałtowska 1995).

Geranio phaei-Urticetum dioicae senecionetosum fuchsii Szczeńsiak 2002 subass. nova hoc loco (Table 5; Table 6, col. 3–4)

NOMENCLATURAL TYPE (holotypus): Table 5, rel. 3 (orig.) holotypus hoc loco.

Some stands of the association recorded on the banks of streams within natural forest communities (in the vicinity of *Lunario-Aceretum* Schlüter 1957 and *Carici remotae-Fraxinetum* W. Koch 1926 ex Faber 1936) are becoming impover-

ished, losing species of the class *Artemisietea vulgaris*, which is replaced by a larger representation of species of the class *Quercu-Fagetea* Br.-Bl. & Vlieger 1937 and order *Fagetalia sylvaticae* Pawłowski in Pawłowski *et al.* 1928, as well as some plant species transgressing from communities of *Epilobietea angustifolii* R. Tx. et Prsg. in R. Tx. 1950, especially the name-contributing species *Senecio fuchsii*. This type is distinguished as the subassociation *G.ph.-U.d. senecionetosum fuchsii*. Differential species are *Senecio fuchsii*, *Oxalis acetosella*, *Ranunculus lanuginosus*, *Phyteuma spicatum* and *Cardaminopsis halleri*. This subassociation was recorded between 280 and 700 m (mean alt. 450 m) in mezo- and oligohemerobic habitats. Mean level of hemeroby $H_m = 32$. Generally this subassociation is typical of undisturbed mountain habitats.

Table 6. Comparing of available materials of *Geranio phaei-Urticetum dioicae* Hadač *et al.* 1969 from South-Western Poland and Tatra Mts.

No. of table	1	2	3	4	5	6	7	8
Number of relevés	5	4	10	3	16	1	7	7
Area of relevés in sq. m	8–25	3–15	3–20	25–100	5–20	.	6–20	4–15
Mean inclination in degrees	25	8	4	.	3	.	7,4 ?	.
Mean altitude in m a.s.l.	1278	1020	510	640	280	170	270	240
Mean number of species	12	19	16	23	18	10	14	9
Ch. et D*. ass. <i>Geranio phaei-Urticetum dioicae</i>								
<i>Geranium phaeum</i>	100	100	100	66	100	1	100	100
<i>Chaerophyllum hirsutum</i> *	20	50	20	66	13	.	17	.
<i>Anthriscus nitida</i> *	60	.	60	100	.	.	17	.
D. subass. <i>Geranio phaei-Urticetum dioicae rumicetosum arifolii</i>								
<i>Rumex arifolius</i>	40	50	.	.	.	.	.	.
<i>Chrysosplenium alternifolium</i>	60	25	.	.	.	.	.	17
<i>Carduus personata</i>	100	.	.	.	.	.	.	.
<i>Epilobium alpestre</i>	20	.	.	.	.	.	.	.
D. subass. <i>Geranio phaei-Urticetum dioicae senecionetosum fuchsii</i>								
<i>Senecio fuchsii</i>	.	25	80	100	.	.	.	.
<i>Cardaminopsis halleri</i>	.	50	10	66	.	.	.	.
<i>Ranunculus lanuginosus</i>	.	.	30	66	.	.	.	.
<i>Phyteuma spicatum</i>	.	.	20	33	.	.	.	.
<i>Oxalis acetosella</i>	.	.	70	.	6	.	.	.
D. subass. <i>Geranio phaei-Urticetum dioicae festucetosum giganteae</i>								
<i>Festuca gigantea</i>	.	.	.	.	88	1	.	.
<i>Stellaria holostea</i>	.	.	10	.	75	1	.	.
D. var. z <i>Chaerophyllum temulum</i>								
<i>Chaerophyllum temulum</i>	.	.	.	.	44	.	.	.
<i>Euphorbia dulcis</i>	.	.	.	.	25	.	.	.
<i>Rumex sanguineus</i>	.	.	.	.	25	.	.	.
D. subass <i>Geranio phaei-Urticetum dioicae arrhenatheretosum</i>								
<i>Dactylis glomerata</i>	20	25	20	66	25	.	86	17
<i>Galium mollugo</i>	.	.	.	.	6	.	42	.
<i>Arrhenatherum elatius</i>	.	.	.	.	.	.	42	.
<i>Rumex acetosa</i>	.	.	.	.	.	.	29	.
<i>Alopecurus pratensis</i>	.	.	.	.	.	.	29	.
All. <i>Aegopodium podagrariae</i>								
<i>Aegopodium podagraria</i>	20	25	90	33	88	1	86	100
<i>Chaerophyllum aromaticum</i>	40	.	20	100	75	1	67	17
<i>Lamium maculatum</i>	.	.	.	33	25	1	.	50
<i>Melandrium rubrum</i>	.	25	30	.	.	.	.	17
<i>Heracleum sphondylium</i>	20	.	.	66	.	.	29	.
<i>Geranium pratense</i>	.	.	.	.	6	.	29	.

Table 6. Continued.

No. of table	1	2	3	4	5	6	7	8
<i>Or. Galio-Calystegietalia et Cl.Artemisietea</i>								
<i>Urtica dioica</i>	100	75	100	100	88	.	100	83
<i>Geum urbanum</i>	40	25	20	.	100	.	42	34
<i>Agropyron repens</i>	20	.	10	.	13	.	29	17
<i>Rumex obtusifolius</i>	40	50	.	.	13	.	17	17
<i>Geranium robertianum</i>	.	25	10	33	38	.	.	17
<i>Galium aparine</i>	.	.	20	.	50	.	42	67
<i>Glechoma hederacea</i>	.	.	40	33	63	1	.	.
<i>Chelidonium majus</i>	.	.	10	.	6	.	42	.
<i>Vicia sepium</i>	.	.	.	33	19	.	17	.
<i>Cirsium arvense</i>	.	25	.	33	13	.	.	.
<i>Impatiens noli-tangere</i>	.	.	20	.	.	.	.	17
<i>Alliaria petiolata</i>	.	.	20	.	44	.	.	.
<i>Epilobium montanum</i>	.	.	10	.	6	.	.	.
<i>Rubus caesius</i>	.	.	.	.	13	1	.	17
<i>Impatiens parviflora</i>	.	.	.	.	38	.	17	.
<i>Calystegia sepium</i>	.	.	.	.	6	.	17	.
<i>Lapsana communis</i>	.	.	.	.	6	.	29	.
<i>Artemisia vulgaris</i>	.	.	.	.	.	.	42	17
<i>Cl. Quercu-Fagetea</i>								
<i>Poa nemoralis</i>	20	.	20	33	56	.	.	34
<i>Viola reichenbachiana</i>	.	.	30	33	.	.	29	17
<i>Fraxinus excelsior</i> juv.	.	25	10	.	13	.	.	17
<i>Stellaria nemorum</i>	40	.	30	33	19	.	.	.
<i>Primula elatior</i>	20	25	50	33	6	.	.	.
<i>Stachys sylvatica</i>	.	.	30	66	38	1	.	.
<i>Ulmus glabra</i>	.	.	10	33	38	.	.	.
<i>Galeobdolon luteum</i>	.	.	40	66	50	.	.	.
<i>Carex sylvatica</i>	.	.	10	33	6	.	.	.
<i>Mercurialis perennis</i>	.	.	40	33	19	.	.	.
<i>Anemone nemorosa</i>	.	.	30	33	.	.	.	17
<i>Ficaria verna</i>	.	.	30	.	.	.	17	17
<i>Pulmonaria obscura</i>	.	.	10	.	25	1	.	17
<i>Acer platanoides</i> juv.	.	.	.	33	19	.	.	34
<i>Acer pseudoplatanus</i>	.	.	30	.	31	.	.	.
<i>Dryopteris filix mas</i>	20	.	30	33	.	.	.	.
<i>Asarum europaeum</i>	.	.	10	33	.	.	.	.
<i>Brachypodium silvaticum</i>	.	.	20	.	6	.	.	.
<i>Cl. Molinio-Arrhenatheretea</i>								
<i>Ranunculus repens</i>	20	100	30	33	13	.	42	.
<i>Poa trivialis</i>	20	100	.	.	19	.	42	17
<i>Veronica chamaedrys</i>	20	75	10	66	13	.	29	.

Table 6. Continued.

No. of table	1	2	3	4	5	6	7	8
<i>Cirsium oleraceum</i>	.	.	20	33	19	.	.	17
<i>Deschampsia cespitosa</i>	.	50	20	33	13	.	.	17
<i>Taraxacum</i> sect. <i>Vulgaria</i>	20	.	10	.	6	.	42	17
<i>Poa pratensis</i>	.	100	.	.	6	.	17	.
<i>Ranunculus acris</i>	20	50	.	33	.	.	.	.
<i>Alchemilla</i> (div. sp.)	20	75	20	.	.	.	17	.
<i>Filipendula ulmaria</i>	.	.	10	.	13	.	.	.
Others								
<i>Poa annua</i>	.	25	20	.	6	.	17	17
<i>Rubus idaeus</i>	40	75	.	66	13	.	.	.
<i>Quercus robur</i>	.	.	10	.	19	.	.	17
<i>Ajuga reptans</i>	.	.	.	66	19	.	.	17
<i>Sambucus nigra</i>	.	.	.	.	6	.	17	17
<i>Hypericum perforatum</i>	.	.	.	.	13	.	17	.

Col. 1. *Geranio phaei-Urticetum*, Hadač *et al.* 1969, Tab. p. 216–217; Dolina Sedmich pramenov, Tatra Mts.

Col. 2. *Geranio phaei-Urticetum dioicae*, Balcerkiewicz 1978, tab.; Dolina Chochołowska valley, Tatra Mts.

Col. 3. *Geranio phaei-Urticetum dioicae senecionetosum fuchsii* subass. nova, Tab. 5, rel. 1–10.

Col. 4. community with *Urtica dioica*, Macicka & Pender 1996, Tab. 3., rel. 1–3; Dolina Pošny, Góry Stołowe Mts.

Col. 5. *Geranio phaei-Urticetum festucetosum giganteae* subass. nova, Tab 4., rel. 1–16.

Col. 6. community with *Geranium phaeum*, Pender & Rybałtowska 1995, p. 96.; Wzgórza Trzebnickie hills.

Col. 7. *Geranio phaei-Urticetum dioicae arrhenatheretosum elatioris* subass. nova, Tab. 3, rel. 1–7.

Col. 8. *Geranio phaei-Urticetum dioicae typicum* subass. nova, Tab. 3, rel. 8–13.

Geranio phaei-Urticetum dioicae rumicetosum alpestris Świerkosz 2002 subass. nova. hoc loco (Table 6, col. 1–2)

NOMENCLATRURAL TYPE: *Geranio-Urticetum dioicae*, Table pp. 215–217, rel. 108 (in Hadač *et al.* 1969: 215–217), typus subass. et lectotypus ass. hoc loco.

Phytocoenoses of this type were first described by Hadač *et al.* (1969) in a typical locality in the Dolina Siedmich Prameňov valley (Belianské Tatra Mts), altitude 1265–1310 m. Differential species are *Carduus personata*, *Rumex alpestris*, *Epilobium alpestre* and *Chrysosplenium alternifolium*. This subassociation is of high mountain and mezohemerobic character. It was reported by Balcerkiewicz (1978) from Polana Chochołowska clearing (West Tatras) as a “community with *Geranium phaeum*”. The syntaxonomic position of the subassociation and its relation to the previous subassociation need further research.

DISCUSSION

Geranium phaeum, the diagnostic species of the association, occurs in mountain and submontane areas of Europe. According to Zajac (1996), in Poland *Geranium phaeum* grows in different types of communities, from high-mountain tall herb communities through various carr communities to wet meadows.

The general distribution of *Geranio phaei-Urticetum dioicae* is not yet identified. In Central Europe this plant association has been recorded rarely. It was described in the Belianské Tatra Mts (Hadač *et al.* 1969) at altitude 1265–1310 m. The association was reported as quite common in the Austrian Alps and their foothills, especially on calcareous substratum (Mucina *et al.* 1993). Phytosociological syntheses from Germany (Hilbig *et al.* 1972, Pott 1995) do not include the association, although *Geranio phaei-Urticetum dioicae* should

occur there, at least in mountain and submontane areas.

The occurrence of this association, described as a “community with *Geranium phaeum*” was reported in the Polish part of the Tatra Mts by Balcerkiewicz (1978) and then by Brzeg (1989). The first relevés of the association from the Sudety Mts (Stołowe Mts) were made by Pender and Macicka-Pawlik (1996), who distinguished a “community with *Urtica dioica*” (Table 6, col. 4). A similar “community with *Geranium phaeum*” is known from Wzgórza Trzebnickie hills (Pender & Rybałtowska 1995). Brzeg and Wojterska (2001) reported the occurrence of the association in the Wielkopolska region, but Matuszkiewicz (2001), in a general work on plant associations of Poland, does not distinguish the *Geranio phaei-Urticetum dioicae* association, and *Geranium phaeum* is mentioned there as a species characteristic of *Alnetum incanae* Lüdi 1921.

The known range of the association is generally limited to mountain and submontane regions of Central Europe (the Tatras, Sudety Mts and their foothills, eastern Alps), with isolated localities on lowlands (in southwest Poland). In Poland it can be expected mainly along the Carpathian-Sudetic arc and in adjacent areas, where *Geranium phaeum* descends from the mountains (Zajac 1996; Zajac & Zajac 2001). Saum communities with *Geranium phaeum* seem to occur mostly within dynamic communities of streamside carrs (both mountain and lowland). Brzeg (1989) links this association with saum communities of Carpathian alder grove (*Alnetum incanae* Lüdi 1921) and fertile Carpathian beech wood (*Dentario glandulosae-Fagetum* (Klika 1927) W. Mat. 1964 ex Guzikowa et Kornaś 1969). In the Sudety Mts, *Geranio phaei-Urticetum dioicae* is found in a dynamic mosaic with *Lunario-Acercetum* Grüneberg et Schlüt. 1957, *Carici remotae-Fraxinetum* Koch 1926 ex Faber 1936, *Aceri-Tilietum* Faber 1936, *Galio sylvatici-Carpinetum* Oberd. 1957 and *Fraxino-Alnetum* W. Mat. 1952.

In the first description of the association, Hadač et al. (1969) included it in the class *Ruderto-Secalinetea* Br.-Bl. 1936, order *Onopordetalia acanthii* Br.-Bl. et R. Tx. 1943 and alliance *Car-*

duo-Urticion dioicae Hadač 1962. This alliance, in his opinion, contained nitrophilous edge communities developing on calcareous soils.

Brzeg (1989) located *Geranio phaei-Urticetum dioicae* in the class *Artemisietea vulgaris* Lohmeyer, Preising et R. Tx. in R. Tx 1950, order *Galio-Calystegietalia sepium* (R. Tx. 1950) Oberd. 1967, alliance *Aegopodion podagrariae* R. Tx. 1967 and suballiance *Melandrio-Aegopodienion* (R. Tx. 1967) Siss. 1973.

Mucina (1993) placed the association in the class *Galio-Urticetea* Passarge ex Kopecký 1969, order *Lamio albi-Chenopodietalia boni-henrici* Kopecký 1969 and alliance *Aegopodion podagrariae* R. Tx. 1967.

In the last critical revision by Brzeg and Wojterska (2001), the syntaxonomical position of this association is the same as in Brzeg (1989), but the authors changed the name of the order *Galio-Calystegietalia sepium* (R. Tx. 1950) Oberd. in Oberd. et al. 1967 to *Convolvuletalia sepium* R. Tx. 1950 em. Oberd. in Oberd. et al. 1967, and the alliance *Aegopodion podagrariae* R. Tx. 1967 to *Petasition officinalis* Silinger 1933 em. R. Tx. 1967. According to Brzeg and Wojterska (2001) the syntaxonomic position of the *Geranio phaei-Urticetum dioicae* Hadač et al. 1969 is as follows:

Class *Artemisietea vulgaris* Lohmeyer,
Preising & R. Tx. in R. Tx 1950
Order *Convolvuletalia sepium* R. Tx. 1950
em. Oberd. in Oberd. et al. 1967
Alliance *Petasition officinalis* Silinger
1933 em. R. Tx. 1967

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