New plant associations from Danubian Plain, Bulgaria

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Abstract. This paper presents the results of syntaxonomic analysis of the natural vegetation in the Middle Danubian Plain in Bulgaria. The nine new associations, subassociations and the variant were published in the PhD thesis of the author on vegetation of this region and also on-line. Therefore, they are not published effectively and are not valid according to ICPN. The aim of this paper is to validate and publish effectively the diagnosis of the new syntaxa.

Key words: Middle Danubian Plain, natural vegetation, syntaxon

Introduction

The Middle Danubian Plain in Bulgaria (Fig. 1) lies between the Yantra and Vit rivers in the east and west, and between the Danube River and the Forebalkan in the north and south. The average altitude of the terrain is 138 m. The relief is formed from the thick loess cover (50 m) in the northern part and calcareous plateaus in the southern parts. According to Velev (1990), the climate is temperate-continental with western and northwestern winds, and the rainfalls average between 500 mm and 600 mm per year. The rivers are mainly with a rain-snowy regime of the flow. The Danube River provides the most important wetland in the region, but many Danubian marshes were drained in the last 60 years. According to Ninov (2002), the widespread soils in this part of the country are the chernozems and phaeozems, and occasionally the luvisols in the southern part. Fluvisols are distributed mostly along the rivers. There are also saline soils, solonchaks and solonetz, but of very limited distribution: along river Studena and in Karaboaz Lowland.

The vegetation of the Middle Danubian Plain is rich: steppes, broadleaved forests, wetlands, etc. Data on the vegetation of this region are scattered and have been obtained mostly according to the dominant method of the Russian phytocoenological scool (Stoyanov 1948; Ganchev & Kochev 1962, Ganchev & al. 1971; Kochev & Yordanov 1981; Kochev & al. 1986,

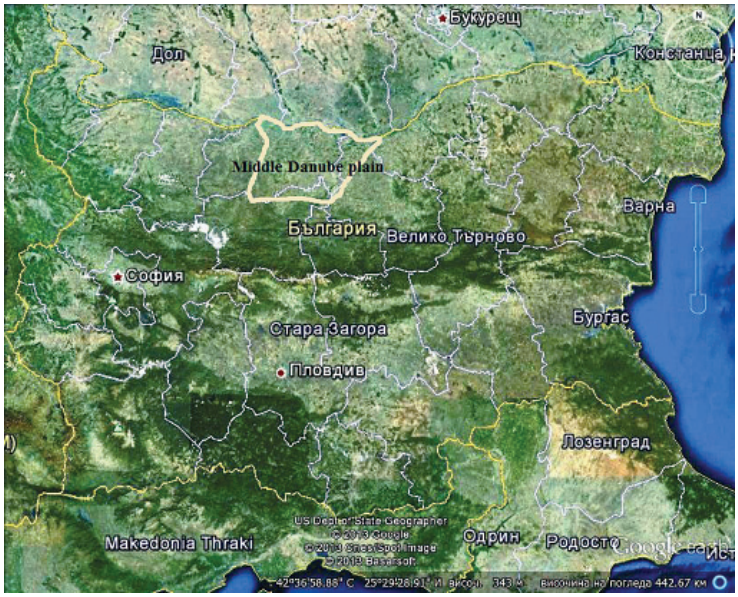

Fig. 1. The study area in Middle Danube plain.

Kochev & Tsolova, 1984, 1987; Bondev 1991, etc). The main studies of the vegetation in this area according to the now applied Braun-Blanquet methodology in Bulgaria are included in the PhD thesis of Tzonev (2002) and some papers also published by Tzonev (2009a,b). However, the publication of the new associations and subassociations is not effective yet, because the first work is only an unpublished PhD thesis and the papers are published on-line, without any printed edition and this is in contradiction with Article 1 of ICPN (Weber & al. 2000). The association *Staphyleo-Tilietum tomentosae* published by Tzonev (2003) is invalid, because the dates and localities of the releves were lost owing to some technical mistake. The aim of the present publication is to publish effectively the new syntaxa from the Middle Danubian Plain described for the first time in the PhD thesis of Tzonev (2002).

Material and methods

The vegetation was investigated during the period 1999–2002, according to the methods of the sigmatic school (Braun-Blanquet 1964; van der Maarel 2005). The expanded scale of Braun-Blanquet for abundance/dominance (Braun-Blanquet 1932) was used, transformed according to van der Maarel (1979) for statistical processing. The cluster analysis of the relevés was performed with Syntaxa software (Podani 2001). The Average Linkage Method (UPGMA) was used and floristic similarity of the relevés was evaluated according to Horn's index (Krebs 1999). The taxonomic nomenclature followed Kozhuharov (1992). The new syntaxa were published and validated according to the rules of the International Code of Phytosociological Nomenclature (Weber & al. 2000) and according to the cited references (Horvat & al. 1974; Doniţá & al. 1992; Kojić & al. 1998; Sanda & al. 1999; Rodwell & al. 2002; etc).

Results

The widespread communities belong to the xerophytic oak forests, steppe grasslands, calcareous chasmophytic communities and also secondary vegetation of the arable lands and urbanized territories. The described new associations and subassociations belong to the halophytic, herbaceous (steppe) and forest vegetation types.

Halophytic vegetation

Association *Limonietum bulgaricum* ass. nova hoc loco holotypus relevé No 3, Table 1

The local Moesian neo-endemic *Limonium bulgaricum* is similar to the widespread species *Limonium latifolium*. Its locality in the Svishtov Municipality is relic and it is likely that this species is preserved in the primary floristic composition of the association *Hedysaro bulgaricum-Camphorosmetum monspeliacae* on the surrounding hills. Subsequent salinization of soils along the river Studena valley permitted its distribution at the bottom of the valley. The phytocoenoses (Table 1) were found on typical solonetz soils, sealed and relatively poor. Their salinity was maintained by rectification of river Studena in the 1950s.

Table 1. Association *Limonietum bulgaricum* ass. nova, holotypus rel. 3 hoc loco.
Localities: 1, 2, 3 – Karamanovo village, Ruse Distruct; **4** – Gorna Studena village, Veliko Turnovo District.
Dates: 1, **2**, **3** – 25. 08. 00 and 24. 04. 02; **4** – 25. 07. 01.

Number of releves	**1**	**2**	**3**	**4**	**Const.**
Altitude	40	25	29	65	
Cover (%)	100	100	100	100	
Area of releves	100	100	100	100	
Diagnostic species to the association					
Limonium bulgaricum Anchev	3	3	4	4	V
Diagnostic species to the class *Festuco-Puccinillietea* Soo 1968					
Scorzonera laciniata L.	r	+	+		IV
Lepidium perfoliatum L.	+	r			III
Cerastium dubium (Bastard) Guépin		1	+		III
Bupleurum tenuissimum L.			+		II
Other species					
Plantago lanceolata L.	+	+		+	IV
Cynodon dactylon (L.) Pers.	3	1		3	IV
Verbascum blattaria L.	+	+	+		IV
Lactuca saligna L.	+	+	+		IV
*Festuca valesiac*a Gaudin	4	4			III
Phragmites australis (Cav.) Steud.	+	+			III
Cichorium intybus L.	+	+			III
Althaea officinalis L.		2		+	III
Festuca arundinacea Schreb.			+	+	III
Chrysopogon gryllus (L.) Trin.	+				II
Daucus carota L.		+			II
Elymus repens (L.) Gould			3		II
Achillea millefolium agg.				+	II
Galium verum L.				+	II
Alopecurus pratensis L.				1	II
Convolvulus arvensis L.				+	II
Trigonella caerulea (L.) Ser.				+	II
Kickxia spuria (L.) Dumort.				1	II
Mentha pulegium L.				1	II
Trifolium hybridum L.				+	II

The river stream was corrected and a new riverbed was created: a 2 m deep canal. It entailed natural "re-salinization" of the soils, which led to replacement of the halophytic phytocoenoses with some meadow vegetation. Floristic composition of phytocoenoses is dominated by *Limonium bulgaricum*, but often a second layer of *Festuca valesiaca* or *Cynodon dactylon* is formed. Typical is the strong ruderalisation of the communities. The obligate halophytes, such as *Puccinellia convoluta, Crypsis aculeata* and *Juncus gerardii* identified by Ganchev & Kochev (1962) are now probably extinct. However, such facultative halophytes as *Lactuca saligna* and *Bupleurum tenuissimum* were found out in the species composition of the association.

Steppe (herbaceous) vegetation

Association *Thymo urumovii-Chrysopogonetum grylli* ass. nova hoc loco holotypus relevé No 15, Table 2

The communities of *Chrysopogon gryllus* were widespread in the study area. They were found most often on south, southwest and southeast-facing slopes, almost equal to those with an incline of 20°. The species were present as single tufts in the composition of rocky open phytocoenoses, but the typical communities grew on relatively well-evolved soil layers. The soils had well developed humus horizon, but relatively low humidity. Occasionally they were eroded, with a not very strong rate of erosion. These communities were typically located on the lower slopes, usually at the base or on the ridges of hills. They also bordered on the open communities of *Dichanthium ischaemum*, *Stipa capillata* and *S. pulcherrima*, occupying the steep or eroded territories and exposed limestone cliffs. Some of them were former communities of *Chrysopogon gryllus*, where the species had remained in single tufts. The species dominated expressly its phytocoenoses. Its coverage reached 100 %. Usually, *Chrysopogon gryllus* formed dense tufts, 1.30 m high. Among these tufts other species formed a second layer. Most common were the significantly lower tufts of *Festuca valesiaca* and seldom of *Poa angustifolia*. Presumably, *Thymus callieri* subsp. *urumovii* occasionally formed a third, ground layer. The communities (Table 2) were rich in species. Most species, such as *Eryngium campestre*, *Euphorbia nicaensis*, *Medicago falcata*, *Teucrium chamaedrys, T. polium*, *Asperula cynanchica*, *Coronilla varia*, *Allium rotundum*, *Dorycnium herbaceum*, *Salvia nemorosa*, and *Achillea millefolium,* were widespread in the Bulgarian lowlands. However, there was also an interesting group of plants representing the primary grass cover of the area. The majority of them were never dominants or co-dominants in the vegetation. Such species were: *Centaurea stereophylla, Astragalus dasyanthus, A. austriacus, A. onobrychis* subsp. *škorpili, Salvia nutans, Astragalus pubiflorus, Nepeta parviflora, Salvia argentea, Adonis vernalis, A. wolgensis, Colchicum turcicum, Goniolimon tataricum, Silene otites, Dianthus carthusianorum, D. pallens, D. roseo-luteus, Astragalus ponticus, Iris pumila*, etc.

Association *Bothriochloetum ischaemi* var. *Cichorium intybus*

Dichantium ischaemum is a most common dominant in the grass cover, not only in the region but across all Bulgarian lowlands. Compared to *Chrysopogon gryllus*, this species is much less exacting and drought-resistant. It withstands the strong grazing and trampling. In the area of our study, *Dichantium ischaemum* occurs most often as a substitute for the communities of *Chrysopogon gryllus,* in places which have become unfit for the latter. Close to the villages, the active grazing pastures are occupied by the communities of *Dichanthium ischaemum*, while *Chrysopogon gryllus* grows in remote, less accessible to livestock grazing areas. Thus the phytocoenoses of *Dichanthium ischaemum* are almost entirely secondary dis-climax grasslands.

In the Middle Danubian Plain, the phytocoenoses of *Dichanthium ischaemum* (Table 3) are found anywhere in the vicinity of settlements, including near the town of Pleven. The altitude varies from 100 m to 260 m a.s.l. The exposition is different, but predominantly southern, southwestern and southeastern. The eroded soils are poor, compact and trampled-in, occasionally also polluted. These phytocoenoses grow also on rocky terrains. The floristic composition is formed by over 120 species (mostly herbs). The main layer is characteristically 0.5–0.7 m high. Indicative of the state of these phytocoenoses is a set of ruderals, such as *Cichorium intybus*, *Crepis setosa*, *Centaurea diffusa*, *Xeranthemum annuum*, *Daucus carota*, *Galium verum*, *Euphorbia cyparisssias, Cynodon dactylon, Cephalaria transilvanica, Chondrilla juncea, Carduus nutans, Picris hieracioides,*and *Berteroa incana* – thorny, poisonous or of species sustaining the trampling and grazing of the livestock. The Bulgarian syntaxon belongs to the association *Bothriochloetum* (*Andropogonetum*) *ischaemii* (Krist. 1937) Pop 1977 described in Romania. The Bulgarian group of phytocoenoses forms a new variant, *Cichorium intybus,* with the species *Cichorium intybus*, *Taraxacum serotinum* and *Crepis setosa*.

Table 2. Association *Thymo urumovii-Chrysopogonetum grylli* ass. nova holotypus rel. 15 hoc loco.

Single species:

1. Diagnostic species to the alliance *Festucion valesiacae* – *Adonis vernalis* L. – 26 (+), *Adonis volgensis* Steven. – 29 (r), *Potentilla obscura* Willd. – 35 (+), *Goniolimon tataricum* (L.) Boiss. – 13 (+).

2. Diagnostic species to the order *Festucetalia valesiacae* and class *Festuco-Brometea* – *Chamaecytisus austriacus* (L.) Link – 30 (2), *Campanula sibirica* L. – 10 (+), *Iris pumila* L. – 16 (+), *Seseli tortuosum* L. – 31 (+), *Melica ciliata* L. – 13 (2), *Sideritis montana* L. – 31 (+), *Scabiosa ochroleuca* L. – 35 (+), *Astragalus ponticus* Pall. – 35 (+).

3. Other species: *Vicia sativa* L. – 9 (+), *Centaurea orientalis* L. – 3 (+), *Trifolium echinatum* M. Bieb. – 9 (+), *Thalictrum aquilegifolium* L. ssp. *storgosiacum* Panov – 30 (+), *Origanum vulgare* L. – 18 (1), *Ononis arvensis* L. – 33 (+), *Fragaria moschata* Weston – 2 (+), *Vincetoxicum hirundinaria* Medik. – 10 (+), *Hieracium hoppeanum* Schult. – 10 (+), *Hypochaeris maculata* L. – 24 (+), *Cruciata pedemontana* (Bellardi) Ehrend. – 1 (+), *Astragalus corniculatus* M. Bieb. – 3 (1), *Cotinus coggygria* Scop. – 13 (2), *Isatis tinctoria* L. – 13 (r), *Melilotus albus* Medik. – 19 (+), *Veronica prostrata* L. – 22 (+), *Centaurea salonitana* Vis. – 30 (+), *Dianthus roseo-luteus* Velen. – 31 (1), *Carthamus lanatus* L. – 31 (1), *Ornithogalum narbonense* L. – 31 (+), *Hieracium echioides* – 4 (+), *Achillea nobilis* L. – 35 (+), *Taraxacum serotinum* (Waldst. & Kit.) Fisch. – 35 (+), *Crocus pallasii* Goldb. – 35 (+), *Filago vulgaris* Lam. – 35 (+).

Localities: 1, 2, 9, 11, 12 – Vubel village, Pleven District; 3 – Levski town, Pleven District; 4 – Zhernov village, Pleven District; 5, 6, 7, 8 – Nikopol town, Pleven District; 10 – Muselievo village, Pleven District; 13, 17, 18, 19, 20 – Lyubenovo village, Pleven District; 14, 15, 16 – Novachene village, Pleven District; 21, 22, 23 – Komarevo village Pleven District; 24, 25, 26, 27, 28, 29 – Riben village, Pleven District; 30 – Dragomirovo village, Pleven District; 31 – Varana village, Pleven District; 32 – Kulina Voda village Pleven District; 33 – Sanadinovo village, Pleven District; 34 – Muselievo village, Pleven District; 35 – Oresh village, Veliko Turnovo District.

Dates: 1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12 – 9. 06. 00 и 12. 10. 01; 3 – 19. 05. 00; 13, 14, 15, 16, 17, 18, 19, 20 – 14. 06. 00 и 5. 10. 00; 21, 22, 23, 24, 25, 26, 27, 28, 29 – 16. 06. 00; 30 – 19. 06. 00; 31 – 21. 06. 00; 32, 33 – 10. 07. 00; 34 – 22. 06. 01; 35 – 18. 10. 01.

Number of relevs	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**C**
Altidude	110	110	120	100	120	120	120	120	100	150	130	130	120	170	170	170	190	180	180	180	110	110	110	110	110	110	110	110	110	160	180	160	200	170	200	**o**
Exposition	SW	SE	S	NE	E	E	SE	SE	W	S	E	E	SE	E	E	E	NW	E	E	E	W	W	SW	SW	W	W	S	S	SW	W	S	SE	SW	SE	W	**n**
Slope of the terrain	15	15	7	10	15	15	20	20	10	10	20	20	20	10	10	10	25	12	15	12	10	5	20	15	15	20	10	10	10	10	15	15	15	10	5	**s**
Cover (%)	90	90	95	100	95	95	80	80	100	100	100	100	100	100	100	100	90	100	95	100	90	100	100	100	100	100	100	100	100	90	100	90	90	100	100	**t.**
Area of relevs (m^2)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
Diagnostic species of the association																																				
Chrysopogon gryllus (L.) Trin.	5	5	4	4	4	5	4	4	5	5	5	5	5	5	4	5	5	5	4	5	4	5	5	5	5	5	5	5	5	4	5	5	5	5	5	V
Thymus callieri Borbás ex Velen. ssp. *urumovii* Velen.	3	1	1	3	2	1	1	1	+		+	1	2	2	2	2		2	3	2	2	2	2	2	2	2	3	3	3			2	3		3	V
Allium rotundum L.	+	+		+			+	+			+	+			+			+		+	+	+			+	+	+	+		+					+	III
Colchicum turcicum Janka	+	+							+	+	+	+	+	r	+	+																		+		II
Astragalus austriacus Jacq.					+	r	1		1	+					+										+	+										II
Diagnostic species to the alliance *Festucion valesiacae* Klika 1931																																				
Eryngium campestre L.			1	1	+	1	1	1	+	+	+	+	+	+	+	+	+	1	1	1	+	+	2	+	+	+	+	+	3	+	1	+	2	+	+	V
Medicago falcata L.	+	3		2	2	1	2	2	3	3	3	3				+		3	4	3	2	3	2	3	3	3	4	4	3	3	2			3	2	IV
Teucrium polium L.				1	+	2	+	2				2	1	1	2	1		2	2		1	+	2							+	1	1		2		III
Poa angustifolia L.	+	2							3	3												1	+	2	2	1	3	2	3						+	III
Dichanthium ischaemum (L.) Roberty					+	+								+	2	+		+	+					+	+				+				1		1	II
Linum austriacum L.					1	1	+	2			+		1						+	+										+	+			1		II
Centaurea stereophylla Bess.						2	1	1																+	+					2						I
Astragalus dasyanthus Pall.																								1	+	2	+	2	+							I

Table 2. Continuation.

Number of relevs	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**C**
Altidude	110	110	120	100	120	120	120	120	100	150	130	130	120	170	170	170	190	180	180	180	110	110	110	110	110	110	110	110	110	160	180	160	200	170	200	**o**
Exposition	SW	SE	S	NE	E	E	SE	SE	W	S	E	E	SE	E	E	E	NW	E	E	E	W	W	SW	SW	W	W	S	S	SW	W	S	SE	SW	SE	W	**n**
Slope of the terrain	15	15	7	10	15	15	20	20	10	10	20	20	20	10	10	10	25	12	15	12	10	5	20	15	15	20	10	10	10	10	15	15	15	10	5	**s**
Cover (%)	90	90	95	100	95	95	80	80	100	100	100	100	100	100	100	100	90	100	95	100	90	100	100	100	100	100	100	100	100	90	100	90	90	100	100	**t.**
Area of relevs (m^2)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
Salvia nutans L.																								+	+	+			+							I
Astragalus pubiflorus DC.														+	2	2																				I
Xeranthemum annuum L.					+	+																													+	I
Potentilla pedata Willd.				+															+																	I
Bromus tectorum L.					+	+																														I
Bromus racemosus L.																						+													+	I
Onobrychis arenaria (Kit.) DC.																														+				+		I
Allium paniculatum L.				+					+																											I
Cerinthe minor L.																														2						I
Potentilla sulphurea Lam.																															2					I
Nepeta parviflora M. Bieb.																														+						I
Diagnostic species to the order *Festucetalia valesiacae* Braun-Blanq. et Tuxen in Braun-Blanq. 1944																																				
Euphorbia nicaensis All.	2	2		2	+	2			2	3	1	1	2	1	1	+	1	+	1	1	2	3	2	3	1	2	1	1	2	+			2	3	+	V
Festuca valesiaca Gaudin.	1	1	3		3	1			2	2		1		+	+	+		+	+	2	+	2		1	+			+	2	3		3	3		2	IV
Asperula cynanchica L.					+	1		+	1						+						+	+		1	+				1			+	+	+	+	III
Coronilla varia L.	+	+		2					2			+		3	+	3		3	+	2		+		2	+	+	2	2	2								III
Dorycnium herbaceum Vill.			2	+	2	3		+						+	2	2	3	3		1										2		3				II
Convolvulus cantabrica L.			2																					+	1			+			+			2		I
Silene otites (L.) Wib.					+							+		+												+										I
Centaurea rutifolia Sm.					+																			1	+	+										I
Carduus nutans L.					+					+										+														+		I
Astragalus onobrychis L. ssp. *skorpii* (Griseb.) Boiss.				+	+	2																														I
Senecio jacobaea L.					1										+													+								I
Stachys recta L.																								1						+						I
Dianthus pallens Sm.																																+	+	+	+	I
Lotus corniculatus L.																+																	+			I
Potentilla pilosa Willd.							+	2					+																							I

Table 2. Continuation.

Number of relevs	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**C**
Altidude	110	110	120	100	120	120	120	120	100	150	130	130	120	170	170	170	190	180	180	180	110	110	110	110	110	110	110	110	110	160	180	160	200	170	200	**o**
Exposition	SW	SE	S	NE	E	E	SE	SE	W	S	E	E	SE	E	E	E	NW	E	E	E	W	W	SW	SW	W	W	S	S	SW	W	S	SE	SW	SE	W	**n**
Slope of the terrain	15	15	7	10	15	15	20	20	10	10	20	20	20	10	10	10	25	12	15	12	10	5	20	15	15	20	10	10	10	10	15	15	15	10	5	**s**
Cover (%)	90	90	95	100	95	95	80	80	100	100	100	100	100	100	100	100	90	100	95	100	90	100	100	100	100	100	100	100	100	90	100	90	90	100	100	**t.**
Area of relevs (m^2)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
Erysimum diffusum Ehrh.																		+					+													I
Leontodon crispus Vill.				+															+																	I
Verbascum phoeniceum L.				+																																I
Diagnostic species to the class *Festuco-Brometea* Braun-Blanq. & Tuxen 1943																																				
Teucrium chamaedrys L.	2	2		2	1	3		2	2		+		2	2	1	1		3	3	2	2	2		1	3	3	3	3	+	+	2	2	+	2	1	V
Plantago lanceolata L.					+	+											+	+	1	1		+		+	+	+			+				1	+	+	II
Galium octonarium (Klokov) Pobed.			1	2					+		2	+		+	1	1	+					+														II
Potentilla argentea L.	1	+					+			1										1	+		+						+						+	II
Salvia nemorosa L.																		+						+	+	+	2			2		+				II
Hypericum perforatum L.				+	+	+									+										+	+										I
Koeleria macrantha (Ledeb.) Schult.		+							2	2																+			+								I
Galium verum L.	1								+																					2	2						I
Sanguisorba minor Scop.			1																																+	I
Allium flavum L.																						+												+		I
Salvia aethiopis																		r													+					I
Dianthus carthusianorum L.					+																															I
Filipendula vulgaris Moench.			+																																	I
Plantago media L.			+																																	I
Other species																																				
Achillea millefolium agg.	+	+							2	+								1	1	1	+	2					+				2				2	II
Agrimonia eupatoria L.														+	+	+								+												I
Dactylis glomerata L.									2																		1								+	I
Verbascum banaticum Schrad.													1					+		+																I
Crataegus monogyna Jacq.																						+											+			I
Vicia cracca L.										+										1																I
Centaurium erythraea Rafn.								+													+															I
Scabiosa argentea L.																																+	1			I

Table 3. Association *Bothriochloetum* (*Andropogonetum*) *ischaemi* (Krist. 1937) Pop 1977 variant *Cichorium intybus*.

Single species:

1. Diagnostic species to the alliance *Festucion valesiacae*: *Astragalus austriacus* Jacq. – 17(+), *Centaurea orientalis* L. – 9 (+), *Medicago minima* – 24 (+), *Potentilla pilosa* Willd. (1), *Potentilla pedata* Willd. – 4 (+), *Linum austriacum* L. – 17 (1), *Koeleria macrantha* (Ledeb.) Schult. – 9 (+), *Senecio jacobaea* L. – 11 (r), *Astragalus ponticus* Pall. – 14 (1), *Digitalis lanata* Ehrh. – 9 (+), *Rumex tuberosus* L. – 9 (+), *Jurinea ledebourii* Bunge – 11 (+).

2. Diagnostic species to the order *Festucetalia valesiacae* and to class *Festuco-Brometea:* *Picris hieracioides* L. – 3 (+), *Convolvulus cantabrica* L. – 11 (+), *Astragalus onobrychis* L. ssp. *chlorocarpus* Griseb. – 17 (+), *Muscari teniuflorum* Tausch. – 11 (+), *Galium octonarium* (Klokov) Pobed. – 15 (+), *Carthamus lanatus* L. – 27 (+), *Cerastium brachypetalum* Pers. 28 (+).

3. Other species: *Centaurea solstitalis* L. – 23 (+), *Marrubium peregrinum* L. – 13 (+), *Rhinanthus rumelicus* Velen. – 12 (+), *Prunus spinosa* L. – 8 (r), *Helleborus odorus* Walst. & Kit. – 23 (+), *Tortula muralis* Hedw. – 8 (1), *Pimpinela saxifraga* L. – 1 (3), *Verbascum banaticum* Schrad. – 2 (+), *Salsola ruthenica* Iljin. – 20 (3), *Medicago lupulina* L. – 29 (2), *Linum bienne* Mill. – 21 (1), *Bromus mollis* L. – 21 (2), *Geranium dissectum* L. – 21 (2), *Bituminaria bituminosa* (L.) C. H. Stirt. – 3 (+), *Clematis vitalba* L. – 4 (2), *Pseudolysimachion barrelieri* (Roem. & Schult.) Holub – 17 (+), *Thalictrum aquilegifolium* L. ssp. *storgosiacum* P. Panov – 11 (+), *Elymus elongatus* (Host) Runemark – 11 (+), *Trifolium repens* – 11 (+), *Reseda lutea* L. – 14 (+), *Linaria genistifolia* (L.) Mill. – 15 (1), *Torilis japonica* (Houtt.) DC. – 16 (+), *Carduus acanthoides* L. – 23 (+), *Comandra elegans* (Spreng.) Rchb. – 7 (+), *Petrorhagia illyrica* (Ard.) P. W. Ball & Heywood – 9 (+), *Lolium perenne* L. – 9 (2), *Lactuca serriola* L. – 27 (+), *Hordeum murinum* L. – 27 (+), *Melissa officinalis* L. – 28 (+), *Sherardia arvensis* L. – 28(+), *Malva sylvestris* L. – 29 (+), *Cirsium ligulare* Boiss. – 28 (+).

Localities: 1, 29 – Gorna Studena village, Veliko Turnovo District; 2 – Lyubenovo village, Pleven District; 3, 4 – Pleven town; 5, 6, 7, 8 – Kushin village, Pleven District;; 9, 10, 16, 28 – Protected area "Chernelka", Pleven District; 11; 12 – Yasen village, Pleven District; 13, 14 – Opanec village, Pleven District; 15 – Turnene village, Pleven District; 17 – Zhernov village, Pleven District; 18 – Pordim town, Pleven District; 19, 22 – Tuchenitsa village, Pleven District; 20 – Somovit village, Pleven District; 21 – Radishevo village, Pleven District; 23 – Butovo village, Veliko Turnovo District; 24, 25 – Ovcha mogila village, Veliko Turnovo District; 26 – Chervena village, Veliko Turnovo District; 27 – Lozitsa village, Pleven District; 30 – Totleben village, Pleven District.

Dates: 1 – 25. 08. 99; 2 – 21. 09. 99; 3, 4 – 28. 07. 99; 5, 6, 7 – 5. 08. 99; 8, 9, 10 – 18. 08. 99; 11, 12 – 6. 09. 99; 13, 14 – 8. 09. 99; 15, 16 – 13. 09. 99, 17 – 9. 06. 00; 18, 30 – 6. 08. 01; 19 – 31. 10. 01; 20 – 14. 10. 99; 21, 22 – 30. 09. 99; 23 – 11. 07. 99; 24 – 16. 06. 00; 25 – 19. 06. 00; 26 – 21. 06. 00; 27 – 24. 07. 01; 28 – 1. 08. 01; 29 – 25. 07. 01.

Number of releves	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**C**
Exposition	SE	W	S	SE	S	S	S	S	W	W	SW	W	SE	SE	S	S	E	S	S	N	NW	S	N	W	NE	NW	0	0	E	N	**o**
Slope of the terrain	2	8	5	5	10	5	5	5	5	2	5	3	10	7	5	7	10	10	2	7	6	5	10	15	6	5	0	0	2	2	**n**
Cover (%)	100	100	100	95	85	95	100	95	95	90	100	100	100	100	80	100	95	100	95	100	100	100	100	90	80	90	100	100	100	100	**s**
Area of releves (m^2)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	**t.**
Chararacter and differencial taxa to the association and variant																															
Dichantium ischaemum (L.) Roberty (Ch)	5	4	4	5	4	4	5	5	5	5	4	5	5	4	3	4	5	5	4	4	4	5	2	4	5	4	4	5	4	5	V
Taraxacum serotinum (Waldst. & Kit.) Fisch. (D)	1	+		+				+		+	+	+	+		+	+				+			+							+	III
Cichorium intybus L. (D)	1	+			+			+				+	+	+	+								+			+	+	+	+	+	III
Crepis setosa Haller f. (D)					+	+	+		+	+	+			+							+						+	+		+	II
Diagnostic species to the alliance *Festucion valesiacae* Klika 1931																															
Medicago falcata L.	2	3	2	2	2	2	2	+	3	3	3	2	2	2	2	3	3	2	+	2	2	3	2	3		2	3	2	3	1	V
Eryngium campestre L.	+	+	1	1	1	1	1	+	+		1	+	+	+	+	+	+	1	+	+	2		+	1		2	+	+	+	1	V
Teucrium polium L.			2	2	1	1	1			+	1				+	2	2	2													II
Xeranthemum annuum L.			1					1					r		1		+			+		1	+				+		1		II
Poa angustifolia L.			+	+				+		+											3		3	1		3		2			II
Chrysopogon gryllus (L.) Trin.										+	+			1	+		2	1			+			2			+				II
Potentilla obscura Willd.			+								+																				I
Petrorhagia illyrica (Ard.) P.W. Ball & Heywood									+	+																					I
Sternbergia colchiciflora Waldst. & Kit.															+					+											I
Centaurea stereophylla Besser													+					+													I

Table 3. Continuation.

Number of releves	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**C**
Exposition	SE	W	S	SE	S	S	S	S	W	W	SW	W	SE	SE	S	S	E	S	S	N	NW	S	N	W	NE	NW	0	0	E	N	**o**
Slope of the terrain	2	8	5	5	10	5	5	5	5	2	5	3	10	7	5	7	10	10	2	7	6	5	10	15	6	5	0	0	2	2	**n**
Cover (%)	100	100	100	95	85	95	100	95	95	90	100	100	100	100	80	100	95	100	95	100	100	100	100	90	80	90	100	100	100	100	**s**
Area of releves (m^2)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	**t.**
Diagnostic species to the order *Festucetalia valesiacae* Braun-Blanq. et Tuxen in Braun-Blanq. 1944																															
Festuca valesiaca Gaudin					2	1	3	2	2	+	3				3	3	1		2	+	3		1	3	1	2	+		3	3	IV
Scabiosa ochroleuca L.		+	+	1	1	+	1	1	1	1	+	+		+		1			+												III
Lotus corniculatus L.	2		2	1	1	1		1	2	2		3	4	2	1				+							2	2			+	III
Asperula cynanchica L.			+	+	+	+	+	+					3	2		1					+				+					+	II
Thymus callieri Borbás ex Velen.								2	+			+					3	2	+		2	1				1	4	3		3	II
Centaurea rutifolia Sm.			+	+	+	+					+	+		+		+	1		+					+					1		II
Dorycnium herbaceum Vill.			3	2	+	1			+	+	+	2		+			2										+				II
Coronilla varia L.		2					+	+	+		+	+	1					1									2	1			II
Euphorbia nicaeensis All.		1									1			+			2							1	2				+		II
Cephalaria transsylvanica (L.) Roem.	+														+								+								I
Allium rotundum L.											+			1											+						I
Chondrilla juncea L.										+																	+			+	I
Erysimum diffusum Ehrh.																								+	2						I
Galium humifusum M. Bieb.																				+							+				I
Hieracium praealtum Vill. ex Gochnat ssp. *bauchini* (Bess.) Petun.					+					+																					I
Alyssum alyssoides (L.) L.																	+							+							I
Carduus nutans L.																					+								+		I
Veronica austriaca L. ssp. *jaquinii* (Baugm.) Maly.									+	+																					I
Diagnostic species to the class *Festuco-Brometea* Braun-Blanq. & Tuxen 1943																															
Plantago lanceolata L.				+				+	+							+				1		1	+	1	+	1	+	1	2	+	III
Teucrium chamaedrys L.			3	2	3	3	3		2	3	2				2	1		3	+												II
Daucus carota L.			+	+				+				+	+		2						+						+	+	+	+	II
Sanguisorba minor Scop.					+	+		+	+	+		+	+		+																II
Galium verum L.									+	+		+		+							+		1			1				+	II
Salvia nemorosa L.	+		+	1		+									+								+				2				II
Potentilla argentea L.														+							+					2	1	+		1	I
Euphorbia cyparissias L.			+	+			1												+			+						+			I
Bromus arvensis L.				+										+		+							3				2		1		I
Trifolium arvense L.									+	+											+								+	+	I
Rosa canina L.			+	+				+								+			+												I
Echium vulgare L.				+	+		+			r																			+		I

Table 3. Continuation.

Number of releves	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**C**
Exposition	SE	W	S	SE	S	S	S	S	W	W	SW	W	SE	SE	S	S	E	S	S	N	NW	S	N	W	NE	NW	0	0	E	N	**o**
Slope of the terrain	2	8	5	5	10	5	5	5	5	2	5	3	10	7	5	7	10	10	2	7	6	5	10	15	6	5	0	0	2	2	**n**
Cover (%)	100	100	100	95	85	95	100	95	95	90	100	100	100	100	80	100	95	100	95	100	100	100	100	90	80	90	100	100	100	100	**s**
Area of releves (m^2)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	**t.**
Petrorhagia prolifera (L.) P. W. Ball & Heywood																					+			+			+		+		I
Berteroa incana (L.) DC.																						+	1				+	+			I
Hypericum perforatum L.			+							r																	+				I
Trifolium campestre Schreb.																												+	+	1	I
Plantago media L.											+		r																		I
Xeranthemum cylindraceum Sm.																			2		1										I
Other species																															
Achillea millefolium agg.									+	+	+	+	+		+		+	+	2	+	1	1	1		+	3	+	+	1	1	IV
Agrimonia eupatoria L.			+	+			+		+	+									+							+					II
Crataegus monogyna Jacq.			+					2		+				+		+			+							+					II
Odontites vernus (Bellardi) Dumort.								+	r	+	2	+	+						+												II
Prunella vulgaris L.				1			+		+	+		+							2												I
Fragaria moschata Weston								+			1				1											2					I
Paliurus spina-christi Mill.						+	+		+	+																					I
Clinopodium vulgare L.			1	+								+																			I
Dactylis glomerata L.								+			+															1					I
Ononis arvensis L.							+					+								+											I
Convolvulus arvensis L.	+																									+			1		I
Nigella arvensis L.								+							r													+			I
Cynodon dactylon (L.) Pers.																					+								2		I
Euphorbia falcata L.									+												+										I
Conyza canadensis (L.) Cronq.																				+								+			I
Agrostis castellana Boiss. & Reut.																					+						+				I
Torilis arvensis (Huds.) Link																+					+										I
Trifolium pratense L.																						+						+			I
Scabiosa argentea L.														+													+				*I*
Trifolium echinatum M. Bieb.																							1					+			I
Setaria italica (L.) P. Beauv.																												+	+		I
Bromus racemosus L.																		+										+			I
Filago vulgaris Lam.																		+											+		I

Association *Centaureo stereophyllae-Stipetum pulcherrimae* ass. nova hoc loco holotypus relevé No 13, Table 4

Stipa pulcherrima is relatively rare in the study area. It occurs mainly in rocky places, in the floristic composition of open calcareous grasslands. Altitudes range between 70 m and 100 m. The phytoceneoses (Table 4) across the area are located on slopes with southern, southwestern or southeastern exposition. The slope gradient varies between 10° and 20°. The soils are highly eroded. *Stipa pulcherrima* is particularly obvious in the communities during flowering in May. The other grass species (70 species) develop between the tufts of *Stipa pulcherrima.* Presumably, these communities have occupied larger areas in the past and have now shrunk because of the climate changes during the Holocene, replaced by more competitive species in areas with unfavourable habitat conditions, such as the rocky slopes (see Yordanov 1936). A new association is described, characteristic with the presence of *Centaurea stereophylla* and other steppe species. *Stipa pulcherrima* species is incorrectly defined in the PhD thesis as *Stipa tirsa* (*S. stenophylla*). A new subassociation of the existing association *Stipetum stenophyllae* is described. The association *Stipetum pulcherrimae* Soó 1942 is included in the alliance *Stipion lessingianae* Soó 1947, typical of the Pannonian region. The floristic structure of the newly established association shows a much greater similarity with the alliance *Festucion valesiacae*. The common species are: *Chrysopogon gryllus*, *Eryngium campestre*, *Euphorbia nicaensis*, *Teucrium polium*, *Festuca valesiaca*, *Convolvulus cantabrica*, *Medicago minima*, *Thymus callieri* subsp. *urumovii*, *Salvia nemorosa*, *Crataegus monogyna*, *Teucrium chamaedrys, Dorycnium herbaceum, Koeleria macrantha,* and *Medicago falcata*. But there are also typical Pontic steppe species, or Balkan endemics, such as *Genista sessilifolia* subsp. *trifoliata, Centaurea stereophylla*, *Salvia nutans, Galium octonarium*, *Phlomis herba-venti* subsp. *pungens*, *Scorzonera laciniata*, *Aster oleifolius*, *Iris pumila*, *Thesium simplex* subsp. *moesiacum*, *Astragalus corniculatus*, *Hedysarum grandiflorum* subsp. *bulgaricum*, *Artemisia santonicum*, *Trinia glauca*, *Nepeta parviflora*, *Serratula bulgarica, Adonis wolgensis,* etc.

Table 4. Association *Centaureo stereophyllae-Stipetum pulcherrimae* ass. nova holotypus rel. 13 hoc loco.
Single species:

1. Diagnostic species to the alliance *Festucion valesiacae*: *Nonea pulla* DC. – 4 (+), *Inula ensifolia* L. – 4 (1), *Polygala major* Jacq. – 4 (+), *Potentilla pilosa* Willd. – 13 (+), *Onosma visianii* Clementi – 13 (+), *Koeleria macrantha* (Ledeb.) Schult. – 6 (+), *Linum hirsutum* L. – 7 (+), *Phlomis tuberosa* L. – 7 (+), *Centaurea orientalis* L. – 4 (+), *Adonis volgensis* Steven ex DC. – 7 (+).

2. Diagnostic species to the order *Festucetalia valesiacae*: *Vebascum phoeniceum* L. – 4 (+), *Veronica austriaca* L. ssp. *jacquinii* (Baumg.) Eb. Fisch. – 4 (1), *Carex tomentosa* L. – 4 (+), *Muscari tenuiflorum* Tausch – 8 (+).

3. Diagnostic species to the class *Festuco-Brometea*: *Potentilla argentea* L. – 1 (+), *Filipendula vulgaris* Moench – 4 (1) **4. Other species:** *Clematis integrifolia* – 4 (1), *Ornithogalum kochii* Parl. – 4 (+), *Pastinaca hirsuta* Pančić – 4 (+), *Dactylis glomerata* L. – 8 (+), *Scutellaria orientalis* L. ssp. *pinnatifida* J. R. Edm. – 8 (+), *Tanacetum corymbosum* (L.) Sch. Bip. – 7 (+), *Vincetoxicum hirundinaria* Medik. – 7 (2), *Dictamnus albus* L. – 4 (1), *Teucrium chamaedrys* L. (1), *Linum austriacum* L. – 5 (+), *Goniolimon tataricum* (L.) Boiss. – 5 (+), *Cotinus cogyggria* Scop. – 5 (+), *Erysimum diffusum* Ehrh. – 5 (+), *Silene otites* (L.) Wibel – 5 (+).

Localities: 1. 2. 3, 4, 6, 7 – Hadzhidimitrovo village, Veliko Tunovo District; 5 – Novachene village, Pleven District; 8, 9, 11, 13, 14 – Riben village, Pleven District.

Dates: 1, 2, 3, 4 – 3. 05. 00; 5 – 16. 05. 00.; 6, 7 – 17. 05. 00; 8, 9, 10, 11, 12, 13, 14 – 9. 05. 00.

Number of releves	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**C**
Altitude	70	85	85	85	230	85	85	100	100	100	100	100	100	100	**o**
Exposition	w	w	w	sw	s	se	se	s	s	s	s	s	s	s	**n**
Slope of the terrain (in degrees)	20	20	20	20	10	10	10	10	15	15	20	20	15	15	**s**
Cover (%)	90	70	70	80	90	90	90	70	60	60	70	60	60	50	**t.**
Area of releves (m^2)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
Character taxa of the association															
Stipa pulcherrima K. Koch.	4	3	3	3	4	4	4	3	2	2	3	3	3	2	V
Centaurea stereophylla Besser	4					+		2	1	1	1	1	1	1	IV
Salvia nutans L.	+			2		+		2	2	2	2	2	2	1	IV
Galium octonarium (Klokov) Pobed.	+				+		+	1	+	2			1		III
Diagnostic species to the alliance *Festucion valesiacae* Klika 1931															
Chrysopogon gryllus (L.) Trin.	2	+	1	1			2	+	1		1	1	+	1	V
Eryngium campestre L.		+	+		+	+		1			+	1	1	+	IV
Teucrium polium L.		1			1			+	1	2	1	1	1		III
Aster oleifolius (Lam.) Wagenitz	2	2	2	1		2	2								III

Table 4. Continuation.

Number of releves	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**C**
Altitude	70	85	85	85	230	85	85	100	100	100	100	100	100	100	**o**
Exposition	w	w	w	sw	s	se	se	s	s	s	s	s	s	s	**n**
Slope of the terrain (in degrees)	20	20	20	20	10	10	10	10	15	15	20	20	15	15	**s**
Cover (%)	90	70	70	80	90	90	90	70	60	60	70	60	60	50	**t.**
Area of releves (m^2)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
Scorzonera laciniata L.	+	+	+					+				+	+		III
Vinca herbacea Waldst. & Kit.				1				1	1	1				1	II
Serratula bulgarica Acht. & Stoj.				1			1								I
Medicago falcata L.													2	1	I
Falcaria vulgaris Bernh.													1	+	I
Astragalus pubiflorus DC.				+	+										I
Astragalus austriacus Jacq.					+							+			I
Diagnostic species to the order *Festucetalia valesiacae* Braun-Blanq. et Tuxen in Braun-Blanq. 1944															
Euphorbia nicaeensis All.	+				+	1	1	+	1	1	1	1	+	1	IV
Satureja montana L. ssp. *kitaibelii* (Wierzb. ex Heuff.) P. W. Ball									1	+	1	1	2	2	III
Iris pumila L.				1		+	2						+	1	II
Festuca valesiaca Gaudin				1	2	2	+					+			II
Phlomis herba-venti L. ssp. *pungens* (Willd.) Maire ex De Filipps	1	+	+	+			2								II
Convolvulus cantabrica L.									1	1	1	1			II
Medicago minima (L.) L.								+			1	2			II
Stachys recta L.						+					1	1			II
Tanacetum millefolium (L.) Tzvelev		1	1												I
Jurinea consanguinea DC. ssp. neicevii Koz.				+		+									I
Trinia glauca (L.) Dumort.				+		+									I
Onobrychis arenaria (Kit.) DC.				+		+									I
Diagnostic species to the class *Festuco-Brometea* Braun-Blanq. & Tuxen 1943															
Thymus callieri Borbás ex Velen. ssp. *urumovii* Velen.				2	2			+			1	+		1	II
Salvia nemorosa L.	2	+	+							1					II
Thesium simplex Velen.		+	1									+			II
Marrubium peregrinum L.								+			1	1			II
Sanguisorba minor Scop.									1		1	1			II
Teucrium chamaedrys L.				1	2										I
Dorycnium herbaceum Vill.					1		2								
Other species															
Genista sessilifolia DC. ssp. *trifoliata* Janka	1	+	2	1			1	+	2	+	2	+	+	1	V
Astragalus corniculatus M. Bieb.	2	2	2	+											II
Ajuga salicifolia (L.) Schreber.	1	+	+	1											II
Nepeta parviflora M. Bieb.	1	+	1			+									II
Crataegus monogyna Jacq.					+					1	+	1			II
Hedysarum grandiflorum Pall. ssp. *bulgaricum* Koz.	1	+	+												II
Artemisia santonicum L.		1	+												I

Association *Potentillo pilosae-Achilleetum clypeolatae* ass. nova hoc loco holotypus relevé No 16, Table 5

This association (Table 5) can be defined as one of sub-Mediterranean or southern origin. This is evidenced not only by the floristic composition, but also by its distribution mainly in the border zone of the Danubian Plain with the Forebalkan. As the loess cover is missing in this territory, the communities inhabit mostly open calcareous substrates on slopes of small karst river valleys. The phytocoenoses are distributed on Cretaceous limestones – rocks and screes, frequently with southern, southwestern and southeastern exposition, and on slopes with an incline be-

tween 10° to 40°. Altitudes vary from 140 m to 240 m a.s.l. The coverage is from 30 % to 80 %. Small depressions on the rocks have collected a thin layer of soil, where these phytocoenoses have developed. Characteristically, the rocks drip water from the surrounding areas during snow melting in spring and some rock terraces even create conditions for excessive humidification. The floristic composition of the new association includes some widespread chasmophytes and calciphytes in the sub-Mediterranean areas of Europe, also typical of Southeast Europe or the Balkans. Some shrubs and low trees of sub-Mediterranean origin also occur on the rocks. The new association holds an intermediate position between the specific petrophytic continental steppes in the north and the low sub-Mediterranean calcareous grasslands in the southwest of the study area. Typical species of the new association are: *Satureja montana* subsp. *kitaibelii*, *Sideritis montana*, *Achillea clypeolata*, *Sedum hispanicum*, *Melica ciliata*, *Allium flavum*, *Potentilla pilosa*, *Acinos alpinus* subsp. *meridionalis, Seseli rigidum* subsp. *rigidum*, *Alyssum saxatile*, *Coronilla scorpioides*, *Allium moschatum*, *Scleranthus annuus, Scabiosa micrantha, Asperula purpurea, Teucrium montanum, Acinos suaveolens, Ornithogalum refractum, Galium lucidum, Parietaria lusitanica.* Some endemics are *Dianthus petraeus* ssp. *noëanus* (Balkan endemic), and *Seseli degenii* (local endemic).

Table 5. Association *Potentillo pilosae-Achilleetum clypeolatae* ass. nova, holotypus rel. 16 hoc loco.
Single species:

1. Diagnostic species to the alliance *Satureijon montanae*: *Parietaria lusitanica* L. – 12 (+), *Seseli degenii* Urum. – 6 (1), *Poa compressa* L. – 1 (1), *Cerastium glomeratum* Thuill. – 16 (+), *Crepis sancta*(L.) Bornm. – 17 (+), *Ornithogalum refractum* Kit. ex Schltdl. – 17 (+), *Asperula purpurea* (L.) Ehrend. – 5 (+), *Anthemis tinctoria* L. – 15 (+), *Teucrium montanum* L. – 7 (1), *Acinos suaveolens* (Sm.) G. Don – 7 (+).

2. Diagnostic species to the order *Festucetalia valesiacae*: *Onosma visianii* Clementi – 15 (+), *Salvia nutans* L. – 15 (+), *Achillea crithmifolia* Waldst. & Kit. – 1 (+), *Salvia nemorosa* L. – 15 (1), *Stipa pulcherrima* K. Koch. – 16 (1), *Onobrychis lasiostachya* Boiss. – 7 (+), *Stachys recta* L. – 16 (1), *Carthamus lanatus* L. – 17 (+), *Verbascum phoeniceum* L. – 1 (+), *Campanula sibirica* L. – 5 (1), *Scabiosa ochroleuca* L. – 17 (+), *Linum tenuifolium* L. – 16 (+), *Herniaria hirsuta* L. – 1 (+), *Euphorbia virgata* Desf. – 1 (+), *Iris pumila* L. – 5 (+), *Phleum montanum* K. Koch – 14 (1).

3. Other species: *Cruciata pedemontana*(Bellardi) Ehrend. – 1 (+), *Crataegus monogyna* Jacq. – 8 (+), *Consolida regalis* S.F. Gray – 2 (1), *Gypsophila muralis* L. – 4 (1), *Hedera helix* L. – 13 (+), *Caucalis platycarpos* L. – 3 (+), *Marrubium peregrinum* L. – 1 (1), *Erodium cicutarium* (L.) L'Hér. – 1 (+), *Agrimonia eupatoria* L. – 1 (+), *Carpinus orientalis*Mill. – 9 (+), *Salvia sclarea* L. – 2 (+), *Cotoneaster integerrimus* Medik. – 16 (1), *Vicia peregrina* L. – 2 (+), *Campanula lingulata* Waldst. & Kit. – 16 (+).

Localities: 1, 2, 3, 4, 16 – Gortalovo village, Pleven District; 5, 6, 7 – Sadovec village, Pleven District; 8, 9, 10 – Kushin village, Pleven District; 11, 12, 13, 14 – Protected area "Kayluka", Pleven District; 15 – Komarevo village, Pleven District; 17 – Tuchenitsa village, Pleven District.

Dates: 1 – 12. 06. 99; 2, 3, 4, 16 – 25. 06. 01; 5, 6, 7 – 29. 06. 01; 8, 9, 10 – 5. 08. 99; 11, 12, 13, 14 – 15. 08. 99; 15 – 16. 06. 00; 17 – 22. 06. 01.

Number of releves	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**C**
Altitude	200	200	200	200	200	200	200	140	150	150	170	170	170	180	80	200	240	**o**
Exposition	SW	S	S	S	SW	W	W	SW	S	S	SW	SE	W	W	SW	SW	S	**n**
Slope of the terrain (in degrees)	30	20	30	10	40	20	40	20	20	15	20	20	20	15	30	10	30	**s**
Cover (%)	80	80	40	60	80	90	80	30	60	40	70	50	40	50	70	50	80	**t.**
Area of releves (m^2)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
Diagnostic taxa of the association																		
Achillea clypeolata Sm.	3	2	2	2	1	+			2	1	1		+			2		IV
Sedum hispanicum (L.) Raym.-Hamet		+	2	2	+		1	+	1	1	+	1		+		1	+	IV
Paronychia cephalotes (M. Bieb.) Besser			1		+		+	+		+	+	1	1	+		1	+	IV
Potentilla pilosa Willd.				+		1	1		1	+	+	+		+	+	1		III
Alyssum saxatile L.				2	1	1						+		+		1		II
Coronilla scorpioides (L.) W. D. J. Koch			+	+		1			+								+	II
Seseli rigidum Waldst. & Kit. ssp. *rigidum*							+						1	+		+		II
Diagnostic species to the alliance *Satureijon montanae* Horvat 1962																		
Sideritis montana L.		1	2	3	3	2	2	+	1	+	+	1	1	+	2	1	2	V
Satureja montana L. ssp. *kitaibelii* (Wierzb. ex Heuff.) P. W. Ball			1	1	1	2		2	2	3	2		1	+	3	1	3	IV
Melica ciliata L.	1	1	1	1			1		+		1				2	1	+	III
Allium flavum L.		+			+	+	+				+	+	1			+	+	III
Acinos alpinus (L.) Moench ssp. *meridionalis* (Nyman) P. W. Ball			1	1	+	+	+									+	+	III

Table 5. Continuation.

Number of releves	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**C**
Altitude	200	200	200	200	200	200	200	140	150	150	170	170	170	180	80	200	240	**o**
Exposition	SW	S	S	S	SW	W	W	SW	S	S	SW	SE	W	W	SW	SW	S	**n**
Slope of the terrain (in degrees)	30	20	30	10	40	20	40	20	20	15	20	20	20	15	30	10	30	**s**
Cover (%)	80	80	40	60	80	90	80	30	60	40	70	50	40	50	70	50	80	**t.**
Area of releves (m^2)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
Allium moschatum Sint. ex Rege								+	1	+							+	II
Dianthus petraeus Waldst. & Kit. ssp. *noeanus* (Boiss.) Tutin			+													2		I
Galium lucidum All.												1		2				I
Diagnostic species to the order *Festucetalia valesiacae* Braun-Blanq. et Tuxen in Braun-Blanq. 1944																		
Teucrium polium L.	2	1	2	1	1	1	1		1		1			+	2	1	1	IV
Convolvulus cantabrica	2	2	2	2	2				1	+	+			+	1	2	+	IV
Dichanthium ischaemum (L.) Roberty		2		+				2	3	2	1	1	+	2	2	+	2	IV
Astragalus onobrychis L. ssp. *chlorocarpus* Grizeb.					2	1	+		+					+	+	2	1	III
Medicago minima (L.) L.	1	1	2	2		3	3	+	+									III
Cleistogenes serotina (L.) Keng		2		1	1		+		+	+				1				III
Asperula cynanchica L.	+		1				+					+	+	1			+	III
Stipa capillata L.		3		2		1	+									1	+	II
Koeleria macrantha (Ledeb.) Schult.			1		+						+	2	+				2	II
Medicago falcata L.	1	2	2											+		2		II
Xeranthemum annuum L.		+			+	+		+									2	II
Orlaya grandiflora (L.) Hoffm.	1		2		2	3	3											II
Centaurea orientalis L.	3	+												+		1		II
Crupina vulgaris Cass.	+	+	1												+			II
Chrysopogon gryllus (L.) Trin.	+	+									+							I
Dasypyrum villosum (L.) P. Candargy			+	+		+												I
*Allium rotundum*L.	+					1											+	I
Petrorhagia illyrica (Ard.) P. W. Ball & Heywood								+			1		+					I
Festuca valesiaca Gaudin								+				2	2					I
Thymus callieri Borbás ex Velen. ssp. *urumovii* Velen.	1							+	+									I
Coronilla varia L.	+	+									+							I
Eryngium campestre L.															+		+	I
Diagnostic species to the class *Festuco-Brometea* Braun-Blanq. & Tuxen 1943																		
Sanguisorba minor Scop.	+		1		1	+			1	+	+				1		+	III
Centaurea rutifolia Sm.	+							+	+	+	+	+		+	+		+	III
Poa bulbosa L.				2	1		+		1	1				+	+		2	III
Teucrium chamaedrys L.	1	2	1	1											1	2	1	III
Bromus tectorum L.			1	+	1		+		+									II
Alyssum minutum DC.	+	+		1			1		+									II
Ajuga chamaepytis Guss.				1											+		+	I
Scleranthus annuus L.					1	1										+		I
Petrorhagia saxifraga (L.) Link		+		2												+		I
Sedum sartorianum Boiss.			1		+	+												I
Minuartia setacea (Thuill.) Hayek ssp. *setacea*							+							1				I
Scabiosa micrantha Desf.			1	+														I
Bromus squarosus L.		+												+				I
Digitalis lanata Ehrh.	1	+																I

Table 5. Continuation.

Number of releves	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**C**
Altitude	200	200	200	200	200	200	200	140	150	150	170	170	170	180	80	200	240	**o**
Exposition	SW	S	S	S	SW	W	W	SW	S	S	SW	SE	W	W	SW	SW	S	**n**
Slope of the terrain (in degrees)	30	20	30	10	40	20	40	20	20	15	20	20	20	15	30	10	30	**s**
Cover (%)	80	80	40	60	80	90	80	30	60	40	70	50	40	50	70	50	80	**t.**
Area of releves (m^2)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
Other species																		
Paliurus spina-christi Mill.	1	+	1	1	1	1	+	+	+	+	+	+	+					IV
Tortula muralis Hedw.								2	+	1	1	+	+	+		2	2	III
Syringa vulgaris L.					+						+	+	2	2		1		II
Arenaria serpilifolia L.					+	+								+		+		II
Trifolium echinatum M. Bieb.				2	2	3							+					II
Verbascum banaticum Schrad.			+	1		+	+											I
Grimmia pulvinata (Hedw.) Sm.								+						+		2		I
Calamintha nepeta Willk.								1									+	I
Prunus mahaleb L.							+							+				I
Tragopogon dubius Scop.	+	+																I
Rhamnus saxatilis Jacq.										+						1		I
Tragus racemosus (L.) All.													+				+	I

Association *Lino linearifolium-Gypsophiletum glomeratae* ass. nova hoc loco holotypus relevé No 18, Table 6 subass. *typicum*

Subassociation *celtitosum glabratae* subass. nova hoc loco, holotype relevé №11, Table 6

The new association (Table 6) is endemic to the Nikopol Plateau in the northern part of the study area. It has been identified on the steep right bank of river Osam, at an altitude of 110 m to 220 m. The communities inhabit rocks of Maastricht age, strongly cut up by transverse gorges of small rivers and temporary springs. High and steep rock chains occasionally rise up to 20 m. Others have formed large screes and landslips. The slope of the terrain varies from nearly flat on top of the hills (5°) to very steep (70°) on the rocky walls. The latter have no soil cover. Humidity, especially on the screes, is very low. During strong summer heats, the limestones resemble as habitat the rocky deserts. This explains the lowest coverage of phytocoenoses (20% to maximum 70%) and the featuring of many species of Pontic origin. Geographic isolation of the phytocoenoses accounts for the presence of a group of endemic and relic taxa (about 80 species). These are: *Dianthus nardiformis*, *Seseli rigidum* subsp. *hirtulum*, *Linum tauricum* subsp. *linearifolium*, *Stachys arenariiformis*, *Alyssum corymbosioides*, *Genista sessilifolia* subsp. *trifoliata*, *Celtis glabrata,* etc.

Two subassociations were identified, depending on the terrain specifics of the syntaxon occurence: *typicum* and *celtitosum glabratae*.

1. The typical sub-association spreads on sliding screes and steep slopes devoid of soil cover. Characteristically, most species grow in tufts, stabilizing the moving rock mass. The typical species are: *Linum tauricum* subsp. *linearifolium*, *Genista sesilifolia* subsp. *trifoliata*, *Scutellaria orientalis* subsp. *pinnatifida*, *Comandra elegans*, *Cotinus cogyggria*, *Gypsophila glomerata, Mathiola fruticulosa, Cephalaria uralensis*, etc.

2. The second sub-association is richer in species than the first (53 vs. 39) and its phytocoenoses inhabit the solid rocky wreaths and terraces. Typical species are: *Celtis glabrata*, *Dianthus nardiformis, Seseli rigidum* subsp. *hirtulum, Galium flavescens, Stachys arenariaeformis, Rhodax canus, Minuartia setacea* subsp. *setacea,* and *Tortula muralis*.

The analysis shows the great specificity of the association *Lino linearifolium-Gypsophiletum glomeratae*. There are some species of the alliance *Satureijon montanae* Horvat 1962, such as *Teucrium montanum*, *Rhodax canus*, *Melica ciliata*, *Sideritis montana*, *Achillea clypeolata, Trigonella monspeliaca, Acinos alpinus* subsp. *meridionalis, Allium moschatum, Paronychia cephalotes, Sedum hispanicum,* and *Alyssum saxatile*. However, the new syntaxon is characterized by low participation of the sub-Mediterranean species specific of the alliance *Saturejon*, although there are some endemic forms of Pontic origin, which are diagnostic of the new association.

Table 6. Association *Lino linearifolium-Gypsophiletum glomeratae* ass. nova holotype rel. 18 hoc loco subassociation *typicum* subassociation *celtitosum glabratae* subass. nova, holotype rel. 11 hoc loco.

Single species:

1. Diagnostic species to the alliance *Satureijon montanae*: *Erysimum diffusum* Ehrh. – 19 (+), *Allium moschatum* Sint. ex Regel – 11 (+), *Paronychia cephalotes* (M. Bieb.) Besser – 17 (+), *Sedum hispanicum* (L.) Raym.-Hamet – 18 (+), *Alyssum saxatile* L. – 19 (+).

2. Diagnostic species to the *Festucetalia valesiacae*: *Agropyron cristatum* (L.) Gaertn. – 11 (1), *Orlaya grandiflora* (L.) Hoffm. – 12 (+), *Stipa capillata* L. – 15 (+), *Chrysopogon gryllus* (L.) Trin. – 11 (+), *Iris pumila* L. – 3 (+), *Eryngium campestre* L. – 19 (+), *Onobrychis arenaria* (Kit.) DC. – 10 (2), *Kochia scoparia* (L.) Schrad. – 13 (+), *Scabiosa ochroleuca* L. – 19 (+), *Brassica elongata* Ehrh. – 9 (+), *Crupina vulgaris* Cass. – 11 (+).

3. Diagnostic species to the class *Festuco-Brometea*: *Anthericum ramosum* L. – 6 (1), *Teucrium chamaedrys* L. – 18 (+), *Goniolimon tataricum* (L.) Boiss. – 16 (+), *Centaurea rutifolia* Sm. – 19 (+).

4. Other species: *Tragopogon dubius* Scop. – 9 (+), *Paliurus spina-christi* Mill. – 19 (+), *Crataegus monogyna* Jacq. – 19 (+), *Trifolium echinatum* M. Bieb. – 16 (4), *Reseda inodora* Rchb. – 19 (+).

Localities: 1, 10 – Lyubenovo village, Pleven District; 3, 4, 5, 6 – Debovo village, Pleven District; 7, 8 – Novachene village, Pleven District; 11, 15, 16, 17, 9 – Evlogievo village, Pleven District; 2, 12, 13, 14, 18, 19 – Muselievo village, Pleven District.

Dates: 1, 11, 12, 13, 14, 15, 16, 17 – 27. 07. 99; 2 – 12. 04. 00; 3, 4, 5, 6, 7, 8 – 16. 05. 00. 18, 19, 9, 10 – 22. 06. 01.

Number of releves	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**		Const.	
Altitude	150	120	120	120	120	110	220	220	130	110	140	120	120	120	140	140	140	110	120	Sub	Sub	Ass.
Exposition	S	S	S	S	S	S	S	S	S	S	S	SE	S	SW	S	S	S	S	SE	ass.	ass.	
slope of the terrain (in degees)	45	45	40	40	40	15	40	45	40	30	60	40	60	5	60	2	60	70	20	typ.	cel	
Cover (%)	60	60	40	30	40	60	30	30	70	70	70	70	50	60	70	90	60	20	30			
Area of releves (m^2)	100	100	100	100	100	100	100	100	100	100	25	100	25	100	25	100	25	25	100			
Character taxa of the association and typical subassociation																						
Gypsophila glomerata Adams	2	1	1	1	2	2	2	1	1	2	2	2	2	2	2		2	+	1	V	V	V
Dianthus nardiformis Janka		1			+				1		2	1	1		1	1	2		r	II	IV	III
Seseli rigidum Waldst. & Kit. ssp. *hirtulum* Peev									1	1			+	1	1			+	1	I	III	II
Differencial taxa of the subassociation																						
Linum tauricum Willd. ssp. *linearifolium* (Lindem.) Petrova	2	+	+	1	2	2	1	1	2	2	+									V	I	III
Alyssum corymbosioides Formánek				1	2	1	1	1	1	1										IV	0	II
Galium flavescens Borb.											2		1	1	2			1	+	0	IV	II
Stachys arenariiformis Rouy											+				+			+	1	0	III	II
Celtis glabrata Steven ex Planch.											+	+					+	1		0	III	II
Diagnostic species to the alliance *Satureijon montanae* Horvat 1962																						
Satureja montana L. ssp. *kitaibelii* (Wierzb. ex Heuff.) P.W.Ball.	3			2	1	2	1	1	2	2	1	2		1	1	2	1	1	1	IV	V	V
Teucrium montanum L.						1			1	1			+	1	1			1		II	III	II
Rhodax canus (L.) Fuss											1	2		2	+		1	+		0	IV	II
Melica ciliata L.				1		+			1	1		1								II	I	II
Sideritis montana L.											+		+				+		+	0	III	II
Haplophyllum suaveolens (DC) G. Don.			+						1	+										II	0	I
Convolvulus cantabrica L.												+	1							0	II	I
Achillea clypeolata Sibth. & Sm.										+	+									I	I	I
Allium flavum L.											+							+		0	II	I
Trigonella monspeliaca L.												1						1		0	II	I
Acinos alpinus (L.) Moench. ssp. *meridionalis* (Nyman) P.W. Ball												+						+		0	II	I

Table 6. Continuation.

Number of releves	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**		Const.	
Altitude	150	120	120	120	120	110	220	220	130	110	140	120	120	120	140	140	140	110	120	Sub	Sub	Ass.
Exposition	S	S	S	S	S	S	S	S	S	S	S	SE	S	SW	S	S	S	S	SE	ass.	ass.	
slope of the terrain (in degees)	45	45	40	40	40	15	40	45	40	30	60	40	60	5	60	2	60	70	20	typ.	cel	
Cover (%)	60	60	40	30	40	60	30	30	70	70	70	70	50	60	70	90	60	20	30			
Area of releves (m^2)	100	100	100	100	100	100	100	100	100	100	25	100	25	100	25	100	25	25	100			
Diagnostic species to the order *Festucetalia valesiacae* Braun-Blanq. et Tuxen in Braun-Blanq. 1944																						
Cephalaria uralensis (Murray) Roemer & Schultes	1				1	1	1	+	1	1	1	1		1	1		1		+	IV	IV	IV
Teucrium polium L.	1	+	2				1	1	1		1	1	2	2		1	1	+		III	IV	IV
Asperula cynanchica L.	1								+	+	1	1	+		1	+	+	1	+	II	V	IV
Euphorbia nicaensis All.		1	+					1	1							+			1	II	II	III
Genista sessilifolia DC. ssp *trifoliata* Janka	1	1	+				1	+	1	1					+				1	IV	I	III
Euphorbia seguerana Neck.	1									1		+	+	1				+		I	III	II
Leontodon crispus Vill.		1	1		+	1	+													III	0	II
Dichanthium ischaemum (L.) Roberty				+	1	+				1										II	0	II
Poa bulbosa L.											+			1	+			1		0	III	II
Medicago minima L.											+	+						+		0	II	II
Bromus tectorum L.												+				1		+		0	II	I
Xeranthemum annuum L.													+			+	+			0	II	I
Centaurea salonitana Vis.	+										1	+								I	II	I
Linum austriacum L.																		+	+	0	II	I
Reseda lutea L.											+				1					0	II	I
Medicago falcata L.																		1	+	0	II	I
Centaurea orientalis L.									+	+										I	0	I
Allium rotundum L.									+									+		I	I	I
Diagnostic species to the class *Festuco-Brometea* Braun-Blanq. & Tuxen 1943																						
Sanguisorba minor Scop.		1	1		1		+	2		+		+						+	+	III	II	III
*Festuca valesiaca*Gaudin.			+	+								1		1		1	1	1	+	I	IV	III
Minuartia setacea (Thuill.) Hayek											1	1		1			2	+	+	0	IV	II
Scutellaria orientalis L. ssp. *pinnatifida* J.R.Edm.	1						1	+	+	+										III	0	II
Mathiola fruticulosa (L.) Maire							1	1	+											II	0	I
Potentilla pedata Willd.																1	+			0	II	I
Alyssum minutum DC.											+							1		0	I	I
Bromus squarosus L.											+									0	I	I
Other species																						
Tortula muralis Hedw.				+							1	2		1	1		1			I	III	II
Cotinus coggygria Scop.	1	1	1				+		1	1										III	0	II
Comandra elegans (Spreng.) Rchb.		2	2			+														II	0	I
Campanula sibirica L.		+	1												+					I	I	I
Lapsana communis L.		+	1																	I	0	I
Fraxinus ornus L.	+									1										I	0	I
Verbascum banaticum Schrad.											+	+								0	II	I

Association *Hedysaro bulgaricum-Camphorosmetum monspeliacae* ass. nova hoc loco holotypus relevé No 10, Table 7

The described phytocoenoses (Table 7) are endemic to the area of research and have very limited distribution. They are distributed on extremely salty Aptian marls along Osam Valley, close to Levski town. The altitude varies from 80 m to 170 m a.s.l. The plots are on hills with southern exposition and small (5°) to steep (45°) gradient. The soil cover is practically undeveloped. The main substrate is represented by allevrite blue-gray sandy clays. Different salts often form reddish nodules in the rocks. This explains the lowest projection coverage of the phytocoenoses: usually 40% to 70%. Diagnostic and constant species are: *Hedysarum grandiflorum* subsp. *bulgaricum*, *Genista sessilifolia* subsp. *trifoliata*, *Limonium bulgaricum*, *Camphorosma monspeliaca*, *Artemisia santonicum*, *Tanacetum millefolium*, *Agropyron cristatum*, *Aster oleifolius*, *Astragalus corniculatus*, and *Echinops ritro*. This floristic complex testifies to the relic origin of the association.

Forest vegetation

Association *Staphyleo pinnatae-Tilietum tomentosae* ass. nova hoc loco holotypus relevé No 23, Table 8

The phytocoenoses (Table 8) of Silver Lime form the most common natural forests in the Middle Danubian Plain. There are isolated lime forests in the area north, south and west of the town of Pleven. Altitude ranges from 70 m to 230 m. The forests are developed almost exclusively on the north-facing slopes, with a gradient of 5° to 45°. According to Bondev (1991), these forests experience no real summer drought due to lower evaporation and lower temperatures in summer. A clearly expressed monodominant structure is one of the most characteristic features of the trees. A good regeneration potential improves the competitiveness of lime, as compared to the oak species. Some current lime coenoses could be considered of secondary origin. Percentage participation of lime occasionally increases because the oak disappears. Its timber is more valuable and it is cut selectively out. The unvarying species in the tree layer are *Tilia tomentosa*, *Quercus cerris, Fraxinus ornus*, and *Acer campestre*; and in the shrub layer *Staphylea pinnata* and seldom *Carpinus orientalis.* There exists no herbaceous layer. Widespread species are only *Dactylis glomerata*, *Geum urbanum* and *Hedera helix*. However, there is a spring ephemeroid layer formed by *Helleborus odorus*, *Scilla bifolia*, *Ranunculus ficaria*, *Isopyrum thalictroides*, *Corydalis bulbosa*, *Anemone ranunculoides*, *Polygonatum latifolium*, *Viola odorata*, and *Lamiastrum galeobdolon.* Generally, the specific environmental conditions and grass and shrub species composition indicate the relic origin of these forests in the plain.

Table 7. Association *Hedysaro bulgaricum-Camphorosmetum monspeliacae* ass. nova holotypus rel. 10 hoc loco.
Single species:

1. Diagnostic species to the order *Festucetalia valesiacae*: *Falcaria vulgaris* Bernh. – 8 (+), *Chrysopogon gryllus* (L.) Trin. – 1 (1), *Scorzonera hispanica* L. – 6 (1), *Artemisia austriaca* Jacq. – 1 (1), *Sideritis montana* L. – 3 (+), *Stipa capillata* L. – 9 (+), *Melica ciliata* L. – 9 (2), *Acinos alpinus* (L.) Moench *ssp. meridionalis* (Nyman) P. W. Ball – 4 (1), *Dianthus palens* Sm. – 21 (1), *Onobrychis arenaria* (Kit.) DC. – 22 (+), *Allium saxatile* M. Bieb. – 9 (+).

2. Diagnostic species to the class *Festuco-Brometea*: *Bromus squarosus* L. – 6 (1), *Acinos arvensis* (Schur) Dandy – 6 (+), *Elymus elongatus* (Host) Runemark – 2 (+), *Salvia aethiopis* L. – 2 (+), *Galium verum* L. – 21 (+).

3. Other species: *Achillea millefollium* L. – 1 (1), *Crepis setosa* Haller f. – 6 (+), *Centaurea thracica* (Janka) Gugler – 21 (+), *Phragmites australis* (Cav.) Steud. – 22 (+).

Localities: 1, 2, 3 – Dragomirovo village, Veliko Turnovo District; 4, 5, 6 – Hadzhidimitrovo village, Veliko Turnovo District; 7, 10, 11, 12, 13, 14, 15, 16 – Levski town, Pleven District; 8, 9,19, 20, 22 – Gorna Studena village, Veliko Turnovo District; 17, 18 – Bulgarene village, Pleven District; 21 – Ovcha Mogila village, Veliko Turnovo District.

Dates: 1 – 22. 06. 99; 2, 3 – 19. 06. 00; 4, 5, 6 – 3. 05. 00; 7, 10, 11. 12, 13, 14, 15, 16 – 19. 05. 00; 8, 9, 19, 20 – 17. 05. 00; 17, 18 – 17. 07. 00; 21 – 4. 10. 00; 22 – 25. 07. 01.

Number of releves	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**C**
Altitude	80	80	80	130	130	130	120	160	160	120	110	110	110	110	110	110	90	90	170	170	130	170	**o**
Exposition	S	SW	SW	S	S	S	S	SE	SE	S	SW	SW	SW	SW	SW	SW	S	S	S	S	S	S	**n**
Slope of the terrain (in degrees)	30	10	10	45	40	30	25	10	30	25	30	40	40	30	30	40	20	20	5	45	5	40	**s**
Cover (%)	60	70	50	70	80	80	50	80	60	40	30	15	20	20	40	60	40	50	60	15	60	70	**t.**
Area of the releves (m^2)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
Diagnostic taxa of the association																							
Hedysarum grandiflorum Pall. ssp. *bulgaricum* Koz.	1	1	1	2	2	1	2			+	2	+	+		2	3		+			+		IV
Astragalus corniculatus M. Bieb.		2	2	+	1	1	1	3	3	2	1			1	1	2			2			1	IV
Camphorosma monspeliaca L.							1			2	1	1	2	2	+	2	2	2	2	2		2	III

Table 7. Continuation.

Number of releves	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**C**
Altitude	80	80	80	130	130	130	120	160	160	120	110	110	110	110	110	110	90	90	170	170	130	170	**o**
Exposition	S	SW	SW	S	S	S	S	SE	SE	S	SW	SW	SW	SW	SW	SW	S	S	S	S	S	S	**n**
Slope of the terrain (in degrees)	30	10	10	45	40	30	25	10	30	25	30	40	40	30	30	40	20	20	5	45	5	40	**s**
Cover (%)	60	70	50	70	80	80	50	80	60	40	30	15	20	20	40	60	40	50	60	15	60	70	**t.**
Area of the releves (m^2)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
Aster oleifolius (Lam.) Wagenitz	+			+			2	+		1	1		1					2	3	+	2	2	III
Tanacetum millefolium (L.) Tzvelev				3	2	1	2	+	2	2	2	+				+		1				2	III
Diagnostic species to the alliance *Artemisio-Kochion* Soó 1964																							
Agropyron cristatum (L.) Gaertn.		2	1		1		1	1	+	2	1	+	1	2	1	1	2	2	+	+	2	2	V
Artemisia santonicum L.							1			+	1				1	+	1	1		1	2	2	III
Kochia prostrata (L.) Schrad.										+		1											I
Diagnostic species to the order *Festucetalia valesiacae* Braun-Blanq. et Tuxen in Braun-Blanq. 1944																							
Teucrium polium L.	1	1	2	2	2	1	1	1	2	2	1					+		1				2	IV
Scorzonera laciniata L.	+	+	+				+	+		1	+	+	+	+	1	+							III
Echinops ritro L.	1	+	2	2	2	1		2	2										+		1	+	III
Eryngium campestre L.	1	+	+			1	+		+	+							+	+			+		III
Festuca valesiaca Gaudin							1			1	2	+	+		2	1			2		1		III
Medicago minima (L.) L.		2				1	2	+		1	1	+											II
Erysimum diffusum Ehrh.		+					+	+	+	+									+				II
Crupina vulgaris Cass.					1	1	+			+													I
Euphorbia nicaensis All.	1	+	1																+				I
Poa bulbosa L.	+					+	+			+													I
Xeranthemum annuum L.	+		+															+					I
Asperula cynanchica L.	+	+	+																				I
*Dichanthium ischaemum (*L.) Roberty				2	2													2					I
Reseda lutea L.				+	+	+																	I
Bromus tectorum L.					1												+						I
Thymus pannonicus All.					2	1																	I
Medicago falcata L.	1																					2	I
Linum austriacum L.				+	1																		I
Allium flavum L.	1	+																					I
Diagnostic species to the class *Festuco-Brometea* Braun-Blanq. & Tuxen 1943																							
Genista sessilifolia DC. ssp. *trifoliata* Janka	2	2	2	1	2		2		1	2				1	2	2	+	+	2	+	1	1	IV
Salvia nemorosa L.	+			+	+	+		2														1	II
Filago vulgaris Lam.	+																+	+	+				I
Sanguisorba minor Scop.								2	1										+			1	I
Scutellaria orientalis L. ssp. *pinatifida* J. R. Edm.	1	2	2																				I
Galium octonarium (Klokov) Pobed.					1	1		+															I
Euphorbia falcata L.				+	1	1																	I
Thymus callieri Borbás ex Velen. ssp. *Urumovii* Velen		2		2																			I
Centaurea rutifolia Sm.							+			+													I
Thesium simplex Velen. ssp. *moesiacum* (Velen.) Koz. et Kuzm.																			+	+			I
Other species																							
Lappula marginata (M. Bieb.) Gürke													+	+	+	+	+	+					II
Limonium bulgaricum Anchev				+	+	+			+												1		II
Linum corymbulosum Rchb.							+			+										+		+	I
Nigella arvensis L.	+		+																		2	+	I
Valerianella coronata (L.) DC.				+	+	1																	I
Melilotus officinalis (L.) Lam.		1	1																			+	I
Diplotaxis muralis (L.) DC.				1	1																		I
Ephedra distachya L.				1		4																	I
Tortula muralis (L.) Hedw.															1	+							I
Caucalis platycarpos L.																	+	+					I

Table 8. Association *Staphyleo-Tilietum tomentosae* ass. nova, holotypus rel. 23 hoc loco.

Single species:

1. Diagnostic species to the order *Quercetalia pubescentis-petraeae*: *Poa nemoralis* L. – 28 (+), *Quercus frainetto*Ten. – 3 (+), *Laser trilobum* (L.) Borkh. – 24 (+), *Lychnis coronaria*(L.) Desr. – 3 (+), *Limodorum abortivum* (L.) Sw. – 3 (r), *Viola hirta* L. – 7 (+).

2. Diagnostic species to the alliance *Carpinion betuli* and order *Fagetalia sylvaticae*: *Doronicum orientale*Hoffm. – 25 (1), *Tilia cordata*Mill. – 23 (1), *Carex digitata*L. – 24 (1), *Acer platanoides*L. – 15 (+), *Galeopsis speciosa*Mill. – 25 (2).

3. Diagnostic species to the class *Querco-Fagetea*: *Arabis turrita* L. – 23 (+), *Chamaecytisus hirsutus* (L.) Link. – 23 (+), *Cornus sanguinea* L. – 20 (1), *Berberis vulgaris* – 8 (+).

4. Other species: *Veronica hederifolia* L. – 1 (1), *Cruciata laevipes* Opiz. – 1 (1), *Thalictrum aquilegifolium* L. ssp. *storgosiacum* P. Panov – 2 (+), *Hesperis sylvestris* Crantz. – 1 (1), *Lamium purpureum* L. – 3 (+), *Poa pratensis* L. – 1 (3), *Platanthera chlorantha* (Custer) Rchb. – 2 (+), *Myosotis sylvatica* Hoffm. – 1 (+), *Erysimum cuspidatum* (M. Bieb.) DC. – 1 (+), *Arctium lappa* L. – 3 (+), *Torilis japonica* (Houtt.) DC. – 27 (+), *Anthriscus sylvestris* (L.) Hoffm. – 3 (+), *Inula conyza* (Griess.) DC. – 25 (+), *Verbascum phoeniceum* L. – 1 (1), *Juglans regia* L. – 3 (+), *Solanum dulcamara* L. – 3 (+).

Localities: 1, 2, 3 – Pleven town, Pleven District; 4, 5, 6, 7, 25 – Tsarevec village; 8 – Somovit viilage, Pleven District; 9, 10 – Dragash Voyvoda village, Pleven District; 11, 12 – Byala Voda village, Pleven District; 13, 14, 15, 16, 17, 18, 19, 20 – Bozhuritsa village, Pleven District; 21, 22 – Vurbitsa village, Pleven District; 23 – 26 – Protected area "Kayluka", Pleven District; 4 – Opanec village, Pleven District; 27 – Sanadinovo village, Pleven District; 28 – Pelishat village, Pleven District; 29 – Vubel village, Pleven District.

Dates: 1, 2, 3 – 16. 05. 99; 4, 5, 6, 7 – 24. 08. 99 and 03. 00; 8 – 14. 10. 99 and 18. 04. 02; 9, 10, 11, 12 – 31. 03. 00; 13, 14, 15, 16, 17, 18, 19, 20 – 8. 09. 99 and 15. 03. 00; 21, 22 – 15. 03. 00; 23, 26 – 18. 06. 00 и 04. 99; 24 – 8. 09. 99 and 15. 03. 00; 25 – 2. 05. 00; 27 – 10. 07. 00; 28 – 8. 09. 00 and 04. 99; 29 – 27. 07. 01 and 31. 03. 00.

Number of releves	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29		
Altitude	160	180	160	160	150	150	160	77	160	160	160	150	120	120	120	120	120	120	120	120	200	200	170	165	150	170	190	230	160		**C**
Exposition	N	NE	N	NE	N	N	N	N	N	N	N	N	N	N	N	NE	NE	NE	NE	NE	N	N	N	NW	N	NE	N	N	N		**o**
Slope of the terrain (in degrees)	10	10	15	18	5	18	20	8	25	15	15	10	20	20	10	15	15	12	12	12	5	2	45	10	20	20	10	15	15		**n**
Cover (%)	85	80	90	90	90	95	95	90	90	90	90	90	90	90	90	90	90	90	90	90	85	85	90	95	85	95	90	95	95		**s**
Area of releves (m^2)	600	600	600	600	400	600	600	400	600	600	600	400	600	600	600	600	600	600	600	600	600	600	400	600	600	600	600	600	600		**t.**
Diagnostic species of the association																															
Tilia tomentosa Moench.	5	3	5	5	4	5	5	4	5	5	5	5	5	5	5	4	5	5	5	5	4	5	4	4	5	5	5	4	5		V
Staphylea pinnata L.				+	4	r									2		2		1	1			2		+	+	2		2		III
Diagnostic species to the alliance *Aceri tatarici-Quercion* Zólyomi 1957																															
Acer tataricum L.	+	+						+																				+			I
Scutellaria altissima L.					+																		2			+					I
Fragaria viridis Weston	+																														I
Diagnostic species to the order *Quercetalia pubescentis-petraeae* Klika 1933																															
Helleborus odorus Waldst. et Kit.	+	+	1	+	+	+	+		1	+	+	+	+	+	+	+	+	+	+	+	1	+	+	+		1	+	+	+		V
Quercus cerris L.	1	2	+										+		1	2	+	+	+	+	1	1	+	2		1		2			III
Fraxinus ornus L.	+		+	+	2	1		+	+		+				+			+			1	+	3	1		1	1				III
Viola odorata L.	2	2	1	+		+			2	1	2				3		2		1					2	1		1	1	1		III
*Carpinus orientalis*Mill.	+	2	1																+	2			2	1		3					II
Buglossoides purpureo-coerulea (L.) I.M.Johnst		2		r		+																	+				2	2			II
Ligustrum vulgare L.			+	+																			+				+	1			I

Table 8. Continuation.

Number of releves	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
Altitude	160	180	160	160	150	150	160	77	160	160	160	150	120	120	120	120	120	120	120	120	200	200	170	165	150	170	190	230	160	C
Exposition	N	NE	N	NE	N	N	N	N	N	N	N	N	N	N	N	NE	NE	NE	NE	NE	N	N	N	NW	N	NE	N	N	N	o
Slope of the terrain (in degrees)	10	10	15	18	5	18	20	8	25	15	15	10	20	20	10	15	15	12	12	12	5	2	45	10	20	20	10	15	15	n
Cover (%)	85	80	90	90	90	95	95	90	90	90	90	90	90	90	90	90	90	90	90	90	85	85	90	95	85	95	90	95	95	s
Area of releves (m^2)	600	600	600	600	400	600	600	400	600	600	600	400	600	600	600	600	600	600	600	600	600	600	400	600	600	600	600	600	600	t.
Viburnum lantana L.				r		+	+																					r		I
Ruscus aculeatus L.									+							r										+				I
Convallaria majalis L.															2					+										I
Tamus communis L.		1																					+							I
Piptatherum virescens (Trin.) Boiss.			1																				1							I
Potentilla micrantha DC.															r							+								I
Ruscus hypoglossum L.												r																	1	I
Diagnostic species to the alliance *Carpinion betuli* Issler 1931 and order *Fagetalia sylvaticae* Pawl. in Pawl. et al. 1928																														
Scilla bifolia L.	1	+	+	+	1	+	1	2	+	+	2	2	2	2	2	2	1	2	2	2	2	2	1	1	3	2		1	1	V
Isopyrum thalictroides L.	+	+	+	1	+	1	+		1	+	+		+	3	2	2	2	2	2	1	2	2	1	+	+	2		+	+	V
Anemone ranunculoides L.			+	1	1	1	+		3	+	2		+	+		+	+	+	+		1	1	+	+	2	1		+	+	V
Ficaria verna L.	+	+	+	1	2	2	+	1	2	3	3	4			+	1		+			2	1		1	2			1	+	IV
Geum urbanum L.	1		1	+	+	+	+	+	+	+	+	+	+	+		+	+	+			+	+		+	1			+		IV
Corydalis bulbosa Pers.	1	1	+							2	3	2	1	1		2	2	2	2		+	1	+	2		3		+		IV
Polygonatum latifolium (Mill.) Desf.	+	2	1	1	2	+			1						+					+			+		1	2				III
Lamiastrum galeobdolon (L.) Ehrend. & Polatschek									2		1		3				2				1	1			1	+			2	II
Pulmonaria officinalis L.				+	1								+		+		+					+	+		+					II
Viola reichenbachiana Jord. ex Bor.,			+												1		2							+	+			+	+	II
Corydalis solida (L.) Clairv.				+		2	2																						+	I
Lilium martagon L.		1									+												+		+					I
Carpinus betulus L.																									+			+	+	I
Corylus avellana L.					+																							+	+	I
Asperula taurina L. ssp. *leucanthera* (Beck) Hayek.																							1			r				I
Stellaria holostea L.																					1							2		I
*Mycelis muralis (*L.) Dumort.																							1			+				I

Table 8. Continuation.

Number of releves	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
Altitude	160	180	160	160	150	150	160	77	160	160	160	150	120	120	120	120	120	120	120	120	200	200	170	165	150	170	190	230	160	C
Exposition	N	NE	N	NE	N	N	N	N	N	N	N	N	N	N	N	NE	NE	NE	NE	NE	N	N	N	NW	N	NE	N	N	N	o
Slope of the terrain (in degrees)	10	10	15	18	5	18	20	8	25	15	15	10	20	20	10	15	15	12	12	12	5	2	45	10	20	20	10	15	15	n
Cover (%)	85	80	90	90	90	95	95	90	90	90	90	90	90	90	90	90	90	90	90	90	85	85	90	95	85	95	90	95	95	s
Area of releves (m^2)	600	600	600	600	400	600	600	400	600	600	600	400	600	600	600	600	600	600	600	600	600	600	400	600	600	600	600	600	600	t.
Carex pilosa Scop.													3									2								I
Diagnostic species to the class *Querco-Fagetea* Braun-Blanq. et Vlieg. 1937																														
Dactylis glomerata L.	3	2	1	+		+	+		+	1	1	1	+	+		+	+	1	+		1	1	1							IV
Acer campestre L.	+	1	+	1	1	+	+	2									+		+							2		2	1	III
Arum maculatum L.	+		+	+			+					+	1	+		+		+				+			+					II
Hedera helix L.													+	+	3	+	2	+	+	+		+	2		+	2		1		III
Crataegus monogyna Jacq.	+			+		+	+	2																	+		1	1		II
Melica uniflora Retz.			+												+		+		+			1	1		1	1				II
Galanthus elwesii Hook f.									+				2	3		1		2				r	1		3					II
Quercus robur L.					1	1		+	+	+	+														+				1	II
Euphorbia amygdaloides Lam.	+														+	+				+			+		+					II
Brachypodium sylvaticum (Huds.) P. Beauv.	2		1	+		+									+															I
Ulmus minor L.					+		+	3																				1		I
Clematis vitalba L.					+		+																+	+						I
Lapsana communis L.	1																		+				+							I
Carex muricata L.	2														2									+						I
Calystegia sylvatica (Kit.) Griseb.			+	+															+											I
Galium aparine L.	1	1	1																											I
Urtica dioica L.			+	+		+																								I
Sambucus nigra L.					+	r	+																							I
Mercurialis ovata Sternb. et Hoppe																							1						1	I
Lathyrus niger (L.) Bernh.	1	1																												I
Cornus mas L.							+																+							I
Hypericum hirsutum L.	+		1																											I
Euonymus verrucosus Scop.					+																		1							I

Association *Arabio turritae-Carpinetum orientalis* ass. nova hoc loco holotypus relevé No 14, Table 9

Oriental Hornbeam (*Carpinus orientalis*) is widespread in the country. The new association occurs (Table 9) mainly in the southern part of the Middle Danubian Plain, bounded by the Forebalkan. Altitude varies from 180 m to 240 m. Exposition also varies. The slope gradient ranges from 10° to 45°, but terrains are predominantly steep. Soils are rich in limestone concretions. There is only one dark-brown thin horizon. It is often torn by different in size boulders of white cretaceous limestone. Specifically, the phytocoenoses, especially those at the base of the cliffs, do not suffer from lack of nutrients, which are carried out by rains to the foothills of the surrounding land. Soil moisture, especially in spring, is also great, because shallow bedrocks retain rainwater. This creates specific microclimatic conditions favouring the survival of many mesophytic species, which have disappeared from the neighbouring lowland forests. These are diagnostic species, such as *Arabis turrita*, *Campanula trachelium* and *Asplenium trichomanes,* but also ephemeroids like *Scilla bifolia*, *Isopyrum thalictroides*, *Corydalis bulbosa*, *Lamiastrum galeobdolon*, *Polygonatum latifolium*, *Asperula taurina*, *Ranunculus villosus* subsp. *constantinopolitanus, Doronicum orientale,* and *Stachys sylvatica*. *Viola mirabilis, Hepatica nobilis, Dryopteris filix-mas* occur very seldom in the Danubian Plain and are localized only in the Oriental Hornbeam forests.

Table 9. Association *Arabio turritae-Carpinetum orientalis* ass. nova holotypus nom. rel. 14 hoc loco.
Single species:

1. Diagnostic species to the alliances *Aceri tatarici-Quercion, Quercion frainetto* and the order *Quercetalia pubescentis-petraea*: *Quercus robur* L. – 5 (1), *Festuca heterophylla* Lam. – 1 (+), *Prunus mahaleb* L. – 6 (+), *Doronicum hungaricum* Rchb. f. – 13 (+), *Himantoglossum caprinum* (M. Bieb.) Spreng. – 1 (r), *Silene viridiflora* L. – 12 (+), *Galium pseudoaristatum* Schur. – 1 (r), *Clinopodium vulgare* L. 14 (1).

2. Diagnostic species to the alliance *Carpinion betuli* and the order *Fagetalia sylvaticae*: *Carpinus betulus* L. – 11 (2), *Carex pilosa* Scop. – 11 (+), *Asperula taurina* L. – 11 (+), *Carex digitata* L. – 14 (r), *Melica uniflora* Retz. – 13 (2), *Viola mirabilis* L. – 13 (1), *Hepatica nobilis* Schreb. – 13 (1), *Tilia cordata* Mill. – 13 (+).

3. Diagnostic species to the class *Querco-Fagetea*: *Euonymus verrucosa* Scop. – 11 (1), *Dryopteris flix-mas* (L.) Schott. – 11 (+).

4. Other species: *Erysimum cuspidatum* (M. Bieb.) DC. – 10 (1), *Ranunculus pedatus* Waldst. et Kit. – 11 (+), *Asplenium ruta-muraria* L. – 11 (+), *Prunus cerasifera* Ehrh. – 11 (+), *Alliaria petiolata* (M. Bieb.) Cavara & Grande – 12 (+), *Verbascum phoeniceum* L. – 12 (r), *Mahonia aquifolium* (Pursh) Nutt. – 13 (+), *Ceterach officinarum* DC. – 14 (+), *Fritillaria orientalis* Adam. – 5 (+), *Allium paniculatum* L. ssp. *fuscum* Arcang. – 1 (+), *Cruciata laevipes* Opiz. – 1 (+), *Lampsana communis* L. – 1 (+), *Hypericum hirsutum* L. – 1 (+), *Myrrhoides nodosa* (L.) Cannon. – 1 (+), *Ranunculus millefoliatus* Vahl. – 6 (+), *Brachythecium velutinum* (Hedw.) Schimp. – 8 (3), *Asparagus tenuifolius* Lam. – 8 (+), *Ajuga reptans* L. – 9 (+), *Prunella vulgaris* L. – 9 (+).

Localities: 1, 2, 3, 4 – Protected area "Chernelka", Pleven District; 5 – Dragash Voyvoda village, Pleven District; 6 – Tuchenitsa village, Pleven District; 7, 8, 9, 10, 11, 12, 13, 14 – Protected area "Kayluka", Pleven District; 15 – Protected area "Studenec", Pleven District.

Dates: 1, 2, 3, 4 – 10. 04. 00; 5 – 31. 03. 00; 6, 7, 8, 9, 10, 11, 12, 13, 14 – 20. 04. 01; 15 – 3. 08. 01.

Number of relevs	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**C**
Altitude	220	220	220	200	160	220	210	210	210	210	200	200	180	180	240	**o**
Exposition	SW	W	W	NW	N	S	N	N	N	S	S	E	W	N	W	**n**
Slope of the terrain (in degrees)	25	45	40	35	25	10	10	10	10	15	10	10	15	30	20	**s**
Cover (%)	95	95	95	95	90	85	90	90	95	95	85	85	95	95	95	**t.**
Area of relevs (m²)	400	100	100	100	400	400	400	400	400	400	400	400	400	400	400	
Diagnostic species of the association																
Carpinus orientalis Mill.	5	5	5	5	5	5	4	5	5	5	4	5	5	5	5	V
Arabis turrita L.	+							+	+	1	+			+	+	III
Campanula trachelium L.								+	+	+	2	+		+	+	III
Asplenium trichomanes L.								+	+	+	+			+	1	II
Diagnostic species to the alliance *Syringo-Carpinion orientalis* Jakucs 1960																
Galanthus elwesii Hook. f.				2	+		+	+	r		1	1	+	+		III
Piptatherum virescens (Trin.) Boiss.	2										+				1	II
Mercurialis ovata Sternb. & Hoppe				1										1		I
Paliurus spina-christi Mill.														1		I
Ruscus aculeatus L.					+											I
Diagnostic species to the alliances *Aceri tatarici-Quecion* Zólyomi 1957, *Quercion frainetto* Horvat 1954 and order *Quercetalia pubescenti-petraeae* Klika 1933																
Fraxinus ornus L.	1	+	+	+	2	+			+		+	1	+	+	+	IV
Helleborus odorus Waldst. et Kit.	+	+	+	+	+	+			+		+	1	1		+	IV
Glechoma hirsuta Waldst. & Kit.	1	+	+			+	+	+	+	+		+	+		1	IV
Viola odorata L.	1			1	+	2	+	+	+	+		+	1		+	IV
Sedum maximum (L.) Suter	+					+			+		+	1		+	+	III

Table 9. Continuation.

Number of relevs	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**C**
Altitude	220	220	220	200	160	220	210	210	210	210	200	200	180	180	240	**o**
Exposition	SW	W	W	NW	N	S	N	N	N	S	S	E	W	N	W	**n**
Slope of the terrain (in degrees)	25	45	40	35	25	10	10	10	10	15	10	10	15	30	20	**s**
Cover (%)	95	95	95	95	90	85	90	90	95	95	85	85	95	95	95	**t.**
Area of relevs (m²)	400	100	100	100	400	400	400	400	400	400	400	400	400	400	400	
Poa nemoralis L.	+					+	+	+	+		+			1		III
Quercus cerris L.	+	+	+				+	1		+						II
Quercus pubescens Willd.			+	+							+	+		+		II
Potentilla micrantha DC.	1					+	+		+							II
Tilia tomentosa Moench				+	+						1					I
Diagnostic species to the alliance *Carpinion betuli* Issler 1931 and order *Fagetalia sylvaticae* Pawlowski in Pawl. et al. 1928																
Hedera helix L.	4	+	2		+	+		+	1	1	2	2	1	2	2	V
Ranunculus ficaria L.	2	3	4	4	4	2	+	+	4			4	2		+	V
Scilla bifolia L.	+	+	+	1	1				1		1	2	1	+	+	IV
Isopyrum thalictroides L.			1	2	1	+			2	1	2	2		1	+	IV
Corydalis bulbosa (L.) DC.	1			2	1		+		2		2	2	2	3		III
Lamiastrum galeobdolon (L.) Ehrend. & Polatschek					+	1		1	2	2	2	2	1	2		III
Anemone ranunculoides L.		1	1	2	1	1			1		+			+		III
Polygonatum latifolium Desf.		1		3								+	1	+		II
Lathyrus vernus (L.) Bernh.							+	+			+	+	+			II
Corylus avellana L.								+	+		+	+		+		II
Corydalis solida (L.) Clairv.					3					2		+		2		II
Doronicum orientale Hoffm.	1		1							2	2					II
Stellaria holostea L.						1					2	+	1			II
Staphylea pinnata L.								+	+		+	+				II
Viola reichenbachiana Jord. ex Bor.									+				+	+	+	II
Ranunculus villosus DC. ssp. *constantinopolitanus* (DC.) A. Elen.	3	2														I
Stachys officinalis (L.) Trevisan							+	+								I
Diagnostic species to the class *Querco-Fagetea* Braun-Blanq. et Vlieg. 1937																
Arum maculatum L.	1	2	1	1					+		+	+	1	+		III
Acer campestre L.						+	2	+	+		1	1	1	+	+	III
Geum urbanum L.	+				+	+			+	+		+	1		+	III
Crataegus monogyna Jacq.	+					+		2	1	+		1	+		2	III
Brachypodium sylvaticum (Huds.) P. Beauv.		2				+			+						2	II
Ligustrum vulgare L.						+			+	+						II
Cornus sanguinea L.										+	+	+				II
Mycelis muralis (L.) Dumort.								+	+					+		II
Dactylis glomerata L.					+										+	I
Aremonia agrimonoides (L.) DC.									+			1				I
Ulmus minor Mill.									+			+				I
Other species																
Hypnum cupressiforme Hedw.						+	1	2	2		2	2		2	3	III
Veronica hederifolia L.	+					3	1	1	2	3	+	2	2			III
Lamium purpureum L.						1	1	+		+	3	1		1		III
Chelidonium majus L.					2				+			+		+		II
Galium aparine L.						+				1		+	2			II
Fragaria moschata Weston						+	+	+		+						II
Viola jordanii Hanry.						+			+			+	1			II
Cystopteris fragilis (L.) Bernh.								+	r	+				+		II
Anthriscus cerefolium (L.) Hoffm.						+				1		2	+			II
Gagea minima (L.) Ker-Gawler.					1	+								+		I
Cruciata glabra (L.) Ehrend.						+	+	1								I
Taraxacum officinale agg.							+	+			+					I
Thlaspi alliaceum L.	+								+							I
Geranium robertianum L.								+		+						I
Urtica dioica L.								+				+				I
Stellaria media (L.) Cirillo									+		+					I
Clematis vitalba L.											+				+	I
Orchis simia Lam.	r												r			I

Conclusions

The vegetation of the Danubian Plain in Bulgaria is under high anthropogenic influence and subject to transformation. However, as it has already been mentioned, there are still many preserved natural and semi-natural communities. The presence of endemic taxa (mostly at the subspecies level) and syntaxa is a proof of the natural origin of many herbaceous and forest phytocoenoses in the region. The new syntaxa in the Danubian Plain belong to the halophytic, steppe and forest vegetation. These communities are specific and relic and their diversity also demonstrates the importance of the Danubian Plain in protection of great biodiversity. Although the most typical natural communities were studied and described in the author's PhD thesis and in some other papers, the vegetation of the Danubian Plain is still poorly studied.

References

Bondev, I. 1991. The Vegetation of Bulgaria. Map M 1:600 000 with Explanatory Text. Sofia Univ. Press, Sofia (in Bulgarian).

Braun-Blanquet, J. 1932. Plant Sociology. McGraw-Hill, New York.

Braun-Blanquet, J. 1964. Pflanzensoziologie. Grundzüge der Vegetationskunde. Springer-Verlag, Wien and New York.

Doniță, N., Ivan, D., Coldea, G., Sanda, V., Popescu, A., Chifu, T., Paucă-Comănescu, M., Mititelu, D. & Boșcaiu, N. 1992. Vegetation of Romania. Tehnicá Agricolá, Buckarest (in Romanian).

Ganchev, S. & Kochev, H. 1962. La Vegetation Gazonnante de la Vallé de la R. Stoudena. – Proc. Inst. of Botany, BAS, 9: 43-78. (in Bulgarian).

Ganchev, I., Kochev, H. & Yordanov, D. 1971. The halophytic vegetation in Bulgaria. – Izv. Bot. Inst. (Sofia), 21: 5-47. (in Bulgarian).

Horvat, I., Glavač, V. & Ellenberg, H. 1974. Vegetation Südo-Osteuropas. G. Fischer Verlag, Stuttgart.

Kochev, H. & Yordanov, D. 1981. Vegetation of Bulgarian Water Bodies. Ecology, Protection and Economic importance. Bulg. Acad. Sci. Press, Sofia. (in Bulgarian).

Kochev, H., Husák, S. & Oťaheľová, H. 1986. Materials on the phytosociological characteristics of the aquatic and marsh vegetation along the eastern stretch of Danube River in Bulgaria. – In: **Nediyalkov, S., Kochev, H., Michev, T., Damiyanova, A. & Velev, V.** (eds), Proc. Int. Symp. "The Role of Wetlands in Preserveing the Genetic Material", Srebarna. Pp. 81-98. Bulg. Acad. Sci. Press, Sofia (in Russian).

Kochev, H. & Tsolova, I. 1984. Phytocoenological investigations of the Persinski Blata Reserve. – In: **Velchev, V.** (ed.), Proc. Contempt. Teor. App. Asp. Veg. Ecol. 1: 148-156 (in Bulgarian).

Kochev, H. & Tsolova, I. 1987. Ecological investigation of the Lugut-Drumkata Protected Area, Pleven District. – In: Proc. Third Natl. Conf. Bot., 3: 215-219 (in Bulgarian).

Kojić, M., Popović, R. & Karadžić, B. 1998. Syntaxonomic Overview of the Vegetation of Serbia. Inst. Biol. Istraž. S. Stanković Press., Belgrade (in Serbian).

Kozhuharov, S. (ed.). 1992. Field Guide to the Vascular Plants in Bulgaria. Naouka & Izkoustvo, Sofia (in Bulgarian)

Krebs, C. 1999. Ecological Methodology. 2nd ed. Benjamin-Cummings Publ., Menlo Park, California.

Ninov, N. 2002. Soils. – In: **Kopralev, I.** (ed.), Geography of Bulgaria. Physical Geography. Socioeconomic Geography. Pp. 277-315. ForCom, Sofia (in Bulgarian).

Maarel, E. van der. 1979. Transformation of cover-abundance values in phytosociology and its effect on community similarity. – Vegetatio, **39**(2): 97–114.

Maarel, E. van der (ed.). 2005. Vegetation Ecology. Blackwell Publishing, Oxford.

Podani, J. 2001. SYN-TAX 2000. Computer programs for data analysis in ecology and systematics. User's manual. – Scientia Publ., Budapest

Roussakova, V. & Tzonev, R. 2003. Syntaxonomy of the oak forests in the region of Pleven (Danube Plain in Bulgaria). – Fitosociologia, 40 (1): 23-31.

Sanda, V., Popescu, A. & Arçus, M. 1999. Critical Revision on the Plant Communities in Romania. Tilia Press Int., Constanța (in Romanian).

Stoyanov, N. 1948. The Vegetation of the Danube Islands and their Economic Use. Bulg. Acad. Sci. Press, Sofia (in Bulgarian).

Tzonev, R. 2002. Flora and vegetation of the Middle Danubian Plain between the valleys of Vit and Studena rivers. PhD. Thesis. Biol. Fak., Sofia Univ. St. Kliment Ohridski, Sofia (in Bulgarian, unpubl.).

Tzonev, R. 2003. Syntaxonomy of the forests of Silver Lime (*Tilia tomentosa* Moench.) in the Middle Danube Plain. – In: **Rosnev, B.** (ed.): Proc. Int. Conf. "75 Years Forest. Inst., Bulg. Acad. Sci.", Sofia. Vol. 1, pp. 60-265. Sofia (in Bulgarian).

Tzonev, R. 2009a. Plant communities, habitats and ecological changes in the vegetation on the territory of three protected areas along the Danube River. – In: **Ivanova, D.** (ed.), Proc. Fourth Balkan Bot. Cong., Sofia 2006. Pp. 321-331. Publishing House Bulg. Acad. Sci., Sofia.

Tzonev, R. 2009b. Syntaxonomy of the natural and semi-natural vegetation of the Middle Danube Plain in Bulgaria. – Biotechnol. & Biotechnol. EQ. 23/2009/SE, Special edition – on-line: 354-359.

Velev, S. 1990. The Climate of Bulgaria. Narodna Prosveta, Sofia (in Bulgarian).

Weber, H.E., Moravec, J. & Theurillat, J.-P. 2000 International Code of Phytosociological Nomenclature. 3rd edition. – J. Veg. Sci., **11**, 739–768.

Yordanov, D. 1936. On distribution of the steppe vegetation in Bulgaria. – Sborn. Bălg. Akad. Nauk., 32: 1-105 (in Bulgarian).