

Medicinal plants in Dragoevska Mountain (Northeastern Bulgaria)

Dimcho Zahariev

University of Shumen, Shumen, Bulgaria

E-mail: d.zahariev@shu.bg

Abstract

Dragoevska Mountain is part of the Eastern Forebalkan in Northeastern Bulgaria. An investigation of medicinal plants as part of its flora is made for the first time. As a result, 388 species of medicinal plants of 259 genera and 72 families were described. This represents 45.92% of the medicinal plant species in Bulgaria. The described medicinal plants belong to 32 floristic elements. We established 2 species of Balkan endemics and 42 relic species, of which 40 species are Tertiary relics and 2 species are Quaternary relics. Among the life forms with the most species are hemicryptophytes (46.13%). Among the biological types with the most species are the perennial herbaceous plants (53.87%). The number of species with conservation status is 20 (5.15%). The antropophytes are 254 species (65.46%). The obtained results can be used for comparison with the data on medicinal plants in other geographic sites in Bulgaria.

Keywords: *Dragoevska Mountain, medicinal plants, analysis*

1. Introduction

Dragoevska Mountain is part of the Eastern Forebalkan in Northeastern Bulgaria. It is located in 4 quadrants from the UTM network of Bulgaria: MH86, MH87, MH96, and NH06 (Figure 1). Its length is about 32 km and its maximum width is 8 km. The area of the mountain is about 190 km². Dragoevska mountain's boundaries are as follows: To the northwest, Golyama Kamchiya River separates it from Preslavska Mountain. To the northeast, Dragoevska Mountain borders on Smyadovsko pole and part of Golyama Kamchiya River and here, at its foot, is the provisional boundary between Eastern Danube Plain and Eastern Forebalkan. To the southwest, Dragoevska Mountain borders on Gerlovska Valley, and to the south on Rishka Valley. To the east, Lopushanska River (the right tributary of Golyama Kamchiya River) and Ticha Dam separated it from Varbishka Mountain. To the south, Dragoevska Mountain and Varbishka Mountain are connected through low saddle (390 m) in the west of Rish village. Near the northern slope of the mountain is the village of Dragoevo, on whose name comes the name of the mountain [1].

From a botanical-geographic point of view, the Dragoevska Mountain is located in the Illyrian province of

the European broad-leaved forest area [2]. In floristic terms, the mountain is situated in the Northeastern Bulgaria floristic region [3].

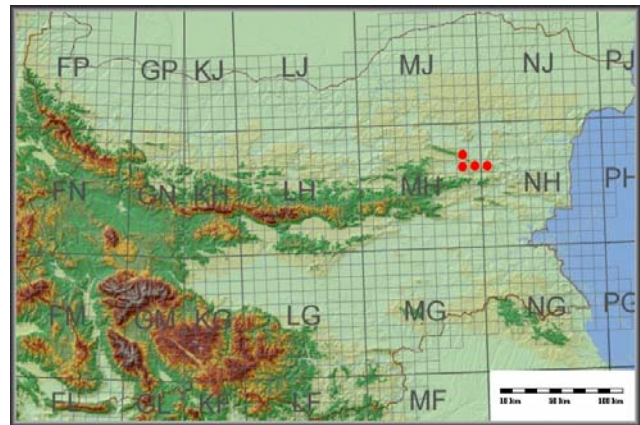


Fig. 1. Geographic position of Dragoevska Mountain (marked with red points)

There are two protected areas and two protected zones of the Natura 2000 ecological network located on the territory of Dragoevska Mountain. The protected areas are as follows: Patleyna Managed Nature Reserve and Div rozhkov Protected Site. The protected zones are as follows: Ticha (with code BG0000178) and Ekocoridor Kamchiya-Emine (with code BG0000393) [4].

Patleyna Managed Nature Reserve has an area of 40.62 ha. The reserve was declared for conservation as it is the largest locality of *Cercis siliquastrum* L. in Bulgaria [4].

Div Rozhkov Protected Site has an area of 71.7 ha. It is located near Patleyna Managed Nature Reserve and has the same purpose as the reserve [4].

Ticha Protected Area (with code BG0000178) was declared for conservation by the Habitats Directive (Directive 92/43/EEC) and has an area of 2,704.64 ha [4]. Subject of conservation in the protected area are 14 natural habitats, as well as a number of animal species [5]. Other important plant species here are also described and include the following medicinal plant species: *Aesculus hippocastanum* L., *Cercis siliquastrum* L., and *Pastinaca umbrosa* Steven ex DC. [6].

Ekocorridor Kamchiya-Emine Protected Area (with code BG0000393) was declared for conservation by the Habitats Directive (Directive 92/43/EEC) and has an area of 28,054.79 ha [4]. Subject of conservation here are 9 natural habitats. Besides them, subjects of conservation are *Himantoglossum caprinum* (M. Bieb.) Spreng. (Family Orchidaceae) and a number of animal species [5]. Described are also other important plant species, including the following medicinal plant species: *Cercis siliquastrum* L., *Cyclamen coum* Mill., *Orchis purpurea* Huds., and *Orchis tridentata* Scop. [7].

To date, there is no data on a study of both the flora and the medicinal plants in Dragoevska Mountain. The aim of our research is to study the medicinal plants in Dragoevska Mountain and to analyze the obtained data.

2. Materials and Methods

The present study was conducted on the route method in the period 2011-2015. The medicinal plants are under the Annex to the Medicinal Plants Act of the Republic of Bulgaria [8], Stoyanov [9, 10], Stoyanov and Kitanov [11], Petkov [12], Pamukov and Ahtardzhiev [13], Landzhev [14], and Nikolov [15].

The following sources are used in the determination of the taxa and the life forms: Handbook for Plants in Bulgaria [16], Flora of the People's Republic of Bulgaria [17,18], and Flora of the Republic of Bulgaria [3, 19]. The names of the species are under Conspectus of the Bulgarian vascular flora [20]. The abbreviations of the authors' names of the plants are according to the International Plant Names Index [21]. The names of the family are according to APG IV [22].

The life forms are represented in the system of Raunkiaer [23]. The biological types are defined by Delipavlov et al. [16]. The floristic elements and the endemics are according to Asyov et al. [20]. The relics are presented according to Zahariev [24].

The conservation statute is recognized using the following documents: Annex II to Council Directive 92/43/EEC of the European Community to protect natural habitats and of wild fauna and flora [25], Appendix I to Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) [26], Appendix II to Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) [27], Red Data Book of the Republic of Bulgaria, Vol. 1. Plants and Fungi [28], Red List of Bulgarian vascular plants [29], Annex III and Annex IV to Biodiversity Act of the Republic of Bulgaria [30].

Recorded are the species included in Order for special arrangements for the conservation and use of the medicinal plants in Bulgaria [31].

The anthropophytes are presented by Stefanov and Kitanov [32].

3. Results and Discussion

As a result of this study, we identified 388 species of medicinal plants belonging to 259 genera and 72 families. They represent 45.92% of the species, 58.33% of the genera and 61.02% of the families of medicinal plants in Bulgaria. A systematic list of identified species is presented in the Appendix.

The most of the families and genera are presented with smaller number of lower taxa: from 1 to 4. The majority of families, 61 (84.72%) were represented with 1-4 genera. Only 11 (15.28%) families included 5 or more genera (Table 1). Most genera were found in the following families: Asteraceae (33 genera), Lamiaceae (24 genera), Apiaceae (20 genera), and Fabaceae (18 genera). Most families, 52 (72.22%) have 1-4 species. Only 20 (27.78%) families are represented by 5 or more species (Table 1). Most species belong to the following families: Asteraceae (45 species), Lamiaceae (42 species), Fabaceae (32 species), Rosaceae (24 species), Apiaceae (22 species), and Scrophulariaceae (21 species). The majority of genera were presented with 1-4 species. Only 4 genera (1.54%) included 5 or more species. Most species belong to the following genera: *Veronica* L. (7 вида), *Acer* L., *Mentha* L., and *Lathyrus* L. (по 5 вида).

Table 1. Families with most genera and species (5 or more in number)

Families	Genera	Species
Amaryllidaceae	<5	5
Apiaceae	20	22
Asteraceae	33	45
Betulaceae	<5	5
Boraginaceae	7	9
Brassicaceae	12	12
Caprifoliaceae	5	7
Fabaceae	18	32
Geraniaceae	<5	5
Lamiaceae	24	42
Malvaceae	<5	6
Oleaceae	<5	7
Orchidaceae	<5	7
Poaceae	7	7
Polygonaceae	<5	9
Ranunculaceae	8	12
Rosaceae	13	24
Salicaceae	<5	7
Sapindaceae	<5	5
Scrophulariaceae	9	21

The phytogeographical structure of the flora includes 32 floristic elements. The largest number of species belongs to the following floristic elements:

European-Asiatic (18.81%), European-Mediterranean (14.69%), Sub-Mediterranean (12.89%), and European-Siberian (10.05%). This distribution of floristic elements can be explained with the mountain's location in the Trans-Continental Climatic Area. Its proximity to Temperate Climatic Area in the west is the reason for the predominance of European floristic elements. The influence of the Continental-Mediterranean Area from the East creates favorable conditions for the development of a large number of Mediterranean species.

Among the medicinal plants are two Balkan endemics (0.52% of the medicinal plants): *Achillea clypeolata* Sm. and *Angelica pancicii* Vandas ex Velen.

The relict species are 42 in number (10.82% of all species). The Tertiary relicts are 40 species (10.31% of all species): *Acer campestre* L., *Acer platanoides* L., *Acer pseudoplatanus* L., *Acer tataricum* L., *Alnus glutinosa* (L.) Gaertn., *Asarum europaeum* L., *Berberis vulgaris* L., *Betula pendula* Roth, *Carpinus betulus* L., *Cercis siliquastrum* L., *Clematis vitalba* L., *Colutea arborescens* L., *Corylus avellana* L., *Corylus colurna* L., *Cotinus coggygria* Scop., *Crataegus pentagyna* Waldst. & Kit. ex Willd., *Dictamnus albus* L., *Fagus orientalis* Lipsky, *Fraxinus excelsior* L., *Fraxinus ornus* L., *Hedera helix* L., *Isopyrum thalictroides* L., *Jasminum fruticans* L., *Juglans regia* L., *Lycopus europaeus* L., *Paliurus spina-christi* Mill., *Populus alba* L., *Populus nigra* L., *Populus tremula* L., *Quercus dalechampii* Ten., *Ruscus aculeatus* L., *Salix alba* L., *Salix caprea* L., *Salix fragilis* L., *Salix purpurea* L., *Sanicula europaea* L., *Staphylea pinnata* L., *Syringa vulgaris* L., *Tamus communis* L., *Ulmus minor* Mill.

The Quaternary relics are 2 species (0.51% of all species). Of these, one species is a Quaternary glacial relic (*Galanthus nivalis* L.) and one species is a Quaternary interglacial relic (*Iris pumila* L.).

The species with conservation status are 20 species (5.15% of all species). In Annex II of Directive 92/43/EEC is included one species (*Himantoglossum caprinum* Spreng.). In Annex V of Directive 92/43/EEC are included 2 species: *Galanthus nivalis* L. and *Ruscus aculeatus* L. In Appendix I of Convention on the Conservation of European Wildlife and Natural Habitats (Berne Convention) is included one species (*Himantoglossum caprinum* Spreng.). In Appendix II of Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) are included 9 species: *Anacamptis pyramidalis* (L.) Rich., *Galanthus elwesii* Hook.f., *Galanthus nivalis* L., *Himantoglossum caprinum* Spreng., *Ophrys cornuta* Steven ex M.Bieb., *Orchis morio* L., *Orchis purpurea* Huds., *Orchis simia* Lam., *Orchis tridentata* Scop. In the Red Data Book of the Republic of Bulgaria are included 3 species in two categories: Endangered – 2 species (*Galanthus elwesii* Hook.f. and *Galanthus nivalis* L.) and Vulnerable – one species

(*Himantoglossum caprinum* Spreng.). In the Red List of Bulgarian vascular plants are included 8 species in following categories Endangered – 2 species (*Galanthus elwesii* Hook.f. and *Galanthus nivalis* L.), Vulnerable – 5 species (*Anacamptis pyramidalis* (L.) Rich., *Angelica pancicii* Vandas ex Velen., *Fraxinus pallisiae* Wilmott, *Himantoglossum caprinum* Spreng., *Ophrys cornuta* Steven ex M.Bieb.), Nearly Threatened – one species (*Cercis siliquastrum* L.). In Annex III and Annex IV of the Act on Amending and Supplementing the Biological Diversity Act of the Republic of Bulgaria are included 17 species. Of them, 5 species are included in Annex III (Protected species): *Anacamptis pyramidalis* (L.) Rich., *Galanthus elwesii* Hook.f., *Galanthus nivalis* L., *Himantoglossum caprinum* Spreng., and *Ophrys cornuta* Steven ex M.Bieb. In Annex IV (Under the conservation and regulated use of the nature) are included 12 species: *Bupleurum rotundifolium* L., *Echinops sphaerocephalus* L., *Lilium martagon* L., *Orchis morio* L., *Orchis purpurea* Huds., *Orchis simia* Lam., *Orchis tridentata* Scop., *Polygonatum odoratum* (Mill.) Druce, *Primula veris* L., *Ruscus aculeatus* L., *Salix caprea* L., and *Scilla bifolia* L.

In addition to the listed species with conservation status, 17 other species have special regime of use. They are included in the Order for Special Arrangements for Conservation and Use of Medicinal Plants by the Ministry for Environment and Water in the Republic of Bulgaria [31]. The species are divided into two groups. Gathering herbs from natural habitats is prohibited for the following 10 species: *Angelica pancicii* Vandas ex Velen., *Asarum europaeum* L., *Asplenium trichomanes* L., *Orchis morio* L., *Orchis purpurea* Huds., *Orchis simia* Lam., *Orchis tridentata* Scop., *Phyllitis scolopendrium* (L.) Newm., *Ruscus aculeatus* L., *Valeriana officinalis* L. Collection of herbs from their natural habitats is restricted for the following 7 species: *Artemisia alba* L., *Berberis vulgaris* L., *Betonica officinalis* L., *Carlina acanthifolia* All., *Galium odoratum* (L.) Scop., *Primula veris* L., *Sedum acre* L.

Among the life forms (Table 2) dominate the hemicryptophytes (46.13%). Next in number are species for the following groups: phanerophytes (19.59%), therophytes (14.95%), and cryptophytes (10.57%). This distribution can be explained by the DRagoevska Mountain's location in the Trans-Continental Climatic Area and the large area of forest habitats.

The following species of the hemicryptophytes group are widely distributed: *Agrimonia eupatoria* L., *Carlina vulgaris* L., *Cichorium intybus* L., *Clinopodium vulgare* L., *Echium vulgare* L., *Eryngium campestre* L., *Lotus corniculatus* L., *Plantago lanceolata* L., *Plantago media* L., *Polygala major* Jacq., *Ranunculus ficaria* L., *Salvia nemorosa* L., *Silene vulgaris* (Moench) Garcke, *Taraxacum officinale* Web.

Table 2. Distribution of the species by life form

Group	Subgroup	Number of species	Percentage
Phanerophytes (Ph)		76	19.59
	Mega-phanerophytes	5	1.29
	Meso-phanerophytes	41	10.57
	Micro-phanerophytes	20	5.15
	Nano-phanerophytes	10	2.58
Chamaephytes (Ch)		15	3.87
Hemicyptophytes (H)		179	46.13
Therophytes-Hemicyptophytes (Th-H)		19	4.90
Cryptophytes (Cr)		41	10.57
	Geophytes	36	9.28
	Helophytes	3	0.77
	Hydrophytes	2	0.56
Therophytes (Th)		58	14.95

The phanerophytes are represented by 4 subgroups: megaphanerophytes, mesophanerophytes, microphanerophytes, and nanophanerophytes. Among the megaphanerophytes widespread is *Quercus frainetto* Ten. Among the mesophanerophytes, the following species are common: *Acer campestre* L., *Carpinus betulus* L., *Fagus sylvatica* L., *Fraxinus ornus* L., *Tilia tomentosa* Moench, and *Ulmus minor* Mill. Examples of more widespread microphanerophytes are the following species: *Cornus mas* L., *Corylus avellana* L., *Crataegus monogyna* Jacq., and *Syringa vulgaris* L. The following nanophanerophytes are common: *Genista tinctoria* L., *Jasminum fruticans* L., and *Rubus caesius* L.

The therophytes with wider distribution are: *Galium aparine* L., *Lactuca serriola* L., *Lamium purpureum* L., *Melilotus officinalis* Pall., *Xeranthemum annuum* L. and others.

Of the cryptophytes, the following geophytes predominate: *Aegopodium podagraria* L., *Arum maculatum* L., *Cardamine bulbifera* Crantz, *Scilla bifolia* L. and others. The helophytes are: *Typha angustifolia* L., *Typha latifolia* L., and *Veronica beccabunga* L. The

hydrophytes are: *Myriophyllum spicatum* L., and *Najas marina* L.

In the biological spectrum (Table 3), the most numerous species are perennial herbaceous plants (53.87%) and annual herbaceous plants (14.95%). The dominant presence of perennial herbaceous plants can be explained with the wide variety of plant communities and habitats on the Dragoevska Mountain's territory. The relatively large number of annual herbaceous plants is due to the presence of natural habitats on shallow and eroded soil cover.

Table 3. Distribution of the species by biological type

Biological type	Symbol	Number of species	Percentage
Annual herbaceous plant	a	58	14.95
Annual or biannual herbaceous plant	a-b	15	3.87
Annual or perennial herbaceous plant	a-p	4	1.03
Biannual herbaceous plant	b	14	3.61
Biannual or perennial herbaceous plant	b-p	15	3.87
Perennial herbaceous plant	p	209	53.87
Shrub	sh	23	5.93
Shrub or tree	sh-t	13	3.35
Tree	t	37	9.54

The antropophytes among the medicinal plants are 254 species (65.46%). Many of them are distributed as ruderal plants: *Capsella bursa-pastoris* (L.) Medik., *Cardaria draba* (L.) Desv., *Chelidonium majus* L., *Conium maculatum* L., *Erigeron canadensis* L., *Heracleum sibiricum* L., *Lactuca serriola* L., *Sambucus ebulus* L., and *Urtica dioica* L. The number of adventive species is 14 species (3.61%). The cosmopolitan species are 21 (5.41%). These results can be explained with the presence of settlements and arable land adjacent to Dragoevska Mountain. Wood production also caused the introduction of antropophytes and adventive species.

4. Conclusions

The results obtained during this study show the presence of a significant variety of medicinal plants on the territory of Dragoevska Mountain. They can be used for comparison with the data on medicinal plants in other geographical locations in Northeastern Bulgaria, as well as all over the country.

Appendix

Systematic list of medicinal plant species, established in Dragoevska Mountain (Northeastern Bulgaria)

Division Equisetophyta

Fam. Equisetaceae: *Equisetum arvense* L.; *Equisetum telmateia* Ehrh.

Division Polypodiophyta

Fam. Aspleniaceae: *Asplenium adiantum-nigrum* L.; *Asplenium ruta-muraria* L.; *Asplenium trichomanes* L.; *Phyllitis scolopendrium* (L.) Newm.

Fam. Hypolepidaceae: *Pteridium aquilinum* (L.) Kuhn

Fam. Polypodiaceae: *Polypodium vulgare* L.

Division Magnoliophyta

Class Magnoliopsida

Fam. Amaranthaceae: *Amaranthus retroflexus* L.; *Chenopodium album* L.; *Chenopodium hybridum* L.; **Fam. Anacardiaceae:** *Cotinus coggygria* Scop.; **Fam. Apiaceae:** *Aegopodium podagraria* L.; *Anethum graveolens* L.; *Angelica panicicii* Vandas ex Velen; *Angelica sylvestris* L.; *Anthriscus cerefolium* Hoffm.; *Bupleurum rotundifolium* L.; *Chaerophyllum bulbosum* L.; *Chaerophyllum temulentum* L.; *Conium maculatum* L.; *Daucus carota* L.; *Eryngium campestre* L.; *Ferulago sylvatica* (Besser) Rchb.; *Foeniculum vulgare* Mill.; *Heracleum sibiricum* L.; *Laser trilobum* Borkh. ex Gaertn.; *Pastinaca sativa* L.; *Peucedanum cervaria* Cusson ex Lapeyr.; *Pimpinella saxifraga* L.; *Sanicula europaea* L.; *Seseli tortuosum* L.; *Tordylium maximum* L.; *Torilis arvensis* (Huds.) Link; **Fam. Apocynaceae:** *Vincetoxicum hirsutinaria* Medik.; **Fam. Araliaceae:** *Hedera helix* L.; **Fam. Aristolochiaceae:** *Aristolochia clematitis* L.; *Asarum europaeum* L.; **Fam. Asteraceae:** *Achillea clypeolata* Sm.; *Achillea millefolium* L.; *Anthemis cotula* L.; *Arctium lappa* L.; *Arctium minus* Bernh.; *Artemisia absinthium* L.; *Artemisia alba* L.; *Artemisia annua* L.; *Artemisia vulgaris* L.; *Bellis perennis* L.; *Bidens tripartita* L.; *Carlina acanthifolia* All.; *Carlina vulgaris* L.; *Carthamus lanatus* L.; *Centaurea calcitrapa* L.; *Centaurea cyanus* L.; *Centaurea diffusa* Lam.; *Centaurea solstitialis* L.; *Cichorium intybus* L.; *Cirsium arvense* (L.) Scop.; *Cirsium vulgare* (Savi) Ten.; *Cota tinctoria* (L.) J.Gay.; *Echinops sphaerocephalus* L.; *Erigeron*

canadensis L.; *Eupatorium cannabinum* L.; *Filago germanica* L.; *Galinsoga parviflora* Cav.; *Hieracium pilosella* L.; *Inula britannica* L.; *Inula ensifolia* L.; *Lactuca serriola* L.; *Leucanthemum vulgare* Lam.; *Matricaria chamomilla* L.; *Petasites hybridus* (L.) G.Gaertn., B.Mey. & Scherb.; *Pulicaria dysenterica* (L.) Bernh.; *Scorzonera hispanica* L.; *Solidago gigantea* Aiton; *Tanacetum vulgare* L.; *Taraxacum officinale* F.H.Wigg.; *Tragopogon pratensis* L.; *Tripleurospermum tenuifolium* Freyn ex Freyn & E.Brandis; *Tussilago farfara* L.; *Xanthium spinosum* L.; *Xeranthemum annuum* L.; **Fam. Berberidaceae:** *Berberis vulgaris* L.; **Fam. Betulaceae:** *Alnus glutinosa* (L.) Gaertn.; *Betula pendula* Roth; *Carpinus betulus* L.; *Corylus avellana* L.; *Corylus colurna* L.; **Fam. Boraginaceae:** *Anchusa officinalis* L.; *Buglossoides arvensis* (L.) I.M.Johnst.; *Buglossoides purpureocaerulea* (L.) I.M.Johnst.; *Cerinthe minor* L.; *Cynoglossum officinale* L.; *Echium italicum* L.; *Echium vulgare* L.; *Heliotropium europaeum* L.; *Myosotis arvensis* (L.) Hill.; **Fam. Brassicaceae:** *Alliaria petiolata* (M.Bieb.) Cavara & Grande; *Brassica juncea* (L.) Czern.; *Capsella bursa-pastoris* (L.) Medik.; *Cardamine bulbifera* Crantz; *Cardaria draba* (L.) Desv.; *Descurainia sophia* (L.) Webb ex Prantl; *Lepidium campestre* (L.) W.T.Aiton; *Nasturtium officinale* R.Br.; *Raphanus raphanistrum* L.; *Rorippa sylvestris* (L.) Besser; *Sisymbrium loeselii* L.; *Thlaspi alliaceum* L.; **Fam. Campanulaceae:** *Campanula persicifolia* L.; **Fam. Cannabaceae:** *Cannabis sativa* L.; *Humulus lupulus* L.; **Fam. Caprifoliaceae:** *Dipsacus fullonum* L.; *Dipsacus laciniatus* L.; *Knautia arvensis* Coult.; *Sambucus ebulus* L.; *Sambucus nigra* L.; *Scabiosa ochroleuca* L.; *Valeriana officinalis* L.; **Fam. Caryophyllaceae:** *Lychnis coronaria* (L.) Desr.; *Saponaria officinalis* L.; *Scleranthus perennis* L.; *Stellaria media* (L.) Vill.; **Fam. Celastraceae:** *Euonymus europaeus* L.; *Euonymus verrucosus* Scop.; **Fam. Convolvulaceae:** *Calystegia sepium* (L.) R.Br.; *Convolvulus arvensis* L.; *Cuscuta europaea* L.; **Fam. Cornaceae:** *Cornus mas* L.; **Fam. Crassulaceae:** *Sedum acre* L.; *Sedum album* L.; *Sedum maximum* Suter; **Fam. Dioscoreaceae:** *Tamus communis* L.; **Fam. Elaeagnaceae:** *Elaeagnus angustifolia* L.; **Fam. Euphorbiaceae:** *Euphorbia amygdaloides* L.; *Euphorbia cyparissias* L.; *Mercurialis perennis* L.; **Fam. Fabaceae:** *Amorpha fruticosa* L.; *Anthyllis vulneraria* L.; *Astragalus glycyphylloides* DC.; *Astragalus glycyphyllos* L.; *Bituminaria bituminosa* (L.) C.H.Stirt.; *Cercis siliquastrum* L.; *Chamaecytisus hirsutus* Link; *Colutea arborescens* L.; *Coronilla scorpioides* W.D.J.Koch; *Coronilla varia* L.; *Galega officinalis* L.; *Genista ovata* Waldst. & Kit.; *Genista tinctoria* L.; *Lathyrus niger* (L.) Bernh.; *Lathyrus pratensis* L.; *Lathyrus sylvestris* L.; *Lathyrus tuberosus* L.; *Lathyrus vernus* (L.) Bernh.; *Lotus corniculatus* L.; *Medicago sativa* L.; *Melilotus alba*

Medik.; *Melilotus officinalis* Pall.; *Ononis arvensis* L.; *Ononis spinosa* L.; *Robinia pseudoacacia* L.; *Trifolium alpestre* L.; *Trifolium arvense* L.; *Trifolium pratense* L.; *Trifolium repens* L.; *Vicia cracca* L.; *Vicia grandiflora* Scop.; *Vicia sativa* L.; **Fam. Fagaceae:** *Fagus orientalis* Lipsky; *Fagus sylvatica* L.; *Quercus dalechampii* Ten.; *Quercus frainetto* Ten.; **Fam. Gentianaceae:** *Centaurium erythraea* Rafn; *Centaurium pulchellum* (Sw.) Druce; *Gentiana cruciata* L.; **Fam. Geraniaceae:** *Erodium cicutarium* (L.) L'Her.; *Geranium dissectum* L.; *Geranium pyrenaicum* Burm.f.; *Geranium robertianum* L.; *Geranium sanguineum* L.; **Fam. Haloragaceae:** *Myriophyllum spicatum* L.; **Fam. Hypericaceae:** *Hypericum perforatum* L.; **Fam. Juglandaceae:** *Juglans regia* L.; **Fam. Lamiaceae:** *Acinos arvensis* (Lam.) Dandy; *Ajuga chamaepitys* (L.) Schreb.; *Ajuga laxmanii* (L.) Benth.; *Ajuga reptans* L.; *Ballota nigra* L.; *Betonica officinalis* L.; *Calamintha nepeta* (L.) Savi; *Calamintha sylvatica* Bromf.; *Clinopodium vulgare* L.; *Galeopsis speciosa* Mill.; *Glechoma hederacea* L.; *Glechoma hirsuta* Waldst. & Kit.; *Lamium maculatum* L.; *Lamium purpureum* L.; *Leonurus cardiaca* L.; *Lycopus europaeus* L.; *Marrubium peregrinum* L.; *Marrubium vulgare* L.; *Melissa officinalis* L.; *Mentha aquatica* L.; *Mentha arvensis* L.; *Mentha longifolia* (L.) Huds.; *Mentha pulegium* L.; *Mentha spicata* L.; *Nepeta cataria* L.; *Origanum vulgare* L.; *Phlomis tuberosa* L.; *Prunella vulgaris* L.; *Salvia glutinosa* L.; *Salvia nemorosa* L.; *Salvia sclarea* L.; *Salvia verticillata* L.; *Scutellaria altissima* L.; *Sideritis montana* L.; *Stachys annua* L.; *Stachys germanica* L.; *Stachys sylvatica* L.; *Teucrium chamaedrys* L.; *Teucrium polium* L.; *Teucrium scordium* L.; *Thymus callieri* Halácsy ex Litv.; *Thymus pulegioides* L.; **Fam. Lythraceae:** *Lythrum salicaria* L.; **Fam. Malvaceae:** *Alcea pallida* (Waldst. & Kit. ex Willd.) Waldst. & Kit.; *Lavatera thuringiaca* L.; *Malva sylvestris* L.; *Tilia cordata* Mill.; *Tilia platyphyllos* Scop.; *Tilia tomentosa* Moench; **Fam. Moraceae:** *Morus alba* L.; *Morus nigra* L.; **Fam. Oleaceae:** *Fraxinus excelsior* L.; *Fraxinus ornus* L.; *Fraxinus oxycarpa* Willd.; *Fraxinus pallisiae* Wilmott; *Jasminum fruticans* L.; *Ligustrum vulgare* L.; *Syringa vulgaris* L.; **Fam. Papaveraceae:** *Chelidonium majus* L.; *Corydalis solida* Sw.; *Fumaria officinalis* L.; *Papaver rhoeas* L.; **Fam. Plantaginaceae:** *Globularia aphyllanthes* Crantz; *Plantago lanceolata* L.; *Plantago major* L.; *Plantago media* L.; **Fam. Polygalaceae:** *Polygala major* Jacq.; *Polygala vulgaris* L.; **Fam. Polygonaceae:** *Fallopia dumetorum* (L.) Holub; *Persicaria hydropiper* (L.) Spach; *Persicaria lapathifolia* (L.) Gray; *Persicaria mitis* (Schrank) Assenov; *Polygonum aviculare* L.; *Rumex acetosella* L.; *Rumex aquaticus* L.; *Rumex crispus* L.; *Rumex obtusifolius* L.; **Fam. Portulacaceae:** *Portulaca oleracea* L.; **Fam. Primulaceae:** *Anagallis arvensis* L.; *Lysimachia*

nummularia L.; *Primula veris* L.; **Fam. Ranunculaceae:** *Anemone ranunculoides* L.; *Clematis vitalba* L.; *Consolida hispanica* (Costa) Greuter & Burdet; *Consolida regalis* Gray; *Helleborus odorus* Waldst. & Kit. ex Willd.; *Isopyrum thalictroides* L.; *Nigella arvensis* L.; *Ranunculus ficaria* L.; *Ranunculus polyanthemus* L.; *Ranunculus repens* L.; *Thalictrum aquilegifolium* L.; *Thalictrum minus* L.; **Fam. Resedaceae:** *Reseda lutea* L.; **Fam. Rhamnaceae:** *Paliurus spina-christi* Mill.; **Fam. Rosaceae:** *Agrimonia eupatoria* L.; *Crataegus monogyna* Jacq.; *Crataegus pentagyna* Waldst. & Kit. ex Willd.; *Filipendula vulgaris* Moench; *Fragaria vesca* L.; *Geum urbanum* L.; *Malus sylvestris* Mill.; *Potentilla argentea* L.; *Potentilla reptans* L.; *Prunus avium* L.; *Prunus cerasifera* Ehrh.; *Prunus mahaleb* L.; *Prunus spinosa* L.; *Pyrus pyraister* (L.) Burgsd.; *Pyrus sativa* DC.; *Rosa canina* L.; *Rosa corymbifera* Borkh.; *Rosa gallica* L.; *Rubus caesius* L.; *Rubus hirtus* Waldst. & Kit.; *Sanguisorba minor* Scop.; *Sorbus aucuparia* L.; *Sorbus domestica* L.; *Sorbus torminalis* (L.) Crantz; **Fam. Rubiaceae:** *Cruciata glabra* (L.) Ehrend.; *Galium aparine* L.; *Galium odoratum* Scop.; *Galium verum* L.; **Fam. Rutaceae:** *Dictamnus albus* L.; **Fam. Salicaceae:** *Populus alba* L.; *Populus nigra* L.; *Populus tremula* L.; *Salix alba* L.; *Salix caprea* L.; *Salix fragilis* L.; *Salix purpurea* L.; **Fam. Sapindaceae:** *Acer campestre* L.; *Acer negundo* L.; *Acer platanoides* L.; *Acer pseudoplatanus* L.; *Acer tataricum* L.; **Fam. Scrophulariaceae:** *Digitalis ferruginea* L.; *Digitalis lanata* Ehrh.; *Euphrasia pectinata* Ten.; *Euphrasia stricta* J.P.Wolff ex J.F.Lehm.; *Kickxia elatine* (L.) Dumort.; *Lathraea squamaria* L.; *Linaria vulgaris* Mill.; *Pseudolysimachion orchideum* (Crantz) Wraber; *Scrophularia nodosa* L.; *Scrophularia umbrosa* Dumort.; *Verbascum densiflorum* Bertol.; *Verbascum nigrum* L.; *Verbascum phlomoides* L.; *Verbascum phoeniceum* L.; *Veronica anagalis-aquatica* L.; *Veronica arvensis* L.; *Veronica austriaca* L.; *Veronica beccabunga* L.; *Veronica chamaedrys* L.; *Veronica officinalis* L.; *Veronica prostrata* L.; **Fam. Simaroubaceae:** *Ailanthus altissima* (Mill.) Swingle; **Fam. Solanaceae:** *Datura stramonium* L.; *Physalis alkekengii* L.; *Solanum dulcamara* L.; *Solanum nigrum* L.; **Fam. Staphyleaceae:** *Staphylea pinnata* L.; **Fam. Ulmaceae:** *Ulmus glabra* Huds.; *Ulmus minor* Mill.; **Fam. Urticaceae:** *Parietaria officinalis* L.; *Urtica dioica* L.; *Urtica urens* L.; **Fam. Verbenaceae:** *Verbena officinalis* L.; **Fam. Violaceae:** *Viola odorata* L.; *Viola tricolor* L.

Class Liliopsida

Fam. Alismataceae: *Alisma plantago-aquatica* L.; **Fam. Amaryllidaceae:** *Allium rotundum* L.; *Allium scorodoprasum* L.; *Allium ursinum* L.; *Galanthus elwesii* Hook.f.; *Galanthus nivalis* L.; **Fam. Araceae:** *Arum maculatum* L.; **Fam. Asparagaceae:** *Polygonatum odoratum* (Mill.) Druce; *Ruscus aculeatus* L.; *Scilla*

bifolia L.; **Fam. Colchicaceae:** *Colchicum autumnale* L.; **Fam. Hydrocharitaceae:** *Najas marina* L.; **Fam. Iridaceae:** *Iris graminea* L.; *Iris pumila* L.; **Fam. Juncaceae:** *Juncus inflexus* L.; **Fam. Liliaceae:** *Lilium martagon* L.; **Fam. Orchidaceae:** *Anacamptis pyramidalis* (L.) Rich.; *Himantoglossum caprinum* Spreng.; *Ophrys cornuta* Steven ex M.Bieb.; *Orchis morio* L.; *Orchis purpurea* Huds.; *Orchis simia* Lam.; *Orchis tridentata* Scop.; **Fam. Poaceae:** *Anthoxanthum odoratum* L.; *Briza media* L.; *Cynodon dactylon* (L.) Pers.; *Elymus repens* (L.) Gould; *Lolium temulentum* L.; *Sclerochloa dura* (L.) P.Beauv.; *Sorghum halepense* (L.) Pers.; **Fam. Typhaceae:** *Typha angustifolia* L.; *Typha latifolia* L.

References

- [1] N. Michev, C. Mihaylov, I. Vaptsarov, S. Kiradzhiev, Geographical Dictionary of Bulgaria, Sofia, Nauka & Izkustvo, 1980.
- [2] I. Bondev, Geo-botanical zoning. In: M. Yordanova, D. Donchev (eds), Geography of Bulgaria, Sofia, 1997.
- [3] D. Peev (main ed.), Flora of the Republic of Bulgaria, Vol. 11, Sofia, Prof. M. Drinov Acad. Publ., 2012.
- [4] Register of protected sites and protected areas in Bulgaria, Ministry of Environment and Water, <http://pdbase.government.bg/zpo/bg/> [accessed 15 April 2017].
- [5] Information system for protected areas of ecological network NATURA 2000, <http://natura2000.moew.government.bg/> [accessed 15 April 2017].
- [6] NATURA 2000 Standard Data Form for Ticha Protected Area (BG0000178), Ministry of Environment and Water, http://natura2000.moew.government.bg/PublicDownloads/Auto/PS_SCI/BG0000178/BG0000178_PS_16.pdf [accessed 15 April 2017].
- [7] NATURA 2000 Standard Data Form for Ekokoridor Kamchiya-Emine Protected Area (BG0000393), Ministry of Environment and Water, http://natura2000.moew.government.bg/PublicDownloads/Auto/PS_SCI/BG0000393/BG0000393_PS_16.pdf [accessed 15 April 2017].
- [8] Medicinal Plants Act of the Republic of Bulgaria, Annex. State Gazette number 29, 7 April 2000, 9–29. Last amended in State Gazette number 58, 18 July 2017.
- [9] N. Stoyanov, Our Medicinal Plants, Vol. 1, Sofia, Nauka & Izkustvo, 1972.
- [10] N. Stoyanov, Our Medicinal Plants, Vol. 2, Sofia, Nauka & Izkustvo, 1973.
- [11] N. Stoyanov, B. Kitanov, Useful Wild Plants in Bulgaria, Sofia, Publishing House of BAS, 1960.
- [12] V. Petkov (ed.), Modern Phytotherapy, Sofia, Medicina & Fizkultura, 1982.
- [13] D. Pamukov, H. Ahtardzhiev, Natural Pharmacy, Sofia, Zemizdat, 1989.
- [14] I. Landzhev, Encyclopedia of Medicinal Plants in Bulgaria, Sofia, Trud, 2005.
- [15] S. Nikolov (ed. in chief), Specialized Encyclopedia of the Medicinal Plants in Bulgaria, Sofia, Trud, 2006.
- [16] D. Delipavlov, I. Cheshmedzhiev, M. Popova, D. Tersiyiski, I. Kovachev, Handbook for Plants in Bulgaria, Plovdiv, Agrar. Univ. Acad. Press, 2011.
- [17] D. Yordanov (main ed.), Flora of PR Bulgaria, Vol. 1–7, Sofia, Publishing House of BAS, 1963–1979.
- [18] V. Velchev (main ed.), Flora of PR Bulgaria, Vol. 8–9, Sofia, Publishing House of BAS, 1982–1989.
- [19] S. Kozhuharov (main ed.), Flora of the Republic of Bulgaria, Vol. 10, Sofia, Prof. M. Drinov Acad. Publ., 1995.
- [20] B. Asyov, A. Petrova, D. Dimitrov, R. Vasilev, Conspectus of the Bulgarian vascular flora. Distribution maps and floristic elements, Sofia, Bulgarian Biodiversity Foundation, 2012.
- [21] International Plant Names Index (IPNI), <http://www.ipni.org/> [accessed 15 April 2017].
- [22] Angiosperm Phylogeny Group, An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG III, Bot. J. Linn. Soc., Vol. 161, No 2, 2009, pp. 105–121.
- [23] C. Raunkiaer, The Life forms of plants and statistical plant geography, Oxford, Clarendon Press, 1934.
- [24] D. Zahariev, Biodiversity of relict vascular plants in Bulgaria, Int. Jour. of Res. St. in Biosc., Vol. 4, No 1, 2016, pp. 38–51.
- [25] Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora, Annex II. OJ L 206, 22.07.1992.
- [26] Convention on the Conservation of European Wildlife and Natural Habitats, Appendix I, 1979, <http://conventions.coe.int/Treaty/FR/Treaties/Html/104-1.htm> [accessed 15 April 2017].
- [27] Convention on International Trade in Endangered Species of Wild Fauna and Flora, Appendix II, 2009, <http://www.cites.org/eng/app/appendices.shtml> [accessed 15 April 2017].
- [28] D. Peev & al. (eds), Red Data Book of the Republic of Bulgaria. Vol. 1. Plants and Fungi, Sofia, Institute of Biodiversity and Ecosystem Research – BAS & Ministry of Environment and Water, 2015.

- [29] A. Petrova, V. Vladimirov (Eds), Red List of Bulgarian vascular plants, *Phytol. Balcan.*, Vol. 15, No 1, 2009, pp. 63–94.
- [30] Act on Amending and Supplementing the Biological Diversity Act of the Republic of Bulgaria. Annex III and Annex IV, State Gazette number 94, 16 November 2007.
- [31] Order number RD-89 from 3 February 2017 for Special Arrangements for Conservation and Use of Medicinal Plants, http://www5.moew.government.bg/?_page_id=45594 [accessed 15 April 2017].
- [32] B. Stefanov, B. Kitanov, *Kultigenen Plants and Kultigenen Vegetation in Bulgaria*, Sofia, Publishing House of BAS, 1962.

Dimcho Zahariev is currently an Associated Professor in the Faculty of Natural Sciences, University of Shumen Bishop Konstantin Preslavski, Shumen, Bulgaria. He is PhD in biology (Botany scientific specialty). He teaches Anatomy and Morphology of Plants, Plant Systematics, Phytogeography and conservation of the biological diversity, Floristic diversity in Bulgaria. His research interests are in: Floristry, Medicinal plants and Biodiversity. Member of the Bulgarian Phytosociological Association.