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Phytotaxonomic and phytogeographical studies in Bulgaria during the last decade (1983-1993)

Abstract

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The present review retraces botanical studies in the field of floristics, taxonomy and phytogeography in Bulgaria during the last decade. It is based on the analysis of 75 publications (floras, plant guides, articles, scientific communications and literature reviews) published during the period 1983-1993, and considers recent trends in the floristic research in Bulgaria, acknowledging its close relation with the *Flora europaea* project and with major regional Flora projects. Newly described taxa (species, subspecies, and hybrids) of vascular plants are surveyed and listed in tabular form, as are taxa first recorded for the country during the last decade. Patterns in the dynamics of the country's flora are highlighted, and future prospects and ideas to further study the country's vascular flora are mentioned.

The project of the Flora of Bulgaria

Volume 9 of the *Flora na Narodna Republika Bălgarija* (Velčev 1989) includes the treatment of 6 families, from *Rubiaceae* to *Solanaceae,* with 63 genera and 309 species, 44 additional subspecies, and 84 varieties and forms. As compared to the fourth edition of the *Flora na Bălgarija* (Stojanov & al. 1966-1967), it includes 56 additional species. It also mentions 173 hybrids, 163 of them from the single genus *Mentha.* Three unnumbered species are included, whose presence in Bulgaria remains doubtful. 16 genera with 28 species of introduced plants, mainly trees and shrubs, are dealt with by means of brief morphological descriptions.

In that same volume three new species are described: two of *Alkanna,* one of *Myosotis,* as well as two new subspecies, also of *Alkanna* (Table 1). For 18 taxa, new nomenclatural combinations were validly published.

The genus *Mentha* was worked out by Harley & Kuzmanov (in Velčev 1989: 260-280), the genus *Thymus* by Markova (in Velčev 1989: 288-331) advised by Jalas. The complex variability patterns and interspecific relationships in polymorphic genera like *Galium, Mentha, Thymus* are expressed not only in a formal way in the morphological descriptions, through the recognition of species groups and the use of hybrid formulae,

but also by free comments on the manifestations of the variability, its nature, and the processes to which it is due. For critical species these texts follow the example of *Flora europaea,* except by being more detailed and are often result from biosystematic studies of Bulgarian populations. The treatments in this volume, same as for volumes 3-8, follow a similar species concept as *Flora europaea,* based on clear morphological boundaries of species and subspecies that reflect their morphological and ecological differentiation.

Table 1. Species and subspecies described as new from Bulgaria during the decade 1983-1993. Herbarium abbreviations follow Holmgren & al. (1990).

	Family	validation source	holotype
Alkanna graeca subsp. *slavjankae* Kožuharov	*Boraginac.*	Velčev 1989: 505	SOM
Alkanna jordanovii Kožuharov	*Boraginac.*	Velčev 1989: 505	SOM
Alkanna stojanovii Kožuharov	*Boraginac.*	Velčev 1989: 505	SOM
Alkanna stribrnyi subsp. *intermedia* Kožuharov	*Boraginac.*	Velčev 1989: 505	SOM
Amygdalus ×*delipavlovii* S. Seraf.	*Rosac.*	Serafimov 1983: 175	SOM
Campanula jordanovii Ančev & Kovanda	*Campanulac.*	Kovanda & Ančev 1989: 196	SOM
Campanula patula subsp. *alekovii* Ančev	*Campanulac.*	Ančev 1994: 196	SOM
Campanula trojanensis Kovanda & Ančev	*Campanulac.*	Kovanda & Ančev 1989: 201	SOM
Cirsium stojanovii Kuzmanov	*Asterac.*	Kuzmanov 1988: 60	SOM
Elytrigia caespitosa subsp. *rhodopaea* Delip.	*Poac.*	Delipavlov 1987: 98	SOA
Hieracium gregorii-bakurianii S. Bräut.	*Asterac.*	Bräutigam 1985: 2	HAL
Hieracium merxmullerianum S. Bräut.	*Asterac.*	Bräutigam 1985: 5	HAL
Linaria brachyphylla Delip.	*Scrophulariac.*	Delipavlov 1990: 344	SOA
Myosotis jordanovii Andrejev & Peev	*Boraginac.*	Velčev 1989: 506	SOM
Pastinaca argyrophylla Delip.	*Apiac.*	Delipavlov 1990: 342	SOA
Pirinia M. Král	*Caryophyllac.*	Král 1984: 162	
Pirinia koenigii M. Král	*Caryophyllac.*	Král 1984: 162	PRC
Poa aitosensis Kožuharov & Stoeva	*Poac.*	Kožuharov & Stoeva 1983: 154	SOM
Poa jordanovii Kožuharov & Stoeva	*Poac.*	Kožuharov & Stoeva 1983: 154	SOM
Pyrus ×*bardoensis* Dostálek	*Rosac.*	Dostálek 1984: 90	PR
Pyrus ×*jordanovii* Dostálek	*Rosac.*	Dostálek 1984: 92	PR
Pyrus ×*velenovskyi* Dostálek	*Rosac.*	Dostálek 1984: 91	PR
Rosa smoljanensis M. Popova	*Rosac.*	Popova 1983: 173	SOA
Soldanella cyanaster O. Schwarz	*Primulac.*	Meyer 1985: 8	JE
Soldanella pirinica F. K. Meyer	*Primulac.*	Meyer 1985: 36	JE
Soldanella rhodopaea F. K. Meyer	*Primulac.*	Meyer 1985: 25	JE
Tulipa pirinica Delip.	*Liliac.*	Delipavlov 1987: 98	SOA

With publication of volume 9, the number of species treated in the *Flora na Narodna Republika Bălgarija* now reaches 2733. One must bear in mind that the first volume of this multi-volume flora was issued in 1963. Until 1982, when volume 8 was published, one volume was released about every three years. Volume 9, when compared to this rhythm, appears to be about 4 years late.

The typescript of volume 10 of the Flora is edited and ready for print. It will include the treatments of 4 families with 27 genera and 164 species, of which 23 genera with 158 species pertain to the single family *Scrophulariaceae*. Obviously, the time between the publication of volume 9 and the expected release date of volume 10 is again considerably longer than the time span between previous volumes. The reasons are mainly linked with recent developments of phytotaxonomic studies on the Bulgarian flora (Kožuharov 1987, Kožuharov & Petrova 1988b).

Guides to the Bulgarian flora

The completion of such great international projects as *Flora europaea* and *Flora of Turkey,* the publication of three volumes of *Med-Checklist,* as well as the successful development of projects for basic Floras in neighbouring countries, have led to a considerable increase, both in quantity and quality, of taxonomic and chorological information about southern and south-eastern Europe as well as S.W. Asia. To this one may add the data contents of the nine published volumes of *Flora na Narodna Republika Bălgarija* and the numerous floristic, taxonomic and biosystematic studies on Bulgarian flora. It was therefore only natural for Bulgarian taxonomists to looked for a speedy way of updating all this taxonomic information for their own country. Thus, following a *Synopsis of higher plants in Bulgaria* (Kožuharov & al., 1980) prepared to serve as a basis for the project "Chorological atlas to the higher plants in Bulgaria", a concise manual on the higher plants of Bulgaria was prepared and published (Kožuharov 1992). This guide includes 3567 species and 830 subspecies. In spite of some problems with the publishers, resulting in a delay in printing, it fulfilled to a large extent its self-set task: to update the taxonomic information available on the Bulgarian flora.

In order to get an accurate idea of the country's floristic inventory, and to stimulate further floristic and taxonomic studies, the manual includes subspecies in full, while varieties are just listed together with the chorological information on the next higher taxon. Some species are included that have been reported for Bulgaria, even though their presence in the country is not confirmed by herbarium specimens.

The guide has Addenda validating new nomenclatural combinations, listing newly described taxa not yet mentioned in the *Flora na Narodna Republika Bălgarija,* and adding some newly found taxa that were omitted from the main body of the text. An illustrated glossary follows the second edition of *Botanical Latin* (Stearn 1978).

During the last years there has been a steadily increasing interest in the flora of some particular floristic regions of the country, among others the Pirin mountains which are renowned for their great floristic variety. The *Flora na Pirin* (Kitanov & Kitanov 1990) is a guide to the higher plants of that mountain. Unfortunately, the taxonomy adopted and taxonomic information included in that book largely remains at the level of the 4th edition of the *Flora na Bălgarija* (Stojanov & al. 1966-1967).

Table 2. Species and subspecies newly recorded from Bulgaria during the decade 1983-1993. – BS = Black Sea coast; pl. = planina; Rh = Rhodope mountains; Sg = Sredna gora mountain; UThr = Upper Thracian plain.

	Family	reference	distr. in Bulgaria
Aegilops speltoides subsp. *ligustica*	*Poac.*	Delipavlov 1992	UThr., E. Rh.
Amaranthus scleropoides	*Amaranthac.*	Panov 1987	BS.
Ammannia auriculata	*Lythrac.*	Delipavlov & Češmedžiev 1983a	UThr.
Anchusa gmelinii	*Boraginac.*	Král 1983	BS.
Anchusa macedonica	*Boraginac.*	Delipavlov 1992	Struma valley
Andrzeiowskia cardamine	*Brassicac.*	Delipavlov & Češmedžiev 1983a	S. BS.
Arbutus andrachne	*Ericac.*	Velčev & al. 1989	E. Rh.
Arbutus unedo	*Ericac.*	Velčev & al. 1989	E. Rh.
Arenaria procera subsp. *glabra*	*Caryophyllac.*	Delipavlov & Češmedžiev 1989	UThr.
Arum alpinum	*Arac.*	Delipavlov & Češmedžiev 1983b	E. Stara pl., Golo bărdo, Strandža
Asperula aristata subsp. *thessala*	*Rubiac.*	Delipavlov & Češmedžiev 1984b	Pirin
Atriplex "hastata" subsp. *polonica*	*Chenopodiac.*	Panov 1987	BS. (ruderal)
Atriplex heterosperma	*Chenopodiac.*	Panov 1987	BS. (ruderal)
Bellevalia ciliata	*Hyacinthac.*	Berg & al. 1989	N.E. Bulgaria
Botrichium matricariifolium	*Ophioglossac.*	Stoeva 1991	C. Stara pl.
Bufonia paniculata	*Caryophyllac.*	Delipavlov 1988	E. Rh., UThr.
Callitriche brutia	*Callitrichac.*	Král 1983	S. BS.
Centaurea subciliaris	*Asterac.*	Delipavlov & al. 1984	Slavjanka
Cephalanthera epipactoides	*Orchidac.*	Markova & Černeva 1984	E. Rh.
Chenopodium acuminatum	*Chenopodiac.*	Panov 1987	BS.
Chenopodium concatenatum	*Chenopodiac.*	Panov 1987	BS.
Consolida phrygia subsp. *thessalonica*	*Ranunculac.*	Delipavlov & Češmedžiev 1984b	Strandža, UThr.
Elymus panormitanus	*Poac.*	Kožuharov & al. 1983	Vračanka pl.
Gagea chrysantha	*Liliac.*	Delipavlov 1990	UThr.
Helichrysum plicatum	*Asterac.*	Gusev 1993	Osogovska, Kamenica
Impatiens parviflora	*Balsaminac.*	Češmedžiev 1988	Rila: Borovec
Knautia degenii	*Dipsac.*	Král 1983	S. BS.
Lindernia dubia	*Scrophulariac.*	Delipavlov & Češmedžiev 1984a	UThr.
Lythrum thymifolia	*Lythrac.*	Delipavlov 1988	UThr.
Malus orientalis	*Rosac.*	S. Dimitrov & Popova 1983	Rh., Rila, Sg.

Table 2 (continued).

	Family	reference	distr. in Bulgaria
Parvotrisetum myrianthum	*Poac.*	Delipavlov 1992	Struma valley
Picris altissima	*Asterac.*	Delipavlov & Češmedžiev 1989	S. BS., E. Rh., UThr.: Slivengrad
Rochelia disperma subsp. *disperma*	*Boraginac.*	D. Dimitrov 1993	S. Struma valley
Rumex cristatus	*Polygonac.*	Panov 1987	BS. (ruderal)
Rumex maritimus	*Polygonac.*	D. Dimitrov 1993	Danube: island Vardim (ruderal)
Rumex pulcher subsp. *divaricatus*	*Polygonac.*	Panov 1987	BS. (ruderal)
Salix xanthicola	*Salicac.*	Zieliński 1992	E. Rh.
Salvia pinnata	*Lamiac.*	Markova & Černeva 1984	E. Rh.
Silene lydia	*Caryophyllac.*	Kurtto 1985	W. Rh.: Velingrad-Pazardžik
Silene radicosa	*Caryophyllac.*	Delipavlov & al. 1984	Slavjanka
Stellaria media subsp. *cupaniana*	*Caryophyllac.*	Češmedžiev 1988	Rila: Borovec
Trigonella orthoceras	*Fabac.*	Delipavlov 1992	C. Rh.: Kričim
Trisetum flavescens subsp. *tatricum*	*Poac.*	Delipavlov 1990	C. Rh.
Urospermum picroides	*Asterac.*	Kuzmanov & Jurukova 1993	BS.
Veronica catenata	*Scrophulariac.*	Delipavlov & Češmedžiev 1989	BS.: Ahtopol
Veronica trichadena	*Scrophulariac.*	Delipavlov 1992	Struma valley: Kresna
Vicia meyeri	*Fabac.*	Terzijski & Delipavlov 1985	BS., Struma valley
Viola persicifolia	*Violac.*	Delipavlov 1988	Sg.

A further contribution to the study of the Bulgarian flora is the "Guide to the plants in Bulgaria" with two editions, the second revised and updated (Delipavlov & al. 1983, 1992). Recently, the second edition of a guide to the wild and introduced trees and shrubs in Bulgaria (Gramatikov 1992) was published.

The following review of recent taxonomic and floristic studies placed in the context of the *Flora na Narodna Republika Bălgarija* project has self-set limitations, since it does not cover biosystematic studies. These are the subject of separate analyses in the present volume. Due to the valuable additional information they provide on the nature of species and their variability, and perhaps also to the faster and emotionally more appealing nature of their results, biosystematic studies attract an increasing number of students and have greatly expanded in volume, both in Europe and Bulgaria.

This is borne out by a preliminary statistical survey for the present (1983-1993) and previous decade (1972-1982), comparing the number of publications in the *Izvestija na Botaničeskaja Institut* in Sofia and its successor after 1974, *Fitologija*. In the field of

biosystematics (including karyosystematics, chemotaxonomy, population science, and numerical taxonomy), 26 papers and communications have been published in the former and 45 in the latter period. In the same time spans, the comparative morphological and taxonomic studies decreased from 5 to 1, and the floristic papers and communications from 25 to 13.

In spite of the afore-mentioned limitation in coverage, it is impossible to review the phytotaxonomic studies in Bulgaria without mentioning, at least in passing, several biosystematic studies on Bulgarian plants which treat certain families and genera in full or almost in full. Such are the revisions of the two largest families of the Bulgarian flora: *Compositae* (Kuzmanov 1991) and *Poaceae* (Kožuharov 1986). Such are, also, the biosystematic studies of genera like *Alyssum, Vicia, Betonica, Arum, Allium,* etc.

Taxonomic and floristic studies

Partly in the context of the *Flora na Narodna Republika Bălgarija* project and of taxonomic and biosystematic studies of polymorphic genera, and partly as a result of field studies in Bulgaria by Bulgarian and foreign botanists, 16 species and 4 subspecies new to science (Table 1), plus many varieties and forms, have been described during the last decade. In addition, six nothospecies have been described: three in *Pyrus*, one in *Amygdalus*, and two in *Hieracium* (Table 1).

From the alpine belt of Mt Pirin, the Czech botanist Král described the new genus *Pirinia*, close to *Spergularia*, with its single species of *P. koenigii* (Král 1984). Three new species were described in *Soldanella* (Meyer 1985). The list of newly described species also includes one in *Rosa*, one in *Pastinaca*, one in *Linaria*, two species in *Campanula*, one in *Cirsium*, two in *Poa*, and one in *Tulipa* (Table 1).

Recent floristic studies and newly collected chorological information relate mainly to the project "Chorological Atlas to the Higher Plants in Bulgaria", which started by a compendium on the collecting, recording and publishing of new chorological information (Kožuharov & al. 1983).

Other new informations on the Bulgarian flora results from critical revisions for the *Flora na Narodna Republika Bălgarija*. Such is the case of *Draba korabensis* Kümmerle & Degen ex Jáv., previously considered a synonym of *Draba tomentosa* Clairv. (Delipavlov 1987).

During the last ten years, 39 species and 9 subspecies have been found for the first time in Bulgaria (Table 2). When reviewing the list of these newly reported taxa and their distribution, one can find confirmation of certain regular patterns in the dynamics of the Bulgarian flora:

Often new taxa penetrate into the southernmost parts of the country, whose flora is closely related to that of the Eastern Mediterranean. Such newly found species are often annual or biennial, easily migrating plants like *Andrzeiowskia cardamine, Rochelia disperma* subsp. *disperma, Knautia degenii, Picris altissima,* and *Urospermum picroides*. Perennial species too may sometimes enter the valleys of the rivers Struma and Marica, where they reach the northern boundary of their area. Such are *Salvia pinnata* and *Cephalanthera epipactoides,* found in two places in the eastern Rhodopes (Markova

& Černeva 1984). The finding of some scattered trees of *Arbutus andrachne* and *A. unedo* in *Quercus frainetto, Q. pubescens* and *Juniperus oxycedrus* communities in the eastern Rhodopes was rather surprising (Velčev & al. 1989).

The localities of new species of the Bulgarian flora often lie along the well-known irradiation pathways of plant species of more southerly floras, in the valleys of the rivers Struma, Mešta, and Marica and on the adjoining slopes of the foothills of the eastern Rhodopes, at the Southern Black Sea coast and on the low coastal slopes of the Strandža Mountain.

Over 30 per cent of the newly found species and subspecies are synanthropic and adventive plants. Among them are representatives of the genera *Amaranthus, Atriplex, Chenopodium,* and *Rumex.* Such are also *Ammannia auriculata* and *Lythrum thymifolia.* Most often they penetrate into regions with strong international traffic, like the Black Sea coast and the banks of the Danube, as well as places with active international tourism. Future years will probably bring more findings of a similar kind from these regions. Along with the southern- and southwesternmost parts of the country, they are the places most frequently visited by Bulgarian botanists.

The Stara planina range and the mountains at the western frontier, which link the Bulgarian flora with that of the Balkan Peninsula and Central Europe, have also their floristic discoveries to offer, although more rarely. Among them are *Botrychium matricariifolium* in the central Stara planina (Stoeva 1991) and *Helichrysum plicatum* in the Osogovska planina (Gusev 1993). In most cases these findings are the result of new floristic studies in rarely visited regions or critical taxonomic studies of special genera. It is probably rare that such species have recently irradiated towards the east, as a result of a shift in their areas.

A further result of recent floristic studies are new locality data for 324 taxa, or 126 species (Kitanov & al. 1983; Češmedžiev 1983; Stanev 1983, 1984, 1987, 1990; Bondev & Ljubenova 1984; Panov 1985; Stefanova-Gateva 1987; Kožuharov & Petrova 1988a; Král 1988; Kuzmanov 1993; Gusev & Kuzmanov 1993). Since 1983, the new chorological information on species and subspecies is being illustrated by means of distribution maps using the UTM grid system (Kožuharov & Popova 1983; D. Dimitrov 1988, 1991; Kožuharov & al. 1988; Baeva 1991).

Following a survey of Bulgarian floristic literature, a list of 214 hybrids – about 6 % of the total number of higher plant species – was produced (Ančev 1984). Most of these hybrids – 174, or 81.3 % – belong to 24 genera, in particular *Salix, Quercus, Rosa, Verbascum,* and *Hieracium.* The above figure does not include some 163 hybrids of *Mentha* reported for the Bulgarian flora at different times (see Harley & Kuzmanov in Velčev 1989: 260-280).

Three species were reconfirmed for the Bulgarian flora that had first been reported by Velenovský (1891, 1898): *Schivereckia doerfleri* (Wettst.) Bornm. (D. Dimitrov 1993), *Linaria arvensis* (L.) Desf. (Delipavlov & Češmedžiev 1984b) and *Centaurea immanuelis-loewii* Degen (Denčev & Kožuharov 1987).

Finally I would like to mention two contributions to the Bryophyte flora of Bulgaria, the only ones during the last decade. They concern the chorology of *Rhodobryum ontariense* (Kindb.) Kindb. (Petrov 1986), and new distributional data for 15 Bryophyte species (Ganeva 1992).

Phytogeographical and floristic studies of local areas

Some studies concern the floristic inventory and its structure, with analyses of phytogeographical relations and florogenesis, of floristically rich biota often included in biosphere reserves or small nature reserves. Examples are the studies of the biosphere reserves Bajuvi dupki-Džindžirica on Mt Pirin (Nikolov 1989), Červenata stena in the western Rhodopes (Nikolov & Nikolov 1984; Andreev & Nikolov 1985), Bistriško branišče on Mt Vitoša (Bondev & al. 1983), and Mt Golo Bărdo (Vasilev & Andreev 1983, 1992).

Investigations on endemic and threatened plants

Endemic species of the Bulgarian flora, the threatened and rare plants, as well as the problems related to their maintenance and protection have been the subject of a number of studies which cannot be covered in the present review. An overview of the results and conclusions from these studies can be found in the Bulgarian Plant Red Data Book (Velčev 1984) and in the Atlas of the endemic plants of Bulgaria (Velčev & al. 1992).

Prospects

Within the next 4-5 years, the *Flora na Narodna Republika Bălgarija* will be completed. The last two volumes – 11 and 12 – will include the families from *Orobanchaceae* to *Compositae*. Preparing and publishing a volume of Corrigenda and Addenda is the final part of this project. Volumes 1 and 2 of the Flora will first be photomechanically reprinted and will later see a second, revised edition.

Work on the *Flora na Narodna Republika Bălgarija*, and also on the *Atlas florae europaeae, Med-Checklist*, the *Mountain flora of Greece*, as well as on updating *Flora europaea*, have stimulated critical taxonomic and biosystematic studies of genera included in the first two volumes of the Bulgarian Flora, especially on the *Poaceae, Cyperaceae*, and *Liliaceae*, have triggered biosystematic and taxonomic revisions in the *Ranunculaceae, Cruciferae, Labiatae*, and studies on the composition, structure and genesis of local floras in the floristically rich regions of Bulgaria.

The project of a "Chorological Atlas" will continue by mapping, as a matter of priority, the threatened and rare plants in Bulgarian flora. Creation of a data base for the Bulgarian flora is under way, which would serve the purposes of taxonomic, biosystematic and phytogeographical studies in Bulgaria.

A project being presently discussed is the preparation of guides to the flora of Stara Planina, Pirin, Rila, and the Rhodopes.

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