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Recent (1994-2004) taxonomic studies on the Bulgarian flora

Abstract

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For the period 1994-2004, despite financial constraints related to the economic and political changes in Bulgaria, some 400 papers dealing with the taxonomy, biosystematics and floristics of the vascular plants of the Bulgarian flora have been published. Taxonomic revisions of different groups, such as *Achillea*, *Cardamine*, *Centaurea*, *Crepis*, *Erysimum*, *Plantago* and *Veronica*, were based on modern biosystematic and allozyme or DNA supported analyses. Many of these studies have been carried out in cooperation with researchers and research teams from other countries, such as Austria, Denmark, Italy, Poland, Slovakia, Sweden, United Kingdom etc. Currently the Bulgarian flora consists of ca. 3900 species, 910 genera and 150 families. In the last decade many species new to science have been described and numerous taxa have been confirmed for the Bulgarian flora or recorded for the first time, e.g. 10 genera (*Acalypha, Ambrosia, Commelina, Cytinus, Duchesnea, Echinocystis, Myricaria, Rochelia, Sicyos, Sisyrinchium*) and two families (*Commelinaceae, Rafflesiaceae*). During the report period the 10th volume of Flora of Republic of Bulgaria has been published, including the taxonomic treatments of 10 families. Many taxa from *Pteridophyta, Asteraceae, Brassicaceae, Campanulaceae, Poaceae* etc. have been studied karyologically.

Introduction

Taxonomic and floristic studies on the Bulgarian flora have already a more than two-century long history. They started with investigations of foreign botanists, among which especially prominent is Czech botanist Josef Velenovský, the author of very first flora of the country, Flora Bulgarica (1891, 1898). Botanical explorations were later continued by enthusiastic Bulgarian botanists as Stefan Georgiev, Ivan Urumov, Bozhimir Davidov, Boris Achtarov, Nikolay Stojanov, Boris Stefanov, Daki Jordanov and many others, who left deep and long-lasting traces in Bulgarian botany.

The main research centres for taxonomic and floristic studies on the Bulgarian flora are: Institute of Botany of the Bulgarian Academy of Sciences, Department of Botany of the Faculty of Biology of Sofia University St. Kliment Ohridski, Department of Botany in the Agrarian University in Plovdiv, Botanical Garden of the Bulgarian Academy of Sciences, National Museum of Natural History of the Bulgarian Academy of Sciences and University of Forestry in Sofia.

For the period 1994-2004 about 400 papers have been published dealing with taxonomic, biosystematic and floristic studies on the Bulgarian flora. They can be divided into: a) studies on selected taxonomic groups for the multi-volume Flora of the Republic of Bulgaria, b) biosystematic studies on different taxonomic groups mainly for dissertations and diploma works, c) inventories of the floristic diversity of protected areas and certain floristic regions in the country, d) informations on the chorology of different taxonomic groups.

Floras, guides, surveys

The 10th volume of the Flora of the Republic of Bulgaria was published (Kožuharov & Kuzmanov 1995). It includes 10 families (*Acanthaceae*, *Scrophulariaceae*, *Globulariaceae*, *Gesneriaceae*, *Orobanchaceae*, *Lentibulariaceae*, *Plantaginaceae*, *Caprifoliaceae*, *Adoxaceae*, *Valerianaceae*), 38 genera and 239 species. Comparing these figures to the fourth edition of Flora of Bulgaria (Stojanov & al. 1966, 1967), there is an addition of 21 species, resulting from the description of new species in *Verbascum*, *Veronica* and *Linaria*, the discovery of species new for the country and the new specific status of 9 taxa.

Two editions of the Conspectus of the Bulgarian vascular flora (Dimitrov 2001, 2002c) have been issued. They provide distribution maps and floristic data for more than 3800 species recorded in the country until 2002.

Very recently, the Key to the Plants of Bulgaria (Delipavlov & Cheshmedzhiev 2003) has been published. It includes keys for the families, genera, species and subspecies of all vascular plants in the country, altogether more than 3800 wild growing as well as 528 of the most widespread introduced and cultivated species. Furthermore, data on the distribution of all species and subspecies in the country is provided.

Biosystematic studies

Several taxonomic groups have been subject of comprehensive biosystematic studies applying a number of modern research methods. The Bulgarian representatives of *Achillea* sect. *Filipendulinae* have been studied (Nedelcheva 1996, 1998). The occurrence of 6 species, 4 varieties and 1 hybrid has been established. It has been found that *Achillea biebersteinii* was erroneously reported for the country. The specific status of the Bulgarian endemic *A. thracica* has been confirmed. Karyological data for the taxa have proven valuable for making taxonomic decisions (Nedelcheva 1995, 1995a). Phytochemical data show heterogeneity and polymorphism among the species with respect to their flavonoid aglycones and confirm their significance as ecological markers for habitats and levels of xerophytisation (Ivancheva & Nedelcheva 1995). Recent biosystematic studies of all Bulgarian taxa of *Achillea* were carried out by Saukel & al. (2003), based on karyological data, phytochemical and DNA analyses. The total of 19 species are reported for the flora of the country, one of them, *A. asplenifolia*, for the first time. The importance of hybridization even between phylogenetically distant species is documented by analysis of a hybrid swarm. A general survey on the basis of *nr*DNA and *cp*DNA sequences demonstrates that *Achillea* is a monophyletic genus.

Centaurea s. l. is one of the most diverse genera of the *Compositae* in Bulgaria. Two sections - *Cyanus* (now genus *Cyanus*) and *Lepteranthus* (*Centaurea* subg. *Jaceae*) have been studied by Sharkova-Bancheva (1999) based on comparative morphological, karyological and pollen-morphological data. It has been established that 16 species (8 in each section) occur in Bulgaria. *Centaurea pichleri* has been reported as new for the country (Bancheva & Denchev 2000), whereas the occurence of *C. phrygia* has not been confirmed. Karyological data shows that two basic chromosome numbers occur in sect. *Cyanus*, but only one ($x = 11$) in sect. *Lepteranthus*. Most of the species are diploid and only a few tetraploid (Bancheva 1998, 1999; Sharkova 1996; Sharkova & Peev 1997). These studies are now expanded to other sections of the genus. A taxonomic revision has been carried out for 7 species of sect. *Napulifera* (genus *Cyanus*) distributed in Bulgaria and the Balkan peninsula (Bancheva & Raimondo 2003) based on comparative morphology, pollen morphology (SEM data) and karyology. Two basic chromosome numbers have been established for the section: $x = 11$ for *C. pseudoaxilaris* and $x = 10$ for the other species. Data of pollen morphology support the specific status of *C. pseudoaxilaris* and *C. tuberosus*. New nomenclatorial combinations are proposed. *C. tuberosus* is reported for the first time for Greece.

A set of analytical techniques, haematoxylin staining, Giemsa-C-banding, Feulgen cytophotometry with scanning densitometry and video-based image analysis as well as propidium iodide (PI) flow cytometry, have been applied to a number of populations of the genus *Crepis* (Dimitrova & al. 1999; Dimitrova & Greilhuber 2000, 2001) together with 'classical' comparative morphological and karyological methods. Dimitrova & Greilhuber (2000) found a positive correlation between C-value and karyotype asymmetry, and concluded that evolutionary advancement in the Bulgarian *Crepis* species is correlated with lower chromosome numbers, lower C-values and higher chromosome symmetry.

Biosystematic studies in *Campanula* by Ančev (1994) have revealed dysploidy and relic or sometimes recent intra- and interspecific hybridization followed by the formation of polyploids as the main evolutionary patterns in the genus. The author based his conclusions on comparative morphological, chorological, karyological and pollen-morphological data and on informations concerning reproductive biology.

Extensive studies have been carried out in *Brassicaceae* by Ančev and collaborators. Four new species have been described: three in *Erysimum* (Ančev & Polatschek 1998) and one in *Alyssum* (Ančev & Uzunov 2002). Furthermore, Anchev (1997) discusses speciation patterns in the family and provides taxonomic notes on *Erysimum* (Anchev 1995) as well as trichome morphology, their diversity and evolutionary trends within *Alyssum* (Ančev 2000).

Data on relationships and evolutionary mechanisms within *Astragalus* subgenus *Cercidothrix* were reported by Pavlova (2003).

Karyological studies

More than 600 species of different families have been studied karyologically in order to obtain chromosome numbers and characterize karyotypes. The results have been published in more than 60 papers (Pavlova & Tosheva 2001, 2002, 2003, 2004; Petrova &

Stanimirova 2001, 2002, 2003; Vladimirov & Szeląg 2001, 2001a; Anchev & Goranova 2002, 2003; Pavlova & al. 2002b; Ivanova 2003; Stoyanova 2003; Tosheva 2003; for the period 1990-2000 see Petrova 1996, 2002). These studies were concentrated mainly on groups of current taxonomic interest such as *Asteraceae* (*Centaurea*, *Cichorioideae*), *Boraginaceae*, *Brassicaceae*, *Campanulaceae*, *Caryophyllaceae*, *Cyperaceae*, *Fabaceae*, *Lamiaceae*, *Liliaceae*, *Poaceae*, etc.

Chemotaxonomic studies

Several groups of chemical compounds, iridoids, flavonoids, terpenoids, have been used as taxonomic markers in order to interpret the evolutionary relationships between different taxonomic groups. *Veronica* and *Plantago* were studied by Taskova & al. (1997, 1997a, 1998, 2002, 2002a, 2002b) and Taskova (1999) with respect to the quantitative and qualitative occurrence of iridoid glucosides in species of the two genera. The results confirm the phylogenetic relationships between the two genera. Treatment of *Veronica* sect. *Pseudolysimachion* as a separate genus is well supported, whereas the generic treatment of *Plantago* subg. *Psyllium* is refuted.

The analysis of the content of iridoids, flavonoids and terpenoids has been carried out in *Lamiaceae* and other families (Taskova & al. 1997b). Chemotaxonomic studies on flavonoids were done in *Euphorbia* (Ivancheva & al. 1997), *Achillea* (Ivancheva & Stancheva 1996, 1996a) and *Geranium* (Ivancheva & Petrova 2000), on steroidal sapogenins in *Asparagus* and *Ruscus* (Nikolov & Gussev 1997) and on alkaloids in *Genista* (Christov & Evstatieva 2001).

Molecular studies

Isozyme polyacrylamide gel electrophoresis has been applied to several representatives of the tribes *Poeae* and *Triticeae* of the *Poaceae* in order to address different taxonomic problems. Within tribe *Poeae* the results support recognition of subtribe *Sclerochloinae* (Angelov 1999, 2000). Studies in *Festuca* reveal that the Balkan endemics *F. hercegovinica*, *F. oviniformis*, *F. hirtovaginata* and *F. thracica* are well differentiated "narrow" species which exhibit high levels of "hidden" infraspecific genetic variation (Angelov 1998, 2002, 2002a, 2003). Electrophoretic data support the taxonomic distinctness of subsect. *Festuca* and subsect. *Saxatiles* (Angelov 1998) as a mesomorphic and a xeromorphic group, respectively, as was already suggested by Kožuharov (1982). Within *Elymus* s. l. isozyme data reveal that *Elytrigia*, *Psammopyrum* and *Trichopyrum* are better lumped within a "broad" genus *Elymus*, whereas *Agropyron* should be considered as a separate genus (Angelov 2001a, 2003b); *Elymus varnense* is shown to be a well differentiated species (Angelov 2001). The taxonomic position of *Dasypyrum* and *Peridictyon* is not yet well resolved within the tribe *Triticeae* (Angelov 2002b, 2003c, 2003d, 2003e). Nevertheless, *Peridictyon* should be treated as a separate genus (Angelov 2000a, 2003a).

Certain relationships within *Veronica* previously suggested on the basis of morphological and karyological characters are now supported by a combination of molecular and chemical data (Taskova & al. 2004).

Embryological and anatomical studies

Embryological studies provide taxonomically useful data, especially in apomictic groups. Extensive relevant investigations were carried out, mainly in the BAS Institute of Botany, on the following *Compositae* genera: *Achillea*, *Artemisia*, *Cicerbita*, *Crepis*, *Lapsana*, *Leontodon*, *Sonchus*, *Tanacetum*, *Xanthium*, etc. (Jurukova-Grancharova 1994, 2000; Jurukova-Grančarova 1997; Yurukova- Grancharova 2004; Robeva & Yurukova-Grancharova 1995, 2001; Robeva & al. 1995; Terziiski & al. 1995, 1996, 1997, 1998; Jurukova-Grancharova & al. 2001; Yurukova-Grancharova & al 2002; Yurukova-Grancharova & Baldjiev 2003), on *Apiaceae* (Yankova & Robeva 2003), *Lamiaceae* (Yurukova-Grancharova & Daskalova 1995, 2002; Daskalova 2002, 2004a, 2004b; Daskalova & Yurukova-Grancharova 1996), *Thalictrum* (Daskalova 1997, 2000, 2004), *Gentiana* (Bicheva & al. 2004), and on *Iberis* (Yurukova-Grancharova & al. 2004). These studies concern the pecularities of micro- and macrosporogenesis, male and female gametophytes as well as embryosac types. Relevant data are very useful for revealing the mode of reproduction, particularly important in rare, endangered and endemic taxa.

The ultrastructural differentiation of the foliar epidermis, cuticles, stomata and indumentum of most of the extant as well as fossil Euro-Mediterranean (incl. Bulgarian) taxa of *Fagaceae* was studied by Uzunova & al. (1997). The authors outline the main evolutionary trends in the family. Similar analyses of the leaf epidermis in Bulgarian taxa of *Origanum* have also provided taxonomically useful data (Uzunova & Stoyanova 2003). An anatomical study of the fruits of two *Angelica* species has been carried out by Yankova (2004).

Terziiski & Cheshmedzhiev (1994) and Češmedžiev & Terzijski (1997) have analysed the ultrastructural organisation of the seed surface in some species of *Allium*, *Nectaroscordum*, etc.

Palynological studies

The characteristics of the pollen and spores have been studied in a number of groups. Most of the investigations have been carried out with electron microscope techniques to make even small differences between the taxa better visible.

An atlas with morphological descriptions and illustrations of the spores of extant pteridophytes native to Bulgaria was prepared by Ivanova & al. (2003). Its main objective is to facilitate taxonomic and paleopalynological studies.

SEM studies on fossil and recent macro- and microspores have shown that the only representative of *Isoetes* in Bulgaria is *I. lacustris* (Stefanova & Ivanova 2000).

For taxonomic purposes palynological studies have been carried out in *Achillea* (Nedelcheva 1998), *Amaryllidaceae* (Borisova & Slavomirova 1994), *Astracantha* (Pavlova & Berge 1995), *Astragalus* (Pavlova & al. 1994, 1995), *Brassicaceae* (Anchev & Deneva 1997), *Centaurea* (Sharkova-Bancheva 1999), *Gentiana* (Kožuharova & al. 1995; Kožuharova & Božilova 2001), *Oxytropis* (Pavlova & Berge 1997) and *Tamus* (Slavomirova 1999).

Population studies

Statistical population studies have been performed in *Carex* (Stoeva & Popova 1995; Stoeva & al. 2002), *Saxifraga* (Peev & Delcheva 1995; Delcheva & Peev 1997, 2002, 2002a; Delcheva 2000), *Dianthus microlepis* (Peev & al. 1995) and *Dactylis glomerata* (Peev & al. 1996). Peev (2002) has summarized his long-lasting studies on the morphometric variability of significant characters in clones and populations of different taxonomic groups in relation to different elevations and habitats.

Floristic and chorological studies

A significant proportion of the studies on the Bulgarian flora have been devoted to floristics and chorology. Comprehensive investigations of the central part of the Danube plain were done by Tzonev (2002) that document 1272 species and subspecies from 113 families of vascular plants. Furthermore, Tzonev (2000, 2002) gives new chorological data for 58 Bulgarian taxa. A new alien species for the whole Balkan peninsula is *Cyperus strigosus* (Tzonev & al. 2003).

Comprehensive studies have been carried out on the floristic diversity of protected areas, the Central Balkan National Park, the Rila National Park (Evstatieva & Hardalova 2000; Gussev & al. 2000; Meshinev & al. 2000; Peev & al. 2000) and several other reserves. Gussev & al. (1997) present a detailed analysis of the flora of the Vitanovo Reserve in Strandža Mt. highlighting the remarkable conservation value of the area. A total of 642 species of vascular plants has been documented, 26 of which are Tertiary relics, 9 are Balkan endemics and 23 have a conservation status.

The flora, vegetation and phytogeographic relationships of the Uzunbudžak Biosphere Reserve, within the Strandža Nature Park have been studied by Gussev & al. (2004). The authors provide data about the considerable diversity of floristic elements (37), preglacial relics (52), Bulgarian and Balkan endemics (24) and taxa of concern for conservation (63).

Numerous other protected areas have been investigated: Dzhendema Reserve within the Central Balkan National Park (Vassileva & al. 2003), Dupkata and Likana in the Eastern Rhodopes (Petrova & al. 2001), Aldomirovsko Blato marsh (Apostolova & al. 2001), Dolna Topčija and Ostrica (Pavlov & Dimitrov 2001, 2002) as well as Vălči Dol in the eastern Rhodopes, Pobiti Kamăni in East Bulgaria, the Marica part of the Central Rila Reserve, the Bjala Krava Reserve in Stara Planina, the Kaliakra Reserve and the Maričini Ezera (see Petrova 2002).

Meshinev & al. (1994) report 208 naturally occuring species for the sand dunes in the region of the summer resort Slunčev Briag (Sunny Beach). Of these species 33 % exhibit secondary expansion, and a few invasive species also have become established. Such studies can be very important for tracing the changes in the distribution of anthropophytes if repeated regularly.

The distribution of vascular plants in Bulgaria relative to floristic regions and habitat diversity is discussed by Meshinev & Apostolova (1998). Velchev (1998) considers the floristic diversity of limestone areas and Pavlova & al. (1997, 2002a, 2003, 2004) on serpentines.

A large part of relevant publications is devoted to floristic surveys of different parts of the country and contains new chorological informations. This is very important for documenting the present distribution of taxa in the country and tracing the changes and dynamics of the flora (Delipavlov & Cheshmedzhiev 1997; Delipavlov 1998; Dimitrov & Pavlova 2000, 2002; Tzonev 2000, 2002; Dimitrov & Tzonev 2001, 2002; Dimitrov & al. 2001, 2003; Kožuharov & al. 2001, 2002; Nyagolov & al. 2002; Pavlova & Nedelcheva 2001; Petrova & al. 2002, 2002a, 2003, 2003a, 2004; Bancheva & al. 2002, 2002a, 2002b, 2004; Dimitrov 2002, 2002a, 2002b, 2002c; Gussev & al., 2002, 2004; Kostadinova & Dimitrov 2002; Milanova & Gussev 2002; Sopotlieva & Petrova, 2002; Uzunov & al. 2002; Zieliński & al. 2002; Dimitrov & Assyov 2003; Dimitrov & Sidjimova 2003; Gerasimova & Petrova 2003; Gerasimova & al. 2003; Petrova 2003, 2004, 2004a, 2004b; Tashev 2003, 2003a; Uzunov & Gussev 2003; Vladimirov 2003; Dimitrov & Stoyanov 2003; Ivanova 2003a, 2004; Assyov & Vassilev 2004; Bancheva & Delcheva 2004; Bergman & al. 2004; Dimitrov & Vutov 2004; Nyagolov 2004; Stoyanov 2004; for the period until 2000 see Petrova 2002).

A number of foreign botanists has contributed to the Bulgarian flora: from the Czech Republic: J. Štěpánková, J. Kirschner, J. Štěpánek, P. Tomšovic, K. Sutory, Z. Kaplan (Štěpánková 1994; Kirschner & Štěpánek 1998; Ančev & Tomšovic 1999; Sutory 2000; Kirschner & Kaplan 2001; Šumberová & al. 2004; Tzonev & Šumberová); from Slovakia; K. Marhold (Marhold & al. 1996; Marhold & Ančev 1999); from Austria: D. Albach, M. Fischer, J. Greilhuber, A. Polatschek (Fischer & Peev 1995; Ančev & Polatschek 1998, 2003; Dimitrova & Greilhuber 2000, 2001; Albach & Vladimirov 2002); from Denmark: Kit Tan (Tan & Vladimirov 2001) and from Poland: Z. Szeląg, J. Zielinski (Vladimirov & Szeląg 2001, 2001a; Zielinski & al. 2002). In this context one should also mention the contribution of Bulgarian botanists to floras of other countries: Pavlova & Kožuharov (1995), Dimitrov (1998) and Ivanova & Piękos-Mirkowa (2003).

As a result of all the studies on the flora of Bulgaria new reports on the distribution of more than 450 taxa have been available. Two families (*Commelinaceae*, *Rafflesiaceae*), 10 genera (*Acalypha*, *Ambrosia*, *Commelina*, *Cytinus*, *Duchesnea*, *Echinocystis*, *Myricaria*, *Rochelia*, *Sicyos* and *Sisyrinchium*) and 70 species have been recorded for the first time in the country. Fifteen taxa for the Bulgarian flora have been re-confirmed or re-discovered. All this improves the national information status significantly.

The taxonomic studies on different groups have led to the description of 30 new taxa (Tab. 1) and to proposals of new combinations or status (Pavlova & Kozhuharov 1994; Delipavlov & Cheshmedzhiev 1997).

General comments on taxonomic studies in the period 1994-2004 and future challenges

The beginning of the period considered coincides with the early years of the political, economic and social changes in the country which have influenced the development of plant taxonomic studies. Financial constraints have been the major difficulty for such research activities. In most of the botanical centers the research facilities are out-of-date, the access to modern literature is very expensive and therefore limited, and the research

Table 1. List of newly described species.

No	Species	Region	Publication
1	*Alyssum orbelicum* Ančev & Uzunov	Pirin Mts	Anchev, M. & Uzunov, D. 2002: Phytol. Balcan. 8(1): 26.
2	*Bromus parilicus* Petrova, Kozuharov & Ehrend.	Slavjanka Mt.	Petrova, A., Kozhuharov, S. & Ehrendorfer, F. 1997: Bocconea 5(2): 775.
3	*Cnicus bulgaricus* Panov	Belasica Mt.	Panov, P. 1996: Fitologiya 48: 9
4	*Epipactis spiridonovii* Devillers-Tersch. & Devillers	Pirin Mts	Devillers, P. & Devillers-Terschuren, J. 1996: Nat. Belg. 76(3): 87.
5	*Erysimum pirinicum* Ančev & Polatschek	Rila Mts	Ančev, M. & Polatschek, A. 1998: Ann. Natürhist. Mus. Wien 100B: 733.
6	*E. pseudoatticum* Ančev & Polatschek	Pirin Mts	Ančev, M. & Polatschek, A. 1998: Ann. Natürhist. Mus. Wien 100B: 726.
7	*E. slavjankae* Ančev & Polatschek	Slavjanka Mt.	Ančev, M. & Polatschek, A. 1998: Ann. Natürhist. Mus. Wien 100B: 729.
8	*Festuca achtarovii* Velchev & Vassilev	Mesta r. valley	Velchev, V. & Vassilev, P. 2002: Phytol. Balcan. 8(2): 185.
9	*F. calcarea* Velchev ex Denchev	Vračanska Mt.	Velchev, V. 2001: Phytol. Balcan. 8(1): 11; Denchev, C. 2004: Willdenowia 34: 78.
10	*F. maleschevica* Velchev & Vassilev	Maleševska Mt.	Velchev, V. & Vassilev, P. 2002: Phytol. Balcan. 8(2): 187.
11	*F. staroplaninica* Velchev	C Balkan Mt.	Velchev, V. 2001: Phytol. Balcan. 8(1): 5.
12	*F. vandovii* Velchev ex Denchev	Mesta r. valley	Velchev, V. 2001: Phytol. Balcan. 8(1): 9; Denchev, C. 2004: Willdenowia 34: 78.
13	*Hieracium ancevii* Szelag	Pirin Mts	Szelag, Z. 2001: Feddes Repert. Spec. 112(1-2): 12.
14	*H. kittanae* Vladimirov	C Rhodopi Mts	Vladimirov, V. 2003: Bot. J. Linn. Soc. 143: 214.
15	*Minuartia intermedia* Panov	Black Sea	Panov, P. 1996: Fitologiya 48: 5
16	*M. janevii* Panov	Struma r.	Panov, P. 1996: Fitologiya 48: 6.
17	*M. strandjensis* Panov	Strandža Mt.	Panov, P. 1996: Fitologiya 48: 7.
18	*Oenothera bulgarica* Delip.	Rila Mts	Delipavlov, D. 1998: Thaiszia J. Bot. 8:
19	*Oxytropis kozhuharovii* D. Pavlova, D. Dimitrov & M. Nikolova	Pirin Mts	Pavlova, D., Dimitrov, D. & Nikolova, M. 1999: Willdenowia 29: 69.
20	*Parietaria eronea* Panov	Danube Plain	Panov, P. 1996: Fitologiya 48: 4.
21	*P. rhodopaea* Panov	C Rhodopi Mts	Panov, P. 1996: Fitologiya 48: 3.
22	*Taraxacum ambitiosum* Kirshner & Štěpánek	Vitoša Mt.	Kirshner, J. & Štěpánek, J. 1998: A Monograph of *Taraxacum* Sect. *Palustria*: 176.
23	*Taraxacum lentum* Kirshner & Štěpánek	Lozenska Mt.	Kirshner, J. & Štěpánek, J. 1998: op. c. 216.
24	*T. melancholicum* Kirshner & Štěpánek	C Rhodopi Mts	Kirshner, J. & Štěpánek, J. 1998: op. c. 172.
25	*T. obuncum* Kirshner & Štěpánek	Lyulin Mt.	Kirshner, J. & Štěpánek, J. 1998: op. c. 165.
26	*T. strictum* Kirshner & Štěpánek	Lozenska Mt.	Kirshner, J. & Štěpánek, J. 1998: op. c.154.
27	*T. subudum* Kirshner & Štěpánek	Lozenska Mt.	Kirshner, J. & Štěpánek, J. 1998: op. c. 225.
28	*T. suspectum* Kirshner & Štěpánek	Vitoša Mt.	Kirshner, J. & Štěpánek, J. 1998: op. c. 162.
29	*Thymelaea bulgarica* Cheshm.	C Balkan Mt.	Cheshmedziev, I. 1997: Bocconea 5(2):
30	*Vicia jordanovii* Velchev	C Balkan Mt.	Velchev, V. 2001: Phytol. Balcan. 8(1): 3.

infrastructure is not sufficiently developed. Moreover, plant taxonomy has not been among the research priorities in the country and this has lead to a decrease of interest among students in taxonomy and general botany. Competition and the pressure for fast careers have lead to early specialization of young scientists and a lack of broader training necessary for the development of good taxonomists. At the same time some very positive trends have become effective, such as the increased mobility of scientists across Europe and the establishment of international research projects.

Many new challenges have to be faced by contemporary taxonomists, especially in a country in transition. There is a strong demand for re-considering the utility of plant taxonomy. Plant systematics should become more useful to a wider range of end-users. Practically, this means i.a. that reliable species inventories for territories of interest should be provided quickly and in a user-friendly way. Links with efforts to conserve biodiversity should be strengthened in order to respond to the political demands of the Convention on Biological Diversity and other biodiversity related documents and initiatives. The dialogue with other scientific disciplines should be re-vitalized and multi-disciplinary training of young researchers should be improved.

Plant taxonomy may be difficult and expensive in Bulgaria nowadays, but it is in no way old-fashioned, boring or even useless. On the contrary, for all those who are fascinated and inspired by the diversity of plant life, it is a very challenging, motivating and exciting field of work and hobby.

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