Botanica SERBICA 35 (2): (2011) 163-178

Survey

University of Belgrade Herbarium – treasury of data and challenges for future research

On the occasion of the 150th anniversary of University of Belgrade Herbarium (1860-2010)

Snežana Vukojičić*, Dmitar Lakušić, Slobodan Jovanović, Petar D. Marin, Gordana Tomović, Marko Sabovljević, Jasmina Šinžar-Sekulić, Milan Veljić, Mirko Cvijan, Jelena Blaženčić and Vladimir Stevanović

Institute of Botany and Botanical Garden, Faculty of Biology, University of Belgrade, Takovska 43, 11000 Belgrade, Serbia

UDK 58.082.5

The Herbarium of the University of Belgrade, as a special unit of the Institute of Botany and Botanical Garden "Jevremovac" of the Faculty of Biology, is one of the most significant and the richest herbarium collections not only in Serbia but in the whole of SE Europe.

The Herbarium was established in 1860 when a famous Serbian botanist Josif Pančić gave his collection (80 bunches of dried plants from Banat and Srem) to the "Great School" in Belgrade, currently University of Belgrade. After Pančić, who established the Herbarium, Ž. Jurišić, Đ. Ilić, Đ. Ničić, S. Pelivanović, N. Košanin, Th. Soška, L. Adamović, V. Blečić, I. Rudski, P. Černjavski, B. Tatić, M.M. Janković, V. Stevanović, J. Blaženčić, M. Niketić and many other botanists from that time until today have contributed to its enrichment.

During its 150 year-long history, the fate of the Herbarium University of Belgrade had at times been very uncertain, and in some periods completely unclear. Namely, it is known that shortly before Pančić's death in 1888 this herbarium collection was stored in the Botanical Cabinet of the Great School in Belgrade. The collection was then under the care of Ž. Jurišić, Pančić's student and follower. Ten years after Pančić's death, herbarium bunches were transferred from The Great School to the Botanical Garden "Jevremovac", where the Herbarium is housed today (Fig. 1). J. Bornmuller (1887-1889) and O. Bierbach (1890-1903) also worked together with Jurišić on the maintenance and enrichment of the Herbarium. Between 1902 and 1906, the head of the Herbarium was professor L. Adamović. There is some written evidence for this period of Herbarium management revealing that Adamović was charged with handing over herbarium specimens to Herbariums in Vienna, Pest, Berlin, and even to some private owners.

Fig. 1. Building in which the Herbarium is housed

*correspondence: sneza@bio.bg.ac.rs

© 2011 Institute of Botany and Botanical Garden Jevremovac, Belgrade

When professor N. Košanin became the director of the Botanical Garden in 1906, the work on enrichment and maintenance of the herbarium collections started again. A new extension to the administration building was turned into the Herbarium rooms, equipped with adequate conditions for preserving the collections. Košanin had been travelling and collecting plant material intensively, restocking Pančić's collection which was impoverished by the previous manager. Since 1914, Košanin and his companion T. Soška, a gardener of the Botanical Garden and a great floristic expert, collected rich plant material during their field surveys, mainly from Macedonia.

During the First World War, the Herbarium was shelled. At the order of the civil governor of Serbia in 1916 K. Maly, the curator of the Herbarium in Sarajevo, who as a sergeant at that time was in Belgrade, sent four collections each consisting of 500 to 1000 specimens of herbarized plants to the Institute of Botany and Botanical Garden of the University in Vienna, Natural History Museum in Budapest, Zemaljski muzej now National Museum in Sarajevo and Botanical Institute in Zagreb.

After the war, thanks to the intense engagement of professor Nedeljko Košanin and the Directorate of Spoils of the Kingdom of Serbs, Croats and Slovenes, collections from Vienna, Sarajevo and Zagreb were returned. In 1920, as revealed by available records which are kept on file at the Institute of Botany in Belgrade, professor R. Wettstein himself, the then director of the Institute of Botany of the University in Vienna, prepared and sent to Belgrade one series of plants that had reached Vienna from Belgrade during the war. In addition, to compensate for those specimens that could not be returned, professor Wettstein sent an additional collection consisting of 550 plants. According to data from the file, in 1919 K. Maly also sent a collection of 3390 plants to Belgrade. Among them there were 1241 plants that were transferred from Belgrade to Sarajevo during the war, as well as another 2149 plants that had been collected mainly from the western Balkans, beyond the territory of Serbia. Furthermore, according to the available information, professor V. Vouk, the then director of the Botanical Institute in Zagreb, returned to Belgrade most of the plants (about 600 specimens) that during the war had been transferred to Zagreb.

Only the fate of herbarium material that had been transferred to Budapest has still not been clarified. In correspondence between the Directorate of Spoils of the Kingdom of Serbs, Croats and Slovenes and the Natural History Museum in Budapest there is a document dated April 7th, 1920 in which T. Filarsky, the then director of the Botanical Department of the Natural History Museum in Budapest, admits that in 1916 he has received a collection of 987 species that had been sent from the Belgrade Botanical Garden. In the same letter Filarsky obligated that the Botanical Department of the Museum in Budapest would make an appropriate plant collection that he would return to Belgrade. At the end of that year, N. Košanin, in his report about the state and needs of the Botanical Garden and Institute of Belgrade University, which he sent to the minister of education on October 16th 1920, included a statement that herbarium collections that were transferred to Vienna and Sarajevo had been returned, and that he expects that those that were transferred to Zagreb and Budapest would soon be returned. The collection from Zagreb was returned, whereas no tracks about the collection from Budapest can be found.

Furthermore, in his book "The Hundredth Anniversary of the Botanical Garden Jevremovac", professor B. Tatić, a long-standing head of the Institute of Botany and Botanical Garden of Belgrade University, explicitly stated that only the herbarium collection from Budapest had not been returned (Tatić 1996).

During the period from Košanin's death (1934) to Soška's (1948) the herbarium was completely uncared-for and neglected. Not only was no new material brought in, but no care was paid to the preservation of the collection. The situation changed in the 1970s following the appointment of V. Stevanović, who restarted handling, sorting, classifying, treating, and refilling the existing herbarium collection. At his initiative, in 1991 S. Vukojičić was elected the new curator of the Herbarium. She has been taking care of the preservation of existing collections, as well as adding to them and exchanging herbarium material with related institutions in Europe and worldwide.

Today, 150 years after its establishment, the Belgrade University Herbarium is registered under code BEOU in the world centre in New York (Holmgren *et al.* 1990) and contains over 180000 specimens of vascular plants, mosses and algae.

Herbarium BEOU is organized into the following collections:

Herbarium Pancicianum which, from historical, cultural and scientific points of view, is the most significant collection of plants that was collected in the 19th century by Josif Pančić.

Herbarium Generale**,** the richest plant collection gathered not only in the Balkan Peninsula, but throughout the whole world; most of the herbarium material derives from the 19th and the first half of the 20th century.

More recent collections (the second half of the 20th century until the present time):

Collection of the Department for Plant Ecology and Geography

Collection of the Department for Plant Morphology and Systematics

Collections of bryophytes

Wet collection of the Department for Algology, Mycology and Lichenology

Specimens of some genera that have been the subject of almost continual taxonomic and chorologic studies since the mid 19th century are good indicators of more recent enrichment of the BEOU collection. Thus, using data from analyses of the collection of the genus *Campanula* L., which numbers 2130 specimens collected or exchanged in Serbia and other Balkan and European countries in the period from 1860 to 2010, and which integrates collections of *Herbarium Pancicianum*, *Herbarium Generale* and *Collection of the Department of Plant Ecology and Geography*, Gudelj (2007) established that more than 200 legators have participated in the formation of the Belgrade University Herbarium. The greatest number of exsiccates integrated in this collection were gathered by V. Stevanović, D. Lakušić, J. Pančić, S. Jovanović, N. Košanin, M. Niketić, Th. Soška, G. Tomović, I. Rudski, M. M. Janković, J. Hruby, S. Vukojičić, J. Petrović, L. Rajevski, G. Džukić, in the order indicated.

Chronology of establishing the collection of genus *Campanula* in BEOU mostly parallels the historical development of floristic investigations in Serbia (Fig. 2). Therefore, the whole period might be divided into three prosperous periods, distinguished by J. Pančić and collaborators (1870-1890), N. Košanin and Th. Soška (1920-1930) and V. Stevanović and his collaborators (1990-2010). Three additional periods of decline are clearly distinct. The first relates to the period before the Balkan Wars and the First World War (1890-1910), the second to the period before the Second World War (1930-1940), and the third to the general decline in activities regarding work in the Herbarium after the II World War (1950-1970).

In geographical respect, most of the collection (72%) is made up of plants gathered in the territory of Serbia (45%), Montenegro (18%) and Macedonia (9%). A considerable number of exemplars originate from Greece (3%), Croatia (3%) and Bulgaria (2%), and quite a number of specimens derive from Italy and Spain. Interestingly, 8% of plants in the collection do not have a precisely established geographical origin.

Because of its botanical significance, i.e. its complex, unsolved taxonomy in the Balkan Peninsula, which results from intra-specific variability, as well as insufficiently clarified chorology, species of the genus *Campanula* have often been collected by botanists. Moreover, because of the attractiveness of this genus, its plants have been picked by collectors and amateurs. Accordingly, the number of exsiccates of this genus taxa is very high and generally illustrates the mode of formation of the whole collection of the Belgrade University Herbarium.

Herbarium Pancicianum

S. Vukojičić, D. Lakušić, V. Stevanović

The most important historical, cultural and scientific collection in the Herbarium of Belgrade University is "Pančić's Herbarium" - ***Herbarium Pancicianum.*** This is a collection containing plants which Pančić himself collected during his botanical surveys in the 19th century

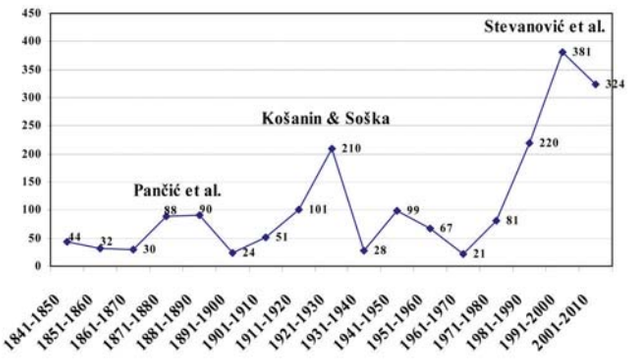

Fig. 2. Chronological overview of the establishment of the genus *Campanula* L. collection in BEOU

Fig. 3. *Herbarium Pancicianum*

from throughout Serbia, Srem, Banat, Montenegro, Bulgaria and Hungary as well as during his travels through Italy, France and Austria.

During his 42-year study Pančić dedicated much attention to collecting plants and to enriching his herbarium collection. What its value was and how much it meant to Pančić, one can learn from the letter sent by him to the Ministry of Education in 1860:

"However, the main result of my 25-year efforts is a great collection of 6000 different plant species- three fourths of the entire European flora - ? together with duplicates of more than 20000 specimens which I picked during my travels or got through exchange from Germany, Italy, France, Spain, Greece and southern Russia .... Ever since this collection has been established I dedicated it to the Serbian people and I will cede it to the Serbian Lycée as soon as the Government meets my requirements and refunds to me at least in part my costs. If an average value is assumed for my herbarium, it is worth about 5000 francs. Given that this sum is not proportional to my efforts and expenses, and since I consider the supplementing of this collection - which is one of the achievements of my better years- to be my main life task, I will not part with it as long as I live..."

Herbarium Pancicianum is not only a collection of the greatest scientific value, but also an extraordinary cultural legacy, and therefore is under a special regime of treatment. Owing to its historical significance, the specimens from this collection may be studied only at the premises of the Herbarium of the Institute of Botany and Botanical Garden "Jevremovac". In addition to opportunities offered for working in Pančić's Herbarium and visits to the Herbarium, electronic images may also be exchanged through the Internet. This collection, currently housed as a separate entity, contains 15377 herbarium specimens (743 genera), which are stored in 176 herbarium boxes (Fig. 3) (http//pancic.bio.bg.ac.rs). From the total herbarium material, 13715 exsiccates (89%) were determined to the species level and intra-specific categories, and exsiccates from 1662 herbarium sheets (11%) were determined to the genus level.

Plants from this collection were collected mostly in Serbia (11404 herbarium specimens). Collections from Montenegro (1014), Romania (865), Hungary (577) and Bulgaria (476) also contain a considerable number of exsiccates. The remaining material that Pančić mainly acquired through exchange or gathered himself during his short stays in European countries relate to plants from Austria, Czechoslovakia, France, Greece, Italy, Germany and Switzerland (Fig. 4).

It is important to point out that BEOU Herbarium predominantly contains plant material that Pančić collected in the period from 1842-1886 from Serbia, Montenegro and Bulgaria. This is unavoidable basics for

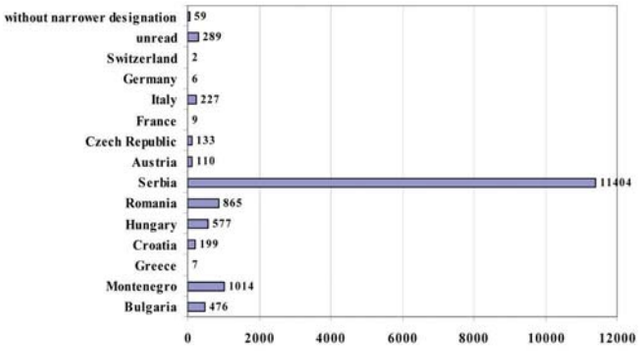

Fig. 4. Number of collected specimens, listed by countries, in Josif Pančić's collection in BEOU

"Flora" of these Balkan countries (Pančić 1874, 1875, 1883, 1884, 1886).

The greatest value of Pančić's herbarium is plants that Pančić described, either himself or in collaboration with either R. Visiani or S. Petrović, as taxa new to science. Undoubtedly, the *Herbarium Pancicianum* collection contains specimens for 91 taxa that Pančić described as new to science. It is certain that of these 91 taxa 47 are today considered valid species (e.g. *Allium melanantherum* Pančić 1883, *Campanula secundiflora* Vis. et Pančić 1862, *Eryngium serbicum* Pančić 1856, *Geum bulgaricum* Pančić 1883, *Ramonda nathaliae* Pančić et Petrović 1882, *Ramonda serbica* Pančić 1874 (Fig. 5), *Tragopogon pterodes* Pančić 1882 ap. Petrović etc.), 11 have a low taxonomic rank in respect to species and 33 are synonyms of previously described species. The preserved Pančić collection is of great significance given that it serves as an inevitable basis for current taxonomical research, which will probably lead to re-affirmation of taxonomical status of many of Pančić's disregarded plants. Such has been the case recently with the taxa *Linaria rubioides* Vis. et Pančić 1865 and *Cardamine kopaonikensis* Pančić 1867 (Niketić & Tomović 2008, Lakušić *et al.* 2005). Current results from research on the taxa *Semperivium kopaonikense* Pančić 1874 and *Viola kopaonikensis* Pančić ap. Hay. 1927 (Lakušić *et al* 2006, Tomović *et al.* 2006) also strongly support the possibility that these two of Pančić's disregarded taxa will be assigned an adequate taxonomic status.

Unfortunately, until now preserved specimens of the following plant taxa have not been found in Pančić's herbarium: *Barbarea balcana* Pančić 1888, *Hieracium naegelianum* Pančić 1875, *Sempervivum leucanthum* Pančić 1883, *Thlaspi avalanum* Pančić 1865, *Hieracium schultzianum* Pančić et Vis. 1869, *Cardamine serbica* Pančić 1884, *Lavatera muricata* Pančić 1856, *Saxifraga thyrsiflora* Pančić 1884, *Eryngium digitatum* Pančić ap. Pančić 1856, *Genista macropteris* Pančić 1871, *Hieracium micranthum* Pančić 1856, *Iris serbica* Pančić 1856, *Oenanthe meoides*

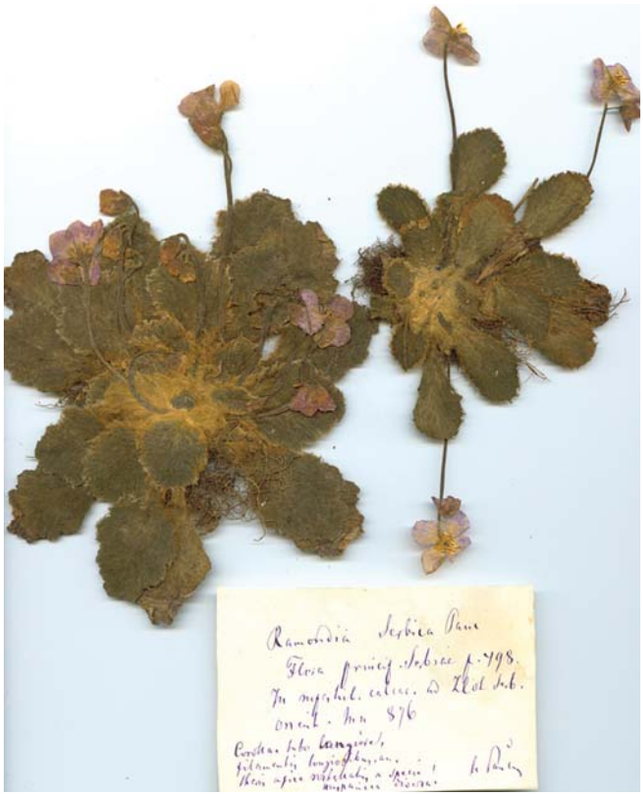

Fig. 5. Herbarium specimen of *Ramonda serbica* Pančić

Fig. 6. Herbarium specimen of *Althaea kragujevacensis* Pančić

Pančić 1883, *Scabiosa fumariaefolia* (Vis. et Pančić) Pančić 1874, *Sempervivum kopaonikense* Pančić 1874, *Sonchus pallescens* Pančić 1875, *Triticum petraeum* Vis. et Pančić 1862, *Verbascum heteromallum* Pančić ap. Hay. 1931, *Viola kopaonikensis* Pančić ap. Hay. 1927 and *Viola prolixa* Pančić ap. Becker 1910.

By analyzing the Josif Pančić collection, it was established that it also contains a significant number of plants that Pančić himself designated as new or possibly new species, but about which he has not left written records. Among herbarium specimens, those designated as *Centaurea lyratifolia* nov. spec., *Senecio glutinosus* nov. spec., *Carex perdistans* nov. spec., *Gladiolus triphyllus* nov. spec., *Hypericum serbicum* nov. spec., *Lathyrus scirptus* nov. spec., *Meum montenegrum* nov. spec., *Myosotis serbica* nov. spec., *Parietaria origanifolia* nov. species, *Polygala grandiflora* nov. spec., *Saxifraga bertiscea* nov. spec., *Saxifraga montenegrina* nov. spec., seem to be overlooked, still not described plant taxa possibly new to science. Otherwise, the status of taxa described by Pančić was discussed in detail in a separate study (Mayer & Diklić 1967).

In addition to the considerable significance that *Herbarium Pancicianum* has for taxonomic and floristic research, owing to the abundance of historical data it contains it is of tremendous importance for the protection of endangered plant species. It incorporates data on plants that are extinct in the world (e.g. *Althaea kragujevacensis* Pančić (Fig. 6) and *Scabiosa achaeta* Vis. et Panč.), data about plants which are extinct in Serbia (e.g. *Achillea ptarmica* L., *Caldesia parnassifolia* (L.) Parl., *Hymenolobus procumbens* (L.) Nutt. ex Schintz & Thell. subsp. *procumbens*, *Polemonium caeruleum* L., *Genista nissana* Petrović, *Lathyrus pancicii* (Jurišić) Adamović etc.), as well as data about many rare and endangered plants which, nowadays, have disappeared from many localities in Serbia.

Herbarium Generale

S. Vukojičić, G. Tomović, V. Stevanović

General collection or *Herbarium Generale* within BEOU Herbarium is stored in 1135 boxes, with over 90000 exsiccates (Fig. 7). The collection is sorted in alphabetical order and encompasses 1203 plant genera and 194 families. It contains exsiccates of vascular plants collected from the Balkan Peninsula, as well as a great number of exsiccates acquired through exchange with other countries in Europe and worldwide.

Of particular importance are collections of plants collected by Pančić's contemporaries, Serbian botanists who were working in the second half of the 19th century,

Fig. 7. *Herbarium Generale*

mainly in Serbia and Macedonia, such as S. Petrović, Ž. Jurišić, D. Petrović, Đ. Ničić, S. Pelivanović, S.M. Obradović and S. Pavlović.

In the first half of the 20th century, the Herbarium collection was enriched by new plants collected throughout Serbia, Montenegro, Macedonia, Bosnia and Herzegovina and Croatia. The greatest contributions to the enrichment were provided by N. Košanin, Th. Soška, J. Petrović, I. Rudski, L. Adamović, Đ. Ilić, Al. Jovanović, O. Bierbach, T. Muravjev, M. Šoškić, St. Gošović, M. Zafirović, and D. Simonović.

Significant herbarium exsiccates of vascular plants in the second half of the 20th century were collected by professors M.M. Janković, R. Bogojević, V. Stevanović and other contemporary botanists. Also from this period dates the Collection of the Institute of Ecology and Biogeography of the Serbian Academy of Sciences and Arts, which is incorporated in *Herbarium Generale* 2002. Specimens from this collection were gathered by the following researchers: V. Mišić, M. Popović, Lj. Borisavljević, L. Veselićić, M. M. Janković, D. Gajić and M. Gajić.

These collections also included plants acquired through exchange at the time of Pančić and Košanin, not only from the Balkans and Europe, but also from the rest of the world. The greatest number of specimens were obtained from botanists such as Sava Hilandarac, T. Heldreich, T. Orphanidis, A. Hayek, E. Halacsy, O. Sendtner, A. Grisebach, J.Velenovsky, V. Janka, P. Boissier, E. Janchen, K. Maly, A. Degen, I. Doerfler, N. Stojanov, B. Stefanov, J. Hruby, E. Formanek, S. Murbeck, G. Beck, T. Georgieff, as well as from F. Parlatore, A. Todaro, P. Porta, G. Rigo, E. Levier and others.

In addition, the general herbarium collection also contains specimens that have been collected for diploma, master and doctoral studies, as voucher specimens of plants that have been studied from molecular, phytochemical, chemotaxonomic and morphoanatomical points of view (423 herbarium sheets).

The special value of the *Herbarium Generale* is the numerous herbarium specimens which potentially represent nomenclatural types of new taxa, collected and described in the Balkan Peninsula by Petrović, Jurišić, Košanin, Černjavski, Soška and others, such as *Edraianthus glisicii* Černjavski & Soška, *Dioscorea balcanica* Košanin (Fig. 8), *Drosera macedonica* Košanin, *Ephedra macedonica*

Fig. 8. Type specimen of *Dioscorea balcanica* Košanin

Fig. 9. Holotype specimen of *Helianthemum marmoreum* Stevanović, Matevski & Kit Tan

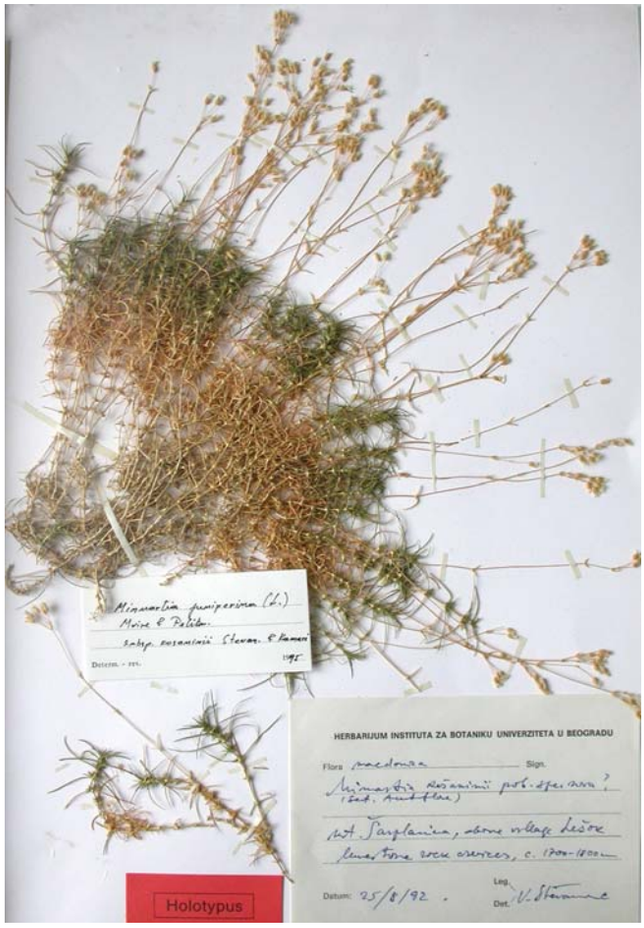

Fig. 10. Holotype specimen of *Minuartia juniperina* Maire & Petitm. subsp. *kosaninii* V. Stevanović & Kamari

Košanin, *Narthecium scardicum* Košanin, *Edraianthus serbicus* Petrović, *Genista nissana* Petrović, *Hypecoum pseudo-grandiflorum* Petrović, *Nonea pallens* Petrović, *Orobus pancicii* Jurišić, and others (Stevanović 1991, Niketić & Stevanović 1999, Niketić 1999a, 1999b, Ranđelović & Vukojičić 1999). Typification of these taxa will be the subject of future studies.

Also deposited in the *Herbarium Generale*, housed at the Herbarium of the University of Belgrade, are nomenclatural types of recently-described taxa, new to science, such as *Draba bertiscea* D. Lakušić & V. Stevanović, *Edrianthus x lakusicii* Stevanović & D. Lakušić, *Edraianthus pulevicii* Surina & D. Lakušić, *Helianthemum marmoreum* Stevanović, Matevski & Kit Tan (Fig. 9), *Heliosperma oliverae* Niketić & Stevanović, *Minuartia juniperina* subsp. *kosaninii* V. Stevanović & Kamari (Fig. 10), *Pedicularis ernesti-mayeri* Stevanović, Niketić & D. Lakušić (Stevanović *et al.* 2001, 2009, Kamari & Stevanović 1996, Lakušić *et al.* 2009, Lakušić & Stevanović 1995, Surina *et al.* 2009).

Type specimens deposited in the Herbarium Generale housed in BEOU

Cerastium decalvans Schl. & Vuk. subsp. ***decalvans*** var. ***robustum*** (G. Beck) Niketić f. ***baldaccii*** Niketić Arch.Biol. Sci. **59** (4): 389, 2007

Holotype: Crna Gora: Prokletije: Kuči - Klementi (ad fines) - Greča (Grijepši), in saxosis (leg. *A. Baldacci 160*, 24-Jul-1900, sub "*C. tomentosum*", BEOU 16444!).

Cerastium decalvans Schlosser & Vuk. subsp. ***leontopodium*** (Stoj. & Stefanov) Niketić var. ***cernjavskii*** (Georgiev) Niketić f. ***stevanovicii*** Niketić Arch.Biol.Sci. **59** (4): 391, 2007

Holotype: Makedonija: Šar planina: Ljuboten, kamenjari i stene, SW ekspozicija, 2200 m (leg. & det. *V. Stevanović 1576*, 6-Jul-1979, sub *C. grandiflorum*, BEOU 16443!).

Draba bertiscea D. Lakušić & V. Stevanović Willdenowia **25** (1):77, 1995

Holotype: Crna Gora, Prokletije: Maja Kolata, *Salicetalia retusae-serpyliffoliae*, krečnjak, 2200 m (leg. *Lakušić*, *D. 475/88*, 08-Jul-1988, det. *Lakušić, D.* & *Stevanović*, *V*., BEOU 16000!);

Paratype: *ibid.* leg. *Lakušić*, *D. 1/94*, 08-Jul-1994, det. *Lakušić*, *D*., BEOU 16001!

Edraianthus* × *lakusicii Stevanović & D. Lakušić Pl. Syst. Evol. **280**(1-2):85, 2009

(*Edraianthus tenuifolius* A.DC. × *Edraianthus wettsteinii* Halácsy & Bald. subsp. *lovcenicus* E. Mayer & Blečić)

Holotype*:* Crna Gora, Lovćen: Branjevine iznad sela Mirac, kamenjari tipa "*Seslerietum nitidae*", krečnjak, 1341.4 m (leg. *Stevanović*, *V*., *Lakušić, D. 20948*, 14-Jul-2006, BEOU 16441!);

Isotype: BEOU 16441!

Edraianthus pulevicii Surina & D. Lakušić Syst. Bot. **34**(3):604, 2009

Isotype: Crna Gora, Durmitor: Prutaš, jugoistočni greben, pukotine stena, sa *Saxifraga opositifolia*, *Sesleria juncifolia*, *Edraianthus graminifolius*, *Potentilla clusiana*, nagib 90˚, 2285 m (leg. & det. *Surina*, *B*., *NHMR 481*, 24-Jul-2007, BEOU 16439!).

Helianthemum marmoreum Stevanović, Matevski & Kit Tan Bot. Serbica **33**(1):15, 2009

Holotype: Makedonija, Prilep: Pletvar, kamenjari, krečnjak, 991 m (leg. *Matevsk*i, *V*., 12-Maj-2009, det. *Stevanović*, *V*., *Matevski*, *V*., *Kit Tan*, BEOU 16338!);

Isotype: BEOU 16338!

Heliosperma oliverae Niketić & Stevanović Bot. J. Linn. Soc. **154**(1): 56, 2007

Isotype: Crna Gora, Prokletije: Ćafa Bor-Šćapica, stene, silifikovani krečnjaci 1900-2000 m (leg. *Lakušić*, *D*., *Niketić*, *M*. *304/94*; *368/94*, 08-Jul-1994, sub *Silene doerfleri* sp. nova, BEOU 16442!).

Iris orjenii Bräuchler & Cikovac Willdenowia **37**(1): 221, 2007

Isotype: Crna Gora, Lovćen: Velje leto i Vučji zub, 1600 m (leg. *Cikovac*, *P*. *3538*, 06-Jun-2002, det. *Braüchler*, *C*., BEOU–16195);

Paratypes: *ibid*. leg. *Cikovac*, *P*. *3539*; *3540*, 06-Jun-2002, det. *Braüchler*, *C*., BEOU 16196!; 16197!

Minuartia greuteriana Kamari ssp. ***greuteriana*** Willdenowia **25**(1): 99, 1995

Isotype: Grčka, Nomos Evrou, Eparchia Soufliou, 1 km S of Dadia, rocky ravine with mixed *P. brutio-P. nigra*, gneiss, 150 m (leg. *Phitos*, *D. et al. 22867*, 13-06-1992, det. *Kamari*, *G*., BEOU 16012!).

Minuartia juniperina Maire & Petitm. subsp. ***kosaninii*** V. Stevanović & Kamari Phyton (Horn) **36**(1): 103, 1996

Holotype: Makedonija, Šarplanina: Kule supra pagum Lešok, krečnjačke stene, 1700-1800 m (leg. *Stevanović, V*., 25-Aug-1992, det. *Stevanović, V*., rev. *Kamari*, *G*., BEOU 16002!);

Isotype: BEOU 16005!

Syntypes: Šarplanina: Kula (Bistrica), krečnjak (leg. *Košanin*, *N*., 21-Jun-1924, det. *Soška*, *T*. sub *Minuartia verna*, rev. *Stevanović*, *V*., *Kamari*, *G*., BEOU 16006!, 16007!, 16008!, 16009!, 16010!).

Orobanche echinopis Pančić Oesterr. Bot. Z. **18**: 80, 1868

Lectotype: Srbija (Vojvodina), Banat: Vakarec (leg. & det. *Pančić*, *J*., Jul-1867, rev. *Zazvorka*, *J*., BEOU 8104!);

Syntype: Banat: Fontina Fetje (leg. & det. *Pančić*, *J*., Jul-1857, rev. *Zazvorka*, *J*., BEOU 8103!);

Pedicularis ernesti-mayeri Stevanović., Niketić & D. Lakušić Razpr. Slov. Akad. Znan. Umetn., Razr. Nar. Vede **42**(2): 211, 2001

Holotype: Crna Gora, Prokletije: Maja Kolata, *Festuco – Seslerietea*, krečnjak, 2200 m (leg. *Stevanović*, *V., Lakušić*, *D*., *Niketić*, *M*., *Bulić*, *Z*., *Hadžiablahović*, *S*., 05-Jul-1995, *334/95*, det. *Stevanović*, *V., Lakušić*, *D*., *Niketić*, *M*., BEOU 16011!);

Salvia glutinosa L. f. ***sagittifolia*** Šilić Rad. Šum. fakulteta u Sarajevu 1: 1-6, 2000

Isotype: Bosna i Hercegovina, Canno Paljanska Miljacka: in sylvis ad pagum Dovlići (pr. urb. Sarajevo), s. calcareo, ca 700 m (leg. *Šilić*, *Č*., 14-Oct-1986, BEOU 16013!).

Collection of the Department of Plant Ecology and Geography

G. Tomović, J. Šinžar-Sekulić, D. Lakušić

The Herbarium collection of the Department of Plant Ecology and Geography is established during the period from 1984 to 2010. Today it contains 51500 herbarium sheets that are entered in an electronic database. The collection was established by members of the Department as part of their research regarding flora of the Balkan, Apennine and Pyrenees Peninsulas, whereby the largest number of specimens was collected in the periods 1991-1995 (10379 exsiccates) and 1996-2000 (10803 herbarium specimens) (Fig. 11). Most of this collection is made up of plants collected by V. Stevanović, S. Jovanović, D. Lakušić and G. Tomović, as well as by S. Vukojičić, who is the head of these BEOU Herbarium collections, and by M. Niketić, curator of the Herbarium of the Natural History Museum in Belgrade.

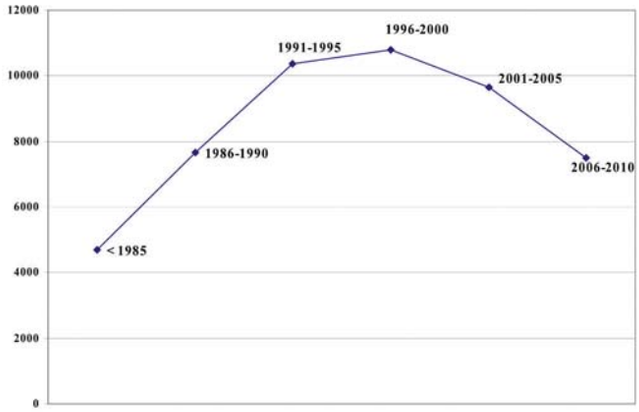

Fig. 11. Chronological overview of the establishment of the Department of Plant Ecology and Geography (BEOU) collection

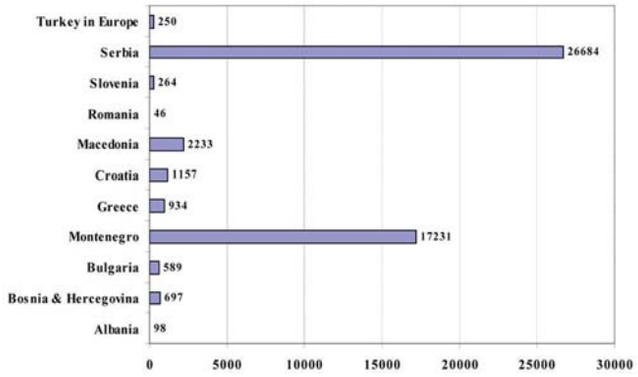

Fig. 12. Number of collected specimens by Balkan countries in the collection of the Department of Plant Ecology and Geography (BEOU)

The Collection also contains a representative selection of plants collected from Mt Fruška Gora, Deliblato Sands, Belgrade surroundings, Mts Kopaonik, Sokolovica, Kosmaj, Gučevo, Šljivovički Vis, Šar planina, Durmitor and Prokletije. Those plants were gathered as part of doctoral and master studies as well as scientific projects in which Š. Duraki, Z. Bulić, S. Adziablahović, S. Stanković, V. Stojanović, M. Jušković and others assisted Department members.

In the last 25 years, this herbarium collection has been enriched through scientific projects realized in the Department of Plant Ecology and Geography of the Institute of Botany and Botanical Garden "Jevremovac". During this period, productive international cooperation was re-established, resulting in Herbarium enrichment with plants from Spain, Portugal, Italy and Greece. Important and area-specific plants were collected and stored in this Herbarium thanks to members of the Department who participated in the following international botanical expeditions: I OPTIMA Iter Mediterraneum - Spain, Andalusia (1988), III OPTIMA Iter Mediterraneum - Sicily (1990), VI OPTIMA Iter Mediterraneum - Spain-Portugal (1994), VII Iter Mediterraneum - Greece (1995), I Iter Amphiadriaticum - Montenegro (1996), II Iter Amphiadriaticum - Abruzzo mountains, Italy (1999), III Iter Amphiadriaticum - N Albania & S Montenegro (2003) and IV Iter Amphiadriaticum - Abruzzo mountains, Aspromonte and Etna, Italy (2004).

In geographical terms, the largest number of specimens (50967 herbarium sheets) were collected from Europe, 50183 being from the Balkan countries and 784 exsiccates from other European countries, and a negligible number of exsiccates was collected from Africa, Asia and South America. As for the Balkan countries, the greatest number of plant specimens was collected from Serbia (26684 herbarium sheets), and a considerable number from Montenegro (17231). A much smaller number of plants was gathered from Macedonia (2233 exsiccates) and from Croatia (1157 herbarium sheets), with even smaller numbers being collected from other Balkan countries (Fig. 12).

In a taxonomic respect, 51500 herbarium sheets belong to taxa classified into 165 families and 1013 genera of vascular flora. Families with the largest numbers of herbarium exsiccates in the Collection of the Department of Plant Ecology and Geography are: Gramineae (5585 sheets), Compositae (5246 sheets), Caryophyllaceae (3479 sheets), Labiatae (3356 sheets), and Leguminosae (3112 sheets). As for genera, the greatest numbers of herbarium exsiccates belong to the genera *Festuca* (1430 sheets), *Carex* (1203 sheets), *Silene* (1039 sheets), *Campanula* (992 sheets), and *Centaurea* (711 sheets).

Of particular value in this Collection are specimens of rare plants that have been recorded by members of the Department as new to some Balkan countries: *Gagea spathacea* (Hayne) Salisb., *Typha domingensis* Pers., *Geum reptans* L., *Viola dukadjinica* W. Becker & Košanin, *Allium paniculatum* subsp. *villosulum* (Halácsy) Stearn, *Frittilaria macedonica* Bornm., *Daphne malyana* Blečić, *Tanacetum larvatum* (Pant.) Hayek, *Cirsium epiroticum* Petrak, *Euphorbia montenegrina* (Bald.) K. Malý ex Rohlena, *Allium phthioticum* Boiss. & Heldr., *Lactuca visianii* Bornm., *Asperula hercegovina* Degen, *Paspalum paspalodes* (Michx) Scribner etc. It is also worth mentioning re-discovered species, such as *Aconitum anthora* L. and *Adenophora liliifolia* (L.) Besser, which had been regarded as extinct from the area of Serbia.

Collection of the Department of Plant Morphology and Systematics
P.D. Marin

Establishment of the Herbarium collection of the Department of Plant Morphology and Systematics began during the 1960s. The collection is stored in 118 herbarium boxes that currently number about 8500 herbarium sheets. Most of the collection contains plants that were collected by members of the Department, B. Tatić, B. Petković, P. Marin, P. Janaćković and M. Veljić, during their botanical investigations in Serbia and neighboring countries. A smaller part of the collection contains plants collected by students during the course of their diploma, master and doctoral studies at the Department. A smaller number of preserved plants collected by V. Blečić from Montenegro and Serbia are of particular value.

Most of specimens were gathered in different localities throughout Serbia (Uvac, Mts. Kopaonik and Šarplanina, Stol, Veliki Krš, Ovčar, Kablar, Mokra Gora, Čemernik, Fruška Gora, Stara Planina, as well as from Tutin, Vlasina, Đerdap, etc.). In addition, a considerable number of plants were collected in Montenegro, Macedonia and Croatia.

In a taxonomical respect, the greatest number of herbarium exsiccates in this Department collection belongs to the families: *Lamiaceae, Asteraceae, Brassicaceae* and *Apiaceae*, and particularly to the genera: *Micromeria, Calamintha, Acinos, Satureja, Clinopodium, Thymus, Mentha, Stachys, Teucrium, Phlomis, Origanum, Centaurea, Cirsium, Achillea, Carduus, Peucedanum, Seseli, Alyssum, Bornmuellera, Thlaspi* and others.

The great value of this collection is plant specimens that have been studied from the taxonomical, phytochemical and chemotaxonomical points of view by members of the Department. In addition many of those plants served for analyzing biologically active substances.

It should be especially emphasized that some specimens of this Collection represent vouchers for plant material used for SEM analysis of micromorphological characters (ornamentation of seeds and fruits, analysis of glandular and non glandular trichomes on the leaf, stem and calyx) and their significance in the differentiation of species and infraspecific taxa. Part of the plant material has been used for comparative-morphological analysis of some taxa, with the aim of establishing intrapopulation and interpopulation variability of some characters and the possibility of their application in the systematics of doubtful taxa.

During the last thirty-odd years the Department has been conducting extensive phytochemical and chemotaxonomical research, particularly on taxa from the family *Lamiaceae*, *Asteraceae* and *Apiaceae*. These investigations were primarily aimed at analysing flavonoids, essential oils, fatty acids and sesquiterpene lactones. Therefore a considerable part of the collection refers to vouchers of plant material that is directly related to these investigations. The collection also contains a large number of plant species used during more than ten years for the analysis of biological activity (antifungal, antioxidant, antibacterial) of their secondary metabolites. This collection represents the basis for further fundamental and applied studies regarding not only on plants already surveyed, but also on related species from Serbia, the Balkan Peninsula and Europe. The Department's collection, with relevant published results, is a significant link between classical, fundamental and applied studies.

Bryophyte Collections
M. Sabovljević, M. Veljić

Bryophyte Collections in the Herbarium of the University of Belgrade include more than 18000 mainly labelled and named specimens. All bryophyte specimens are deposited in two working collections in the Department of Plant Ecology and Geography and the Department of Plant Morphology and Systematics.

The bryophyte collection within the Department of Plant Ecology and Geography includes 5013 labelled and named specimens and about 10000 labelled but not named exemplars.

The initial collection of bryophytes in the Bryophyte collection within the Department of Plant Ecology and Geography was established in the early 1990s as part of the project Flora and Vegetation of Mt Durmitor by members of the Department under the leadership of V. Stevanović. The initial bryophyte collection was made by botanists dealing with vascular plants in 21 locations of the Durmitor National Park. The duplicates of this collection were sent to Berlin for identification and are deposited in the herbarium of the Botanic Garden and Botanical Museum Berlin-Dahlem (B). This collection contains 211 samples, including some mixed gatherings, which have been separated and numbered by adding small letters to the original 179 envelopes. Data about this collection, which is formally named "Collection of Durmitor bryophytes made by Jovanović, Lakušić, Pavić and Stevanović between 1989 and 1994", are published in Kürschner & Parolly (1997). The significance of this collection is highlighted by the presence of 19 taxa (nine liverworts and ten mosses) which were recorded for the first time for the area of Mt Durmitor, including nine species new to Montenegro.

Subsequently, S. Grdović (maiden name Pavić) enriched the collection with Belgrade bryophytes during her M.Sc. and Ph.D. studies regarding the ecology and bioindication of urban Belgrade bryophyte flora (1994-2003). In the BEOU bryophyte collection there are 195

specimens representing the urban area of Belgrade.

M. Sabovljević, who became a member of the Department of Plant Ecology and Geography in 2000, contributed greatly to the BEOU bryophyte collection by enriching the initial collection, consisting of 354 specimens, with an additional 15000 either collected or exchanged specimens by 2010. The recent bryophyte collection includes specimens collected mainly from the Central Balkans (Serbia 71.13% and Montenegro 8.28%), but also from Germany (2.47%), France (1.07%), Italy (1.88%), Greece (2.47%), Macedonia (0.98%), Spain (2.47%) and Finland (2.47%). The remaining 6.83% of named material comes from exchange or cooperation with Portugal, Croatia, Bosnia-Herzegovina, Hungary, Bulgaria, Turkey, Switzerland, Austria, USA, Russia, Slovakia, Norway, Sweden, Albania, and Australia. In addition, the collection includes unnamed material from Northern and Southern Greece, Montenegro, Serbia, Spain, Germany, Hungary, Norway, Sweden and Finland collected by M. Sabovljević. The best represented regions of Serbia, within this collection, are Srem and Banat, Belgrade and its surroundings, Western Serbia, Mt Šar in Southern Serbia and Đerdap gorge in Eastern Serbia. S. Pavić, V. Stevanović, D. Lakušić, D. Savić, J. Blaženčić, D. Dimović, J. Šarčević, M. Miliša, M. Vujičić and B. Zlatković have made small but valuable contributions to this collection, mainly by exemplars collected in the Balkans.

Of special value in this collection are the herbarium specimens of numerous rare and endangered species added by M. Sabovljević. Some of the most significant samples of rare and endangered species are of *Anoectangium hornschuchianum, Asterella saccata, Bartramia subulata, Breutelia azorica, Bruchia vogesiaca, Buxbaumia viridis*, *Campylopus oerstedianus, Crossidium laxefilamentosum, Cyrtomnium hymenophylloides*, *Dichelyma capillaceum, Entosthodon hungaricus*, *Hilpertia velenovskyi, Mannia fragrans, Oreas martiana, Pyramidula tetragona, Rhynchostegium rotundifolium,* etc. The significance of this collection is enhanced by the numerous vouchers for ongoing studies in molecular, phylogenetic, physiological, pharmaceutical and ecological research, conducted by the group led by M. Sabovljević in inter-departmental, inter-institutional and inter-national collaboration with other colleagues.

The bryophyte collection within the Department of Plant Morphology and Systematics includes more than 3000 mainly labelled and named specimens. This bryophyte herbarium was formed in 1990 and has been headed by Milan Veljić since its beginning. This collection includes mainly riparian bryophytes from springs and river courses. Thus, bryophyte flora from around 15 springs from the Dinaric and the Carpathian regions in Serbia, plant material from valleys of the rivers Uvac, Đetinja, Zlošnica and Toplica with their tributaries, as well as from Mts. Zlatar, Kopaonik and Tara, make up a large part of the collection (e.g. Zlatar 127, Kopaonik 134, Fruška Gora 50, Vrela 126, Uvac 165, Đetinja 66, Đavolja Varoš 58 taxa).

Some valuable old specimens of bryophytes are included in both Department collections, but these are only partly labeled and named. In the Bryophyte collection within the Department of Plant Ecology and Geography there are many, mainly *Philonotis* and *Sphagnum* specimens from Mt. Stara Planina dated from the 1970s but with incomplete collecting data. Also, some older specimens with doubtful collection data are still to be resolved. The oldest exemplar in this collection is *Aulacomnium palustre* (BEOU Bryo4577) from Macedonia (crossroad to Aldince) collected in 1910 by N. Košanin. The Bryophyte collection within the Department of Plant Morphology and Systematics contains part of the bryophyte collection of M. Popović from the period 1950-1960 from Mts Kopaonik and Stara Planina, Majdanpečka Domena, as well as a collection from the Alps from an unknown collector.

Further work on the old herbarium sheets and collection studies may reveal those bryophyte samples of museum value, namely those collected by early Serbian and regional collectors and botanists.

Algae Collection

Algae Collections in the Herbarium of the University of Belgrade include about 6000 mainly labelled and named specimens. They are deposited in the Department of Algology, Mycology and Lichenology and are sorted into two main collections: **Microalgae collection and Charophyta collection**.

The collections contain numerous specimens of freshwater algae, marine macrophytic algae and lichens, examplers of which are also used for students' practical instructions. In addition, such plant material is stored as dry herbarium specimens.

Microalgae collection

M. Cvijan

In the Herbarium of the University of Belgrade there are more than 3000 mainly labeled and named specimens of microalgae that are conserved in plastic bottles in various fluid fixatives. This collection includes some macrophytes from the genus *Batrachospermum* and *Bangia*.

All samples are deposited in two working collections. Samples of the first collection are used for qualitative, and those of the second for quantitative analysis. Samples of microscopic algae used for qualitative analyses are kept in smaller plastic bottles, of about 80 ml, whereas specimens for quantitative analysis are kept in plastic bottles of 1 L.

For all specimens there are basic data about locality,

physico-chemical characteristics, location and time of collection. For many specimens there are also data about detailed physico-chemical characteristics of the water.

Algae deposited in the collection were mostly gathered from various running waters, reservoirs, lakes, canals and salt marshes in Serbia, both from plankton and benthos, sometimes also from other aquatic plants present in the water.

Formation of the microalgae collection began in the 1990s. The collection from this period contains plant material from the area of Vlasinsko and Lisinsko lakes, as well as algae collected from the rivers Sava, Tisa and Danube.

Most of the collection was established in the last ten years, and represents or will represent the basis for preparing doctoral dissertations, master theses and diploma works. All these present-day collections relate to water samples in which freshwater algae of all divisions are present. Samples were collected from varying aquatic habitats in Serbia, such as reservoirs, rivers, canals, ponds, salt marshes, etc. Thereby, most often the samples are being used or have been used for studying specific algal groups for doctoral dissertations, master theses as well as diploma works (pigmented Euglenophyta – G. Subakov-Simić; silicate algae – J. Krizmanić, J. Andrejić; desmids – M. Stamenković, S. Fužinato, etc.). In addition, algae of other groups are always accessible to interested researchers.

More seldom, samples were collected from the benthos (e.g. of the river Zapadna Morava) or plankton (from the river Tisa) to determine the dynamics of algal communities in space and time in respect to different environmental factors, including human factors in particular. Thus, in such circumstances complete analyses of algal flora were performed for investigations during preparation of some master theses (I. Jurišić, A. Ržaničanin).

The value of the collection is especially enhanced by specimens of freshwater red algae (Rhodophyta), which were the basis for writing a monograph "Algal Flora of Serbia – Rhodophyta 2" (Cvijan *et al*. 2003). In addition, the collection contains specimens of rare and endangered algae of Serbia such as species of the genus *Batrachospermum*, as well as specimens that grow in specific habitats, such as salt marshes in Vojvodina.

Most of the data on these collections are incorporated in an electronic database in which 2097 specimens are currently registered.

Charophyta Collection

J. Blaženčić

A forerunner of the collection of charophytes in the Institute of Botany is the herbarium collection from Serbia which was collected by J. Pančić in 17 localities.

Fig. 13. Herbarium specimen of *Nitella syncarpa* (J.L.Thuillier) F.T.Kützing

His first specimen was dated in 1851, and the last in 1880. The collection of Pančić's charophytes was treated by N. Košanin, who published Pančić's data, along with his own records relating to his botanical survey in southern Serbia (Košanin 1907a, 1907b). At that time, as stated by Košanin, Pančić's collection was well preserved. However, from the beginning of the 20th century onwards Serbia passed through a spate of turbulent historical events in which many national treasures perished or were lost. During periods of war, Pančić's and Košanin's herbarium material with charophytes disappeared, so that today only two herbarium sheets, of the species *Nitella syncarpa* from

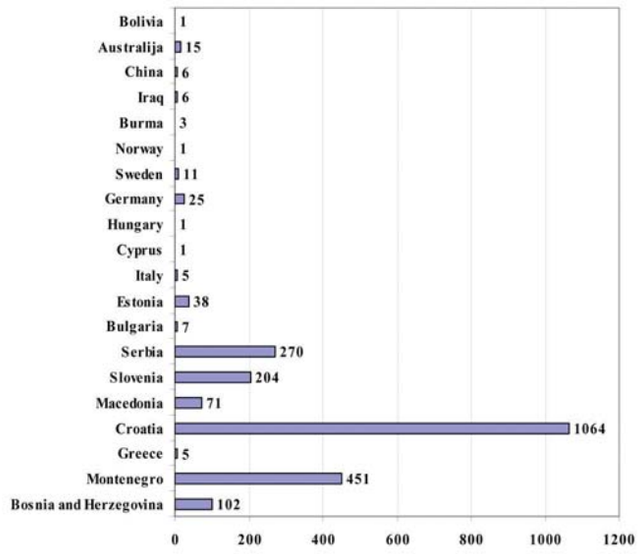

Fig. 14. Number of collected specimens by countries in the Charophyta collection in BEOU

Vlasinsko blato that Košanin collected on 7th June 1907 (Fig. 13), are in the Herbarium of the Institute for Botany.

In the Herbarium of the Institute of Botany there are altogether 61 herbarium sheets with charophytes taxa, such as: 8 from Poland (leg. I. Michna, I. Dambska), 23 from Montenegro (leg. J. and Ž. Blaženčić), 11 from Croatia (leg. J. and Ž. Blaženčić), 10 from Serbia (leg. N. Košanin, J. and Ž. Blaženčić) and 9 from Macedonia (leg. N. Košanin, Lj. Glišić).

Systematic studies of charophytes started in the 1970s, when the current Collection was established by J. Blaženčić. In the wet collection there are 2287 treated and about 100 untreated specimens. Specimens in the wet collection are stored in plastic bottles. They are conserved in 4% formaldehyde or in 50% alcohol, and are marked with numbers and labels on which is taxon name, sampling date and localities as well as the legator's name. A constituent part of this collection is field diaries and a listing of specimens by numbers, taxa and relevant data on habitats. An electronic database is under preparation. The complete charophyta collection consists of 2348 labelled and named specimens from the wet collection (2287) and herbarium sheets (61).

During the course of their long-standing research, more than 90% of the collection was collected and treated by Jelena and Živojin Blaženčić. Additional legators of charophytes are: N. Košanin, Lj. Glišić, D. Milovanović, Ž. Adamović, M. Kalezić, V. Stevanović, D. Lakušić, J. Šinžar-Sekulić, R. Laušević, M. Stanković, M. Milić, P. Anđus, V. Ranđelović, B. Zlatković, G. Subakov, D. Laketić, M. Živić, Z. Krivošej, Z. Romčević, B. Milijašević, I. Krizmanić, J. Krizmanić, P. Janaćković, N. Prelević, P. Lazarević, L. Đurđević, S. Radotić, R. Ilić, A. Vesić, O. Urbavc-Berčič (Slovenia), V. Biberdžić, K. Jasavić (Montenegro), Z. Levkov (Macedonia), I. Stanković, A. Alegro (Croatia), A. Garcia (Australia), I. Kirjakov (Bulgaria), M. Hospers, J. Bruinsma (the Netherlands) and A. Langangen (Norway), Th. von Heldreich (Germany), I. Dambska, I. Miichna (Poland).

The collection contains representatives of charophytes from 19 countries and four continents (Europe - 14 countries, Asia - 3 countries, Australia and South America - 1 country, each). About 95% of the collection consists of plant material collected from former Yugoslav countries (Fig. 14). Most of the specimens were collected from Croatia (1064) and Montenegro (451), and much less from Serbia (270), Slovenia (204), Macedonia (71) and Bosnia and Herzegovina (102).

The collection contains representatives of all extant genera: *Nitella* (485), *Tolypella* (18), *Nitellopsis* (63), *Lamprothamnium* (5), *Lychnothamnus* (35) and *Chara* (1680), *Protochara* (1).

Using specimens from this collection the genera *Nitellopsis* and *Lychnothamnu* were recorded for the first time in W and C Balkans flora; distribution of the species *Nitella tenuissima*, seldom present in C and SE Europe, was defined; floristic, vegetation and ecological studies on charophytes in lakes of Serbia and Macedonia were conducted; a remarkable diversity of charophytes in the W and C Balkans was registered and the Red Data List of Charophytes in the Balkans was published (literature data supporting those statements are given in the References Section).

Among the most significant specimens in the Charophyta collection are certainly type specimens of the species *Chara visianii* J. Blaženčić & V. Ranđelović, as well as the natural rarities *Chara rohlenae* Vilhelm, *Chara ohridana* (Kostić) Krause, *Tolypella intricata* (Trentep.) Leonh., *Lamprothamnium papulosum* (Wallroth) J. Groves and *Protochara inflata* (Fil. & G.O.A. ex Fil.) Wom & Ophel from Australia.

Concluding remarks

The Herbarium of the University of Belgrade has passed through very rough times from Pančić's era until today. Nevertheless, despite the fact that it was partly damaged or transferred to other countries, the Herbarium has not only historical and cultural value today, but it also presents an inevitable [that doesn't seem to be the correct word. Maybe 'enviable' was intended.] basis for contemporary taxonomic, phytogeographic and floristic research in the Balkan Peninsula. The abundance of chorological data contained in these collections, together with professional taxonomic revision, are published not only as individual

articles, but also in new editions of the Flora of SR Serbia (in press) and in the Atlas Florae Europaeae (Jalas *et al.* 1996, 1999, Kurtto *et al.* 2004, 2007, 2010). In addition, the Herbarium is a valuable resource for new botanical exploration of the Balkan countries, both for the present-day and future generations, which is in accordance with Pančić's wording: "Were I to live ten men's lives I would not be able to thoroughly treat a plantlet that I have started to treat – the plantlet called Botany. It is upon you young brethrens, by following my example, to treat that plantlet and its branches in particular".

Acknowledgements – The authors express their thanks for technical assistance to: Ivana Gudelj, Ivana Janković, Dijana Dobrota, Jovana Pantović, Tijana Milekić, Sanja Đurović, Ksenija Jakovljević, Eva Kabaš, Nevena Kuzmanović and Mira Petrović.

REFERENCES

Blaženčić J & Blaženčić Ž. 1983. *Lychnothamnus* (Rupr.) V. Leonh. (*Characeae*) a new genus to the flora of Yugoslavia. *Acta Bot. Croat*. **42**: 95-101.

Blaženčić J & Blaženčić Ž. 1986. Flora i vegetacija algi razdela *Charophyta* u planinskim jezerima Crne Gore. CANU, *Glasnik odeljenja prirodnih nauka*, Titograd **5**: 187-203.

Blaženčić J & Blaženčić Ž. 1988. Florističko-horološka analiza algi razdela *Charophyta* u Bosni i Hercegovini. Zbornik referata naučnog skupa „Minerali, stijene, izumrli i živi svijet BiH", Sarajevo pp. 223-233.

Blaženčić J & Blaženčić Ž. 1992. Macrophytes of Prošće and Ciginovac the lakes of Plitvice. (Makrofite u Plitvičkim jezerima Prošće i Ciginovac). *Arch. Biol. Sci.* **44** (3-4): 213-222.

Blaženčić J & Blaženčić Ž. 1994. Floristička i ekološka studija makrofita u jezerima Nacionalnog parka „Biogradska gora" (Crna Gora, Jugoslavija). *Glasnik Instituta za botaniku i Botaničke bašte* **28**: 101-114.

Blaženčić J. & Blaženčić Ž. (1999): Doiran lake charophytes. *God. zb. Biol*., Skopje **52**: 83-92.

Blaženčić J & Cvijan M. 1980. *Nitellopsis* Hy. (*Tolypellopsis* Mig.)-novi rod za floru Jugoslavije iz razdela *Charophyta*. *Glas. Republ. zavoda zašt. prirode-Prirodnjačkog muzeja*, Titograd **13**: 7-13.

Blaženčić J & Ranđelović V. 1994. *Chara visianii* J. Blaženčić et V. Ranđelović sp. nov. (Characeae) from the river Krka (Croatia). *Cryptogamie*, *Algol*. **15**(1): 73-79.

Blaženčić J & Stanković M. 2008. *Tolytella intricata* (Trent. ex Roth.) Leonhardi (Characeae) – nova vrsta u flori Srbije. (Tolytella intricata (Trent. ex Roth.) Leonhardi (Characeae). *Zaštita prirode* **60** (1-2): 215-221.

Blaženčić J, Blaženčić Ž & Cvijan M. 1994. Floristička i ekološka studija *Charophyta* u vodenim ekosistemima Nacionalnog parka "Durmitor" (Crna Gora, Jugoslavija). *Ekologija* **28**(1-2)-**29**(1-2): 33-54.

Blaženčić J, Stevanović B, Blaženčić Ž & Stevanović V. 2006a. Red data List of Charophytes in the Balkans. *Biodiversity and Conservation* **15**: 3445-3457.

Blaženčić J, Stevanović B, Blaženčić Ž & Stevanović V. 2006b. Distribution and ecology of charophytes recorded in the West and Central Balkans. *Cryptogamie, Algol.* **27** (4): 311-322.

Blaženčić J, Urbanc-Berčić O & Vrhovšek D. 1990. Makrofiti v jezerih Triglavskega narodnega parka. *Biol. vestn*. **38**(1): 1-14.

Cvijan M, Blaženčić J & Subakov-Simić G. 2003. FLORA ALGI SRBIJE 2.- Rhodophyta, NNK International, Beograd, pp. 74

Đorđević Ž. 1926. Josif Pančić. In: Šević M. (ed.), Pedagoški radovi Dr. Josifa Pančića s predgovorom o Josifu Pančiću od Dr. Živojina Đorđevića profesora Univerziteta, Pedagogijska knjižnica, Izdanje knjižarnice Rajkovića i Đurkovića, Beograd. **34/ 35**: 3-18.

Glišić Lj. 1939. Pančić kao osnivač prirodnjačkih ustanova, prosvetni radnik i rodoljub. Spomenica Josifa Pančića, Srpska kraljevska akademija, Posebna izdanja, Izdanje zadužbine Veljka Savića, Beograd, **18**: 13-31.

Glišić Lj. 1965. Pančić kao ispitivač flore i vegetacije Srbije i susednih zemalja Balkanskog poluostrva. In: Bartoš M. (ed.), Spomenica o svečanom skupu povodom 150-te godišnjice od rođenja Josifa Pančića, Posebna izdanja, Srpska akademija nauka i umetnosti, Beograd, **27**: 23-30.

Glišić Lj. 1976. Život i rad velikog naučnika i rodoljuba dr. Josifa Pančića. In: Josifović M. (ed.), Josif Pančić, Srpska akademija nauka i umetnosti, Beograd. **28**: 25-51

Gudelj I. 2007. Zbirka roda *Campanula* L. u Herbarijumu instituta za botaniku Univerziteta u Beogradu (BEOU). Diplomski rad, Biološki fakultet, Univerzitet u Beogradu.

Holmgren PK, Holmgren NH & Barnett LC. 1990. Index Herbariorum. Part 1. The herbaria of the World. Regnum Veg. **120**: 1-693. Continuously updated at http://sciweb.nybg.org/science2/IndexHerbariorum.asp

Jakovljević S. 1939. Životopis Josifa Pančića. Spomenica Josifa Pančića, Srpska kraljevska akademija, Beograd, Posebna izdanja, knjiga CXXVIII, Spomenice, knjiga 10, Izdanje zadužbine Veljka Savića, **18**: 33-45.

Jalas J, Suominen J & Lampinen R. (eds.) 1996. Atlas Florae Europaeae. Distribution of vascular plants in Europe 11. *Cruciferae* (*Ricotia* to *Raphanus*). The Committee for Mapping the Flora of Europe & Societas Biologica Fennica Vanamo, Helsinki, pp. 310.

Jalas J, Suominen J, Lampinen R & Kurtto A. (eds.) 1999. Atlas Florae Europaeae. Distribution of vascular plants in Europe 12. *Resedaceae* to *Platanaceae*. The Committee for Mapping the Flora of Europe & Societas Biologica Fennica

Vanamo, Helsinki, pp. 250.

Janković M. 1975. Pančićeva „Flora Kneževine Srbije" i istorijski razvoj floristićkih proučavanja u Srbiji. In: Stevanović P, Spomenica o proslavi 100-godišnjice „Flore Kneževine Srbije" od Josifa Pančića, Srpska akademija nauka i umetnosti, Beograd, 1975, Spomenice, knjiga I, Odeljenje prirodno-matematičkih nauka, **1**: 17-30.

Janković M & Vasić Ž. 1964. Naučni i nastavni doprinos Josifa Pančića. *Glasnik Prirodnjačkog muzeja u Beogradu*, Beograd, **19B**: 5-24.

Josifović M. 1974. (ed.). Zbornik radova sa simpozijuma povodom 100. godišnjice prve Jugoslovenske dendrologije Josifa Pančića. Srpska Akademija nauka i umetnosti, Akademija nauka i umjetnosti Bosne i Hercegovine, Beograd 1974, Naučni skupovi, Odeljenje prirodno-matematičkih nauka, knjiga **1**, VII + pp. 236.

Jovanović S. 1998. Botanička bašta "Jevremovac" jedinstveni spomenik prirode Srbije-na pragu trećeg milenijuma. *Zaštita prirode* **50**: 71-78.

Jurišić Ž. 1889. Dr. Josif Pančić. Biografska skica. Od Ž. J. Jurišića kustosa botaničkog kabineta. Čitano na prvom skupu društva „ Pančić" 8. januara 1889 god. Geološki anali Balkanskoga poluostrva, Beograd, **1**: 170-195.

Jurišić Ž. 1899. Botanička bašta „Jevremovac" u Beogradu. Državna štamparija, Beograd.

Košanin N. 1907a. Naše Characeae. Prilog poznavanju flore algi u Srbiji. *Nastavnik* **18**: 264-267.

Košanin N. 1907b. Characeen Serbiens. Ein Beitrag zur Algenflora von Serbien. *Osterreichische Botanische Zeitschrift* **57**(7/8): 280-281.

Kamari G. 1995. *Minuartia greuteriana* (Caryophyllaceae), a new species from NE Greece. *Willdenowia* **25** (1): 99-104.

Kamari G & Stevanović V. 1996. *Minuartia juniperina* (Caryophyllaceae) in the Balkan Peninsula. *Phyton* (*Horn*) **36**(1): 93-105.

Kurtto A, Fröhner SE & Lampinen R. (eds.) 2007. Atlas Florae Europaeae. Distribution of vascular plants in Europe 14. *Rosaceae* (*Alchemilla* and *Aphanes*). The Committee for Mapping the Flora of Europe & Societas Biologica Fennica Vanamo, Helsinki, pp. 200.

Kurtto A, Lampinen R & Junikka L. (eds.) 2004. Atlas Florae Europaeae. Distribution of vascular plants in Europe 13. *Rosaceae* (*Spiraea* to *Fragaria*, excl. *Rubus*). The Committee for Mapping the Flora of Europe & Societas Biologica Fennica Vanamo, Helsinki, pp. 320.

Kurtto A, Weber HE, Lampinen R & Sennikov AN. (eds.) 2010. Atlas Florae Europaeae. Distribution of vascular vlants in Europe 15. *Rosaceae* (*Rubus*). The Committee for Mapping the Flora of Europe & Societas Biologica Fennica Vanamo, Helsinki, pp. 362.

Kürschner G & Parolly G. 1997. Additions to the bryophytes flora of the Durmitor National Park (Crna Gora) and a first conspectus of all records. *Willdenowia* **27**: 249-264.

Lakušić D, Lakušić B & Novčić R. 2005. *Sempervivum kopaonikense* Pančić (Subgenus Jovibarba (DC. emend Koch) Baker–groupe heuffelii–Crassulaceae) morphological, chorological and ecological characteristics. XVII International Botanical Congress, Abstracts, Vienna, Austria, P0737.

Lakušić D, Novčić R, Kučera J & Marhold K. 2006. *Cardamine pancicii* (Brassicaceae) a neglected species of the Balkan Peninsula. *Willdenowia* **36**: 177-191.

Lakušić D, Rakić T, Stefanović S, Surina B & Stevanović V. 2009. *Edraianthus* x *lakusicii* (Campanulaceae) a new intersectional natural hybrid: morphological and molecular evidence. *Plant Syst. Evol*. **280**: 77–88.

Lakušić D & Stevanović V. 1995. *Draba bertiscea* (D. sect. Aizopsis, Brassicaceae), a new species from Montenegro (Yugoslavia). *Willdenowia* **25 (1)**: 75-80.

Lakušić D, Stevanović V, Vukojičić S, Niketić M, Jovanović S, Konjević R & Mesaroš G. 2001. Josif Pančić na internetu. Naučni skup "Prirodni potencijali kopna, kontinentalnih voda i mora Crne Gore i njihova zaštita, Plenarni referati i izvodi saopštenja, Žabljak, pp. 240.

Lakušić D & Vukojičić S. 2006. Herbarium University of Belgrade 1860-2006. "Erbario: Scrigno di Biodiversità", "Inaugurazione del Museo dell'Erbario dell'Università' del Molise", Dipartimento S.T.A.T. Pesche (IS), 17 Ottobre 2006.

Lakušić D, Vukojičić S, Stevanović V, Niketić M, Jovanović S & Konjević R. 1999. Pančićeva zaostavština. Josif Pančić (1814-1888). Reliquiae Pancicianae. http://pancic.bio.bg.ac.rs.

Mayer E & Diklić N. 1967. *Nomenclator Pancicianus*. In: Josifović M (ed.), Pančićev zbornik u spomen 150. godišnjice njegovog rođenja - Recuel des travaux édité a l'occasion du 150 anniversaire de la naissance de Josif Pančić, pp. 3-26, Srpska Akademija nauka i umetnosti, Beograd.

Mitranović D. 1963. Pančićev život. Srpska Akademija nauka i umetnosti, Beograd, Posebna izdanja, knjiga CCCLXXV, Odeljenje prirodno - matematičkih nauka, knj. 33. pp. 181.

Niketić M. 1999a. *Hypecoum pseudograndiflorum* Petrović. In: Stevanović V (ed.), Crvena knjiga Flore Srbije **1**: 302-303, Ministarstvo za životnu sredinu Republike Srbije, Biološki fakultet Univerziteta u Beogradu, Zavod za zaštitu prirode Republike Srbije.

Niketić M. 1999b. *Nonea pallens* Petrović. In: Stevanović V (ed.), Crvena knjiga Flore Srbije **1**: 303-305, Ministarstvo za životnu sredinu Republike Srbije, Biološki fakultet Univerziteta u Beogradu, Zavod za zaštitu prirode Republike Srbije.

Niketić M & Stevanović V. 1999. *Genista nissana* Petrović. In: Stevanović V (ed.), Crvena knjiga Flore Srbije **1**: 118-

120, Ministarstvo za životnu sredinu Republike Srbije, Biološki fakultet Univerziteta u Beogradu, Zavod za zaštitu prirode Republike Srbije.

Niketić M & Tomović G. 2008. Taxonomy and nomenclature of the *Linaria genistifolia* complex (Plantaginaceae-Antirrhineae) in S.E. Europe and Anatolia. *Taxon* **57**(2): 619-629.

Pančić J. 1874. *Flora Kneževine Srbije ili vaskularne biljke, koje u Srbiji divlje rastu*. Po analitičkom metodu složio Dr. Josif Pančić. *Flora Principatus Serbiae*. Državna štamparija, Beograd, XXXIV+ pp. 798.

Pančić J. 1875. *Elenchus plantarum vascularium quas aestate a. 1873 in Crna Gora legit. Dr. Jos. Pančić*, Belgradi, Edidit Societas Erudita Serbica. Typographia status, VII+ pp. 106.

Pančić J. 1881. Botanička bašta u Beogradu. Državna štamparija, Beograd.

Pančić J. 1883. *Građa za Floru Kneževine Bugarske*. Glasnik Srpskog učenog društva, Beograd, knjiga **53**: 161-231.

Pančić J. 1884. *Dodatak Flori Kneževine Srbije* od Dr-a Josifa Pančića-*Additamenta ad Floram Principatus Serbiae*. Izdanje Kraljevske srpske državne štamparije, Beograd, pp. 253.

Pančić J. 1886. *Nova građa za Floru Kneževine Bugarske od Dr-a J. Pančića*. Glasnik Srpskog Učenog Društva, Beograd, knjiga **66**: 103-146.

Ranđelović V & Vukojičić S. 1999. *Lathyrus pancicii* (Jurišić) Adamović. In: Stevanović V (ed.), Crvena knjiga Flore Srbije **1**: 120-122, Ministarstvo za životnu sredinu Republike Srbije, Biološki fakultet Univerziteta u Beogradu, Zavod za zaštitu prirode Republike Srbije.

Ranđelović V, Blaženčić J & Blaženčić Ž. 1993. Hydrophilous and hygrophilous vegetation in Krka river. *Arch. Biol. Sci*. **15**(3-4): 137-146.

Stevanović V. 1991. Horologija i taksonomski položaj Košaninovih taksona. In: Gajić M (ed.), Zbornik radova sa Simpozijuma „Nedeljko Košanin i botaničke nauke", pp. 289-306, Srpska Akademija nauka i umetnosti, Institut za botaniku i botanička bašta PMF, JP za gazdovanje šumama „Golija" Ivanjica, Beograd-Ivanjica.

Stevanović V, Matevski V & Tan K. 2009. *Helianthemum marmoreum* (Cistaceae), a new species from the Central Balkans. *Botanica Serbica* **33**(1): 13-19.

Stevanović V, Niketić M & Lakušić D. 2001. *Pedicularis ernesti-mayeri* (P. subsect. Comosae, Scrophulariaceae), a new species from Mt Prokletije (Yugoslavia). Razprave IV. Razreda SAZU, XLII-**2**: 210-226.

Surina B, Rakić T, Stefanović S, Stevanović V & Lakušić D. 2009. One new species from the genus *Edraianthus,* and a change in taxonomic status for *Edraianthus serpyllifolius* f. *pilosulus* (Campanulaceae) from the Balkan Peninsula. *Systematic Botany* **34**(3): 602–608.

Šilić Č. 2000. Prilog poznavanju spontanih mutacija nekih šumskih vaskularnih biljnih vrsta u Bosni i Hercegovini. Radovi Šumarskog fakulteta Univerziteta u Sarajevu, Sarajevo, **1**: 1-6.

Tatić B. 1996. Stota godišnjica Botaničke bašte "Jevremovac". Zavod za udžbenike i nastavna sredstva, Beograd.

Tomović G, Niketić M, Novčić R, Ćalić I & Žukovec D. 2006. What actually is "*Viola kopaonikensis*" Pančić?. IV Balkan Botanical Congress, "Plant, fungal and habitats diversity, investigation and conservation", Book of Abstracts, Sofia, Bulgaria, 201.

Urbaniak J, Gabka M & Blaženčić J. 2008. *Nitella tenuissima*, a rare Charophyte in Central and Southern Europe. *Cryprogamie*, *Algologie*, **29**(2): 161-171.

Vrhovšek D, Blaženčić J, Urbanc-Berčič O, Kosi G, Bricelj T, Brancelj M, Povž M, Voh J, Remec Š & Dobravec J. 1991. Ocenitev stanja in spremljanje procesa evtrofizacije v Bohinjskem jezeru 1986-1990. Tisk Skušek, pp. 1-64, Ljubljana.

Vukojičić S. 1996. Pančićev herbar-osnova za istraživanje ugrožene flore Srbije. 5. Kongres ekologa Jugoslavije, Zbornik sažetaka, Beograd, pp. 36-37.

Vukojičić S. 1997. Analiza i revizija Pančićevog herbara kao osnove za istraživanja ugrožene flore Srbije. Magistarska teza, Biološki fakultet, Univerzitet u Beogradu, pp. 1-102.

Vukojičić S, Lakušić D. 2006. Herbarium material of Josif Pančić from Bulgaria. IV Balkan Botanical Congress, "Plant, fungal and habitats diversity, investigation and conservation", Book of Abstracts, Sofia, Bulgaria, 109.

Vukojičić S, Lakušić D & Stevanović V. 2000. Presentation of herbarium collection of Josif Pančić-Herbarium Pancicianum (HERB. PANC.-BEOU). Second Balkan Botanical Congress, Abstracts, Istanbul, Turkey, 61.