

SARA's tale of Herzegovinian Centre of Endemism

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Abstract: According to the Herbarium of the National Museum of Bosnia and Herzegovina (SARA), the Herzegovinian Centre of Endemism represents significant biodiversity of higher plants: 98 families, 460 genera, 1104 species, and 224 subspecies. Within this number, there are 156 endangered, as well as 96 endemic and 13 stenoendemic taxa. Forty-seven (47) registered nomenclatural types are a particular feature of the researched area. The Herbarium of the National Museum of Bosnia and Herzegovina contributes a large amount of valuable and unique specimen data for future investigations. To access them quickly and make them available for scientific investigations, we must prioritize SARA's digitization and data sharing.

Keywords: Herbarium, specimen, nomenclatural type, endangerment, biodiversity, digitization

INTRODUCTION

By the 17th century, herbarium collections were critical components of biological research infrastructure (Marsico et al., 2020). In the beginning, they were the precious basis of information for the extensive assortment of classical taxonomic and floristic studies (Metsger and Byers, 1999; Lister et al., 2010). The last century opened the door to progressively diverse and innovative uses of herbaria and assigned possible forthcoming applications (Heberling et al., 2019). Diversification of herbaria research and increased citation of its authors of specimen were clarified by the impending development of interdisciplinary and integrative studies. Nowadays, herbarium specimens provide a valuable source for different research areas: from global changes, conservation biology, and bioprospecting to fundamental taxonomic, ecological, molecular, phylogeographic, and evolutionary investigations.

Regional, national, and small herbaria collections represent a crucial source of information with the aim to overpass critical geographic gaps in preserving and expanding our knowledge of taxonomy, phytogeography, and global biodiversity. Therefore, digitization and data sharing are crucial for balancing research access to all herbaria (Williams & Crouch, 2017; Marsico et al., 2020).

NATIONAL MUSEUM OF BOSNIA AND HERZEGOVINA

The founding of the National Museum of Bosnia and Herzegovina in Sarajevo in 1888 represents an important event in the cultural history of this country. From its establishment until today, the National Museum has left deep traces in the development of science and culture, enabling crucial changes that led to the birth and development of many scientific disciplines and fields of culture (Dautbegović, 1988).

Since the founding of the Museum, the Department of Natural Sciences has been functioning throughout three divisions: Geological, Botanical, and Zoological. The Botanical division encloses the Library, the Botanical Garden, and Herbarium collection. Herbarium of the National Museum, with the museum code-name SARA, includes five units: the Bosnian-Herzegovinian collection with about 55,000 specimens, the general part with about 60,000, the collection of Otto Blau 2,503, the collection of Erich Brandis 13,013 and the collection of Nomenclatural types with 392 specimens. The collection of Erich Brandis is the oldest large-scale botanical collection in the territory of Bosnia and Herzegovina.

RESEARCH AREA

The Bosnian-Herzegovinian collection, among others, holds specimens from the area designated as the Herzegovinian Centre of Endemism (HENC). This centre represents glacial, rare, and endemic flora concentrated on high mountains: Prenj, Čvrsnica, Čabulja, and Velež, which lie on both sides

of the middle course of the river Neretva, to the north and northwest of the city of Mostar (Bjelčić & Šilić, 1971). The Herzegovinian centre of endemism roughly covers the area from the accumulation of Lake Jablanica in the north to the Bijelo Polje valley in the south, and from the settlement of Boračko Lake in the east to the furthestmost northwest slopes of Mt. Čabulja in the west (Fig. 1).



Figure 1. Herzegovinian Centre of Endemism (HENC)

The elevation of mountains Prenj, Čvrsnica, and Čabulja massifs to today's heights, the formation of the Neretva canyon and well-cut valleys of its tributaries, are the result of vertical uplift movements in the late Neogene and the Quaternary (Lepirica, 2007). The glaciations that followed in this area found an already formed mountain relief, and the extent of glacial phenomena depended on the relief, deep Neretva canyons, and geographical position (Bjelčić & Šilić, 1971). The most dominant modern geological process present in the study area is karst erosion. It created the bays and plateaus of Prenj, Čvrsnica, Plasa, and Čabulja mountains. In addition, the diversity of landscapes of the Herzegovinian Centre of Endemism supplements the appearance of exokarst forms (Lepirica, 2007).

The geographical position of the researched area resulted in the intersection of various, rare and significant species for science. Mesozoic carbonate rocks (limestone and dolomites) have a dominant role in their structure (Lepirica, 2005). The mountains Prenj, Čvrsnica, and Čabulja, were influenced by continental climate from the north and the Mediterranean from the south while the highest peaks (Velika Čvrsnica, 2228 m above sea level and Zelena glava, 2155 m above sea level) have alpine climatic conditions. Precisely, such climate transitions and diversity have contributed to biodiversity of the Herzegovinian Centre of Endemism (Bjelčić & Šilić, 1971).

The objectives of this paper were: to explore the diversity of flora of the Herzegovinian Centre of Endemism, according to the data from the Herbarium of the National Museum; to review the nomenclature of the specimens; to detect the presence of endangered and endemic taxa, and to identify nomenclatural types from the study area.

MATERIAL AND METHODS

The SARA Catalogue of vascular plants from the Herzegovinian Centre of Endemism (HENC) was prepared as an electronic supplementary material temporary available at the editorial office while the official database is under construction (Supplement 1). It included all available specimen label records: taxonomic identification, collector(s) name, date of collection, and collection site with not so often given details (e.g., geopolitical location, GPS coordinates, or habitat information). Supplement 1 provides an overview of all the above-mentioned data, classified into eight columns: family name, species name and infraspecies taxa, revised taxon name (Euro+Med, 2021; WFO, 2021), site name, phytocenological affiliation, geological background and altitude, name of legator and determinant, and date of collection. The list of families, as well as genera, is given in alphabetical order.

Conservation status was specified according to the IUCN Red List (IUCN 2021) and the Red List of Vascular Flora for the Federation of BiH (Đug et al., 2013). The endemic status of plant species is indicated, with an asterisk next to the species name, according to Đug et al. (2013), Lubarda et al. (2014), and nomenclatural types according to Šilić et al. (1984).

RESULTS AND DISCUSSION

The oldest specimen in the herbarium of the National Museum, from the Herzegovinian Centre of Endemism, is *Satureja subspicata* Bartl. ex Vis. subsp. *subspicata* from Mt. Prenj (Supplement 1), collected by Moellendorff in 1871. Out of 55 participated legators from this region, Karl Malý made the largest contribution with 2001 collected specimens, which makes up 43.6%. Additional legators were Čedomil Šilić with 564 collected exicates (12.3%), Franz Fiala with 374 (8.15%), V. Loschnigg with 344 (7.50%), etc.

SARA'S COLLECTION OF THE VASCULAR PLANTS FROM THE HERZEGOVINIAN CENTRE OF ENDEMISM

The SARA Catalogue of vascular plants (Supplement 1) from the Herzegovinian Centre of Endemism provides an updated reference list of 4585 registered exicates of vascular plants, namely 1104 accepted species and 224 subspecies from 98 families (Tab. 1). Several exicates (110) were excluded from further analyses, more specifically: 82 were determined up to

the genus level, 24 still do not have a resolved taxonomic status, and 4 have uncertain hybrid origin.

It is important to underline, concerning some problematic taxonomic cases, that the consulted databases (Euro+Med, 2021 WFO, 2021) were not always congruent with other respectful references. For illustration, such a case was with *Crataegus oxyacantha* L. recognized as a synonym of the *C. rhipidophylla* Gand. (Supplement 1, Euro+Med, 2006; WFO, 2021), that is in contradiction with miscellaneous typifications of this taxon according to other opinions (Christensen, 1992).

Herzegovinian Centre of Endemism (HENC) collection comprised of 56% of the total number of vascular plants families (175), 38% of species (3359), and 20% of subspecies (1091) recognized in Bosnia and Herzegovina by Redžić et al. (2008). According to SARA's collection, this region highly contributes to the vascular plant diversity of Bosnia and Herzegovina.

The family Compositae is the most numerous, with 71 genera, 183 accepted species and 74 subspecies. It is followed by families Apiaceae with 35 genera (54 species and 11 subspecies) and Poaceae with 34 genera (61 species and 11 subspecies). A large number of families represented by only one genus (48.9% of the total number, Tab. 1) notably contributes to the diversity of the researched area (Tab. 1).

SARA'S COLLECTION OF THE ENDANGERED AND ENDEMIC PLANTS FROM THE HERZEGOVINIAN CENTRE OF ENDEMISM

The collection of the Herzegovinian Centre of Endemism contains specimens for 156 threatened taxa (Supplement 1). Out of 156 threatened taxa, 28.20% (44) are Endangered (EN), 3.84% (6) are Critically Endangered (CR), and 30.2% (48) are Vulnerable (VU, Đug et al., 2013, Tab. 2). The species with Endangered and Critically Endangered conservation status were collected from 253 sites.

Due to the period when threatened species were collected, their existence remains questionable. Thankfully, the current presence was confirmed for some of the species. For example, author Šilić confirmed the presence of the Critically Endangered species *Doronicum grandiflorum* Lam. on Mt. Čvrsnica in 2002. (Supplement 1), firstly registered by Vandas in 1889. According to SARA's collection, 3.42% have a certain kind of conservation status (Tab. 2). Often the local conservation status did not correspond to the IUCN Red List (IUCN 2021). For instance, according to the Red List of Vascular Flora for the Federation of BiH (Đug et al., 2013), nine taxa have the status of Vulnerable species, while according to the IUCN Red List (IUCN, 2021), these taxa are the Least Concern (Tab. 2).

Table 1. Different taxonomic ranks of the vascular flora deposited in the SARA from HENC

Number of genera per family	Families (number of: exicates/species/subspecies)
1	Acanthaceae (3/2/0), Amaranthaceae (2/1/0), Amaryllidaceae (4/2/2), Anacardiaceae (1/1/0), Aquifoliaceae (2/1/0), Araceae (1/1/0), Aspleniaceae (18/6/0), Athyriaceae (2/1/0), Berberidaceae (1/1/0), Betulaceae (1/1/0), Cannabaceae (1/1/0), Caprifoliaceae (4/4/0), Clusiaceae (9/3/1), Colchicaceae (8/1/0), Cornaceae (4/2/0), Cucurbitaceae (1/1/0), Cupressaceae (20/3/1), Dennstaedtiaceae (1/1/0), Grossulariaceae (3/2/0), Haloragaceae (1/1/0), Lentibulariaceae (3/2/0), Liliaceae (1/1/0), Linaceae (14/7/1), Loranthaceae (1/0/1), Lycopodiaceae (1/1/0), Moraceae (2/1/0), Nymphaeaceae (1/1/0), Oleaceae (4/2/0), Ophioglossaceae (1/1/0), Oxalidaceae (1/1/0), Parnassiaceae (1/1/0), Paulowniaceae (1/1/0), Pinaceae (13/3/0), Plumbaginaceae (11/1/1), Potamogetonaceae (9/4/0), Resedaceae (3/1/0), Salicaceae (26/9/0), Santalaceae (5/3/0), Sapindaceae (20/4/1), Saxifragaceae (56/13/0), Selaginellaceae (2/1/0), Tamaricaceae (1/1/0), Taxaceae (4/1/0), Tiliaceae (3/2/0), Ulmaceae (1/1/0), Urticaceae (1/1/0), Violaceae (40/9/3), Vitaceae (2/1/0)
2	Apocynaceae (12/3/1), Aristolochiaceae (2/2/0), Asparagaceae (4/2/0), Celstraceae (2/2/0), Cistaceae (22/5/2), Cystopteridaceae (9/2/1), Dryopteridaceae (24/5/0), Euphorbiaceae (47/20/0), Geraniaceae (22/11/0), Iridaceae (6/2/1), Juncaceae (7/5/0), Lythraceae (3/3/0), Malvaceae (9/4/0), Onagraceae (14/6/0), Polygalaceae (34/4/2), Scrophulariaceae (45/12/3), Thymelaeaceae (9/5/0), Typhaceae (3/3/0), Viburnaceae (15/3/0)
3	Convolvulaceae (7/5/0), Corylaceae (8/3/0), Crassulaceae (28/9/0), Fagaceae (16/4/0), Polygonaceae (17/7/1), Rhamnaceae (52/5/1), Rutaceae (14/3/0), Solanaceae (12/4/0), Valerianaceae (29/9/1)
4	Chenopodiaceae (6/3/0), Dipsacaceae (47/12/3), Gentianaceae (82/9/4), Papaveraceae (7/4/1), Rubiaceae (85/25/3)
7	Campanulaceae (86/23/0), Ericaceae (32/9/0), Primulaceae (66/13/1)
8	Cyperaceae (34/19/0), Orobanchaceae (93/25/1), Plantaginaceae (125/36/3)
10	Ranunculaceae (96/24/3)
11	Orchidaceae (32/16/1)
13	Caryophyllaceae (260/53/16)
14	Boraginaceae (110/27/3)
20	Fabaceae (249/66/30)
22	Rosaceae (309/79/10)
24	Lamiaceae (661/60/25)
28	Brassicaceae (171/45/7)
34	Poaceae (155/61/4)
35	Apiaceae (202/54/11)
71	Compositae (890/183/74)

Table 2. The threatened taxa of the vascular flora deposited in the SARA from HENC (¹Dug et al., 2013; ²IUCN Red List)

Taxon	Status
<i>Cardamine graeca</i> L., <i>Doronicum grandiflorum</i> Lam., <i>Minuartia handelii</i> Mattf., <i>Primula acaulis</i> (L.) L., <i>Primula minima</i> L.	CR ¹
<i>Alyssum moellendorffianum</i> Asch. ex Beck, <i>Amphoricarpos neumayeri</i> Vis. (= <i>Amphoricarpos neumayerianus</i> (Vis.) Greuter), <i>Aquilegia dinarica</i> Beck, <i>Asperula hercegovina</i> Degen, <i>Asperula scutellaris</i> Vis., <i>Asyneuma canescens</i> (Waldst. & Kit.) Griseb. & Schenk, <i>Bartsia alpina</i> L., <i>Bellidiastrum michelii</i> Cass., <i>Centaurea glaberrima</i> Tausch, <i>Cephalaria flava</i> (Sibth. & Sm.) Szabó, <i>Chaerophyllum coloratum</i> L., <i>Euphrasia illyrica</i> Wettst., <i>Euphrasia liburnica</i> Wettst., <i>Festuca bosniaca</i> Kumm. & Sendtn., <i>Festuca halleri</i> All., <i>Galium boreale</i> L., <i>Gentiana lutea</i> subsp. <i>symphyandra</i> (Murb.) Hayek, <i>Hieracium humile</i> Jacq., <i>Kernera saxatilis</i> (L.) Sweet, <i>Lathyrus alpestris</i> (Waldst. & Kit.) Čelak., <i>Linaria alpina</i> (L.) Mill., <i>Moehringia ciliata</i> (Scop.) Dalla Torre, <i>Opopanax chironium</i> (L.) W. D. J. Koch, <i>Oxytropis prenja</i> (Beck) Beck, <i>Petasites kablikianus</i> Bercht., <i>Peucedanum longifolium</i> Waldst. & Kit., <i>Peucedanum neumayeri</i> (Vis.) Reichb. fil. (= <i>Peucedanum arenarium</i> subsp. <i>neumayeri</i> (Vis.) Stoj. & Stef.), <i>Plantago gentianoides</i> Sibth. & Sm., <i>Polygala croatica</i> Chodat (= <i>Polygala alpestris</i> subsp. <i>croatica</i> (Chodat.) Hayek), <i>Rhamnus illyrica</i> Griesb. ap. Pant. (= <i>Rhamnus orbiculata</i> Bornm.), <i>Rhamnus pumila</i> Turra, <i>Saxifraga oppositifolia</i> L., <i>Scorzonera austriaca</i> Willd., <i>Scrophularia bosniaca</i> Beck, <i>Taraxacum alpinum</i> Hegetschw., <i>Thesium parnassi</i> A. DC., <i>Veronica satrejoideis</i> Vis.	EN ¹
<i>Corylus colurna</i> L., <i>Daphne laureola</i> L., <i>Goodyera repens</i> (L.) R. Br., <i>Gymnadenia odoratissima</i> (L.) Rich., <i>Salix glabra</i> Scop., <i>Selaginella helvetica</i> (L.) Spring, <i>Vicia ochroleuca</i> Ten. (= <i>Vicia pisiformis</i> L.)	EN ¹ , LC ²
<i>Campanula hercegovina</i> Degen & Fiala, <i>Ajuga pyramidalis</i> L., <i>Anthyllis vulneraria</i> subsp. <i>alpestris</i> (Schult.) Asch. & Graebn., <i>Arenaria gracilis</i> Waldst. & Kit., <i>Cerastium decalvans</i> Schloss. & Vuk., <i>Cerastium grandiflorum</i> Waldst. & Kit., <i>Coronilla vaginalis</i> Lam., <i>Dianthus petraeus</i> Waldst. & Kit., <i>Edraianthus hercegovinicus</i> Malý, <i>Edraianthus serpyllifolius</i> (Vis.) A. DC., <i>Edraianthus tenuifolius</i> (Waldst. & Kit.) A. DC., <i>Euphorbia capitulata</i> Rchb., <i>Genista sylvestris</i> subsp. <i>dalmatica</i> (Bartl.) H. Lindb., <i>Knautia dinarica</i> (Murb.) Borbás, <i>Knautia sarajevensis</i> (Beck) Szabó, <i>Onosma stellulata</i> Waldst. & Kit., <i>Phyteuma orbiculare</i> L., <i>Primula kitaibeliana</i> Schott., <i>Satureja subspicata</i> Bartl. ex Vis. subsp. <i>subspicata</i> , <i>Scabiosa silenifolia</i> Waldst. & Kit., <i>Sedum atratum</i> L., <i>Soldanella alpina</i> L., <i>Stachys anisochila</i> Vis. & Pančić, <i>Teucrium arduinii</i> L., <i>Viola biflora</i> L.	LC ¹
<i>Cyclamen purpurascens</i> Mill., <i>Geum bulgaricum</i> Pančić, <i>Juniperus sabina</i> L., <i>Pinus heldreichii</i> H. Christ	LC ^{1,2}
<i>Gentiana dinarica</i> Beck, <i>Achillea abrotanoides</i> (Vis.) Vis., <i>Achillea clavennae</i> L., <i>Anemone baldensis</i> L., <i>Aster alpinus</i> L., <i>Astrantia carniolica</i> Jacq., <i>Bupleurum karglii</i> Vis., <i>Centaurea kotschyana</i> Heuff., <i>Centaurea murbeckii</i> Hayek, <i>Daphne blagayana</i> Freyer, <i>Delphinium fissum</i> Waldst. & Kit., <i>Dianthus freynii</i> Vandas, <i>Dryas octopetala</i> L., <i>Euphorbia fragifera</i> Jan., <i>Festuca dalmatica</i> (Hack.) K. Richt., <i>Gentianella crispata</i> (Vis.) Holub, <i>Grafia golaka</i> (Hacq.) Rchb., <i>Helleborus multifidus</i> Vis., <i>Knautia travnicensis</i> (Beck) Szabó, <i>Lathyrus binatus</i> Pančić, <i>Melampyrum trichocalycinum</i> Vandas, <i>Minuartia graminifolia</i> subsp. <i>clandestina</i> (Port.) Mattf., <i>Orobanche flava</i> F. W. Schultz, <i>Orobanche panicii</i> Beck, <i>Pedicularis leucodon</i> Griseb., <i>Poa minor</i> Gaudin, <i>Poa pumila</i> Host, <i>Potentilla apennina</i> Ten., <i>Potentilla speciosa</i> Willd., <i>Reichardia macrophylla</i> (Vis. & Pančić) Pančić, <i>Saxifraga aizoides</i> L., <i>Saxifraga caesia</i> L., <i>Saxifraga glabella</i> Bertol., <i>Saxifraga prenja</i> Beck, <i>Silene acaulis</i> (L.) Jacq., <i>Silene marginata</i> (Kit.) Kit., <i>Silene retzdorffiana</i> (K. Malý) H. Neumayer, <i>Veronica aphylla</i> L., <i>Vicia montenegrina</i> Rohlena.	VU ¹
<i>Adenophora liliifolia</i> (L.) A. DC., <i>Cephalanthera rubra</i> (L.) Rich., <i>Ilex aquifolium</i> L., <i>Nuphar lutea</i> (L.) Sm., <i>Pinguicula leptoceras</i> Rchb., <i>Rhodiola rosea</i> L., <i>Sorbus chamaemespilus</i> (L.) Crantz, <i>Tanacetum cinerariifolium</i> (Trevir.) Sch. Bip., <i>Taxus baccata</i> L.	VU ¹ , LC ²
<i>Asplenium lepidum</i> C. Presl	VU ¹ NT ²
<i>Androsace lactea</i> L., <i>Arenaria biflora</i> L., <i>Campanula cochleariifolia</i> Lam., <i>Festuca panciciana</i> (Hack.) K. Richt., <i>Genista sericea</i> Wulfen, <i>Legousia hybrida</i> (L.) Delarbre, <i>Moltkia petraea</i> (Tratt.) Griseb., <i>Oxytropis campestris</i> (L.) DC., <i>Saxifraga marginata</i> Sternb., <i>Scutellaria alpina</i> L., <i>Sedum magellense</i> Ten., <i>Silene reichenbachii</i> Vis., <i>Thymus alpestris</i> (Čelak.) Tausch ex A. Kern., <i>Thymus bracteosus</i> Vis. ex Benth., <i>Trifolium noricum</i> Wulfen	NT ¹
<i>Anacamptis pyramidalis</i> (L.) Rich., <i>Petteria ramentacea</i> (Sieber) C. Presl., <i>Platanthera chlorantha</i> (Custer) Rchb.	NT ¹ , LC ²
<i>Carduus ramosissimus</i> Pančić, <i>Centaurea rupestris</i> L., <i>Erigeron atticus</i> Vill., <i>Geum molle</i> Vis. et Pančić, <i>Linaria pelisseriana</i> (L.) Mill., <i>Melampyrum hoermannianum</i> K. Malý, <i>Oxytropis jacquinii</i> Bunge	DD ¹
<i>Arabis scopoliana</i> Boiss., <i>Veronica scardica</i> Griseb.	DD ^{1,2}
<i>Carex nigra</i> (L.) Reichard, <i>Prunus cocomilia</i> Ten.	DD ¹ , LC ²

The complex of Čvrsnica, Čabulja, Prenj, and Velež mountains is named the Herzegovinian Centre of Endemism due to its exceptional wealth of endemic taxa (Bjelčić & Šilić, 1971; Šilić et al., 1984; Bjelčić, 1987). According to the SARA's collection and Euro+Med PlantBase, including WFO (2021), 96 taxa from HENC were endemic (Supplement 1). Regrettably, there is a great variety of unrecognized endemic taxa, from the Balkan region, especially the Dinaric Alps. Such is the case with the endemic taxon *Rhamnus pumila* Turra subsp. *illyrica* Šilić (Šilić, 2005) whose subspecies status has not been accepted so far (Euro+Med PlantBase; WFO, 2021). Namely, 13 stenoendemic taxa (of 23 in total for Bosnia and Herzegovina) from the centre of endemism were deposited in SARA's herbarium: *Clinopodium alpinum* subsp. *orontium* (K. Malý) Govaerts, *Alyssum moellendorffianum* Asch. ex Beck, *Asperula hercegovina* Degen, *Campanula hercegovina* Degen & Fiala, *Centaurea murbeckii* Hayek, *Dianthus freynii* Vandas, *Edraianthus hercegovinicus* K. Malý, *Euphorbia barrelieri* subsp. *hercegovina* (Beck) Kuzmanov, *Melampyrum trichocalycinum* Vandas, *Minuartia handelii* Mattf., *Oxytropis prenja* (Beck) Beck, *Thymus richardii* Pers. subsp. *richardii*, including *Potentilla heptaphylla* subsp. *veležensis* currently registered as *P. heptaphylla*.

SARA'S COLLECTION OF THE NOMENCLATURAL TYPE SPECIMENS FROM THE HERZEGOVINIAN CENTRE OF ENDEMISM

Nomenclatural types determine the relevance of names of taxonomic groups. According to Shenzhen Code (Turland et al., 2018), a type (*typus*) in biological nomenclature is a constituent to which the name of a taxon is eternally linked. Consequently, nomenclatural types have great significance for Herbarium collections, and they are subjects of particular preservation. A catalogue of vascular plants types from the SARA's herbarium includes 392 type specimens (Šilić et al., 1984). The nomenclatural types from the Herzegovinian Centre of Endemism make 12% (47 specimens) of the total number of species (Tab. 3). The oldest holotype (Fig. 2) is *Alyssum cinereum* O. Blau (= *Alyssum moellendorffianum* Asch. ex G. Beck) collected by Otto Blau in 1869 (Tab. 3).

Table 3. The nomenclatural types, including *Jocuss classicus*, deposited in the SARA from HENC

No	Taxon	Locus classicus	Nomenclatural types
1	<i>Seseli hercegovinum</i> K. Malý	<i>In saxosis montis</i> Glogovo prope Jablanica	HOLOTYPUS
2	<i>Peucedanum illyricum</i> K. Malý	<i>In declivibus petrosis et dumetosis faucis</i> Gudura Neretve prope Karaula; cca 140 m s. m.	SYNTYPUS
3	<i>Anthriscus fumaroides</i> (W.K.) Spreng. f. <i>calvescens</i> K. Malý	Čabulja pl.; 1240 m	TYPUS
4	<i>Hyacinthus dalmaticus</i> Backer var. <i>veležensis</i> Beck	na Velikoj Veleži kod Mostara	SYNTYPUS
5	<i>Myosotis ronnigeri</i> K. Malý	<i>In pratis saxosis apricis vallis</i> Lapov dol in montibus Preslica planina; solo calcareo; cca 1300 m s. m.	HOLOTYPUS
6	<i>Campanula hercegovina</i> Degen & Fiala	<i>In rupium calcar. fissuris montis</i> Glogovo planina prope Jablanica	ISOTYPUS
7	<i>Campanula hercegovina</i> Degen & Fiala var. <i>squarosa</i> Degen & Fiala	Čvrsnica pl. (Waldregion)	HOLOTYPUS
8	<i>Campanula patula</i> L. var. <i>micrantha</i> K. Malý	<i>In fauce Naronitana prope stationem ferrem</i> Prenj; 170 m s. m.	HOLOTYPUS
9	<i>Hedraeanthus hercegovinus</i> K. Malý	Veliki Jelenak, do vrha - 2170 m	HOLOTYPUS
10	<i>Phyteuma sieberi</i> Spreng. var. <i>brandisianum</i> K. Malý	Mala i Velika Čvrsnica	HOLOTYPUS
11	<i>Dianthus freynii</i> Vandas	Plasa pl.	TOPOTYPUS
12	<i>Heliosperma retzdorffianum</i> K. Malý (<i>Silene quadridentata</i> /Murr./ Pers. subsp. <i>retzdorffiana</i> /Malý/ Neumayer; <i>Silene retzdorffiana</i> /K. Malý/ Walters)	Jablanica (Narenta): An Felsen umweit der Doljanka	HOLOTYPUS
13	<i>Moenchia mantica</i> (L.) Bartl. var. <i>hercegovinica</i> K. Malý	bei Soviči - Ljubuški	SYNTYPUS
14	<i>Alyssum cinereum</i> O. Blau (<i>Alyssum moellendorffianum</i> Ascherson)	In kalkigem Berglezum in Treschanitz - Tal	HOLOTYPUS

15	<i>Hieracium cottetii</i> Godet subsp. <i>glogošnicae</i> Loschnigg & Zahn	Prenj planina - Glogošnica (Obodić)	HOLOTYPUS
16	<i>Hieracium praecurrens</i> Vukot. subsp. <i>megaladenophyes</i> K. Malý & Zahn	<i>In saxosis vallis</i> Doljanka prope Jablanica; cca 300 m s. m.	HOLOTYPUS
17	<i>Hieracium guentheri</i> - <i>beckii</i> Zahn subsp. <i>ortisanum</i> Fiedler & Zahn	Prenj planina - <i>in rupibus calcareis montis</i> Ortiš; 1950 m	TOPOTYPUS
18	<i>Hieracium tauschii</i> Zahn subsp. <i>bokševicanum</i> K. Malý & Zahn	<i>In monte</i> Bokševica prope Ostrožac; 1000 m s. m.	HOLOTYPUS
19	<i>Hieracium tauschii</i> Zahn subsp. <i>viridantiforme</i> K. Malý & Zahn	<i>In monte</i> Bokševica prope Ostrožac; 1000 m s. m.	HOLOTYPUS
20	<i>Tragopogon tommasinii</i> Schultz - Bip. var. <i>glaber</i> K. Malý	Velež kod Mostara; cca 1200 m s. m.	HOLOTYPUS
21	<i>Leontodon illyricus</i> K. Malý	Auf einer humosen Stelle der Čvrtnica pl.; cca 2000 m s. m.	HOLOTYPUS
22	<i>Centaurea variegata</i> Lam. var. <i>pseudomontana</i> K. Malý	Hänfig in den mit Weiskiefern bepflanzten Bergabhängen <i>bei</i> Konjic; cca 300 m s. m.	HOLOTYPUS
23	<i>Anthyllis jancheniana</i> K. Malý	Mala Čvrtnica	HOLOTYPUS
24	<i>Oxytropis prenja</i> G. Beck	<i>In saxosis calc. montis</i> Prenj pl.: Ortiš; cca 2000 m	TOPOTYPUS
25	<i>Lathyrus alpestris</i> Rchb. var. <i>regis</i> - <i>alexandri</i> G. Širjaev	Čvrtnica planina: Veliko Šljeme; cca 1700 m s. m.	TYPUS
26	<i>Calamimorpha</i> × <i>narentana</i> (K. Malý) Šilić	<i>In declivibus lapidosus secus flumen Narenta et in faucibus finitimis singulariter, solo calcareo</i> , 130-150 m s. m.	HOLOTYPUS
27	<i>Clinopodium vulgare</i> L. f. <i>minus</i> Šilić	iznad sela Kostajnica kod Ostrošca, cca 370 m s. m.; na kiselom zemljištu	HOLOTYPUS
28	<i>Micromeria thymifolia</i> (Scop.) Fritsch f. <i>condensata</i> Č. Šilić f. nov.	Prenj: Kantar	HOLOTYPUS
29	<i>Micromeria thymifolia</i> (Scop.) Fritsch f. <i>macrodonata</i> Č. Šilić f. nov.	Diva Grabovica prope Jablanica	HOLOTYPUS
30	<i>Satureja (Calamintha) orontia</i> K. Malý (Syn. <i>Acinos orontia</i> /K. Malý/ Šilić)	<i>In apricis declivibus et in pinetis (Pinetum nigrae) agri Konjicensis</i> ; cca 280 m s. m.	HOLOTYPUS
31	<i>Satureja subspicata</i> Bartl. ex Vis. subsp. <i>subspicata</i> f. <i>obovata</i> Č. Šilić	Prenj pl.: Kantar	HOLOTYPUS
32	<i>Stachys anisochila</i> Vis. & Pančić var. <i>diversicalyx</i> K. Malý f. <i>micrantha</i> K. Malý <i>in sched.</i>	<i>In saxosis vallis</i> Trešnica <i>ad viam inter</i> Podorašac et Konjic; cca 280-360 m s. m.	SYNTYPUS
33	<i>Stachys sendtneri</i> G. Beck	Dugo polje, <i>inter montis</i> Čvrtnica et <i>montis</i> Vran; cca 1200 m s. m.	TYPUS
34	<i>Stachys labiosus</i> Bertol. var. <i>sendtneri</i> G. Beck f. <i>diversicalyx</i> K. Malý (Syn. <i>S. anisochila</i> Vis. & Pančić var. <i>diversicalyx</i> K. Malý)	<i>In vallis</i> Trešnica <i>inter</i> Podorašac - Konjic; cca 350-370 m s. m.	SYNTYPUS
35	<i>Stachys subcrenata</i> Vis. var. <i>petragena</i> (Malý) Hayek f. <i>illyrica</i> K. Malý	<i>In declivibus orientalis. m.</i> Veliki Jelenak; cca 1700 m s. m.	TYPUS
36	<i>Stachys subcrenatus</i> Vis. var. <i>illyricus</i> K. Malý	Am Jelenak <i>in der</i> Čvrtnica pl.; cca 1800 m s. m.	SYNTYPUS
37	<i>Stachys subcrenatus</i> Vis. var. <i>angustifolia</i> Vis. f. <i>hercegovina</i> K. Malý	<i>In subalpinis mte</i> Velež; <i>solo calcareo</i> ; cca 1400 m s. m.	HOLOTYPUS
38	<i>Stachys anisochila</i> Vis. & Pančić f. <i>elliptica</i> K. Malý	<i>In saxosis dolomitica vallis</i> Trešnica <i>inter</i> Podorašac et Konjic	TYPUS
39	<i>Acinos orontius</i> (K. Malý) Šilić f. <i>albiflora</i> Č. Šilić	Vrtaljica: <i>in saxosis dolomit.</i> ; cca 280 m s. m.	HOLOTYPUS
40	<i>Koeleria splendens</i> Presl. var. <i>ciliata</i> K. Malý	So besonders typisch auf Dolomit bei Podorašac, Konjic, in Ljutatale bei Konjic	HOLOTYPUS
41	<i>Rhamnus pumila</i> Turra subsp. <i>illyrica</i> Šilić (Syn. <i>Oreohertzogia pumila</i> /Turra/ Vent subsp. <i>illyrica</i> Šilić)	kanjon Rakitnice (<i>sub montem</i> Jasenov vrh) <i>in rupium fissuris</i> ; <i>solo calcareo</i> ; cca 600 m s. m.	HOLOTYPUS
42	<i>Potentilla heptaphylla</i> L. subsp. <i>veležensis</i> Beck	<i>Ad pedem montis</i> Velež prope Mostar, 1400 m s. m. (loc. class.!)	TOPOTYPUS
43	<i>Rubus hercegovinicus</i> Malý et Hruby (<i>R. sanctus</i> > <i>procerus</i>)	<i>Secus rivulum</i> Neretvica prope Ostrožac	HOLOTYPUS
44	<i>Rubus ulmifolius</i> Schott. var. <i>zahnii</i> Hruby	Bijelo polje prope Mostar	HOLOTYPUS
45	<i>Asperula aristata</i> L. fil. var. <i>gracilis</i> K. Malý	<i>In fauce</i> Rakitnica <i>ad oppidum</i> Konjic; <i>solo calcareo</i> ; cca 400 m s.m.	HOLOTYPUS
46	<i>Saxifraga prenja</i> Beck	<i>Ad nives montis</i> Plasa; <i>solo calcareo</i> ; ca 1800 m s. m.	TOPOTYPUS
47	<i>Viburnum lantana</i> L. var. <i>naronitanum</i> K. Malý	Čvrtnica: Muharnica; <i>habitat in fagetis loci</i> "Bilike" dom; cca 1130 m s. m.	HOLOTYPUS



Figure 2. The oldest Holotype: *Alyssum cinereum* O. Blau (= *Alyssum moellendorffianum* Asch. ex Beck)

CONCLUSION

Herzegovinian Centre of Endemism (HENC) represented by the mountain complex: Prenj, Čvrtnica, Čabulja, and Velež, which includes canyons of the Neretva River and its tributaries. It corresponds to the landscapes of Refugio-relict ecosystems and signifies one of the most relevant European biodiversity hotspots. SARA's collection also testifies to the importance of this unique centre of natural heritage. Regrettably, anthropo-

genic pressures are progressively reshaping its habitats, reducing, and disintegrating boundaries of this still unprotected area. According to Heberling et al. (2019), the role of museum research has transferred from documenting the diversity of life to documenting biodiversity change and predicting the future. Therefore, the digitization of this SARA's collection provides a good starting point to assist with conservation assessments for the Herzegovinian Centre of Endemism (Fig. 2).

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SAŽETAK

U periodu od 1871. do 2017. godine veliki broj botaničara je terenski istraživao floru Hercegovačkog endemnog centra čiji su podaci evidentirani u priručnoj kartoteci Herbarijuma Zemaljskog muzeja Bosne i Hercegovine. Cilj ovog rada bio je proučiti diverzitet flore Hercegovačkog endemnog centra kroz analizu podataka priručne kartoteke Herbarijuma. Utvrđena je brojnost zastupljenih taksona počevši od nivoa porodice, primijenjena nomenklatura u priručnoj kartoteci je usklađena sa važećom koja prati svjetske baze podataka, utvrđeni su ostali dostupni podaci koji su se nalazili uz eksikate (lokaliteti, legatori, datum sakupljanja itd.), te je dat poseban osvrt na ugrožene i endemične taksoni, kao i na tipske primjerke sa istraživanog područja. Od ukupno 175 biljnih porodica koje se nalaze na području Bosne i Hercegovine, čak 98 njih (56%) nalazi se rasprostranjeno na području Hercegovačkog endemnog centra što govori o bogatom genofondu istraživanog područja. Uzevši u obzir činjenicu da se na prostoru Hercegovačkog endemnog centra nalazi 156 ugroženih, 96 endemičnih i 13 stenoendemičnih taksona, očuvanje istraživanog područja je neminovno. Jedan dio endemičnih taksona je vezan isključivo za istraživano područje što ukazuje na opravdanost korištenog naziva "Hercegovački endemni centar" koji se susreće u botaničkoj literaturi. Rezultati ovog rada daju značajan doprinos ukazivanju potrebe zaštite biodiverziteta istraživanog područja, kao i pokušaj da se ukaže na izuzetno bogatstvo i važnost Herbarijuma Zemaljskog muzeja Bosne i Hercegovine te na nužnost njegovog očuvanja i digitalizacije podataka.

Ključne riječi: herbarium, primjerak, nomenklatura, tip, ugroženost, biodiverzitet, digitalizacija