PLANTS FROM JEPI MOUNTAINS, BUCEGI, PRESENT IN "ALEXANDRU BELDIE" HERBARIUM

Crisan Vlad 1, Lucian Dincă 1, Sorin Deca 2*

1 „Marin Drăcea” National Institute for Research and Development in Forestry, Romania
2 PhD student at the Romanian Academy of Advanced Studies – Bucharest, Romania

Abstract
The present article describes the plants collected from Jepi Mountains area (Buceği) and present in one of the most important Romanian herbarium - “Alexandru Beldie” Herbarium from “Marin Drăcea” National Institute for Research and Development in Forestry. The article presents the studied material, the number of vouchers with species harvested from this area as well as some characteristics of this great plant collection. The most important species collected from Jepi Mountains are also mentioned, with an analysis of their characteristics: the collection's creation period and the plant's harvesting periods. The plants collected from this area belong to 54 different genera. Most of them belong to Hieracium and Gentiana and were collected during the last century, starting with 1900 and ending in 1999. The found genera were systematized, with an emphasis on the most representative ones. Furthermore, the specialists that had an important contribution for the representation of Jepi Mountains within the herbarium are also mentioned and honored.

Keywords: “Alexandru Beldie” Herbarium, Jepi Mountains, plant vouchers.

1. INTRODUCTION
Bucegi Mountains belong to the Southern Carpathians and are located in their East part. Prahova Valley separates them from the Curvature Carpathians (figure 1). The highest peak is represented by Omu Peak, with an altitude of 2505 m. The highest area of the Bucegi Mountains is a large complex of structural plateaus located at an altitude between 1800 and 2500 m, and a local relief index of no more than 400-500 m, usually 100-200 m (Mihai et al., 2009).

”Alexandru Beldie” Herbarium was created in 1929 and is inscribed in Index Herbariorum, having the international BUCF code. With approximately 40,000 vouchers (Vechiu et al., 2018a; Dincă et al., 2018), the herbarium is owned by „Marin Drăcea” National Institute for Research and Development in Forestry from Bucharest. The herbarium contains numerous vouchers initially harvested by Al. Beldie himself and then enriched by exchanges with other national or international herbariums. As such, the herbarium is nowadays one of the most important from our country. Among the genera of plants present in this herbarium we mention: 36 Bromus species (Tudor et al., 2019), 21 Agrostis species (Cântar et al., 2019), 33 Orobanche species (Scârlătescu et al., 2017a), 42 Alnus species (Dincă et al., 2019), 6 Vaccinium species (Scârlătescu et al., 2017b), 80 Trifolium species (Cântar et al., 2018), 19 Centaurea species (Dincă et al., 2017) and 7 Lycopodium species (Vechiu et al., 2018b).

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*Corresponding author, E-mail address: sorin.stefan.deca@gmail.com
2. MATERIALS AND METHODS
The material that was used for the present article is composed of 146 vouchers belonging to different genera from the studied area. The database was created with the information inscribed on the identification labels of each voucher. As such, the following data was taken from the labels: drawer number, voucher number, plant’s scientific name, collection name, harvesting date, harvesting place, the name of the person who has collected or identified the plant. Due to the fact that the creation of the database has involved the analysis of each voucher, another characteristic was also added, namely the conservation degree of each specimen. In this way, a grade from 1 to 4 was given to each specimen as follows: 1 for an entire plant, correctly attached to the voucher and well conserved; 2 for the plant detached from the voucher with existent but detached parts; 3 for plant detached from the voucher with missing parts and 4 for plant detached and fragmented, with over 50% of its parts missing. The next step was to verify if their scientific name is accepted at an international level followed by their update based on The Plant List (www.iucnredlist.org; www.theplantlist.org; www.ipni.org; ww2.bgbm.org/EuroPlusMed/query.asp).

3. RESULTS AND DISCUSSIONS
After the vouchers were analysed and systematized, 146 vouchers were identified as containing plants collected from Bucegi Mountains, namely from Jepi Mountains. The vouchers belong to more than 54 genera, with the most representative plants from this area belonging to: *Hieracium* (18 samples from 11 species), *Gentiana* (16 samples belonging to 6 species), *Trifolium* (8 samples from 3 species), *Bupleurum* (7 samples from 3 species).

An excerpt concerning the vouchers that contain plants collected from Bucegi Mountains, area of Jepi Mountains is rendered in table no.1.
### Table 1. Plants harvested from Jepi Mountains area (Bucegi Mountains) and present in “Alexandru Beldie” Herbarium from “Marin Drăcea” National Institute for Research and Development in Forestry - excerpt

| Drawer number | Voucher number | Herbarium/ Botanic Collection / Institution (from the voucher’s label) | Species (from the voucher’s label) | Harvesting Date (from the voucher’s label) | Harvesting Place (from the voucher’s label) | Collected/ Determined by | Conservation Degree (1…4) |
|---------------|----------------|---------------------------------------------------------------------|------------------------------------|------------------------------------------|--------------------------------------------|--------------------------|---------------------------|
| 60            | 79             | Al. Beldie Herbarium Bucharest                                      | Bromus barcensis Si mk. var. romanicus | 1937.09.01.                              | Bucegi, Jepi Valley                         | Al. Beldie 1               |                           |
| 60            | 86             | Bucharest Polytechnics School Herbarium, Botanic Laboratory         | Bromus barcensis Si mk. var. romanicus | 1940.09.01.                              | Bucegi, Jepi Valley                         | Al. Beldie 1               |                           |
| 155           | 46             | The Institute of Forestry Research and Experimentsitions             | Galium erectum Huds.               | 1993.08.03.                              | Bucegi, Jepi Valley                         | Al. Beldie 1               |                           |
| 156           | 14             | Al. Beldie Herbarium Bucharest                                      | Galium schultesi Vest.             | 1935.05.01.                              | Bucegi, Jepi Valley 1150 m                  | Al. Beldie 1               |                           |
| 87            | 6              | Al. Beldie Herbarium Bucharest                                      | Gentiana philogifolia Schott et Kotschy | 1935.08.01.                              | Bucegi, Jepi Mici Mountains                 | Al. Beldie 3               |                           |
| 122           | 76             | Bucharest Polytechnics School Herbarium, Silviculture Faculty        | Dianthus tenuifolius Schur.        | 1948.09.02.                              | Bucegi, Seaca Valley of Jepi Mountains       | Al. Beldie 1               |                           |
| 44            | 70             | Bucharest Polytechnics School Herbarium, Botanic Laboratory         | Artemisia petrosa Baum. ssp. carpatica | 1939.09.03.                              | Bucegi, Jepi Valley                         | P. Crețoiu 2               |                           |
| 47            | 21             | Bucharest Polytechnics School Herbarium                             | Trifolium repens L.var. ochranthum  | 1940.09.01.                              | Bucegi, Jepi Valley                         | P. Crețoiu, Al. Beldie 1   |                           |
| 62            | 49             | Bucharest Polytechnics School Herbarium                             | Bupleurum falcatum L.             | 1946.08.01.                              | Bucegi, Jepi Mountains                      | Al. Beldie 2               |                           |
| 37            | 1              | The Institute of Forestry Research and Experimentsitions             | Hieracium nigrescens              | 1935.03.09.                              | Bucegi, Jepi Mici Mountains                 | Al. Beldie 1               |                           |

In the area of Jepi Mountains there were also identified following species in "Alexandru Beldie” Herbarium: Achillea millefolium subsp. stricta (Schleich. ex Heimerl) Hyl., Aconitum anthora L., Aconitum toxicum Rchb., Elymus caninus (L.) L., Agrostis rupestris All., Alchemilla glaucescens Wallr., Alchemilla heteropoda Buser, Alchemilla obtusa Buser, Alchemilla fissa Günther & Schummel., Allium oleraceum L., Androsace lactea L., Anemone narcissiflora L., Angelica archangelica L., Cota tinctoria subsp. fussii (Griseb. & Schenk) Oberpr. & Greuter, Anthyllis alpestris (Schult.) Kit., Angelica archangelica L., Arenaria biflora L., Artemisia umbelliformis subsp. eriantha (Ten.) Vallès-Xirau & Oliva Brañas, Astrantia major L., Helictotrichon pubescens (Huds.) Schult. & Schult.f., Helictotrichon planiculme (Schrad.) Pilg., Brachypodium pinnatum (L.) P.Beauv., Bromus riparius Rehmann, Bupleurum falcatum subsp. cernuum (Ten.) Arcang., Bupleurum falcatum L., Bupleurum longifolium L., Conioselinum vaginatum (Spreng.) Thell., Dianthus carthusianorum subsp. tenuifolius (Schur) Hegi, Kobresia myosuroides (Vill.) Fiori, Equisetum hyemale L., Equisetum pratense Ehrl., Festuca amethystina L., Festuca altissima All., Galium austriacum Jacq., Galium album Mill., Galium mollugo L., Galium intermediate Schult., Galium verum L., Gentiana asclepiadea L., Gentiana acaulis L., Gentiana cruciata L., Gentianella

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*Corresponding author, E-mail address: sorin.stefan.deca@gmail.com*
lutescens (Velen.) Holub, Gentianella austriaca (A.Kern. & Jos.Kern.) Holub, Gentiana punctata L., Gentiana verna L., Hedysarum hedsaroides (L.) Schinz & Thell., Hieracium bifidum Ser. ex Froel., Hieracium fritzeii F.W.Schultz, Hieracium murorum C.B.Clarke, Hieracium murorum subsp. medianum (Griseb.) Zahn, Hieracium nigrescens Willd., Hieracium pietrosoense Degen & Zahn, Hieracium praecurrens Vuk., Hieracium prenanthoides subsp. lanceolatum (Vill.) Zahn, Pilosella stoloniflora (Waldst. & Kit.) F.W.Schultz & Sch.Bip., Hieracium villosum Jacq., Hieracium villosum subsp. ovalifolium Nägeli & Peter, Hypochoeris argentina Cabrera, Minuartia recurva (All.) Schinz & Thell., Ornithogalum gussonei Ten., Orobanche alba Stephan ex Willd., Orobanche caryophyllacea Sm., Phyteuma spicatum L., Pinus mugo Turra, Plantago montana Huds., Persicaria bistorta (L.) Samp., Primula elatior (L.) Hill, Primula veris L., Ranunculus montanus Willd., Ranunculus oreophilus M.Bieb., Ranunculus serpens subsp. nemorosus (DC.) G.López, Rubus saxatilis L., Podospermum roseum (Waldst. & Kit.) Gemeinholzer & Greuter, Tephroseris integrioria subsp. capitata (Wahlenb.) B.Nord., Senecio integerrimus var. major (A.Gray) Cronquist, Senecio superstitiosus, Sesleria coeruleus Friv., Sesleria coeruleus Friv., Silene nutans L., Solidago virga-aurea L., Sorbus aucuparia L., Telekia speciosa (Schreb.) Baumg., Thesium alpinum L., Thymus pulegioides subsp. montanus (Benth.) Ronniger, Trifolium alpestre L., Trifolium pratense L., Trifolium repens L., Trifolium repens var. ochranthum K.Maly, Trifolium repens var. orphanideum (Boiss.) Boiss., Vaccinium uliginosum L.

Hieracium belongs to the Asteraceae family and is a perennial herb. They are complex plants with an intricate pattern of morphological variation and reproductive systems (Zeljko et al., 2008). According to the International Plant Names Index, there are more than 12,000 names for this species including subspecies and synonymous. The majority of Hieracium species can be found in the Alps and Central Europe, but they also occur in North America and Asia. It grows in forests and forest margins, pastures, screes, rocks and disturbed ground. In the area of Jepi Mountains botanists found following Hieracium species: Hieracium bifidum Ser. ex Froel., Hieracium fritzeii F.W.Schultz, Hieracium murorum C.B.Clarke, Hieracium murorum subsp. medianum (Griseb.) Zahn, Hieracium nigrescens Willd., Hieracium pietrosoense Degen & Zahn, Hieracium praecurrens Vuk., Hieracium prenanthoides subsp. lanceolatum (Vill.) Zahn, Pilosella stoloniflora (Waldst. & Kit.) F.W.Schultz & Sch.Bip., Hieracium villosum Jacq., Hieracium villosum subsp. ovalifolium Nägeli & Peter.

Gentiana genus is part of the Gentianales order, Gentianaceae family. This genus includes approximately 400 species which are found mainly in the alpine areas of the temperate regions of Asia, Europe and America. It prefers neutral and acidic soils rich in humus and well-drained. "Alexandru Beldie" Herbarium contains more than 60,000 plates from which 206 belong to the Gentiana genus (Enescu et al., 2018). The Gentiana species found in Jepi mountains are the following: Gentiana asclepiadea L., Gentiana acaulis L., Gentiana cruciata L., Gentianella lutescens (Velen.) Holub, Gentianella austriaca (A.Kern. & Jos.Kern.) Holub, Gentiana punctata L., and Gentiana verna L. The most numerous Gentiana species found in "Alexandru Beldie" Herbarium harvested all over Romania are the following: Gentiana asclepiadea L. (21 plates), Gentianopsis ciliata L. (10 plates), Gentiana Gentiana acaulis L. (11 plates), Gentianella lutescens (Velen.) Holub (25 plates), Gentiana verna L. (23 plates) and Gentiana utriculosa L. (20 plates) (Enescu et al., 2018).

Trifolium genus is very large and includes annual and perennial species. Numerous Trifolium species were originally native to the middle and south of Europe, North Africa and the area ranging from Asia Minor to China. Trifolium species are found in a wide variety of moist habitats

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*Corresponding author, E-mail address: sorin.stefan.deca@gmail.com
throughout those areas (Sabudak and Guler, 2009). Botanists have found three species belonging to this genus in Jepi Valley from Bucegi Mountains: *Trifolium alpestre* L., *Trifolium pratense* L. and *Trifolium repens* L.

The plants collected from Jepi Mountains (Bucegi) that are present in “Alexandru Beldie” Herbarium are in a good conservation state.

As such, from the total of 146, the majority of vouchers, namely 100, are in a very good conservation state. 40 vouchers are in a good conservation state, while 5 vouchers are in a weak conservation state and only one is in a very poor state (figure 2). The majority of vouchers are kept in their original maps (figures 3, 4).

![Figure 2. Conservation degree of species collected from Jepi Mountains](image)

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![Figure 3. Vouchers with plants from Jepi Mountains (Bucegi) present in “Alexandru Beldie” Herbarium, “Marin Drăcea” National Institute for Research and Development in Forestry (Gentiana asclepiadea L. – left, Hieracium carneum Greene - right)](image)

*Corresponding author, E-mail address: sorin.stefan.deca@gmail.com*
The plants gathered from Jepi Mountains (Bucegi) and present in “Alexandru Beldie” Herbarium were systematized based on their harvesting year. This has allowed for an observation of the periods in which the plants were gathered and when this area of Bucegi Mountains were an important area for the herbarium’s development. These periods can also be analysed in figure 5.

As such, from a total of 146 plants, the majority (71) were collected during 1940-1949 (figure 5). The majority of plants harvested from this area amount to 114 and were gathered by Alexandru Beldie himself who was very attached to this area. As such, Alexandru Beldie has known in detail the flora and vegetation from Bucegi Mountains and is considered the father of Bucegi Natural
Reservation, being also its first custodian (Vasile et al., 2016). In addition, “Alexandru Beldie” Herbarium also contains vouchers with plants collected by other botanists from this region such as C.C. Georgescu (whose name is present on 2 vouchers), M. Haret (14 vouchers), M. Brandza (2 vouchers), P. Cretzoiu (6 vouchers), R. Zitti, T. Bunea and I. Todor (each with one voucher).

4. CONCLUSIONS
Jepi Mountains area (Bucegi) represents a territory with a rich biodiversity and has represented in the past as well as in the present, an important source for the development and enrichment of “Alexandru Beldie” Herbarium from “Marin Dracea” National Institute for Research and Development in Forestry.

The plants collected from this area belong to 54 different genera. Most of them belong to Hieracium and Gentiana and were collected during the last century, starting with 1900 and ending in 1999.

Numerous plant species from Jepi Mountains (Bucegi) can be found in “Alexandru Beldie” Herbarium.

Even though more than 100 vouchers were collected by the famous botanist Alexandru Beldie, approximately 9 specialists have covered the forests, meadows and pastures from Jepi Mountains (Bucegi) in order to collect plants that have extended the collections from this herbarium.

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