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DISTRIBUTION OF THE VASCULAR PLANTS IN YUGOSLAVIA (SERBIA, MONTENEGRO) AND MACEDONIA. I

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On the basis of long-term floristic investigations and checking of herbarium material (BEO, BEOU), 32 new taxa for flora of Balkan peninsula, Yugoslavia (Serbia, Montenegro) and Macedonia were established.

The species distribution in Yugoslavia and Macedonia is presented on maps with basic squares, 10 x 10 km. For new localities letter codes were given and for the squares 50 x 50 km and 10 x 10 km, in accordance with the mapping in Atlas Florae Europaeae, were given the numbers.

Key words: Yugoslav flora, Balkan flora, mapping of the flora, endemic species, disjunction of area.
Ključne reči: flora Jugoslavije, flora Balkana, kartiranje flore, endemiti, disjunkcija areala.

INTRODUCTION

This paper represents the continuation of floristic investigations on taxonomy, distribution and ecology of the species of the flora of Yugoslavia (Serbia, Montenegro) and Macedonia. Namely, though the highly rich flora of this part of the Balkan Peninsula is well known, many a year field investigations and checking of the herbarium material (BEO, BEOU) provided a great number of floristic notes on some regions. A special objective of these investigations was to obtain data for the new edition of „Flora Serbiae" and „Atlas Florae Europaeae". In this paper only species and subspecies new to flora of Yugoslavia (Serbia, Montenegro) and Macedonia are cited. This floristic contribution will be also of significance as data base for the „Atlas of Florae Europaea". Besides, the obtained floristic data, together with those obtained by other European authors dealing with systematics and chorology, will be a sound data base for the future Atlas Florae Yugoslaviae.

REVIEW OF SPECIES

Dryopteris submontana (Fraser-Jenk. & Jermy) Fraser-Jenk
N.W. Montenegro (CN 1/85): 1. Mt Durmitor, Štuoc-Breza, mountain slopes toward to the canyon of river Tara, fir-spruce forest, c. 1650 m, 15.07.1991. *M.N.* (BEO, BEOU); 2. Canyon of river Tara – Ćurovac, black pine forest on limestone, c. 1600 m, N exp., 6.10.1991. *V.S., M.N., D.L.* (BEO, BEOU), (Fig. 1).

This fern has been separated relativly recently as the independent taxon from the complex *Dryopteris villari* (Bellardi) Woynar ex Schinz et Thell. For this reason, the distribution of the species is insufficiently known. According to available records, the species range extends in W., C., S. and partly in E. Europe, Algeria, Asia Minor and the Caucasus. Fraser-Jenkins and Jermy (1977) mentioned it also for the flora of the Balkan Peninsula (Albania, Greece, Yugoslavia, Roumania). According to their classification it is hybridogenous tetraploid, probably allotetraploid, resulting from the hybridization of diploid ferns *D. villari*, which grows in subalpine and alpine regions, and submediterranean *D. pallida* (Bory) Maire et Petitmengin. This observation is supported not only by data on karyotypes but also by morphological characters, as well as by the ecology of the species *D. submontana*. Namely, in respect to parental species, it grows in intermediate habitats i.e. in shady and rocky places in montane and subalpine region, chiefly in forests. On the massifs of Mt Durmitor it grows in the zone of subalpine spruce-fir forests, as well as in the black pine stands, in several places on the outskirts of the canyon of the river Tara. According to Christinsen (1986) *Dryopteris submontana* most frequently coexist with *D. villarii* and *D. pallida*, though it grows on separate localities. Both parental species grow on Mt Durmitor whereby *D. villarii* is on higher mountain areas, in stony opening of mountain pine forest, and *D.*

pallida at the foot of the mountain, on southern slopes, in the canyon of the river Komarnica. **New to Montenegro.**

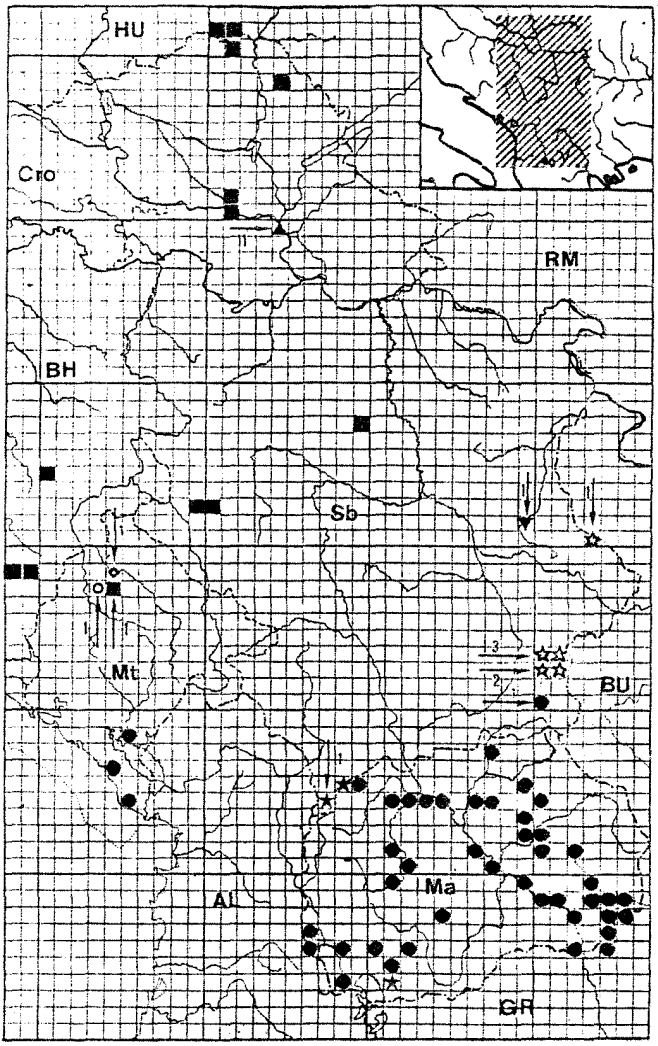

Fig. 1. – Distribution of the species: ◇*Dryopteris submontana* (Fraser-Janks & Jermy) Fr.-Jenk; ▼*Minuartia fastigiata* (Sm.) Rchb.; ☆*Silene velenovskyana* Jord. & Pan.; ● *Sisymbrium polyceratium* L. and O *Carex parviflora* Host in Yugoslavia; ★ *Cirsium tymphaeum* Hausskn.; ▲*Sisymbrium polymorphum* (Murray) Rothm. in Yugoslavia and Macedonia; ■*Iris sibirica* L. in Yugoslavia and Bosnia and Herzegovina. On the area maps, new records, as cited in the text, were signed by numerical arrows.

Minuartia fastigiata (Sm.) Rchb.
N.E. Serbia (EP 4/20): 1. Knjaževac, Beli Potok in vicinity of village Ništevci, 7. 1853., *J.P.* – subnom. *M. fasciculata* (BEOU), (Fig. 1).

This relatively widely distributed S. European species, on the Balkan Peninsula grows shiefly in Illyrian Province (Dalmatia, Bosnia and Herzegovina, Montenegro) whereas in the central part of the Peninsula it was recorded only in Macedonia. The locality in N.E. Serbia is along the southeast margin of the range. **New to Serbia.**

Minuartia baldaccii (Hal.) Mattf. subsp. *baldaccii*
S.W. Serbia (Metohija) (DM 3/87): 1. Bridge Švanjski most, gorge of Beli Drim river in vicinity of village Zrze, 10.6.1923, *T.S.*, (BEOU); N.E. Albania: (DM 1/65): 2. Vezirov Most, *7.5.1913, N.K.* (BEOU), (Fig. 5).

Endemic scardo-pindic species which is represented by three subspecies *(baldaccii, doerfleri* and *scutariensis)* out of which, till now, only subsp. *doerfleri* (Hayek) Hayek was recorded for Serbia on Mt Koritnik above the place Prizren (Hayek, 1923, 99:113, Gajić, 1977, 9:55). However, by checking the herbarium material (BEOU) we concluded that the subsp. *baldaccii* occurs also in the gorge of the river of Beli Drim by the village Zrze in Metohija. **New subspecies to Yugoslavia (Serbia).**

Moehringia ciliata (Scop.) Dalla Torre
NW Montenegro (CN 1/74) : 1. Mt Durmitor, glacial cirque Škrke, limestone screes, c. 2000-2300 m, 18.7.1992., *V.S. & M.N.* (BEOU); (CN 1/75); 2. Durmitor, glacial cirque Ledeni do, limestone screes under the summits of Pleća and Bandijerina, c. 2200-2300 m, 22.07.1992., *M.N.* (BEO); 3. Mt Durmitor, glacial cirque Kotao under summit Šljeme, limestone screes, c. 2200 m, *D.L.*, 13.8.1992., *D.L.* (BEOU), (Fig. 5).

Alpine-dinaric orophyte of disjunctive range. On the Balkan Peninsula distributed on the S.E. Dinarides on Mt Prenj in Herzegovina (Beck, 1903: 149) and on Mt Hekurave in N. Albania (Javorka, 1926 : 230). We suppose that such a disjunction between alpine and dinaric part of the range results from migratory processes of the population from the Alpes towards Dinarides during the Glacial Age. **New to Yugoslavia (Montenegro).**

Silene skorpilii Velen.
S.E. Serbia (FN 1/82): 1. Barje near Čiflik, between Bela Palanka and Pirot, *S.P.*, 09.1884., subnom. *S. rhodopaea* Janka, rev. *M.N.* (BEOU), (Fig. 4).

Endemic species of Mesian region, distributed in Bulgaria, the Black Sea coast near Burgas, eastern Mt Stara Planina, Struma valley, eastern Mt Rhodopes, Thracian plain nd Tundja hilly region (Jordanov & Panov, 1966, 3:456). The isolated part of the range is in the eastern Thessaly (Jalas & Suominen ed. 1986: 40, Map 1079). As for the territory of one time Yugoslavia, there are records for Macedonia in the vicinity of the place Kavadarci (Stojanoff, 1928: 88). This record is not included in the area map in AFE 7, map 1079 (Jalas & Suominen, 1986: 40). The locality in S.E. Serbia represents the northernmost extreme of the range of the species. **New to Yugoslavia (Serbia).**

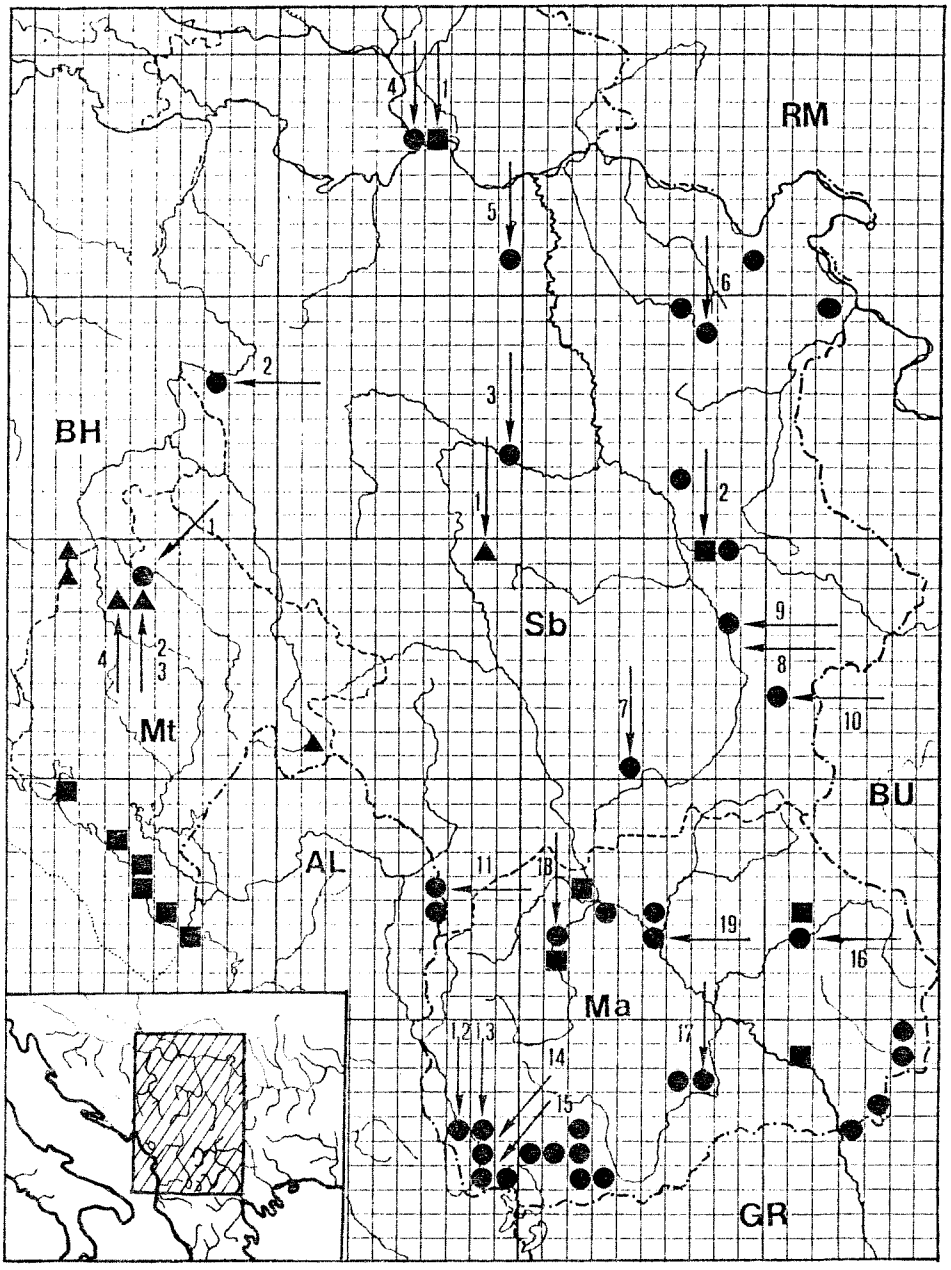

Fig. 2. – Distribution of the species: ▲ *Poa supina* Schrader in Yugoslavia; ■ *Polycarpon tetraphyllum* (L.) L. and ● *Rorippa prolifera* (Heuff.) Neilr. in Yugoslavia and Macedonia.

Silene velenovskyana D. Jordanov & P. Panev
E. Serbia (FP 1/4): 1. Mt Stara planina, Tupanar, 23.6.1958., subnom. *S. roemeri, N.D, V.N.,* rev. *M.N.* (BEO); Mt Stara planina, Ženski vis, meadows, 21.6.1958., subnom. *S. roemeri, N.D.,* rev. *M.N.* (BEO); S.E. Serbia (FN 2/31,32): 2. Vlasinsko jezero lake, surrounding meadows, c. 1200 m., 23.7.1966., subnom. *S. roemeri, N.D.,* rev. *M.N.* (BEO); S.E. Serbia (FN 2/21): 3. Mt Vardenik-Veliki Strešer, meadows at western slopes, c. 1700 m., 23.7.1967., subnom. *S. roemeri, N.D.,* V.N., rev. *M.N.* (BEO); Strešer, *DI.I.,* subnom. *S. sendtneri,* rev. *M.N.* (BEOU), (Fig. 1).

East-mesian endemic species, distributed in Bulgaria on Mt Pirin and Rila and W. and mid-Rhodopes mountain. Within the section *Otites,* in taxonomical and phylogenetic respect, it is most closely related to illyrian-balkan *S. sendineri,* apennine-balkan *S. roemeri,* and N. scardo-pindic species *S. ventricosa.* By checking herbarium material (BEO, BEOU), referring to Serbia (S t e v a n o v i ć and N i k e t i ć, 1993), it was found that the ranges of these species in S.E. Serbia overlap, which is the unique case on the Balkan Peninsula. For the species *S. velenovskyana,* it was established that it is distributed, in addition to Bulgaria, on the mountains of S.E. Serbia and that is the western margin of its range. **New to Yugoslavia (Serbia).**

Silene pusilla W. & K. subsp. **candavica** (Neumayer) Greuter & Burdet
S.W. Macedonia (DL 3/57): 1. Rujan (Struga), limestone rocks, 19.7.1921., *T.S.,* det. *M.N.* (BEOU); (DL 3/78): 2. Mt Stogovo (summit Golema Megdanica) schistose rocks, c. 2000 m, 17.8.1945. *O.G.,* det. *P.Č.,* subnom. *S. quadridentata* (L.) Pers. ssp. *albanica* (K. Maly) Neum., rev. *M.N.,* (BEO); S.W. Serbia – Metohija (DM 4/48): 3. Mt Šarplanina, valley of river Duška reka in vicinity of village Brod, limestone cliffs, c. 1600 m, *V.S. & M.N.* 19.07.1988. (BEO), (Fig. 4).

This subspecies, of taxonomically and chorologically highly complex mid-southeuropean orophyte *S. pusilla,* was known to date only from locus classicus on Mt Jablanica, above the lake of Ohrid. In Serbia it was recorded on the S.W. spurs of Mt Šara, which is the northenmost extreme of the this species range. Besides, in the herbarium (BEO) there are specimens, collected on Mt Stogovo in W. Macedonia, indicating the relatively continuous range of this stenoendemic species of the northern part of scardo-pindic province. **New subspecies to Yugoslavia (Serbia).**

Silene latifolia Poiret subsp. **latifolia**
S.W. Serbia – Metohija (DM 3/79): 1. Mt Ošljak, above Virovi – northern spur of Šarplanina masif, 23.7.1930. *I.R.,* subnom. *Melandrium album,* rev. *M.N.,* (BEOU), (Fig. 4).

Polytypic ruderal species *Silene latifolia* Poiret is represented on the Balkan Peninsula by three subspecies out of which the Euroasian subsp. *alba* (Miller) Greuter & Burdet is widely distributed, whereas Balkan-Euroasian subsp. *eriocalycina* (Boiss.) Greuter et Burdet is recorded in E. part of the Peninsula. Typical subspecies *latifolia,* which is distributed on the whole Mediterranean, was recorded till now for the flora of Croatia, Greece, Macedonia and Bulgaria. By checking the herbarium material (BEOU) we found out that it is also present in the flora of Serbia in Metohija Province, on the slopes of Mt Ošljak. Given that this area is affected by Mediterranean influences,

primarily along the valley of the river Beli Drim, we suppose that subsp. *latifolia* can be found also on other localities in Metohija, within the basin of this river. **New to Serbia.**

Silene echinata Otth

E. Serbia (EN 3/87): 1. „Juxta vias inter. oppida Nisch et Kurvin Grad", 06.1884., *S.P.*, subnom. *S. trinervia* Seb. et Maur., rev. *M.N.* (BEOU); (EN 3/96) 2. village Supovac, *S.P.*, det. *P.Č.*, 1940 (BEO), (Fig. 4).

Florogenetic center of the section *Lasiocalycine* Chowdhuri is in S.W. Asia. For the flora of Europe only a few species are mentioned, out of which *S. echinata* Otth for the Apennine and Iberian Peninsula and the eastmediterranean *S. squamigera* Boiss for the Balkan Peninsula. Both species grow in dry, ruderal habitats. *S. echinata* has been till recently considered as endemic species to Apennine Peninsula. Most recently it has been mentioned as adventitive for the flora of Spain (Talavera, 1990), whereas beyond Europe it is cited as adventitive for Algeria (Greuter et al., 1984). *S. squamigera* was recorded for the flora of Greece (Halacsy, 1901). However, according to Jalas and Suominen (1986) these data are errenous. The only evidence on *S. squamigera,* taken for granted by these authors, was taken from Slavnić (1970). Slavnić cited this species for the surrounding of Niš in Serbia. His assumption seems to be based on the available herbarium material (BEOU) of S. Petrović, who determined the plant, collected in 1884, as *S. squamigera.* The locality is in lowland area, on sunny-south sides of the valley of the river Južna Morava, through which pontic and mediterranean influences are exerted. By checking the comparative herbarium material of related species, *S. echinata* from Italy and *S. squmigera* from Asia Minor, we concluded that in S. Petrović's herbarium there is actually *S. echinata.* It is most conclusive from long and thin multicellular hairs on the sepals, which differentiate it from the related Asia Minor species. Besides, in the herbarium collection (BEO) there is a specimen, collected by S. Petrović in the valley of the river Južna Morava some 20 km north of the mentioned locality, which is, we contend, rightly determined as *S. echinata* (BEO). Thus, the presence of the species *S. squamigera* in the flora of Europe is not confirmed. Localities in E. Serbia refer to the species of *S. echinata,* which is also new for the flora of the Balkan Peninsula, and its extreme find represents the easternmost and northernmost extreme of the entire range. On the basis of our conclusions and recent literature data, the area map of Jalas and Suominen (1986) was revised. Since great and unusual disjunctions are involved, it might be assumed that this species occurs also on the Balkans as adventitive. As it is also possible that the plant has disappeared further field investigations are needed. **New to Balkan Peninsula (Serbia).**

Polycarpon tetraphyllum (L.) L.

Serbia-Šumadija (DQ 3/67): 1. City of Belgrade, along the sidewalk, *D.L.*, 5.1992. (BEOU); E. Serbia (EN 3/98): 2. City of Niš (Čair) *M.N.* 09.05.1986. (BEO), (Fig. 2).

Widely distributed ruderal plant in Mediterranean and W. Europe. Adventive in Mid-Europe, where its area of distribution extends to Germany and S. Czechoslovakia in the north. It is probably in the phase of spreading and is distributed on the Balkan

Peninsula, in mediterranean – submediterranean regions of Greece, Albania, Yugoslavia (Dalmatia, Montenegrine coast, Macedonia) and Bulgaria (Thrace, The Black Sea coast, to the W. parts of Vlaška plain). In the Atlas Florae Europaea 6 (Jalas & Suominen, 1983:155, map 982) the species is not mentioned for Macedonia. However, on the basis of reliable literature data this species occurs in Macedonia: EM 1/53: village Kučkovo in vicinity of Skopje; EM 2/32: village Modrište – Poreč; FM 2/42: Zletovo (Matvejeva, J., 1982 and FL 1/82: Gradec (Soška, T., 1939, 20:180). These data are included in the attached area map 2.

The finds in the big Serbian cities, where it occurs within the ruderal vegetation of the order *Chenopodietalia,* indicate that the species spreads along the main roads, from the Aegean Mediterranean along the valley of the rivers Vardar and Morava towards the inside of the Peninsula. The future investigations will probably show that it is more frequent than usually considered on the basis of the present records. The locality in the city of Belgrade is the northernmost extreme of the part of the range on the Balkan Peninsula. **New to Serbia.**

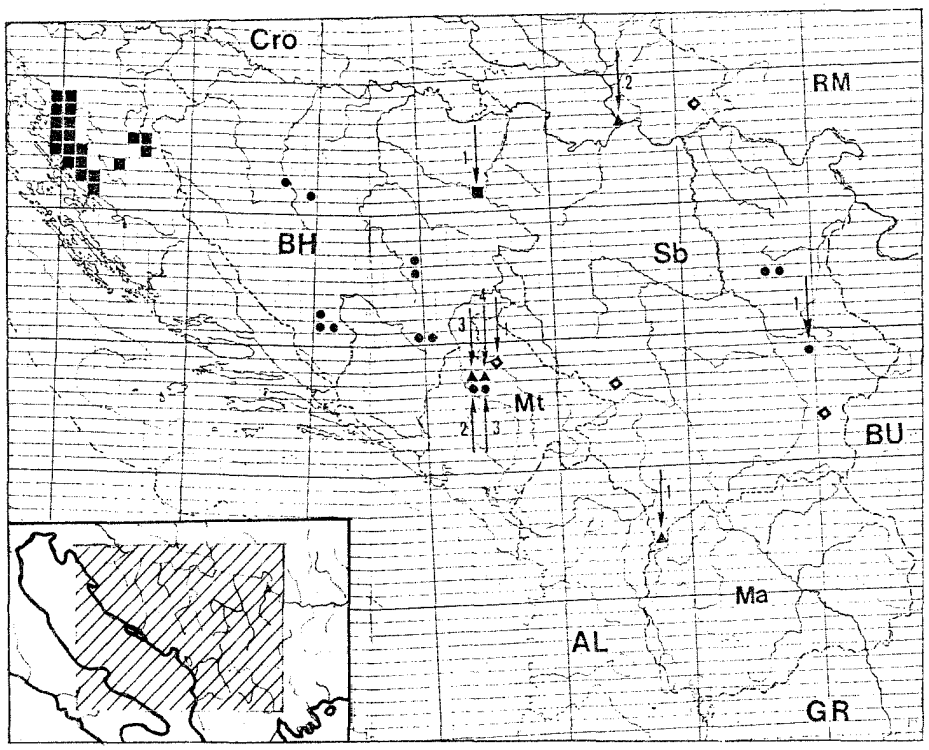

Fig. 3. – Total distribution of ■ *Cardaminopsis croatica* (Schot, Nyman & Kotscy) Jav; Distribution of the species: ◇*Pyrola chlorantа* Scwarz and ▲x *Festulolium loliaceum* (Hudson) P. Fourn. in Yugoslavia and ●*Orobanche laserpitii-sileris* Reuter ex Jordan in Yugoslavia and Bosnia and Herzegovina.

Sisymbrium polyceratium L.
S.E. Serbia (FN 2/1): 1. village Gornja Ljubata, vicinity of Bosilegrad *L.R.*, 24.7.1947, (BEOU), (Fig. 1).

Relatively frequent ruderal species of mediterranean – submediterranean parts of one time Yugoslavia, especially of Macedonia. Given that it is widely distributed in Macedonia as far as Skoplje, its presence on the territory of S. Serbia had been expected. These assumptions were confirmed by the occurrence of the species in S.E. Serbia in the vicinity of the town Bosilegrad. It probably occurs as ruderal species also in other places in S. Serbia and Kosovo. **New to Serbia.**

Sisymbrium polymorphum (Murray) Roth
N. Serbia-Vojvodina (DQ 1/95): 1. Slankamen, 1857, *J.P.* (BEOU), (Fig. 1).

East european species having steppe characters, distributed in Hungary, Polland, Roumania, Ukraine, Crimea and Russia. On the Balkan Peninsula recorded in N.E. Bulgaria (Dobruja). In Flora Europaea it is not cited for Yugoslavia (B a l l , 1964: 265). Literature data on the presence of this species in the E. parts of loess plateau of Mt Fruška Gora near the place Slankamen (S c h u l z e r et al., 1866: 144, O b r a d o v i ć , 1966: 102) are confirmed by herbarium material, collected by P a n č i ć in 1857 on the same locality. The investigations over the last 50 years did not confirm this find. **New to Yugoslavia (Serbia).**

Cardamine trifolia L.
NW Serbia (CP 3/99): 1. Mt Medvednik, beech forest, 5. 1871, *M.P.* (BEOU), (Fig. 5).

Mid-southeuropean montane species distributed from French Mt Jura and along the Alpes towards Tatra and Sudeta Mts to the Carpathians in the east. It extends to N. Apennines in the south, on one side, and to N.W. Dinarides on another side. The eastern limit of the range on the Balkan Peninsula is E. Bosnia on Mt Javornik near the place of Kladanj (B e c k , 1903: 238). The find on Mt Medvednik in N.W. Serbia is the easternmost locality of this species range on the Balkan Peninsula. **New to Yugoslavia (Serbia).**

Cardaminopsis croatica (Schott, Nyman & Kotschy) Jav.
E. Bosnia (CQ 4/25): 1. Prosjek in vicinity of Zvornik, 7. 1890, *Ž.J.* (BEOU), (Fig. 3).

Endemic species of Velebit Mts. The species range comprises, in addition to Mt Velebit and Mt Plješevica. B e c k (1903: 255), disputing the findings of J u r i š i ć (1891) on the occurrence of this species in E. Bosnia, in the locality of Prosjek, near the place of Zvornik, claimed that *Cardaminopsis croatica* „must have been confused and seems to refer to *Arabis hirsuta*". However, Jurišić's material from this locality (BEOU) surely confirms that it is certainly the species *Cardaminopsis croatica.* The locality near Zvornik is the easternmost extreme of the distribution. It is also highly disjunctive, and probably relict part of the range of this steno-endemic illyrian species. **New to Bosnia and Herzegovina.**

Rorippa prolifera (Heuf.) Neilr.
N.W. Montenegro (CN 1/85): 1. Mt Durmitor, shores of glacial lake Crno jezero, c.

1450 m, *M.N.* 26.08.1990. (BEO); W. Serbia (CP 3/68): 2. Mt Tara, canyon of river Rača, 1966, *N.D.* (BEO); C. Serbia (DP 4/40): 3. Vrnjci, 1886, *J.P.* (BEOU); Serbia-Šumadija (DQ 3/66): 4. Beograd, 1992, *S.J.*, (BEOU); Serbia-Pomoravlje (DQ 4/20): 5. Smederevska Palanka, 1943, *Pečnik* (BEO); (EP 3/88): 6. Brestovačka Banja, 1972, *N.D., V.N.* (BEO); S. Serbia (EN 2/5): 7. Kmetovce – Dobrićane (Binićka Morava), 1965, *V.N.* (BEO); S.E. Serbia (EN 3/59): 8. Grdelica, BEOU; (EN 3/69): 9. Leskovac, cemetery, *Obradović* (BEOU); (FN 2/31): 10. Vlasina, 1991, *S.J. & M.N.* (BEOU); S.W. Serbia (DM 3/57): 11. Žur (Prizren), *S.T.*, 1923, (BEOU); S.W. Macedonia (DL 3/58):

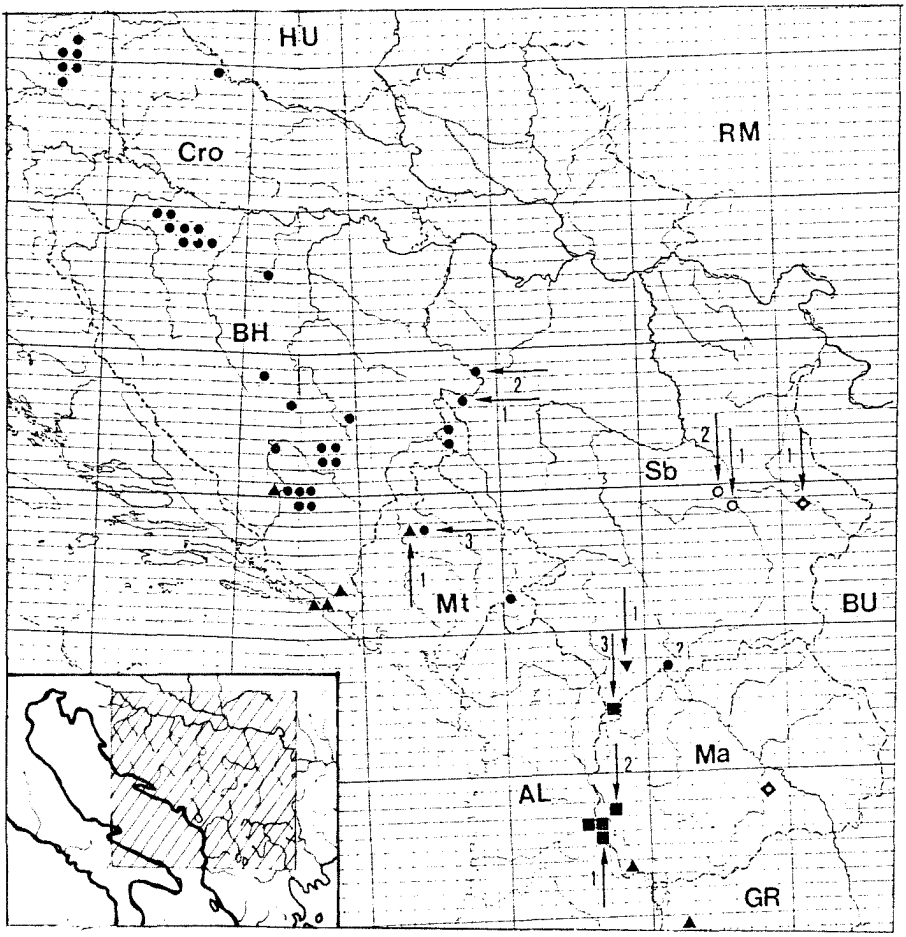

Fig. 4. – Total distribution of ■ *Silene pusilla* W. & K. subsp. *candavica* (Neumayer) Greuter & Burdet and ▲ *Festuca hercegoviniaca* Markraf-Dannenberg; Distribution of the species: ○ *Silene echinata* Otth in Balkan peninsula; ● *Centaurea macroptilon* Borb. in Balkan; ▼ *Silene latifolia* Poiret subsp. *latifolia* in Yugoslavia and ◇ *Silene scorpilii* Vel. in Yugoslavia and Macedonia.

12. Klimentsko blato (Struga), Lj.G., 1921 (BEOU); (DL 3/49) 13. Studenčište, 1939, *P.Č.* (BEO); 14. Čerava (Ohridsko jezero), 1921, *T.S.* (BEOU); (EL 3): 15. Djuleč-Sirko (Prespa), 1922, *Romanovski* (BEOU); N. Macedonia (EN 1/44): Dušanovac (Skoplje), 2.7.1925, *T.S.* (BEOU); E. Macedonia (FM 2/32): 16. Bregalnica (Štip-Kočane), 1925, *Ž.J.* (BEO); Kočane, Crna Reka, 1922, *T.S.* (BEOU); S. Macedonia (EL 3/87): 17. Gnjilište (Prilep), *S.T.*, 17.6.1930 (BEOU); N. Macedonia (EM 2/32): 18. Glumovo (Treska), 1921, *S.T.*, (BEOU); (EM 4/36): 19. Katlanovska Banja, 1921, *S.T.* (BEOU), (Fig. 2).

The species distributed on the Balkan Peninsula and in Roumania with uncertain and probably erraneous data on the distribution in Turkey (Valentine, 1964, 1:284, Coode, & Cullen, 1965, 1:433). By checking herbarium material from the territory of Serbia and Macedonia a great number of new localities have been established, which indicates that this species is relatively widely distributed in the eastern part of Yugoslavia. The find on Mt Durmitor represents the first evidence on the distribution of the species in Montenegro. It is also the westernmost extreme of the range. **New to Montenegro.**

Malcolmia bicolor Boiss. & Heldr.
S. Macedonia (EL 3/56): 1. Mt Selečka planina, village Makovo, c. 20 km east from Bitolj, near road, 13.06.1927., *P.Č.* (subnom. *Malcolmia maritima*), rev. *V.S. & M.N.* (BEO), (Fig. 6).

Endemic species of the Balkan Peninsula, distributed in Greece and S. Albania (Ball, 1964-274). It is distributed in Greece, extending from Peloponnesus to Epirus and Thessaly. According to the most recent taxonomic classification *M. bicolor* is included as one of the three subspecies of *M. graeca* (Stork, 1972). The specimens collected in the surrounding of the place of Bitolj, as judged by medifixed, rarely multifid (3-4 fids) stellate hairs of the indumentum, growth habit and all floral parts, match the most the description of the species of *M. bicolor,* i.e. of *M. bicolor* var. *veluchensis* (Boiss. & Heldr.) Hayek (Hayek, 1928: 420; Halacsy, 1901, 1:76) as well as the comparative material from Greece, we had the insight into. The find in the surrounding of Bitolj is the northernmost locality of the range. **New to Macedonia.**

Laserpitium zernyi Hayek
S.W. Serbia (Metohija) (DM 4/58): Mt Šarplanina: 1. river Duška reka in vicinity of village Brod, *V.S., M.N.* 19.07.1988. (BEO); 2. river Leva reka in vicinity of village Brod (DM 4), limestone rocky slopes, c. 1500 m, 30.9.1992., *V.S., M.N., D.L.* (BEOU), (Fig. 5).

The species *L. zernyi* was described from the southwestern slopes of Mt Paštrik in Albania (Hayek, A. 1923: 154). Tutin classifies this taxon as a subspecies of southeuropean montane species *Laserpitium siler (L. siler* subsp. *zernyi* (Hayek) Tutin (1968: 369). However, on the basis of the investigation on taxonomy and distribution of the complex *L. siler* in Macedonia, Micevski (1981) claims that *L. zernyi* is a good species, chorologically and morphologically well differentiated in respect to the species *L. garganicum* (Ten.) Bertol., *L. ochridanum* Micevski and *L. siler* L. Namely, *L. zernyi* is distributed only in the boundary region between Macedonia and Albania in subalpine

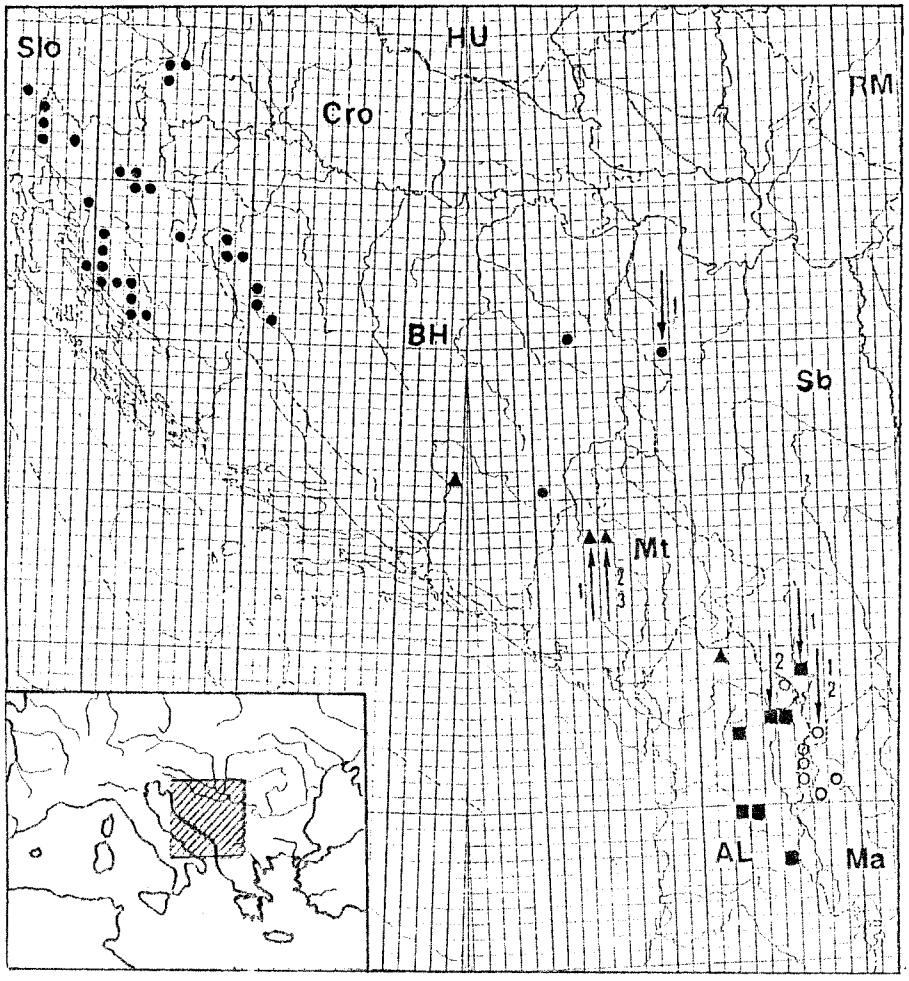

Fig. 5. – Total distribution of ■ *Minuartia baldaccii* (Hal.) Mattf. subsp. *baldaccii* and ○ Laserpitium zernyi Hayek; Distribution of the species: ● *Cardamine trifolia* L. and ▲ Moehringia ciliata (Scop.) Dalla Torre on Balkan penninsula.

region from Mts Dešat and Korab toward Bistra up to southern slopes of Mt Šara. In addition to these localities, it was recorded also on Albanian side of the Mt Koritnik (J a v o r k a , 1926: 279). Our find on S.W. slopes of Mt Šara, above the village of Brod, is adjacent to Mt Koritnik. **New to Yugoslavia (Serbia).**

Pyrola chlorantha Sw.
N.W. Montenegro (CN 1/86): 1. Mt Durmitor, margin of the canyon of river Tara,

summit Trgilo near village Aluge, forest of black pine, 1500 m, 25.07.1992., *M.N.* & Z.B (BEO), (Fig. 3).

Circumboreal-subboreal species, relatively widely distributed in C. and E. Europe. On the Balkan Peninsula disjunctly distributed in mounatinous-subalpine regions, chiefly in coniferous forests. In one time Yugoslavia it was recorded in Slovenia (Mayer, 1952: 190), Croatia (Hirc, 1905: 52) and in Serbia (Pančić, 1884:178, Sigunov, 1970: 99, Blečić, 1972: 473). The find on Mt Durmitor is the only one known in S.E. Dinarides. **New to Montenegro.**

Orobanche laserpitii-sileris Reuter ex Jordan
E. Serbia (EN 3/90): 1. Mt Suva planina (Sokolov kamen), *M.N.*, 4.07.1989.; N.W. Montenegro (CN 1/64): 2. Mt Durmitor, S. slopes of Lojanik, 1700 m, limestone rocky ground, 7.1989, *D.L.* (BEOU); (CN 1/65): 3. Boljske Grede, S. slopes, limestone screes, c. 1700 m, 25.8.1990, *M.N.* (BEO), (Fig. 3).

Alpine-balkan species the range of which extends from Swiss Alpes over the Dinarides to the mountains in Serbia and Macedonia (Hees, et al. 1972, 3:259). Very rare on the Balkans and scattered chiefly in the western part of the Peninsula. It is reported from the small number of localities in Croatia, Bosnia and Herzegovina and Serbia, whereas for Macedonia the data are not available. Given that it parasitises on the species from the aggregate *Laserpitium siler,* otherwise relatively widely distributed on the Dinarides and Scardo-Pindic mountains, we suppose that it is more widely distributed than the available material shows. **New to Montenegro.**

Achillea korabensis (Heimerl) Micevski
SW Serbia – Metohija (DM 4/48): 1. Mt Šarplanina (N.W. slopes of Rudoka), Gradski Kamen in vicinity of village Brod, limestone cliffs c. 1400-1500 m, 30.9.1992., *V.S., M.N. & D.L.* (BEOU), (Fig. 7).

Endemic Scardo-Pindic orophyte, recently separated as the species from *A. clavenae* L., which had been considered to be distributed from the Alpes over Dinarides to the south of the Balkan Peninsula to Epirusin Greece (Micevski, 1984, 5(2): 5-10). According to this author the range of the species *A. clavanae* comprises the Alpes and the Dinarides in the southeast including Prokletije, whereas *A. corabensis* is distributed on the mountains of Scardo-Pindic system in E. Albania, Macedonia and N.W. Greece-Epirus (Map 7). The specimens of *A. corabensis* from the mountains of W. Macedonia (Bistra, Dešat, Korab, southern side of Šara Mt Ceripašina) and Albania have been determined as *A. clavenae* var. *argentea* Vis. f. *corabensis* Heim. or *A. clavenae* var. *intergrifolia* Hal. (Micevski, 1984). In Serbia both species grow; *A. clavenae* on Mt Prokletije and in Sandžak and *A. corabensis* on Mt Šara. **New to Yugoslavia (Serbia).**

Crepis macedonica Kitanov
N.W. Serbia-Metohija (DM 4/48): 1. Mt Šarplanina, gorge of Leva reka river in vicinity of village Brod, N exposed and extremly uncovered limestone rock crevices, c. 1650 m, 30.9.1992., *M.N. & V.S.* (BEO, BEOU), (Fig. 6).

Locus classicus of the species *Crepis macedonica* Kitanov on Mt Dešat, on Macedonian-Albanian border, is the only known locality. K i t a n o v (1950) collected holotypic material on clay screes, with poor lime content, at the altitude of 2130 m. He thinks that this is a vicarious species of alpine *C. terglouensis* (Hacq.) A. Kerner. This observation was disputed by S e l l (1976). According to his classification *C. macedonica* belongs to another section (sect. *Crepis*) and its closest vicarious species is *C. albanica* (Jav.) Babcock from Mt Prokletije. Our specimens were collected on N.W. slopes of Mt Šara, which represents the second locality, known so far, of this endemic orophyte. **New to Yugoslavia (Serbia).**

Cirsium thymphaeum Hausskn.
SW Serbia – Metohija (DM 4/48): 1. Mt Šarplanina, gorge of river Duška reka in vicinity of village Brod, 19.7.1988., *V.S. & M.N.* (BEO); 2. gorge of river Leva reka (Gradski Kamen), in vicinity of village Brod, 30.9.1992., *V.S., D.L. & M.N.* (BEO, BEOU), (Fig. 1).

According to W e r n e r (1976: 241) this endemic species is distributed in N. and C. Greece and S. Albania. For the territory of one time Yugoslavia it is mentioned for Macedonian part of Mt Šara (B o r n m u l l e r, 1928: 101) and Mt Pelister (BEO). Our specimen found on N.W. slopes of Mt Šara supports Bornmuller's finding that this Greek orophyte is distributed on Mt Šara, which is the northernmost part of its range. **New to Yugoslavia (Serbia).**

Centaurea macroptilon Borbas subsp. **macroptilon**
W. Serbia (CP 3/68): 1. Canyon of river Drina in vicinity of Perućac, side of the macadame road, c. 200 m, 14.7.1989, *M.N.* (BEO); N.W. Serbia (CP 3/89): 2. Canyon of river Trešnjica in vicinity of Ljubovija, 25.7.1992, *M.S.* (BEOU); N.E. Montenegro (CN 1/75): 3. Mt Durmitor, Žabljak, c. 1450 m, *S.J.* (BEOU), (Fig. 4).

Within phylogenetic series of the subgenus *Jacea* (Miller) Hayek, the species *C. macroptilon* Borbas belongs to the section *Jacea,* though, based on a number of morphological characters, it is more related to the section *Lepteranthus* (DC.) Dumort. This, apparently hybridogenous, orophyte is distributed in mountainous areas of the Balkans, on N.W. Carpathians and Sudeten Mts. Typical subspecies is known from the S.E. Alpes and Illyrian regions (Austria, Slovenia, Croatia, Bosnia and Herzegovina, Montenegro). It is first mentioned for the flora of Serbia by S o š k a (1939) for the vicinity of the place Kačanik, in the province of Kosovo. This unconfirmed data, based on O. Bierbach's herbarium material, was not rementioned in any of the subsequent publications referring to regional floras, probably because S o š k a ' s (1939) literal citing was: „*C. microptilon* Borb.". Printing error may suggest a related W. european species, *C. microptilon* Gren. & Gordon. However, the author' s name does confirm that it was *C. macroptilon.* Unfortunately, we were not in the situation to check, either from the herbarium or in the field, this record, which would represent the easternmost and southernmost locality of the subspecies range. However, we have collected the taxon mentioned in W. Serbia on the right bank of the river Drina and the gorges of its tributories. In one habitat it is sympatric with related taxon, of the mentioned related section *C. phrygia* L. subsp. *phrygia.* **New to Serbia.**

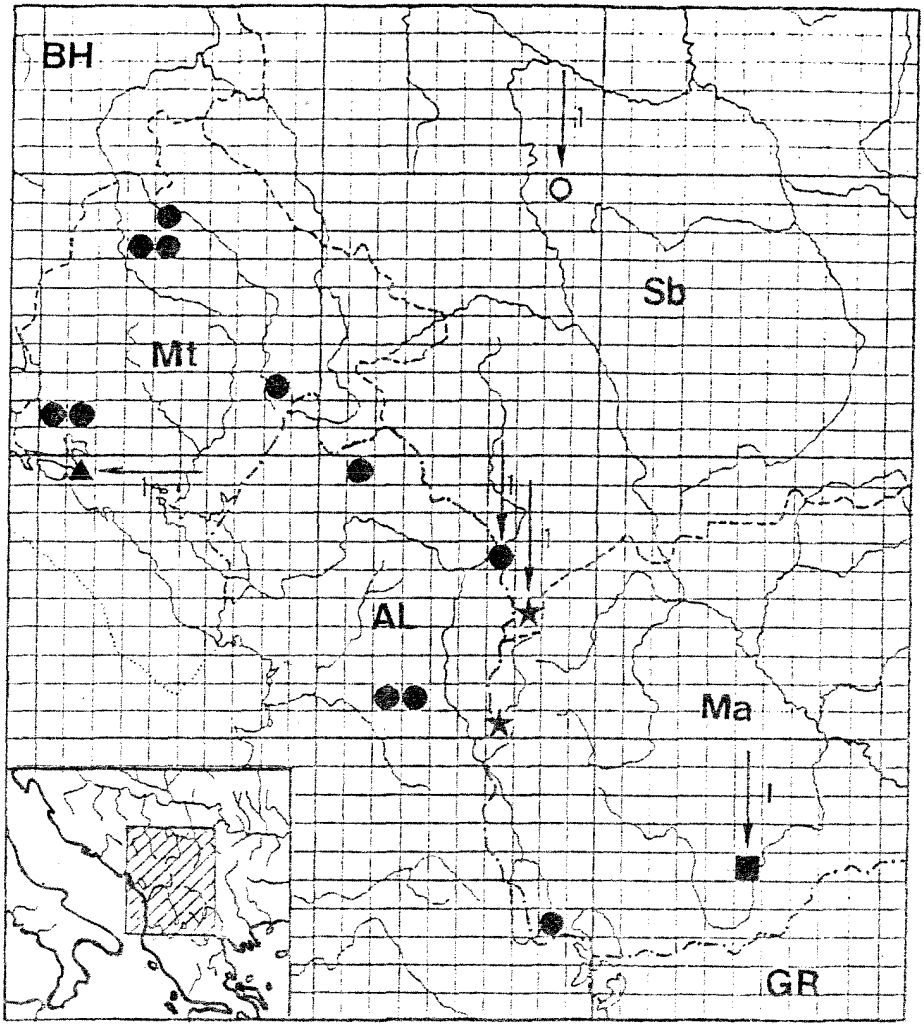

Fig. 6. – Total distribution of ★ *Crepis macedonica* Kitanov; Distribution of the species: ▲ *Senecio inaequidens* DC. on Balkan peninsula; O *Festuca pratensis* Hudson subsp. *appenina* (De Not.) Hegi in Yugoslavia; ● *Omalotheca hoppeana* (Koch) Scultz-Bip & F.W. Schultz in Yugoslavia and Macedonia and ■ *Malcolmia bicolor* Boiss. and Heldr. in Macedonia.

Omalotheca hoppeana (Koch) Schultz-Bip & F.W. Schultz
S.W. Serbia-Metohija (DM 3/67): 1. Mt Koritnik, around snow patches, 7. 1937, *H.O.*, det. *O.G.* (BEO), (Fig. 6).

Mid-southeuropean orophyte, distributed from the Pyrenees, Alpes, Apennines, Balkan Mts to Tatra Mt On the Balkans it chiefly grows on dinaric mountains, where it is relatively frequent, and its range extends to Albania and Macedonia in the south (Hess et al., 1972, 3:478-479; Micevski & Mayer, 1980, 33:107). The find on Mt Koprivnik represents the northernmost locality in Scardo-Pindic part of the range. **New to Serbia.**

Senecio inaequidens DC.
S. Montenegro (CM 1/92): 1. Boka Kotorska bay, Kotor-Dobrota, banks of poluted stream near its mouth into the sea, saline habitat, 24.5.1990, *V.S., S.J., D.L.* (BEOU), (Fig. 6).

Adventive species in some parts of Mediterranean and W. Europe (Italy, Belgium, France) originating from S. Africa (Chateer and Walters, 1976:195). According to Pignatti (1982) this species is in the phase of rapid spreading in W. Europe. Light, anemochorous seed, intensive communication along the seaways and other roads, seem to be the cause of this species spreading in Europe. The occurrence of this species on Montenegrine coastal area might also be due to the same reason. **New to Balkan Peninsula (Montenegro).**

Carex parviflora Host
N.W. Montenegro (CN 1/74): 1. Mt Durmitor, glacial cirque Škrka, foothill of Šareni pasovi, c. 2000 m, snow patches, 19.7.92. *D.L.* (BEOU), (Fig. 1).

Mid-Southeuropean mountain species, the range of which extends from the Pyrenees, toward Alpes, Dinarides and Carpathians, thence toward Mts of Asia Minor and Caucasus (Schultze-Motel, 1980, 2:171). Mt Durmitor represents at present the southernmost locality of the range on the Balkan Peninsula. In regard to ecological and chorological characteristics of the species, its presence might be expected also on Mt Prokletije, as well as on limestone mountains of the north facing part of the Scardo-Pindic Mts. Due to its characters it is often confused with the related and frequent species *Carex atrata* L. **New to Yugoslavia (Montenegro).**

Poa supina Schrader
C. Serbia (DN 3/99): 1. Mt Kopaonik, *J.P.*, 1870:20:206, BEOU (subnom *Poa annuua* var. *varia*); Krst, c. 1700 m, granite, banks of the mountain stream, 5.7.91, *D.L.* (BEOU); N.W. Montenegro (CN 1/75): 2. Mt Durmitor, Dobri Do, c. 1850 m, wet meadow arround small glacial lake, 5.10.1991, V.S., *D.L.* et *M.N.*; Točak, c. 1650 m, wet subalpine meadow, 12.8.1992, *L.D., M.N.;* (CN 1/74): 4. Glacial cirque Škrka, arround well near mountain refuge, c. 1700 m, 18.7.1992, *L.D., V.S., M.N., S.J.* (BEOU), (Fig. 2).

According to Pignatti the species is arctic-alpine element of circumholarctic distribution (1982, 3:469), whereas Hess et al. (1967, 1:330) consider it the element of Euro-Asian mountains, distributed on mountains from Pyrinees, toward the Alpes, Apennines, Dinarides and Carpathians thence to the Caucasus and Himalayas, as well as to lower areas of C. Asia, W. and E. Siberia.

On the mountains of the Balkan Peninsula it is presumably more frequent than shown by available data. It is often confused with widely distributed *Poa annua* L. **New to Serbia.**

Festuca hercegoviniaca Markgr.-Dannenb.
N.W. Montenegro (CN 1/74): 1. Mt Durmitor, glacial cirqu Škrke, W. slopes of Planinica, c. 1800 m, limestone screes, 18.7.92., *D.L., V.S., M.N., S.J.* (BEOU), (Fig. 4).

Endemic species of S.W. part of the Balkan Peninsula, distributed in Hercegovina (near Mostar), Dalmatia (the vicinity of Dubrovnik), S.W. Macedonia (the surrounding of Ohrid) and Greek Macedonia on mountains above the city of Pisoderion (Markgraf-Danennberg, 1978, 76 (4): 323). Mt Durmitor represents the southernmost locality in the Dinarides part of this species range. The species seems more widely distributed in SE Dinarides and in mountains of the N. part of Scardo-Pindic Mts than it is known today due to the configuration of the species range (widely disjunct mountainous area). **New to Yugoslavia (Montenegro).**

Festuca pratensis Hudson subsp. **appenina** (De Not.) Hegi
C. Serbia (DN 3/99): 1. Mt Kopaonik, Jelačića strugara, c. 1500 m, granite,, margin of spruce forest, 13.7.1988, *S.S.* (BEOU), (Fig. 6).

Middle-South European mountain species, distributed on the Alpes, Apennines, Sicillian Mts, E. and C. Carpathians, N.W. mountains of one time Yugoslavia (Markgraf-Dannenberg, 1980, 5:132) and on Mt Vitoša in Bulgaria (Velev, 1963, 1:415). According to Hayek (1938, 3:291) this taxon occurs also in Dalmatia. Data on the presence of this subspecies on Mts Kopaonik and Vitoša indicate the possibility that it is more widely distributed on the mountains of the Balkan Peninsula. **New to Yugoslavia (Serbia).**

x Festulolium loliaceum (Hudson) P. Fourn.
S.W. Serbia (Metohija) (DM 4/48): 1. Mt Šarplanina, Gradski kamen in vicinity of v. Brod, 30.9.91, *V.S., D.L., M.N.* (BEOU); N.W. Serbia (Srem) (DQ 3/66): 2. City of Novi Beograd, sandy places, *D.L.* (BEOU); N.W. Montenegro (CN 1/74): 3. Mt Durmitor, near the road in vicinity of mountain refuge Sušičko jezero, c. 1200 m, 20.7.92.; (CN 1/75): 4. city of Žabljak, c. 1450 m, 22.7.1992, *S.J., D.L.,* (BEOU), (Fig. 3).

Widely distributed Euro-Asian species of insufficiently known distribution (Pignatti, 1982, 3:501). As a hybrid, of the species *Festuca pratensis* L. *Lolium perenne* L., it is probably more widely distributed in E. Yugoslavia, which can be inferred from the scattered first finds on this territory. The record on the presence of *Lolium perenne* L.m. *rammosum* Sm in the town of Novi Sad probably refers to the species *Festulolium loliaceum* (Bož a and Vasić, 1986, 10:253). **New to Yugoslavia (Serbia and Montenegro).**

Sesleria tenerrima (Fritsch) Hayek
S.W. Serbia-Metohija (DM 3/80): 1. Mt Ošljak (northern spur of Mt Šarplanina) Virovi-Lokve, highmountain limestone rocky meadows, 8.6.1923, *N.K.* (BEOU), (Fig. 7).

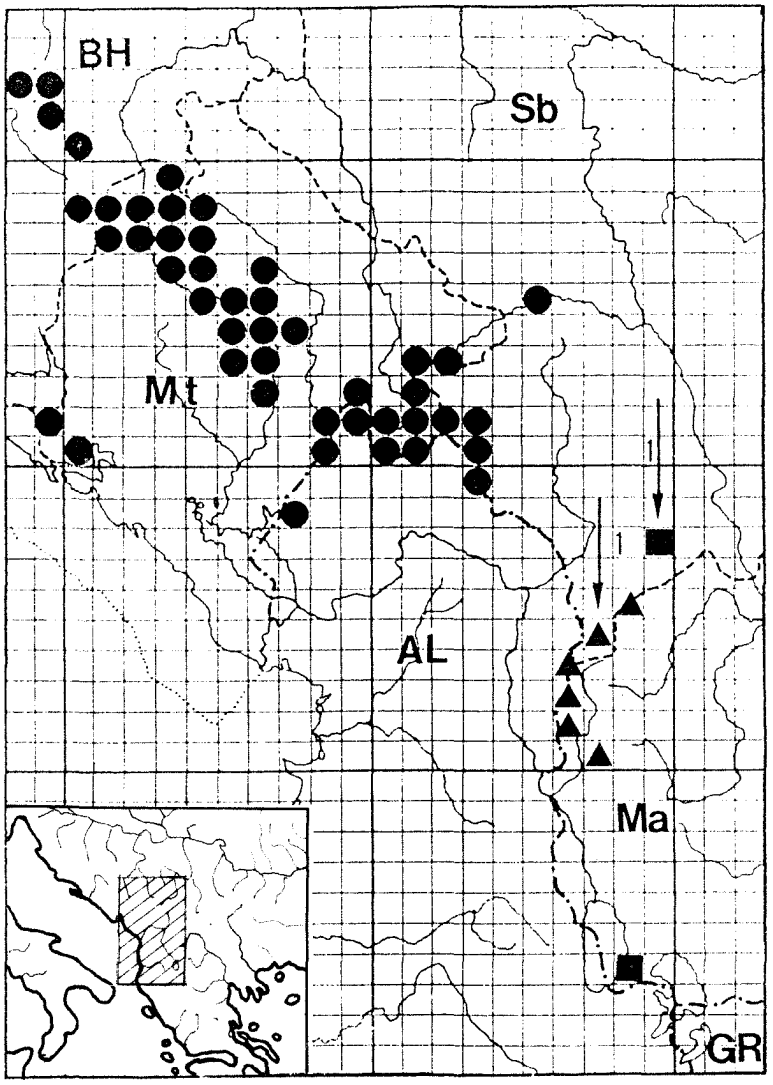

Fig. 7. – Distribution of species: ■ *Sesleria tenerrima* (Fritsch) Hayek and ▲ *Achillea corabensis* (Hiemerl) Micevski in Yugoslavia and Macedonia and ● *Achillea clavennae* L. in S.E. Dinarides.

Endemic species of the N part of the Scardo-Pindic Mts, distributed on the mountains of W. Macedonia (Mt Galičica) and E. Albania i.e. Nemerka-Karajan Mt (D e y l, 1946, 3: 147). The find on the N. slopes of Mt Šara represents the northernmost locality of this species range and also confirms the assumption that *Sesleria tenerrima* is distributed also on Korab and Šara Mts. (op.cit.). **New to Yugoslavia (Serbia).**

Iris sibirica L.

N.W. Montenegro (CN 1/75): 1. Mt Durmitor, mountain stream Beli Potok at Jezerska plateou, c. 1400 m, 23.7.92, D.L. & *S.J.* (BEOU), (Fig. 1).

East-Mideuropean, South-Central Syberian species. On the Balkan Peninsula rare and disjunctly distributed in C. Bosnia, W. Serbia and Bulgaria (B e c k , 1903, 1:84; R a d e n k o v a , 1964, 2:340; S t j e p a n o v i ć - V e s e l i č i ć , 1976, 8:22). According to personal communications of Branislava Butorac, this species is distributed on several places in Vojvodina (Selevenjska šuma, Jasenovačka pustara, Banatski Monoštor and Petrovaradinski rit). It inhabits damp places mainly on mountainous and subalpine regions. **New to Montenegro.**

CONCLUSION

Over the years, field floristic investigations were carried out, and the herbarium material (BEOU, BEO) checked and revised, which provided numerous, new data on the distribution of the species of vascular flora of Yugoslavia (Serbia, Montenegro). Besides, data on the new species and subspecies for the flora of Yugoslavia (Serbia, Montenegro) were obtained. Some species ranges were added new localities and thus the margins of these ranges were set. The following new species were established for Serbia: *Minuartia fastigiata* (Sm.) Rchb., *Minuartia baldaccii* (Hal.) Mattf. subsp. *scutariensis* Hayek, *Silene velenovskyana* D. Jord. & P. Pan., *Silene latifolia* Poiret subsp. *latifolia, Silene skorpilii* Vel., *Silene pusilla* subsp. *candavica* (Neumayer) Greuter & Burdet, *Polycarpon tetraphyllum* (L.) L., *Sisymbrium polyceratium* L., *Sisymbrium polymorphum* (Murray) Roth., *Cardamine trifolia* L., *Cardaminopsis croatica* (Schott, Nyman & Kotschy) Jav., *Laserpitium zernyi* Hayek, *Achillea corabensis* (Hiemerl) Micevski, *Crepis macedonica* Kitanov, *Centaurea macroptilon* Borb., *Cirsium thymphaeum* Hausskn., *Omalotheca hoppeana* (Koch) Schultz Bip. & F.W. Schultz, *Sesleria tenerrima* (Fritsch) Hayek, *Poa supina* Schrader and *Festuca pratensis* Hudson subsp. *appenina* (De Not.) Hegi; for Montenegro: *Dryopteris submontana* (Fraser-Jenk. & Jermy) Fr.-Jenk, *Moehringia ciliata* (Scop.) Dalla Torre, *Rorippa prolifera* (Heuff.) Neilr., *Pyrola chlorantha* Scwarz, *Orobanche laserpitii – sileris* Reuter ex Jordan, *Iris sibirica* L. and *Festuca hercegovinica* Markgr.-Dannenb.; for Macedonia: *Malcolmia bicolor* Boiss. & Heldr.; for Yugoslavia: *Carex parviflora* Host, and *xFestulolium loliacem* (Huds.) P. Fourn. and for Balkan peninsula: *Silene echinata* Otth. and *Senecio inaequidens* DC.

Parallely, new bounadries of the entire or of the part of the species range on the Balkan Peninsula were set as follows: eastern (*Cardamine trifolia* and *Cardaminopsis croatica*), western (*Silene velenovskyana* and *S. skorpilii*) and northern (*Crepis macedonica, Sisymbrium polyceratium, Cirsium thymphaeum* and *Silene pusilla* subsp. *candavica*).

Authors 'Abbreviations: *J.P.* (Josif Pančić), *S.P.* (Sava Petrović), *N.K.* (Nedeljko Košanin), *L.R.* (Lav Rajevski), *P.Č.* (Pavle Černjavski), *Ž.J.* (Živko Jurišić), *V.S.* (Vladimir Stevanović), *M.N.* (Marjan Niketić), *D.L.* (Dmitar Lakušić), *S.J.* (Slobodan

Jovanović), *S.S.* (Snežana Stanić), *V.N.* (Vojislav Nikolić), *N.D.* (Nikola Diklić), *H.O.* (Hans Oehm), *M.S.* (Marko Sabovljević), *DJ.I.* (Djura Ilić), *T.S.* (Teodor Soška), *O.G.* (Oleg Grebenščikov), *I.R.* (Igor Rudski), *M.P.* (Milan Petrović), *LJ.G.* (Ljubiša Glišić), *Z.B.* (Zlatko Bulić).

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Rezime

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RASPROSTRANJENJE VASKULARNIH BILJAKA U JUGOSLAVIJI (SRBIJA, CRNA GORA) I MAKEDONIJI. I.

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Višegodišnjim terenskim floristićkim istraživanjima, pregledom i revizijom herbarskog materijala (BEOU, BEO) sakupljen je veliki broj novih podataka o rasprostranjenju vrsta vaskularne flore Jugoslavije (Srbija, Crna Gora) i Makedonije. U okviru ovog rada objavljeni su podaci o novim vrstama i podvrstama za floru Jugoslavije (Srbija, Crna Gora) i Makedonije, kao i određene dopune areala za pojedine vrste. Utvrđene su nove vrste za floru Srbije: *Minuartia fastigiata* (Sm.) Rchb., *Minuartia baldaccii* (Hal.) Mattf. subsp. *baldaccii*, *Silene velenovskyana* D. Jord. & P. Pan., *Silene latifolia* Poiret subsp. *latifolia*, *Silene skorpilii* Vel., *Silene pusilla* subsp. *candavica* (Neumayer) Greuter & Burdet, *Polycarpon tetraphyllum* (L.) L., *Sisymbrium polyceratium* L., *Sisymbrium polymorphum* (Murray) Roth., *Cardamine trifolia* L., *Cardaminopsis croatica* (Schott, Nyman & Kotschy) Jav., *Laserpitium zernyi* Hayek, *Achillea orabensis* (Hiemerl) Micevski, *Crepis macedonica* Kitanov, *Centaurea macroptilon* Borb., *Cirsium thymphaeum* Hausskn., *Omalotheca hoppeana* (Koch) Schultz Bip. & F.W. Schultz, *Sesleria tenerrima* (Fritsch) Hayek, *Poa supina* Schrader i *Festuca pratensis* Hudson subsp. *appenina* (De Not.) Hegi; za Crnu Goru: *Dryopteris submontana* (Fraser-Jenk. & Jermy) Fr.-Jenk, *Moehringia ciliata* (Scop.) Dalla Torre, *Rorippa prolifera* (Heuff.) Neilr., *Pyrola chlorantha* Scwarz, *Orobanche laserpitii – sileris* Reuter ex Jordan, *Iris sibirica* L. and *Festuca hercegovinica* Markgr.-Dannenb.; za Makedoniju: *Malcolmia bicolor* Boiss. & Heldr.; za Jugoslaviju: *Carex parviflora* Host, and *x-Festulolium loliaceum* (Huds.) P. Fourn. i za Balkansko poluostrvo: *Silene echinata* Otth. i *Senecio inaequidens* DC.

Istovremeno, utvrđene su nove granice celokupnog ili dela areala na Balkanskom poluostrvu: istočna *(Cardamine trifolia* i *Cardaminopsis croatica)*, zapadna *(Silene velenovskyana* i *S. skorpilii)* i severna *(Crepis macedonica, Sisymbrium polyceratium, Cirsium thymphaeum* i *Silene pusilla* subsp. *candavica).*

Rasprostranjenje vrsta na teritoriji Jugoslavije i Makedonije prikazano je na UTM kartama. Konkretni lokaliteti označeni su odgovarajućim znakom u osnovnim poljima 10 x 10 km. U tekstu ispred lokaliteta slovnim kodom označeni su UTM kvadrati 100 x 100 km, kao i brojevi kvadrata 50 x 50 km (1-4) i 10 x 10 km (01-100).