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A CONTRIBUTION TO THE PHYTOGEOGRAPHICAL CLASSIFICATION OF THE ILLYRIAN FLORAL ELEMENT

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The general distribution of *Lamium orvala* L. is discussed and a classification of the Illyrian phytogeographical element is proposed. Thus, all so called Illyrian endemic plants have been classified into 3 groups of true Illyrian endemics, inhabitants of thermophilous and heliophilous vegetation types, and relict Illyricoid paleoendemics, elements of mesophilous beech forests.

Introduction

Three more or less complete maps showing the distribution of *Lamium orvala* L. have recently been published: Gaži-Baskova (1973) shows the range of this species on the basis of data from the literature and from analysis of herbarium material from Zagreb (ZA) and Sarajevo (SARA); the distribution of *L. orvala* given by Meusel and al. (1978) is based on the data available in the literature; finally Menemá (1989) shows the distribution of this species only on the basis of herbarium material kept in the herbaria of Central, Western and Northern Europe. In addition, Fukarek (1978) and Marinček (1981) published the area of *L. orvala*, too.

Revision of the area of *Lamium orvala* L.

By comparing these surveys, one will notice immediately that they all coincide in the central band of the area, whereas each of them is in-

complete in some of its marginal parts. Thus Gaži-Baskova (1973) was the only one to indicate the localities in Montenegro, based on specimens from the Šarajevo herbarium (SARA), which at the same time represent the farthest eastern reach of the range of *L. orvala* (cf. also Rohlena 1942, Domac 1950). Mennema (1989) records *L. orvala* on Monte Gargano in Italy, a locality not mentioned by Pignatti (1982), and the most southern point of its range. Fukarek's (1978) area is incomplete, and Marinček's (1981) area is very detailed for Slovenia.

Although all authors who studied the problem of the distribution of *L. orvala* used a dotted representation of the area, in some parts »the dots« are very close while in the others they are dispersed or even reduced to single ones. Assuming that in the part of the habitat with dense occurrence of this plant (cf. Horvat 1938, Praprotnik 1987) neither all real localities (cf. also Marinček 1981) have been recorded nor all herbarium materials from the respective localities collected, then, in case that all possible localities have been introduced and marked in the map, the »dots« would become so close that such parts of the area could be represented also by a continuous surface, such as is often used especially in smaller scale maps.

By uniting these published dotted area maps (Gaži-Baskova 1973, Fukarek 1978, Meusel and co. 1978, Marinček 1981, Mennema 1989) we have made a revision of the range of *L. orvala*. For this purpose the parts of the area in which *L. orvala* is a common and ordinary plant have been represented by a hatched surface while dots have been used to show the marginal parts and limits. Besides, the area has been completed by the data of Panjković (1990) for eastern Croatia (Baranya).

Finally Fukarek and Stefanović (1958) mentioned *L. orvala* for the virgin forest of Peručica in Bosnia, and Fukarek and al. (1967) for the Dinara mountain, but according to Fukarek (1978: 149) this has been a mistake in determination.

The area represented in the manner explained above highlights quite well that the central part of the range of *L. orvala* is located in the boundary region between the Southeast edge of the Alps and the Northwest Balkan Peninsula (Fig. 1).

Problem of the phytogeographical limitation of the Illyrian elements

As it is known, the notion of the Illyrian floral element was introduced by G. Beck-Mannagetta (1901) to indicate all plant taxa which in their distribution are either fully limited to or located by its center in the so called Illyrian countries, regardless of the vegetational forms they belong to. Geographically, it corresponds to the Dinaric Alps and from the climatic point of view these should be mainly thermophilous and heliophilous elements, even when developed in the mountain belt, because the mountain climate of the Dinaric Alps is strongly (and markedly) influenced by the Mediterranean climate.

Due to the xerothermal character of most elements in the Illyrian flora, such as understood by Beck, he genetically connected it (Beck 1901, 1907, 1908, 1913) with the Pontic flora, so that sometimes he called it Illyrian (cf. Beck 1907, 1908) and sometimes West Pontic (cf. Beck 1913).

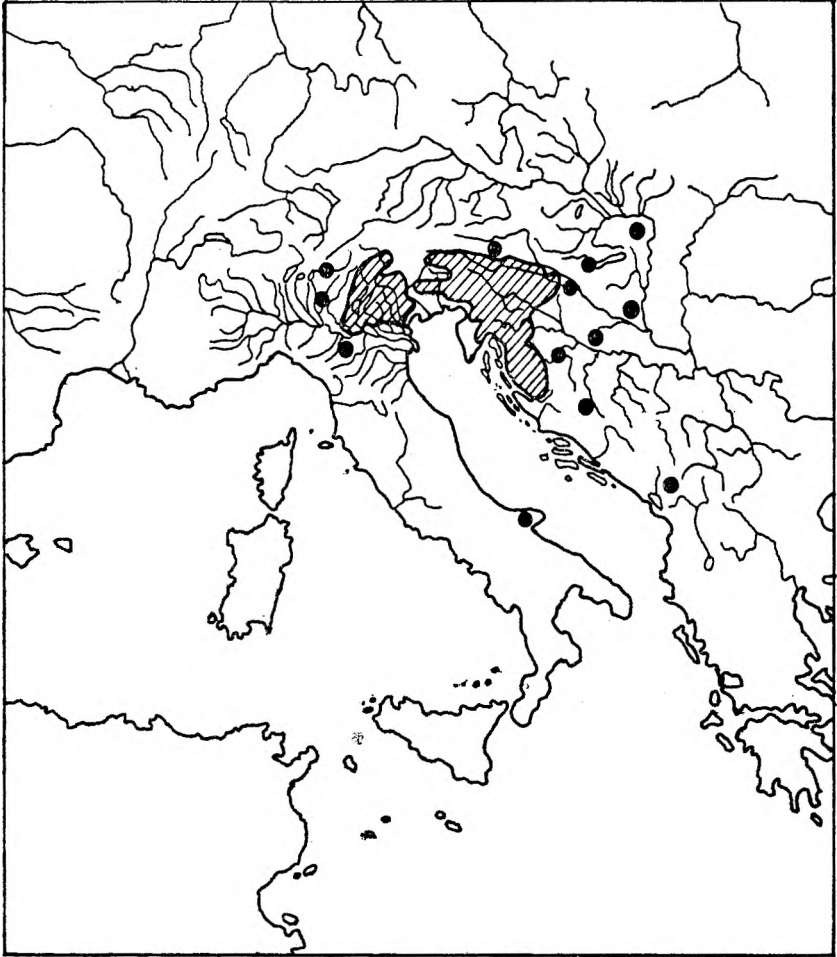


Fig. 1. Distribution of *Lamium orvala* L.

The analysis of several Beck's lists of the Illyrian species marked by him shows that there we shall also find species which, once their entire area has become known, cannot be regarded as Illyrian any more, as in the case of *Ostrya carpinifolia*, *Fraxinus ornus*, *Carex humilis*, *Chrysopogon gryllus*, *Bothriochloa ischaemum* and others. For some other species it was proved that they had not been determined correctly, as, e.g. *Aristolochia pallida* which in fact is limited to the eastern border of the Maritime Alps, while until recently the name of »*A. pallida*« was used in the Illyrian countries to designate the Southeuropean species *A. lutea* Desf. (cf. Nardi 1984, Martini 1990, Trinajstić 1990).

In fact Beck, in a large number of his contributions includes in the group of the Illyrian elements some rather heterogenous groups of plants: the first group comprises endemic plants, the elements of the vegetation of rocks and screes, limited to the Adriatic region of the Mediterranean, but of Dinaric genesis (for ex. *Dianthus tergestinus*, *Drypis jacquiniana*, *Centaurea dalmatica*, *Leucanthemum platylepis* and others). As it is known, all these species were designated by Horvatić (1963) as Illyrian-adriatic endemic species.

The second group consists of the vegetation elements of heliophilic black-pine forests of the Dinaric Alps (e. g. *Genista januensis*, *G. dalmatica*, *Daphne blagayana*, *Leontodon incanus*, *Leucanthemum croaticum*, *Sesleria autumnalis* and others).

The third and very numerous group consists of heliophilic elements of the vegetation of mountain rocks, screes and meadows (e. g. *Aquilegia dinarica*, *Arabis scopoliana*, *Campanula waldsteiniana*, *Cardaminopsis croatica*, *Carex kitaibeliana*, *Dianthus freynii*, *Euphrasia dinarica*, *Festuca bosniaca*, *Iberis velebitica*, *Oxytropis dinarica*, *Primula kitaibeliana*, *Saxifraga prenja*, *Sesleria juncifolia* and many others) which were designated by Horvatić (1963) as Illyrian-balcanic endemic plants.

Finally, the fourth group in Beck's list of Illyrian, or. West Pontic species consists of mesophytic and more or less sciophytic species, elements of mesophilous beech and less often, sessile oak forests, such as for instance *Omphalodes verna*, *Hacquetia epipactis*, *Aposeris foetida*, *Erythronium dens-canis* and others. The said species and several species with Southeuropean distribution were used by I. Horvat (1938) for the differentiation of the whole group of the Illyrian beech forests (*Fagion illyricum*). A similar approach was adopted later by practically all Central European authors (for instance Borhidi 1963, Soó 1964—1980, Meusel and al. 1965, M. Wraber 1966, 1969, Walter and Straka 1970, Meusel and al. 1978, Pignatti 1982, Praprotnik 1987, Poldini 1990).

As already mentioned, Beck compared the Illyrian flora with the Pontic, as its Western differentiation (the West Pontic flora): on the contrary, it appears much more realistic to the Illyrian flora with the ancient Mediterranean flora (Adamović 1909), as emphasized by Horvatić (1928) and Horvat (1929), too. If, in this sense, we make an analysis of the genesis of those endemic Illyrian species which were formed on the Dinaric Alps, from the sea level up to the highest mountain peaks, it can be found that they represent vicarious species (rather rarely genera) closely congeneric with species differentiated on the mountain ranges surrounding the Mediterranean basin (the Alps, the Apennines, Greek mountains, the Pyrenees, Atlas, Lebanon; cf. Trinajstić 1988), and thus they can be considered as found »in situ« and not being connected at all with the Pontic flora which basically belongs to the steppe. Accordingly, it can be concluded that they are relatively young species and that they belong to genera, sections or series, the forms of which differentiated only recently (in the Posttertiary) as part of progressive polymorphous genera, e. g. *Alyssum*, *Aurinia*, *Campanula*, *Centaurea*, *Dianthus*, *Edraianthus*, *Festuca*, *Genista*, *Leucanthemum*, *Silene* etc. (cf. Turill 1929, Trinajstić 1988). All the above mentioned and similar forms are inhabitants of rock-fissures, screes or mountain meadows above the upper forest border (trimberline), that is adapted to markedly heliophilic habitats with extreme ecological conditions and less frequently they are elements of open black-pine (*Pinus nigra*) or muni-

ka-pine (*P. heldreichii*) forests. All such Illyrian endemic plants could be regarded as true Illyrian elements (Illyrian endemics — *plantae illyri-cae endemicae*)

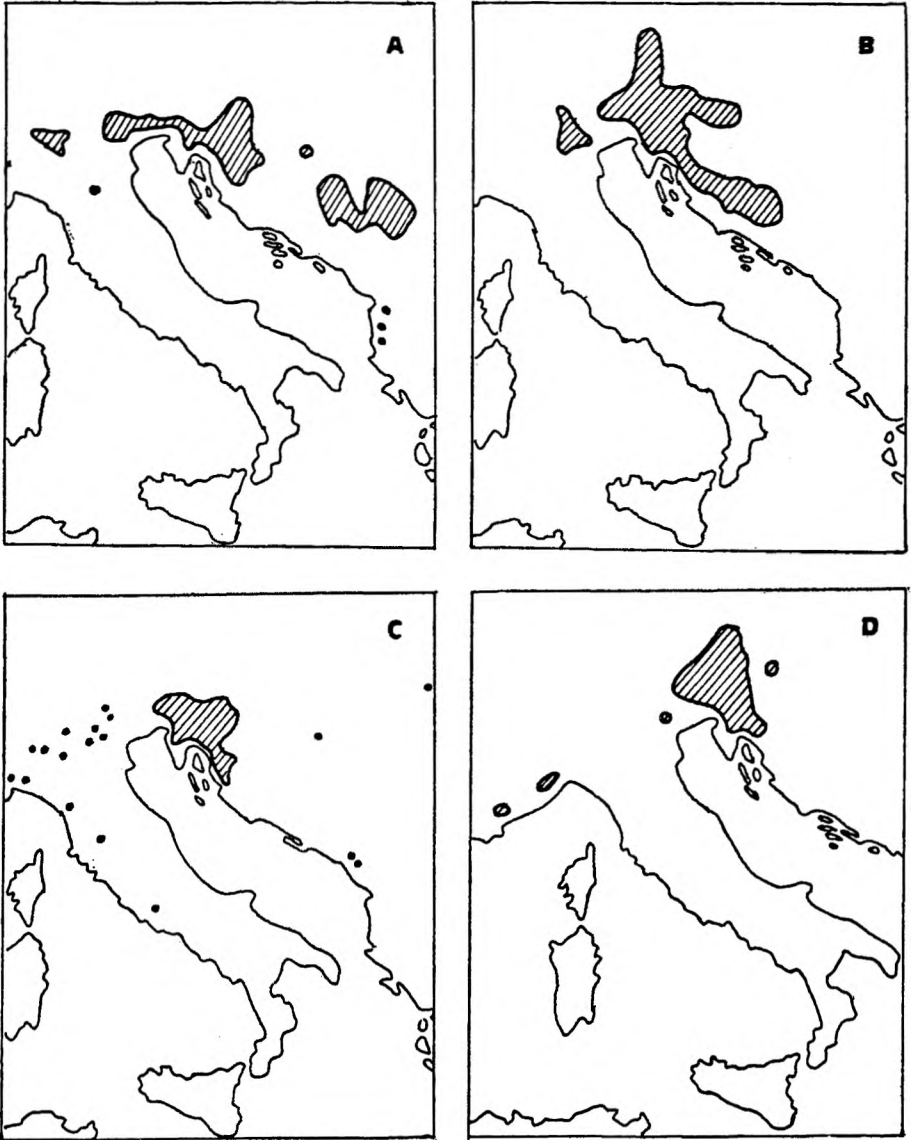


Fig. 2. Distribution of the illyricoid elements: A-*Epimedium alpinum* L., B-*Vicia oroboides* Wulfen, C-*Omphalodes verna* Moench (according to Gaži-Baskova 1963, 1973), D-*Anemone trifolia* L. (Meusel and co. 1965)

On the other hand there is a separate group of endemic species of mesophilic forest habitats which, as already said, has also been classified into Illyrian elements although practically in no connection with them either from the genetical, ecological or chorological point of view (cf. Trinajstić 1987).

An analysis of the taxonomic position of these species will demonstrate that they are completely isolated with regard to their closer or more distant relatives and that very likely they are to be considered Tertiary relict species (cf. Turill 1929), presently of an endemic character (Paleoendemics). They are diffused just over the boundary region between the Southeastern Alps and the Northwestern Dinaric Alps where probably they survived the ice age in some refugia with mesophilous vegetation. Some of them were conserved but practically only as a component of mesophilic beech or sessile oak (hornbeam) forests, in particular in adjacent parts of Europe, but nowhere jointly as in the above mentioned Southeastern Alps-Western Dinaric area.

All these elements resemble in distribution the true Illyrian endemics (*plantae illyricae endemicae*); because of their recent spread they cannot be identified with them, and consequently they have been designated as Illyricoid elements (*plante illyricoideae*).

The following species can be listed as Illyricoid:

<i>Anemone trifolia</i> L.	<i>Geranium phaeum</i> L.
<i>Aposeris foetida</i> Less.	<i>Hacquetia epipactis</i> DC.
<i>Aremonia agrimonoides</i> Neck.	<i>Helleborus atrorubens</i> Waldst. et Kit.
<i>Cardamine trifolia</i> L.	<i>Homogyne sylvestris</i> Cass.
<i>Carex pilosa</i> Scop.	<i>Knautia drymeia</i> Heuff.
<i>Cerastium sylvaticum</i> Waldst. et Kit.	<i>Lamium orvala</i> L.
<i>Cyclamen purpurascens</i> L.	<i>Laserpitium peucedanoides</i> L.
<i>Dentaria ennaeaphyllos</i> L.	<i>Omphalodes verna</i> Moench
<i>Dentaria trifolia</i> Waldst. et Kit.	<i>Potentilla carniolica</i> Kerner
<i>Epimedium alpinum</i> L.	<i>Pseudostellaria europaea</i> Schaeft.
<i>Erythronium dens-canis</i> Bernh.	<i>Scopolia carniolica</i> Jacq.
<i>Euphorbia carniolica</i> Jacq.	<i>Senecio ovirensis</i> (Koch) DC.
<i>Euphorbia dulcis</i> L.	<i>Vicia oroboides</i> Wulfen

The distribution of some Illyricoid elements is represented in Fig. 2.

Conclusions

The comparison of previously published maps (Gaži-Baskova 1973, Fukarek 1978, Meusel and co. 1978, Marinček 1981, Mennema 1989), allows a revision of the distribution of *Lamium orvala*. The already known area has been completed with the data of Panjković (1990) for Baranya in Eastern Croatia.

The Illyrian elements s. lat. as understood by Beck (1901) has been divided into a group of true Illyrian endemic plants (*plantae illyricae endemicae*) according to Horvatić (1963), and into a group of isolated, relict species resembling true illyrian plants only by their recent chronology and designated as Illyricoid elements (*plantae illyricoideae*).

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S A Ž E T A K

PRILOG FITOGEOGRAFSKOM RAZGRANIČENJU ILIRSKOG FLORNOG ELEMENTA

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Ujedinjenjem dosad objavljenih arealnih karata (Gaži-Baskova 1973, Fukarek 1978, Meusel et al. 1978, Marinček 1981, Menem 1989) izvršena je revizija areala vrste *Lamium orvala*. Isto je tako dosad poznati areal dopunjen podacima Panjković (1990) za Baranju u Hrvatskoj.

Široko shvaćeni ilirski elementi u smislu Becka (1901) raščlanjeni su na skupinu pravih ilirskih endemičnih biljaka u smislu Horvatića (1963) i na skupinu izoliranih, reliktnih vrsta koje su samo po svojoj procentnoj rasprostranjenosti slične ilirskim elementima, a označene su imenom ilirikoïdni elementi.

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