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East-West Euroasiatic disjunction of woody genera

Abstract

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As an example of woody genera the East-West Euroasiatic disjunction is discussed and the very generalized maps of its distribution are presented. The author found 14 such genera, namely: *Bosea* (*Amaranthaceae*), *Hedera* (*Araliaceae*), *Pterocarya* (*Juglandaceae*), *Fontanesia*, *Forsythia*, *Ligustrum* and *Syringa* (*Oleaceae*), *Cedrus*, (*Pinaceae*), *Paliurus* (*Rhamnaceae*), *Pyracantha*, *Pyrus* and *Sibiraea* (*Rosaceae*), *Wendlandia* (*Rubiaceae*), *Zelkova* (*Ulmaceae*).

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INTRODUCTION

The East-West Euroasiatic disjunction concerns only those genera which occur exclusively on the Euroasiatic continent (occasionally also in North Africa), and which are absent in North America. One of the first if not the first to note this disjunction was Good (1927) who gave several examples mentioning 4 genera of woody plants, namely: *Bosea*, *Forsythia*, *Pterocarya* and *Zelkova*. Unfortunately Good did not compile distribution maps of these genera. Next, forty five years later Green, (1972) in his study of the nomenclature of the *Osmanthus decorus* (Boiss. et Bal.) Kasapl. observed that this type of disjunction occurs in several genera of family *Oleaceae*, in *Forsythia*, *Fontanesia*, *Syringa* and *Ligustrum*, and besides in section *Osmanthus* of the genus *Osmanthus*. At the same time Green published line range maps of these genera. It appears, however, that such woody genera are more numerous and during my work on the chorology of trees and shrubs of south-west Asia. I have found further 7 genera with an East-West Euroasiatic disjunction, so that with those already mentioned the number is 14.

Below in alphabetical order by families all these genera are presented with a short characteristic of distribution and range maps. These maps have been

prepared primarily on the basis of literature and thus they are very generalized – this concerns primarily the region of southeast Asia.

List of disjunctive genera

Amaranthaceae

1. *Bosea* L.

This genus is represented by only three species each of which is characterized by a very narrow range, much removed from each other (Fig. 1).



Fig. 1. The disjunctive range of genus *Bosea* L.

Most westerly is *B. yervamora* L., an endemic species for the Canary Islands. The second species, *B. cyprica* Boiss. is an endemite of Cyprus, occurring on the island quite commonly, particularly in coastal regions. The third species, *B. amherstiana* (Moq.) Hook f. occurs from Pakistan (Swat) through Kashmir to northwestern India. According to Townsend (1973) these three species "... can be readily separated by seed character".

Araliaceae

2. *Hedera* L.

According to Pojarkova (1951) this genus has 15 species, however, it appears that some of them are critical and that the number of species is most probably 10–12.

Four species of *Hedera* occur in the West, namely: 1. *H. canariensis* Willd. – Canary Islands, the Açores, North-West Africa and Portugal; 2. *H. helix* L. – Europe and South-West Asia (Anatolia, the Caucasus, Cyprus, Syria, Lebanon, Israel and Iraq); 3. *H. colchica* K. Koch – northern Anatolia and the Caucasus; 4. *H. pastuchowii* Woronow – eastern Caucasus and northern Iran (Caspian region).

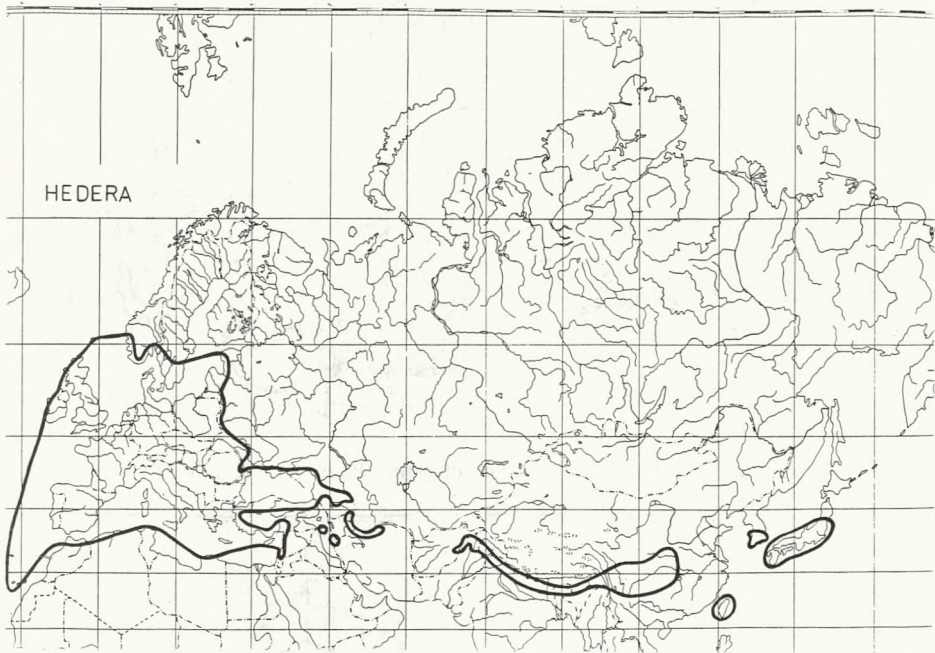


Fig. 2. The disjunctive range of genus *Hedera* L.

The remaining species grow primarily in China and in Japan. In this part of the genus range the most westerly is *H. nepalensis* K. Koch from the northwestern Himalayas, northern Pakistan and eastern Afganistan (Fig.2).

Juglandaceae

3. *Pterocarya* Kunth

Iłinska ja (1963) in her monograph of the genus mentions 10 species. Only one of these, *P. fraxinifolia* Spach occurs in the West, in the Euxine-Hyrcanian province – Anatolia, the Caucasus and northern Iran (also in northern Iraq). Nine other species are restricted in their range to eastern Asia, primarily to China and Japan – they are also known from northern Laos and northern Vietnam. In this part of the eastern range of *Pterocarya* the most northerly is *P. rhoifolia* Siebold et Zucc. from Japan and most western is *P. macrocarpa* Batalin from southeastern China (Fig. 3).

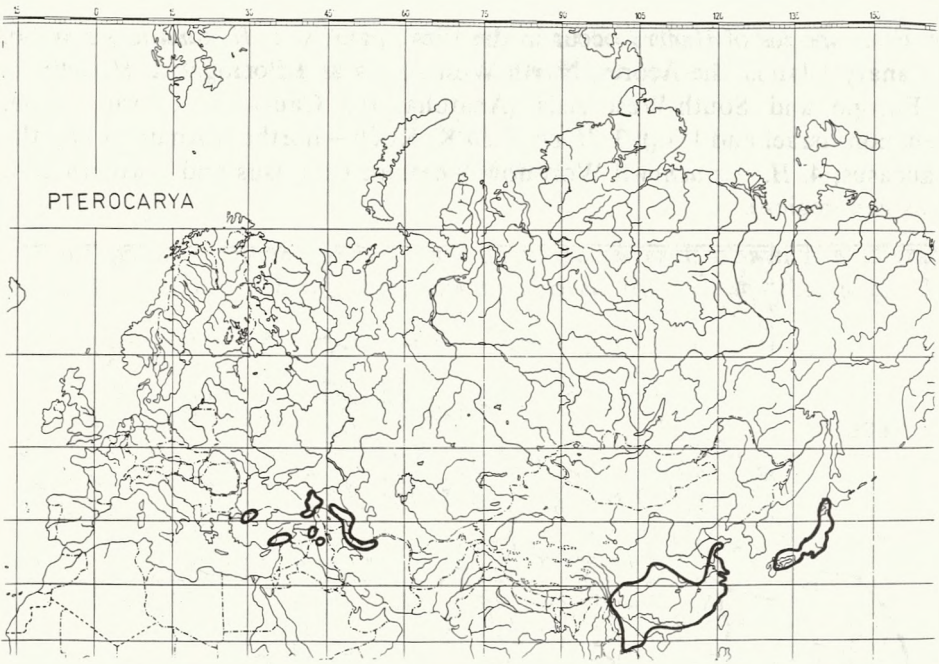


Fig. 3. The disjunctive range of genus *Pterocarya* Kunth

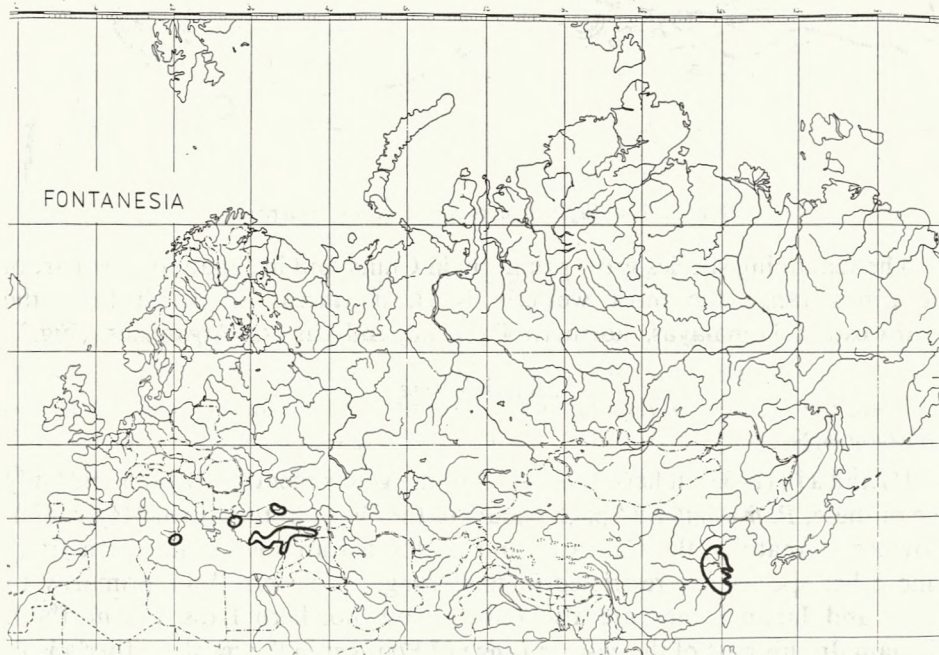


Fig. 4. The disjunctive range of genus *Fontanesia* Labill.

Oleaceae

4. *Fontanesia* Labill.

This genus is represented by only one, possibly two species. In Anatolia, primarily in the south and also in northwestern Syria and Europe, in southeastern Sicily, there occurs *F. phillyreoides* Labill., while from eastern China *F. fortunei* Carrière is reported. These two species are so similar to each other that at times they are considered to be identical with two forms, varieties or subspecies – subsp. *phillyreoides* and subsp. *fortunei* (Carrière) Yaltirik (Fig. 4).

5. *Forsythia* Vahl.

In this genus 6-7 species are known of which only one occurs in Europe, *F. europaea* Deg. et Baldacci, known only from Albania and western Jugoslavia. On the other hand the remaining species occur in eastern Asia, in Korea – *F. viridissima* Lindley, *F. ovata* Nakai, in Japan – *F. japonica* Makino, and in eastern China *F. suspensa* Thunb, *F. giraldiana* Lingelsh. (Fig. 5).

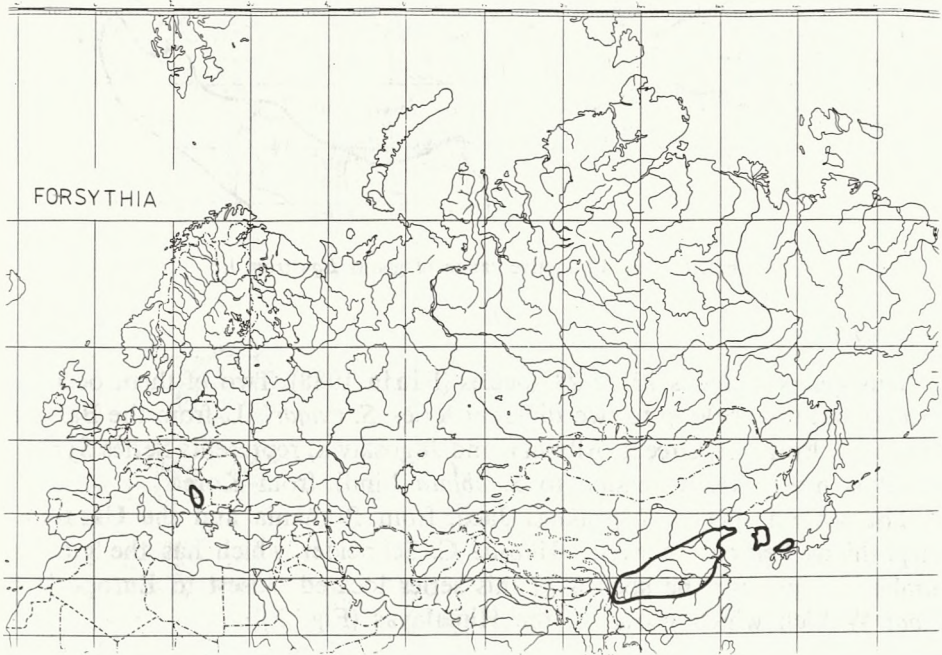


Fig. 5. The disjunctive range of genus *Forsythia* Vahl.

6. *Ligustrum* L.

This genus is rich in species, there being about 50. Only one of these, *L. vulgare* L. is widely distributed in Europe, and then in NW Africa, on the

Caucasus, in Anatolia and in NW Iran. All remaining species have ranges associated with eastern and southeastern Asia, all the way to central Sakhalin, and the most westerly species is *L. compactum* Hook. f. et Thompson known also from northwestern Himalayas (Kumaun) (Fig. 6).

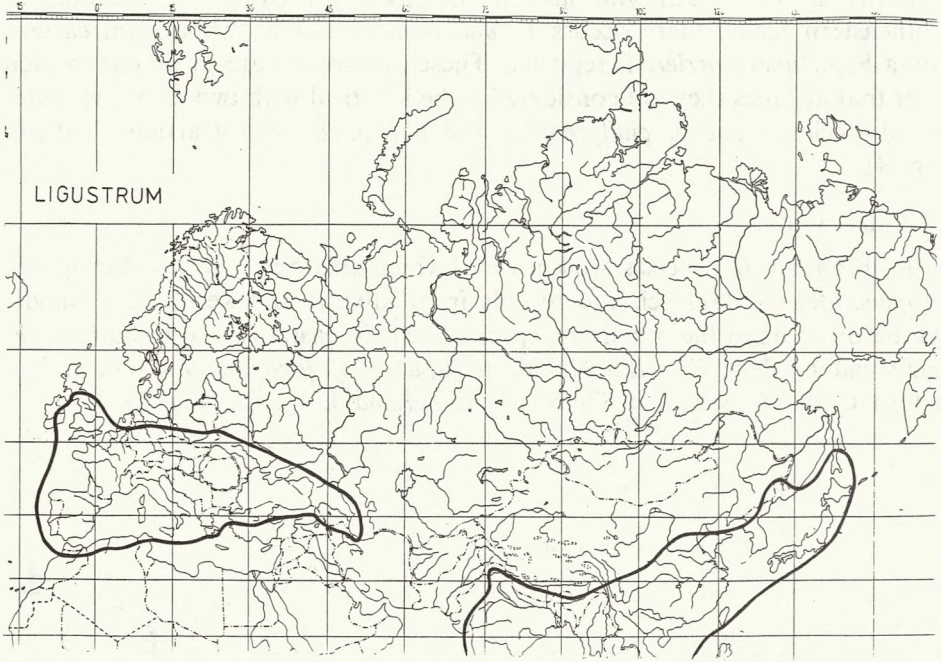


Fig. 6. The disjunctive range of genus *Ligustrum* L.

7. *Syringa* L.

This genus includes 23 or 24 species (Fiala 1988). Two of them occur in Europe and they belong to two different series. *S. vulgaris* L. from the Balkans (Romania, Bulgaria, Greece, Albania, and Jugoslavia) represents Series *Syringa* and it is most closely related to *S. oblata* Lindl. from Korea.

The second species *S. josikaea* Jacq. from Romania and the Ukrainian Carpathians belongs to Series *Villosae* C. Schneider which has the greatest number of species. The species of this series located closest to Europe is *S. emodi* Wallich which grows in the Himalayas (Fig. 7).

Pinaceae

8. *Cedrus* Link.

Distribution of the the 3 or 4 species of this genus is perhaps the best known from among the genera with the East-West Euroasiatic disjunction. Most westerly is *C. atlantica* (Endl.) Carrière from the mountains of North East

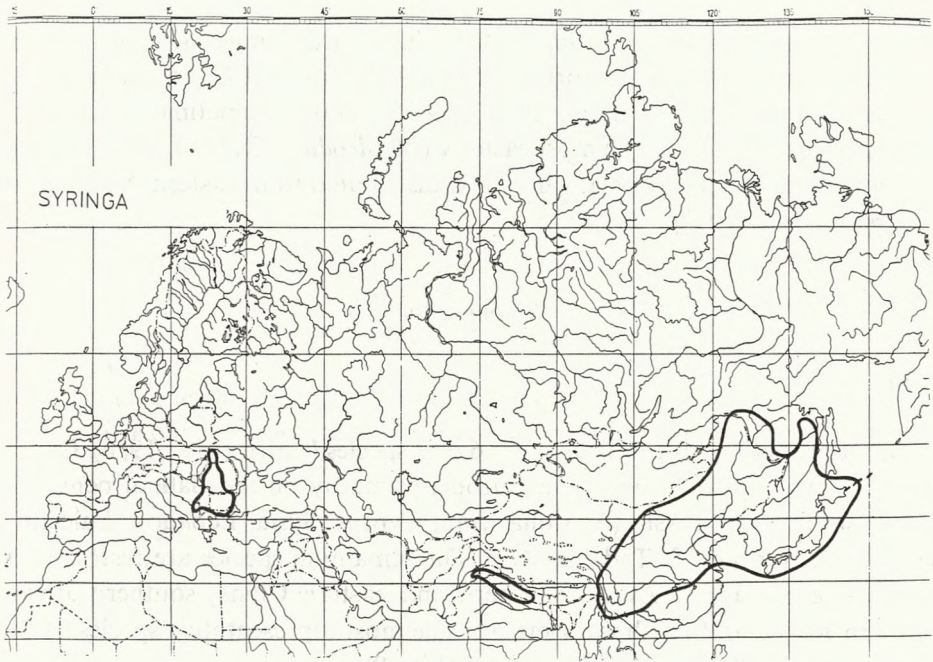


Fig. 7. The disjunctive range of genus *Syringa* L.

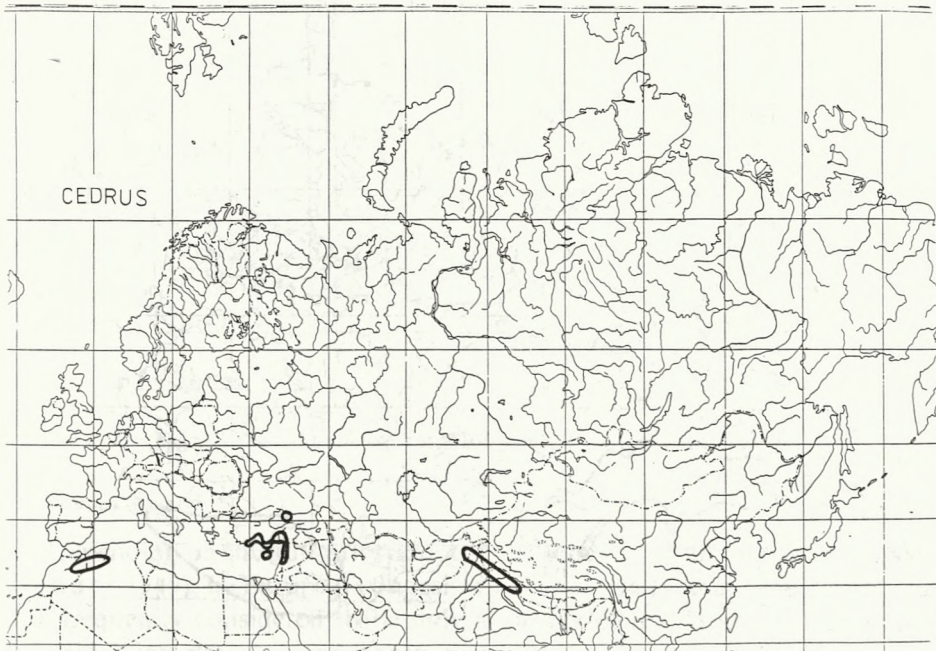


Fig. 8. The disjunctive range of genus *Cedrus* Link.

Africa. The next species is *C. libani* A. Rich. from the mountains of Anatolia (primarily the Taurus Mts.), northern Syria, Lebanon and *C. brevifolia* (Hook. f.) Henry from Cyprus. This latter species is also sometimes treated as a subspecies of *C. libani*. The most easterly is *C. deodara* (D. Don.) G. Don from the mountains of central Asia, where it is distributed from eastern Afghanistan to western Nepal (Fig. 8).

Rhamnaceae

9. *Paliurus* L.

Most probably this genus includes 6 or 7 species (Schneider 1916). One of them *P. spina-christi* L. occurs in Europe, primarily on the Balkan peninsula and in southwestern Asia (Anatolia, Iran, Cyprus, Syria, Lebanon, Palestine, NE Afghanistan and S. Tadzhikistan). The remaining species are restricted in their range to eastern Asia – southern and eastern China, southern Japan, southern Korea and northern Vietnam. The most representative species of the latter group is *P. ramosissimus* Poiret (Fig. 9).

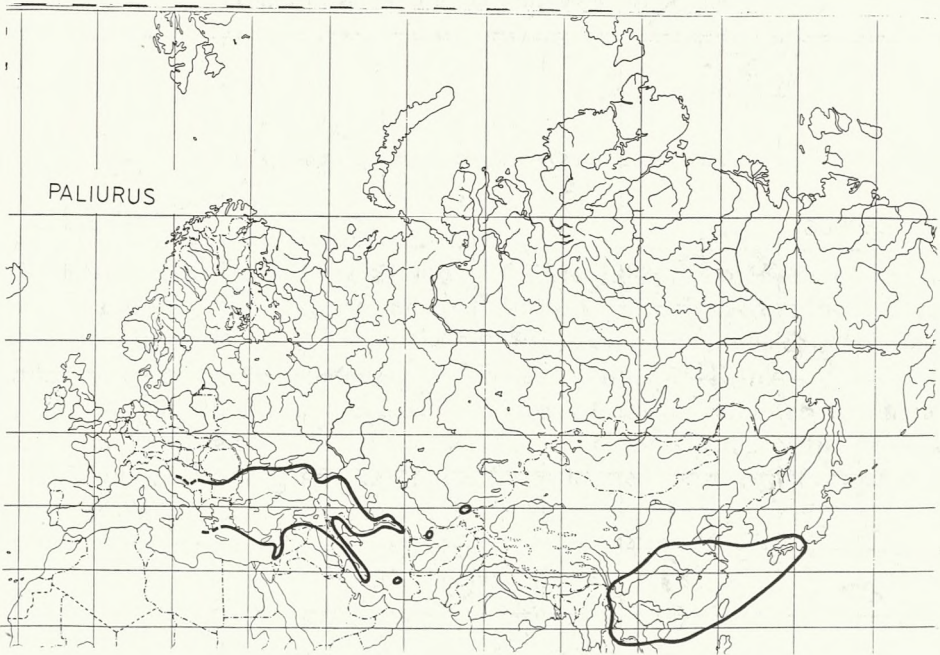


Fig. 9. The disjunctive range of genus *Paliurus* L.

*Rosaceae*10. *Pyracantha* M. Roemer

So far a systematic description of this genus is lacking, however, as be judged from the available data it includes 6 to 8 species (Rehder 1949). In the West, in Europe, there occurs only one species, *P. coccinea* Roemer, the range of which is not sufficiently clear. It is most probably restricted to the Balkan peninsula (Albania, Yugoslavia, Bulgaria, Greece and Turkey) and Crimea, while in southwest Asia it occurs in Anatolia, northern Iran and northern Lebanon. In France, Spain and in Italy *P. coccinea* is probably only naturalized.

The range in the East extends as a relatively narrow belt from Kashmir (*P. crenulata* (Roxb.) M. Roemer) through southern China, northern Laos and northern Vietnam to Taiwan (Fig. 10).

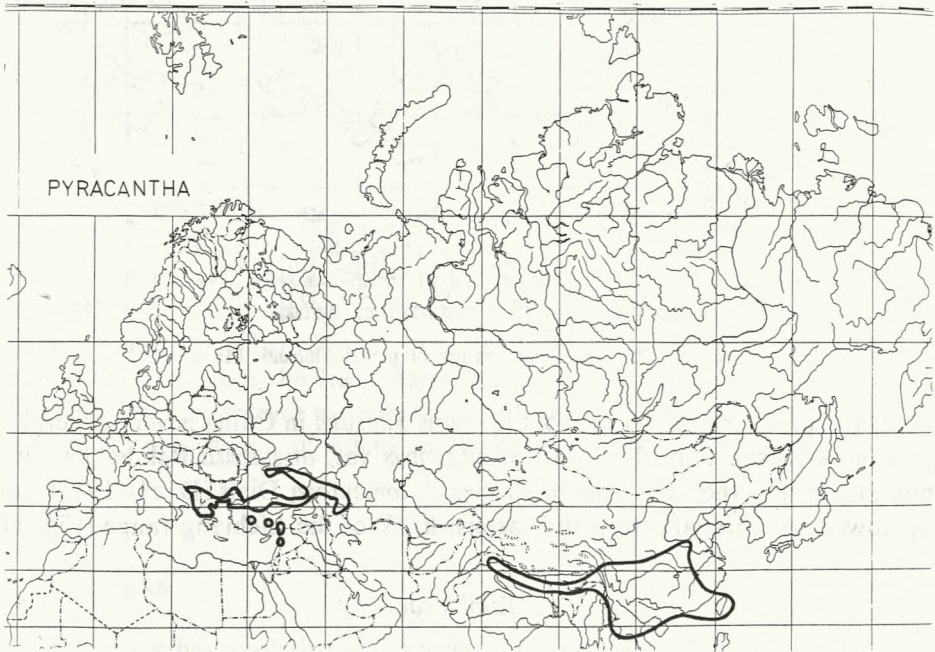


Fig. 10. The disjunctive range of genus *Pyracantha* M. Roemer

11. *Sibiraea* Maxim.

Depending on the authority adopted the genus has from one to four species (Rehder 1949). In Europe, in Yugoslavia, *S. croatica* Degen. occurs rarely and it is frequently considered to be only a variety of the Asiatic *S. altaiensis* C. Schneider, or else as being conspecific with it.

In the Asiatic part of the range *S. altaiensis* is restricted to southeastern

Kazakhstan, to Altai Mts. and here it is represented by the type variety *altaiensis*. Another species, *S. tianschanica* (Krasnov) Pojark. is restricted in its range to Tien Shan Mts. Ranges of these two taxa in the USSR have been described by Svjazeva (1980).

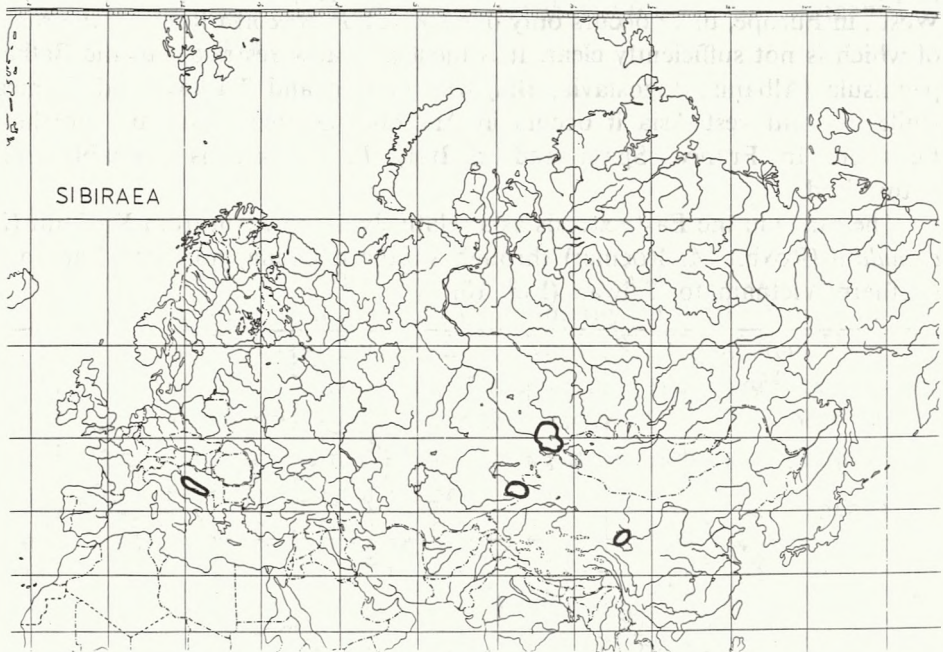


Fig. 11. The disjunctive range of genus *Sibiraea* Maxim.

Data about the occurrence of the genus *Sibiraea* in China is very general. In provinces Kasnu and Shechwan *S. altaiensis* var. *angustata* Rehder has been mentioned and the little known species *S. tomentosa* Diels (Diels 1912) from northwestern Yunnan, from the eastern flank of the Lichiang range (Fig. 11).

Rubiaceae

12. *Wendlandia* Bartling

In a monograph of this genus Cowan (1932) reports that it numbers 60 species, all of which except two grow in southwest Asia – from China to India and Pakistan, through the Malayan Peninsula to the Sundai Islands, New Guinea and even Australia. The most westerly species from this group are *W. exerta* DC and *W. puberula* DC, weaching western Pakistan.

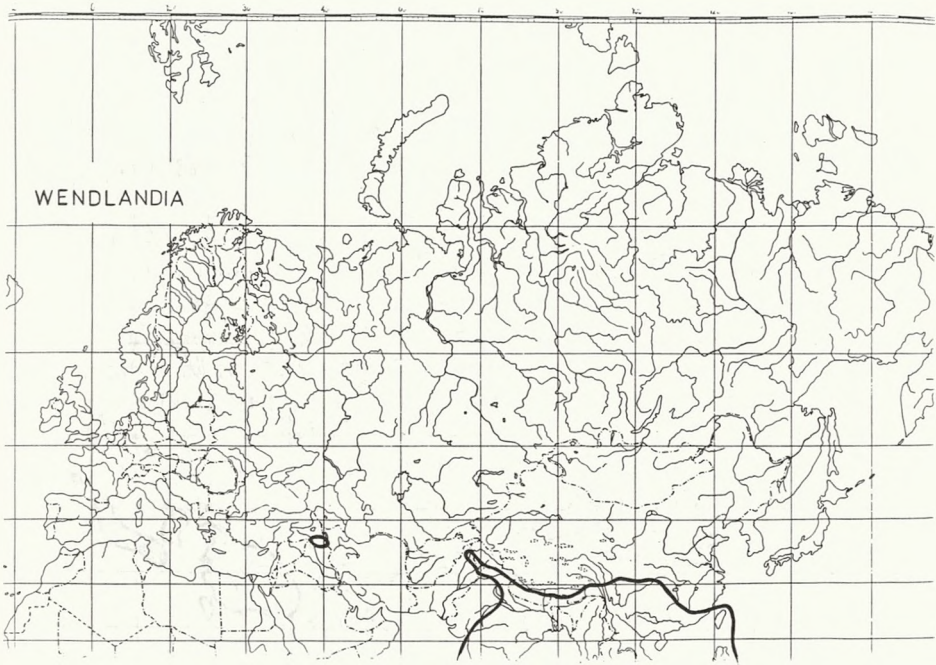


Fig. 12. The disjunctive range of genus *Wendlandia* Bartling

Two very isolated species occur in the western part of the genus range. The first is *W. lingustroides* (Boiss. et Hochen.) Blackelok, known so far only from northern Iraq (Browicz, Zieliński, 1990), though possibly it grows also in southern Turkey since the Iraqi stands almost reach the frontier between the two countries. The second western species *W. arbica* Deflers has been found in southern Yemen (region of Aden) and in eastern Africa, in Somalia (Fig. 12).

Ulmaceae

13. *Zelkova* Spach

This genus has probably 5-6 species (Czerepanov 1957) two of which grow in the western region. One of them has been reported from southern Europe, namely *Z. abelicea* (Lam.) Boiss., which is an endemite for Crete, and the other from southwest Asia – *Z. carpinifolia* (Pallas) K. Koch. It is an Euxine-Hyrcanian species, the range of which is restricted to northern Iran, the Caucasus (Talysh and Colchida) and it has been also reported from a few stands in eastern Anatolia and western Iran. As regards the eastern part of the range 3 or possibly 4 species occur in China, Japan, southern Korea and Taiwan (Fig. 13).

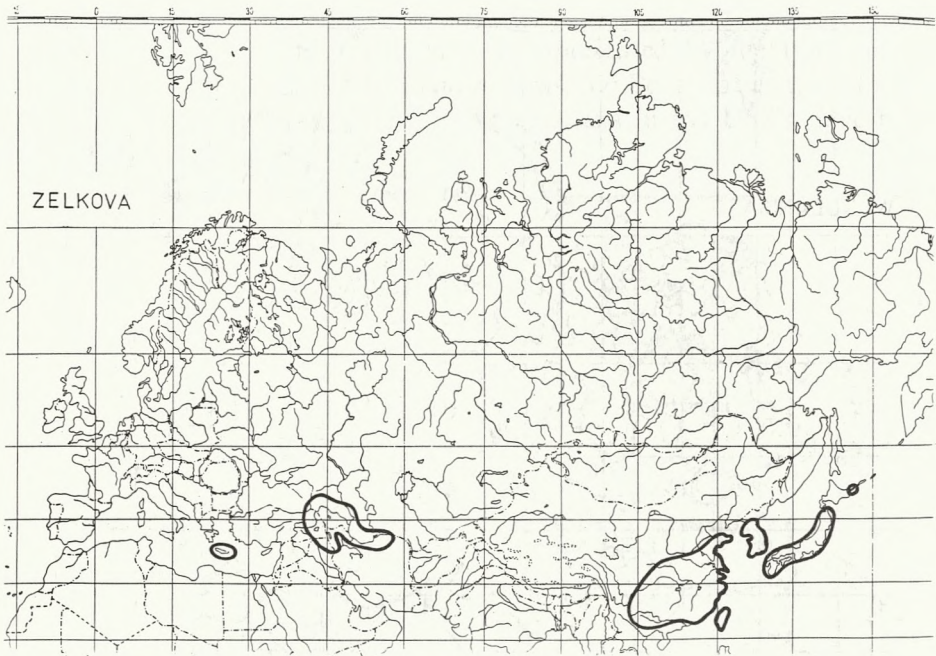


Fig. 13. The disjunctive range of genus *Zelkova* Spach

CONCLUSION

Now one could pose the question, how to explain this type of disjunction? The majority of the genera and species mentioned here are mesophytic plants, associated with climatic conditions characterized by greater humidity of both air and soil, frequently growing in forests, sometimes evergreen ones (*Hedera*, *Pyracantha*, and – partially *Ligustrum*). They occur primarily in the eastern region with only few species in the West. Thus these are species which are to a greater or lesser extent sensitive to drought.

Most probably a break in the initially continuous range has been caused by a modification of climate in southwest Asia, becoming increasingly dry. Many species were unable to adapt themselves to such new, difficult conditions and thus died or migrated to more favourable regions, such as the Euxine or Hyrcanian Provinces.

This can perhaps be best observed on the example of the genus *Pyrus* L., which can be included here as no. 14 among the list of previously mentioned genera. The range of genus *Pyrus* is almost continuous (Fig. 14) and the number of species is considerable – about 80. Many of them (probably a half) are represented by only small endemites, restricted to one or only a few stands,

possibly being of hybrid origin. In the region of southwest Asia, that is in the region of the disjunction for the above 13 genera, there grow the most xerophytic species of the genus *Pyrus*. Among such species we should include *P. korshinskyi* Litw., *P. regelii* Rehd., *P. syriaca* Boiss., *P. salicifolia* Pallas, *P. oxyprion* Woronow and others (Browicz 1982). This is even better demonstrated by the range of *Pyrus* species section *Pashia* Koehne. Species of this section are true mesophytes and in the West only one representative of the section remains, namely *P. boissieriana* Buhse (range of this species has been shown on the map as a dark area). Other species of this section occur almost exclusively in the eastern part of the genus range, and the most westerly one is *P. pashia* Ham. ex D. Don, distributed in China and through the Himalayas to northern Kashmir, Pakistan and eastern Afghanistan.

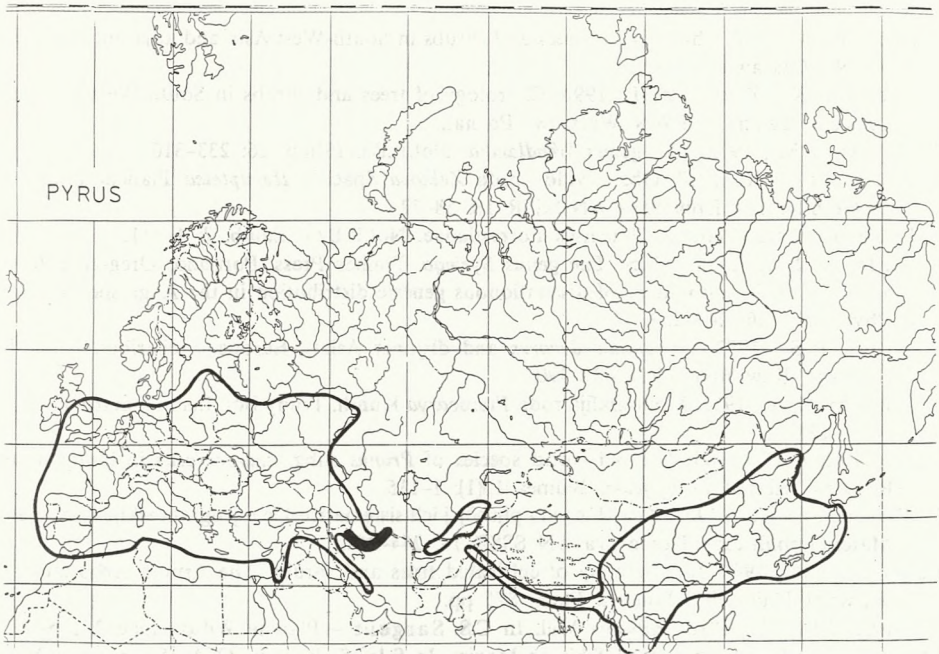


Fig. 14. The disjunctive range of genus *Pyrus* L.

The list of genera with the East-West Euroasiatic disjunction could be further increased, though in such genera as *Olea* L., *Myricaria* Desv., *Colutea* L., or *Cotoneaster* Meicus such a disjunction is not sufficiently clear. However, if we were to follow Kalkman's (1965) suggestion and include genus *Pygeum* Gaertner into genus *Laurocerasus* Duhamel, them in this so widely understood genus our disjunction would be clearly evident. This would make it the 15th genus of woody plants on our list.

SUMMARY

The East-West Euroasiatic disjunction concerns only those genera which are represented in Eurasia but are absent in North America. This type of disjunction was described in 1927 by Good and in 1972 by Green, who gave examples for 7 genera of woody plants, namely *Bosea*, *Forsythia*, *Fontanesia*, *Ligustrum*, *Pterocarya*, *Syringa* and *Zelkova*. In the present study further 7 genera are mentioned: *Cedurs*, *Hedera*, *Paliurus*, *Pyracantha*, *Pyrus*, *Sibiraea* and *Wendlandia*. For all fourteen genera range maps have been prepared. It was noted that in the majority of cases the genera include mesophytic species and the disjunction resulted as a consequence of increasing dryness of climate within the region of southwest Asia.

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Wschodnio-zachodnia eurazjatycka dysjunkcja rodzajów drzewiastych

STRESZCZENIE

Wschodnio-zachodnia eurazjatycka dysjunkcja dotyczy tylko tych rodzajów, które reprezentowane są na kontynencie Eurazji, ale brak ich zupełnie w Północnej Ameryce. Tego typu dysjunkcją zajął się w 1927 roku Good, a w 1972 roku Green, którzy podali przykłady

7 rodzajów drzewiastych, a mianowicie: *Bosea*, *Forsythia*, *Fontanesia*, *Ligustrum*, *Pterocarya*, *Syringa* i *Zelkova*. Autor wymienia dalszych siedem rodzajów: *Cedrus*, *Hedera*, *Paliurus*, *Pyracantha*, *Pyrus*, *Sibiraea* i *Wendlandia*. Dla wszystkich czternastu rodzajów opracował mapy zasięgowe. Zwrócił jednocześnie uwagę, że w większości przypadków do rodzajów tych należą gatunki mezofilne i że dysjunkcja zasięgowa powstała w wyniku pogłębiającej się suchości klimatu na obszarze południowo-zachodniej Azji.

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