

Chorology of the Euxinian and Hyrcanian element in the woody flora of Asia

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Key words: Flora of SW. Asia; Euxinian and Hyrcanian Euro-Siberian region, floristic provinces; trees and shrubs.

Abstract: The Euxinian and the Hyrcanian floristic province are analysed in respect to their trees and shrubs. These provinces mark the southern limit of the Euro-Siberian Region in SW. Asia. Mesophyllic forests dominate; they are deciduous, but there is a substantial component of evergreen shrubs in the understorey. Characteristic species frequently have a relic nature. Species lists and some exemplary distribution maps are presented for the Euxinian and the Hyrcanian element, both with endemic and more wide-spread species, including the characteristic Euxine-Hyrcanian group.

The southern limit of the Euro-Siberian region coincides with the southern coastal areas of the Black and Caspian Seas. The mesophyllic vegetation of these areas in the south borders on the xerophytic vegetation of the Irano-Turanian region. From this they are sharply separated by sometimes very high mountain ranges. Only in NW. Anatolia these mountains are much lower and less compact, so that the limit between the Euro-Siberian and the Irano-Turanian regions is more diffuse there.

The western area near the Black Sea is referred to as the Euxinian province, whereas the eastern, near the Caspian Sea, as the Hyrcanian province; they are separated by the Caucasus massif. Sometimes these two provinces are treated jointly as the Euxine-Hyrcanian province, with two subprovinces, the Euxinian and the Hyrcanian. Within Eurasia they represent one of the very characteristic relic refugia for the mesophyllic tree and shrub flora. In spite of considerable similarities, the two provinces (or subprovinces) clearly differ from each other in their floristic composition.

The **Euxinian province** was first described as such by GAJEWSKI (1937). He was using the nomenclature adopted from BRAUN-BLANQUET (1928) calling it a "domaine" and understood it in a very wide sense, including both the Crimea and the Novorossijsk region on the Black Sea. Within it GAJEWSKI (1937) recognized a Hyrcanian sector. Independently, MALEEV (1940) limited the Euxinian province to the coastal areas of the Black Sea and considered the vicinity of Varna in Bulgaria as its northern limit in Europe. Both, GAJEWSKI and MALEEV, included the province into the Mediterranean region, while MEUSEL & al. (1965) placed it into the Sub-Mediterranean subregion. As regards the northern limit of the Euxinian province,

various opinions were expressed, e.g., by DAVIS (1971) who includes in it besides the Crimea also the Dobrudzha, a delimitation initially also accepted by TAKHTAJAN (1974). Today, however, following numerous investigations of the area (among others CZECZOTT 1937, DAVIS 1965, ZOHARY 1973, DOLUCHANOV 1980, BROWICZ 1982–1988) the range of the Euxinian province is sufficiently well established. It covers in Europe the southeastern Black Sea area, in Bulgaria approximately from the Ropotamo valley (or else from the Burgas reservoir), eastern European Turkey (Istranca Daglari), northern Anatolia and the Western Caucasus (Adhsaria, district Kutaisi, Abkhazja, coastal part of Krasnodar district), with its northern limit near Tuapse (TAKHTAJAN 1978). The eastern limit in the Caucasus is not yet exact known.

DAVIS (1971) divides the Euxinian province (in Turkey only; but I believe this applies to the whole province) into a western and an eastern part (the latter called Colchic sector), placing their boundary in northern Anatolia along Melet valley near Ordu. The basis for this division is the substantial increase in the density of Euxinian species (Fig. 1) and in the total precipitation towards the east.

It is a characteristic feature of the Euxinian province that it is covered by extensive mesophyllic forests, primarily broad-leaved forests. Among them, a dominant role is played by beech woods (*Fagus orientalis*) with an undergrowth of evergreen shrubs, such as *Rhododendron ponticum*, *Laurocerasus officinalis*, *Ilex colchica*, *Daphne pontica*, *Hedera helix* and *H. colchica*. In the eastern Colchic sector, coniferous forests with *Abies nordmanniana* subsp. *nordmanniana* and *Picea orientalis* are a substantial component.

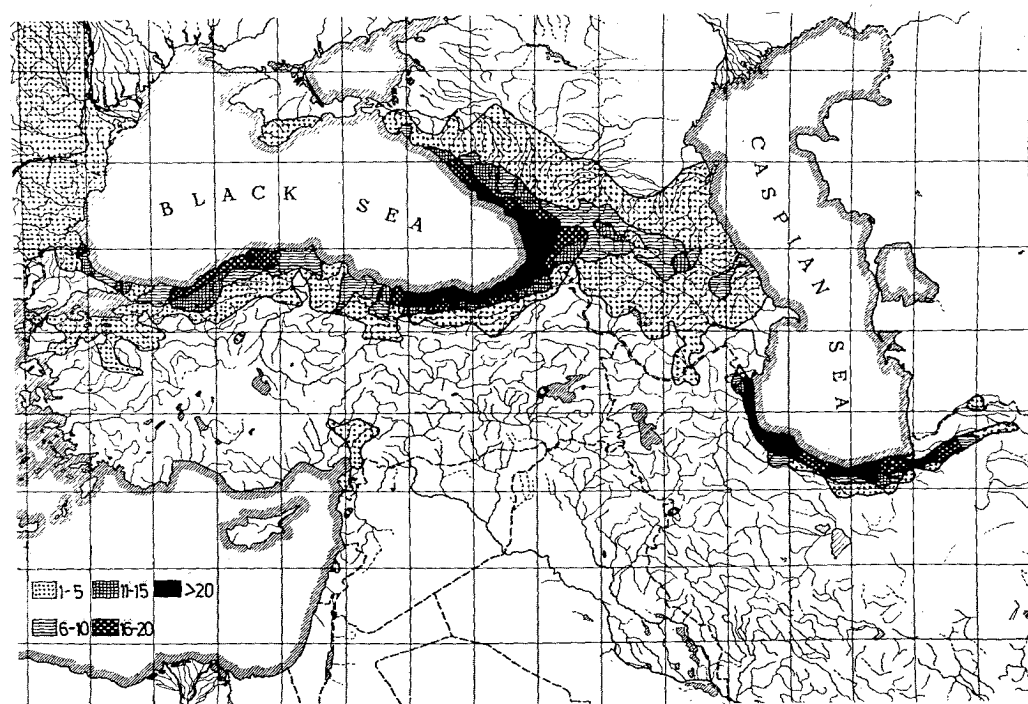


Fig. 1. Density of woody Euxinian and Hyrcanian species

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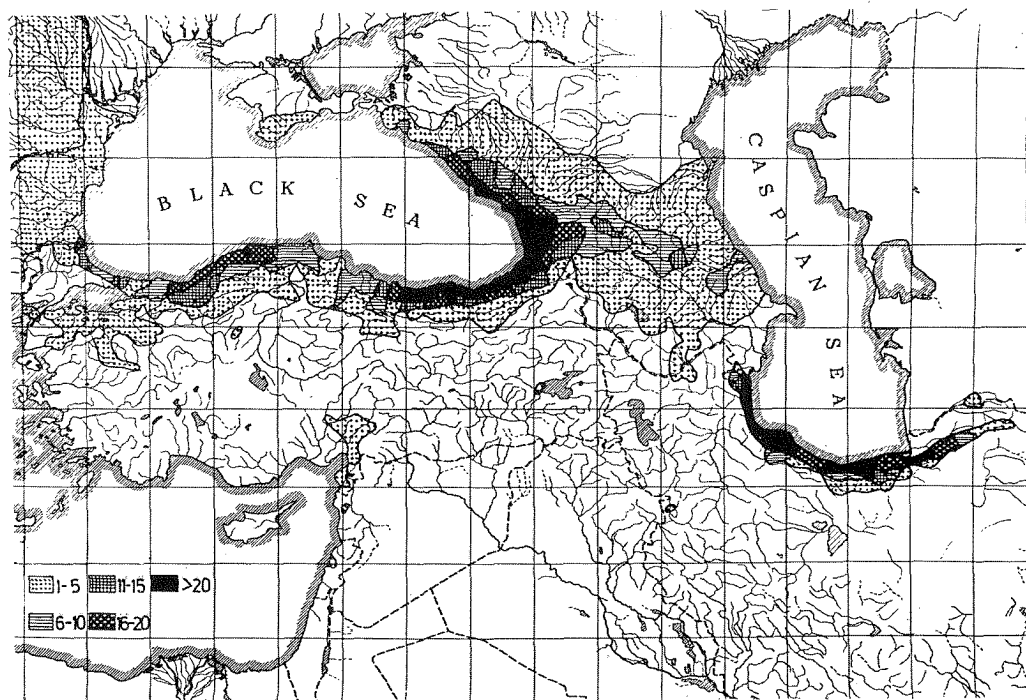


Fig. 1. Density of woody Euxinian and Hyrcanian species

The number of Euxinian species *sensu stricto* is not fully established yet. To a large extent this is due to the inadequate knowledge of the species ranges or else, to systematic problems. An example is the *Buxus sempervirens* aggregate which is considered to be represented in the Colchic sector by an independent species, *B. colchica*, and in the Hyrcanian province by *B. hyrcana*, species not yet generally recognized. Strictly Euxinian species of trees and shrubs approximately number about 30, among them a large number (15) of evergreens (marked by *).

Euxinian species: *Abies nordmanniana* (STEV.) SPACH subsp. *nordmanniana**, *Acer trauttveteri* MEDV., *Betula medwedewii* REGEL, *Buxus colchica* POJARK.*, *Daphne glomerata* LAM.*, *Epigaea gaultherioides* (BOISS. & BAL.) TAKHT.*, *Hedera colchica* (K. KOCH) K. KOCH*, *Hypericum calycinum* L.*, *H. xylosteifolium* (SPACH) N. ROBSON, *Ilex colchica* POJARK*, *Osmanthus decorus* (BOISS. & BAL.) KASAPLIGIL*, *Philadelphus caucasicus* KOEHNE, *Picea orientalis* (L.) LINK*, *Pyracantha coccinea* (L.) M. ROEMER*, *Quercus hartwissiana* STEV., *Q. pontica* K. KOCH, *Rhamnus imeretinus* BOOTH, *R. microcarpus* BOISS., *Rhododendron caucasicum* PALLAS*, *R. luteum* SWEET, *R. ponticum* L.*, *R. smirnowii* TRAUTV.*, *R. ungeri* TRAUTV.*, *Rhodothamnus sessilifolius* P. H. DAVIS*, *Staphylea colchica* STEV., *S. pinnata* L., *Sorbus colchica* ZINSERL., and *Viburnum orientale* PALLAS.

The ranges of these Euxinian species coincide with the limits of the province or else (when they also occur in neighbouring regions) are centred there. Relevant and examples of such Euxinian species are, e.g., *Rhododendron luteum*, widely distributed throughout the province, but also in substantial parts of Ukraine and Bialorussia, and extending to Poland and Yugoslavia. Similar is *Staphylea pinnata* whose range mainly occupies the Balkan peninsula, but in the north reaches to southeastern Poland. Finally, *Hypericum androseum* L. has the major part of its range beyond the Balkan gap, extending into western Europe. Furthermore, there are species not included in the Euxinian list which most probably should be considered as such, e.g., *Castanea sativa* MILLER (very rarely also in the Hyrcanian province) or *Lonicera caucasica* PALLAS.

The Euxinian species can be divided into several groups: First, there are species endemic to the province. Within that group only two species occur almost throughout the province. These are *Quercus hartwissiana* and *Acer trauttveteri*. The others are associated primarily with the Colchic sector: *Abies nordmanniana* subsp. *nordmanniana*, *Betula medwedewii*, *Buxus colchica*, *Daphne glomerata*, *Hedera colchica*, *Hypericum xylosteifolium*, *Philadelphus coronarius*, *Rhamnus imeretinus*, *R. microcarpus*, *Rhododendron caucasicum*, *Sorbus colchica*, *Staphylea colchica*, and *Viburnum orientale*.

This Colchic group includes some very localized endemics, such as *Quercus pontica*, *Epigaea gaultherioides*, *Rhododendron ungeri* and *Rh. smirnovii*, *Rhodothamnus sessilifolius* and *Osmanthus decorus* (Fig. 2). In the western part of the Euxinian province there is only one endemic species, i.e., *Hypericum calycinum* (Fig. 3).

Furthermore, there are species extending the second beyond the Euxinian province. Some of these taxa reach far removed areas, e.g., *Rhododendron ponticum*, one of the most important species of the understorey of Euxinian province forests; it has isolated populations in the Lebanon and in the southwestern Iberian Peninsula. *Ilex colchica* (Fig. 4) is also known from southern Turkey (Amanus Mts), and *Pyracantha coccinea* also from Greece, Yugoslavia, and Albania. *Rhododendron luteum* and *Staphylea pinnate* have already been mentioned.

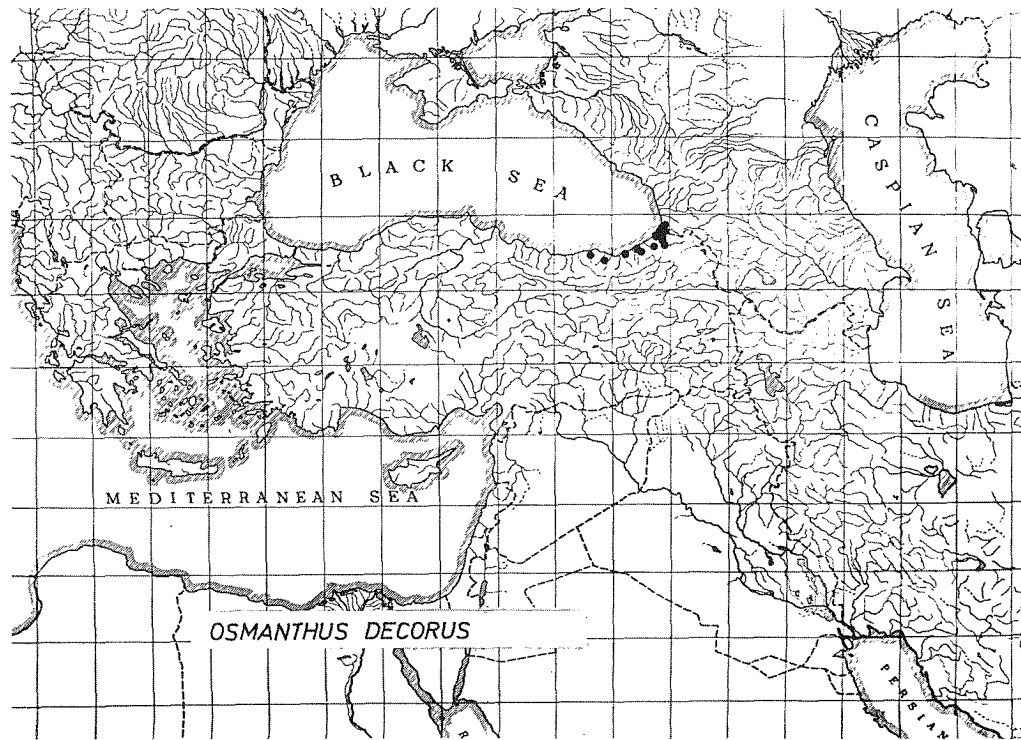


Fig. 2. The range of *Osmanthus decorus*, endemic to the eastern part of the Euxinian province

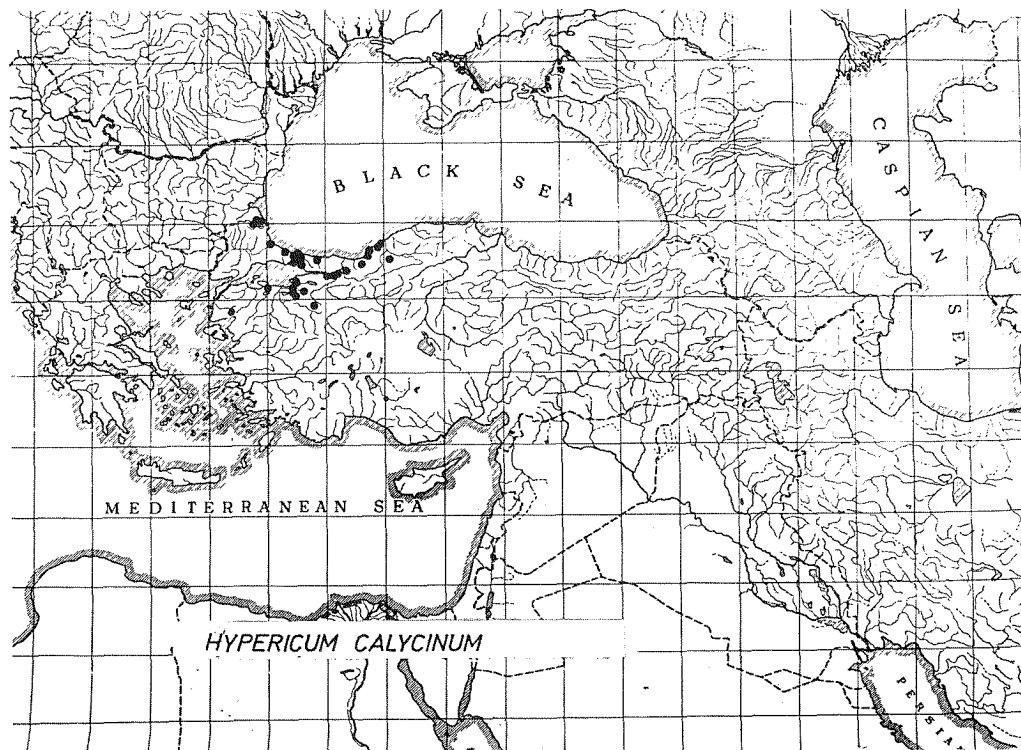


Fig. 3. The range of *Hypericum calycinum*, endemic to the western part of the Euxinian province

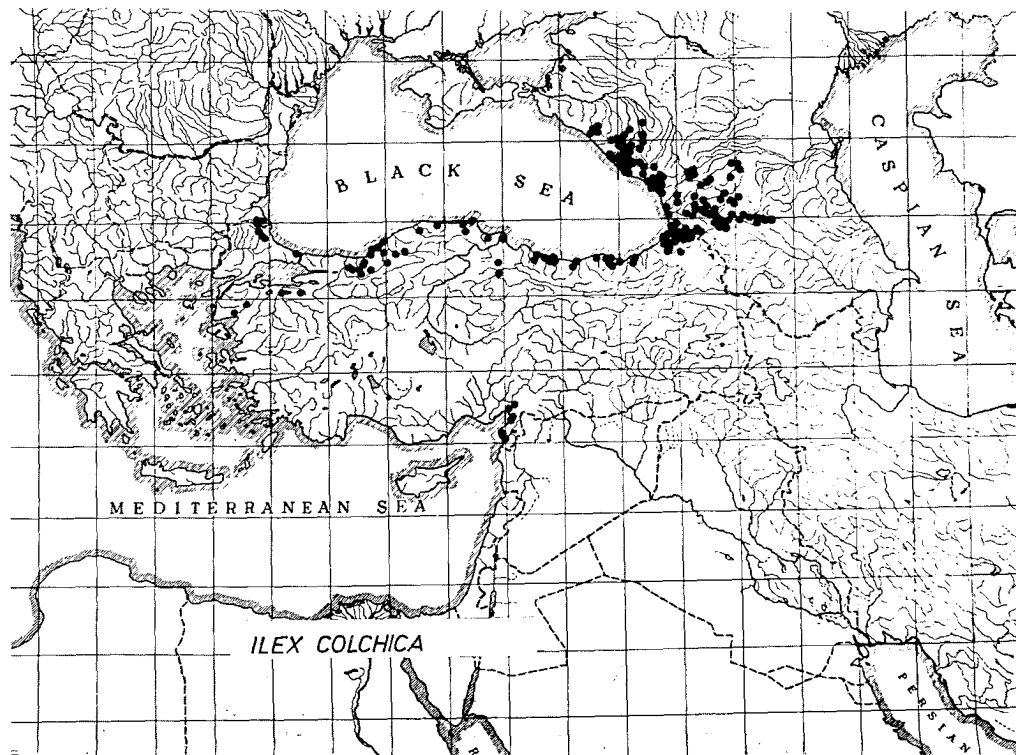


Fig. 4. The range of *Ilex colchica*, an Euxinian species also known from southern Turkey in the Amanus Mts

Species occurring in the Euxinian and the Hyrcanian province usually are being referred to as Euxine-Hyrcanian and number 18, not including *Castanea sativa* and *Lonicera caucasica*.

Euxine-Hyrcanian species: *Acer cappadocicum* GLED., *Alnus barbata* C. MEYER [= *Alnus glutinosa* (L.) GAERTN. subsp. *barbata* YALTIRIK], *Andrachne colchica* FISCH. & C. MEYER (Fig. 5), *Crataegus microphylla* K. KOCH (Fig. 6), *C. pentagyna* WALDST. & KIT., *Daphne pontica* L., *Diospyros lotus* L., *Fagus orientalis* LIPSKY, *Hypericum androsaemum* L., *Jasminum officinale* L., *Laurocerasus officinalis* M. ROEMER, *Mespilus germanica* L., *Pterocarya fraxinifolia* (POIR.) SPACH, *Ribes bibersteinii* BERL. ex DC., *Sorbus subfusca* (LEDEB.) BOISS., *Smilax excelsa* L., *Vaccinium arctostaphylos* L., and *Zelkova carpinifolia* (PALLAS.) K. KOCH.

Some of these are rather rare in the Hyrcanian province, with the majority of their populations in the Euxinian area, e.g., *Andrachne colchica*, *Daphne pontica*, *Vaccinium arctostaphylos*, *Sorbus subfusca*, or *Ribes bibersteinii*. Widely distributed in both provinces as well as in the Caucasus are *Fagus orientalis*, *Alnus barbata*, *Crataegus pentagyna*, *Smilax excelsa* and, to a lesser degree, also *Pterocarya fraxinifolia*.

In the Euxinian province the density of Euxinian and Euxine-Hyrcanian species (Fig. 1) is largest in the western Caucasus and in northeastern Anatolia about 38° E. Long. in the west), where we find from 20 to 35 of these species. West of that line there is a distinct decline, with a minimum in the approximate region between Samsun and Sinop. This region is an obvious enclave of Mediterranean species in

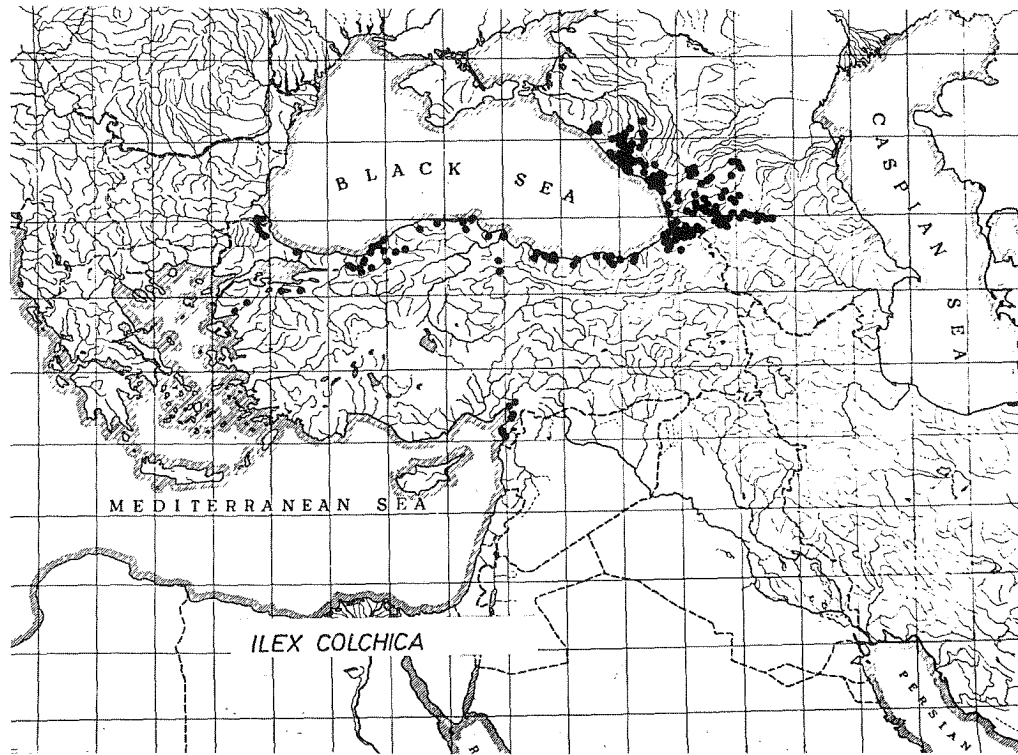


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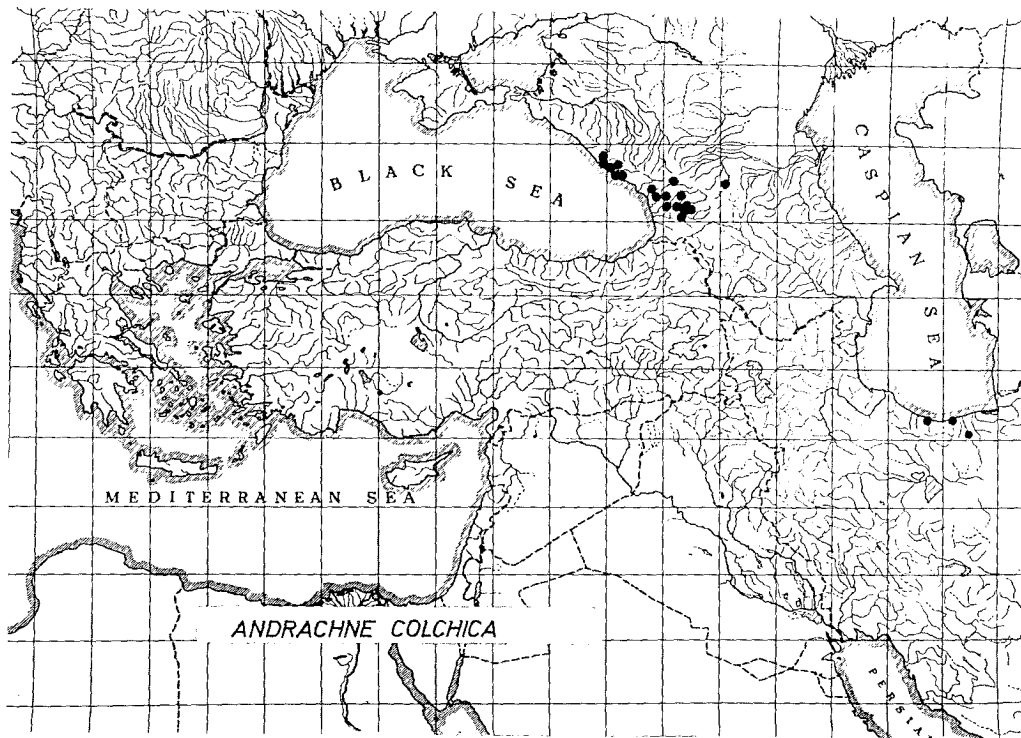


Fig. 5. The range of *Andrachne colchica*, an Euxine-Hyrcanian species, centred in the Euxinian province

northern Anatolia. However, there they do not (or only very locally) form the typical Mediterranean maquis and phrygana formations. Further westward, the number of Euxinian species increases again but with numbers between 10 and 20 remains substantially lower than in the Colchic sector.

The Hyrcanian province is much smaller than the Euxinian province, but it is more compact and has a much more clearly defined southern boundary. It extends from the southeastern Soviet Azerbajdzhan (Lenkoran, Talish) as a relatively narrow belt along the shores of the Caspian Sea and including its depressions, through the Iranian provinces of Gilan, Mazandaran and Gorgan to the western tip of the Khurasan province at about 56° E. Long. (where there is a National Park). Some species extend somewhat further eastwards, as far as Bojnurd in Iran and partly reappear in southwestern Turkmeniya (Kopet Dagħ Mts), but they do not play a major role in the plant communities there.

Hyrcanian species (* evergreen): *Acer velutinum* BOISS., *Albizia julibrissin* DURAZZ., *Alnus subcordata* C. MEYER, *Buxus hyrcanus* POJARK*, *Danaë racemosa* (L.) MOENCH*, *Euonymus velutinus* FISCH & C. MEYER, *Frangula grandifolia* (FISCH. & C. MEYER) GRUBOV, *Gleditsia caspica* DESF., *Hedera pastuchowii* WORONOW*, *Ilex spinigera* (T. LOESNER) T. LOESNER*, *Parrotia persica* C. MEYER, *Populus caspica* BORNM., *Pyrus boissieriana* BUHSE, *Quercus castaneifolia* C. MEYER, and *Ruscus hyrcanus* WORONOW*.

The **Hyrcanian province**, just as the Euxinian, is characterised by the wide distribution of mesophyllic forests, but they are exclusively broad-leaved here, since

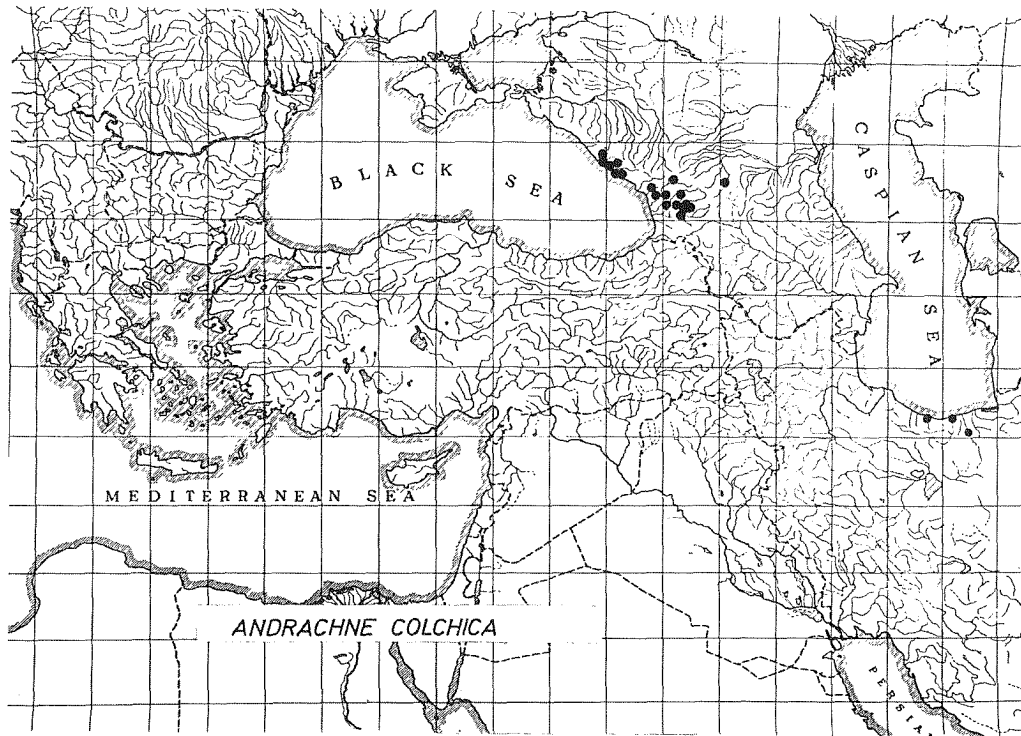


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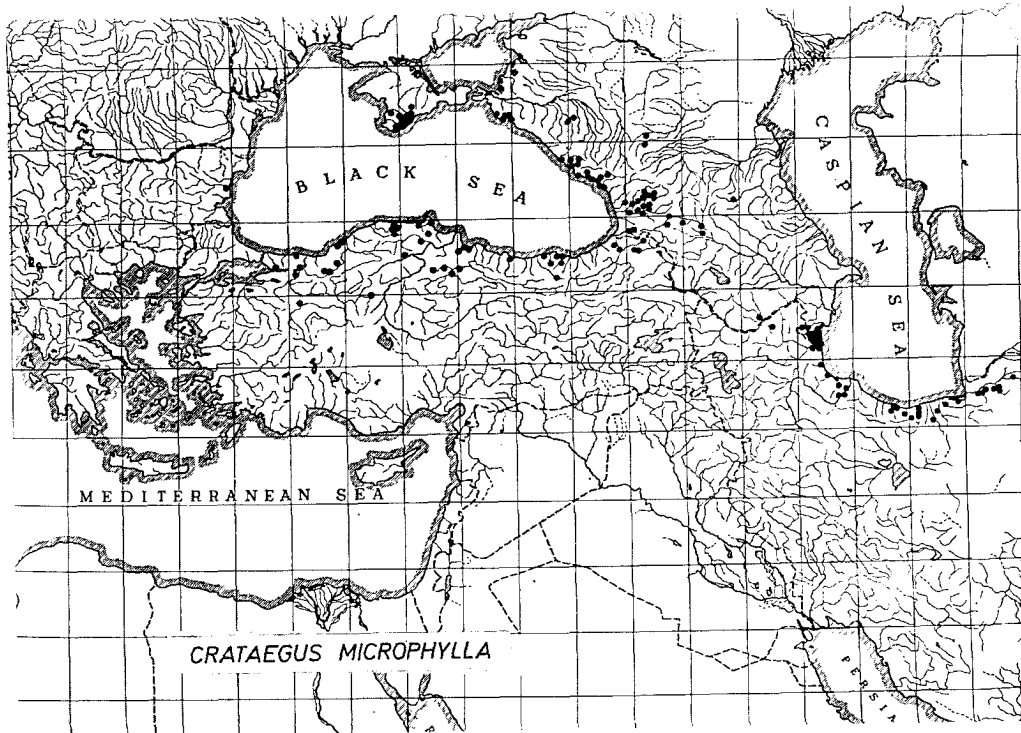


Fig. 6. The range of *Crataegus microphylla*, an Euxine-Hyrcanian species, widely distributed in both provinces

spruce and fir are missing. These forests are composed, besides *Fagus orientalis*, of such species as *Quercus castaneifolia*, *Alnus barbata* and *A. subcordata*, *Zelkova carpinifolia*, *Pterocarya fraxinifolia*, and *Parrotia persica*. Whereas the number of endemic species is clearly smaller in the Hyrcanian as compared with the Euxinian province, the prominence of mesophyllic Hyrcanian forests with their specific composition (including one endemic genus *Parrotia* C. MAYER) does under no circumstances allow its inclusion in the Irano-Turanian region (as proposed by TAKHTAJAN 1978). Local enclaves of Irano-Turanian and even Mediterranean species (e.g., *Cupressus sempervirens* L.), in the Hyrcanian province do not play a prominent role there. One should also remember the presence of characteristic evergreen species, such as *Hedera pastuchovii*, *Ilex spinigera*, *Ruscus hyrcanus*, *Daphne pontica* and *Laurocerasus officinalis*.

As the Euxinian, also the Hyrcanian species can be divided into groups. The first includes species endemic to the Hyrcanian province: *Alnus subcordata*, *Frangula grandifolia*, *Gledistia caspica*, *Ilex spinigera* (Fig. 7), *Populus caspica*, and *Ruscus hyrcanus*. Here, one could perhaps also include *Parrotia persica* and *Quercus castaneifolia* which, however, have also been found at the foothills of the Greater Caucasus in Azerbajdzhan (U.S.S.R.).

The second group includes species which extend only insignificantly beyond the limits of the Hyrcanian province, primarily in a westerly direction, i.e., to the eastern Caucasus.

Here, we can list *Acer velutinum*, *Buxus hyrcanus*, *Danaë racemosa*, *Euonymus*

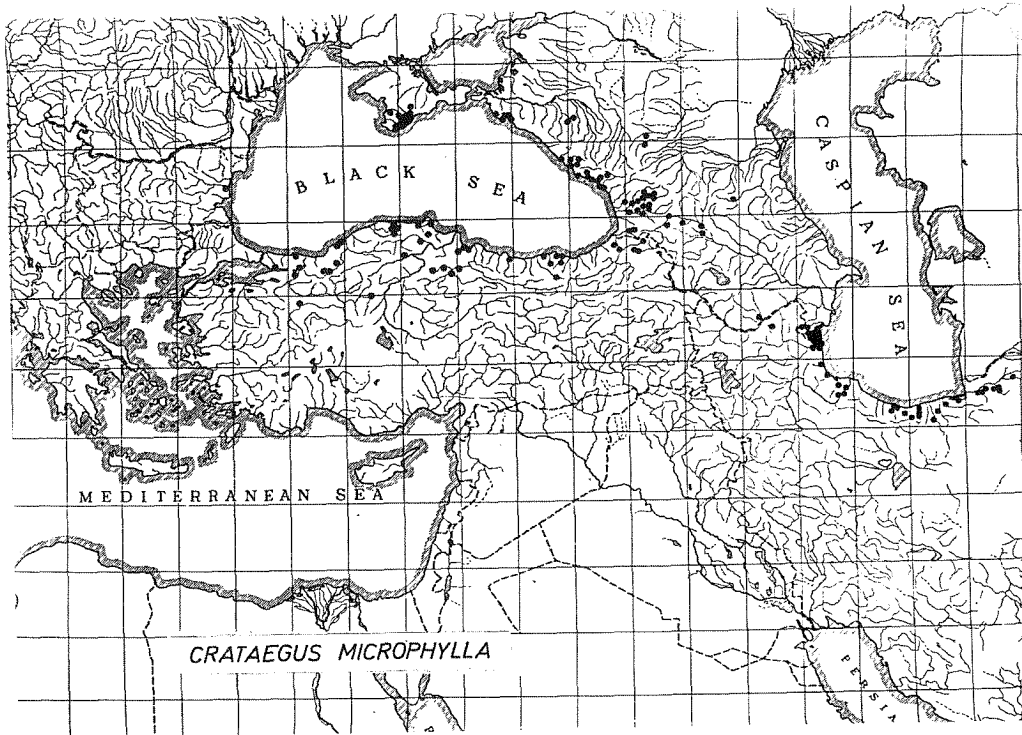


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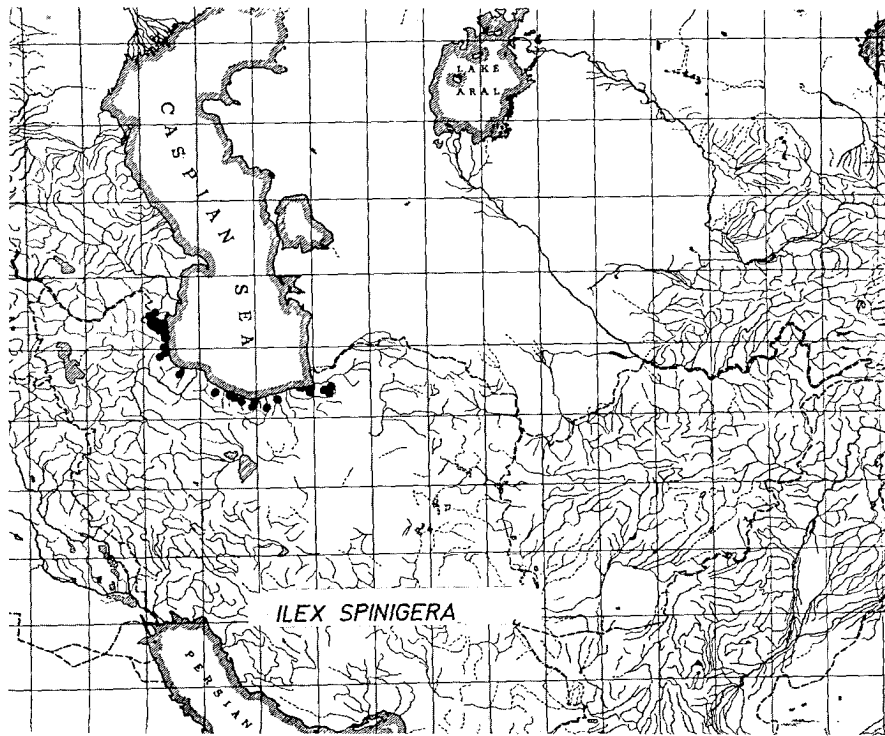


Fig. 7. The range of *Ilex spinigera*, endemic to the Hyrcanian province

velutinus, *Hedera pastuchowii*, and *Pyrus boissieriana* (grows in the Turkmenian Kopet-Dagh).

Danaë racemosa is characterized by a very unusual disjunction: besides the Hyrcanian province, it also grows in a distance of about 1 000 km and in isolated populations in the Amanus Mts of southern Turkey and northwestern Syria.

Among the more wide-spread species, we have already discussed the Euxine-Hyrcanian groups.

As with *Rhododendron luteum* and *Staphylea pinnata* in the Euxinian group, one could have doubts about *Albizzia julibrissin* being classified as Hyrcanian element. The major part of its range is situated in China, Korea and Japan, at a distance of about 6 000 km from the Caspian Sea.

The **relic nature** of the species of trees and shrubs belonging to the Euxinian and Hyrcanian element is obvious when one compares their systematic affinities and geographic links with other species.

Acer cappadocicum includes varieties (sometimes treated as species) which occur from NE. Afghanistan through the Himalayas to western and central China.

Albizzia julibrissin has the main part of its range in eastern Asia.

Alnus subcordata has closely related species in Europe (Corsica, Italy): *A. cordata* (LOISEL) LOISEL and northeastern Asia: *A. japonica* MIQ.

Betula medwedewii is a member of sect. *Costatae* (RGL.) KOEHNE which has other representatives in eastern Asia (the majority) and in North America.

Danaë racemosa is the only species of the genus *Danaë* MEDIKUS.

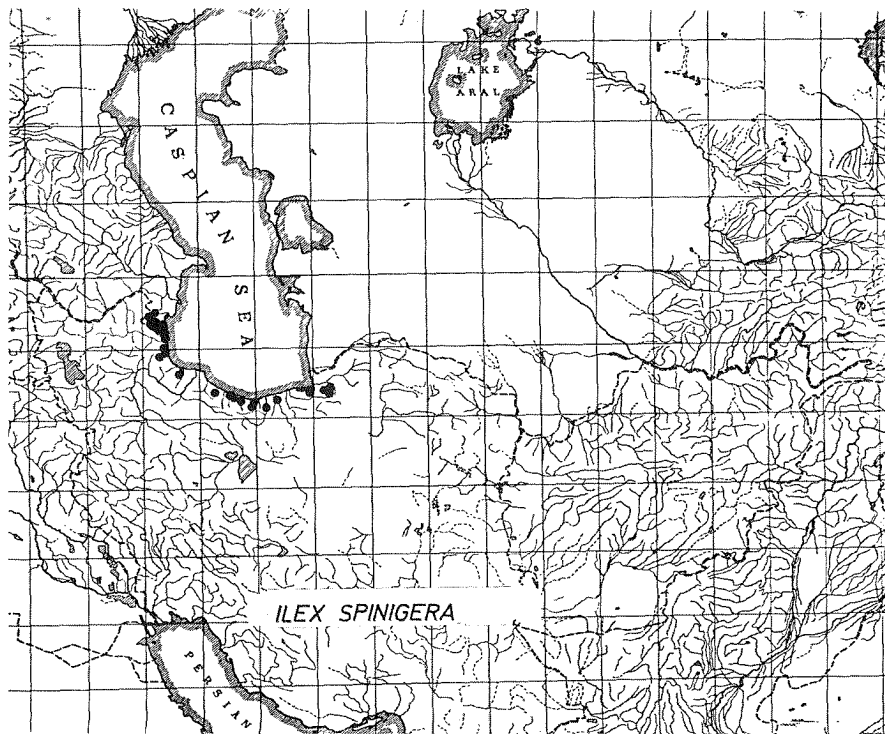


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Diospyros lotus has the main part of its range in Central and southern China, but also grows in the western Himalayas and in the mountains of Uzbekistan and Tadzhikistan.

Epigaea gaultherioides is one of the three species of the genus *Epigaea* L., occurring in considerable isolation, with *E. asiatica* MAXIM. in Japan and *E. repens* L. in eastern N. America.

Gleditsia caspica has most closely related species in China and Japan (*G. japonica* MIQ. and *G. ferox* DESF.).

Hedera pastuchovii is closely related to the Japanese *H. tobleri* NAKAI.

Jasminum officinalis has the main part of its range from the Himalayas to China.

Laurocerasus officinalis is a species closely related to *L. lusitanica* ROEM. from SE. Europe and NW. Africa. The remaining species of this genus occur in S. Africa and SE. Asia.

Mespilus germanica is the only representative of the genus *Mespilus* L.

Osmanthus decorus is the only representative of the genus *Osmanthus* LOUR. in W. Asia. Other species grow in eastern and southern Asia.

Parrotia persica is an endemic species (and genus) of the Hyrcanian province. It is most closely related to the monotypic genus *Parrotiopsis* C. SCHNEIDER, occurring from eastern Afghanistan to India.

Pterocarya fraxinifolia is the only representative of this genus in western Asia. All remaining species occur in eastern Asia (China and Japan).

Pyracantha coccinea, all remaining species of the genus grow in Asia, from the Himalayas to China and Taiwan.

Pyrus boissieriana, all remaining species of sect. *Pashia* KOEHNE occur in the Himalayas and in E. Asia.

Rhodothamnus sessilifolius belongs to a genus with two species. The other, *Rh. chamaecistus* (L.) REICHB., occurs in the eastern Alps of Europe.

Vaccinium arctostaphylos has its most closely related sister species, *V. padifolium* J. E. SM., on Madeira.

Viburnum orientale is most closely related to *V. sargentii* KOEHNE and *V. trilobum* MARSH. which occur in NE. Asia and E. North America, respectively.

Zelkova carpiniifolia belongs to a genus where remaining species grown in E. Asia, and one on Crete [*Z. abelicea* (LAM.) BOISS.].

Finally, one should note that in both provinces, the Euxinian and the Hyrcanian, there occur several Euro-Siberian species of trees and shrubs which are widely distributed and find their optimum conditions in northern and central Europe. Here, near the Black Sea, and to a somewhat lesser degree the Caspian Sea, they attain their southern limit. This group includes, among others: *Acer campestre* L., *Alnus glutinosa* (L.) GAERTN., *Berberis vulgaris* L., *Carpinus betulus* L., *Cerasus avium* (L.) MOENCH, *Cornus sanguinea* L., *Corylus avellana* L., *Daphne mezereum* L., *Euonymus europaeus* L., *Frangula alnus* L., *Fraxinus excelsior* L., *Juniperus communis* L., *Quercus petraea* (MATTUSCHKA) LIEBL., *Rhamnus catharticus* L., *Sorbus aucuparia* L., *Taxus baccata* L., and *Viburnum opulus* L.

Their presence and often substantial participation in Euxinian and Hyrcanian forest communities, gives evidence for the inclusion of these into the Euro-Siberian region.

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