

# Characterization of areas

## Anacardiaceae

### *Cotinus* Scop.

#### 1. *Cotinus coggygria* Scop.

Syn.: *Rhus cotinus* L.

A strong erect shrub or small tree up to 5 m tall, sometimes even taller, frequently with stems prostrate on the ground and taking root thereby giving rise to new individuals. This species is quite variable in the degree of shoots, inflorescence and leaf pubescence, thus several varieties have been recognized within it, the systematic value of which is as yet not quite clear.

*C. coggygria* is characterized by an exceptionally large, though disjunctive range of distribution, distinctly cut into two basic parts, a western one and an eastern one. The western, relatively compact part of the range covers southern Europe, from southwestern France and Switzerland in the west to the Black Sea (Romania, Bulgaria, European Turkey, Crimea), Anatolia, western Syria and the Caucasus in the east, though without Armenia. *C. coggygria* is also known from northern Iranian Azerbaydzhan. The eastern part of the range on the other hand, is composed of several segments occupying Pakistan (from the Afghan border, in the Kurram valley), Kashmir, northwestern India and Nepal, the southern and central China, as far as Peking.

It is striking that in the first, western part of the range, we are dealing primarily with forms that have completely glabrous leaves and shoots, sometimes described as var. *laevis* Engl. and with only sporadically appearing forms with more or less pubescent leaves, particularly on the dorsal side (in Romania, Bulgaria, Crimea, Caucasus and eastern Anatolia). Such forms have been described under various names, such as: var. *arenaria* Wierzb., var. *pubescens* Engl., var. *cinerea* Engl., or var. *sublaevis* Novopokr. In the east, on the other hand, glabrous forms are scattered and the further east one goes the pubescence of leaves becomes stronger covering both leaf surfaces – var. *velutina* Engl. (= *Cotinus velutina* (Engl.) C. Schneider). All this would indicate that we are dealing here with two subspecies, subsp. *coggygria* at the eastern extremity of whose range intermediate forms appear (mentioned above) and subsp. *velutina*\* with intermediate forms at the western extremity of its range.

It is a heliophilous species, resistant to drought and with low soil requirements (usually these are soils of the rendzina type). It occurs in various types of xerothermic communities, singly scattered or in small groups. In places, particularly on banks of streams and rivulets it can be abundant, gregarious, but its own pure communities over wider areas are not formed. It readily occupies regions after the clear felling of xerothermic forests. In the Balkan peninsula, in Anatolia, on Crimea and on the Caucasus these are maquis thickets (with predominance of *Quercus coccifera* L.), pseudomaquis and shiblyak and low sparse oak forests (*Quercus pubescens* Willd., *Q. frainetto* Ten., *Q. trojana* Webb.) and sparse pinewoods (*Pinus nigra* Arnold, *P. halepensis* Miller, *P. brutia* Ten. and *P. sylvestris* L.). Very frequently *C. coggygria* accompanies such

\* *Cotinus coggygria* Scop. subsp. *velutina* (Wall.) Browicz comb. nova = *Rhus velutina* Wall. in Don. Gen. Syst. 1: 69 (1831); *C. coggygria* Scop. var. *velutina* (Wall.) Engl., Bot. Jahrb. 1: 403 (1881); *C. velutina* (Wall.) C. Schneid. Ill. Handb. Laubholz. 2: 146 (1907).

shrubs and trees with deciduous leaves as *Ostrya carpinifolia* Scop., *Carpinus orientalis* Miller, *Fraxinus ornus* L., *Ligustrum vulgare* L., *Crataegus monogyna* Jacq., *Cerasus mahaleb* (L.) Miller and others. In the West Himalayas it occurs in the *Pinus roxburgii* Sarg. or *Olea ferruginea* Royle-*Quercus baloot* Griffith forests.

In its vertical distribution it even occurs from the sea shores itself, however, it is most common between 200 - 300 and 800 - 900 m. It reaches higher up in Syria, to 1000 - 1200 m, in Greece to 1500 m, in Anatolia to 1610 m, in Albania to 1700 m, in Pakistan to 2400 m and in China to 2500 m.

*C. coggygria* is a commonly cultivated ornamental shrub, particularly its cultivar 'Rubrifolius' with dark red leaves being treasured. Leaves of this species, due to a considerable tannin content are being used in the tanning industry, particularly for tanning of delicate skins. Pigments obtained from the yellow wood are being used for the dyeing of wool, silk and skins.

References: 64(2), 103(6), 104(5), 105(1), 157(2), 163(2), 179, 242(2), 400, 403, 405.

## *Pistacia* L.

### 2. *Pistacia lentiscus* L.

An evergreen, much branched shrub, with elastic stems, 1 - 3 m tall, more rarely a small tree reaching up to 4 - 5 (8) m. A closely related species *Pistacia aethiopica* Kokwaro, which differs in having a greater number of leaflets pairs (3 - 5) and stronger growth (15 m) occurring in east Africa from Ethiopia to Tanzania was until recently considered to be only a variety of *P. lentiscus* L. var. *emarginata* Engl.

A circum-Mediterranean species (except for Egypt) known also from the Canary Islands. In the eastern part of the range, on the Balkan peninsula *P. lentiscus* occurs only in western Jugoslavia, Albania and Greece where in the north it reaches as far as Thasos Is. Besides it occurs throughout Crete and most islands of the Aegean. On that region *P. lentiscus* is associated with seashore locations. It is similarly distributed in the Asiatic part of the range, in western and southern Anatolia, on Cyprus, in Lebanon and in Palestine reaching in the south as far as the Judean Mts. In Syria it is very rare, reported only from the northwestern part of the country, from regions close to Turkey.

*P. lentiscus* is a typical thermophilous and heliophilous shrub, very characteristic for xerothermic thickets of the phrygana and maquis. In the phrygana, particularly when it grows free, it forms low but wide bushes, roundish in outline, with densely ramifying and prostrate stems, while in maquis it has a greater tendency towards the tree form of growth. In such communities it is frequently the dominating element, in places forming uniform, pure scrubs difficult to traverse. It occurs primarily on dry and open, rocky slopes and cliffs, on hillsides and also on edges of pinewoods (*Pinus halepensis* Miller, *P. brutia* Ten). and also in seaside dunes where it can become covered with sand.

In the western part of the Mediterranean region *P. lentiscus* is the leading species for the alliance *Oleo-Ceratonion* while in the eastern, and particularly the Asiatic part of the range for the alliance *Ceratonion-Pistacion lentisci*. Of the species which accompany it most commonly one can mention *Quercus coccifera* L., *Ceratonia siliqua* L., *Juniperus phoenicea* L., *Olea europaea* L., *Myrtus communis* L., *Prasium majus* L., *Osyris alba* L. and others.

The strong thermophily of the species naturally reduces its vertical distribution to only lower locations. Basically it is a common species only between 0 and 300 m. Further up it occurs much less commonly and this only in small groups or as single individuals. For example, on Crete the elevational maximum is 400 - 600 m, in Cyrenaica 500 - 600 m, on Cyprus 760 m, on the Greek island of Milos 775 m and in Palestine 850 m.

From the bark and branches one can obtain (through incisions) a commercial gum-mastic which finds a use in dentistry and in the manufacture of laquers. The flow and quality of mastic are better in male individuals than in female ones. It is treasured most from Chios where in the southeastern part of the island a special variety - var. *chia* Duhamel is cultivated. Mastic has been known already in antiquity and in the Near East it has been used as an additive to incense.

References: 64(2), 66, 151(1), 163(2), 188, 254, 259(2), 387, 403, 415.

### 3. *Pistacia terebinthus* L.

A strong, erect, broadly ramified shrub, composed of several stems, 2 - 3 m tall, or a small tree with a wide, dense crown attaining up to 6 m and in some cases even up to 8 - 10 m. Sometimes it forms hybrids with *Pistacia lentiscus* L. known under the name *P. x saportae* Burnat which are to be found in the western part of the range but are also known, from Cyprus, Lebanon and Palestine.

This is a Mediterranean species, differentiated into two subspecies. The first one, subsp. *terebinthus* with leaves always imparipinnate and lateral leaflets obtuse covers the western part of the range while the other, subsp. *palaestina* (Boiss.) Engl. with leaves paripinnate or imparipinnate and lateral leaflets acuminate, the eastern. The intermediate zone between the two subspecies covers western Anatolia and Cyprus.

In the eastern Mediterranean region, in Europe, the range of *P. terebinthus* covers southern and central part of the Balkan peninsula, Crete and the larger islands of the Aegean. The northern part of the range runs through Yugoslav Macedonia (vicinity of Skopje) and central Bulgaria. On the other hand, in southwestern Asia the species is distributed in western, northern (as far east as the vicinity of Trabzon) and southern Anatolia (as far east as province of Malatya). Further south it occurs along western Syria and Lebanon and reaches Palestine; the most southerly part of the range being located in Jordan, south of the Dead Sea (Petra). Besides *P. terebinthus* is also known from Rodhos island and from Cyprus. In northeast Africa it is not represented.

*P. terebinthus* is a heliophilous species which sustains drought well it occurs most commonly on calcareous rocks, on rock rubble, scree and on „terra rosa”, and in extreme cases also on seashore dunes only few meters away from the water, as for example on the western shores of Thasos Island. It grows in various types of xerothermic thickets, primarily in maquis, in which it is the most characteristic representative of trees and shrubs having deciduous leaves. It occurs also, particularly in the northern part of the range in pseudo-maquis and in shiblyak, and also in open, low growing oakwoods and sparse pinewoods (*Pinus halepensis* Miller, *P. brutia* Ten., *P. nigra* Arnold). In contrast to the more thermophilous *P. lentiscus* L., which is associated exclusively with seashore regions, *P. terebinthus* enters sometimes deeply inland, particularly along rivers valleys and it occupies more elevated places. Most typical for it are hilly regions and feet of the mountains, up to an elevation of 600 - 800 m. In the northern part of the range, in Albania, Yugoslavia and Bulgaria the elevational maximum is 700 m, in Lebanon 800 m, in Greece 900 - 1000 m, on Cyprus 1370 m and in southern Anatolia and southern Jordan even 1500 m.

From *P. terebinthus*, similarly as from other species of the genus *Pistacia*, it is possible to obtain aromatic oils for various local usage (in medicine, for consumption). Leaf galls, which resemble paprika fruits in shape, contain stains and tannins used for wool staining and tanning of delicate skins. In fruit-growing *P. terebinthus* is commonly used as a rootstock for *Pistacia vera* L.

References: 64(2), 78, 151(1), 163(2), 188, 254, 259(2), 415.

### *Rhus* L.

#### 4. *Rhus coriaria* L.

An erect, suckering, strong shrub with thick, stiff, poorly branched stems, 2 - 4 m tall, rarely taller. The largest individuals, 6 - 8 m tall, and 15 - 20 cm in diameter have been reported from Uzbekistan, from the basin of the river Tupalanga. Thanks to numerous roots suckers it forms as a rule smaller or larger clumps in which the access of light to the soil is considerable; the pinnate leaves positioned on tips of shoots permit a free passage of sun rays.

The range of *R. coriaria* is strongly elongate, from the Canary Islands, Azores and Madeira in the west through southern Europe, southwestern Asia to Afghanistan and Tadzhikistan in the east. On this very extensive range it is probably not everywhere an indigenous species but in many places gone wild from cultivation long ago and now fully naturalized. In North Africa and on some islands of the Mediterranean (Balearic Is., Corsica, Sardinia) it does not occur and on Crete it is known only from one location.

In the eastern part of its range *R. coriaria* grows throughout Greece, in Albania and also in western and southern Yugoslavia, in Dalmatia up to vicinity of Split, and in Macedonia as far as Skopje. In Bulgaria it belongs to rather rare species occurring in the valley of the Struma, in the Rhodopy Mts. and in the north-eastern part of the country (in Dobruja as far as Cape Caliacra). In southwestern Asia it is a common shrub almost throughout Anatolia except for the driest central part and high mountain regions.

*R. coriaria* is also very common on the Caucasus, particularly in the west where, as well as in Crimea, the species reaches its most northerly extreme at 45° Lat. N. South of Anatolia *R. coriaria* is restricted in its occurrence to Cyprus and to a narrow Mediterranean belt in Lebanon, southwestern Syria and Palestine. Extreme southern stands occur in the Judean Mts, and in Edom, south of the Dead Sea. In Iraq stands of *R. coriaria* cover the northeastern part of the country and Jabal Sinjar. In southwestern and northern Iran they are already much scattered and in Afghanistan they are known only from the vicinity of Herat and Kabul (but are they really natural?). The stands reaching farthest in the northeasterly direction are to be found in the USSR republics of Middle Asia, in Turkmeniya (Kopet Dag Mts.), in Uzbekistan (Tupalanga and Sangardak river basins) and in Tadzhikistan (Vakhskij, Darvazskij, Karataghinskij and Gissarskij Khrebet).

This is a helio-, termo- and xerophilous species, as a rule growing in exposed very sunny places, usually on soils of the rendzina type or on limestone scree, on rocks, together with xerothermic trees and shrubs, representatives of maquis and shiblyak. More rarely it can be found on edges of forests or in very sparse oak or pinewoods. Some stands, for example near roads close to villages are of ruderal nature.

The vertical distribution of *R. coriaria*, similarly as the horizontal one is characteristically very extensive. In the Balkan peninsula it grows primarily in the lower elevation, on hills and mountain slopes, usually not higher than 800 - 900 m. The highest stands in Bulgaria are known from an elevation of 1000 m, in Crimea from 1150 m, in Yugoslav Macedonia from 1200 - 1300 m, and on Crete from 1450 - 1500 m. In the Asiatic part of its range *R. coriaria* reaches even further upwards. On Cyprus it grows between 1000 - 1830 m, in Iraq between (500)700 and 1900 m, in Afghanistan between 1700 and 2000 m, in Anatolia between 10 and 2100 m, and in Iran between 1000 and 2300 m. The most elevated stand has been reported from northern Tadzhikistan, in the Zeravshan river basin from 2600 to 2900 m.

*R. coriaria* is characterized by valuable technological properties – it supplies tannins and dyes and is used in folk medicine. These properties were known since antiquity. Leaves and young shoots contain up to 33% of tannins used for the tanning of various skins. As a result this shrub has been cultivated in special plantations established for example by the Arabs already in VIIIth c. in Spain. The dyes obtained from *R. coriaria* (leaves, fruit, roots, young shoots) are used till these days in the Asiatic part of the range for the dying of materials (carpets). Ripe fruits have also found their way to consumption, powdered they are added as a spice to meat and fish dishes and in the form of a liquid extract they act as substitute for vinegard. Besides a brew made from the leaves, bark and fruits is used, particularly in the eastern, Asiatic, part of the range for various illnesses such as nausea, vomiting, bleeding, diarrhea, ulcers, destinery and for washing of wounds, etc

References: 64(2), 78, 103(6), 104(5), 105(1), 151(1), 163(2), 188, 228 (4), 252, 254, 259(2), 370, 397.

## *Aquifoliaceae*

### *Ilex* L.

#### 5. *Ilex colchica* Pojark.

Syn.: *I. stenocarpa* Pojark., *I. imerethica* Gagn.

An evergreen shrub 1 - 3 m tall or a short shrubby-scrubby tree, which in favourable conditions can be 5 - 6 m tall with a stem diameter of 20 cm. Its lower branches are frequently prostrate on the ground, take root and give clonal colonies. The leaves are very variable in size and shape as well as in the degree of denta-

tion and spination. Until not long ago it has been treated as *Ilex aquifolium* L., an Atlantic species which reaches southwestern Asia only in northwestern Anatolia, on the Kapidagi peninsula on the sea of Marmara in province of Balikesir.

*I. colchica* is a typical representative of Euxinian flora with a range restricted to southeastern Bulgaria (Strandsha Mts.), Black Sea Turkey and the Caucasus. It is a distinctly mesophilous, calciphilous species with considerable requirements on the fertility and moisture of the soil, sustaining even considerable shade well, to a greater degree than other Euxinian species of evergreen shrubs.

It is most common on the Caucasus, where its range covers almost the whole of Georgia, except for the driest regions. Here it constitutes the undergrowth of shady beech, beech-fir, spruce-fir, spruce or mixed broadleaf forests in places, particularly in Adzhariya it forms in them almost pure thickets. Where insolation in the forests is somewhat greater it is replaced by other evergreen shrubs such as *Laurocerasus officinalis* Roemer or *Rhododendron ponticum* L. It is distributed from shores of the Black Sea to an elevation of about 2000 (2300) m, however, it finds optimal conditions for development between 1000 and 1700 m. On the other hand, in Anatolia the range of *I. colchica* extends as a relatively narrow belt from Kaz Dagi Mt. on the Aegean, through Ulu Dag and the shores of the Black Sea as far as the USSR frontier. Similarly as several other Euxinian species it appears also in southern Anatolia, in the Amanus Mts. In the north it grows primarily in beech and fir forests and in the south in beech and hornbeam (*Carpinus orientalis* Miller) ones, usually at elevations up to 1000 - 1200 m, and the most to 1800 m.

References: 64(2), 103(6), 104(5), 374, 377.

#### 6. *Ilex spinigera* (T. Loesner) T. Loesner

Syn. *I. hyrcana* Pojark.

An evergreen shrub or small shrubby-tree up to 4 m tall, with a dense, widely conical form. It is closely related to *Ilex colchica* Pojark. from which it differs, however, in having densely puberulent twigs and smaller leaves, often puberulent on the lower surface. Similarly as *I. colchica* Pojark. it used to be identified with *Ilex aquifolium* L.

It is a typical representative of the Hyrcanian Forest with a narrow elongate range of distribution extending along the southern shore of the Caspian Sea, from the Talish Mts. in southeastern Azerbaydzhan (USSR) in the west, through province of Gilan and Mazandaran, as far as province of Gorgan in northern Iran in the east. In that region the shrub occurs primarily in lower located places, usually more or less up to 1000 - 1200 m elevation. It grows as an understorey, in places quite dense, in shady, moist broadleaf forests, particularly of beech (*Fagus orientalis* Lipsky), hornbeam (*Carpinus betulus* L.) or oak (*Quercus castaneifolia* C. Meyer) developing along deep and narrow valleys. The most elevated stands have been reported from Iran, from an elevation of 1700 to 1800 m. Similarly as *I. colchica* Pojark. it is a mesophilous species sustaining even considerable shade.

References: 103(6), 104(5), 374, 377, 401,

### Caprifoliaceae

#### *Lonicera* L.

#### 7. *Lonicera etrusca* Santi

A strong climber with stems reaching the length of 4 - 5 m and a diameter of about 5 - 6 cm. Characteristic for this climber are glaucous leaves and shoots and terminal inflorescences on peduncles.

This is circum-Mediterranean species known also from the Azores and Madeira. In the Balkans it is widely distributed in Greece (including Crete and the Aegean Islands), Albania and Turkey. In the northerly direction

it extends furthest into Yugoslav Macedonia, along the valley of the river Vardar to Skopje, and in Bulgaria as far as Melnik in the valley of the Struma, the Arda valley in the eastern Rhodope Mts. and the shores of the Black Sea. Even further to the north are stands along the north-western shores of that sea in USSR in the vicinity of Novorossiysk and Anapa. On Crimea it has gone wild from cultivation.

In southwestern Asia stands are scattered in western (more commonly on the Aegean) and southern Anatolia, in western Syria, in Lebanon and in Palestine. The most southerly stands occur in Jordan, south of the Dead Sea in Petra. In northeast Africa the species is quite common in northern Libya, in Cyrenaica.

*L. etrusca* is one of the more characteristic components of various types of xerothermic Mediterranean or sub-Mediterranean thickets both evergreen (maquis, phrygana) and deciduous (particularly shiblyak) as well as oak or hornbeam scrubs and sparse pinewoods. It develops on screes, cliffs, roadsides and cultivated fields, often on calcareous rocks. Similarly as the maquis the main plant community with which it is associated, *L. etrusca* grows in lower located regions, primarily up to about 800 (1000) m. However, it reaches 1200 m in Albania, 1550 m in Anatolia and Greece (Mt. Athos) and in Lebanon even as high up as 1700 - 1900 m.

It is an ornamental shrub, but rare in cultivation.

References: 64(4), 105(1), 163(3), 188, 311.

### 8. *Lonicera implexa* Aiton

Evergreen, twining or sometimes bushy shrub with stems 2 - 3(5) m long, creamy-white flowers often tinged with red, located on tips of shoots and supported by fused leaves.

This is a Mediterranean species. It occurs throughout southern Europe and in northwest Africa. Its most westerly stands occur on Flores Island in the Azores Archipelago. In southwest Asia it is known so far only one stand, on Bozcaada Island located near the northwestern shores of Anatolia. In the eastern Mediterranean region *L. implexa* is the only evergreen representative of the genus *Lonicera*. Its stands are located here primarily along the eastern, Aegean shores of Greece. In that country the most northerly stands have been reported from Thasos Island and from eastern Thrace where they attain 41° Lat. N. In the neighbouring European Turkey only one stand has been reported and this only in 1973.

*L. implexa* is a light requiring, thermophilous species associated with the maquis communities extending along the sea shores. Further inland it does not occur. It grows primarily on isolated stands, on rocky, primarily limestone, dry slopes. It can also be found on edges of sparse dry pinewoods. Nowhere it is a common species, and on individual stands it is represented most commonly by single specimens. In its vertical distribution it occurs from a few meters above sea to an elevation of 400 - 600 m, occasionally up to 900 m. In the western Mediterranean region, in Africa, on the slopes of the Atlas Mts., the most elevated stands have been found at an elevation of 2200 m.

*L. implexa* is an ornamental shrub, however, in cultivation it is rather tender.

References: 105(1), 188, 371.

## *Euphorbiaceae*

### *Andrachne* L.

#### 9. *Andrachne colchica* Fischer et C. Meyer

Syn.: *Arachne colchica* (Fischer et C. Meyer) Pojark., *Leptopus colchicus* (Fischer et C. Meyer) Pojark.

A small shrub 60 - 80 cm tall with numerous, densely leaved shoots without latex. Its leaves are thin, ovate, 2 - 3 cm long, flowers unisex, inconspicuous, yellowish-green.

A rare plant, in the USSR placed on the list of protected species (Red Book). Until recently it was considered to be an endemite of the western Transcaucasus, where it grows in thickets and sparse forests, on stony slopes and limestone rocks, but only at low elevations, up to 450 m. Not long ago *A. colchica* has been discovered in northern Iran on the Caspian Sea in province of Mazandaran and so far it is known here only from three stands in the valleys of the rivers Chalus, Haraz and Talar. It occurs here in similar conditions as in the Transcaucasus, between 100 and 620 m elevation.

References: 103(6), 104(5), 388, 404.

### *Euphorbia* L.

#### 10. *Euphorbia acanthothamnus* Heldr. et Sart.

Lactiferous, intricately branched, very spinescent shrub, 20 - 50 cm tall with a very characteristic cushion-like habit. Its branches are short and stiff, pseudo-dichotomously branching, ending by a pair of spines formed the indurated, forked rays of the inflorescences.

This is an eastern Mediterranean species, Aegean, in central Mediterranean replaced by the closely related *Euphorbia spinosa* L. In Europe its range is restricted to Greece only, particularly its southern and eastern part, Crete, Euboea, Rodhos and the Aegean Islands, while in Asia the range is restricted to few stands in southwestern Anatolia (province of Mugla). The most northerly stands of *E. acanthothamnus* occur in western Greece on Levkas Island and in eastern Greece on the Athos peninsula.

This distinctly heliophilous species, resistant to drought, loses its leaves in June and remains bare till October, that is during the most severe summer heats, when it has the appearance of a completely dry plant. This difficult period it survives by reducing its water consumption (leafless condition) and due to the characteristic tuber-like underground thickenings at the base of tap root where reserve nutrients are stored.

*E. acanthothamnus* grows primarily in the communities of sea shores phrygana, on dry insolated rocky and stony slopes, on both calcareous and siliceous ground, using even the smallest rock fissures. In places in such communities it can be the dominating element forming the little studied yet association *Euphorbietum acanthothamni*. Species which accompany it most frequently are shrubs *Coridothymus capitatus* (L.) Reichb. f., *Calicotome villosa* (Poiret) Link., *Olea europaea* L. var. *sylvestris* (Miller) Lehr., and also *Rhamnus oleoides* L., *Quercus coccifera* L. and *Juniperus phoenicea* L. while among the herbaceous plants *Urginea maritima* (L.) Baker. In contrast to *Euphorbia dendroides* L. with which species it meets on some stands, the vertical distribution of *E. acanthothamnus* is more diversified. Usually it appears on regions located from the seashore itself to 600 - 1000 m, however, on Crete it appears to have optimal conditions for growth between 1200 and 1800 m and the most elevated stand has been reported from Mt. Spathi at 2020 m.

References: 105(3), 188, 198(1), 251, 341, 375, 386.

#### 11. *Euphorbia dendroides* L.

Lactiferous shrub, up to 2 - 3 m tall which, however, forms a single quite robust stem up to 1 m tall achieving thus the appearance of a small tree. Thanks to the very regular di- or trichotomous branching it forms regular umbrella-like or semi-globose crowns.

The range of *E. dendroides* is restricted to the central and eastern Mediterranean region, covering a narrow coastal belt in southern Europe and north Africa. The most westerly stands are on the Balearic Isles and in northeastern Spain where it grows abundantly on rocky shores of the Golfe de Rosas. On the Balkan peninsula *E. dendroides* occurs in Yugoslavia (Dalmatia), Albania and in Greece (frequently) and the Ionian and Aegean Islands. The most northerly Greek stands occur on the Sithonia and Athos peninsula.

In the Asiatic part of the range it is restricted to only a few stands in southwestern Anatolia (province of Mugla and Antalya) and the Greek islands of Rodhos and Kastellorizo (between Rodhos and Cyprus, close to the shores of Anatolia). At a considerable distance from these stands *E. dendroides* is reported also from Israel from the maritime cliff of Mount Carmel where most probably it is a relict of a more humid period. Besides this stand a few are also known from northeast Africa, from Cyrenaica and Egypt.

*E. dendroides* is a helio-, thermo- and calciphilous species resistant to drought. Its leaves begin to fall after flowering and more or less from June to September, that is during the peak of the summer heats the shrubs are completely leafless. Throughout its range of distribution *E. dendroides* enters the phrygana communities, particularly its more degraded parts. In places it can be dominant element, forming a specific association — *Euphorbietum dendroidis*. Particularly abundantly it appears on the southern extremities of the Poloponnisos and on the northern shores of the Gulf of Corinthos. Usually the stands are located at low elevation, up to about 200 m, rarely higher, up to 400 m. In the western part of the range *E. dendroides* appears maximally at an elevation of 600 m.

References: 105(3), 188, 198(1), 259(2), 386, 398.

## **Globulariaceae**

### **Globularia L.**

#### **2. *Globularia alypum* L.**

A dwarf evergreen shrub up to 50 - 60 cm tall, occasionally taller, frequently with the lower branches prostrate on the ground, with bluish flowers collected into heads on tips of shoots, blossoming during the winter and in the spring.

This is a Mediterranean species with a disjointed range, occurring in southern Europe from Spain to Greece and also on infrequent stands in western Anatolia. In north Africa it is absent from Tripolitania (Libya) and Egypt. The most westerly stands were found on Madeira and the Azores. It is also known from a few Greek islands, namely from the southern Ionian Islands, from Crete, Euboea, Rodhos and Kithira. From the Balkan peninsula, besides Greece, it has been reported also from Dalmatia (Jugoslavia) and Albania, from the latter country, however, more detailed information is lacking. In Greece itself it is most commonly distributed in the southeastern part of the country (Attica, Peloponnisos) and in the northeast it reaches southern Macedonia and Kizil Adalar (Princes Is.), islands located on the sea of Marmara near Istanbul.

*G. alypum* grows primarily in degraded maquis and in the phrygana, as well as in sparse pinewoods (*Pinus halepensis* Miller, *P. brutia* Ten.), on dry, insolated and warm places. Locally, as for example on Zante Is. (Ionian Islans) it is very abundant. Its stands are primarily located at low elevations, up to about 300 - 400 m, more rarely higher up to 800 m as for example near Izmir in Anatolia or on Yerania Ori near Korinthos in Greece. The most elevated stand is known from Morocco, at 1800 m.

References: 105(3), 188, 360, 406, 407.

## **Guttiferae**

### **Hypericum L.**

#### **13. *Hypericum androsaemum* L.**

Semi-evergreen, erect, delicate shrub, 80 - 100 cm tall, exceptionally somewhat taller, characterized by original fruits which are somewhat fleshy, subglobose capsules resembling a berry in appearance, initially red but turning dark-purple or violet-purple when ripe.



The range of this species is composed of two clearly isolated parts. The first covers western Europe. Here *H. androsaemum* grows in Portugal, Spain, France, Ireland, Great Britain, Belgium, Switzerland, Italy and Yugoslavia. Stands in northwest Africa are associated with this part of the range. The other part extends as a narrow belt along the shores of the Black Sea from southeastern Bulgaria (Strandsha Mts.) through northern Anatolia to the Caucasus, and then along the southern shores of the Caspian Sea from Talish (Azerbaijan SSR) to northern Iran, where most easterly stands occur in Gorgan province. Single isolated stands are also known from southern Anatolia, Amanus Mts. and Kurt Dagi.

In the European part of the range *H. androsaemum* may be considered an Atlantic species while in the eastern part an Euxino-Hyrcanian one. On the latter region it grows primarily in moist, more or less shaded places, in gorges, on banks of streams, in seashore bushes or in forests, particularly of beech, but also alder-chestnut, hornbeam and even in spruce ones (*Picea orientalis* (L.) Link). It is a mesophilous species with considerable requirements as regards fertility and moisture of the soil. On the Caucasus it occurs up to 1000 m elevation, in Iran up to 1300 m, in northern Anatolia up to 1500 m and in southern even up to 1800 m.

This is melliferous shrub in cultivation since the XVI c. It can be recommended for planting in parks and under canopies of trees on moist sites.

References: 64(2), 103(6), 104(5).

#### 14. *Hypericum calycinum* L.

A small shrub, 50 - 60 cm tall, rhizomatous, with evergreen leaves, unbranched stems and single large (diameter 6 - 8 cm) golden-yellow flowers blossoming from May to August.

This is a western Euxinian species with a much reduced range extending along the southwestern shores of the Black Sea and southeastern shores of the Sea of Marmara, from the Strandsha Mts. in Bulgaria to the Anatolian provinces of Zonguldak and Kastamonu. An isolated stand occurs in the region of the Aegean on Mt. Kaz Dagi in Balikesir province.

*H. calycinum* thanks to numerous root sprouts and in the absence of competition from other plants forms larger more compact groups. It grows inside forests, particularly oak, beech or chestnut ones, or else on their edges as well as in maquis, usually in places which are more or less shaded, on sandy but fertile, humic, always moist soils, usually near small streams or springs. In its vertical distribution it does not exceed in Bulgaria 100 m elevation, while in Turkey it usually appears between 30 and 400 m and only on Ulu Dag near Bursa it is to be found between 200 and 1200 m.

It is a valuable ornamental shrub introduced into cultivation in the XVII c. into many countries with a milder climate, and locally it has become naturalized. It is used in parks and gardens to form a green mantle under canopies of trees.

References: 61, 64(2).

#### 15. *Hypericum empetrifolium* Willd.

An evergreen, small caespitose shrub, erect to procumbent, 50 - 60 cm tall with ericoid 2 - 12 mm long leaves, arranged in whorls, and with turned out margins. In a vegetative condition it resembles in appearance *Empetrum* or *Erica*. It is particularly attractive during flowering time (May to June), thanks to numerous golden-yellow flowers.

This is an eastern Mediterranean, Aegean, species. In Europe it occurs only in continental Greece, on Crete and some islands of the Aegean, and besides on one isolated stand in northern Albania. In western Greece it is not known beyond the Peloponnisos, however, recently it has also been discovered in the north-western part of Levkas island. In eastern Greece it reaches as far north as southern Macedonia (Khalkidhiki).

In southwestern Asia *H. empetrifolium* has been only reported from western Anatolia, from Rodhos and Cyprus. On the latter island it occurs only in the north in the Kyrenia area. In North Africa it grows only in Libya, in Cyrenaica.

*H. empetrifolium* is a thermo- and heliophilous shrub, resistant to drought, occurring primarily in phrygana communities and in low sparse maquis, but also in open pinewoods, both on calcareous and siliceous stony ground. It appears there as single individuals or forms small clumps. Locally it can be quite common as for example on Crete and also on the Peloponnisos.

In Anatolia it is distributed only at low elevations, from the seashore up to about 200 - 300 m. On the other hand, in Greece it attains 900 m and on Crete even 2000 m and even higher. On the latter island *H. empetrifolium* is characterized by considerable polymorphism (habit, flowering abundance) thus 3 varieties were recognized within it differing also in vertical distribution. At lower locations there is var. *oliganthum* Rech. f., between 200 and 1200 m var. *empetrifolium* and above 1200 m var. *tortuosum* Rech. f.

It is one of the very valuable low ornamental shrub, however, it is tender and without appropriate protection it can be only planted in regions with the mildest winter. It is suitable for rock gardens.

References: 64(2), 105(1), 188, 198(1), 251, 341, 359.

#### 16. *Hypericum hircinum* L.

A semi-evergreen shrub, up to 1 - 1,5(2) m tall, with erect, 4-angled stems. Its leaves after crushing frequently give an unpleasant goat-smell.

This is a Mediterranean species, however, it is much more common in the eastern part of the range. In the west it reaches southern Italy, Sicilia, Sardinia, Corsica and Balearic Isles. It has been also reported from the Azores. On the Balkan peninsula *H. hircinum* is known exclusively from southern Greece, from the Peloponnisos. Besides it grows on some of the Greek islands, such as Kithira, Crete, Andros, Samos and Rodhos. In the Asiatic part of the range scattered stands occur in southern Anatolia, Cyprus, western Syria, Lebanon and northern Palestine. Here as far south as Mt. Carmel and Samaria.

It is a mesophilous species. It appears as a rule on damp places, particularly on rivers and streams and also in vicinity of springs, at feet of limestone rocks in places where water flows, sometimes also in forests of *Pinus nigra* Arnold in shade or in semi-shade or even in insolated places but always in moist soils. The vertical distribution of *H. hircinum* is not much differentiated. These are primarily low located sites from 50 - 100 m to about 600 - 800 m elevation, however, on Crete it reaches 900 m, in the Peloponnisos 1100 m, in the Amanus Mts. 1260 m and in Lebanon 1370 m.

It is an ornamental shrub under cultivation in Europe since 1640 and sometimes naturalized from gardens.

References: 64(2), 105(1), 163(2), 188, 259(1).

#### 17. *Hypericum xylosteifolium* (Spach) N. Robson

Syn.: *H. inodorum* Willd.

A shrub, 1 - 1.5 m tall with a creeping root stalk that permits it to form thickets of various size. Its young shoots are compressed and slightly two-winged towards the top, densely leaved, with somewhat leathery, more or less persistent foliage, having an unpleasant smell when crushed, similarly as with *Hypericum hircinum* L.

The range of *H. xylosteifolium* is restricted only to the Colchic sector of the Euxine Province. It occurs primarily on the Caucasus in Georgia (districts Abkhazya, Kutaisi, Adzhariya) and besides infrequent stands are known from northeastern Anatolia, provinces of Giresun, Trabzon, Rize and Artvin.

It is a mesophilous species, shade tolerant, requiring fertile deep and moist soils. It grows in broadleaf orests, primarily in oakwoods, where in places it can form a dense understorey. It appears also in beech

and chestnut forests, on forest edges and on shady banks and cliffs. In Anatolia the stands are located lower than in the Caucasus, from the seashore to about 670 m, while in the Caucasus up to 1000 - 1200 m.

It is an ornamental shrub, similar in use as *H. androsaemum* L., but less valuable because of poor flowering.

References: 64(2), 103(6), 104(5).

## *Hippocastanaceae*

### *Aesculus* L.

#### 18. *Aesculus indica* (Wall. ex Cambess.) Hook f.

Syn.: *Pavia indica* Wall. ex Cambess.

A 30 m tall tree, a stem diameter of up to 2.5 m. In favourable conditions, however, it can attain even greater dimensions as for example in the western Himalayas, where in North Garhwal the tallest individual measured was 43 m tall. In later age the trees are characterized by a bark peeling off upwards in long thick bands.

It is a western Himalayan species, the range of which extends along the southern feet of the Himalayas and Hindukush, starting in western Nepal in the east, through northwestern India, Kashmir, northern Pakistan to eastern Afghanistan in the west. *A. indica* has been also reported from the Pakistani Baluchistan (Loralai), however, it is not certain whether it grows there truly in the wild condition since it is frequently cultivated as an ornamental tree (eg. in Quetta, Muree, Simla).

*A. indica* is a mesophilous species occurring throughout its range of distribution in scattered stands, and even though it is not a gregarious tree in places it has been found in large numbers and locally it can even be common. It grows primarily in moist and shady valleys, on streams and rivers, together with other trees and shrubs particularly from the genera: *Acer*, *Ulmus*, *Juglans*, *Quercus*, *Celtis*, *Prunus*, *Corylus*, *Crateagus*, *Euonymus* and sometimes it appears also in mixed forests together with *Cedrus deodara* (D. Don) G. Don and *Picea smithiana* (Wall.) Boiss. In its vertical distribution *A. indica* has been found from an elevation of about 1000 m up to 3000(3300) m, most commonly, however, between 1500 and 2500 m.

It is a valuable ornamental tree (leaves, flowers) placed under cultivation beyond its natural range of occurrence since mid XIX c. Its wood is of little value, however, where native it is used by the local people for construction, for water troughs, for packing-cases and for small household utensils (plates, mugs). Leaves and twigs are frequently lopped for winter fodder. Fruits are used in medicine (rheumatic pains) and also eaten by goats.

References: 179, 367, 382, 396.

## *Labiatae*

### *Coridothymus* Reichb. f. (monotypic genus)

#### 19. *Coridothymus capitatus* (L.) Reichb. f.

Syn.: *Thymbra capitata* L., *Thymus capitatus* (L.) Hoffm. et Link

A small, intricate, strongly aromatic shrub about 30 - 50 cm tall, occasionally somewhat taller, with numerous, small densely set branchlets, which when old and particularly when flowering can be somewhat spinescent. Freely growing individuals form characteristic, dense, cushion-like forms, as wide as tall or even wider.

It is a circum-Mediterranean species (except for France). In the eastern Mediterranean it grows on the one hand in the Balkan peninsula, on Crete, on the islands of the Aegean and on the other in western Anatolia, on Cyprus, in western Syria, in Lebanon and Palestine where it reaches as far south as the Judean Mts. and the Judean Desert. It is also known from Cyrenaica and coastal Egypt.

This shrub is distinctly light requiring and heliophilous, resistant to drought, calcicole, distributed primarily along the sea coast. It grows on various types of soils, more frequently, however, on rendzinas and on shallow soils developing on limestone, calcareous or sandstone rocks. It constitutes a characteristic representative of the phrygana, particularly its more degraded and thinned parts. In places it is the dominant element occurring abundantly and forming its own association *Coridothymetum capitati*. This association is well represented in the most easterly part of the range in Palestine. Besides *C. capitatus* there occur small shrubs and shrublets as: *Cistus incanus* L. and *C. salvifolius* L., *Sarcopoterium spinosum* (L.) Spach, *Fumana thymifolia* (L.) Spach, *Satureja thymbra* L., *Thymbra spicata* L., *Helianthemum lavandulifolium* Miller and among larger ones *Calicotome villosa* (Poiret) Link. A characteristic feature of this association is the very poor specific composition, particularly of annual plants.

In its vertical distribution *C. capitatus* occurs from almost the seashore, usually up to an elevation of 300 - 450 m, more rarely up to 700 - 800 m. On Crete, however, where similarly as on Cyprus it is a common species, it reaches high up into the mountains, even up to 2000 m.

*C. capitatus* is a valuable melliferous shrub. As a rule it flowers abundantly and the flowering period is very long, from May to October or even November. On Cyprus villagers use whole specimens of *C. capitatus* as kindling and rough brooms.

References: 56, 163(3), 188, 251, 259(3), 392.

### *Lavandula* L.

#### 20. *Lavandula stoechas* L.

A small aromatic shrub 60 - 100 cm tall with characteristic inflorescences in the form of the compact, thick spike having in the upper part long leaflike purple to violet bracts.

This is a circum-Mediterranean species, however, in North Africa it is absent in Libya and Egypt. In the eastern part of the range it occurs in continental Greece, on Crete and on some of the Aegean Islands, in European Turkey, in western Anatolia (rarely), on Cyprus, in Syria (very rarely), in Lebanon and in Israel. The most southern stands occur in the latter country, on coastal Philistean Plain, somewhat south of Haifa, while the most northerly stands occur in the vicinity of Istanbul. This shrub grows primarily at close distances to the seashore and only rarely further inland (near Sparti on the Peloponnisos, and in the Anatolian province of Izmir).

In Greece the stands of *L. stoechas* are restricted only to the Peloponnisos and the western shores of the Aegean. In the western part of the country, beyond the Peloponnisos the species has been found only on the shores of Akarnania, near Mytikas.

*L. stoechas* is a quite characteristic component of the phrygana particularly in its more sparse and disturbed parts, on sandy, gravelly or sandy-clayey soils. It appears to be a calcifugous plant. This is a thermo- and heliophilous shrub resistant to drought and occurs in strongly insolated places, locally quite abundantly as for example on Cyprus or in Israel. Besides it enters communities of secondary nature, such as roadsides or road escarpments. It is distributed on low lying sites, almost from the seashore to about 300 - 500 m, rarely higher. The most elevated stands have been reported from Lebanon at 800 - 1300 m.

This shrub is melliferous and it is decorative. It contains ethereal oils which can be used in perfum-making and in medicine.

References: 105(2), 163(3), 188, 198(1), 259(3).

21. *Prasium majus* L.

An erect shrub up to 1 m tall with thin and feeble, poorly branched shoots, frequently supporting itself or recumbent on branches of cohabiting shrubs. It flowers very early in the winter and spring, starting from January.

This is a circum-Mediterranean species, widely distributed along all the sea coasts, both in Europe (except for southern France) and in Africa. It is also reported from the Canary Islands (Tenerife) and from Madeira. In the eastern part of the range, on the Balkans it occurs primarily in Greece, both continental and on the islands and here the most northern stand is on the island of Thasos. It is also known from Yugoslavia and Albania, from where, however, detailed data is not available. Most probably it has more stands there than is indicated on the map of distribution. In south-west Asia it is more common only in Palestine and on Cyprus. It occurs less frequently in Lebanon, western Syria and in Anatolia. In the latter country stands are scattered, particularly in southwestern part.

*P. majus* usually occupies rocky places, limestone, sandstone or even serpentine ones and on the seashore also fixed sand dunes. It enters xerothermic thickets of the maquis and phrygana type in which it does not form larger agglomerations but appears as single individuals. In the eastern part of the range it is considered to be a species characteristic for the alliance of associations *Ceratonio-Pistacion lentisci* which corresponds to the alliance *Oleo-Ceratonion* of the western Mediterranean. In its vertical distribution it is restricted primarily to regions located at low altitudes, from 0 to 300(400) m, more rarely up to 600 m. The most elevated stands are known from Cyprus at about 750 m, and the Peloponnisos and Palestine at about 800 - 850 m. In Jordan on the Dead Sea some stands occur in depressions down to -200 m elevation.

References: 105(2), 163(3), 188.

*Lauraceae*

*Laurus* L.

22. *Laurus nobilis* L.

An evergreen, aromatic, strong, erect shrub or small tree, usually with several stems close to each other, in favourable conditions attaining even 15 - 20 m in height and 40 - 50 cm in diameter. The genus *Laurus* is represented by only two species. One of them, *Laurus azorica* (Seub.) Franco is believed to belong to the Macaronesian element (Canary Islands, the Azores, Madeira) and the other, *L. nobilis*, to the Mediterranean one.

An exact delimitation of the range of *L. nobilis* is today very problematic, similarly as in the case with *Ceratonia siliqua* L. or *Ficus carica* L. Throughout the Mediterranean and also beyond this region the species has been in cultivation for centuries and probably in many places it has gone wild., eg. in Spain or on the Caucasus. Sometimes it is believed that the proper native region for the laurel is Asia Minor and the Balkan peninsula from where it got distributed in the westerly direction in Roman times.

In the eastern Mediterranean *L. nobilis* occurs almost exclusively along the sea coast. On the Balkan peninsula it grows in Yugoslavia (Dalmatia), in Albania, Greece (together with Crete and some Aegean Islands) and also in European Turkey (near Istanbul). The Asiatic part of the range covers the shores of the Black Sea in northern Anatolia and in western Caucasus, the shores of the Aegean in western Anatolia and of the Medi-

terranean in southern Anatolia. Besides laurel is also known from Cyprus, western Syria, Lebanon and Palestine, reaching southwards to the Judean Mts. In northeast Africa it is known exclusively from Cyrenaica.

*L. nobilis* has been most probably in the past a component of evergreen Mediterranean forests, particularly of oakwoods (*Quercus ilex* L.). This is indicated by preserved colonies of laurel here and there described as the association *Lauretum nobilis*, as for example in northern Anatolia near Sinop. In that association laurel is the dominating element. Presently it is considered to be one of the more characteristic species of the mesic maquis variants, in which it is usually represented by shrub specimens or small trees up to 3 - 5(6) m tall. It enters also as an understorey into sparse pinewoods. It is most common in various small valleys and gorges, growing out of limestone rock fissures or from their feet, both in full insolation and in more or less shaded places.

This is a helio-, thermo- and calciphilous species. Its considerable requirements for high temperatures are reflected in the vertical distribution, primarily from the seashore to an elevation of about 300 - 400 m. On the Caucasus the most elevated stands occur at 500 m, in Albania at 600 m, in Greece at 700 m, in Anatolia (Amanus Mts.) at 1200 m, in Syria at 1350 m and in northwest Africa even at 1600 m.

In ancient times several myths and cults were associated with the laurel. Zeus has changed nymph Daphne who was loved by Apollo into a laurel tree. Whence the Greek name for laurel "Daphne". Laurel was dedicated to Apollo thus around the temples of this god usually whole groves were planted with laurel. Wreaths of laurel leaves or fruiting twigs were used to decorate heroes, poets and other deserving people. A continuation of these practices is the title of laureate or bachelor (in French bachelier) which derives from the Latin "baccalleureus".

Aromatic dry leaves of laurel became a popular spice used for soups, sauces, pickling etc. For this purpose special plantations (eg. on the Caucasus) are being established where about 1 ton of dry leaves is cropped annually per hectare. The leaves are collected during winter, between November and February, also from natural stands as for example on the Greek island of Levkas. Aromatic oils from the fruit of laurel (*Oleum Lauri*) have a use in medicine and in the cosmetic and food preservation industries.

*L. nobilis* is also cultivated for ornamental purposes, and since it sustains pruning well it is used for hedges. In countries with a more severe climate, where the cultivation of laurel is not possible in the open it is planted in wooden boxes and grown indoors for decorative purposes.

References: 103(4), 104(3), 163(2), 188, 254, 259(2), 373, 376, 383, 410, 411.

## *Myrtaceae*

### *Myrtus* L.

#### 23. *Myrtus communis* L.

An evergreen, aromatic, much branched shrub up to 1 - 3 m tall, occasionally even up to 5 m. In very favourable conditions it has been known to attain even 8 m and individual stems have had a diameter of 11 - 17 cm. This is a very variable species, both in terms of growth form and in the size and shape of leaves or colour and shape of fruits which has led to the discrimination within it of several forms, varieties and even subspecies.

The circum-Mediterranean range of *M. communis* is difficult to identify, because the shrub has been in cultivation since ancient times, and in many places it has probably gone wild and became naturalized. In the eastern Mediterranean region it is widely distributed and common along the seashores of Albania, Greece, western and southern Anatolia, Syria, Lebanon, Israel and Cyrenaica. Besides it grows on Crete, on some islands of the Aegean and on Cyprus. Beyond the Mediterranean region it occurs also in northern Anatolia, along the Black Sea as far as Trabzon in the east. Several stands, clearly isolated from the Mediterranean

ones are to be found further inland in Iraq and in Iran, particularly in the southwestern part of the country. *M. communis* has been also reported from eastern Afghanistan and western Pakistan. These latter stands are not included in the map, since there is much in favour of the opinion that they are not natural stands. In the westerly direction the furthest stands of myrtle occur on the Azores and on Madeira.

Throughout the range myrtle occurs in similar conditions, primarily in various communities of maquis and in the understorey of sparse pinewoods (*Pinus brutia* Ten.) or oak forests (in Iraq and Iran), and also on seashore rocks and even dunes where it behaves as a semi-halophyte. Within maquis it usually occupies more mesophytic locations, thus it is more common along streams or rivers. It sustains shade well and is also adopted to full insolation. It belongs to the few shrubs in the Mediterranean region which flower at the peak of the summer, during the warmest time. It grows either as single individuals or in small clumps, sometimes even in large numbers, as for example in the vicinity of Mersin in southern Anatolia or on the banks of river Jordan. *M. communis* is characterized by considerable ecological plasticity and shows a wide range of tolerance to the vicissitudes of physiographic, edaphic, climatic and biotic factors. Shrubs of myrtle are not browsed by game nor are they attacked by insects or fungi (at least not to any significant degree).

In this vertical distribution myrtle has a considerable variation. Majority of its stands are located at lower elevations, primarily between 0 and 300 m, rarely up to 500 m. In southern Syria, on the Golan Heights, myrtle has been reported from 200 - 450 m and in Lebanon up to 700 - 800 m. The most elevated stands are known from the Amanus Mts. up to 1000 m, from Mt. Cassius near the border with Syria up to 1300 m and from Cyprus up to 1700 m. In Iraq it is distributed between 600 and 1300 m and in Iran between 500 and 2000 m., most elevated stands being in Iranian Baluchistan on the Kuh-e-Taftan Mts.

*M. communis* is very valuable ornamental shrub, for ages now planted in parks and gardens and even cultivated in flower pots indoors (dwarf forms). It sustains pruning well thus it can be used for various forms of hedges. It played an important role in folk customs, in religious cults of various people in ancient times, particularly Greeks and Romans. These customs have persisted in some European countries till this day, where a myrtle shoot is used for wedding bouquets and wreaths. Fruits of *M. communis* are edible and are consumed by poor local people both fresh and dried, as well as in the form of spices for various dishes. Myrtle oil (*Oleum Myrti*) found in the leaves has been used in perfume industry and in medicine.

References: 64(4), 163(2), 188, 228(4), 358, 368, 373, 399, 402, 409.

## Oleaceae

### *Fontanesia* Labill.

#### 24. *Fontanesia phillyraeoides* Labill.

It is a densely branched shrub, spreading widely, 1 - 3 m tall resembling privet in appearance from which it differs, however, in having minutely serrulate leaves and fruits which are not fleshy berry-like drupes, but flat, roundish nuts winged all around.

The genus *Fontanesia* Labill. is represented by only two species: *F. phillyraeoides* and *F. fortunei* Carrière. The latter species grows in China. Morphological differences between these are small (stronger growth and larger leaves in the Chinese species), thus some taxonomists believe that they should be considered within the same taxon, as forms, varieties or subspecies of *F. phillyraeoides* e.g. *f. fortunei* (Carrière) Schelle, var. *sinensis* Debeaux or subsp. *fortunei* (Carrière) Yalt.

*F. phillyraeoides* is a species of the eastern Mediterranean region having a range almost exclusively restricted to Anatolia. Few stands occur also in northwestern Syria and in southern Europe, on Sicilia — on that island it must be rare or perhaps extinct now. In Anatolia itself the range of *F. phillyraeoides* is divided into two parts.

The first, much larger one, covers the southern part of the country in the Taurus range, from provinces of Burdur and Antalya in the west to province of Siirt in the east. The latter part occurs in northern Anatolia, only in two Black Sea provinces of Kastamonu and Samsun. Besides also one isolated stand is also known from northwestern Anatolia, on the Aegean Sea in Çanakkale province.

*F. phillyraeoides* grows in various types of xerothermic communities of shrubs, both evergreen and deciduous, frequently in maquis with a large component of *Quercus coccifera* L. and *Phillyrea latifolia* L., but also in sparse pinewoods (*Pinus brutia* Ten.) and in mixed bushy forests, primarily of oak (*Quercus infectoria* Olivier, *Q. macrolepis* Kotschy), on clayey slopes and limestone rubble, sometimes also on fixed seashore dunes. It can also be found sometimes on waste ground and among crops. Most commonly it occurs between 100 - 900 m, the highest elevations attained being up to 1250 m.

*F. phillyraeoides* is an ornamental shrub in cultivation since the end of the XVIII c., used in a similar manner as *Ligustrum vulgare* L.

References: 64(6), 163(3), 188, 311.

## *Fraxinus* L.

### 25. *Fraxinus ornus* L.

A small tree 8 - 15 m tall, occasionally attaining 20 m, characterized by having a smooth grey bark and greyish or brownish buds. It is a very variable species both in terms of size and shape of leaflets, their dorsal pubescence and size, shape and pigmentation of the fruits. As a result several forms, varieties and subspecies have been recognized within it, the systematic value of which is generally problematic. However, one of the subspecies, subsp. *cilicica* (Lingelsh.) Yalt. deserves special mention. It has glabrous, long acuminate leaflets and not shortly acuminate and brownish pubescent along the midrib on the dorsal side as in the case with the type subspecies. The range of subsp. *cilicica* is in southern Anatolia.

It is an eastern sub-Mediterranean species with a range extending in Europe from northeastern Spain in the east to the Black Sea (Romania, Bulgaria, Turkey) in the east. In the north the limit of the range passes through Switzerland, Austria, southern Czechoslovakia and central Romania. In North Africa, on Crimea and in the Caucasus *F. ornus* does not occur. It is also absent on Crete and Cyprus as well as on most of the Aegean Islands. The Asiatic part of the range covers western and southern Anatolia, northwestern Syria and northern Lebanon. In that region the stands of *F. ornus* are less numerous and more scattered than in the case of Europe.

*F. ornus* belongs to the very characteristic representatives of the woody flora of the Balkan peninsula and is widely represented in various plant associations included in the alliance *Ostrya-Carpinion orientalis* and *Quercion frainetto*. In these associations the main role is played by trees and shrubs with deciduous leaves as for example *Quercus pubescens* Willd., *Q. frainetto* Ten., *Q. trojana* Webb, *Carpinus orientalis* Miller, *Ostrya carpinifolia* Scop., *Cotinus coggygria* Scop., *Acer monspessulanum* L., *A. campestre* L., *Celtis australis* L. and others. In the south of the peninsula as well as along the shores of the Mediterranean and the Aegean *F. ornus* enters such associations as *Orno-Quercetum ilicis* and *Orno-Quercetum cocciferum*. In all these communities it appears singly, scattered or as small groups, in places, however, so abundantly that during flowering time (white flowers, luxuriant inflorescences) it gives the communities a characteristic appearance discernible from a distance.

It grows on various substrata, but generally speaking it is a calci-, thermo- and heliophilous species resistant to drought. It occurs primarily in hilly country and in mountains. While it can occur from the seashore itself, it can most commonly be found at elevations between 300 and 800 (1000) m. In Greece, on the Peloponnisos it probably reaches no further up than 1200 - 1300 m, in Bulgaria up to 1500 m and in Albania and Yugoslav Macedonia up to 1600 - 1700 m. A greater differentiation is observable in the Asiatic part of the range, up to 1000 m in northwestern Anatolia, up to 1300 - 1400 m in southwestern Anatolia and in the south, in the Amanus Mts. even up to 2300 m.



*F. ornus* is a valuable decorative species, planted commonly in parks, also outside the natural range of distribution. By incision a bark layer on the stem a sweetish fluid is obtained from it, which solidifies in air in the form of yellowish granules. This is the so called "mannah", used in medicine as a laxative and for syrups. In southern Italy and on Sicilia special plantation of *F. ornus* are cultivated for its production.

References: 64(6), 163(3), 311, 383, 384, 391, 395, 413.

## 26. *Fraxinus xanthoxyloides* (G. Don.) DC.

A strong, erect shrub growing up to 3 - 5 m tall, or else a small tree up to 7.5 m in height and with a trunk diameter of 50 - 60 cm. It is characterized by slow growth and stiff shoots forming a rounded crown.

It is one of the most interesting species in terms of geographical distribution from those occurring in south-west Asia. Its range consists basically of two parts, much removed from each other. On the one hand, *F. xanthoxyloides* occurs in northwestern Africa, in Morocco and Algeria, and on the other, after a disjunction of about 5000 km, it occurs again in the eastern part of southwestern Asia. The latter part of the range, much larger than the African one, covers eastern Afghanistan and northern Pakistan (districts Kalat, Quetta, Loralai, Zhob, Waziristan, Dir, Chitral, Swat, Hazara, Gilgit) and Kashmir. Further to the east in Central Asia the species grows also in the Himalayas, in northwestern India reaching Kumaun in the east, thus probably up to 80° longitude East.

*F. xanthoxyloides* grows along river banks and on the valley slopes, even very steep ones, on a sandy, gravelly, stony or rocky substratum, avoiding clayey, impermeable soils. Locally it occurs very abundantly, though some of its stands are scanty and far apart from each other. Possibly this is caused by the grazing of animals (goats), which bite off the palatable shoots. This ash tree is frequently accompanied by *Olea jerrunginea* Royle, *Quercus baloot* Griffith, *Acer pentapomicum* J. Stewart, junipers and almonds.

In the vertical distribution *F. xanthoxyloides* occurs locally from 700 - 800 m up to 3200 m though optimal conditions for its growth are to be found between 1100 and 2500 m.

References: 179, 278, 380, 390, 395.

## *Jasminum* L.

### 27. *Jasminum fruticans* L.

This is a semi-evergreen, suckering shrub up to 1.5 - 2 m tall, forming a dense mass of erect or arching downwards stems with green angular shoots. In places where it grows, in the vicinity of large shrubs, on somewhat moister sites it can attain even 2.5 - 3 m. Flowers are yellow, tubular, with a diameter of 10 - 15 mm. This shrub is readily browsed by animals.

*J. fruticans* is a Mediterranean species, which, however, enters the Irano-Turanian Region in the east. In southern Europe it occurs from Portugal to Turkey, but is absent on the islands of the Mediterranean and on almost all islands of the Aegean. In North Africa it is known only in the west, in Morocco, Algeria and Tunisia. In the eastern part of the range, on the Balkan peninsula it behaves as a sub-Mediterranean species, and here its stands cover primarily Albania, northern Greece, Yugoslav Macedonia, Turkey and southern Bulgaria where along the Black Sea coast it reaches far north to the Romanian Dobruja and further still to the Crimea. On the Caucasus the range of *J. fruticans* is disrupted into two parts, the first one extends along the northeastern shores of the Black Sea and the latter covers southeastern Transcaucasus. On the other hand, the stands in Anatolia are scattered in the north, west and the south. From here, through western Syria and Lebanon *J. fruticans* reaches as far south as Jerusalem. Even further in the easterly direction it reappears in northern Iran, ending its range in southern Turkmeniya (Kopet Dag Mts.).

Throughout its range *J. fruticans* enters into various types of xerothermic thickets, phrygana, maquis, pseudo-maquis, shiblyak, and oak scrub, as well as into sparse pinewoods and edges of mixed forests. Locally, as for example in European Turkey (Tekir Daglari) it can be the dominant element in such thickets. It grows primarily on dry rocky places and open sunny hillsides, as well as on stony outcrops in cultivated fields. It can be found from the seashore up to 900 - 1000 m, and rarely higher. The most elevated stands are to be found in the southern and eastern extremities of the range, in Turkmeniya up to 1600 m, in Lebanon up to 1700 m, in Anatolia up to 1800 m. and in Iran even up to 2000 m.

It is an ornamental shrub, cultivated in Europe since the XVI c., primarily in the regions of natural occurrence.

References: 64(6), 105(2), 163(3), 294, 311.

### *Ligustrum* L.

#### 28. *Ligustrum vulgare* L.

The only representative of the genus *Ligustrum* in the flora of Europe and southwestern Asia. It is a strong erect shrub up to 3 - 5 m tall very variable in leaf size and colour, in the fruit colour and in habit. In the northern part of the range its leaves are deciduous, while in the south they have a tendency to be semi-evergreen particularly in the terminal parts of the shoots (var. *italicum* (Miller) Vahl.).

*L. vulgare* is widely distributed almost throughout western, central and southern Europe. Furthest to the north are stands in the British Isles and southwestern Sweden. In the southeast, in Ukraine, the furthest stands have been reported from the shores of the Azov Sea. Beyond Europe it grows also in northwestern Africa, on the Caucasus, in Anatolia (here primarily along the shores of the Black Sea) and also on single stands in northwestern Iran (Azerbaijan, Gilan).

It is a light demanding species, somewhat calcicole. On the one hand, it occurs in open regions, on edges of fields and roads, in xerothermic thicket composed of trees and shrubs with deciduous leaves such as *Ulmus minor* Miller, *Acer campestre* L., *Prunus spinosa* L., *Cornus sanguinea* L., *Rhamnus catharticus* L., *Clematis vitalba* L. and various species from the genus *Rosa* L. On the other hand it is to be found on edges of forests and in sparse forests, primarily in pinewoods and also in mixed (*Fagus-Aties*) forests. It avoids exceptionally dry places, thus it is only exceptionally found in maquis communities or in phrygana. Besides it can be also found on sandy coastal plains and in river valleys even periodically flooded. As a rule it grows in the plains or slightly hilly terrain almost from the seashore itself. The most elevated stands have been noted in Greece at elevation of 1000 m, in Yugoslav Macedonia at 1200 m, in Anatolia and the Caucasus at 1500 m, in northwestern Africa (Morocco) at 1600 m and in Iranian Azerbaijan even at 1750 m.

*L. vulgare* is a valuable ornamental shrub, commonly used for hedges. As a result it is possible that a portion of its stands is of secondary nature, formed as a result of the seeds being dispersed by birds that feed on the fruits of shrubs found in cultivation.

References: 64(6), 103(7), 311.

### *Osmanthus* Lour.

#### 29. *Osmanthus decorus* (Boiss. et Bal.) Kasapl.

Syn.: *Phillyrea decora* Boiss. et Bal., *P. vilmoriniana* Boiss. et Bal., *P. medwedewii* Sred.

An evergreen strong shrub, up to 3 - 4 m tall, sometimes even a small tree, producing abundant succers from the base. Leaves are large, up to 17 cm long and 6 cm wide, lustrous and revolute on the margins. It is the only representative of the genus *Osmanthus* in southwestern Asia, included in the Asiatic section *Osman-*

thus. Other species of this section occur from the western Himalayas to Japan and Formosa. Until not long ago (till year 1970) *O. decorus* was considered to belong to the genus *Phillyrea* L.

The range of *O. decorus* is restricted to the Colchic sector of the Euxine Province and extends along the montane belt running along the Black Sea. Furthest westwards are stands in the Anatolian province of Giresun and in the northeastern direction in Adzhariya on the Caucasus. The stands are few and it appears that the shrub is disappearing. On the region in question it grows primarily in mixed deciduous or mixed beech-spruce forests or else in pure spruce ones, and particularly on their edges forming small thickets in valleys and on their slopes, on a gravelly or stony substratum. It is a mesophilous species sustaining shade well. In Anatolia it occurs at elevation from 100 to 1600 m and in Adzhariya up to 1800.

It is a valuable ornamental shrub introduced into cultivation in the latter part of the XIX c. In cultivation a narrow-leaved form is known as cultivar — cv. 'Baki Kasapligil' and a hybrid with *Osmanthus delavayi* Franchet (= *O. x burkwoodii* (Burkwood et Skipwith) P. Green).

References: 64(6), 103(7), 311, 379, 385.

### *Phillyrea* L.

#### 30. *Phillyrea latifolia* L.

Syn.: *P. media* L.

An evergreen, strong much developed and richly branched shrub 3 - 5 m tall, or a small tree, attaining in extreme cases even 10 - 15 m in height and 15 - 20 cm in stem diameter. This is a very variable species in leaf size, shape and serration. These differences, it appears, are conditioned on the one hand by the site (insolated or shady places, soil dry or moist) and on the other, by age of the individuals (juvenile and adult leaves).

This is a circum-Mediterranean species reaching as far west as the Canary Islands (Lanzarote Island). Besides *Quercus coccifera* L. it is undoubtedly the most common, evergreen species in the eastern Mediterranean. On the Balkan peninsula it reaches as far north in Yugoslavia as Dalmatia and Istria and in Bulgaria to the valley of the Struma, the eastern Rhodope and the Strandzha Mts. In the Asiatic part of the range it is distributed along the sea coast of Anatolia, on the Black Sea as far as Trabzon in the east, on the Sea of Marmara, the Aegean and the Mediterranean, then in Syria, Lebanon, Cyprus and Palestine, here as far as the Judean Mts. in the south. Besides it is also known from northeast Africa in Cyrenaica.

*P. latifolia* is one of the basic species of maquis, in abundance frequently no lesser than *Q. coccifera* L. and in places even dominating. In degraded low maquis and in the phrygana it looks so very much like this oak that they are difficult to distinguish from a distance. In places it forms pure dense thickets. Besides in more northern parts of its range it enters the pseudo-maquis together with *Juniperus oxycedrus* L., *J. excelsa* M. Bieb., *Pistacia terebinthus* L., *Jasminum fruticans* L. and others.

*P. latifolia* is characterized by an exceptionally wide tolerance as regards site conditions. While most typical for it are dry insolated rocky, particularly limestone slopes, it will also grow in gravelly soils, clays, rendzinas and even on fixed seashore sand dunes, both in full insolation and in considerable shade, on extremely dry locations and in moist ones (banks of rivulets and streams), primarily in thickets of shrubs but also in the understorey of sparse pinewoods (*Pinus halepensis* Miller, *P. brutia* Ten., *P. nigra* Arnold). In connection with this variability of sites the range of *P. latifolia* is not restricted like maquis to seashores regions only but the species penetrates deep inland particularly along river valleys. On the other hand, in the vertical distribution the scale is not great. Most commonly *P. latifolia* appears more or less from the seashore to about 600 m elevation, however, in Yugoslav Macedonia and in Lebanon it reaches up to 800 m, on Crete and Samos Island up to 1100 m, in continental Greece up to 1200 - 1300 m and in Anatolia even up to 1350 m.

References: 64(6), 163(3), 188, 254, 259(3), 311, 408.

## Polygonaceae

### *Atraphaxis* L.

#### 31. *Atraphaxis billardieri* Jaub. et Spach

A small profusely branched shrub 60 - 80 cm tall with thin tortuose twigs quite variable in size and form of leaf apices. For this reason two varieties are distinguished, the type var. *billardieri* covering primarily the western part of the species range and var. *tournefortii* (Jaub. et Spach) Cullen the eastern part. Sometimes these varieties are treated as independent taxa this, however, does not meet with universal approval.

The main region of occurrence of *A. billardieri* is in Asiatic Turkey (Anatolia) and in Lebanon and adjoining parts of western Syria. Besides scattered stands are also known in Asia from northeastern Iraq, western Iran and also from the Greek islands Rodhos, Chios and Samos. In Europe this shrub has been reported from Crete and from two stands in mainland Greece, from Mt. Imittos near Athens and Mt. Timfristos. However, these latter two stands date back to the XIX century and it is not known whether they still exist. It is sometimes suggested that *A. billardieri* originates from the eastern Caucasus, there, however, it is not this species that occurs but a closely related one, the recently described *Atraphaxis daghestanica* (Lovelius) Lovelius.

*A. billardieri* grows in the mountains above 1000 m elevation, rarely somewhat lower, on open, insolated sites with dry soil and air, as a rule well inland, far from the sea, that is in regions where continentality of the climate is strong. It enters communities of steppe nature and into disturbed phrygana, which develop on bare rocks both limestone and metamorphic, on rocky rubble, gravels and clayey-sandy soils. The most elevated stands are to be found in Iraq, 1650 m, Iran, 2100 m and in Turkey, 2600 m.

*A. billardieri* can be considered as a good indicator species of a much advanced site degradation.

References: 64(2), 105(3), 163(1), 188, 393, 394.

## Ranunculaceae

### *Clematis* L.

#### 32. *Clematis cirrhosa* L.

A woody climber with stems up to 3 - 5 m long and large creamy-white flowers 4 - 7 cm in diameter, blossoming in the winter and early spring, from November to March. The leaves dry up during summer droughts and fall off and they reappear after the first autumn rains attaining full development in the winter, thus the shrub is frequently referred to as being evergreen.

*C. cirrhosa* is a polymorphic species, particularly in north-west Africa, and its variability concerns primarily the size of flower and leaf form. Within the species several taxa were recognized which are given various systematic rank. Some of these have at times been treated as independent species.

This is a circum-Mediterranean species. In Europe it has been reported from Portugal, Spain, France, Italy and Greece as well as from many islands of the Mediterranean, particularly the Balearic Isles, Corsica, Sardinia, Sicilia, and Crete. On the other hand, in North Africa it is most common in Morocco where it even attains the shores of the Atlantic. Besides it is also to be found in Algeria, Tunisia and Libya (here only in Cyrenaica).

In south-west Asia *C. cirrhosa* is known from the western and southern Anatolia, from the isles Rodhos and Cyprus, from northwest Syria, from Lebanon, Israel and Jordan. In that part of the range it reaches

northwards as far as Istanbul and southwards to the Judean Mts. *C. cirrhosa* is associated with evergreen thickets of maquis type and is distributed in regions along the sea coast. Rarely it migrates further inland. It grows on warm insolated places usually from the seashore to about 350 - 500 m elevation. More elevated stands, up to 800 m, have been reported from Crete and Palestine, and even higher, up to 1200 m from Cyprus. In the latter country it is a common shrub in the western and northern parts of the island.

This is an attractive ornamental shrub, particularly due to the time of blossoming, however, it can be cultivated only in regions with a mild climate.

References: 64(1), 105(2), 151(1), 163(2), 188, 259(1), 363, 368, 389.

### 33. *Clematis flammula* L.

A woody climber with shoots 5(8) m long having glabrous internodes and white fragrant flowers 2 cm in diameter, collected in loose, much branched panicles. It flowers from May to July. In the vegetative state it is sometimes mistaken with the closely related *Clematis vitalba* L., which is characterized by much more vigorous growth – shoots up to 30 m long with hairy internodes.

*C. flammula* is a circum-Mediterranean species reaching in the west as far as the Azores. In the eastern part of the range it is known primarily from Albania, Greece, Lebanon and northern Israel, while in Lybia (Cyrenaica), on Crete, in Anatolia and Syria its stands are few and scattered. It is absent in Egypt, on the Aegean Islands, on Rodhos and on Cyprus. It occurs primarily in xerothermic communities of shrubs of the maquis, phrygana and shiblyak type, however, it appears in sparse pinewoods, on exposed seashore rocks and in abandoned olive groves.

This thermophilous and heliophilous climber flowers when its shoots reach beyond the crown of other shrubs, and then thanks to the white flowers and numerous inflorescences it is readily observable from a distance. It spreads in lowland and hilly regions, and sometimes also in the lower reaches of mountains. In its vertical distribution as a rule it does not appear beyond 600 - 750 m. However, in Anatolia it has been found as high up as 900 m, in Bulgaria and Greece up to 1000 - 1200 m (Mt. Olimbos, Epiros) and in Lebanon even up to 1300 - 1600 m.

*C. flammula* is a valuable ornamental shrub favoured for its abundant flowering and pleasant fragrance of the blossoms. It has been in cultivation since the end of the XVI c.

References: 64(1), 105(2), 188, 259(1), 389.

### 34. *Clematis viticella* L.

A delicate climber with thin feeble more or less woody stems up to 4 m long with violet flowers 3 - 5 cm in diameter blossoming in summer, June to August.

This is a sub-Mediterranean species the range of which extends from western Italy through Jugoslavia, Albania, Greece, southern Bulgaria and European Turkey, to western Anatolia in the east. Single isolated stands are also known from northern Anatolia and the shores of the Black Sea in the Caucasus. *C. viticella* is sometimes reported from northwestern Syria and from Crete, where, however, it does not exist. Possibly it has been confused there with *Clematis cirrhosa*, which resembles it somewhat when in a vegetative state.

*C. viticella* occurs in scrub and in mixed, more thermophilous forests, particularly on valley slopes and in calcareous gorges, in valleys of rivers and streams, sometimes quite abundantly. Stands of this climber are distributed as a rule in regions located at lower elevations, from the seashore up to about 700 m in Greece, 900 m in Albania and Anatolia and 1000 m in Bulgaria.

It is an ornamental species in cultivation since the XVI c., frequently planted in gardens and parks, sometimes locally naturalized. It is represented by several forms differing in size and colour of flowers. In breeding

work it has been crossed with other species such as *Clematis lanuginosa* Lindley, *C. florida* Thunb., *C. patens* Morren and others. Such hybrids are referred to as large flowered Clematis.

References: 64(1), 78, 103(4), 151(1), 188, 363, 389.

## Rhamnaceae

### Frangula Miller

#### 35. *Frangula alnus* Miller

Syn.: *Rhamnus frangula* L.

An unarmed, erect shrub 2 - 3 m tall, more rarely a small tree (5 - 7 m). In eastern Anatolia a small-leaved subspecies has been described — subsp. *pontica* (Boiss.) P. Davis et Yalt., which differs from the type subspecies in having also a smaller number of lateral veins. It is not impossible that this is a form conditioned by ecological factors, a more dry substratum and insolated site.

This is a Euro-Siberian species. Its range covers almost the whole Europe except for the most northern extremities, and also western Siberia. It has been also reported from northwest Africa, Morocco, Algeria and Tunisia. In the southern part of the Balkan peninsula, in Albania, Greece and European Turkey it is becoming rare, known from only few scattered locations and sometimes confused with *F. rupestris* (Scop.) Schur. In southwest Asia *F. alnus* is represented only on the Caucasus and in Anatolia. In the latter country it is more common near the Black Sea, particularly in the northwest. In southern Anatolia only few stands are known. Besides one stand is reported from northwest Syria, one from northeastern Iraq and two from northern Iran, province of Gilan.

*F. alnus* is a mesophilous shrub which has no special requirements as regards the soil and tolerates shade well. It grows best on fertile and moist soils, in the understorey of mixed broadleaved forests (particularly alders) or in coniferous ones, in places, however, it occurs on exposed regions, on dry and rocky slopes. Within the European part of the range *F. alnus* is distributed on lowlands, or else on lower mountain locations. In Switzerland up to 1500 m. The most elevated stand has been reported from northeastern Anatolia, province of Rize at 1800 m (here subsp. *pontica* (Boiss.) P. Davis et Yalt.).

The bark of *F. alnus* has found various usage in medicine, particularly in folk medicine, among others as a laxative. From bark and fruits stains used to be obtained for the staining of cotton and woolen materials.

References: 64(2), 103(6), 104(5), 372, 381.

#### 36. *Frangula grandifolia* (Fischer et C. Meyer) Grubov

Syn.: *Rhamnus grandifolius* Fischer et C. Meyer

A loose, broadly expanding shrub 5(6) m tall with thin, elliptical leaves, up to 20 cm long.

A typical representative of the Hyrcanian Forest flora. Its range extends as a relatively narrow belt along the southern shores of the Caspian Sea, from Talish in Azerbaydzhan (U.S.S.R.) in the west, through the Iranian provinces of Gilan and Mazandaran to province of Gorgan in the east. Isolated stands have also been reported from the eastern Caucasus in the Kuba region (Samur river basin).

*F. grandifolia* is a mesophilous, shade tolerant species occurring in the understorey of broadleaved forests and on their edges, particularly on the banks of rivers and streams, on fertile, permanently moist and even boggy soils. It grows scattered, usually at low elevations, in Talish up to 500 m, and in Iran (province of Gorgan) up to 960 m.

References: 103(6), 104(5), 372, 381.

37. *Paliurus spina-christi* Miller

Syn.: *P. australis* Gaertner, *P. aculeatus* Lam.

A strong, erect shrub 2 - 3(4) m tall, usually composed of several stems growing close to each other, profusely ramified, almost at right angles. Second and third order branches are frequently arched downwards, with translucent foliage and having stipular spines up to 18 mm long, sometimes straight and sometimes bent downwards. The fruits are very characteristic, dry, hard and depressed-subglobose with broad, horizontal wings. Flowering takes place from May to July and frequently longer, sometimes it is repeated, so that towards the end of the summer and in autumn on one and the same individual it is possible to see ripening fruits and blossoming flowers.

This is a northern and eastern Mediterranean species, which, however, enters into the Irano-Turanian Region in the east. It is absent in North Africa and on the Mediterranean Islands. Cyprus is an exception, however, the information available from the island is inadequately clear and it is possible that it concerns not *P. spina-christi* but *Ziziphus lotus* (L.) Lam.

In Europe the most westerly stands of *P. spina-christi* occur in Spain, where, however, it is probably only subspontaneous. On the Balkan peninsula it is a common shrub almost throughout Greece, particularly central and northern, Albania, Yugoslav Macedonia, southern Bulgaria and European Turkey. In that part of the range the most northern stands occur on the Black Sea in Romanian Dobruja and even further east also in southern Crimea. No less common is the shrub in the Asiatic part of the range, particularly on the Caucasus and in northern and southern Anatolia, from where it extends south as far as Lebanon and Palestine. Here only some of the stands are indigenous. From the Caucasus and the Talish Mts. in U.S.S.R. *P. spina-christi* penetrates into northern Iran and finally into southern Turkmeniya, while from southeastern Anatolia through Iraq to southwestern Iran as far as province of Fars. In southern Iran its stands are more rare than in the north. Even further eastwards one stand is known from northwestern Afghanistan and a few stands from Tadzhikistan.

*P. spina-christi* is a calciphilous shrub, distinctly heliophilous. In greater shade it gradually dries and dies. It belongs to one of the most characteristic components of deciduous brushwood, described in the Balkans as shiblyak. Such communities have resulted as a consequence of the destruction of forests, particularly of oakwoods. In the shiblyak there grow such species as *Carpinus orientalis* Miller, *Cotinus coggygria* Scop., *Colutea arborescens* L. (*C. cilicica* Boiss. et Bal. in Anatolia and *C. buhsei* (Boiss.) Shap. in Iran and Turkmeniya) *Coronilla emerus* L. subsp. *emeroides* (Boiss. et Spruner) Hayek, *Cornus mas* L., *Acer campestre* L. (shrub forms), *Crataegus monogyna* Jacq., *Clematis vitalba* L. and various species of roses. A much advanced degradation of the shiblyak frequently leads to its impoverishment in species number and even to pure thickets of *P. spina-christi* (*Paliuretum*) difficult to penetrate due to the spines that save it from grazing by goats and sheep. Such thickets are an indicator of extreme and irreversible degradation of forest sites (dry shallow soils). Besides *P. spina-christi* appears also, particularly in seashore regions, on edges of maquis, however, only as single, scattered specimens. In places as for example on the Black Sea in Bulgaria it enters also the dunes, where, however, it becomes sand covered and does not attain such dimensions as in shiblyak.

*P. spina-christi* primarily grows on dry insolated places, or even on hilly land and on exposed mountain slopes, but only in the lower locations, from the seashore itself up to usually no more than 800 - 1000 m. On the Caucasus and in Iraq the most elevated stands were found at 1500 m, in Anatolia at 1650 m, and in Iran, in Elburz Mts. even at 2300 m (in Tadzhikistan between 1100 and 1500 m).

Within its natural range *P. spina-christi* is commonly used for fencing (dry branches) of pastures and cultivated fields, and as natural hedges. Generally, however, it is a troublesome weed representing a nuisance to men and domestic animals.

References: 64(2), 103(6), 104(5), 151(1), 163(2), 198(1), 228(4), 254, 366, 372.

**38. *Rhamnus alaternus* L.**

A dioecious, evergreen, unarmed bush or small tree 1 - 4 m tall, exceptionally taller (up 6 m) with flexible upturned shoots. In habit and leaf form it resembles *Phillyrea latifolia* L. with which species it can be mistaken. It differs from the latter in having alternate as distinct from opposite leaf arrangement.

It is circum-Mediterranean species, however, distributed primarily in the western part of the range. It is also reported from the Canary Islands (Gran Canaria). It occurs primarily along the sea coast. On the Balkan peninsula it grows in western Yugoslavia (Dalmatia), in Albania, in Greece, on Crete, Euboea and some islands of the Aegean. In the Asiatic part of the range it is more common only on Cyprus, in Lebanon and in Palestine where it has been reported as far south as the Judean Mts. In Syria, western and southern Anatolia (except for the region of Izmir) the stands are very rare and scattered. It is also known from northeastern Africa, but only from eastern Cyrenaica.

*R. alaternus* is a characteristic component of the semihumid maquis in which, however, it does not occur at any place in larger numbers, but usually as single specimens. Only in communities of this type does it attain larger dimensions, particularly on slopes with a western or northern exposition, also along rivulets and streams, permanent ones as well as those that dry up seasonally. In a sparse, degraded or strongly dried maquis and in the phrygana it becomes impoverished and tends to die out.

It is a helio- and calciphilous plant. It occupies lower locations, from the seashore usually up to about 300 - 400 m elevation. In Anatolia it reaches as high up as 700 m, in Greece 800 m, in Lebanon 900 m and on Cyprus even 1100 m.

It is an ornamental shrub used in countries with a milder climate for natural or pruned hedges.

References: 64(2), 151(1), 163(2), 188, 254, 372, 381.

**39. *Rhamnus catharticus* L.**

A thorny, strong, erect shrub or a small tree up to 6 - 8 m tall, sometimes in favourable conditions (Central Europe) attaining even 10 - 12 m. This is a very variable species in terms of size, shape and pubescence of leaves, thus several forms and varieties have been recognized within it of which in south-west Asia only var. *caucasicus* Kusn. (= *Rhamnus elbursensis* Gauba et Redh. f.) deserves special mention being characterized by tomentose shoots, petioles and even dorsal leaf surfaces. This variety occurs on the Caucasus, in the Talish Mts. and in northern Iran. It forms natural hybrids with *Rhamnus pallasii* Fischer et C. Meyer described as *Rhamnus* × *spatulifolius* Fischer et C. Meyer.

This is a Euro-Siberian species. The range of *R. catharticus* covers most of Europe (in the north as far as 61°45' in Sweden) and western Siberia, here as far as the upper reaches of the river Ob. Besides *R. catharticus* is known from northwest Africa, Morocco and Algeria. In the south, within the range of the species there lies the Iberian peninsula but without southwestern extremity, Sicilia, the Appenine peninsula, the Balkan peninsula (excluding European Turkey and almost whole of Greece), Crimea, the Caucasus, the Talish Mts., northeastern Anatolia and northern Iran\*. There is no connection between the range in the Balkans and the range in Anatolia, where stands are few and scattered. In that region of disjunction there occurs the closely related species *Rhamnus rhodopeus* Velen.

*R. catharticus* grows primarily in the lowlands or in hilly country, on insolated, exposed places, on moderately dry soils, rich in calcium, more rarely slightly acidic, however, it sustains shade and moist soils very

\* Mouterde (163,2) has reported this species from Lebanon and Syria, however, judging from his drawings of leafy shoots this appears doubtful. Possibly we are dealing here with the short-petioled form of *Rhamnus petiolaris* Boiss. f. *brevipetiolata* (191).



well. It occurs in various types of thickets and also in dry open broadleaf forests, on banks of river valleys and on rocky mountain slopes. In Europe it attains an elevation of 1600 m and in Morocco, the Atlas Mts. up to 2000 m. The most elevated stand was found in Iran, the Elburz Mts. at 2300 m.

References: 64(2), 103(6), 104(5), 372, 381.

#### 40. *Rhamnus cornifolius* Boiss. et Hohen.

Syn.: *Oreohertzogia cornifolia* (Boiss. et Hohen.) Vent

An unarmed shrub with prostrate or ascending shoots and with leaves 8 - 9 cm long with 6 - 12 pairs of well marked lateral veins.

This is a high mountain species. Its narrow range extends from the southeast to northwest along the Iranian Zagros mountain massif, through the mountains of northeastern Iraq and the Anatolian province of Hakkari. In the latter region it is a very rare species, known from only a few stands, while in Iran, in central Zagros in the Bakhtiari range it occurs quite frequently.

It grows in the alpine stratum, in the upper parts of the mountains, primarily in fissures and cervices of strongly fractured steep rocky walls, usually on limestone, and as a rule above 2000 m. elevation, occasionally lower down to 1450 m in Iraq. The most elevated stands are known from Anatolia at about 3000 m, from Iraq at 3400 m and from Iran at 4100 m.

References: 64(2), 228(4), 372, 381, 412.

#### 41. *Rhamnus imeretinus* Booth

Syn.: *Oreohertzogia imeretina* (Booth) Vent

A strong, erect or widely divaricate shrub with stiff, quite thick shoots and large (up to 13 mm long) acutely pointed buds. Its broadly elliptic-oblong leaves are up to 20 (25) cm long with 15 - 30 pairs of lateral veins, being largest among all the representatives of the genus *Rhamnus* in southwestern Asia.

This is a Euxine species, the range of which is restricted to a relatively small area. On the one hand, it occurs in the southwestern Caucasus (primarily in Colchida) and on the other, though much less common in northeastern Anatolia.

*R. imeretinus* is a mesophilous shade tolerant species which throughout its range grows on edges and in the understorey of mixed and coniferous forests (*Abies nordmanniana* (Steven) Spach, *Picea orientalis* (L.) Link) and in thickets of shrubs near the upper tree limit, on fertile moist soils, on stony rubble and scree, from 1000 - 1300 m elevation up to about 2000 m.

This is a valuable ornamental shrub, but distinctly intolerant of low temperatures. It is valued primarily for its large leaves, which turn to bronze-purple in the autumn.

References: 64(2), 103(6), 104(5), 381, 412.

#### 42. *Rhamnus libanoticus* Boiss.

Syn.: *Oreohertzogia libanotica* (Boiss.) Vent, *O. taurica* Vent

An erect shrub 2 - 3 m tall, closely related to *Rhamnus cornifolius* Boiss. et Hohen. from which it differs primarily in having crenate-serrate leaves (in *R. cornifolius* these are entire or subentire).

The range of *R. libanoticus* consists of two widely separated parts. The first one covers southern Anatolia, the central part of the Taurus Mts. and the adjoining Amanus Mts. The disjunction in the range which is to be found in the south of province of Konya is probably only apparent, the result of insufficient penetration

of the region in question. Most westerly stands of *R. libanoticus* occur in Anatolia in the Isparta province till the Dedegöl Dağları range extending on the western side of lake Beyşehir, while in the east the extreme stands occur in the northwestern parts of province of Maraş. Here *R. libanoticus* grows at an elevation of 1500 - 2500 (2700) m on rocks and limestone slopes in open places, frequently together with *Juniperus excelsa* M. Bieb., *J. drupacea* (Labill.) Antoine et Kotschy, *J. oxycedrus* L., and shrubs from the genus *Amelanchier* Medikus, *Amygdalus* L., *Cotoneaster* Medikus, *Crataegus* L., *Rosa* L. and *Sorbus* L.

The second part of the range is restricted to two mountain ranges, the Lebanon and the Antilebanon, and to their southern extension Hermon (Jebel-esh-Sheikh) running latitudinally in Lebanon and in western Syria. In that region *R. libanoticus* attains 2800 (3000) m elevation. On lower elevations it appears in the forests of *Abies cilicica* (Antoine et Kotschy) Carrière and *Cedrus libani* A. Rich. and in the upper parts of mountains frequently besides *Juniperus excelsa* M. Bieb. as the only representative of the dendroflora.

References: 64(2), 163(2), 381, 412.

#### 43. *Rhamnus microcarpus* Boiss.

Syn.: *Oreohertzogia microcarpa* (Boiss.) Vent

An unarmed, more or less prostrate shrub, 30 - 50 cm tall with tortuose shoots and leaves broadly-ovate, 3 - 5 cm long with 7 - 10 pairs of lateral veins.

It is a mountain Euxinian species. Its range covers the western part of the Lesser and Greater Caucasus in U.S.S.R. and northeastern Anatolia close to the Black Sea, the western limit of the range passing through province of Giresun. In that whole region *R. microcarpus* grows in the subalpine and alpine zone, in exposed places, on dry rocky slopes, in fissures of vertical rock walls, both limestone and granitic, or else of volcanic origin, more or less from an elevation of about 1500 m (rarely lower) up to 2400 m and even 2700 - 2900 m (eg. on Keşiş Dağları in the Anatolian province of Erzincan).

A closely related species *Rhamnus depressus* Grubov, which attains only 15 cm in height has leaves half the size with 5 - 7 pairs of lateral veins and occurs in the upper reaches of the mountains in the Caucasus and in northeastern Anatolia, between 2000 and 3000 m. It used to be considered a small leaved variety of *R. microcarpus* (var. *microphyllus* Trautv.).

References: 64(2), 103(6), 104(5), 381, 412.

#### 44. *Rhamnus pallasii* Fischer et C. Meyer

A thorny shrub, up to 1 - 3 m tall, erect, gnarled or even prostrate, very variable. This variability is manifested particularly in the length and width of leaves, their pubescence and also in the pubescence of shoots and colour of bark. For this reason three subspecies have been recognized within it: 1) the type — subsp. *pallasii* with narrow and long leaves, and a range covering the Caucasus, north-eastern Anatolia and north-western Iran, 2) subsp. *sintenisii* (Rech. f) Browicz et Ziel., with leaves clearly shorter, distributed primarily in northern Iran, Turkmeniya, and northwest Afghanistan, and 3) subsp. *iranica* (Hauskn.) Browicz et Ziel., with yellowish-brown bark, from west and southwest Iran. This latter subspecies, as it appears, should include individuals from the only two stands of *R. pallasii* in Iraq. The ranges of the three subspecies mentioned above meet and partially overlap in Iranian Azerbaydzhan. On the eastern side of the Caspian Sea in Middle Asia *R. pallasii* grows not only in Turkmeniya (Kopet Dag, Bolschyje Balkchany) but also in southwestern Kazakhstan (Polusostrov Mangyshlak).

*R. pallasii* is undoubtedly the most common species from the genus *Rhamnus* in the region under study. It occurs as a rule on exposed, insolated and warm places, on stony rubble, scree and on rocky, primarily limestone slopes, also in fissures of vertical cliffs, in hilly country or in the mountains, in forest-steppe communities, steppes and even in semi-desert. It is accompanied by trees and shrubs of such species as *Paliurus spina-*

-*christi* Miller, *Cerasus microcarpa* (C. Meyer) Boiss., *Berberis integerrima* Bunge, *Colutea buhsei* (Boiss.) Shap. and other species from the genera *Pistacia* L., *Amygdalus* L. and *Lycium* L.

This is a species resistant to drought with very low demands as regards the soil. In its vertical distribution it appears in Iran already from 200 m elevation, in Anatolia from 450 m, however, it finds optimal conditions above 900 - 1000 m. The most elevated stands are known from Anatolia at 2000 m, and from Iran at 2500 - 2600 m.

*R. pallasii* forms hybrids with *R. catharticus* L., known under the name *Rhamnus x spathulifolius* Fischer et C. Meyer, reported primarily from the Caucasus and Iran.

References: 64(2), 103(6), 104(5), 228(4), 372, 381.

#### 45. *Rhamnus rhodopeus* Velen.

Syn.: *R. anatolicus* Grubov

An erect, thorny shrub up to 2 m tall, sometimes taller. In later age it has numerous small densely leaved short-shoots. It is relatively variable species in terms of leaf size and pubescence.

The range of *R. rhodopeus* is restricted in Europe to the Balkan peninsula: southern Bulgaria, Yugoslav Macedonia, northern Greece (Macedonia, Thrace, northern Thessalia) and Turkey, while in southwestern Asia it is restricted to western Anatolia. In the latter country it appears that *R. rhodopeus* does not reach further east than 36° Long. Throughout its range of distribution it is much scattered and never forms any larger agglomeration entering singly into sparse, steppe xerothermic thickets, frequently together with *Amygdalus webbii* Spach. It occurs also in the understorey of sparse pinewoods.

It is a thermophilous shrub. It grows on gravelly or sandy-clayey soils and also on rocky slopes, in lowland regions, on various hillocks and in lower reaches of mountains. In Europe stands of *R. rhodopeus* are situated at about 200 - 500 m elevation while in Anatolia at 100 - 1000 m and more rarely at more or less 1400 m.

The range of the species, particularly in Europe, is still insufficiently known, which is associated with the fact that it is readily confused with closely related taxa such as *Rhamnus saxatilis* Jacq., *R. intermedius* Steudel et Hochst. and *R. prunifolius* Sibth. et C. Smith. It forms hybrids with *R. catharticus* L. (*R. x wagnerina* Kárp.).

References: 27, 64(2), 294, 381.

#### *Sageretia Brongn.*

#### 46. *Sageretia thea* (Osbeck) M. Johnston

Syn.: *S. theezans* (L.) Brongn., *S. spinosa* Wettst., *S. laetevirens* (V. Komarov) Gontch., *S. horrida* O. Schwarz, *S. yemensis* (Defl.) Grubov, *S. spiciflora* (A. Rich.) Hutch. et E. A. Bruce

A strongly spinescent shrub up to 2(3) m tall with stiff shoots, in appearance resembling species from the genus *Cotoneaster* Medikus in mode of ramification, leaves and fruits. It grows on rocks frequently supporting its shoots on them or reclining on them. It has great polymorphism in size, dentation and pubescence of leaves as well as in the number of loculi on the fruit and in the structure, size and pubescence of the inflorescences. This had led to the recognition of several varieties and even small species (see the synonymy). Only subsp. *brandrethiana* (Aitch.) Ziel., deserves a special mention because it is characterized by a persistent wooly indumentum on the dorsal surface, so dense that the blade is not visible at all. This subspecies occurs only in Afghanistan, Pakistan and in western Kashmir.

*S. thea* has an exceptionally extensive geographic distribution. It extends from South Korea, Japan and Malayasia (ca 134° Long. E) through eastern and central China, Nepal, northern India, Pakistan, northeastern Afghanistan, Tadzhikistan and Uzbekistan and also through southern and southwestern Iran to the

Arabian peninsula and East Africa as well as the Sinai peninsula and southern Anatolia, where, however, it grows only in provinces of Antalya and Mersin (more or less to 30° Long. E). Thus the range of *S. thea* extends through 100 or more degrees of longitude. The further one goes in the westerly direction the more disrupted is the range of the species, the various outliers being substantially isolated from each other and composed of a decreasing number of stands.

The factors determining the occurrence of *S. thea* are temperature and light. The shrub grows primarily in warm more or less exposed sites, on open slopes, in rock fissures etc. It is most commonly reported from a limestone substratum. In Tadzhikistan it is accompanied by such species of trees and shrubs as *Juniperus seravschnica* V. Komarov, *Acer pentapomicum* J. Stewart, *A. semenovii* Regel et Herder, *Pistacia vera* L., *Amygdalus bucharica* Korsh., *A. spinosissima* Bunge, *Rhus coriaria* L. and *Cerasus verrucosa* (Franchet) Nevski. In more easterly regions, as for example in the valley of the middle run of the river Chenab, *S. thea* is a component of the understorey of sparse forests, included in the association *Olea ferruginea-Quercus baloot*.

In its vertical distribution subsp. *thea* appears almost from the sea level to about 1000 m in the Sinai, 1200 m in Anatolia, 2400 in Afghanistan and Pakistan and 2700 m in Tadzhikistan or even up to 3500 m in Iran. The other subspecies, subsp. *brandrethiana* occurs between 700 and 2000 m.

*S. thea* does not have any greater economic importance, though locally it has been used by the population for various purposes. Thus for example in China the leaves of *S. thea* have been used as a tea substitute (whence the Latin name „*thea*”), and the small sweetish fruits are a great favourite with the Afghans and are being sold on bazzars in regions on both sides of the Pakistani and Afghan border.

References: 63(2), 372, 414.

## *Santalaceae*

### *Osyris* L.

#### 47. *Osyris alba* L.

Dioecious, root-semiparasitic shrub, broom-like in branching, up to 1 - 1.2 m tall, sometimes slightly taller, particularly when grown in shade. Branches are angular, green for several years, loosely leaved, the leaves being linear-lanceolate, up to 2.5 cm long, usually early deciduous.

It is a circum-Mediterranean species, but rare in northeastern Africa (Cyrenaica). In the eastern Mediterranean region it occurs most commonly in territories adjacent to the Aegean, in Greece, on Crete and in western Anatolia, then it is also in Lebanon and Palestine but rare on Cyprus and in southern Anatolia. Besides few stands are also known on the Black Sea, from the Strandsha Mts. in southeastern Bulgaria to the vicinity of Sinop in northern Anatolia. The most southerly stands reach Jordan, south of the Dead Sea near Shaubak (23°30'N).

*O. alba* is a calci-, helio- and thermophilous shrub highly resistant to drought. It is primarily associated with thickets of phrygana and disturbed maquis (particularly its edges), but it can also be found in sparse pinewoods (*Pinus halepensis* Miller, *P. brutia* Ten.) and on heaths (*Erica manipuliflora* Salisb.). In these communities it is frequently a common element, but represented only as single specimens. More rarely it forms small monospecific agglomerations. It grows on lower located sites, in small hills, almost from the seashore up to usually no more than 300 - 450 m. In continental Greece and Crete it attains 900 m, in the Anatolian Amanus Mts. 1100 m, in Lebanon 1300 and in southern Jordan even 1450 m. The highest located stands are known from the western part of the range, in northwest Africa, where in Morocco it attains 2400 m.

As a result of animal browsing *O. alba* is frequently only a small shrub 30 - 50 cm tall. Shoots of such pruned individuals are short, stiff and hard, even prickly. Fruits of *O. alba* are globular and fleshy drupes 6 - 8 mm in diameter, initially green but later yellow and finally red when ripe. They are edible but of no practical importance.

References: 163(1), 188, 259(1), 389.

## Tamaricaceae

### *Myrtama* Ovcz. et Kinzikaeva (monotypic genus)

#### 48. *Myrtama elegans* (Royle) Ovcz. Kinzikaeva

Syn.: *Myricaria elegans* Royle *Tamarix ladachensis* Baum, *Tamaricaria elegans* (Royle) Qaiser et Ali

A strong shrub or a small tree up to 5 - 6 m tall with leaves not scaly but rather large and flat, up to 1.5 cm long. Up to about 20 years ago it used to be included in the genus *Myricaria* Desv.

*M. elegans* is a characteristic high mountain species for Central Asia. Its range extends from Tadzhikistan (U.S.S.R.) where the most northerly stands occur on the southern side of Lake Sarezskoye, through Wakhan in northeastern Afghanistan, northern Pakistan and Kashmir to eastern Kumaun in northwestern India. In the east, as can be judged from the available data, it is only slightly extended beyond 80° of longitude East; in Nepal it is not known to occur. It has also been found in southwestern China, in southern Kashgaria and in southwestern Tibet. In Tadzhikistan it is a very rare species represented only by few specimens on few stands. Further to the east, particularly in Karakoram and in the Himalayas it occurs commonly.

*M. elegans* usually grows along streams or mountain rivers, forming thickets, pure or mixed with other riparian shrubs such as *Myricaria germanica* (L.) Desv., *Hippophaë rhamnoides* L. and various species of willows. It occurs from an altitude of 2500 m in the Badakhshan Mts. of the U.S.S.R. and Kashmir but is most commonly to be found at altitudes of over 3000 m. In Afghanistan it attains elevations of up to 3800 m, in Karakoram up to 4300 m and in northwestern India and Tibet up to 4500 m.

References: 362, 365, 397.

## Tiliaceae

### *Grewia* L.

#### 49. *Grewia tenax* (Forsskal) Fiori

Syn.: *G. populifolia* Vahl, *G. betulaefolia* Juss.

A suberect or erect shrub, up to 2 - 3 m tall with yellowish white flowers 2 - 2.5 cm in diameter and characteristic fruits, deep-orange 2 - 4-lobed drupes. It is a very variable species, in size, form and pubescence of leaves, length of petioles, pedicels and peduncles, and incisions on petal tips. Two subspecies are recognized within it, subsp. *tenax* with suborbicular to broadly ovate leaves and pedicels 6 - 14 mm long and subsp. *makranica* (Rech. f. et Esfand.) Browicz with cuneate-obovate leaves and pedicels 1 - 2 mm long. The latter subspecies is restricted in its distribution primarily to Iran and Pakistani Makran and Baluchistan.

*G. tenax* is a Nubo-Sindian species, thus it belongs to the group of species the ranges of which link up East Africa and southern Asia. The range extends from tropical Africa through the southern part of the Arabian peninsula, southeastern Iran and Pakistan to western India (Punjab, Rajasthan, Kuch, Bombay and Madras Presidencies) and Sri Lanka (Ceylon). Besides it is known from southeastern Egypt, the Sinai peninsula and it is also reported from Afghanistan but without any specific localization. In the north it only goes slightly beyond 34° Lat. N.

It is a shrub that is extremely resistant to drought, occurring on semi-desert and desert regions, on rocky, stony, clayey, gravelly and sandy soils. As a rule it grows in places that are much insolated and hot, on arid

and semi-arid plains, on slopes of hillocks, on limestone cliffs, locally quite abundantly (eg. in Pakistan). As a rule it occupies lower located regions, up to an elevation of 800 - 1000 m, rarely appearing higher as for example in Pakistani Baluchistan up to 1220 m and southern Iran on Kuhha ye Genu near Bandar Abbas up to 1450 m. In desert regions of India it is one of the most common shrubs accompanying *Euphorbia* bushes and in Arabian peninsula it accompanies *Acacia* bushes.

In its native region *G. tenax* plays a utilitarian role. Its fruits are edible and sold on markets and water decoction from the wood is used in folk medicine for the treatment of cough. Leaves and young shoots are used as fodder for animals.

References: 364, 369, 378.

## *Umbelliferae*

### *Bupleurum* L.

#### 50. *Bupleurum fruticosum* L.

An evergreen shrub up to 2 - 2.5 m tall with much extended stems, rod-like, poorly branched, erect or recumbent on neighbouring bushes.

This is a Mediterranean species. In southern Europe it is known only from Portugal, Spain, France together with Corsica, southern Italy, together with Sardinia and Sicilia, and Greece while in northwest Africa it occurs in Morocco, Algeria and Tunisia. However, it is absent from Crete and the Aegean Islands except for Euboea. In southwestern Asia its only stands, separated by about 1000 km from the limit of the range in Greece, occur in western Lebanon northeast of Beirut. The shrub is also reported from Crimea having gone wild there.

*B. fruticosum* grows on stony, bare rocks, particularly limestone ones, on open places, among thickets of maquis and the phrygana and sometimes also in sparse pine forests. In Greece its infrequent stands are distributed between 200 and 900 m. In Lebanon it appears that it grows as high up as 700 m. The most elevated stands have been reported from 1180 m in Corsica.

It is an ornamental shrub planted sometimes in parks and gardens in countries with a mild climate. It has been in cultivation since the year 1600.

References: 105(1), 163(2), 188, 371.