

# Characterization of areas

## *Asclepiadaceae*

### *Pergularia* L.

#### 1. *Pergularia tomentosa* L.

Syn.: *Daemia tomentosa* (L.) Pomel, *Daemia cordata* (Forsskal) R. Br.

This is a small, delicate shrub, up to 70-100 m tall, with a milky juice in all its parts, covered by a shaggy-canescenscent indumentum. Its young twigs are thin, more or less twining around older ones or other plant species growing close by. Flowers are yellowish-white, about 1 cm in diameter. Fruits are very characteristic, 5-7 cm long follicles, broadest at the base, tapering to a long beak and echinate.

It is a Saharo-Sindian species with a strongly elongate range, extending from northwestern Africa to southwestern Asia. In Africa it is known on the Sahara, in southern Morocco and southern Algeria and also from Libya and Egypt. In the latter country it occurs primarily in southern Israel and in southwestern Jordan as well as almost throughout the Arabian peninsula. Here in Saudi Arabia the northern limit runs more or less between 26° and 28°N. It is common in the southeastern part of the United Arab Emirates (Abu Dhabi). The species is also common in southern Iran, in southern Afghanistan and in southern Pakistan (Makran, Sind) and possibly also southern Baluchistan. Furthest to the east it reaches Karachi and Heydabarad and as can be judged from the data obtained so far it almost does not cross the valley of the Indus. It reaches furthest northwards slightly beyond Lat. 32°N in Afghanistan, in province of Kandahar.

*Pergularia tomentosa* is a light requiring species occurring in open places, insolated, and on dry sandy or gravelly-sandy-clayey soils, frequently together with *Artemisia* and various semishrublets (suffrutex). In vertical distribution it has been found in depressions around the Dead Sea, more or less at -250 m and usually it does not grow beyond 900-1200 m elevation. The most elevated localities have been found in Pakistan at 1330 m and in Afghanistan at 1500-1600 m.

References: 166 (3), 259 (3), 339, 500, 508, 518 (2), 633, 649, 665.

## *Caprifoliaceae*

### *Lonicera* L.

#### 2. *Lonicera griffithii* Hook. f. et Thomson

A scandent, but without support, prostrate shrub with hollow twigs up to 4 m long. Leaves are glabrous on both sides, sub-orbicular or ovate-elliptic, usually entire, but sometimes irregularly lobed. Flowers are

relatively large, the biggest in this genera in the eastern part of south-western Asia, 2-3 cm long, pink-purple, aggregate in triflore cymes in apical heads. Fruits edible (October and November).

It is a mountain and rare species, known only from a few localities, limited in its range to eastern Afghanistan (provinces of Kapisa, Laghman, Kunar, Kabul and Paktia) and north-western Pakistan (district of Chitral), more or less between 69° and 72°E and 34° to 36°N, and only slightly crosses these borders. There is no precise data on the ecological requirements of *L. griffithii*, however, it is known that it most commonly grows in river valleys, in *Quercus baloot* Griffith communities, between 1500 and 3000 m a.s.l. The highest locality reported was from Afghanistan.

References: 225, 533, 574.

### 3. *Lonicera microphylla* Willd. ex Roemer et Schultes

Includ. *L. pamirica* Pojark.

A strong, richly branched and densely-leaved shrub up to 1.5-2.5 m tall. Leaves are 1-1.5 (3) cm long, narrowly elliptic to obovate, bilaterally puberulent or sometimes almost glabrous. Flowers pale yellow, 10-15 mm long with a short tube strongly gibbous at the base. Berries connate, ca 5 mm long, yellow at the beginning, red when ripe.

It is a Central-Asiatic species with range extending from the northern mountain massifs of eastern Tyan-Shan, Pamir-Alai, Dzhungarskiy Alatau and Tarbagatay in south-eastern Kazakhstan and attaining its northern limit of distribution in southern Siberia, in the Altai and Tuva, more or less around 53°N. Farther south it appears in western China (Kashgaria, Dzhungaria) as well as in Mongolia (around 102°E). To the south *L. microphylla* is distributed in Hindukush (eastern Afghanistan, northern Pakistan), in the western Himalayas, and in north-western India up to Kumaun.

*Lonicera microphylla* grows on high mountain steppes and deserts, on stony slopes and in river valleys, and along forest edges and among a woody junipers, usually alone or in small groups. However, it can be a dominant component of shrub scrubs, as in Pamir, for example. It occurs between 2750 and 3150 m (in Pamir between 3600 and 4100 m), and its vertical limit is attained in the Karakoram Range at 4270 m. Stations are significantly lower at the northern limit of its distribution, i.e. at the Altai Mts at 1550, and in Tuva at 1400 m.

References: 108, 177 (9), 181, 218 (3), 225, 533, 574.

### 4. *Lonicera semenovii* Regel

A dwarf, intricate and prostrate shrub, up to 10-20 cm tall, forming pulvinate forms. Leaves elliptic to elliptic-oblong, 5-20 mm long and 3-6 mm broad, glabrous or with scattered hairs and with ciliate margins. Flowers yellow, 1.5-2.5 mm long, glabrous or almost so. Berries ca 8 mm in diameter, orange-red.

It is a mountain, alpine species. Its range extends to the Middle-Asiatic Republics in the north, to the mountain massifs of Tyan-Shan and Pamir-Alai and western China (Kashgaria, Tibet). Although, the southern part of the range includes eastern Afghanistan, northern Pakistan, Kashmir and north-western India, where towards the east *L. semenovii* does not cross Long. 79°E.

*Lonicera semenovii* occurs in the sub-alpine and alpine zone and grows on stony slopes and in stony dales and chinks or in screes, in the vicinity of glaciers. Its localities are distributed between 3000 and 4500 m, however, it frequently is found higher. For example in Pamir up to 4800 m, and in northern Kashmir (Ladakh) even at 4900 m. Thus, this particular species from the *Lonicera* reaches the highest elevation compared to all other species of this genus.

References: 177 (9), 181, 218 (3), 225, 533, 574.

### 5. *Lonicera webbiana* Wallich ex DC.

A large shrub up to 3 m tall with fibrous papery bark. Leaves up to 8-12 cm long and 5 cm broad, elliptic to ovate-lanceolate, distinctly acuminate, nearly glabrous above and pilose-glandular beneath. Flowers yellow, diffused with deep red, in axillary pairs on the peduncle 3-5 cm long. Berries ovoid, ca 7 mm long, red. It is similar to the European species *Lonicera alpigena* L., therefore, in older publications it is often mentioned under this name.

This is a Himalayan species with a range extending from eastern Afghanistan through northern Pakistan and Kashmir, along the massifs of the Himalayan Mts up to Burma and China (Tibet, Szechwan). This mesophyllous shrub occurs commonly in the undergrowth of moist forests, especially oak, between 1800-3500 (3600) m. The highest stations are reported from China at 4000 m and from Nepal at 4300 m.

References: 225, 533, 574.

### 6. *Lonicera xylosteum* L.

Includ.: *L. steveniana* Fischer ex Pojark.

This is a 2(3) m tall shrub with dark-grey shoots. Leaves are broadly-elliptic or ovate, bilaterally (especially adaxially) pilose. Flowers axillary, grouped in two on a long peduncle, creamy-white, up to 15 mm long, berries globose, ca 7 mm in diameter, connected only at the base.

A Euro-Siberian species with a very large range. It covers Europe almost entirely, excluding the British Isles and the extreme northern and southern parts. In the north *L. xylosteum* almost reaches the White Sea, around Lat. 64°N and at the east, in Siberia, up to the upper reaches of the Jenisey river, approximately Long. 91-92°E. However, in south-western Asia this species is represented rarely and only in north-eastern Anatolia and in the Caucasus. In this region, forms different from the typical *L. xylosteum* were reported with narrower corolla tubes and more deeply cut lobes and glabrous branches and peduncles. These forms are treated as a separate species, *L. steveniana* Fischer ex Pojark. However, it seems that they could be treated as varieties or subspecies of *L. xylosteum*.

This mesophyllous shrub occurs mostly in the undergrowth of different types of coniferous, mixed and deciduous forests, as well as in scrubs along river-shores and on valley slopes. It grows mainly on lime soils. The most elevated localities are known from the Alps in Europe at ca 2000 m, and from the Caucasus at 2500 m, in Anatolia it appears between 600 and 1800 m.

References: 64 (4), 218 (3).

## *Celastraceae*

### *Maytenus* Molina

### 7. *Maytenus royleanus* (Wallich ex Lawson) Cuf.

Syn.: *Gymnosporia royleana* (Wallich) Lawson

It is a strongly spinescent shrub up to 2-3.5 m tall with grey and thin bark. Spines are 2-3 cm long, straight, subhorizontal or positioned at an acute angle. Leaves are coriaceous, 1-5 cm long and 3 (4) cm wide, variable in size and shape, from broadly lanceolate to elliptic and obovate, entire or faintly toothed,

short-petioled. Flowers are small, whitish, about 5 mm in diameter, in short axillary cymes, and the fruits (capsules) are turbinate, 3-gonous, up to 1 cm long with black seeds partially covered with a white aril.

It is a subtropical species, the continuous range of which extends from eastern Afghanistan, through northern Pakistan and southern Kashmir to northwestern India. It is the most northerly projecting species of the genus *Maytenus*, which in Afghanistan attains more or less Lat. 35°N, and in Pakistan in the southerly direction it does not cross Lat. 30°N. In Afghanistan its stands are few, known only from provinces of Laghman, Nuristan and Khost – here the western limit of the range attains Long. 70°E. The eastern limit of the range is not known exactly, however, as can be judged from the generalized data from India it runs through Kumaun State, more or less between 79° and 80°E. *M. royleanus* is not known from Nepal.

In Pakistan, beyond the continuous range some stations are also known from northern Baluchistan. The species has been reported also from the frontier between southern Baluchistan and Makran, however, the latter localities seem doubtful and possibly concern another species, the more southerly *Maytenus senegalensis* (Lam.) Exell.

*Maytenus royleanus* is distributed in the foothill zone and outer Himalayas, where it is a fairly common plant. It grows in dense multispecific thickets on warm, dry, rocky and rugged slopes and plains, usually between 500 and 1500 m and only exceptionally higher.

References: 179, 224, 225, 364, 493, 498.

## *Chenopodiaceae*

### *Arthrocnemum* Moq.

#### 8. *Arthrocnemum macrostachyum* (Moric.) Moris

Syn.: *Arthrocnemum glaucum* Ung.-Sternb., *Salicornia glauca* Del., *Salicornia macrostachya* Moric.

A glabrous, glaucous, much branched, more or less erect, succulent shrub, 30-100 cm tall. Branches articulate, lower ones rooting. Flowering branches erect, ending in thick, obtuse spikes. Flowers very small, ca 2-4 mm long. Seeds black, tuberculate.

The entire range of this species is insufficiently known, especially with regard to its southern border. In Eastern Africa *A. macrostachyum* grows in Egypt, Sudan, Ethiopia and Somalia, and in Western Africa it occurs in the Cabo Verde and Canary Islands. Then it is distributed along the entire Mediterranean – in Europe from Portugal to Greece and in northern Africa from Morocco to Egypt. However, in south-western Asia this shrub is known only in a few stations in south-western and southern Anatolia, from Cyprus, Syria and Lebanon as well as from somewhat greater numbers of stations in Israel and Jordan. It appears along the eastern shore of the eastern Arabian peninsula, from Kuwait to the United Arab Republics. A few localities occur in southern Pakistan. However, it is very likely that the stations distributed along the Persian Gulf do not exist today, or have been extirpated in high percentages as a result of recent tragic oil pollution of the Gulf water. The same situation exists for other halophytes in this region, including *Halocnemum strobilaceum* M. Bieb.

*Arthrocnemum macrostachyum* is a halophyte and it grows mostly on littoral salines (salt-marshes and salt-lakes). Here and there it forms its own association – *Arthrocnemetum macrostachyi*. On more saline, flooded places is replaced by *Halocnemum strobilaceum* M. Bieb. This exclusively littoral shrub is distributed only in places near sea-level (not higher than 30 m), and near the Dead Sea in Israel and in Jordan also in depressions.

References: 64(2), 123(5), 128, 151(2), 163(1), 188, 189, 218(1), 225, 251, 510, 638, 639, 649, 665.

*Halocnemum* M. Bieb.  
(monotypic genus)

**9. *Halocnemum strobilaceum* (Pallas) M. Bieb.**

Syn.: *Salicornia strobilacea* Pallas

A fleshy and glabrous, small shrub, 20-50 cm tall, with numerous bud-like branches. Stem prostrate or ascending. Leaves opposite, with rudimentary blades, scale-like, united at the base. Flowers hermaphrodite or polygamous, inconspicuous, in clusters of 3, forming lateral and terminal, short and dense spikes. Perianth about 1.5 mm long with 3 unequal segments. Stamen 1.

This is a widely distributed species extending from southern Spain and north-western Africa in the west, reaching approximately Long. 95°E in Tuvinskaya Avt. Obl. and south-western Mongolia (Dzhunagrian Gobi) in the east. The range of this species covers approximately 100 longitudinal degrees. A distinct span is also noted in latitudinal distribution. In the north *H. strobilaceum* appears in southern Siberia, to more or less 55-56°N. Its southern limit is not fully known and presumably in the Arabian peninsula and Ethiopia (Eritrea) it reaches 13-14°.

The distribution of this species is not uniform and first of all depends on specific site conditions and the occurrence of salt pans. In the western part of its range *H. strobilaceum* occurs primarily along the sea shores. In Europe it is known to occur in a few sites in Spain, Sardinia and Sicily, from Albania, Greece and Turkey, as well as from Romania, southern Ukraine and south-eastern Russia. Similarly, the majority of the African sites in Libya (Cyrenaica), in Egypt and in south-eastern part of the Arabian peninsula are littoral in nature. However, further to the east or to the north-east this species exists far inland, for example in central Anatolia, in Republics of Middle-Asia, in Iran and in western China (Dzhungaria, Kashgaria) and also in Mongolia. These stands are generally dispersed and sporadic and especially along rivers and salt-lakes they are in greater concentration.

*Halocnemum strobilaceum* is a distinctly light-demanding halophyte. It grows in completely open and insolate sites, on salt-marshes (loamy and sandy), starting from sea-shores where it is often flooded by tides. Occasionally it creates pure communities, or includes other halophytes which, however, spread around their perimeters. As a pioneer species it occupies loose salt pans. Due to the rooting of recumbent shoots on the ground, it propagates vegetatively and is resistant to covering by drift sand. It is characterized by a shallow root system developed mostly in the thin upper layer of salt-soil and is susceptible to lowering of the water table. Admittedly, most frequently it grows in low-elevation flat sites, however, in its vertical distribution, for example in Iran, it has been found at an elevation of 1250-1600 m.

References: 64(2), 151(2), 163(1), 177(3), 218(2), 610, 633, 638, 639, 640, 649, 665.

*Krascheninnikovia* Guldenst.

**10. *Krascheninnikovia ceratoides* (L.) Guldenst.**

Syn.: *Eurotia ceratoides* (L.) C. Meyer, *Eurotia arborescens* Los.-Losinsk., *Eurotia fruticulosa* Pazij, *Eurotia pungens* Pazij, *Ceratoides papposa* Botsch. et Ikonn., *Ceratoides latens* (Gmelin) Rev. et N. Holmgren.

A long-lived (up to 100 years), erect half shrubs, heavily branched at the base, usually not taller than 1 m, however, in Central Asia it reaches 2 m, while in alpine regions it develops pulvinate forms and attains just 10-15 cm. It is an extremely variable species, this variability is expressed in growth form as well as in the size of leaves (10-40 mm), which could be linear-oblong, elliptic or ovate-lanceolate, more or less pubescent. Their characteristic feature is a cuneate or round base.

It is an Irano-Turanian and central Asiatic species. Its more or less compact range extends from middle Anatolia (Long. ca 32°E) up to vicinity of Peking in China (Long. ca 115°E). Included in this range are Anatolia, the Caucasus, Iran (especially northern part), Afghanistan, northern Pakistan, northern Kashmir and north-western India (dry inner Himalayas), western Nepal, republics of the Middle-Asia (Turkmeniya, Uzbekistan, Tadshikistan, Kirgiziya, Kazakhstan) and southern Siberia. In Siberia the most northerly stands are located in vicinity of Krasnoyarsk and along the northern edges of Baykal Lake, i.e. around Lat. 55°N; the southern range does not extend beyond Lat. 28°N. Further eastward its range includes western and northern China (Sikiang and Tibet). and Mongolia. Outside of this range, considerably isolated from each other, occurs a few European localities in Spain, Austria, Hungary, Romania, Jugoslav Macedonia, southern Ukraine, southern Russia and Crimea. In addition, there are also known stations in southern Africa and in Morocco and Egypt.

*Krascheninnikovia ceratoides* is a light-demanding and oligotrophic xerophyte. It grows in steppe and desert, especially in high mountain plateaux, on sandy, gravel or loessal soils and on stony slopes. It grows separately or in groups and in alpine areas creates its own communities, where it is a dominant or co-dominant species and accompanies other alpine species from genera: *Artemisia*, *Oxytropis*, *Acantholimon*, *Stipa*, *Onobrychis*, *Ephedra* and others.

The vertical distribution of *K. ceratoides* is equally as extensive as the horizontal range, which extends across 120 geographical degrees, from Spain to Peking. It occurs from the Caspian Sea basin or coastal plains of Ukraine, and extends to alpine levels. For example in Anatolia it ranges between 300 and 2800-2900 m (vicinity of Van Lake), in Iran from 1000 to 3400 m, in Tadshikistan from 1600 to 4250 m, and in Nepal at 4300 m. The most elevated locality were reported from Kashmir at ca 5200 m. It is only natural that with such a great vertical span of stands this is an extremely variable species, however, numerous local forms are ecotypes and not taxons in nature. The systematics of the entire *Krascheninnikovia* genus, with an estimated 6-7 species, is not fully studied due to an insufficient knowledge of the scale of their variation and the existence of numerous transitional forms.

*Krascheninnikovia ceratoides* is an important forage crop for sheep and camels. They graze not only on young shoots but also older shoots during periods of food shortage. In regions lacking fuel wood, especially in alpine deserts, local populations utilize entire uprooted plants for this purpose.

References: 64(2), 103(3), 108, 123(5), 135, 177(2), 218(1), 225, 610, 625, 640, 651.

#### 11. *Krascheninnikovia ewersmanniana* (Stachegl.) Grubov

Syn.: *Eurotia ewersmanniana* Stachegl., *Ceratoides ewersmanniana* (Stachegl.) Botsch. et Ikonn.

It is closely related to the previous species, from which it differs mostly in embranchments (in upper part) and leaves which are cordate, rounded at the base, and bilaterally densely pubescent. The range of *K. ewersmanniana* is much smaller than the range of *K. ceratoides* and is entirely contained within its central part. It extends from the Aral lake at Long. ca 61°E in the west up to ca 93°E in Mongolia in the east. It includes southern Kazakhstan, Uzbekistan, Kirgiziya and Tadshikistan, north-western China (Kashgaria, Dzhungaria) and western Mongolia as well as central and north-eastern Afghanistan. The more northern localities are in northern Mongolia at 50°N, when in the south, in Afghanistan, it does not extend beyond 33°N.

*Krascheninnikovia ewersmanniana* grows in conditions similar to *K. ceratoides*, although, it does not reach as high an elevation. For example in Tadshikistan its vertical distribution extends between 1000 and 3500 m (absent in Pamir) and in Afghanistan between 1000 and 4100 m.

References: 177(2), 181, 218(1), 625, 640.

## *Noaea* Moq.

### 12. *Noaea mucronata* (Forsskal) Asch. et Schweinf.

Syn.: *N. spinosissima* (L. f.) Moq. in DC.

A glabrous shrub, 25-50(75) cm tall, with branches usually transformed into spines. Leaves alternate, filiform, up to 2.5 cm long (sometimes longer), mucronate. Flowers hermaphrodite, inconspicuous, solitary or crowded at the base of the spiny twigs. Fruits with 5 transverse wings (perianth-segments) on the back. Very polymorphic species, sometimes divided into two subspecies: subsp. *mucronata* and subsp. *tournefortii* (Spach) Aellen with a longer leaves (3-4 cm).

Irano-Turkestanian species. It is known in Europe from a few stands in Greece and Turkey, however in northern Africa its range extends from Morocco to Egypt, up to the Sinai peninsula. However, its main area of distribution is in Anatolia and Iran. Besides south-western Asia, it is known also from southern and eastern Caucasus, where it reaches its northern limit of distribution, from southern Turkmeniya, Iraq, Syria, Lebanon, Israel, Jordan and Cyprus. It attains its eastern limit in north-western Afghanistan and along the boundary between Turkmeniya and Uzbekistan up to the Kugitangtau. It is not known where the southern border of its distribution lies precisely, probably in Saudi Arabia, in vicinity of Jiddah, i.e. more or less at Lat. 22-21°N.

*Noaea mucronata* is a typical representative of steppe or semi-desert associations, especially with a presence of *Artemisia herba-alba* Asso, and on saline sides with *Anabasis articulata* (Forsskal) Moq; it also creates its own association – *Noaetum mucronatae*. It grows in open and insolate, sandy, gravelly and stony places, in alluvial plains, along the roads and field borders. Its vertical distribution varies greatly, from 300 to 2500 m in Anatolia, from 500 to 2750 m in Iraq, and from 800 to 3000 m or more in Iran.

References: 64(2), 151(2), 163(1), 259(1), 510, 610, 626, 638, 664.

## *Cistaceae*

### *Helianthemum* Miller

### 13. *Helianthemum lippii* (L.) Dum.-Cours.

A dwarf, procumbent, highly branched shrub, 20-60 cm tall. Branches canescent, rigid, more or less sharply tipped. Leaves are very variable according to season and ecological conditions, 5-15 mm long and up to 4-6 mm broad, elliptical to linear, more or less revolute, whitish-pubescent to green. Flowers yellow, small, ca 10 mm in diameter, with petals somewhat longer than calyx.

Saharo-Arabian species with a strongly elongated range, from Morocco in the west up to western Pakistan in the east. In Europe it is known only from a few stands in southern Italy and Sicilia, but there it is often treated as a separate species – *Helianthemum sessiliflorum* (Desf.) Pers.; recently it was also discovered in Crete. It appears that the northern and eastern border of the range in south-western Asia go through northern Syria and northern Iraq, where, however, there are only a few scattered stations between 34° and 36°N and continuing through western and southern Iran and the Pakistanian Baluchistan. However, the southern extent of the border in Arabian peninsula is unclear, presumably it crosses middle Saudi Arabia and Oman.

Its western and southern border range in western Africa is not known, and information from these parts is very general. This shrub grows in north-western Africa, in Morocco, Algeria, Tunisia and north-western

Libya, and in north-eastern Africa it occurs across most of Egypt, especially in oases and wadis. Similar to north-western Saudi Arabia, there is not enough data from Egypt to present it in a dot map.

*Helianthemum lippii* is a xerophyte occurring on deserts, in intensively insolate and warm sites, on sandy and gravelly soils, usually more or less calcareous, often with *Artemisia herba-alba* Asso, and with species from genera: *Retama*, *Salsola*, *Zilla*, *Fagonia*, *Noaea*, *Tamarix* and others. Usually it occurs on plains, from the Dead Sea depression up to 1100-1200 m. The most elevated stations were noted in Pakistan and Saudi Arabia at 1650 m, in Iran at 1700 m, Tchad at 1500-1800 m, Sinai at 1800-2000 m, and in Oman above 2000 m.

References: 163(2), 228(4,1), 259(1), 644, 649, 655, 663, 665.

#### 14. *Helianthemum syriacum* (Jacq.) Dum.-Cours.

Syn.: *Helianthemum fasciculi* Greuter, *H. lavandulifolium* auct. non Miller

This is a small shrub up to 40-50 cm tall, with branches and leaves more or less densely grey-tomentose. Leaves are small, up to 3-4 cm long, lanceolate to narrowly ovate, with strongly revolute margins. Flowers yellow on one-sided inflorescences.

This is a Mediterranean species, divided into two subspecies. One of them subsp. *thibaudii* (Pers.) Meikle occurs in the western Mediterranean region, from north-eastern Italy and Corsica to southern France, southern and eastern Spain, as well as in north-western Africa; another, subsp. *syriacum* occurs in the eastern Mediterranean. They differ from each other in the character of pubescence on the surface of outer sepals.

*Helianthemum syriacum* subsp. *syriacum* is known in Europe only from southern Greece (especially from the south-west) and from a few islands (Zakynthos, Euboea, Crete, Chios and Rhodos). In south-western Asia it grows in a few localities in southern Anatolia, commonly in Cyprus, and in western Syria, in Lebanon, in western Jordan and in Israel, where it reaches the vicinity of Jerusalem (Judean Mts.). Its sites are usually scattered, and this shrub is often represented by an individual specimens. It usually grows on calcareous sandstone, rocky hillsides, mainly near the coast, sometimes in open pinewoods and in phrygana, on insolate and dry places. It occurs already at sea-level, up to 400-750 m in Cyprus and 800 m in Greece and in Israel. The highest station, at 1500 m, is reported from middle Anatolia, from Ercias Dagi near Kayseri.

References: 64(1), 151(1), 163(2), 259(1), 650.

## *Convolvulaceae*

### *Convolvulus* L.

#### 15. *Convolvulus oleifolius* Desr.

A small shrub or subshrub, 30-40 cm tall, erect or spreading, with adpressed, silvery-silky indumentum. Leaves linear, spatulate up to 5 cm long, gradually narrowed to a distinct petiole. Flowers terminal, in congested 2-5-flowered cymes, pink, pinkish or almost white. *C. oleifolius* is closely related to the west-ern-Mediterranean *Convolvulus cneorum* L. and possibly it could be treated as its subspecies.

It is a eastern-Mediterranean, southern species, with a range extending from Sicilia and Malta in the west, through Greece, western Anatolia and Cyprus to Israel in the east, the largest concentration of localities



falling on islands and edges of the Aegean Sea, Crete and Cyprus. Besides on infrequent coastal stations it is represented in Libya (Cyrenaica) and in Egypt. Furthest to the north it reaches and only slightly crosses Lat. 39°N in Greece (Skantzoura Is.), while in the south, in Israel, in Central Negev, it grows down to more or less Lat. 31°N.

*Convolvulus oleifolius* is a calciphilous species, occurring on exposed, insolated and warm places, on dry and stony slopes and on sandy sea shores, usually close to the sea, and only rarely (e.g. in Israel) deeper inland. It occurs in phrygana communities, already from the sea level to 500 m elevation, and the most elevated localities are reported from Cyprus at about 600 m, from Karpathos Is. at 650-700 m and from Israel even from 800 m.

References: 64(6), 151(2), 188, 189, 251, 259(3), 299, 300, 301.

## *Euphorbiaceae*

### *Euphorbia* L.

#### 16. *Euphorbia hierosolymitana* Boiss.

Syn.: *E. thamnoides* Boiss.

An unarmed, upright, glabrous shrub, up to 100 cm tall, with simple or intricately ramose branches, forming a semiglobular crown. Its shortpetioled, oblong or obovate leaves fall during the summer drought, thus the shrub is devoid of leaves more or less from June to October. This is a characteristic feature of two other woody Euphorbias, known from southwestern Asia, namely *E. dendroides* L. and *E. acanthothamnos* L. The fruits of *E. hierosolymitana* (capsules) have a diameter of 4-5 mm and similarly as in *E. acanthothamnos* are covered with warts. In the southern part of the range, in Israel, the shrub is represented by the variety – var. *ramanensis* (Baum) Zohary (= *E. ramanensis* Baum), which has poorer growth and smaller leaves.

It is an eastern-Mediterranean species, however, it does not occur in Europe. Its range is restricted to southwestern Anatolia (scarcely a few stands), to western Syria, western Jordan, Lebanon and Israel. In the latter country the shrub is quite common. Besides it grows also in Egypt, on the Sinai peninsula and on the minute Greek island Ajjios Jeorjios, belonging to the group of Kastellorizo islands located close to the shores of southern Anatolia, opposite Kas. Hundred years old data about its presence on Cyprus have not been confirmed.

*Euphorbia hierosolymitana* is a light requiring shrub occurring in open insolated places, particularly on limestone rocks and on rocky scree, in semi-steppe, together with *Artemisia herba-alba* Asso and in degraded phrygana as well as in very sparse forest. As a rule it grows at low elevations, in Anatolia between 5 and 300 m, however, in Israel it attains 800 m and in Jordan even more than 1000 m.

References: 64(7), 163(2), 259(2), 300, 386, 628, 631.

## *Guttiferae*

### *Hypericum* L.

#### 17. *Hypericum heterophyllum* Vent.

This is a dwarf shrub up to 30-40 cm tall, with a short stem and a typical semispherical crown. The leaves are clearly differentiated into two types: on the main stems narrowly-elliptic to linear, 5-13 mm long; when on short axillary shoots broadly ovoid and densely crowded, up to 5 mm long. The flowers are yellow, 3-12 in terminal cymose panicles. It is the only representative of the *Heterophyllum* Robson section.

An Anatolian endemic. It occurs on a few localities in western and central Anatolia, in provinces of Bolu, Ankara, Balıkesir and Denizli. It grows in mountains, on open, stony places, sometimes among pine forest (*Pinus nigra* Arnold and *P. sylvestris* L.) between 1200 and 2050 m. The most elevated sites have been reported from Ak Dag near Isikli.

References: 64(4).

#### 18. *Hypericum thymifolium* Banks et Sol.

Syn.: *H. serpyllifolium* Lam.

An erect shrub up to 1 m tall, with long, reddish-brown branches. Leaves are small, only 1 cm long, ovate to elliptical, revolute and glaucous below, persistent. Inflorescences corymbose, terminal. Flowers yellow, 1-1.5 cm in diameter with more or less glandular petals.

It is an eastern-Mediterranean species with a relatively small, narrow range, extending from southern Anatolia, where it grows only in the Amanus Mts, across western Syria, Lebanon and north-western Jordan (Gilead), up to middle Israel (Judean Mts.).

*Hypericum thymifolium* is a moderate mesophilous and shade-tolerant shrub. It occurs in forests, primarily in degraded pine and oak, as well as in maquis on rendzina soils. It appears already at 5 m a.s.l., usually it does not exceed 600-700 m. However, in the Lebanon Mts. it occurs up to 1000-1500 m.

References: 64(4), 163(2), 259(1).

## *Labiatae*

### *Dorystoechas* Boiss. et Heldr. ex Benth (monotypic genus)

#### 19. *Dorystoechas hastata* Boiss. et Heldr. ex Benth in DC.

This is an aromatic shrub up to 1 m tall, pilose or pubescent with sessile glands. Leaves are lanceolate, hastate, 3-7 cm long, tomentose-canescens with numerous glands, crenulate, on the petiole up to 5 cm long. Flowers are small, white ca 5 mm long in verticillasters forming an elongated spike, 6-17 cm long. It is a very distinctive species, somewhat resembling in appearance of woody species of *Salvia*.

Anatolian endemic. It occurs in southern Anatolia and only in province of Antalya, where its range is very limited, but this shrub is not uncommon there. It grows in rocky meadows, in phrygana and scrub of

*Quercus coccifera* L. and also in open *Pinus brutia* Ten and *Cupressus sempervirens* L. forests at an elevation of 500-2000 m.

References: 64(7), 629.

### *Salvia* L.

#### 20. *Salvia fruticosa* Miller

Syn.: *S. triloba* L.f., *S. libanotica* Boiss. et Gaill., *S. cypria* Kotschy

Highly branched, aromatic shrub up to 120-150 cm tall. Its tallest shoots are the flowers one. Stems appressed-wooly-tomentose, white. Leaves are ovate-oblong, simple or trilobed, at the same time in the latest ones, small lateral segments appear at the base. Leaves are bilaterally pubescent. Flowers are, very variable, eglandular or glandular. Inflorescence apical, raceme-like, with lavender or violet-blue, sometimes pink or white flowers, up to 2.5 cm long.

It is an Eastern-Mediterranean species with a range extending from north to south more or less between 41° and 31°N (Judean Mts. in Israel). In Europe it is mostly distributed in Greece and in the Greek islands, including Crete, and a few localities are also known in Albania, Turkey, southern Italy (Calabria) and Sicilia. However, in south-western Asia this species is represented in south-western Anatolia, Cyprus (common), Syria (uncommon), Lebanon and Israel.

*Salvia fruticosa* is frequently a component of scattered, low maquis and phrygana, and also appears on edges of pine forests, mainly in insolate and warm places. In phrygana it is often accompanied by *Sarcopoterium spinosum* (L.) Spach, and in some places it is even a dominant species (for instance Mt Carmel in Israel), and forms its own *Salvietum fruticosae* association. It grows on dry, stony and calcareous slopes, almost from sea-level to more or less 500-600 m a.s.l. The most elevated stations are known from Lebanon at 820 m, from the islands of Naxos at 900 m and Samos at 1000-1200 m, and from Cyprus at 1550 m.

It is a honey-yielding species. Its aromatic leaves are locally added to tea.

References: 64(7), 151(2), 163(3), 259(3).

#### 21. *Salvia pomifera* L.

Syn.: *S. calycina* Sibth. et Smith

A much-branched, grayish shrub up to 1 m tall, with appearance similar to the previous species, *S. fruticosa* Miller. The main difference is in the leaves, which are always simple, without lobes, and larger flowers, purplish-blue with a paler lower lip up to 3.5 cm long and strongly accrescent calyx.

It is an eastern-Mediterranean species, limited in occurrence to the Aegean region. In Europe it is known only from south-eastern, continental Greece, from western Crete and from a few Greek islands, especially from Euboea, Northern Sporadhes and Samos. Moreover, a few localities are still in Anatolia, but only in the western provinces of Aydin and Izmir. Similar to *Salvia fruticosa* Miller this shrub grows in maquis and phrygana associations, on insolate and stony-hill sides and limestone cliffs as well as in the deep valleys of dried streams. Most often it appears from sea-level up to 500-600 m. The highest stations are known from Anatolia (Samsun Daglari) at 800 m and from Crete at 1250-1300 m.

The species name of *S. pomifera* is associated with a presence of characteristic, apple-like, round and smooth galls. In Greece they are collected by local peasants in May and candied. Similar galls are known also in *S. fruticosa* Miller.

References: 64(7), 105, 188, 189.

## *Leguminosae*

### *Acacia* Miller

#### 22. *Acacia modesta* Wallich

A slow growing, small or a medium sized tree, up to 5-6 m tall or sometimes taller, with stem diameter up to 50 cm, with recurved, brown and shining, paired prickles, 4-5 mm long. Leaves are bipinnate. Pinnae 2-3 pairs, up to 2-3 cm long, with 3-4 pairs of ovate or obovate small leaflets, only 4-10 mm long. Flowers greenish-white in cylindrical spikes, ca 4-7 cm long and pods stipitate, flat, glabrous with 3-6 seeds.

Sub-Himalayan species. Its range covers eastern Afghanistan and middle Pakistan, Kashmir, and western India, where in the western direction it extends no further than Long. 78°E, where in the northerly direction it most probably does not extend beyond Lat. 35°N – therefore, it is the most northern species from the genus of *Acacia*.

*A. modesta* is in some places, especially in Punjab, one of the most common woody plants in scrub forests. It occurs on plains, on dry rocky hills, between granite boulders, on the edges of cultivated fields, usually between 600-900 (1000) m. Higher elevated stations are known from Afghanistan, in the district of Khost at 1400 m and from Pakistan, in the district of North Waziristan at 1500 m.

Species are used for hedges and it is possible that in some places, particularly in southern most occurrences, it is of such origin. A tasteless gum exuded from the bark is used in medicine.

References: 30, 179, 223, 224, 225, 364, 576, 617.

### *Chamaecytisus* Link

#### 23. *Chamaecytisus hirsutus* (L.) Link

Syn.: *C. ciliatus* (Wahlenb.) Rothm., *C. hirsutissimus* (K. Koch) Czerep., *C. leucotrichus* (Schur) Czerep., *C. polytrichus* (M. Bieb.) Rothm., *C. triflorus* (Lam) Skalická

An erect, ascending or procumbent shrub up to 1 m tall, sometimes taller. Leaves with 3 leaflets, more or less up to 2 cm long and 1 cm wide, obovate to elliptical. Flowers yellow, up to 3 cm long, in leafy racemes, legumes linear, 2.5-4 cm long. It is an exceptionally variable species, particularly in the degree and quality of pubescence of twigs, leaves, calyx and fruit. This led to the recognition of several species within it, about the systematic value of which there is much disagreement, should they be treated as species or subspecies within *C. hirsutus* sensu lato? The latter view has been adopted in the present study.

It is a central and southern European species, reaching in the west to Switzerland, Italy and France and in the east to the Caucasus. In the north it is known as far as Hungary and Czecho-Slovakia. In southwestern Asia, in Anatolia, it is the most common representative of the genus *Chamaecytisus*, though restricted in its distribution primarily to the western part of the country. Besides it reappears after a major disjunction

in northeastern Anatolia (approaching the Caucasian part of the range) and in the south in provinces Hatay and Adana.

*C. hirsutus* is a moderately mesophilous shrub, occurring both in thickets and in forests of oak, hornbeam, pine and even fir as well as in open places, particularly on edges of forests, on hill slopes and along roadsides. While it can grow at lower elevations of 40-300 m it is most common above 500-800 m and the elevational maxima are attained in Anatolia at 1650 m, in Bulgaria at 2000 m and in Greece even at 2200 m.

References: 26(1), 64(3), 103(5), 236, 634, 635.

### *Genista* L.

#### 24. *Genista fasselata* Decne.

"*Genista sphacelata*" (var. ortogr.)

A very prickly shrub, up to 2 m tall with numerous, divaricate and rigid, green branches, distinctly striate-grooved. Leaves are sparse, 5-10 mm long and early deciduous, commonly reduced to deltoid scales. Flowers are solitary, about 1 cm long, yellow. Fruits (pods) are about 8 mm long with two seeds. The species is sometimes confused with *Genista acanthoclada* DC. occurring in Greece, Anatolia, Syria and Lebanon, from which it differs in having axillary spines (in *G. acanthoclada* they are not axillary). On Cyprus, on stations located higher, it is represented by an endemic variety for species, var. *crudelis* Meikle, which is characterized by very small size (up to 20 cm tall), exceptional density of rigid and very thorny branchlets and it forms large mats and hemispherical compressed cushions. Flowers of this variety are somewhat smaller than in the type var. *fasselata*.

It is an eastern-Mediterranean species, with a range divided into three parts much separated from each other. Furthest to the west it occurs on two Greek islands, Karpathos (here only in the south) and Kasos. A second, and at the same time richest in stations, part of the range is in Cyprus, while the third in western Israel – Mt. Carmel and adjacent hills. The shrub grows on stony and dry rocky mountain sides, in maquis and phrygana, sometimes also in pine forests. From Cyprus *G. fasselata* has been reported from an elevation between 900 and 1500 m.

References: 151 (1), 259 (2), 295.

### *Gonocytisus* Spach

#### 25. *Gonocytisus angulatus* (L.) Spach

Syn.: *Spartium angulatum* L., *Genista angulata* (L.) Taubert

An erect shrub, 1-5 m tall, with rod-like, green twigs, when young triangular in cross section, and when older with little ridges but terete. Leaves are trifoliolate, sessile or almost so and leaflets are up to 2 cm long, narrow, elliptic or lanceolate. Flowers are yellow, in short, leafless, terminal racemes. The fruits (pods) are more or less rhomboid with 1-2 seeds.

It is an eastern-Mediterranean species, a Turkish endemic. It occurs primarily in western and southern Anatolia, where its most southern and at the same time most easterly stations have been reported from province of Adana. It grows on stony or clayey mountain slopes, in valleys of rivers, in phrygana and

maquis thickets as well as in sparse pine and oak forests. It is most common at an elevation of about 30-50 m growing up to 500-600 m, more rarely higher. Exceptionally it can reach 1050-1200 m

References: 64(3).

## 26. *Gonocytisus pterocladus* (Boiss.) Spach

Syn.: *Cytisus pterocladus* Boiss.

This species is closely related to the previous one [*G. angulatus* (L.) Spach] and is very similar to it. It differs primarily in having markedly angular-winged branches and somewhat larger flowers, in which the standard is more or less equal to the keel (in *G. angulatus* it is shorter).

It is an eastern-Mediterranean species. Its range represents as it were the southern extension of the range of *G. angulatus*. The most northerly stations of the shrub are to be found in Anatolia in provinces of Mersin and Adana, where it does not exceed Lat. 38°N. Further south the range extends as a narrow belt through western Syria and western Lebanon, ending in northern Israel, in Upper Galilee more or less at Lat. 33°N.

*Gonocytisus pterocladus* occurs in similar conditions as *G. angulatus*, between 50 and 900 m, but apparently more commonly above 500 m.

References: 64(3), 161, 163(2), 259(2).

## *Smirnowia* Bunge (monotypic genus)

## 27. *Smirnowia turkestanica* Bunge

Syn.: *Eremosparton turkestanicum* Franchet, *Smirnowia iranica* Sabeti.

This is an erect shrub, up to 50-120 cm tall, with thin, rod-like, white tomentose twigs. Leaves are single, more rarely trifoliate, up to about 15 mm long, obovate with entire margins, on short petioles. These leaves fall during summer drought and twigs tips dry. Flowers are violet-pink, sometimes even white, collected in short racemes. Fruits (pods) are up to 5 cm long, characteristically inflated, in which they resemble fruits of species from the genus *Colutea* L.

This is a desert, Irano-Turanian species, until not long ago considered to be an endemic of Middle Asia, for the Kara-Kum and Kyzyl-Kum deserts, however, it has been discovered also in northeastern Iran and in northern Afghanistan, in province of Maimana, where, however, it is to be found on very few stations. The main region of its occurrence is in Turkmeniya and here *S. turkestanica* is a common species, almost throughout the republic except Kopet Dag Mts. Besides it is known also from western parts of Uzbekistan, primarily from the valley of river Amu Darya.

*Smirnowia turkestanica* is a psammophile, a thermophilous shrub, occupying deep, moving or loosely fixed sands. It sustains high temperature and low air humidity. It propagates both generatively and vegetatively through root sprouts. It grows singly or forms small groups, pure or mixed with other psammophiles, semishrubs or shrubs, primarily from the family Chenopodiaceae. It is distributed in lowlands, up to 400-500 m, however, in Iran, its most elevated stations are located at elevation of 1000-1200 m.

References: 218(3), 558, 610, 643, 658.

## *Taverniera* DC.

### 28. *Taverniera cuneifolia* (Roth.) Arn.

Syn.: *T. glabra* Boiss., *T. ephedroides* Jaub. et Spach, *T. stocksii* Boiss.

A small shrub, up to 75 cm tall with glabrous or only sparsely pubescent twigs. Leaves are 1-foliolate or exceptionally 2-3-foliolate. Leaflets are ovate or obovate, glabrous or sparsely pubescent, particularly beneath. Flowers are collected 1-20 in dense racemes with rachis up to 3 cm long. Corolla is up to 15 mm long, pink to pale red. Pod is stipitate with 1-4 segments.

It is a Saharo-Sindian species, but with rather northern origin. Its range is restricted primarily to southern Iran and to Pakistan. In Iran its stands do not cross in the northerly direction 30°N, while in Pakistan they extend much further, up to 34°N. *T. cuneifolia* is also known from southeastern India and from the extreme northeastern part of the Arabian Peninsula (United Arab Emirates and Oman). Besides it is reported also, after a major disjunction, from northern Somalia.

*Taverniera cuneifolia* grows in open, dry and hot regions, on sandy or gravelly-sandy clay hills and plains, on the shale slope, along wadis or in salt range. It occurs primarily on regions located lower, usually from more or less 30 m elevation to 1100 m, however, in Iran it has been found as high up as 1500-1600 m and in Pakistan up to 1750-1900 m.

References: 506, 518(6), 558, 581, 627, 662, 665.

### 29. *Taverniera spartea* (Burm. f.) DC.

Syn.: *T. incana* Boiss., *T. gonoclada* Jaub. et Spach

An upright shrub, usually 15-120 cm tall, exceptionally taller, up to 2 m, with densely white sericeous twigs, leaves, calyx, petiole and pedicel. Its leaves are reduced usually to one leaflet, more rarely palmately trifoliolate. Leaflets are 5-15 mm long, ovate to orbicular. The shrub flowers when leafless. The flowers are pink or purple, about 1 cm long. It occurs over almost the same region as *Taverniera cuneifolia* (Roth.) Arn., which differs primarily in having glabrous or sparsely pubescent, but not sericeous twigs and leaves.

*Taverniera spartea* has a range restricted to southwestern Asia, to a relatively narrow extending on both sides of the Persian Gulf and Gulf of Oman, covering southern Iran and southern Pakistan, eastern Saudi Arabia, United Arab Emirates and Oman. In the north *T. spartea* as a rule does not extend beyond Lat. 28°N, though exceptionally it reaches even Lat. 29°N in Pakistan, and in the south, in Oman, it most probably does not reach further than 20°.

The ecological requirements of *T. spartea* are little known yet. Generally it can be said that it is a species growing in open places, it is light requiring, tolerant of high temperatures, growing on gravel sandy hillocks, sand dunes and salt-marshes as well as on rocky slopes by saline rivers. Also at edges of date palm groves, fields of sorghum and irrigated ditches. In its vertical distribution it appears already on seashore beaches, in the south up to about 100-200 m, while in the north, in Iran and Pakistan up to 800-500 m, and even somewhat higher. Shrubs of this species are readily grazed by animals.

References: 506, 558, 627, 649, 662, 665.

## *Tephrosia* Pers.

### 30. *Tephrosia apollinea* (Del.) Link

A small shrub or subshrub, up to 40-70 cm, appressed and silvery, hairy. Leaves imparipinnate, up to 10 cm long, with 2-5 pairs of linear-lanceolate, up to 4 cm long leaflets. Flowers deep red or purple, ca 1 cm long, in elongated axillary racemes. Pod 4-5 cm long, linear, compressed, with 6-8 seeds.

Sudano-Arabian species. The main part of its range is situated in eastern Africa, Egypt and the Sinai peninsula, Sudan, Ethiopia, Somalia, and the Arabian peninsula – Saudi Arabia, north-eastern United Arab Emirates (very common), Oman and Yemen, but its southern range is not fully known. However, in south-western Asia *T. apollinea* is a rare species, known from a few stands in south-eastern Iran and south-western Pakistan where it does not cross Lat. 28°N, and also from Israel and Jordan. In the latter two countries, the northernmost localities are along the Dead Sea, but they do not reach Lat. 32°N.

*Tephrosia apollinea* is a hot desert species and it grows mainly on alluvial plains and foothills, among rocks and along mountain wadis, up to 900 m. The highest sites are known only from Oman and Saudi Arabia at ca 1000 m, and Yemen at 1100 m. Near the Dead Sea *T. apollinea* appears in depressed areas from -390 m.

References: 259 (2), 506, 558, 633, 665.

## *Malvaceae*

### *Lavatera* L.

### 31. *Lavatera bryoniifolia* Miller

Syn.: *L. unguiculata* Desf.

An erect shrub (or subshrub) up to 3 m tall, with rod-shaped stems, which are whitish tomentose when young, glabrous when older. Leaves broadly cordate, up to 10(20) cm long, 3-5-lobed with the middle lobe longer than the laterals, bilaterally, densely, stellate tomentose. Flowers pinkish-violet, axillary, solitary or in pairs, occurring along the stems, shortly stalked, ca 5 cm in diameter.

This is an eastern Mediterranean species. Its European range is limited to Greece, mainly to Peloponnisos and Crete, Euboea, Andros and Karpathos; it also occurred in Sicilia, where most probably it has been extirpated. Its range in south-western Asia includes south-western and southern Anatolia, and adjacent Greek islands (Chios, Samos, Rhodos), as well as Cyprus and northern Israel. In addition, there are known stations in northern Africa, in Libya (Cyrenaica).

*Lavatera bryoniifolia* occurs mainly in open, insolate and dry places, in phrygana and maquis, on the bare chalky hillsides and cliffs and along stream banks. It usually grows singly, however, sometimes forming scrubs, as in the north-western part of the Chios Island.

The vertical distribution of *L. bryoniifolia* is limited to lowlands, as a rule between sea-level and 400-500 m. At higher elevations, the presence of this shrub was noted at 750 m in Cyprus, at 1000 m in Israel, and even at 1200 m in Crete.

References: 64(2), 151(1), 251, 259(2).



## *Menispermaceae*

### *Cocculus* DC.

#### 32. *Cocculus pendulus* (J. R. et G. Forester) Diels

Syn.: *Menispermum leoeba* Del., *Cocculus leoeba* (Del.) DC.

This is a deciduous climber shrub with slender and straight branches and puberulous branchlets. Leaves are very variable in size and form, 1.5-5 cm long, lanceolate-oblong to obovate-oblong, short-petioled with 3-5 basal nerves. Flowers are minute, greenish, about 3 mm long. Drupes are about 5 mm in diameter, red in groups of two or three.

It is a Saharo-Sindian species with a range covering north Africa, the Arabian peninsula and southeastern part of South-West Asia. In Africa, where the course of both northern and southern frontiers is not sufficiently well known, this climber occurs from the Canary Islands in the west through southern and central Sahara to eastern Egypt (including the Sinai peninsula), northern Sudan and Ethiopia in the east. On the Arabian peninsula, as can be judged from the data available so far, *C. pendulus* occurs primarily along the coast of the whole peninsula, both in Saudi Arabia and in the United Arab Emirates and Yemen. In that part of the range the most northerly stations are in Israel and in western Jordan, where, however, it does not go beyond Lat. 32°N. Further to the east the species is widely distributed in Pakistan, except for its northern, montane part and it appears only slightly beyond Lat. 34°N in the northerly direction. One stand is also known from southern Iran, from Fars province. It has been reported also from the western desert part of India, however, the data from that region is inadequate to be able to tell where the eastern limit of the species is to be found.

*Cocculus pendulus* is a desert shrub, which occurs on sandy and rocky soils, on rocks and cliffs. Frequently it is spreading over the ground and its shoots attain 5-6 m in length. Even longer, up to 10 m shoots are observable in specimens pendulous from vertical rock surfaces, particularly on sides of dry watercourses. When it grows in company of other woody plants (*Acacia*, *Lycium*, *Capparis*), *C. pendulus* twines its shoots around the shoots of other species. Data on the vertical distribution of the species is very limited. On Sinai it grows between 200 and 1000 m, in Pakistan between 100 and 1200 m and in Iran only between 10-20 m.

Leaves and roots of *C. pendulus* are used in folk medicine.

References: 259(1), 364, 510, 581, 633, 657, 665.

## *Myrsinaceae*

### *Myrsine* L.

#### 33. *Myrsine africana* L.

An erect, evergreen, densely branched shrub up to 1 m tall with rusty pubescent twigs. Leaves are lanceolate to elliptic, sharply minutely serrate, 1-2 cm long and very small flowers, only 2 mm in across, white, bi-sexual; male flowers have 4 stamens and conspicuous purple anthers.

A paleotropical species with a characteristic highly disjunctive range. This species grows in eastern and southern Africa and Açores as well as in Asia. In addition, it is known also from the southern part of the Arabian peninsula, from the south-western part of Saudi Arabia and Yemen.

In south-western Asia its range extends in a relatively narrow belt from eastern Afghanistan, where *M. africana* is uncommon and noted only from the district of Nangahar, from vicinity of Jalalabad, across the northern Pakistan, southern Kashmir up to north-western India. In Pakistan an isolated station is known in Baludschistan. Further to the east the range of *M. africana* includes Nepal, southern China and Taiwan.

*Myrsine africana* grows in forest (especially pine) undergrowth and their margins as well as on open slopes, often gregariously. It is a shade-tolerant species. In mountain regions it usually occurs at elevations between 900 and 1800 m, sometimes higher. The highest sites were reported from Nepal at 2300 m, from Kashmir at 2400 m, from India at 2500 m, from Saudi Arabia at 2700 m, and from Africa up to 3800 m.

The fruits of *M. africana* are sold at bazaars and used as an anthelmintic.

References: 30, 179, 645, 656, 661.

## Rosaceae

### *Cerasus* Miller

#### 34. *Cerasus bifrons* (Fritsch) Pojark.

Syn.: *C. erythrocarpa* Nevski

It is a shrub 50-150 cm tall, sometimes even taller, more or less erect or else prostrate with thin twigs when young densely puberulent, initially grayish-brown and when older grayish-black or even black. Leaves elliptic, ovate-oblong, obovate-oblong or round, serrate, white tomentose beneath, on 2-5 mm long petioles. Leaves of long-shoots are 2-3 times longer and wider from those on brachyblasts. Flowers are red with a cylindrical hypanthium about 6 mm long, positioned along a shoot, singly or in pairs. Drupes are red, more or less globose, 6-10 mm in diameter. This species is very variable particularly in size and shape of leaves, degree of hypanthium pubescence and the sculpturing of stone surfaces. In Middle-Asia *C. bifrons* forms natural hybrids with *Cerasus verrucosa* (Franch.) Nevski and *Prunus divaricata* Ledeb.

It is a montane west-central Asiatic species. It occurs primarily in the eastern Middle-Asiatic republics and in Afghanistan. In the former region it is distributed in the mountains of Tyan-Shan and Pamir-Alai in western Tadzhikistan, western Kirgiziya and in north-western Uzbekistan. Besides it appears also on isolated stations in southern Kazakhstan (Khrebet Kara Tau) and in Turkmeniya, where it grows on central Kopet Dag Mts. and in Khrebet Kugitangtau. South of this region the range of *C. bifrons* covers besides the central-eastern Afghanistan, also northwestern Pakistan and Kashmir. Where exactly the range terminates in the east is not sufficiently clear. Most probably this occurs in northwestern India.

*Cerasus bifrons* is a xerothermic, light requiring shrub which occupies open regions and particularly stony and rocky, granite slopes. In places it forms its own, small thickets or else enters into mixed thickets in which participate the species of the genus *Berberis*, *Cotoneaster*, *Rosa*, *Cerasus*, *Amygdalus*, *Pistacia* and others. In the north of its range *C. bifrons* has been found on lowly located stands, even at elevations of 700-800 m, however, the further south, the higher. In Tadzhikistan it attains up to 2000 m elevation, in Pakistan between 1400 and 2800 m, in Kashmir between 1500 and 2400 m and in Afghanistan between 1500 and 3300 m, but most commonly above 2000m.

Fruits of *C. bifrons*, similarly as the fruits of other small-leaves and small fruited Asiatic cherries are consumed by the local population.

References: 51, 177(4), 218(2), 442, 610.

### 35. *Cerasus jacquemontii* (Hook. f.) Buser

Spreading shrub up to 3 m tall, at high altitudes more or less prostrate, with thin, glabrous or only initially puberulent twigs. Leaves widely lanceolate, elliptic or oblong-obovate, up to 4 cm long, sometimes even longer, with margins sparsely and sharply serrate, glabrous on both sides. Flowers sessile or almost sessile with pink petals and hypanthium lobes 3-4 times shorter than the tube. Drupes ca 8 mm in diameter, red.

A central Asiatic species with a more or less continuous range extending from eastern Afghanistan, through northern Pakistan and Kashmir to northwestern India as far as Kumaun (Garhwal). Here in western Himalayas *C. jacquemontii* reaches about Long. 80°E, however, data from that region are too general to draw the course of the species limit in that part of the range on this basis. Beyond the continuous range single occurrences are also known from western and central Afghanistan.

*Cerasus jacquemontii* is a high elevation shrub, which grows on rocky granite slopes, in valleys of mountain rivers, among rock blocks and on pastures, singly or in the form of thickets, in places quite common as in the Kurram Valley in Pakistan or in Niti Valley in Garhwal. It occurs most commonly above 1800-2000 m, rarely lower (down to 1500 m) and its elevational maxima are attained in Afghanistan at 3000 m, in the Himalayas at 3500 m, and in Pakistan even at 3650 m (near the Barum Glacier).

References: 51, 134, 135, 179, 225.

### 36. *Cerasus rechingeri* Browicz

An erect shrub. This is a montane species related to *Cerasus microcarpa* (C. Meyer) Boiss., from which it differs primarily in having a campanulate-cylindric hypanthium, not ventricose at the base, while in *C. microcarpa* it is only cylindric and at the base distinctly ventricose. The leaves are ovate-elliptic or obovate, relatively large, up to 5 cm long and up to 3 cm wide, glabrous on both sides, with margins sharply serrate, flowers white on peduncles up to 15 mm long. Drupes are red, ellipsoidal or ovoid-oblong, up to 12 mm long. This taxon is little known yet, and its stations, as can be judged from the available data, are few and scattered.

The range of *C. rechingeri* represents as if an extension in the easterly direction of *C. microcarpa*, occurring primarily in Afghanistan starting from the mountains in the Herat province in the west, to Kabul in the east. This shrub has been also found in Pakistani Baluchistan, in the vicinity of Quetta. In its vertical distribution *C. rechingeri* occurs in Afghanistan between 1600 and 2500 m and in Pakistan between 2100 and 2600 m.

References: 51.

## *Pyrus* L.

### 37. *Pyrus communis* L.

A tree, up to 28 m tall, sometimes taller, attaining a stem diameter of 100-120 cm. The bark is dark grey or almost black, plate-like fissured. Young twigs are spinescent, glabrous, yellowish brown. Leaves are very variable in shape and size, usually, however, roundish, rounded at the base or even cordate, crenu-

late-serrate or integerrime, 3-7 cm long, on long petioles, darkening after drying. Fruits are more or less globose, 2 cm in diameter, yellowish-green with persistent or sometimes partly deciduous calyx, with numerous stony cells in the flesh.

The systematics of this species is very complicated and troublesome, and this is so as a result of the considerable variability in shape, size, and pubescence of leaves, degree of thorniness and the size and shape of fruits. Numerous forms usually represent various types of segregants from hybridization of this taxon with other European species, or else they are only representatives of cultivars gone wild from orchards, or even hybrids of the latter forms with wild ones. Some of these forms are treated as separate species or varieties. As a result it is frequently thought that the Linnean name *P. communis* should refer only to the cultivated forms and that the wild forms should be treated as separate species – *Pyrus pyraster* Burgstd. On the other hand *P. communis* is considered very broadly including, wild forms as subsp. *communis* and cultivated forms as subsp. *sativa* (DC) Hegi and Caucasian forms as subsp. *caucasica* Fed. (= *Pyrus caucasica* Fed.). In the present study the latter definition was adopted, thus the range map concerns only the two subspecies: subsp. *communis* and subsp. *caucasica*. The latter subspecies differs from the typical one (subsp. *communis*) primarily in having entire margins and woolly-ciliate leaves.

*Pyrus communis* is widely distributed in Europe, particularly in Central and eastern Europe and it reaches in the north more or less to Lat. 55°N and in the east to Long. 50°E. Besides it occurs in north-west Africa, in northern and western Anatolia and on the Caucasus (subsp. *caucasica*). An accurate delimitation of this range is, however, very difficult, which is connected with systematic problems and the various origin of forms. In the south of Europe, on the Balkan peninsula, in Greece and Turkey, *P. communis* is very rare and it is known from only infrequent stations isolated from each other. It is also rare from Anatolia, where from the east it reaches the Caucasian subspecies, subsp. *caucasica*. This latter subspecies is much more common on the Caucasus itself and locally it is even very common.

*Pyrus communis* is a mesophyllous tree occurring in various types of forests, both coniferous and deciduous, and particularly on their edges or in places with more light available. In agricultural regions after forest have been eliminated the pear is often protected in hedgerows. Basically it is a lowland species found usually up to an elevation of 1000-1100 m, however, in Anatolia it reaches 1650 m and on the Caucasus even 2000 m.

The wood of *P. communis* is reddish colored and it is valued in furniture work. Also it is used for the construction of musical instruments and for the making of engravings. Fruits, in spite of being not large and hard, in view of the large number of stony cells, when they lie for some time they become suitable for consumption and are locally eaten, particularly by children. Seedlings of this pear are used as stocks for the grafting of pomological cultivars.

References: 26(2), 64(4), 67, 79, 103(5), 156(2), 218(2).

### 38. *Pyrus oxyprion* Woronow

A small tree up to 5 tall or a strong shrub with spinescent branches. Leaves are narrow oblanceolate, up to 7(-9) cm long and about 1.5 cm wide, on the margin sharply and singly serrulate, at first bilaterally cobweb pubescent and when older glabrous above and more or less pubescent beneath, grayish-green. Fruits pyriform, up to 2 cm long, on thick pedicells, twice as long as the fruit.

It is a Caucasian species, with infrequent, scattered stations. The major part of the range covers Armeniya and eastern Georgia. Beyond the Caucasus it has been also found in northeastern Anatolia and in Iranian Azerbaydzhan, west of lake Rezaiyeh.

*Pyrus oxyprion* belongs to one of the most xerophytic species of pears occurring on the Caucasus. It grows on exposed places, on dry stony and rocky slopes, in thickets together with such species as *Amygdalus fenzliana* (Fritsch) Lipsky, *Acer monspessulanum* L. subsp. *ibericum* (Bieb.) Yalt., *Pyrus salicifolia* Pall.

and *P. syriaca* Boiss. – with the latter two pears it probably forms hybrids. It is found primarily in the prealps and in river valleys; in Iran it has been found at an elevation of 1600-1700 m.

References: 103(5), 218(2).

## Salicaceae

### *Populus* L.

#### 39. *Populus talassica* V. Komarov

Syn.: *P. densa* V. Komarov, *P. pamirica* V. Komarov

This is a middle sized tree up to 20 m tall, with light, pale-greenish bark and typically angled, dark-brown, yellowish twigs with narrow conical buds. Leaves possess a long petiole, from wide-oval to wide-lanceolate, serrate up to 8 cm long and 5 cm wide. Female catkins up to 10 cm long. It belongs to and is the western most representative of the *Tacamahaca* Spach section, closely related to most eastern *Populus laurifolia* Ledeb. It produces hybrids with *Populus afghanica* (Aitch. et Hemsley) C. Schneider.

*Populus talassica* is a mesophyte, mainly distributed in the Middle-Asia Mts (Tyan-Shan, Pamir-Alai) and attaining more or less Lat. 45°30'N at the Dzhungarskiy Alatau massif. In the east it is known from western China (Dzhungaria, Kashgaria, W. Tibet) and in the south it appears in eastern Afghanistan, northern Pakistan and north-western India, where it is most likely planted. It grows along rivers and river valleys, and also in ravines and on slopes, singly or in small clusters, sometimes creating riparian forests. It is accompanied by species from the genus: *Juniperus*, *Betula*, *Malus*, *Myricaria*, *Lonicera*, *Rosa* and *Berberis*. Usually it occurs between 2000 and 3000 m. The most elevated localities were noted from the Karakoram Range at 3800 m and from Tadshikistan (Badakshan) 3860 m.

References: 174, 177(3), 181, 218(1), 225, 646.

## Sapotaceae

### *Monothecha* A. DC.

(monotypic genus)

#### 40. *Monothecha buxifolia* (Falc.) A. DC.

Syn.: *Edgeworthia buxifolia* Falc., *Reptonia buxifolia* (Falc.) A. DC., *Reptonia mascatensis* (A. DC.) Radlk., *Monothecha mascatensis* A. DC.

A strong thorny shrub or a small tree, up to 5-7 m tall, with a short trunk up to 60-90 cm in circumference with a close rounded crown. Thorns are numerous, alternate and terminal. Leaves are evergreen, quite thick, alternate or in fascicles, about 3 cm long, elliptic-oblong to obovate-oblong, with margins somewhat recurved initially slightly pubescent, later glabrous on both sides. Flowers are small, with a diameter of 3-5 mm, whitish or greenish-yellow, in compact axillary clusters. Drupes, about 1 cm in diameter, are globose, initially green and black when ripe.

This species has a very original range of distribution. It is characterized by a disjunction between two major parts, a northern and southern one. The northern part extends along the Afghan-Pakistani frontier, more or less between Lat. 31° and 35°N. Here the majority of occurrences lies in Pakistan, particularly in districts of Khyber, North and South Waziristan and Kohat, while in Afghanistan they are concentrated in two provinces of Nuristan and Khost. The second, southern part of the range is in the Arabian peninsula and in east Africa (Ethiopia, Somalia), from where, however, the data are very scarce. It is known that it grows in Oman, where it is "... an important member of the woody communities of the upper part of Jabal Akhdar". Recently it has been found in southwestern Saudi-Arabia, on "... Jabal Abu Hassan, a sandstone topped mountain of the escarpment SE of Abha; on the summit plateau".

*Monotheca buxifolia* grows on dry, limestone and sandstone rocky hills, frequently in communities of forest nature (*Olea ferruginea* Royle – *Quercus baloot* Griffith) and in thickets together with *Acacia modesta* Wallich and *Sageretia thea* (Osbeck) M. Johnston. It occupies submontane regions more or less between 700 and 1400 m elevation, though in Saudi Arabia it has found higher, at an elevation of 1700 m.

Fruits of *M. buxifolia* are edible, and in spite of the fact that their fleshy parts are very small they are consumed by the local population, particularly by children, and even are sold on bazaars.

References: 30, 31, 179, 225, 288, 364, 630, 633, 648.

## Solanaceae

### *Lycium* L.

The genus *Lycium* L. is represented in south-western Asia by 9-10 species. However, their systematics are not well understood. This is especially true for older publications, where the nomenclature as well as synonymy are often completely wrong. Problems with the interpretation of herbarium specimens are associated with the fragility of dried, small flowers and shoot size and the stiffness of numerous spines pointed in different directions. On specimen labels there is no information concerning the color of the fruits (red or black).

#### 41. *Lycium dasystemum* Pojark.

Strongly branched, spinescent shrub up to 1.5 m tall, with pale-yellow bark, on the older branches pale-grey. Spines 0.5-6 cm long, leafless or with leaves and flowers. Leaves narrowly-ovate or narrowly-elliptic to obovate, 1-4.5 (7) cm long. Flowers axillary, single or 2-6 in clusters, violet-glaucous, 10-12 mm long. Berries red.

The range of *L. dasystemum* overlaps part of the range of *L. ruthenicum*, however, in Middle-Asia *L. dasystemum* does not occur in Turkmeniya, in the east it does not reach Mongolia, and in China is known only from the most western part. It is an uncommon species in Afghanistan and Pakistan and its stations are small in numbers and in the south it does not cross Lat. 30°N, while in the north, in Kazakhstan 49°N.

*Lycium dasystemum* grows mainly on steppe and desert areas, especially saline, on open areas, river valleys, in scrubs and poplar forests (*Populus euphratica* Oliver), as well as on mountain slopes, and in Middle-Asia from the plains at northern edge of the Aral Sea, up to 2500 m. In Afghanistan it appears between 700 and 2600 m, and in western China even up to 2800 m.

References: 177(8), 218(3), 636, 641, 653, 654, 659.

#### 42. *Lycium depressum* Stocks

Syn.: *L. turcomanicum* Turcz. ex Miers

It is a glabrous, spinescent shrub 1-3 m tall. Leaves are 3-5 cm long and 5-10 mm wide, variable in shape, more or less oblong to spatulate, tapering to a petiole. Flowers are in clusters 2-5, on long pedicels (up to 20 mm), with cupuliform calyx irregularly 4-6 dentate. Corolla is pale violet. Stamens exerted from the corolla tube with glabrous filaments. Berries are globose or ellipsoid, orange-red.

It is an Irano-Turanian species with a very extended range covering almost whole southwestern Asia, however, it is rare in Anatolia and Syria, where its stations are scattered and much isolated from each other. The main region of occurrence extends to Iran, Afghanistan, southwestern Pakistan, Iraq, Israel, Jordan and NE Saudi Arabia. Besides it is known also from the southern part of Middle-Asiatic republics – Turkmeniya, Uzbekistan, and Tadzhikistan as well as from the southern Caucasus. In the eastern part of the range it reaches in the north as far as Lat. 40°N, while in the south only insignificantly beyond Lat. 26°N, in Iran. Further south it is replaced by *Lycium shawii* Roemer et Schultes, though in places in the south (southern Iran, Israel, western Jordania) the ranges of the two species partly overlap.

*Lycium depressum* is a xerophytic, light requiring shrub occurring in open places, on regions that are semidesert and desert, frequently saline, in river valleys, in hedges and wadis together with species from the genera *Artemisia*, *Zygophyllum*, *Tamarix*, *Calligonum*, *Haloxylon* and *Pistacia*, on lowlands and prealps. There are usually elevations from the seashore to 1300 m, however, in Pakistan the species has been reported from an elevation of 1500 m, in Afghanistan at 2000 m and in Iran even higher.

References: 64(6), 103(7), 163(3), 166(3), 177(8), 518(4), 610, 632, 636, 637, 649, 653, 654, 659.

#### 43. *Lycium europaeum* L.

An intricately branched and very spiny, glabrous shrub up to 2.5-4 m tall. Leaves obovate and to lanceolate, tapering at the base, up to 5 cm long, and 1 cm broad. Flowers 1-3 in a cluster, up to 14 mm long, pale violet, glabrous, but with a pubescent throat. Stamens with glabrous filaments. Berries red.

Mediterranean species, irregularly distributed. In Europe from Portugal to Turkey, and in northern Africa from Morocco to Egypt. In south-western Asia it is infrequently represented in the western most part of Anatolia and in the southern part of the Adana province. Further towards the south it is known in western Syria, Lebanon, western Jordan and Israel.

*Lycium europaeum* grows on open, insolate sites, usually along roadsides, fields and orchards, on lithosol sites, singly or in clusters, often in the form of hedgerows. Over the entire range, some sites are uncertain with respect to their native origin. The majority of the sites are on lowlands, from near sea level up to 200-300 m, and in Anatolia and Greece up to 500 m, whereas in Israel it occurs from the Dead Sea basin (-390 m) to as far up as 900 m.

References: 64(6), 163(3), 259(3), 636, 637.

#### 44. *Lycium kopetdaghi* Pojark.

A spreading, spinescent shrub, 0.5-1.5 m tall, with a grey longitudinally fissured bark. Leaves are up to 10 cm long and 2.5 cm wide, narrowly elliptic or oblong-lanceolate, gradually tapering into a distinct petiole. Flowers are on peduncles up to 10 mm long, collected 2-3, and on tips of twigs much more numerous, up to 20-40. Corolla violet, stamens exerted with glabrous filaments. Berries red, globose or obovoid-globose.

It is an Irano-Turanian species with the range covering only the Kopet Dag Mts., both from the northern, Turkmenian and from the southern Iranian side. In Turkmeniya the stations are concentrated in Central Kopet Dag, while in Iran they are more scattered. The species has been also found on a few sites much separated from the main part of the range, in northern Afghanistan.

*Lycium kopetdaghi* is a rather rare shrub even in the central part of its range. It grows on the prealps and at lower elevations of mountains, on shallow, skeletal soils and rocky slopes, in steppe communities, up to an elevation of 1300-1500 m, and exceptionally higher.

References: 610, 636, 654, 659.

#### 45. *Lycium ruthenicum* Murray

A shrub up to 2 (2.5) m tall, glabrous, with many acicular, leafless spines up to 2 cm long. One of the most typical representatives of the *Lycium* genus in the area under investigation, due to its pale, gray or even white branches glaucous, green leaves, 5-40 mm long and 1-4 mm wide, somewhat fleshy, sessile, linear and almost cylindrical. Flowers 8-15 mm long, with white tube and more or less violet at the throat. Filaments lanuginose at the base. Berries globular, 4-8 mm in diameter, black.

Irano-Turanian species with a wide range, extending from eastern Anatolia in the west up to China (Kashgaria, Dzhungaria, Tibet) and middle Mongolia in the east. In south-western Asia, except Anatolia, where *L. ruthenicum* is very rare, it occurs in the south-eastern Caucasus, in northern Iran, in Afghanistan, Pakistan and Kashmir. It was also found in north-eastern Iraq. It is also widely distributed in Middle-Asia, where in Kazakhstan it reaches Lat. 51°N. Its stations are irregularly distributed and often considerably isolated from each other.

*Lycium ruthenicum* grows in dry areas, on plains, mountains, semidesert and desert areas, on sandy, loess and often saline soils, along river valleys and on lake and irrigation canal shores, along roadsides and on abandoned fields. It is a photophilous xerophyte, and among all other *Lycium* species the most resistant to low temperatures. In its vertical distribution, stands are higher in the south-eastern part of its range than those at western and northern parts. Thus it appears in Iran between 600 and 1700 m, in Turkey between 915 and 1750 m, in Afghanistan usually between 350 and 1500 m. The most elevated stations are in Pakistan at 2600 m, in Afghanistan (Wakhan) at 2700 m, and in Kashmir above 3000 m.

In desert regions this shrub is used for fuel, and in Middle-Asia also for hedgerows. Its berries are locally used as a violet pigment for cotton fabrics (Kara-Kalpakya).

References: 64(6), 103(7), 177(8), 181, 218(3), 225, 636, 641, 653, 659.

#### 46. *Lycium shawii* Roemer et Schultes

Syn.: *L. persicum* Mires, *L. arabicum* Schweinf. ex Boiss.

It is an intricately branched, strongly spinescent shrub up to 3 m tall, usually, however, not more than 1.5-2 m tall. Spines are alternate, 1-1.5 cm long. Leaves are oblanceolate-oblong or linear-oblong, tapering at base, more or less tomentose, similarly as young twigs and peduncles. Flowers are small, white or pale violet. The calyx is narrowly-tubular with 5 equal teeth and corolla with 5 lobes, 4-5 times shorter than the tube. Stamens are included and filaments glabrous. Berries are red.

It is an East-African-Arabian species, attaining its limit in southwestern Asia where, as can be judged, it does not extend in the northerly direction beyond Lat. 32°N. Furthest to the east, it occurs on infrequent stations in southwestern Pakistan and in southeastern Iran, in province of Makran. Besides in Iran *L. shawii* has been reported also from provinces of Fars and Lar, and it is very rare in southeastern Iraq, on the border with Kuwait. This species is frequent and locally even common on the Arabian peninsula, however,



its northern limit in Saudi Arabia is not sufficiently well known yet. Further to the west *L. shawii* appears in eastern Egypt, in Israel and in Jordan and here it is known from the vicinity of Jericho, somewhat north of the Dead Sea. It has been also reported from southern Turkey (from the frontier with Syria) as well as from western Libya, however, these information require checking. The main part of the species range covers east Africa and includes even countries south of the equator, Malawi, Zambia and Mozambique.

*Lycium shawii* grows primarily on alluvial plains, in flat desert wadis, on gravelly and salty sands, besides rivers, together with representatives of the genera *Acacia*, *Prosopis*, *Ziziphus*, *Periploca*, *Pistacia* and *Grewia*. Most commonly these are regions located low, usually not higher than at 600-900 m, however, in Iran *L. shawii* reaches up to 1300 m, in eastern Africa to 1500 m, in Saudi Arabia even to 1650 m and on the Dead Sea it has been noted from depressions.

Shrubs of *L. shawii* are used in some countries, as for example in the United Arab Emirates, as wind-breaks and sand stabilizers. The fruits are edible.

References: 175, 184(2), 225, 259(3), 518(4), 633, 636, 649, 653, 659, 665.

### *Nicotiana* L.

#### 47. *Nicotiana glauca* Graham

This is a strong and erect shrub or a small tree up to 3-6 m tall, sometimes taller (up to 10 m), with very variable shaped and sized leaves, from lanceolate to ovate. Flowers are narrowly tubular, yellow, up to 4 cm long in lax subcorymbose terminal panicles, developed the entire year, but especially from May to September.

South-American species occur in Argentina and Bolivia. This species has become fully naturalized in South and Central America, in the southern part of the United States, and in Africa and Australia. Introduced to Europe in 1827 and as a fugitive from botanical gardens, it appeared in the Mediterranean region approximately in the middle of the XIX century. It has spread over Europe as well as northern Africa and south-western Asia, and also to the Canary Islands and Madeira. The first reports from Egypt are from 1864, from Greece from 1876, from Israel from 1909, from Cyprus from 1913 and from Anatolia from 1932. In addition, it was also found in Lebanon and Jordan.

*Nicotiana glauca* tolerates drought and heat exceptionally well. Over the course of an extremely dry summer, when the majority of other plants have dried up, it remains in full leaf and blooms plentifully. It spreads mostly in lithosols, along roadsides, on ruins and walls, in rock crevices and in abandoned fields, mainly in littoral areas.

References: 64(6), 151(2), 163(3), 259(3), 632.

### *Withania* Pauquy

#### 48. *Withania coagulans* (Stocks) Dunal in DC.

Syn.: *Puneeria coagulans* Stocks.

A branched shrub up to 1 m tall, densely grey or yellowish tomentose. Leaves up to 8-cm long and 3 cm wide, lanceolate to elliptic-ovate, integerrime, leathery, bilaterally grayish with a short petiole, up to 1 cm. Flowers are yellowish, ca 1 cm long, in axillary clusters. Fruits (berries) 1-1.5 cm in diameter, globose, red.

The range of *W. coagulans* is restricted mainly to Pakistan, where this shrub grows in the entire country except the northern mountainous part. The stations are concentrated mainly on the plains up to the border of Afghanistan in the west, up just past the valley of the Indus river in the east. To the north *W. coagulans* reaches up to the Dir district. Outside of Pakistan this species is found from eastern Afghanistan, from the provinces of Kabul, Laghman, Kunar, Paktia, and Nangarhar and from south-eastern Iran, more or less to Long. 60°E. Moreover, a few localities are reported in India, from the desert of the Rajasthan State, and from the valley of the Sutley river, where the range of the species ends approximately at Long. 78-79°E. The farthest south shrub has been found is in the Arabian peninsula in Mascat.

*Withania coagulans* is a semidesert or desert shrub and it grows on open sites, in full sun, on dry and hot hillsides, on sandy ground. It appears from sea-shores (Makran in Pakistan), usually up to 1200 m, however, sometimes higher, as in Afghanistan up to 1300 m, in Iran up to 1600 m, and in Pakistan up to 1700-2000 m. The most elevated station was found in this country in the Quetta province at 3000 m.

Fruits of *W. coagulans* are used in folk medicine as an emetic and diuretic and are used to coagulate milk in the manufacture of cheese, thus a local species name, "Penirband" or "Paneer-bandh", meaning "Cheese-maker".

References: 179, 225, 364, 581, 653, 659.

#### 49. *Withania somnifera* (L.) Dunal in DC.

An erect, branched shrub up to 1.5 m tall, grey stellate-tomentose. Leaves alternate, but the upper ones sometimes opposite, up to 10(13) cm long, broadly ovate, entire, usually acute, subglabrous. Flowers small, greenish-yellow, campanulate, in axillary clusters. Fruits, a many-seeded berry, globose, about 8 mm in diameter, shiny red. In flower and fruit throughout the year.

It is an African species, widely distributed throughout the entire continent in arid regions, however, at very scattered sites. Its western extent is the Canary Islands and the Cape Verde Islands. In the north it reaches S. Europe, where it occurs only in Spain, Greece, Crete, Sicilia and Sardinia. However, in south-western Asia along Palestine, Lebanon and Syria it occurs in Cyprus and southern Anatolia, and throughout the Arabian peninsula up to southern Iraq and Iran, eastern Afghanistan, Pakistan, Kashmir and the deserts of western India. However, throughout its range it is a rare species often represented at a site by a single individual.

*Withania somnifera* occurs on lithosol sites, on waste ground, along roadsides and also along the margins of cotton, date-palm and banana plantations, at dry, rocky, insolate, warm and dry sites. It occurs at sea-level and in Israel near the Dead Sea in depressions. Most often it grows at low sites, usually less than 1000 m. The highest stations are in Iran and Afghanistan up to 1400 m, in Kashmir up to 1600 m, and in Pakistan up to 2300 m (Swat district).

Roots, leaves, fruits and seeds are locally used in native medicines.

References: 64(6), 151(2), 163(3), 179, 259(3), 364, 581, 649, 653, 659.

## Zygophyllaceae

### *Malacocarpus* Fischer et C. Meyer (monotypic genus)

#### 50. *Malacocarpus crithmifolius* (Retz.) Fischer et C. Meyer Syn.: *Peganum crithmifolium* Retz.

A shrub, 1-1.5 m tall, with thin twigs, creeping on neighbouring other shrubs or on rocks, or else prostrate on the ground, covered with a thin, white bark, darkening in older age. Its leaves are very characteristic, glabrous and slightly fleshy, to about 6 cm long, deeply pinnatisect with lanceolate-linear segments. Flowers are small, with white petals positioned singly along the twig. Fruits, berries, are red 6-10 mm in diameter.

It is an Irano-Turanian species, with a relatively small range. Its major part covers southwestern Turkmeniya. Beyond this region isolated and scattered stations are known also in Middle-Asia, in northern Turkmeniya, in southwestern Kazakhstan and also in the Autonomous Republic of Karakalpakia as well as from northern slopes of Turkestanskiy Khrebet. On the other hand in south-western Asia *M. crithmifolius* grows only in northern Iran, in province of Khurasan and in central Afghanistan, in the valley of river Surkhab. Within the whole range it occurs relatively rarely and scattered, though in places it forms small clumps.

*Malacocarpus crithmifolius* is a xerophytic shrub, thermophilous and oligotrophic, occurring on open places, primarily in the plains though also on slopes of montane gorges, on clayey and sandy soil, also on salty ones and on rocks, particularly limestone ones. It occurs in the prealps, more rarely in the mountains and for example in Afghanistan it has been found at elevations between 800 and 1500 (1900) m.

Fruits of this species are edible with a high vitamin C content and are used by the local population for the production of fruit-jellies.

References: 218(3), 610, 642.