

Plant Formations in the East Mediterranean BioProvince

Peter Martin Rhind

East Mediterranean Oak Woodland/Scrub

It seems likely that much of the Eastern Mediterranean would have been clothed in a climax community of oak woodland prior to human intervention. Much is dominated by *Quercus calliprinos* a species that can attain heights of 15 m in some of the woodland remnants that have been left undisturbed such as in the so-called sacred woods. In such areas other species like *Crataegus aronia*, *Laurus nobile*, *Pistacia palaestina*, *Quercus ithaburensis* and *Q. macrolepis* can all grow into stately trees, but many of the remaining stands have a much more stunted appearance. In Palestine, Syria and Lebanon much of these are dominated by *Quercus calliprinos*, although the endemic *Pistacia palaestina* (Anacardiaceae) may often be co-dominant. Its interesting to note that these two species have their West Mediterranean vicariads in *Quercus coccifera* and *Pistacia terebinthus*, while *Arbutus andrachne*, another important component of these East Mediterranean oak woods, is an east vicariad of the mainly west and north Mediterranean *Arbutus unedo*. In other parts of the East Mediterranean the oak woodlands are typified by other species. *Quercus bossieri* becomes the main species in slightly colder, more mesic situations such as on Meron Mountain (north Palestine), while in northwestern Anatolia *Q. coccifera* and *Q. infectoria* are the main species and *Arbutus andrachne* is replaced by *A. unedo*, showing the areas affinity with the Western Mediterranean. Other oak species forming dominant woodland trees include *Quercus ilex* (e.g. uplands of Crete), *Quercus macrolepis* (e.g. western and south western Turkey) and *Quercus ithaburensis*. Woodlands dominated by the latter reach their southern limit in central Palestine occurring in places such as the Sharon Plain, Lower Galilee and the Golan area. Like several other woodland and maquis species, *Quercus ithaburensis* is winter deciduous and may represent a vegetational relic of an earlier climate. Among the many endemic or near endemic species associated with these oak woodlands are *Asperula libanotica* (Rubiaceae), *Cytisus syriacus*, *Lupinus palaestrinus* (Fabaceae), *Gonocytisus pterocladus* (Fabaceae), *Origanum laevigatum* (Lamiaceae), *Plantago sarcophylla* (Plantaginaceae), *Prunus ursina* (Rosaceae), *Synelcosciadium carmeli* (Apiaceae) and *Verbascum gaillardotii* (Scrophulariaceae).

East Mediterranean *Quercus cerris* Montane Woodland

These summer green woodlands often occupy an intermediate zone between the lowland woodlands of *Quercus calliprinos* and the mountain woodlands of *Cedrus libani* and range in altitude from about 1000 to 1600 m. They can be found in various upland areas such as the Amanus Mountains (southern Turkey), Lebanon Mountains and Mount Hermon. Other characteristic arboreal species are *Acer monspessulanum*, *Colutea arborescens*, *Cotinus coggygria*, *Eriolobus trilobatus*, *Fontanesia phillyreoides*, *Fraxinus ornus*, *Juniperus oxycedrus*, *Ostrya carpinifolia*, *Pinus nigra* subsp. *pallasiana*, *Pyracantha coccinea*, *Quercus chrysophylla* and *Quercus look*, some of which form local dominants in their own right. Of the shrubs, ferns and herbs the following are fairly typical: *Asplenium trichomanes*, *Blechnum spicant*, *Phyllitis sagittata*, *Pteris vittata*, *Adenocarpus complicatus*, *Agropyron panormitanum*, *Buxus longifolius*, *Cornus australis*, *Cytisus drepanolobus*, *Hypericum hircinum* and *Salvia grandiflora*. The associated endemic or near endemic species include *Ampelopsis orientalis* (Vitaceae), *Gonocytisus pterocladus* (Fabaceae), *Kundmannia syriaca* (Apiaceae), *Lecokia cretica* (Apiaceae), *Pyrus syriaca* (Rosaceae), *Rhamnus hirtellus* (Rhamnaceae), *Scutellaria diffusa* (Lamiaceae) and *Siphonostegia syriacus* (Scrophulariaceae).

East Mediterranean *Pinus brutia* Forest

Forests dominated by *Pinus brutia* extend from Lebanon through southern and western Turkey, the Black Sea regions, Cyprus, Crete, and other Aegean islands, and range from sea level to about 1800 m. In fact, on Cyprus it is the only pine-species that descends to sea level. It has many traits in common with the more southerly *Pinus halepensis*, but is much more widespread. The rich undergrowth varies from place to place and includes a number of endemic or near endemic taxa like *Acer obtusifolium* (Aceraceae), *Berberis cretica* (Berberidaceae), *Bromus syriacus* (Poaceae), *Centaurea cretica*, *Jurinea mollis* subsp. *anatolica* and *Lactuca cretica* (Asteraceae), *Cytisopsis pseudocytisus* (Fabaceae), *Origanum libanoticum*, *Origanum syriacum*, *Phlomis vicosa*, *Salvia triloba* subsp. *libanotica* and *Stachys distans* (Lamiaceae).

East Mediterranean *Cupressus sempervirens* Forest

Forests of *Cupressus sempervirens* var. *horizontalis* have been recorded in Anatolia, Crete, Cyprus, Jordan and Lebanon, and according to the fossil record were probably also in the Judean Mountains and elsewhere. They are normally confined to rocky ground and invariable co-dominated by species such as *Acer obtusifolium* (e.g. Cyprus), *Acer orientale* (e.g. Crete), *Juniperus phoenica* (e.g. Jordan) and *Quercus calliprinus* (e.g. Lebanon). Their under story species also display large variations but may include various endemic or endemic species such as *Astragalus creticus* (Fabaceae), *Gonocytisus pterocladus* (Fabaceae), *Silene libanotica* (Caryophyllaceae) and *Stachys cretica* (Lamiaceae).

East Mediterranean *Cedrus libani* Forest

These forests are confined to the highest forest zones of the Eastern Mediterranean reaching the timberline at about 2,200 m. Some of the best examples are seen in the Lebanon Mountains, while less extensive and often relict stands can be found in Syria, the Amanus, Taurus, the Anti-Taurus Mountains (Anatolia), and the Troodos Mountains (Cyprus). In Cyprus the cedar belongs to a separate variety known as var. *brevifolia*. The outstanding cedar forest of Bsharri consists of many ancient and majestic specimens. Commonly associated arboreal species include *Abies cilicica*, *Juniperus excelsia* and *Quercus libani*. Associated endemic or near endemic species are *Acantholimon libanoticum* (Plumbaginaceae), *Campanula damascena* (Campanulaceae), *Geranium libani* (Geraniaceae), *Marrubium libanoticum*, *Phlomis chrysophylla* (Lamiaceae), *Rhamnus libanoticus* (Rhamnaceae), *Rossularia libanotica* (Crassulaceae), *Scabiosa intermedia* (Dipsacaceae) and *Scrophularia libanotica* (Scrophulariaceae).

East Mediterranean *Ceratonia siliqua*-*Pistacia lentiscus* Maquis

Although grazing by domestic stock has always interfered with this community its arboreal elements have never been totally destroyed, and it often retains an open, park-like appearance. Some of the more typical trees include the community dominants *Ceratonia siliqua*, *Olea europaea* var. *oleaster* and sometimes *Juniperus phoenica*, while the shrubby cover is predominated by *Pistacia lentiscus*. But this should not belie the fact that this is one of the Eastern Mediterranean's richest maquis communities supporting some 250 flowering plants, and no other maquis displays such a profusion of flowers in springtime. It occurs throughout the BioProvince and in Palestine forms almost a continuous belt along the foothills and lower zones of the calcareous Cisjordanian Mountains from Duweima (near Hebron) to the Lebanese frontier. It shows slight variations in species composition from place to place. In Syria and Lebanon, *Myrtus communis* becomes a more important component, while in Cyprus *Juniperus phoenica* usually supersedes *Ceratonia siliqua* as the most important tree species. Its Anatolian counterpart is also slightly different in that *Pistacia lentiscus* becomes less common and may be replaced by species such as *Quercus coccifera*. Many of the associated species, such as *Ceratonia siliqua*, *Cistus*

creticus, *Erica verticillata* and *Pistacia lentiscus* have circum or almost circum - Mediterranean distributions, while others like *Pyrus syriaca* are found further east in the Irano-Turanian flora. There is also a large endemic or near endemic element including *Genista anatolica* (Fabaceae), *Marjorana syriaca* and *Salvia hiersolymitana* (Lamiaceae), *Rhamnus palaestinus* and *R. punctata* (Rhamnaceae).

East Mediterranean *Sarcopoterium spinosum* Garigue

This represents the main dwarf shrub vegetation of the East Mediterranean and often dominates wherever the arboreal climax vegetation has been destroyed, although on the eastern and southern fringes of the BioProvince it forms natural climax vegetation in its own right. Referred to as Batha in the Bible it is usually characterized by the dominance of *Sarcopoterium spinosum*, but may also commonly include *Calycotoma villosa*, *Cistus creticus*, *Corydanthus capitatus*, *Genista fasselata*, *Helianthemum stipularum* or *Salvia triloba*, any one of which can be locally dominant or sub-dominant. It also incorporates hundreds of other species including many winter and summer annuals and can be extremely colourful especially in springtime. Although it probably sees its best development in Palestine, it also occurs in Lebanon, Syria, Turkey, Cyprus and Crete. Many of the species are deep-rooted heliophytes with relatively low moisture requirements and can grow well on stony ground. The many endemic or near endemic species include *Acanthus syriacus* (Acanthaceae), *Convolvulus caelesyriacus* (Convolvulaceae), *Eryngium creticum* (Apiaceae), *Euphorbia cassia* (Euphorbiaceae), *Maresia pulchella* (Brassicaceae), *Nigella arvensis* var. *palaestina* (Ranunculaceae), *Plantago cretica* (Plantaginaceae), *Teucrium creticum*, *Phlomis cretica*, *Salvia libanotica* (Lamiaceae), *Lotus creticus*, *Lupinus palaestinus*, *Trifolium palaestinum*, *Vicia palaestina* (Fabaceae).

East Mediterranean *Ballota undulata* Semi-Steppe (Batha)

This encapsulates a number of associations of batha-like semi-steppe vegetation confined to the borderlands between the Mediterranean and Irano-Turanian territories. Other dominant or co-dominant species include *Convolvulus dorycnium* and *Psoralea bituminosa* (e.g. Upper Galilee), *Echinops polyceras* (e.g. South Judean Desert), *Ononis natrix* (e.g. Judean Mountains), *Euphorbia hiersolymitana* (e.g. Syria), together with several endemic or near endemic species like *Alkanna strigosa* (e.g. Judean Mountains), *Centaurea damascena* (e.g. Lebanon) and *Salvia dominica* (e.g. Golan Slopes). Many of the associated perennials are exclusively Mediterranean border plants, but in addition there are a considerable number of associated annual species. Other associated endemic or near endemic species include *Acanthus syriacus* (Acanthaceae), *Arrhenatherum palaestinum* (Poaceae), *Crepis palaestina*, *Filago palaestina*, *Onopordum palaestinum*, *Scorzonera judaica* (Asteraceae), *Pimpinella cretica* (Apiaceae), *Salvia judaica* (Lamiaceae), *Scabiosa palaestina* and *S. prolifera* (Dipsacaceae).

East Mediterranean *Hyperrhenia hirta* Grassland / Savannah

There are extensive stands of *Hyperrhenia hirta* in Anatolia, Crete, Israel and Syria. It either forms of grass-steppe mixed with *Capparis spinosa* var. *aegyptia* or a savannah-like formation in which trees of *Ziziphus spina-christi* are scattered throughout the grass layer. The latter has a strong resemblance to an African savannah, and although it is now mainly confined to the foothills bordering the coastal plain, a series of lowland remnants suggest that it once occupied large areas of the Philistean Plain before human interference, and may represent a local climax community. Similar savannah-like landscapes are encountered in the Upper Jordan Valley. Some of the associated endemic species include *Eryngium creticum* (Apiaceae), *Rhamnus palaestinus* (Rhamnaceae) and *Sideritis pullulans* (Lamiaceae).

East Mediterranean *Varthemia montana* Rock, Cliff and Scree Formations

This broad category includes all communities occurring on rocks, walls, scree and chasms. Lithophytes (i.e. species capable of penetrating rocks with their roots) and chasmophytes make up the bulk of the species with some of the most characteristic of these including *Varthemia montana*, *Ballota saxatilis*, *Hyoscyamus aureus*, *Micromeria fruticosa*, *Onosma orientale*, *Sedum nicaeense*, *Stachys palaestina* and *Umbilicus intermedius*. On scree *Theligonum cynocrambe* becomes one of the main species together with *Aristolochia parifolia*, *Cicer pinnatifidum*, *Crepis bulbosa*, *Cruciata areticulata*, *Geranium tuberosum*, *Lathyrus marmoratus*, *Pisum fulvum* var. *amphicarpum* and *Valantia hispida*. Some of the associated endemic or near endemic species include *Echium judaeum* (Boraginaceae), *Parietaria judaica* (Urticaceae) and *Rumex cyprius* (Polygonaceae).

Further information required.

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