

Plant Formations in the Hyrcanian BioProvince

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Hyrcanian *Alnus-Pterocarya* Forest

These ancient yet ill-defined forests are confined mostly to damp and poorly drained soils on the coastal plain. They are characterized by the near endemic *Alnus subcordata* (Betulaceae) and *Pterocarya fraxinifolia* (Juglandaceae). Common associates include *Acer insigne*, *Albizia julibrissin*, *Alnus glutinosa*, *Buxus sempervirens*, *Celtis australis*, *Diospyros lotus*, *Ficus carica*, *Fraxinus excelsior*, *Melia azedarach*, *Mesilus germanica*, *Morus nigra*, *Paliurus spina-christa*, *Prunus laurocerasus*, *Punica granatum* and *Salix fragilis*, while common endemic or near endemic species are *Gleditsia caspica* (Fabaceae), *Populus caspica* (Salicaceae), and *Prunus caspica* (Rosaceae). The shrub layer comprises *Andrache colchica*, *Hypericum androsaemum*, *Sambucus edulis* and several endemic taxa like *Epimedium pinnatum* subsp. *pinnatum* (Berberidaceae), *Ruscus hyrcanus* (Liliaceae) and *Teucrium hyrcanus* (Lamiaceae). These forests are also characterised by the presence of numerous lianas and climbers, which occur on many of the trees and shrubs - typical species are *Clematis vitalba*, *Hedera colchica*, *Jasminum officinale*, *Peroploca graeca*, *Rubus caesius*, *Smilax excelsa*, *Solanum dulcamara*, *Tamus communis* and *Vitis sylvestris*.

Hyrcanian *Zelkova-Parrotia* Forest

These forests, dominated by *Zelkova carpinifolia* and the near endemic *Parrotia persica* (Brassicaceae), are primarily confined to the foothills and lower mountain slopes up to about 800 m. For a long time *Parrotia* was thought to be an endemic Hyrcanian genus, but a small stand of *P. persica* was discovered in the Alazab Valley near Kutkashen (Azerbaijan) in the early 1970s. Other important tree species are *Albizzia julibrissin*, *Carpinus betulus*, *C. caucasica*, *Diospyros lotus* and the endemic or near endemic *Acer velutinum* (Aceraceae), *Ficus hyrcana* (Moraceae) and *Quercus castaneifolia* (Fagaceae), while understory species frequently include *Cornus meyeri*, *Crataegus pentagyra*, *Danaë racemosa*, *Frangula alnus*, *Prunus divaricata* together with the endemic *Ilex hyrcana* (Aquifoliaceae) and *Ruscus hyrcanus* (Ruscaceae). Lianas typically include *Hedera pastuchowii*, *Periploca graeca* and *Smilax excelsa*.

Hyrcanian *Fagus orientalis* Montane Forest

These upland beech forests occupy some of the most humid parts of the Hyrcanian uplands usually between altitudes of about 600 to 1200m. The few arboreal associates include *Acer cappadocicum*, *A. insigne*, *Fraxinus excelsior*, *Mesopolus germanica* and *Taxus buccata*. The ground layer is typically poor in species but may include *Asperula odorata*, *Cardamine bulbifera*, *Fragaria vesca*, *Filipendula ulmaria*, *Geranium robertianum*, *Geum urbanum*, *Lamium luteum*, *Lathraea squamaria*, *Phyllitis scolopendrium*, *Potentilla reptans*, *Ranunculus constantinopolitanus*, *Sanicula europaea*, *Stellaria holostea* and *Viola odorata*. At heights above 1200m the forest becomes very stunted and its here that the endemic *Acer hyrcanum* (Aceraceae) is encountered.

Hyrcanian *Quercus macranthera* Sub-Alpine Forest

These more xeric forests are confined to the higher mountain zones mainly between elevations of 1600-3000 m. Among the comparatively rich assemblage of associated low trees and shrubs are *Berberis integerrima*, *Celtis tournefortii*, *Cotoneaster racemiflora*, *Juniper communis*, *Lonicera caucasica*, *Pyrus cordata*, *Rhamnus spathulifolia*, *Sorbus aria*, *S. boissieri*, *S. torminalis*, *Ulmus monyana*, *Viburnum lantana*, and the two endemic or near endemic species *Acer hyrcanum* (Aceraceae) and *Pyrus boissieriana* (Rosaceae). A

version of this type of forest occurs in the high altitude, rocky forest of Dodangeh south of Sari. This is the last refuge of the endemic tree *Betula pendula* (Betulaceae). Studies show that this species and *Corylus avellana* are relicts of an ancient more extensive Hyrcanian forest that has now largely disappeared. Species found associated with these *Betula* stands include a rich variety of endemic taxa such as *Alchemilla farinosa* (Asteraceae), *Cortusa matthiola* subsp. *iranica* (Primulaceae), *Delphinium elbursense* var. *elbursense* (Ranunculaceae), *Scabiosa hyrcanica* (Dipsacaceae), *Semervivum iranicum* (Crassulaceae) and *Stachys persica* (Lamiaceae).

Hyrcanian *Cupressus sempervirens* Forest

These rare cypress forests are thought to be relict stands of a once much more extensive forest of ancient Mediterranean vegetation that probably pre-dates much of the current Hyrcanian vegetation.

Hyrcanian Steppe and Xeric Dwarf Semi-Shrub Zone

Occupying an altitudes of between 1600-2300 m are steppe formations dominated by *Festuca valesiaca*, *Koeleria cristata*, *Phleum phleoides*, *Stipa lessingiana* and *S. tirsia*. Also characteristic of this zone are thorn-cushion communities of *Astragalus aureus*, *A. lagurus* and *Onobrychis cornuta*.

Further information required

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